United States
Environmental Protection
Agency

Region 6
1201 Elm Street
Dallas TX 75270

EPA 906/9-82-004
March 1982

Water

Environmental Impact Statement

Draft

Henry W. Pirkey Power Plant Unit–I / South Hallsville Surface Lignite Mine Project Harrison County, Texas

This report is available to the public through the
National Technical Information Service, US Department
of Commerce, Springfield, Virginia 22161.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION VI
1201 ELM STREET
DALLAS, TEXAS 75270

March 15, 1982

TO ALL INTERESTED AGENCIES, PUBLIC GROUPS AND OFFICIALS:

EPA determined that the decision on its National Pollutant Discharge Elimination System (NPDES) permit for wastewater discharges from the proposed H. W. Pirkey Power Plant and South Hallsville Lignite Mine represented a major action significantly affecting the quality of the human environment, and has prepared this Draft Environmental Impact Statement (EIS).

Comments on the Draft EIS should be sent to Mr. Clinton B. Spotts, Regional EIS Coordinator, U.S. Environmental Protection Agency, Region 6, 1201 Elm Street, Dallas, Texas 75270. Substantive comments received on the Draft EIS will be considered in the preparation of the Final EIS. It is requested that comments on the Draft EIS be submitted to EPA, Region 6, within 45 days of the "Notice of Availability" of the Draft EIS in the Federal Register.

It should be noted that if changes to the proposed project and Draft EIS are minor, the Final EIS will consist primarily of: (1) the summary, (2) pages in the text with changes necessitated in response to comments on the Draft EIS, and (3) the coordination section with EPA responses to comments received on the Draft EIS. Therefore, we recommend that the Draft EIS be retained.

EPA will hold a public hearing on the Draft EIS at the following location:

Marshall High School Auditorium
1900 Maverick
Marshall, Texas
Tuesday, April 27, 1982
7:30 p.m.

Fifteen separate studies utilized in the preparation of this EIS are provided for public review as "Technical Support Documents" in an EPA file at the following locations:

EPA Regional Office
1201 Elm Street, Suite 2800
Dallas, Texas 75214
Contact Mr. Norm Thomas

Marshall Public Library
300 South Alamo
Marshall, Texas 75670
Contact Ms. Dorothy Morrison

The Final EIS will be sent to agencies and interested parties who request a copy or make substantive comments on the Draft EIS.

Sincerely,

for Dick Whittington, P.E.
Regional Administrator

Enclosure

DRAFT ENVIRONMENTAL IMPACT STATEMENT

HENRY W. PIRKEY POWER PLANT - UNIT 1/SOUTH HALLSVILLE SURFACE LIGNITE MINE PROJECT HARRISON COUNTY, TEXAS

Responsible Agency:	U.S. Environmental Protection Agency, Region 6
Action being considered:	Issuance of a new source National Pollutant Discharge Elimination System (NPDES) permit to Southwestern Electric Power Company (SWEPCO) for construction and operation of a lignite-fired power plant in Harrison County, Texas, and issuance of a new source NPDES permit to Sabine Mining Company (SMC) for construction and operation of a surface lignite mine adjacent to the proposed power plant.
Cooperating Agencies:	U.S. Army Corps of Engineers New Orleans District Fort Worth District U.S. Department of the Interior Office of Surface Mining Bureau of Reclamation Fish and Wildlife Service (Albuquerque, NM and Ft. Worth, TX) National Park Service U.S. Department of Agriculture Soil Conservation Service Federal Emergency Management Agency State of Texas General Government Section, Budget and Planning Office Texas Department of Health Texas Air Control Board Texas Department of Agriculture Texas Department of Water Resources Bureau of Economic Geology

Cooperating Agencies: (Concluded)
State Department of Highways and Public Transportation
Railroad Commission of Texas
Texas Historical Commission

Contact for further information:
Clinton B. Spotts, Regional EIS Coordinator
U.S. Environmental Protection Agency, Region 6
1201 Elm Street
Dallas, Texas 75270
Phone: Commercial (214) 767-2716
FTS 729-2716

Abstract:

SWEPCO has evaluated numerous power plant and transportive systems design and siting options, alternative energy sources, as well as alternatives not requiring the creation of new generating capacity in order to meet future electric generation needs for its service area. SWEPCO proposes to construct and operate a 720 MW (gross)/640 MW (net) power plant. In association with the plant, three 138 kV transmission lines, a makeup water pipeline from Big Cypress Bayou and a railroad spur are proposed for construction and operation. SMC has evaluated several mine operation alternatives, as well as several reclamation alternatives. SMC proposes to construct and operate a 2.8 million-ton-per-year surface lignite mine under contract to SWEPCO. The proposed mine will be a single-seam, dragline surface mining operation designed to produce lignite for a period of at least 24 years. EPA is considering the issuance of new source NPDES permits for the alternatives considered (as well as no issuance). Land-use, water resources, mining and reclamation impacts are among the more important areas of concern that are considered in this statement.

Date Comments due: 10 MAY 1982

Responsible Official:

Frances E. Phillips (for)
Dick Whittington, P.E.
Regional Administrator

SUMMARY

BACKGROUND

The National Environmental Policy Act of 1969 (NEPA) requires that all Federal agencies prepare environmental impact statements on major actions significantly affecting the quality of the human environment. Furthermore, Section 511(c)(1) of the Federal Water Pollution Act (FWPCA or P.L. 92-500) as amended by the Clean Water Act of 1977 (P.L. 95-217) mandates that the requirements of NEPA apply to issuing a permit under Section 402 of FWPCA for discharging any pollutant by a "New Source" as defined in Section 306 of FWPCA. The Environmental Protection Agency (EPA) determined that the issuance of New Source NPDES permits to Southwestern Electric Power Company (SWEPCO) for the proposed Henry W. Pirkey Power Plant-Unit 1 and South Hallsville Surface Lignite Mine represented a major Federal action significantly affecting the quality of the human environment. Therefore, this environmental impact statement (EIS) is prepared to assess the impacts of EPA's New Source NPDES permit actions.

ALTERNATIVES

SWEPCO evaluated numerous power plant, mine, and transportive systems design and siting options, as well as alternatives not requiring the creation of new generating capacity, and alternative energy sources. Energy conservation, purchasing power, reactivating or upgrading older plants and baseload operation of existing peaking facilities were considered and found to be insufficient for future electric resource needs. Energy sources such as geothermal, solar, wind, coal, and petroleum gasification, natural gas, and western coal were evaluated and eliminated as being technologically infeasible at present, not cost-effective, or contrary to present governmental policy. Nuclear power was discarded for several reasons, including dependence on limited sources of fuel, high capital costs, and licensing uncertainties. Alternative design systems for the major components of an electric generating station were also considered including cooling, biological controls, air pollution controls, and waste treatment and wastewater handling. Twelve siting options for the proposed power plant were considered using numerous engineering, economic, and environmental criteria.

The proposed South Hallsville Surface Lignite Mine will be operated by The Sabine Mining Company (SMC). Lignite extraction alternatives that were considered included underground mining, auger mining, and surface mining. All operating lignite mines in the United States are surface mined, and this method was selected as the preferred lignite extraction alternative for the proposed mine. Other mine operation alternatives for the major components of a surface mine were considered including overburden removal, lignite-loading, lignite transportation, and reclamation.

The no action alternative could be implemented by the permit applicants or as a result of EPA's denial to issue NPDES permits for the proposed mine and power plant. Other alternatives available to the EPA are to issue the NPDES permits for the projects as proposed or to issue the NPDES permits for the projects with certain conditions to minimize or alleviate adverse impacts.

PROPOSED PROJECT

The project area, which includes the power plant site and mine site, is located approximately 10 miles southeast of the city of Longview in Harrison County, Texas. The project area contains approximately 24,768 acres. Additionally, power plant transportive systems will include a 20-mile makeup water pipeline extending from Big Cypress Bayou to the proposed cooling reservoir, three 138 kV transmission lines totaling 11.7 miles, and a 3.5-mile railroad spur. The pipeline right-of-way (ROW) will cover approximately 700 acres; the transmission lines, 86 acres; and the railroad spur, 100 acres. At the mine site, overburden will be removed, and lignite will be extracted and hauled to the plant site. There, the lignite will be crushed and used as boiler fuel for the proposed 720 MW (gross)/640 MW (net) power plant.

Power Plant

The plant site comprises 3,111 acres of which 272 acres will be encompassed by the plant island. The plant site will be located in the northeastern portion of the project area, adjacent to the mine site. The cooling reservoir will preempt 1,388 acres, and 1,451 acres surrounding the plant island and cooling reservoir may be affected by plant activities. The cooling reservoir will be located adjacent to and southeast of the proposed plant.

The proposed power plant will contain a Babcock and Wilcox balanced draft, single-reheat, drum-type boiler and a Westinghouse Electric four-flow, tandem-compound, reheat-type turbine. When operating at a maximum continuous rating, the unit will generate from 707 to 720 MW. Approximately 8 percent of the power will be consumed by various unit auxiliaries, leaving about 640 MW of usable power produced. This power will leave the plant site and connect to existing transmission lines located near the site. The unit will consume approximately 541 tons of lignite per hour. A 60-day supply of fuel will be stored on the plant site.

The heat dissipation system will be composed of Foster Wheeler twin-shelf, single-pressure, two-pass surface condensers. Circulating water for condensing the turbine exhaust steam will be provided by a 1,388-acre cooling reservoir, formed by constructing a dam across Brandy Branch Creek. Makeup water for the cooling reservoir will be pumped about 20 miles from Big Cypress Bayou, approximately 1 mile south of Ferrell's Bridge Dam. The makeup water will be transferred by a proposed 36-inch concrete cylinder pipeline to the cooling reservoir. The diversion rate will be 33.4 cubic feet per second, equivalent to 15,000 gallons per minute, with an annual diversion of 18,000 acre-feet.

Condenser cooling water taken from the cooling reservoir will be supplied to the screen house at the plant island by three vertical wet-pit circulating water pumps. The water will pass through a bar grill and traveling water screens, which consist of a series of overlapping, self-draining screen trays mounted on rotating mechanisms. Water will be removed from the condenser unit into a discharge canal and returned to the northeastern corner of the cooling reservoir at the most extreme point in the water flow circuit from the screen house.

Plant makeup water from the cooling reservoir will be stored in the makeup water pond and supplied to the plant by a makeup pump. Traveling screens will be washed with high-pressure service water. Low-pressure water will be used to cool various unit auxiliaries, as makeup to the bottom ash hopper, and as makeup to the SO_2-removal system. High-pressure service water will be used to seal or lubricate slurry pumps, to flush sump pump discharge lines, to wash the boiler regenerative air heaters, to suppress dust in the lignite-handling system, and for the fire protection system.

The power plant waste scheme will include a drain collector pit, service water returns, storm drains, bottom ash basins, a lignite pile runoff basin, a waste slurry sump, a surge pond, a reclaimed water sump, a filtrate overflow sump, and a wastewater treatment system.

Bottom ash produced by the steam generator will be stored in a lined bottom ash hopper. Bottom ash will be sluiced to either of the two bottom ash basins. The bottom ash will be removed from the plant property and sold. Pyrites rejected by the lignite pulverizer will be stored in the pyrite storage tank. Sintered fly ash from the flue gas stream will be collected in hoppers for removal from the plant. Fly ash collected in the precipitator hoppers will be removed by two dry conveying systems of the positive-pressure type. Fly ash stored in the fly ash silo will be mixed with the dewatered SO_2-removal system sludge and removed from the plant site for disposal.

The fly ash and scrubber sludge will be mixed at the power plant site. The waste will be disposed of within a tract of land owned by SWEPCO. The proposed waste disposal plan features initial landfill and research into the use of ash wastes as a soil amendment for mine reclamation and/or mine disposal. The type of landfill proposed is valley fill, and the initial site in the vicinity of the power plant has a sufficient capacity for 2 years production of ash sludge wastes.

Lignite to power the steam generator will be delivered to the plant site by bottom dump trucks. Conveyors will transport the lignite to the breaker house, to the transfer house, and then to the transfer tower. From the transfer tower, lignite will be transported to a 15,000-ton-capacity emergency coal pile or to the active reclaim storage building. A rotary plow reclaim tunnel will be used to reclaim lignite from the active reclaim storage building and the lignite will be moved by conveyor to the crusher house. From the crusher house, lignite will go into crusher house surge lines and then fed into granulator crushers and into lignite storage silos.

Flue gas will exit the power plant through a 525-foot chimney. NO_x emissions will be maintained below acceptable limits by burner design, burner arrangement, and furnace designs. Particulate matter will be removed from the flue gas stream by Universal Oil Products' cold-side, twin casing, weighted-wire type electrostatic precipitator. SO_2 will be removed from the flue gas stream by a Universal Oil Products, limestone, double-loop-type scrubbing system consisting of four vertical freestanding absorber modules.

Mine

The South Hallsville Surface Lignite Mine will be operated for SWEPCO by The Sabine Mining Company. The mine site encompasses approximately 20,771 acres. Of this total area, 10,545 acres will be disturbed by mining, 430 acres will be disturbed by the construction of haul roads, 43 acres will be preempted by mine facilities, and 9,753 acres surrounding the area to be mined may be affected by mining activities during the 24-year life of the mine. Approximately 439 acres will be disturbed each year by mining activities. These areas will be reclaimed to existing or higher land-use productivity generally concurrent with overburden removal. A maximum ungraded area of 741 acres will occur in the year 2008.

The area to be mined was determined from a single-seam deposit containing approximately 72 million recoverable tons of lignite. An average of 2.8 million tons of lignite will be extracted from this deposit each year for 24 years.

The proposed mine will use conventional single-seam area mining procedures with two dragline pits. The draglines will use a conventional dig and sidecast procedure. Timber and brush will be cleared as soon as practicable in advance of mining operations.

Drainage and erosion will be controlled by construction of sedimentation control structures prior to surface disturbance in each area. As mining progresses, a series of ditches and diversion structures will be installed to control surface water runoff. The two types of ditches proposed to be used are interceptor ditches and sediment diversion ditches. Additionally, upstream reservoirs will be constructed to control drainage from undisturbed areas. Temporary stream channel diversions for a portion of Hatley Creek, and several of its unnamed tributaries will be constructed. Permanent diversions may be required to enable mining through or near the existing channels and to prevent flood flows from interfering with mining operations.

Levees will be constructed to prevent flooding caused by backwater from the Sabine River and other streams in the project area. Overland flow will be controlled by overland flow diversion channels and catchment basins to prevent runoff from entering mine pits.

Overburden will be removed using two 70- to 120-yard electric-powered walking draglines in a conventional dig and sidecast procedure. Lignite will be loaded from the two active pits by two 12 to 18 cubic-yard hydraulic backhoes, or comparably sized front-end loaders or shovels.

Road construction in the mine area will consist of building lignite haul roads, access roads, and temporary access roads. When roads are no longer needed, the surface will be regraded and reclaimed to an approved postmining land use compatible with the surrounding area.

The proposed surface (soil) reconstruction and revegetation operations involve segregation and redistribution of topsoil and near-surface oxidized overburden for use as postmining soil. The reconstructed soil will consist of 6 inches of soil (topsoil) over a mixture of the remaining soil and the near-surface overburden. The two reconstructed layers will provide a minimum of 48 inches of cover over the unoxidized overburden material. The reconstructed soil will be revegetated with approved plant species that are adapted to the region.

Mine facilities will consist of two separate areas: one for dragline erection and the other for mine personnel, storage, and maintenance facilities. The dragline erection area will be partially reclaimed when dragline erection is complete. The remainder of the site will be used to receive and store materials and equipment shipped by rail over the life of the mine. The mine facilities area will exist for the life of the mine.

ENVIRONMENTAL EFFECTS OF NO ACTION

If the proposed power plant and mine were not constructed, environmental conditions within the project site would remain approximately as they presently exist. However, economic development is presently occurring in the project region and is expected to continue.

Construction of the plant site commenced in the spring of 1979. Construction was begun at that time in order to comply with a requirement contained in the Prevention of Significant Deterioration (PSD) permit issued by EPA for the facility. This construction proceeded at the Company's own risk, as stipulated in 40 CFR 6.906, the NPDES regulations in effect at that time. It was the Company's interpretation of this regulation that the risk involved was whether a final NPDES permit would be issued. The plant island (272 acres) has been cleared of vegetation and construction of the power plant has begun. The cooling reservoir site (1,388 acres) has been cleared of vegetation and construction of the dam is underway. In addition, the railroad spur (100 acres) has been built, and the makeup water pipeline is partially constructed. There has been a long-term non-irreversible commitment of vegetation/wildlife habitat within the cleared areas. Irreversible and irretrievable commitments focus on cultural resources and construction materials/cost ($79,363,000-approximately) within the construction site boundaries.

ENVIRONMENTAL EFFECTS OF PROPOSED PROJECT

Topography

Construction of the plant site facilities has resulted in a long-term adverse impact on topography from leveling of the site (construction of the plant site commenced in the spring of 1979). The foundation area for the main building and wastewater ponds have been built on the 272 acre plant island, and the 1,388 acre cooling reservoir has been cleared of vegetation. The 100 acre railroad spur has been constructed, as well as a portion of the 700 acre makeup water pipeline. Construction of the transmission lines has not been initiated. Construction of the transportive systems has conformed to the present land surface, and no adverse impacts will occur. No adverse impacts to topography will occur as a result of power plant or transportive systems operation.

Short-term adverse impacts to local topography will be experienced during mining of a given area. However, following mining, the mined surface will be shaped to a configuration similar to premining topography. Construction of mine facilities will result in some alteration to local topographic features.

Geological Resources

Construction activities associated with the power plant and transportive systems has resulted in localized long-term displacement of shallow surface sediments, but no detrimental impacts to geologic resources will occur. A minor adverse impact of the proposed power plant would be the possible preclusion of the use of small amounts of natural resources during the life of the project.

The geologic units of the mine area, which overlie the mineable lignite, will experience unavoidable long-term alterations to the depth of the lignite resource removed.

Soils

Soil erosion will be unavoidable during the construction of the power plant and construction and operation of the mine. The severity of erosion and related impacts will be lessened by employing erosion control techniques (e.g., seeding/sodding, mulching, etc.) until exposed areas are revegetated. Soil erosion at the mine site will be short-term because the area will be stabilized by reclamation. Approximately 52.6 acres of prime farmland, according to Texas Railroad Commission criteria, will be affected by construction or operation of the proposed power plant and mine. Approximately 30.4 percent of the soils in the mine area are designated as prime farmland under U.S. Department of Agriculture-Soil Conservation Service criteria. These soils will be adversely impacted by mining and reclamation activities.

Water Resources

The adverse short-term impacts on the project area ground-water system are the lowering of ground-water levels and removal of ground water in active mining areas. Short-term adverse effects on surface water will occur from increases in sediment yield from construction and mining activities.

Long-term adverse impacts on the ground-water system will be disruption of stratification in the saturated overburden; probable reduction in horizontal permeability and yield characteristics of overburden aquifer strata; probable increase in porosity and storage characteristics of overburden aquifer strata; and increase in dissolved solids concentrated in shallow ground-water systems. A slight recharge of ground water will occur in the vicinity of the power plant's cooling reservoir.

Long-term adverse surface water hydrologic impacts expected as a result of mining activities are alterations in peak runoff rates and volumes resulting from changes in the site topography, topsoil characteristics, vegetative cover patterns, and land uses. Major streams will be altered due to permanent rerouting, resulting in straighter stream channels and shorter flow lengths. Short-term adverse surface water impacts will occur from temporary increases in overland runoff from cleared areas, and increased transport of sediments and turbidity in receiving streams during periods of heavy rainfall and increased streamflow.

Air Quality

Short-term, localized, adverse air quality impacts will occur during project site preparation activities (e.g., clearing, burning, and construction). These impacts will be minor, with only occasional exceedances of normal background levels being realized. The principal air pollutants to be emitted during plant operation are sulfur dioxide (SO_2), oxides of nitrogen (NO_x), and particulate matter from the proposed plant's stacks. Carbon monoxide (CO) and hydrocarbons (HC) will also be emitted in very small quantities. BACT will be applied to SO_2, NO_x, and total suspended particulates (TSP). Ground-level SO_2 concentrations resulting from power plant operations are predicted to be below threshold levels which may cause damage to sensitive plant species in the vicinity of the plant site. Trace radioactive emissions are expected to be below existing Federal standards protecting public health. Sources of fugitive dust emissions include lignite and limestone handling, processing, and storage operations. All reasonable air pollution control measures will be undertaken to prevent fugitive dust from becoming airborne.

Sound Quality

Due to the large distances of noise-sensitive receptors from the proposed project facilities (greater than 2,800 feet) and the attenuation effects of surrounding topography and vegetation, only minor noise impacts will occur. Similarly, increased noise levels associated with operation of the proposed project will not have adverse effects on the surrounding area. Increased noise levels will be localized, of relatively short duration, and attenuated with distance from the source.

Ecology

Construction of the plant site and transportive systems has adversely impacted local biological communities by the direct elimination of vegetation/wildlife habitat. About 2,460 acres of vegetation/wildlife habitat were preempted by construction of the proposed power plant, cooling reservoir, pipeline corridor, and railroad spur. These areas consisted primarily of upland forest. A portion of an additional 1,451 acres (primarily upland forest) comprising the plant site ancillary activities area may be affected during construction and 86 acres will be cleared for transmission line ROW's, which will cause short-term adverse impacts.

During the life of the mine, approximately 10,545 acres of vegetation/wildlife habitat will be cleared. Some of the vegetation/wildlife habitat present in the 10,226-acre mine ancillary area will be cleared during the life of the mine. These areas consist primarily of upland forest and pasture.

Intermittent and perennial stream habitats and associated aquatic communities in the vicinity of the plant site, cooling reservoir, transportive system

ROW's, and mine will be adversely impacted from clearing and construction. No threatened or endangered species of vegetation, wildlife or aquatic biota are known to inhabit the project area. Consultation between EPA and the U.S. Fish and Wildlife Service, in accordance with Section 7 of the Endangered Species Act, is currently on-going and a Biological Assessment of the potential impacts to threatened and endangered species is being prepared.

Short-term adverse impacts of the project will occur due to the removal of vegetation during mining, but will be minimized by revegetation. Construction of the power plant and mine facilities will produce increased noise and human activity and disturb local wildlife. Additionally, clearing during reproductive seasons will disrupt breeding activities of wildlife present in the vicinity of areas being cleared. Stresses on wildlife populations in adjacent areas will occur during the sequential mining program.

Increase in siltation due to construction activities will result in temporary decreases in some fish, larval insects, and aquatic clam populations and temporary and localized algal blooms. Some insect larvae (e.g., Trichoptera, some Odonates) and clam species preferring coarse substrates may be adversely affected by increased sedimentation. Fish may avoid areas of high suspended material concentrations. Nutrients associated with increased concentrations of suspended solids, particularly following initial clearing may encourage algal production. Mine operation will cause increased siltation.

Existing vegetation will be preempted by construction of the power plant, cooling reservoir, and mine facilities for the life of the project. Long-term impacts will result from the mining of lands presently supporting relatively mature, diverse communities, which will take many years to fully re-establish.

Enlarging of Rogers Lake from 5 acres to the 1,388-acre cooling reservoir will permanently change the character of the existing ecosystem. The resultant lake will, however, contain a greater habitat diversity and support a greater diversity of fish and other aquatic species than previously existed. Increased shoreline length, a greater range of water depths, and the potential for inclusion of a greater variety of substrate types will all contribute to the increase of habitat diversity in the cooling reservoir. The creation of sufficient water depth to ensure a vegetation free zone will permit the development of a recreational fishery in this reservoir.

Cultural Resources (Historic and Prehistoric)

Construction activities associated with both the proposed power plant and mine have the potential of adversely affecting more than 500 cultural sites. Thirteen of these historic sites and one prehistoric site have been recommended for further testing. Surveying the remaining 80 percent of the mine site could reveal additional sites that may require testing.

Construction related activities in the power plant and cooling reservoir area have resulted in a total commitment of the existing cultural resources. Construction of the railroad spur ROW has been completed. The extent of the impact of this construction on sites that may have existed in the ROW has not been determined as a cultural resources survey has never been conducted. Construction related activities completed along approximately half of the makeup water pipeline may have caused a negative impact on any sites that may have existed in this segment of the pipeline.

A Memorandum of Agreement (MOA) will be drafted between the EPA, the SHPO and the Advisory Council on Historic Preservation in compliance with Section 106 of the NHPA. The intent of this MOA will be to avoid or minimize future construction related adverse impacts on cultural resources. During the course of future construction activities, potential project-related adverse impacts on significant cultural resources will be coordinated with the SHPO of Texas.

Socioeconomics

The construction and operation phases of the South Hallsville Mine/Pirkey Power Plant-Unit 1 will induce both beneficial and adverse effects in the study area. Beneficial effects include the creation of new employment and income in the area, which in turn may induce increased business investment, secondary jobs, and income. In addition, electrical power will be generated through consumption of domestic energy sources. Potential adverse effects associated with the project include a short-term lag period in the flow of community services (e.g., housing, public utilities, and retail services) resulting from the size and transience of project construction employment as compared to the more permanent project operation work force.

Beneficial impacts from constructing of the mine/power plant include creating 825 primary jobs and 842 secondary jobs during the peak employment period in 1984. Total local annual income generated by primary employment is estimated to peak in excess of $20 million (1980 dollars). Over the 7-year construction phase, nearly $109 million in construction expenditures is expected to be spent locally, generating about $103 million in additional secondary income.

During peak construction, the population influx associated with worker and family in-migration to the two-county project area is expected to total 2,155 new residents. By 1985, the in-migrant population is anticipated to decrease by approximately 62 percent to 818 persons. The potential impact of in-migration to local communities may be somewhat mitigated by the release of construction workers from other projects already in the area, who become available for the proposed project.

The benefits of project operation will accrue in the study area for a period of 30 years. In addition to the generation of electrical power, it is estimated that the project will provide 271 primary jobs and 273 secondary service jobs during full operation in 1986. Total annual operations expenditures for the power plant and mine are estimated at $78 million (1980 dollars), with more than $122 million in local secondary income. The new population is expected to peak at 276 persons in 1986. However, the movement of construction workers into operation jobs as well as the release of workers from other area projects can potentially decrease additional operation period in-migration. For instance, the secondary employment generated from direct project activities during construction will likely remain to serve the operation work force.

During both construction and operation of the combined project, the local housing sector will need to expand to meet in-migration needs. While the construction work force is more likely to use temporary housing (i.e., apartments and mobile homes), the operation work force will require more permanent single family housing.

Land Use

A total of 13,091 acres of land and associated land use will be adversely affected by the proposed project (mine, power plant, cooling reservoir, and transportive systems). Additionally, 11,677 acres of ancillary activities area may be potentially affected. The predominant land use of the proposed plant site and mine site is undeveloped forestry (2,068 acres and 4,983 acres, respectively). Operational project impacts focus upon the conversion of existing agricultural land to industrial use during the mining period. Approximately 10,205 acres of agricultural land (pasture and cropland) and 12,594 acres of forested land (undeveloped forest and forestry) would potentially be affected by the proposed project (mine, power plant, cooling reservoir, transportive systems, and ancillary activities areas).

Changes in land use caused by the proposed project will result in the short- and long-term removal of existing land uses on the mine and power plant sites.

Although RRC regulations require that the permit area be restored to conditions capable of supporting premining land uses, alternative land uses may be approved through consultation with the RRC and landowner. Additional long-term impacts in land-use resulting from the proposed project would be increased urbanization, regionally, due to project-related in-migration and potential modifications of wildlife habitat and aesthetic qualities of the land.

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1.0 INTRODUCTION

This Environmental Impact Statement (EIS) is prepared to assess the effects of a proposed mine-mouth power plant and surface lignite mine located within the Sabine River drainage basin of northeastern Texas (Fig. 1-1). Southwestern Electric Power Company (SWEPCO) will own both the power plant and mine facilities; The Sabine Mining Company (SMC) will operate the mine under contract to SWEPCO. The proposed South Hallsville Project will consist of a single unit mine-mouth, 720-MW (gross) (640-MW net), lignite-fired steam electric generating station (Henry W. Pirkey Power Plant - Unit 1) and its fuel source, a 2.8 million-ton-per-year surface lignite mine (South Hallsville Mine). Transportive systems associated with the power plant will include a makeup water pipeline, transmission lines, and railroad spur.

1.1 EPA'S RESPONSIBILITY AND LEGISLATIVE AUTHORITY

Before discharge of any pollutant into navigable waters of the United States from a designated source in an industrial category for which performance standards have been promulgated, a new source National Pollutant Discharge Elimination System (NPDES) permit must be obtained from the Environmental Protection Agency (EPA). Section 511 (c) (1) of the Clean Water Act (CWA) also requires that the issuance of an NPDES permit by EPA for a new source discharge be subject to the National Environmental Policy Act (NEPA), which may require preparation of an EIS on the new source. Pursuant to the requirements of NEPA and its authority under the CWA, a notice of intent to prepare an EIS on the issuance of an NPDES permit for the proposed South Hallsville Project was issued by EPA on July 10, 1981.

This EIS evaluates alternative permit actions (i.e., issuance or denial of permits) available to the EPA and other Federal agencies and the environmental effects of undertaking each of these alternatives.

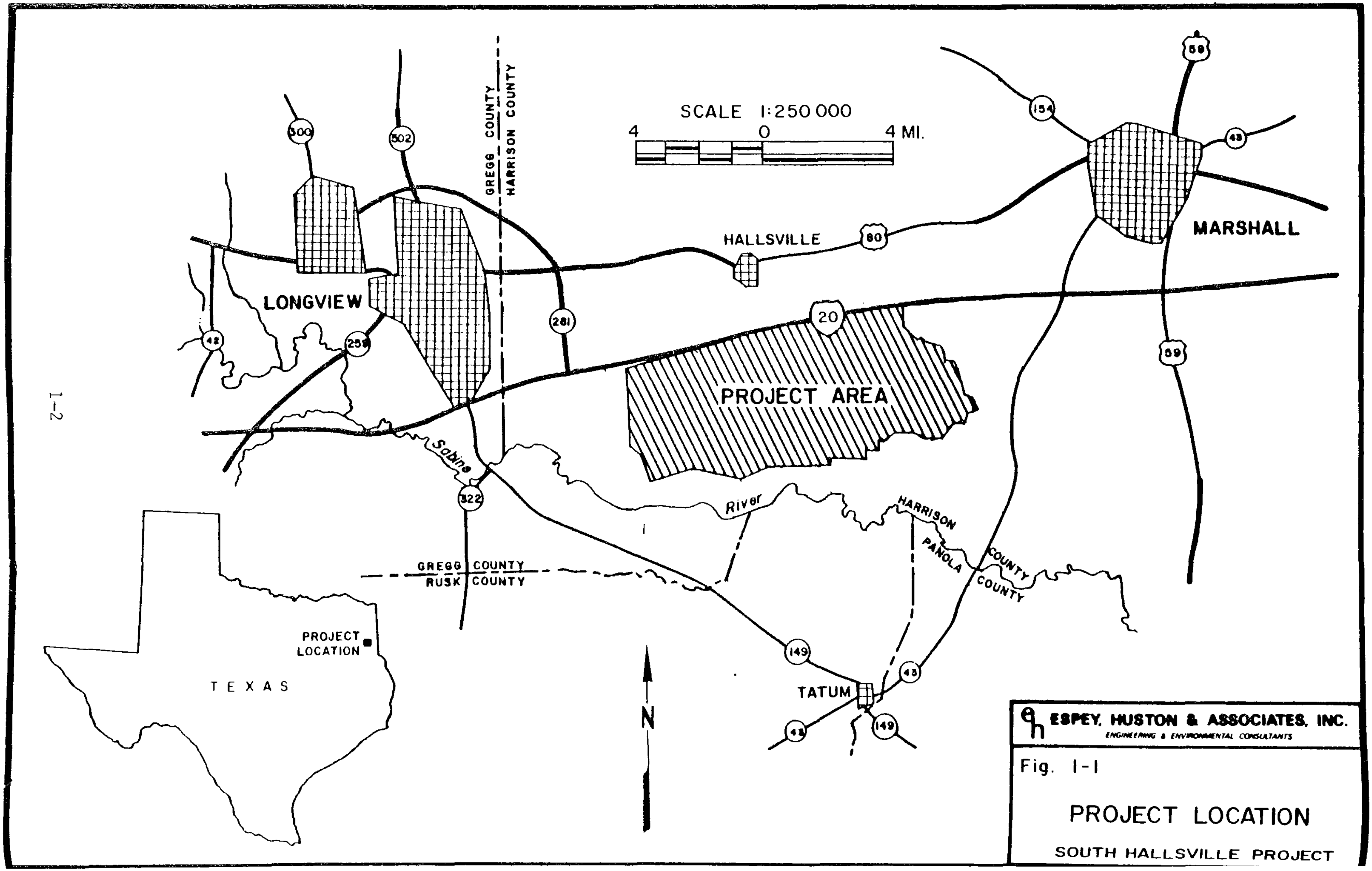


Fig. 1-1

PROJECT LOCATION

SOUTH HALLSVILLE PROJECT

The purpose of this EIS is to evaluate the environmental consequences of issuing new source NPDES permits for the proposed South Hallsville Project. With respect to the objectives, the document addresses the following:

- o purpose and need for the project;
- o alternatives available to the permit applicants, EPA, and other governmental agencies;
- o environmental consequences of alternatives; and
- o possible measures to mitigate adverse environmental consequences.

1.2 OTHER FEDERAL, STATE, AND LOCAL LEGISLATIVE REQUIREMENTS

In order for SWEPCO to construct and operate the proposed lignite-fired power plant and surface lignite mine facilities, compliance or conformance with State and Federal laws and regulations is required. These requirements include performance standards, limitations, agency reviews and approvals, and interagency coordination. A list of these required permits and/or regulations is presented in Table 1-1, and a brief discussion of certain requirements is included in Appendix A.

1.3 DESCRIPTION OF THE APPLICANT

Southwestern Electric Power Company (SWEPCO) is a public utility engaged in generating, purchasing, transmitting, distributing and selling electricity in portions of northeastern Texas, northwestern Louisiana, and western Arkansas. It is a wholly owned subsidiary of Central and South West Corporation, a registered public utility holding company.

On December 31, 1980, SWEPCO supplied electric service to about 332,000 retail customers in a 25,000 square mile area with an estimated population of 828,000. It supplied electric energy at wholesale to two municipalities, eight

TABLE 1-1

FEDERAL AND STATE PERMITS/REGULATIONS/APPROVALS APPLICABLE TO THE PROPOSED SOUTH HALLSVILLE PROJECT

Permit, Regulation or Approval	Agency*
NPDES (Section 402) permit under Clean Water Act	EPA
Section 404 permit for placement of dredge and fill material under Clean Water Act	USCE
Section 10 permit under Rivers and Harbors Act	USCE
Compliance with Section 316(b) of the Clean Water Act for makeup water intake	EPA
Compliance with Clean Air Act Section 110: Implementation Plans Section 111: Standards of Performance for New Stationary Sources Section 123: Stack Heights Section 160-169: Prevention of Significant Deterioration of Air Quality	EPA, TACB
Compliance with Endangered Species Act of 1973 as amended	FWS
Compliance with the National Historic Preservation Act and Executive Order 11593	EPA, Texas SHPO, ACHP,
Compliance with Archaeological and Historic Preservation Act of 1974	EPA, Texas SHPO, ACHP
Compliance with Protection of Historic and Cultural Properties criteria	EPA, Texas SHPO, ACHP
Compliance with Federal Aviation Administration Regulations	FAA
Compliance with the Fish and Wildlife Coordination Act of 1934 as amended (1965)	FWS

TABLE 1-1 (Concluded)

Permit, Regulation or Approval	Agency*
Compliance with the Wild and Scenic Rivers Act of 1968	NPS
Compliance with the National Energy Act of 1978	N/A
Compliance with the Federal Aviation Act of 1958	FAA
Railroad Commission of Texas Surface Mining Permit	RRC
Certificate of Convenience and Necessity (power plant)	TPUC
Construction Permit (power plant)	TACB
Operating Permit (power plant)	TACB
Appropriation of State Water Permits (power plant)	TDWR
Wastewater Discharge Permit	TDWR
Solid Waste Registration (power plant)	TDWR

*Acronyms:

EPA - Environmental Protection Agency
USCE - U.S. Corps of Engineers
FWS - U.S. Fish and Wildlife Service
FAA - Federal Aviation Administration
SHPO - State Historic Preservation Officer
ACHP - Advisory Council on Historic Preservation
USDA - U.S. Department of Agriculture
NPS - U.S. Department of the Interior, National Park Service
RRC - Railroad Commission of Texas
TPUC - Texas Public Utilities Commission
TACB - Texas Air Control Board
TDWR - Texas Department of Water Resources

rural electric cooperatives, and five other electric utilities. The three largest metropolitan centers served by SWEPCO are the metropolitan areas that include the adjoining cities of Shreveport and Bossier City, Louisiana; Texarkana, Arkansas and Texas; and the City of Longview, Texas. SWEPCO owns certain transmission facilities in Oklahoma, but serves no customers there.

SWEPCO's 332,108 customers at year end 1980 were made up of 286,861 residential customers, 35,780 commercial customers, 7,260 industrial customers, and 2,207 other users of electrical power. The net system capability during 1980 at the time of the peak was 3,215 MW.

The Sabine Mining Company is a corporation organized and existing under the laws of the State of Texas and having an office at Office Alpha, 13140 Coit Road, Suite 400, Dallas, Texas 75240. The purpose for which the corporation is organized is to design, develop, construct, equip, and operate a lignite mine near Hallsville in Harrison County, Texas, to supply lignite to Southwestern Electric Power Company.

2.0 PURPOSE AND NEED

2.1 NEED FOR THE PROPOSED PROJECT

SWEPCO has the obligation to provide dependable and reliable power in the most economical and environmentally acceptable manner to customers in its respective service territory. SWEPCO proposes to construct the South Hallsville Project to continue to supply reliable electric service. As shown in Table 2-1, peak demand for electricity, as well as the total number of customers to which SWEPCO furnishes electrical service, has increased steadily during the past 15 years.

Major factors contributing to SWEPCO's need for additional generating resources are to provide capacity to meet future needs; to provide adequate reserves for reliable service during periods of maintenance and emergency outages; and to lessen dependence on natural gas and fuel oil as a source of fuel.

2.1.1 Project Demand

The proposed Henry W. Pirkey Power Plant - Unit 1 is needed to help meet the increasing demand for electricity within the SWEPCO service area even though the rate of growth has decreased. Nevertheless, a positive growth is still being experienced and is projected. A peak demand growth rate of 3.43 percent has been projected for the SWEPCO service area through 1990 (Table 2-2). This will result in a projected peak load of 3,140 MW in 1985, when the Henry W. Pirkey unit is scheduled to begin operation.

2.1.2 Projected Power Supply Capability

As a member of the Southwest Power Pool (SPP), a group of interconnected utilities in the south-central United States, SWEPCO is required to

TABLE 2-1

PEAK LOAD AND CUSTOMERS FOR

SOUTHWESTERN ELECTRIC POWER COMPANY FOR THE PAST 15 YEARS

Year	Peak Load (MW)	Residential	Commercial	Industrial	Other	Total
1966	939	197,613	27,541	5,906	1,473	232,533
1967	981	203,096	27,912	6,018	1,454	238,480
1968	1,104	211,217	28,291	6,070	1,505	247,083
1969	1,309	216,064	28,628	6,172	1,555	252,419
1970	1,383	220,574	29,163	6,152	1,661	257,550
1971	1,517	227,371	30,188	6,295	1,723	265,582
1972	1,653	234,965	30,984	6,303	1,773	274,025
1973	1,768	240,395	31,104	6,329	1,876	280,244
1974	1,932	247,553	31,457	6,502	1,937	287,449
1975	2,075	253,475	31,966	6,627	2,029	294,097
1976	2,117	259,592	32,963	6,727	1,944	301,226
1977	2,404	267,069	33,553	6,844	2,017	309,483
1978	(2,543-183)*	274,935	33,986	6,982	2,067	317,970
1979	2,291	281,709	34,910	7,068	2,148	325,835
1980	2,652	286,861	35,780	7,260	2,207	332,108

* With the addition of the Flint Creek Power Plant in 1978, Arkansas Electric Cooperative Corporation assumed responsibility for its own load. This portion (183 MW) of the system load (2,543 MW) should therefore be discounted in determining the SWEPCO peak load.

TABLE 2-2

SOUTHWESTERN ELECTRIC POWER COMPANY

FORECAST OF CAPABILITIES, PEAK DEMANDS, AND RESERVES

IN MEGAWATTS

(1978-1990)

	Actual			Forecast									
	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
NET PLANT CAPABILITIES													
Dolet Hills	0	0	0	0	0	0	0	0	320	320	320	320	320
Pirkey	0	0	0	0	0	0	0	640	640	640	640	640	640
Flint Creek	264	264	264	264	264	264	264	264	264	264	264	264	264
Welsh	528	528	1,056	1,056	1,584	1,584	1,584	1,584	1,584	1,584	1,584	1,584	1,584
Wilkes	879	879	879	879	879	879	879	879	879	879	879	879	879
Lieberman	276	276	276	276	276	276	276	276	276	276	276	276	276
Knox Lee	537	537	537	537	537	537	537	537	537	501	501	501	501
Lone Star	50	50	50	50	50	50	50	50	50	50	50	50	50
Lone Star Gas Turbines	40	40	40	40	40	40	40	40	40	40	40	40	40
Arsenal Hill	161	113	113	113	113	113	113	113	113	113	113	113	113
1. TOTAL	2,735	2,687	3,215	3,215	3,743	3,743	3,743	4,383	4,703	4,667	4,667	4,667	4,667
DELIVERIES WITHOUT RESERVES													
PSO (from 4 units)	100	0	0	0	0	0	0	0	0	0	0	0	0
GSU	0	0	0	250	350	260	0	0	0	0	0	0	0
CLECO	0	100	200	0	0	0	0	0	0	0	0	0	0
CPL from PSO (on-system)	0	0	0	0	0	0	0	0	0	0	0	0	0
CPL	0	0	0	0	0	0	0	0	0	0	0	116	231
PSO	0	0	0	0	0	0	0	0	0	0	0	43	136
PSO with WTU	0	0	0	0	0	0	0	0	0	0	0	0	20
2. TOTAL	100	100	200	250	350	260	0	0	0	0	0	159	387

TABLE 2-2 (Concluded)

	Actual			Forecast									
	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
RECEIPTS WITHOUT RESERVES													
Tex-La Narrows	27	27	27	27	27	27	27	27	27	27	27	27	27
PSO for GSU	0	0	0	60	200	145	0	0	0	0	0	0	0
PSO for CPL (on-system)	0	0	0	0	0	0	0	0	0	0	0	0	0
3. TOTAL	27	27	27	87	227	172	27	27	27	27	27	27	27
4. TOTAL (1-2+3)	2,662	2,614	3,042	3,152	3,620	3,655	3,770	4,410	4,738	4,694	4,694	4,535	4,307
5. PEAK LOAD	2,360	2,465	2,652	2,685	2,790	2,905	3,020	3,140	3,265	3,395	3,535	3,635	3,715
6. INTERRUPTIBLE LOAD INCLUDED IN PEAK LOAD	0	0	0	0	0	0	0	0	0	0	0	0	0
DELIVERIES WITH RESERVES													
7. TOTAL	0	0	0	0	0	0	0	0	0	0	0	0	0
RECEIPTS WITH RESERVES													
Tex-La Peaking	117	117	117	117	117	117	117	117	117	117	117	117	117
SPA-Bentonville	18	18	18	18	18	18	18	18	18	18	18	18	18
TVA Diversity	100	100	0	0	0	94	133	13	13	13	13	13	13
8. TOTAL	235	235	135	135	135	229	268	148	148	148	148	148	148
9. LOAD RESPONSIBILITY (5-6+7-8)	2,125	2,230	2,517	2,550	2,655	2,676	2,752	2,992	3,117	3,247	3,387	3,487	3,567
10. TOTAL RESERVES (4-9)	537	384	525	502	395	409	448	848	854	524	529	505	554
11. PERCENT RESERVES ((10/9) x 100)	25.3	17.2	20.9	19.7	14.9	15.3	16.3	28.3	27.4	16.1	15.6	14.5	15.5

maintain a 15-percent reserve margin to provide reliable electrical service. Without the Pirkey unit, reserves in 1985 would be 208 MW or only 7 percent. In 1986, reserves would total only 6.9 percent or 214 MW would exist, even with the planned addition of 320 MW from another unit scheduled to become commercial that year. These reserve margins would not provide adequate system reliability.

From Table 2-3, it is evident that SWEPCO has historically relied primarily upon natural gas and/or fuel oil as a fuel source for its boilers. In the late 1960's, when the uncertain future of sources of natural gas and oil became apparent, SWEPCO planned four coal-fired units using low-sulfur coal from Wyoming. Three of these were put into operation in 1977, 1978, and 1980. The fourth generating unit is scheduled to become operational in 1982. The coal for these units was contracted for in 1972. However, due to increasing coal and transportation costs and the new secure supply of local lignite that was not available when the coal-fired units were planned, SWEPCO has determined that mine-mouth lignite fired power plants, such as the South Hallsville Project, will provide the best all around service for additional generating requirements at the lowest fuel cost.

2.1.3 Materials and Energy Commitments

The proposed project would commit approximately $340 million to such materials as cement, lumber, steel, wiring, and other construction items to long-term project use. Approximately $9 million per year would be spent annually on power, consumables, and lubricants during the long-term operation phase of the mine. About $1 million will be spent annually on consumables during the long-term operations phase of the power plant. Some materials used in construction of the power plant, such as steel and copper, would be salvaged at the completion of the plant's usefulness.

While fuels and energy will be consumed in both construction and operation of the proposed power plant/mine project, the net result of the operation

TABLE 2-3

EXISTING AND PROPOSED GENERATING UNITS
SOUTHWESTERN ELECTRIC POWER COMPANY

Name	Location	In Service	Capability	Primary Fuel
Arsenal Hill	Shreveport, LA			
Unit 5		1960	113 MW	Gas
Lieberman	Mooringsport, LA			
Unit 1		1947	28 MW	Gas/Oil
Unit 2		1949	28 MW	Gas/Oil
Unit 3		1957	111 MW	Gas/Oil
Unit 4		1959	109 MW	Gas/Oil
Knox Lee	Longview, TX			
Unit 1		1950	36 MW	Gas
Unit 2		1950	38 MW	Gas
Unit 3		1952	36 MW	Gas
Unit 4		1956	83 MW	Gas
Unit 5		1974	344 MW	Gas/Oil
Lone Star	Lone Star, TX			
Unit 1		1954	50 MW	Gas/Oil
Unit 2		1968		Gas Turbine
Unit 3		1968	40 MW	Gas Turbine
Unit 4		1968		Gas Turbine
Wilkes	Jefferson, TX			
Unit 1		1964	177 MW	Gas/Oil
Unit 2		1970	351 MW	Gas
Unit 3		1971	351 MW	Gas
Welsh	Cason, TX			
Unit 1		1977	528 MW	Coal
Unit 2		1980	528 MW	Coal
Unit 3		1982	528 MW	Coal
Flint Creek	Gentry, AR			
Unit 1		1978	264 MW*	Coal

TABLE 2-3 (Concluded)

Name	Location	In Service	Capability	Primary Fuel
Henry W. Pirkey	Hallsville, TX			
Unit 1		1985	640 MW (net)	Lignite
Dolet Hills	Naborton, LA			
Unit 1		1986	320 MW*	Lignite
Unit 2		1988-1992	320 MW*	Lignite

*50% Ownership.

of these facilities will be a positive contribution to the nation's energy production and will reduce dependence on foreign fuel resources. The annual amount of lignite to be mined is equivalent to about 5.5 million barrels of crude oil or about 33.6 trillion cubic feet of natural gas. At 60 percent capacity factor, annual electrical energy supplied by the proposed power plant will total approximately 3.4 million MWh.

3.0 DESCRIPTION AND EVALUATION (SCREENING) OF ALTERNATIVES

This chapter presents information relevant to availability of alternatives and their relative merits for the proposed mine-mouth power plant, surface lignite mine, and respective facilities, including no action alternative. Two classes of power plant alternatives are considered: (1) those that could conceivably meet the power demand without requiring the creation of new generating capacity and (2) those that do require the creation of new generating capacity. Design and siting options for the lignite-fired steam electric generating plant are also discussed, as well as alternative transportive systems associated with a power plant (i.e., transmission line, makeup water pipeline, and railroad spur). Mine alternatives that were evaluated included 1) mine layout, 2) lignite extraction methods, 3) lignite transportation systems, and 4) reclamation methods.

3.1 NO ACTION ALTERNATIVE

The no action alternative could be implemented by the permit applicants of their own choice, or as a result of EPA's denial to issue NPDES permits for the mine-mouth power plant and surface lignite mine as proposed (i.e., with a point source water discharge requiring an EPA permit). Implementation of the no action alternative would mean that the site preparation, construction, and operation of the proposed project would not occur.

If the proposed power plant and mine facilities were not built, it is anticipated that the South Hallsville Project area would remain a rural, agriculturally based environment. Agricultural activities within the project boundaries are limited principally to cattle grazing. Most upland areas have been previously exploited through intense row crop production. Today, these upland areas are typified by eroded topsoils and volunteer growths of mixed pine-hardwood tree stands. However, areas of relatively productive agricultural activities (e.g., pastureland and cattle grazing) and wildlife habitat are encountered in the floodplains of major project area streams and the Sabine River.

Furthermore, the SPP is a regional reliability council member of the Coordinated Bulk Power Supply Program of the U.S. These councils interconnect utilities and coordinate the reliability and adequacy of future electric power. The SPP requires that it's members maintain a 15 percent reserve in order to retain their membership. At the current rate of growth, SWEPCO's reserve capability in 1985 will be less than that required by the SPP. Within the respective service areas, demands for electrical power will have to be reduced or met by other means. If service is reduced, future economic growth in the area could be affected. If not reduced and the proposed project is not constructed, the increased power needs must be supplied from a new power plant in another region or supplied by other utility companies.

3.2 ALTERNATIVES NOT REQUIRING THE CREATION OF NEW GENERATING CAPACITY

Four conceivable alternative means of serving the electric demand considered, without creating new plant capacity, are listed below:

- energy conservation;
- the purchase of power;
- the reactivation or upgrading of older plants; and
- baseload operation of existing peaking facilities.

3.2.1 Energy Conservation

Recent energy conservation has caused some reduction in load demands on SWEPCO's system, primarily by reducing the rate of growth; however, an upward trend in demand has persisted for the past 15 years (see Table 2-1), and it is doubtful that energy conservation can offset the need for new generating facilities. The effects of conservation practices are monitored carefully by SWEPCO so that accurate demand forecasts can be assimilated. A Load Management Group is active within the Company, looking into various possibilities of controlling load, i.e., interruptable customers, control of industrial and commercial load, or residential air conditioners by way of some externally applied method. Tests are planned for 1982 on a selected group of the above. Conservation alone is not a feasible alternative to meet future needs.

3.2.2 Purchased Power

The purchase of power to replace an equivalent of that to be produced by the proposed facility would require the purchase of bulk power over an extended period of time from a neighboring utility with whom major interconnecting ties exist. Some of these utilities are already scheduled to purchase power from SWEPCO in 1985, indicating they will be in need of power and therefore will be unable to provide power for sale. Most other utilities will not have sufficient excess power to provide this type of sale. Additionally, if any bulk power were available for sale in 1985, it would have to be committed now to assure reliable service in 1985. The alternative of waiting until such time as the system demand exceeds system capability to purchase replacement power is unacceptable from a reliability standpoint.

3.2.3 Reactivation or Upgrading of Older Plants

To date, all other power plants on the companies' systems use gas, fuel oil, or western coal as boiler fuels. (SWEPCO is currently constructing a mine-mouth power plant in northwestern Louisiana that is slated for completion in 1986.) To modify existing oil- and gas-fired units so that they can burn coal would require extensive boiler modifications and the purchase of adjacent lands to facilitate coal storage, coal handling, pollution control, and ash disposal systems. In many cases, adjacent lands are not available at existing power plant sites. Most power plants now operating on SWEPCO's system that use water for cooling do not have sufficient water supply to support an additional large generating unit.

Reactivation of older generating units would result in the increased use of gas or oil as fuel. Given the relatively higher cost of these fuels, the decreased availability of these fuels, and the relatively poor power plant efficiency of the older units, the cost of electric generation would increase substantially. Sufficient supplies of these fuels are not available for reactivation of gas/oil fired units on a long-term or high use factor basis. This would also be contrary to national fuel use policy and goals.

3.2.4 Baseload Operation of Existing Peaking Facilities

SWEPCO's gas-fired units are being phased out as new coal and lignite units are added to their systems. During 1980, for instance, 40 percent of SWEPCO's fuel requirements were met by coal and some 59 percent by natural gas. By 1985, when the proposed facility is to be added, only 25 percent of SWEPCO's needed fuel is expected to be supplied by gas.

The older gas-fired units are being moved into peaking service requiring fuel during the summer peak load months. Sufficient gas cannot be obtained from suppliers for use in future baseload operation of these units. Even if gas or oil was available in sufficient quantities, current estimates project the cost of gas to be two to three times that of the lignite to be used at the proposed Henry W. Pirkey Power Plant-Unit 1 and the cost of oil to be four times as much. For these reasons, baseload operation of existing peaking units is impractical.

3.3 ALTERNATIVE ENERGY SOURCES

A limited number of alternative energy sources are available to electric utilities at the present time, and they are discussed next.

3.3.1 Geothermal

Geothermal energy is the energy of hot or molten rock. Geothermal electricity can be produced by drilling into a reservoir of steam so that the steam can be brought to the surface, passed through insulated pipes to a power plant, and run through a low-pressure steam turbine. Geothermal electricity can be very cheap, but a geothermal plant releases two to three times as much wasted heat as a plant burning fossil fuel, and about 75 percent more waste heat than a nuclear plant of equivalent capacity.

Deposits of geothermal resources occur in the Texas Gulf Coastal Region. However, these deposits are untapped in Texas and do not appear to be a feasible alternative for meeting demands of the early 1980's.

3.3.2 Solar

Solar energy is widely available, immense in quantity, non-polluting, and free for the taking. Use of solar power is being studied with increasing emphasis; however, present technology has not yet developed a low-cost method of power storage that can be coupled with solar units. For that reason, solar energy remains an unsuitable source of large-scale baseload power.

3.3.3 Wind

The energy of the wind originates from the sun, making it an unlimited energy source. The technology of windmills is well-developed; however, wind power is intermittent and unreliable by nature. It is limited by geographical location and its inability to supply large amounts of power for heavy industry. Electrical power generation from wind has been demonstrated on a 1-MW scale, but cannot compete economically with other sources on a 1,000-MW scale. These combined disadvantages make wind power an unsuitable source of baseload power.

3.3.4 Coal and Petroleum Gasification

Efforts to demonstrate that coal and heavy petroleum products can be gasified and that gas can be used as a boiler fuel have had some success. Nationally, studies are in progress to determine if it is possible to backfit present gas-fired boilers with alternative gas fuel sources, such as those derived from heavy petroleum products and coal. However, since successful research is uncertain and large scale technology is undemonstrated, this source is not a feasible alternative at this time.

3.3.5 Natural Gas

Natural gas is a clean fuel, requires no storage bins or tanks, and can be piped in as needed. It is burned in simple, inexpensive, almost maintenance-free furnaces. For these reasons, gas is the most sought-after member of the petroleum family for home and industrial heating and electric power generation. However, natural gas supplies are dwindling, and the Federal government is urging industry to convert its boiler units to fuels other than gas. The Fuel Act of 1978 restricts the future use of natural gas as a boiler fuel for power generation. Additionally, SWEPCO has found that, during recent efforts to secure continued supplies of gas for existing boilers, gas suppliers cannot provide the large quantities of the fuel necessary for power generation on a long-term basis. The gas that is available has increased in cost to the point that it is no longer competitive with other fuels as a boiler fuel.

3.3.6 Western Coal

Western coal is a low-sulfur, medium-Btu coal, which is available in adequate supply and can be used as fuel in an environmentally acceptable manner. Historically, it has been more economical to transport than lignite. Even though lignite has considerably more bulk and is, therefore, even less economical to transport long distances, it is nevertheless looked upon as an economical alternative when associated with a mine-mouth power plant such as the proposed power plant facility. However, the ever-increasing cost associated with the handling and long-distance transporting of western coal has compelled users to evaluate other alternatives. In addition, the environmental impacts associated with mining in western states may, in some cases, be more severe than in the Gulf Coast Region.

3.3.7 Nuclear

Nuclear power plants lack the kinds of air pollution associated with burning conventional fuels. The amount of fuel required for nuclear plants is small, and partial refueling is conducted only once or twice a year. Because of this, transportation costs are small, making the cost of a nuclear plant practically independent of its location. As such, it is a good fuel alternative. However, it does not seem wise to depend solely on limited sources of fuel as was done in the past with the use of gas and oil. Nuclear technology has come of age, yet is encumbered by high capital costs, lengthy lead time for siting, threatened moratorium (licensing uncertainties), escalating fuel costs, and lack of development of new fuel processing and waste disposal facilities. For these reasons, nuclear fuels were not considered a feasible choice for a power plant needed by 1985.

3.4 DESIGN AND SITING OPTIONS FOR THE CONSTRUCTION AND OPERATION OF THE PROPOSED POWER PLANT, TRANSMISSION LINES, WATER PIPELINE, AND RAILROAD FACILITIES

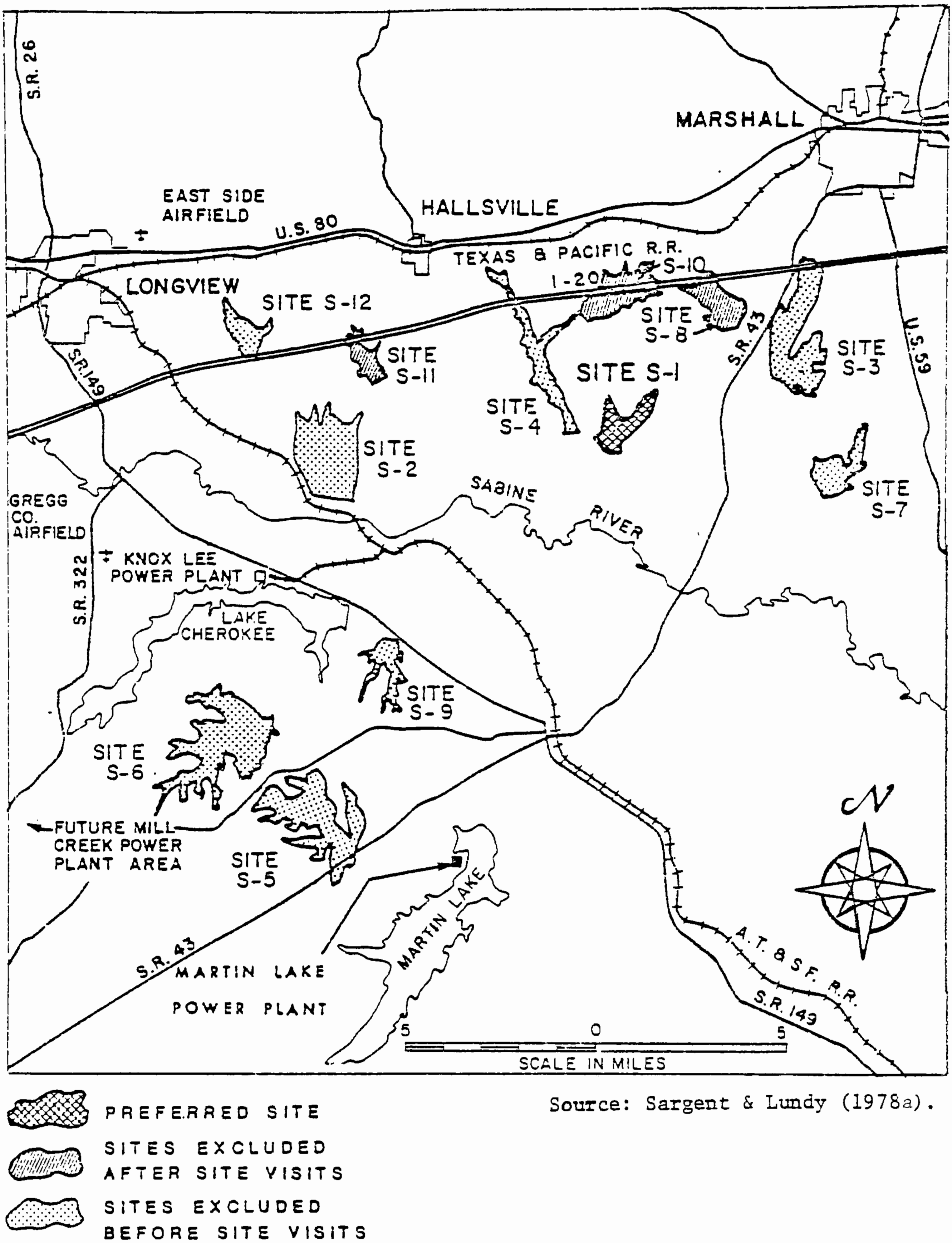
3.4.1 Alternative Power Plant Sites

Lignite is a relatively economical fuel source when it is used in proximity to its point of extraction. Therefore, all potential power plant sites were located within a 20- mile radius of the South Hallsville lignite reserve. A potential power plant site is defined as any area that meets preliminary site selection (engineering) considerations and is characterized by features that make the area appear feasible for project development and hence, worthy of further investigation. A two-phase study was conducted to identify potential power plant locations in the area south of Hallsville, Texas (Sargent and Lundy, 1978a). Phase I was a search of published and unpublished literature about the study area and determination of plant requirements. Twelve possible sites (S-1 through S-12, Fig. 3-1) were identified based on the following criteria generated in this phase:

- o proximity to the lignite field,
- o extra storage capacity to provide a sufficient supply of cooling water in the event of a 1-year drought, and
- o requirement of cooling towers for a potential second unit.

Phase II of the site selection study was evaluation and comparison of the 12 sites, based on environmental and engineering considerations, to choose the optimum location for the plant. These 12 sites were assessed for the following during preliminary screening: suitability of topography for a power plant and cooling reservoir; geotechnical suitability, including an assessment of surface and subsurface geology, ground-water levels, seepage potential, foundation conditions for plant and dam, and seismology; and impact on such existing features as population centers, airports, cemeteries, pipelines, transmission lines, highways, railroads, and mineral extraction areas.

Three sites (S-8, S-10, and S-11) were eliminated in the preliminary screening, either because of interference with Interstate Highway 20 (I-20), or because the proposed cooling reservoir would overlie economically recoverable lignite deposits. Seven more sites were excluded in further screening procedures (e.g., additional map studies, literature review, and field reconnaissance of engineering conditions).



Source: Sargent & Lundy (1978a).

Fig. 3-1 Hallsville Area Site Selection Study Location Map.

The two remaining sites (S-1 and S-2) were considered in a study designed to evaluate comparatively the different development considerations at each site. Site development schemes were prepared and earthwork quantities estimated for both sites. Two preliminary exploratory borings were made in the proposed dike foundation area of Site S-2 to confirm the existence of suspected highly permeable and, therefore, unsuitable foundation conditions. These borings indicated that the proposed dike and cooling reservoir areas were underlain by up to 40 feet of moderately to highly permeable sand and gravels. Because of this permeability, seepage beneath the dike and through the reservoir bottom could be excessive and corrective measures too costly. Also, Texas Eastman had already acquired water rights to Mason Creek, and a contract had been let for constructing a cooling reservoir that would partially overlap the pond proposed for the S-2 site, so this site was eliminated from consideration.

Additional activities were performed to establish site development requirements and plant operating parameters conclusively before final determination of site location. Within the framework of the comparative screening methodology used in Phase II of the study, Site S-1 was the preferred site in the study area. Advantages include proximity to, but nonencroachment on, economically recoverable lignite deposits, a pond configuration resulting in an efficient water circulation pattern, and minimal impact on existing land uses. In addition, this site provides suitable foundation conditions for the plant and an earth-fill dam. Favorable atmospheric dispersion characteristics are enhanced by the rolling terrain and remoteness from other major emission sources, with the exception of the Martin Lake Power Plant located 15 miles away. Disadvantages of the site include the need to construct a railroad spur of up to 13 miles long; the apparent inability of the cooling reservoir to support more than one unit for cooling purposes, if makeup water to the pond is not available for a period of 1 year; the need to provide saddle dikes in order to contain the pond at flood elevations; and the probable need to provide some way to seal portions of the pond perimeter, under the dam, and on abutments to prevent possible seepage problems.

3.4.2 Alternative Electric Generating Station Designs

3.4.2.1 Cooling System Alternatives

The cooling system will remove excess or "waste" heat contained in the steam passing through the condenser. "Spent" or "exhausted" steam (i.e., steam at a temperature and pressure at which it cannot readily accomplish additional work) is condensed into boiler feedwater by the circulating water system and returned to the boiler, where it is again converted to useful steam. The waste heat of the "spent" steam is thus transferred to the circulating water and must be removed before this cooling water can be used again.

Seven alternative cooling systems to remove waste heat from circulating water were considered: cooling reservoirs, spray canals, dry cooling towers, wet natural draft towers, wet mechanical draft towers, wet-dry towers, and a once-through system on Lake O' The Pines or the Sabine River. The cooling reservoir scheme was chosen for the proposed plant for reasons elucidated in the following subsections.

Spray Canals

In spray canals, heat dissipation is accomplished by evaporation, convection, and radiation. The evaporative process occurs when the heated circulating water is exposed to cooler air and is enhanced by continuously running this water through the nozzles of spray modules. The resultant aerosol offers increased surface area at a greater relative velocity for faster evaporation.

Water drift produced by spray modules could create ground fog under appropriate weather conditions. The poor thermal performance and low cooling efficiency of the spray module system, along with the high operating and maintenance costs, diminish overall plant efficiency and make this a costly alternative cooling system. For these reasons, and because of limited operational success, the spray canal system was eliminated from consideration.

Dry Cooling Towers

In dry cooling towers, heated cooling water from the plant's condensers is pumped through banks of finned-tube heat exchangers. Fans force air past the heated finned tubing and out of the tower, where the heat is dissipated by conduction and convection to the ambient air. This totally closed system does not depend on water evaporation for cooling. Since the heated water is never in direct contact with the air, no evaporation or drift is lost and no makeup or blowdown is required.

A very large cooling tower is needed to provide sufficient surface area for heat transfer. Initial expenditures are great, and the high plant auxiliary power requirements, due to the large number of fans needed for efficient operation, are extremely costly. These considerations make dry cooling towers infeasible as an alternative cooling system.

Wet Natural Draft Cooling Towers

Natural upward drafts through this type of tower are created as a result of differences in density of the warmed air inside the tower and the cooler air outside. Outside air, drawn in by the upward drafts, contacts the circulating water, which is pumped to the fill elevation of the tower and allowed to fall. Mechanical draft towers, therefore, need only be 50 to 60 feet high, much lower than those using natural drafts. Like the spray canal, this type of tower can produce ground fog under appropriate meteorological conditions. Evaporation pond capacity would also be required to accomodate the cooling tower blowdown and prevent water quality deterioration in nearby streams.

Wet-Dry Cooling Towers

Dry and evaporative methods of cooling are combined in wet-dry cooling towers. The parallel-path-type tower operates as follows: Ambient air is drawn in parallel paths through a dry finned-tube heat exchanger system. The dry heat exchanger system minimizes the potential for ground-level fogging and icing during the winter months. The air leaves this section at a high dry bulb temperature and low relative humidity and then mixes with the air leaving the wet evaporative cooling section. This mixed air is emitted from the tower in a warm, unsaturated condition, which reduces the plume and the potential for ground-level fogging and icing. The reduced evaporation from the tower resulting from a reduced plume permits a commensurate reduction in the amount of makeup water required.

The performance advantages of the wet-dry tower are best utilized when the power plant is operating at a high load factor during cold weather. However, since peak electrical demand generally occurs during hot weather in the SWEPCO service area, the benefits of this cooling system are not applicable to the proposed power plant. Also, an evaporation pond for the cooling tower blowdown would be necessary to safeguard water quality in area streams.

Wet Mechanical Draft Cooling Towers

The same principle of heat transfer as in wet natural draft towers is used in wet mechanical draft cooling towers, but instead of depending on the "natural draft" process, they employ an "induced draft" created by motor-driven fans. The balance between relatively small tower height and the use of motor-driven fans proved to be the most economical of the cooling tower alternatives. The lower tower height also reduces local aesthetic impacts resulting from the presence of the plant. Like the spray canal, this type of tower can produce ground fog under appropriate meteological conditions. A makeup water pond is needed for this type of facility.

Once-through Cooling System

Once-through cooling was formerly the most commonly used means of eliminating waste heat from power plants. Proximity to a sufficiently large and stable source of water is requisite for efficient operation. This method consists of pumping water from the water source to the plant, where this water absorbs waste heat in a condenser and then is discharge back into the water source.

Lake O' The Pines is not considered close enough to the proposed plant for efficient use of once-through cooling. When considering the Sabine River, the plant would have to be shut down during periods of minimum flow as sufficient cooling water would not be available. Moreover, Federal and State effluent temperature requirements could be very difficult or impossible to satisfy.

Cooling Reservoir

The cooling reservoir is a closed-cycle, recirculating system. Cooling water is discharged to the pond from the condensers, recirculated through the reservoir for cooling, and again withdrawn from the reservoir. This cyclical flow pattern induces artificial currents that permit a long retention time in the reservoir for heated water, allowing it to cool enough (through evaporation, conduction and radiation) to be reused in the condenser. Natural runoff and spillage from the cooling reservoir are usually of sufficient volume and frequency to prevent development of abnormally high TDS (total dissolved solids) concentrations in the cooling reservoir.

The cooling reservoir was selected as the optimal cooling system due to the availability of land for a pond site and the lower cost as compared to a cooling tower system that requires expensive fans to be purchased and operated. This fact, along with other system features discussed in the following sections, establishes the cooling reservoir as the optimal cooling system for the Henry W. Pirkey Power

Plant - Unit 1. The cooling reservoir will be formed by constructing a dam across Brandy Branch.

3.4.2.2 Biological Control Alternatives

Organic-Based Microbiocides

Chemicals such as chlorophenols, amines, mercurials, copper salts, and acrolein can also be effective in controlling algae and slime in cooling systems. However, most are less degradable, more toxic, and more expensive than chlorine and would be needed in large dosages. As no real advantage could be derived from their use, the organic-based biocides were rejected as agents to control biological deposits.

Ozonation

The introduction of ozone (O_3) into water for biocidal purposes is presently used to a limited extent in the tertiary treatment of municipal wastewater. Ozonation is also employed in industrial waste treatment for oxidation of phenolic wastes, destruction of cyanide wastes, decomposition of organic wastes, purification of wastewater from coke plants, and other special applications. Its operational cost, however, is prohibitively high, compared with traditional chlorination. Capital investment for an ozonation plant would be two to three times higher than a comparable chlorination installation, and as present equipment for producing ozone is very inefficient (conversion efficiencies are only about 10 to 14 percent), operating costs would run three to four times higher. Thus, ozonation was not considered a feasible alternative to chlorination for largely economic reasons.

Mechanical Cleaning

The design of the service water system makes mechanical means of preventing biofouling impractical except in the main condenser. If a mechanical cleaning system were used in the main condenser, a separate chlorine injection system would be needed to protect the service water system. Due to these considerations, as well as the much greater capital and operating expenses of the mechanical cleaning system, chlorination was determined the superior method.

Chlorination

Periodic chlorination will be used at the proposed power plant to control biological deposits on the heat-transfer and other surfaces in the circulating and service water systems. Chlorine was selected as the biocide because of its proven effectiveness in a long history of use, its relatively short breakdown time, and its low cost. Alternative control methods considered were organic-based micro-biocides, ozonation, and mechanical cleaning.

3.4.2.3 Air Pollution Control System Alternatives

Stack Emission Control Systems

Particulates

Alternative particulate removal systems considered were "cold-side" and "hot-side" electrostatic precipitators, mechanical collectors, fabric filters, and Venturi scrubbers.

An electrostatic precipitator on the downstream side of the boiler air heaters ("cold-side" installation) was chosen for removing fly ash from the flue gas. The electrostatic precipitator will remove particulate matter by charging the particles in the flue gas stream with an electrical current and collecting the charged fly ash particles on surfaces having an opposite charge. Periodically, the collecting surfaces will be rapped, causing the particles to fall into collection hoppers below.

A "hot-side" precipitator works in much the same manner as a "cold-side" precipitator, except it is located upstream of the air heaters. For low-sulfur, sub-bituminous coal, a "hot-side" precipitator may be used to take advantage of lower fly ash resistivities that usually exist at higher flue gas temperatures. For lignites, however, ash resistivity usually does not decrease with increasing flue gas temperatures. Therefore, a "hot-side" precipitator would not perform as well as a "cold-side" unit and would have to be much larger physically to handle the larger volumetric flue-gas flow at the higher temperature.

One mechanical means to remove fly ash from flue gases is by filtering through porous fabrics. The performance of these fabric filters has not been reliably demonstrated for fossil-fuel-fired power plants for extended operating periods. Basic equipment in a filterhouse (baghouse) includes cylindrical fabric bags that are supported top and bottom within a housing structure. The flue gases enter from one end and are moved through the filter by either suction or propulsion. Particles suspended in the gas stream adhere to the filter medium and are thus removed from the gas stream. When dust buildup on the filter surface becomes excessive, the unit is cleaned by one of the following methods: reverse flow (backwash); shaking, rapping, or vibrating the filter element; complete or partial collapse of the filter elements; or a combination of these methods.

The major disadvantage of fabric filters is the necessity for frequent maintenance and repair due to short bag life (1- or 2-year guarantee) and sensitivity to acid dew point variations. Filterhouse and other mechanical dust collectors do not provide the particulate removal efficiency required to meet particulate and opacity emission limitations. Their performance has, to date, not been reliably demonstrated on large-scale utility power plants.

The use of Venturi scrubbers for particulate removal would require more fan power than any of the above alternatives. Also, wet scrubbers would be very susceptible to premature failure from wear and to plugging due to the abrasive nature of lignitic fly ash. The fly ash/water waste resulting from this process would create an additional disposal problem.

Precipitator performance will depend on the physical and chemical properties of the flue gas and of the collected fly ash particles.

Sulfur Dioxide (SO_2)

Alternatives to the chosen limestone system considered were fuel mixing, fluidized-bed combustion, recovery FGD (flue gas desulfurization) systems, lime/alkaline fly ash FGD system, lime FGD, double alkali FGD, the spray-dryer type SO_2-removal system, and fuel benefaction. Other methods for removing sulfur from the fuel prior to combustion, such as liquefaction or gasification, are not technologically or economically feasible at this time for power-plant-sized installations and, therefore, were not considered.

Sulfur emissions can be controlled by mixing the fuel before combustion to ensure that the fuel burned will be the average analysis fuel (a fuel mixture with an averaged sulfur content). This control strategy was not selected because it alone is not sufficient to meet the necessary removal efficiency requirement for the project, since only one fuel source is currently being considered for use.

Sulfur dioxide can be captured during the combustion process in a fluidized-bed boiler. Fluidized-bed combustion systems, however, are still under development and are not commercially available for large-scale utility application. They were, therefore, not selected.

Recovery FGD systems produce a marketable product, usually elemental sulfur or sulfuric acid, from the SO_2 collected from the flue gas. Many types of systems are being developed, but operating experience on the two types of recovery systems commercially available (the Wellman-Lord Process (W-L) and the MgO

Alkaline Process) is limited. There is only one full-scale (115 megawatt) WL Process currently operating on a coal-fired utility boiler in the United States, although there is additional experience on oil-fired industrial boilers. There is only one partial MgO system (about 40 megawatts) currently installed on a coal-fired utility boiler in the United States, and operation has been brief. There has been additional experience with the MgO system on coal- and oil-fired utility boilers, but these systems have been dismantled.

Although recovery FGD systems appeared to hold some promise for future applications, there are at present only two systems operating in the United States. The economic practicality of a recovery system depends on the quality of sulfur produced by a regeneration facility, which may or may not be owned by the utility and located on the site. The purity, amount, and local demand would determine the credit to the utility for the sale of the product. As a result of these considerations, recovery flue gas desulfurization systems were not selected.

Another technically feasible FGD system is the lime/alkaline fly ash system. This design, however, has not been demonstrated to be capable of SO_2 removal efficiencies greater than 65 percent, so that it would meet the SO_2 removal efficiency required to comply with the applicable NSPS limitations.

Of the throwaway-type flue gas desulfurization systems commercially available, lime and limestone scrubber systems are the most technically advanced, based on operating experience and system availability. One additional throwaway scrubber system is the double alkali process, which may have some advantages over lime/limestone systems. Lime and limestone systems have been demonstrated on commercial installations similar to the proposed lignite-fired units. Double alkali systems are promising, and the chemistry has been demonstrated at a prototype system. All of the aforementioned throwaway systems operate in a similar fashion but use different reactants for SO_2 removal.

The major advantages of a limestone system over lime and double alkali systems are a lower reactant cost and the general availability of limestone in the quantities required. Although a limestone system consumes more power than a lime system, it is less energy intensive since substantial fuel is required to produce limes.

The spray-dryer-type SO_2 removal system is still in the developmental stage, with only two pilot plants planned and no full-size commercial units yet on order. The spray-dryer-type system uses a fabric filter to collect SO_2 and particulate matter from the flue gas stream. As mentioned before, the fabric-filter particulate collector is still in the developmental stage.

A variation of the spray-dryer, utilizing air atomization and SO_2 and particulate matter collection by electrostatic precipitator, is also still in the developmental phase and has not yet been demonstrated to be suitable for full-size power plant applications.

Washing the fuel before combustion to remove sulfur and ash (benefaction) was not considered practical due to the amount of water required, the resulting water disposal problem, and the loss in fuel-handling capability resulting from wet lignite.

The proposed system for SO_2 removal from the flue gas stream is a wet limestone absorption FGD system. The flue-gas desulfurization system will consist of several parallel vessels called "scrubbers" or "absorbers" that mix the SO_2-laden flue gas with a limestone slurry. In the scrubber, SO_2 will react chemically with water and limestone to form a precipitate in the limestone slurry removed by blowing down. The SO_2 in the flue gas will be converted to a sulfate (SO_4) in the precipitate and will be removed from the system as a waste in the blowdown stream. The limestone slurry will be circulated through the absorbers continuously. Inside the absorbers, the limestone slurry will be sprayed into the flue gas stream and will be further dispersed by layers of packing to ensure close contact with the flue gas so the chemical reaction can take place.

Nitrogen Oxides (NO_x)

NO_x emissions will be controlled by burner design, burner arrangement, and furnace design. The only other methods of controlling NO_x considered were different forms of boiler design, such as flue gas recirculation and staged combustion, which were offered by various boiler manufacturers during the plant predesigning phase. NO_x scrubbing was not considered because this method is not yet commercially available. Various boiler operating modes, such as low excess air firing, reduced air preheating, and reduced load operation, were also not considered as these are not positive means of controlling NO_x, but preventative measures that rely on "off-design" operating to reduce NO_x emissions.

Boiler furnace design and arrangement of burners will be coordinated to increase the burner-zone cooling surface, reducing the burner-zone heat release rate and flame temperature to minimize NO_x formation. The boiler will be equipped with dual-register circular burners that utilize an inner and outer burner register. Initial burning of the fuel will occur near the burner in a fuel-rich atmosphere. The balance of the secondary air will be introduced through the outer register. This additional air will complete combustion and will maintain an oxidizing atmosphere near the furnace walls, resulting in lower NO_x formation.

Flue gas recirculation inhibits NO_x formation by reducing combustion temperature and oxygen concentration in the burner zone. Flue gas recirculation requires additional ductwork, dust collection equipment, and gas recirculation fans. These fans are often very troublesome because they must handle a flue gas laden with sintered fly ash, which can cause premature fan erosion. Additionally, the fly ash collected in the mechanical separators must be disposed of, which requires more fly-ash removal equipment. Although some fly ash can be removed using flue gas recirculation, no credit can be taken in the sizing specifications for the main particulate collection equipment.

Staged combustion also inhibits NO_x formation by reducing burner-zone combustion temperature and oxygen concentration. In staged combustion, an insufficient quantity of air is admitted with the fuel at the burners. This reduces available burner-zone oxygen and causes a lower combustion temperature, thereby reducing NO_x formation. Additional air is added through excess air ports at the top of the burner zone to assure complete fuel combustion.

Fly Ash Removal

Alternative fly-ash removal systems considered were the vacuum-type removal system and the pressurized, pneumatic-type removal system.

In the vacuum-type removal system, air under slightly negative pressure is used to draw the fly ash through the pipeline conveyor. The motive force (vacuum) is supplied by vacuum-producing equipment that requires large quantities of water. Some water and fly ash get mixed, no matter how stringent the methods used to keep them separated. The ash/water mixture creates another disposal problem. The capacity of the vacuum-type system also is limited because the amount of vacuum produced is limited. With lignite, a lot of fly ash occurs, which will require many parallel vacuum systems to meet removal capacity requirements. Operating facilities using this type of system have experienced considerable operational and maintenance difficulties.

An alternative vacuum-type system considered was to produce a vacuum by using mechanical vacuum pumps. However, small amounts of fly ash still manage to reach the vacuum pumps and cause mechanical problems. Also, the capacity of the system is limited by the amount of vacuum produced.

Fly ash collected in the electrostatic precipitators will be removed from the precipitator hoppers by a pressurized, pneumatic-type removal system. The pressurized removal system will essentially use air under positive pressure to blow the fly ash through a conveying pipeline to the fly ash storage silo. The motive force (pressurized air) will be supplied by rotary blowers. Once in the storage silo, fly ash will be removed for blending with waste sludge from the SO_2 removal system.

Use of Tall Chimneys for Pollutant Dispersion

The electric power industry has, in many instances, employed the tall chimney in an attempt to maintain reasonable ground-level air quality in the vicinity of power-generating stations. Debate is active, however, both nationally and internationally, regarding the effectiveness of these chimneys in overall pollution management.

An EPA-supported research program conducted to determine the local areal extent and effects of power plant emissions from tall chimneys found that tall chimneys serve to reduce and, in some cases, eliminate the significant ground-level pollutant concentrations that occur when using short chimneys (Schiemeir, 1972).

Since the ambient concentration of pollutants is the primary control criterion, the effective height of emission is a very important parameter. The height of emission is determined by two additive factors, the height of the chimney and the height of plume rise due to buoyancy and momentum. The plume will continue to rise as long as the flue gas temperature exceeds that of the ambient air.

The thermal rise achieved by particular emission rates and reduction of ground-level concentrations in specific cases have been subjects of controversy. It is clear, however, that increased chimney height and thermal rise will result in lower ground-level ambient effluent concentrations. Notable benefits derived from the use of tall chimneys include the following:

(1) A tall chimney located in open, uncomplicated terrain will significantly reduce local ground-level concentrations of gases and small particles, compared to release of the same emission at a lower level.

(2) A tall chimney can effectively remove a plume from special localized wind circulation patterns, such as aerodynamic downwash, that tend to return pollutants to ground level in higher than normal concentrations.

(3) A tall chimney of the proposed height of 525 feet could emit a plume in an inversion that, because of its height, would dispense at greater distances and result in lower ground concentrations at point of impact.

EPA now has regulations limiting theoretical stack heights; SWEPCO will comply with these requirements and achieve dispersion under air quality criteria. The proposed stack meets the tall stack guidelines for credit given during modeling emissions.

3.4.2.4 Waste Treatment Systems Alternatives

Sanitary Waste Disposal Systems

Three sanitary waste systems were considered for the proposed Henry W. Pirkey Unit-1 Power Plant Project: 1) existing sewage treatment plant; 2) septic tank; and 3) packaged plant.

Existing Sewage Treatment Plant

The sewage treatment plant nearest the proposed power plant site is located in Longview, approximately 10 miles to the northwest. Piping sewage this distance would be unacceptably costly, so this method of disposal was eliminated from consideration.

Septic Tank

A relatively large volume of sewage will be generated during both construction and operation of the plant. Although small-volume (residential) septic tank systems may be feasible given the soil conditions in the site area, the permanent ground-water level would affect the disposal of large volumes of wastes, resulting in adverse environmental effects. On these grounds, this waste disposal technique was deemed unsuitable.

Packaged Plant

A packaged extended aeration unit with secondary treatment and chlorination is the sanitary waste disposal system chosen for use at the proposed Henry W. Pirkey Power Plant-Unit 1. The permanent sanitary waste system will discharge to the ash pond system. An effluent discharge permit application has been completed and forwarded to TDWR. (Impacts are discussed in Sec. 4.2.2.4). Maintenance and operations of this system will be performed by SWEPCO.

3.4.2.5 Wastewater Handling Alternatives

$\underline{SO_2}$ Removal System/Sludge-Treatment System Drains

Rainwater runoff, housekeeping drains, equipment drains, and system emergency bleeds from the SO_2 removal system and from the sludge treatment facility will all be collected and routed to a "surge" pond, an impervious holding basin, and allowed to settle. From the surge pond, the decanted water will be pumped back to the SO_2 removal system as makeup, or processed through the wastewater treatment system. Sedimentation will be removed from the pond periodically and conveyed to the sludge-treatment system, where it will be processed like SO_2 removal system waste slurry. If the drains or bleeds contain a large percentage of solids, they will be routed to an "auxiliary surge" pond, where they will be allowed to further thicken by evaporation. This thickened material will be removed from the pond and processed through the sludge-treatment system. Any water decanted from the contents of the auxiliary surge pond will overflow into the surge pond and will be returned to the SO_2 removal system as makeup. There will be no discharge of SO_2 removal system contaminated water.

Boiler Blowdown

Boiler blowdown will be routed to the bottom ash basin and mixed with the ash sluice water. The quality of the boiler blowdown water will be good compared with other plant waste streams, including the bottom-ash basin blowdown. Alternatives considered were (1) using the blowdown as makeup to the unit's demineralizer and (2) treating the blowdown in the wastewater treatment system. Using blowdown as demineralizer makeup would require large storage tanks to store and cool the blowdown until the need for demineralized water developed and the demineralizer began to operate. This method was less economical than routing the blowdown to the ash basins. Routing the boiler blowdown to an equalization basin and treating it in the wastewater treatment system was also considered. This is discussed in the section on bottom ash blowdown.

Demineralizer Wastes

Demineralizer regenerant wastes, pretreatment system clarifier blowdown, and general water-treating area chemical drains will be routed to a chemical sump, then pumped to the surge pond and finally travel to the wastewater treatment system or the reclaim sump for use as plant water makeup. The acidic constituents of these wastes will be neutralized by the alkaline constituents of the demineralizer wastes. The only alternative considered was routing the demineralizer wastes to the ash basin wastewater treatment system.

Metal Cleaning Wastes

Waste generated during chemical cleaning of the boiler (performed once every several years) may be routed to the metal cleaning waste pond. If discharge is necessary, this waste will then be routed through the wastewater treatment system. Disposal in the bottom ash basin was considered, but regulatory requirements preclude this alternative without prior treatment for removal of dissolved metals.

Ash Hopper Overflow

Excess water added to the ash hopper for cooling, flushing, and sealing will overflow into the ash hopper pit sump. From there, the water will be pumped to the bottom ash basin and mixed with the ash sluice water.

Bottom Ash Blowdown

In addition to bottom ash sluice water, boiler blowdown and ash hopper overflow will be routed to the bottom ash basin.

In the ash basin, these wastes will mix with the ash system sluice water. In some cases, the chemical composition of the various waste streams will tend to neutralize the bottom ash water, but usually not to any marked degree.

In addition to adding liquid volume to the basins, the wastes will cause an increased concentration of dissolved solids. To regulate volume and to help control solids buildup, a blowdown stream from the bottom ash basins will be used. This blowdown stream will be routed to either the SO_2-removal system, where it will serve as makeup for the scrubber, or to the wastewater treatment system, where it will be treated (if the SO_2-removal system is inoperative).

Bottom ash will not contain any trace metals that would result in a discharge in excess of any water quality standards, criteria, or limitations. Bottom ash system blowdown will be discharged to the cooling system reservoir.

Lignite Pile Runoff

Runoff water and sump discharges from all the lignite storage pile and handling facilities will be collected and routed to the lignite-pile runoff basin. Here, the water will be allowed to settle. The lignite pile runoff water will be subject to regulation under applicable sections of 40 CFR 423. These standards of performance require that the pH of the effluent be within the range of 6.0 to 9.0 and the TSP be less than 50 mg/l. If the pH and suspended solids are within acceptable limits, the water will be discharged. If additional treatment is required, the water will be routed to the wastewater treatment system.

Wastewater Treatment System Effluent

The wastewater treatment system effluent will be routed back to the cooling reservoir. The only alternative would have been to pump this water to the Sabine River. This is not considered necessary at this time.

Wastewater Treatment System Drains

Wastewater treatment system clarifier blowdown, equipment drains, equipment overflows, and system recycle flows will be routed to the previously mentioned "surge" pond. There, the wastes will settle and the decanted water will be pumped back to the SO_2 removal system as makeup.

Low-Volume Wastes

The following miscellaneous plant drains, not requiring treatment, will be routed directly to the cooling reservoir: roof drains, storm drains, electrical manhole sump pump discharges, demineralized water storage tank drains, and uncontaminated plant runoff.

Miscellaneous plant drains will be routed to the cooling reservoir through a drain collector pit (with oil separator) because (1) they may contain trace amounts of oil in case of accidental spillage or, (2) routing will be easier to the collector pit than directly to the cooling reservoir because of source location. These plant drains are as follows: fuel oil pump drains, turbine oil room drains, transformer drains, turbine oil tank drains, water treatment building drains (clean), pretreatment drains (clean), and filtered water tank drains.

Cooler Drains

Service water used in various plant equipment coolers will be collected in a common header and returned to the plant's circulating water system. From there, the water will go to the cooling reservoir. Before being discharged into the circulating water system, the equipment cooler drains will be monitored.

Service-Water Strainer Backwash

Backwash from the service-water strainer will be routed to the plant's circulating water system and, from there, to the cooling reservoir. In the cooling reservoir, the suspended solids in the backwash water will settle out.

An alternative method would have been to collect the backwash in a low-volume equilization basin and then route the volume through the wastewater treatment system at a regulated flow. Since the only unacceptable constituent in the backwash water would be suspended solids, originally from the cooling reservoir, and since the cooling reservoir would provide a much longer retention time for settling, little justification would exist for routing these drains to the wastewater treatment system, which would have increased the system size.

Ash and Scrubber Sludge Handling and Storage

Bottom Ash Handling

One alternative considered for handling bottom ash was identical to the method selected, except that it used dewatering bins. In this method, the ash sluiced from the bottom ash hopper would be directed to these dewatering bins. Here, the water would be drained off and stored in a holding pond and pumped back to the plant to be reused in the sluicing operation. The dewatered ash would be trucked to the ash basin for storage and eventually sold off-site, disposed of, or used on-site. This system was not considered economically feasible due to the high cost of extra equipment and the additional holding pond required.

Another alternative considered was the drag-link, wet-ash extractor system, where a drag-link conveyor removes the bottom ash from a shallow ash hopper beneath the boiler continuously. Once removed, this ash would be trucked, sluiced, or conveyed to bottom ash basins for storage. This system was not considered economically feasible, nor readily available from domestic suppliers.

Bottom ash produced by the boiler will be collected in a bottom ash hopper under the boiler and hydraulically sluiced to one of two bottom ash basins periodically. The sluice water will be decanted and pumped back to the plant to be used again in the sluicing operation. Bottom ash will be sluiced approximately 3 hours during every 8-hour shift. Bottom ash will be stored in the ash basins. Periodically, the basins will be drained and the bottom ash will be removed and sold for use off-site, disposed of, or used on-site. Two basins would be provided so that one can be cleaned while the other is in use.

Economizer Ash Handling

Large particles of fly ash will be collected in the economizer hoppers under the boiler rear pass. As the fly ash settles out in the hoppers, it will be removed by gravity and stored in two dry volume storage tanks. Periodically, the ash will be removed from the two storage tanks by a pneumatic-type, vacuum pipeline transporting system and will be conveyed to an air separator. The transported air will be separated from the ash/water mixture produced by the vacuum equipment. This clean air will be discharged. The ash/water slurry will flow to the bottom ash basins through the bottom ash hopper discharge lines. In the basin, the water will be decanted off and returned to the plant for reuse in the sluicing process.

The only alternative to this method considered was to store this ash in two water-impounded storage tanks and to use jet pumps to sluice the stored water and ash to the ash basins. Because this ash could possibly plug and solidify when stored wet, this alternative was rejected.

SO_2 Removal System Sludge Handling

Landfill — Waste slurry blowdown from the SO_2 removal system will be dewatered, blended with fly ash from the storage silo, and trucked to an on-site landfill for disposal. Dewatering of the SO_2 removal system waste slurry will be accomplished by passing the slurry through parallel thickeners and then through parallel rotary-drum vacuum filters. Water decanted from the sludge will be returned to the SO_2 removal system as makeup. If the SO_2 removal system is not operating, but sludge is still being dewatered, the water will be sent to the plant wastewater treatment system.

From the vacuum filters, the dewatered sludge will be conveyed to mixers where fly ash from the storage silo will be blended with the sludge. From the mixers, the dry sludge will be conveyed to a truck load-out area, where it will be loaded into trucks and transported to the landfill site for disposal.

A lime additive system will be included in the sludge treatment facility to provide the capability of producing higher-strength dry sludge for lining the disposal area. The system includes 100 percent redundancy so that any piece of system equipment can fail without reducing the system's capacity.

The proposed landfill(s) will be designated tract(s) of land owned by SWEPCO. A total volume of 15,517 acre-feet is required for the life of the project (24 years). The area(s) will be divided into landfill cells. Topsoil will be excavated from the landfill cell site. Fixed ash will be placed in the cell as a lining base, if required. The area will be filled to an appropriate depth and a cap of fixed waste placed on top. The landfill cells will then be covered with topsoil and vegetated. Sediment ponds will be required to receive and treat runoff during the landfill operation. The completed landfill waste will be isolated from ground-water and surface water systems (see Sec. 4.2.2.4). Surface water treatment during the landfill operation may be required.

<u>Return to Mine</u> — For this alternative the waste would be returned to the valleys between spoil ridges in a fixed state for disposal prior to spoil grading. The operational feasibility of this alternative in all weather conditions is uncertain. The potential for the development of hazardous leachate from the fixed ash wastes is unknown and will require further research under field conditions. There also exist liabilities associated with this disposal method if these wastes are declared to be hazardous by State or Federal environmental regulatory agencies. The EPA has temporarily determined these wastes to be non-hazardous. However, this is currently undergoing study, and a determination will be made at a future time.

<u>Reclamation</u> — There is a possibility that the ash/sludge waste could be used as a soil amendment (substitute for lime) during reclamation in the adjacent

lignite mine. The potential for this utilization of the waste will require considerable feasibility research. The major advantage of this scheme, if practical, is that it would provide for a final disposal of the waste and at the same time reduce the cost of reclamation.

Mill Rejects — Pyrites and tramp metal incapable of being ground by the boiler pulverizers (mills) will be rejected by the pulverizers and collected in individual hoppers located on each pulverizer. Periodically, rejects will be sluiced hydraulically to a common pyrite storage tank. Pyrites will be removed from this tank from time to time and hydraulically sluiced to the bottom ash basins. As with bottom ash, the sluice water will be decanted to the basin and returned to the plant to be used again in the sluicing operation.

One alternative considered was to dump the mill rejects on the boiler room floor and remove them manually. The rejects would then be trucked to a disposal site. This method was rejected because it would create housekeeping problems.

Another alternative considered was to sluice the rejects from each individual pulverizer hopper to the bottom ash hopper. The mill rejects would then be sluiced to the bottom ash basin simultaneously with the bottom ash. This method was not used because introduction of pyrites into the bottom ash hopper could cause water to splash on the hot tubes forming the floor of the boiler furnace.

3.4.3 Alternative Transmission Facilities

In order to tie the Pirkey Power Plant into its bulk transmission system, SWEPCO evaluated several transmission alternatives. One alternative considered was to build a 345 kV line to Shreveport and a 345 kV line to the Knox Lee Power Plant. The other alternative was to rebuild and tie into the 138 kV lines that exist in the plant area. The alternative of building 345 kV lines was rejected because of the higher cost as compared to the rebuilding of the 138 kV lines existing in the plant area.

The preferred alternative is to rebuild the existing lines. Approximately 11.7 miles of new 138 kV line and ROW will be required. A description of the proposed transmission facilities is provided in Sec. 3.5.1.11.

3.4.4 Alternative Makeup Water Facilities

3.4.4.1 Sources of Makeup Water

Local Municipalities

No local municipalities provide water service to the plant site area. It is unlikely that if such service was available, the quantities of water needed for makeup could be provided by existing municipal systems. Therefore, this alternative was rejected.

Sabine River

The nearest major surface water system to the power plant site is the Sabine River, located two miles to the south. The Sabine River Authority was contacted regarding availability of water and it was determined that upsteam industrial facilities had prior water rights claims on the existing water in the basin. Also, it was determined that the flow in the Sabine River during low-flow conditions was inadequate to provide needed makeup during drought conditions. Therefore, this alternative was rejected.

Cypress Bayou

The nearest major surface water system to the power plant site, discounting the Sabine River, is the Cypress Bayou Basin, approximately 20 miles to the north. The Northeast Texas Municipal Water District advised that sufficient water was available in storage at Lake O' the Pines to meet the projected water needs of the proposed facility. Therefore, this alternative was selected, despite the lengthly distance of transport.

3.4.4.2 Intake Structure Design

The same screen-type alternatives were considered for this structure as were considered for the cooling reservoir intake structure, which are discussed below in Sec. 3.4.4.4. However, fixed panel screens were selected for use over travelling screens due to the remoteness of the location from the plant site, an important consideration since travelling screens must be operated at their location. The intake velocity of water entering the pump house will be 0.5 feet per second or less, thereby minimizing impingement and entrainment of aquatic organisms. Fixed panel screens have proven effective at other similar installations.

Several alternative pump house locations were considered, including off-shore submerged, off-shore surface, and inland embayment. With the off-shore submerged intake structure, water would be withdrawn through a submerged inlet located in the Big Cypress Bayou channel. This alternative would be costly to construct and would be difficult to maintain. An off-shore surface intake would have these same disadvantages and might pose a hazard to navigation in Big Cypress Bayou. The inland embayment would require some excavation to create a channel inland from the shoreline to the pump house. Such channels have been found to be attractive to certain fish species and would therefore increase the potential for impingement and/or entrainment.

3.4.4.3 Makeup Water Pipeline

Six alternative pipeline routes were evaluated and are presented in Fig. 3-2. The preferred route was selected because of environmental, engineering,

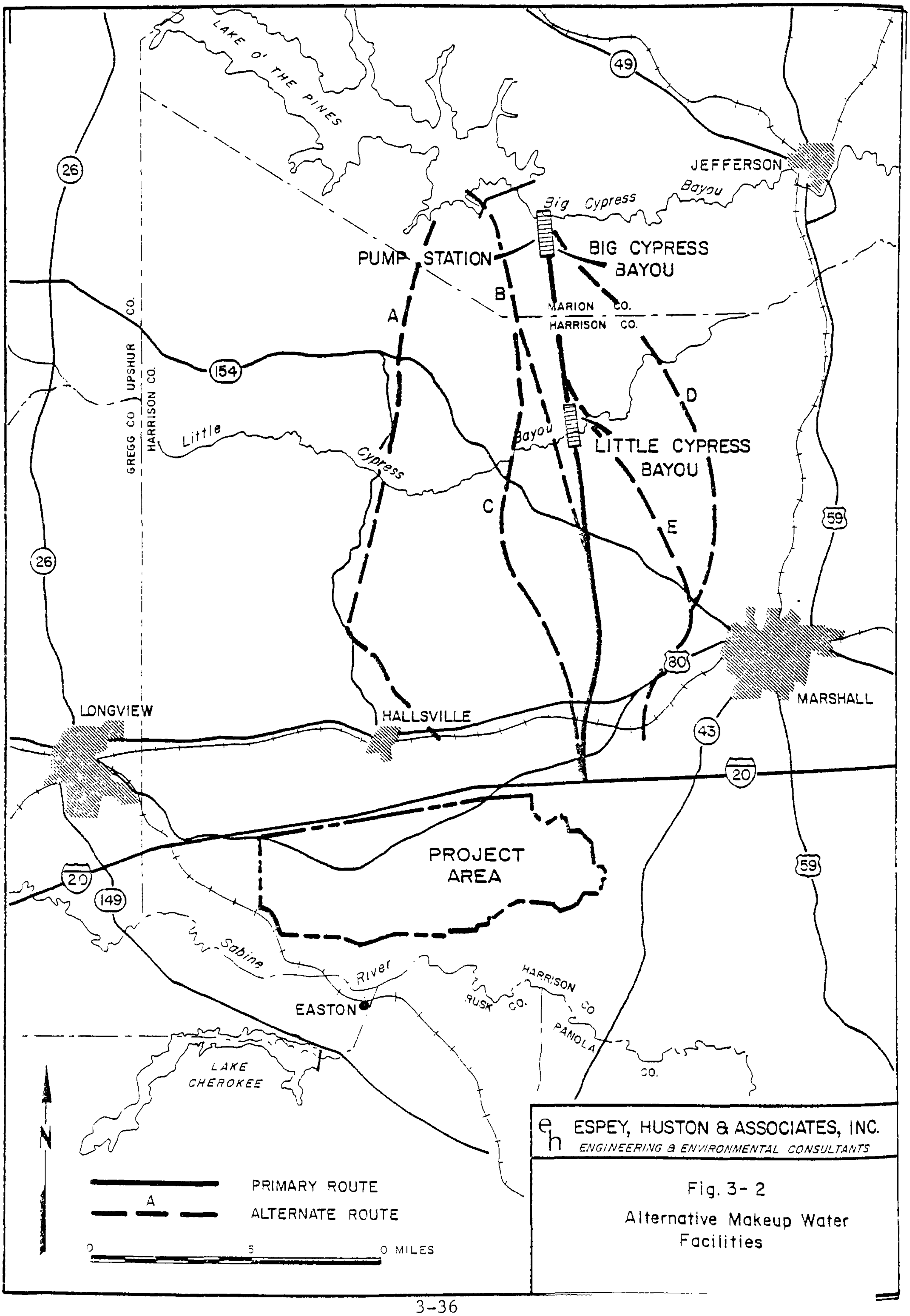


Fig. 3-2

Alternative Makeup Water Facilities

and economic constraints. This route is also the shortest of the alternative routes considered.

3.4.4.4 Circulating Water Intake Structure Design

The proposed circulating water intake structure for the Henry W. Pirkey Power Plant - Unit 1 will consist of a screen house located within a bay on the shore of the cooling reservoir. This screen house will contain circulating water pumps, service water pumps and strainers, a fire pump, and debris-removal equipment. Five types of intake screens were evaluated: 1) inclined screens; 2) fixed panel screens; 3) horizontal screens; 4) revolving screens; and 5) conventional vertically rotating screens.

Inclined Screens

The inclined traveling screen is a modification of the conventional vertically traveling screen; its advantages and disadvantages are similar. Relatively few installations use these screens as they usually experience debris loading that is very heavy or of a nature that does not readily adhere to a screen. The longer screen well required, along with other minor variations from the conventional vertical screen design, make the inclined screen slightly more expensive.

Fixed Panel Screens

Fixed panel screens are mounted upstream of the pumps in vertical guides that allow them to be raised above the surface of the water. A serious drawback of these screens is that operators must be immediately available to remove and clean the screens in the event of a limiting head loss. The possibility always exists for a sudden heavy debris load to completely clog the fixed screens, causing plant shutdown and possible collapse of the screens. Although the single main advantage over conventional vertically traveling screens is a savings in costs of mechanical equipment and maintenance for the screen drives and spray wash pumps, actual operating costs for the fixed screens may be higher if manual cleaning is required frequently. Due to these factors, many fixed screens originally installed for economic reasons have had to be replaced with traveling screens.

Horizontal Screens

The specific design purpose of the horizontal screen is to protect fish and, as such, is a major advance in mechanical screening technology. This screen is still in the experimental stage, however, and it will be some time before installment in major steam electric power plants is economically feasible.

Revolving Screens

Vertically and horizontally revolving drum screens have never been used at a United States power plant. Although these screens permit the return of fish to a body of water, they offer no special advantages for fish protection over other common screens and require a very large screen structure to limit approach velocities to those optimal for fish survival. In the case of the proposed cooling reservoir, returning fish to the pond is of little advantage as there is no current to carry fish away.

Conventional Vertical Traveling Screens

The conventional vertical traveling screen is the most common mechanically operated screen for power plant intakes in the United States. Other economically and technically feasible intake structure designs exist, but none are considered as efficient and reliable as the conventional vertically rotating (traveling) screens with bar grill. It performs efficiently, has a long service life, requires little operational and maintenance repair, applies to almost all water screen situations, and readily adapts to changing water levels. A standard 3/8-inch screen mesh will be used because it not only allows effective water passage, but also reduces the potential entrainment of aquatic organisms.

Deterrent Devices

Techniques other than traveling screens to divert fish from intake structures include sonic and electrical devices, water jets, hanging chains, and bubble screens. These devices have been termed "behavioral" screening systems since their effectiveness depends, at least to some extent, on their ability to induce fish to avoid them without using mechanical barriers.

The success of experimentation with sound generators has been limited. Preliminary testing has indicated that fish can become conditioned to low frequency sounds and have only limited responses to very high frequencies (US DOI, SSFR 403; Maxwell, 1973; Moorehouse, 1953). Also, increased noise levels have been correlated with detrimental effects on fish growth (Banner and Hyatt, 1973).

Results of experiments with electrical current barriers are conflicting. The use of electric fields with intake canals is generally discouraged because contact with the field can so disable fish that they drift into the intake structure.

Considerable variation exists in response of fish species to air bubble screens (Maxwell, 1973). Moderate success has been achieved in diverting schools of fish, but individuals respond unpredictably. Since avoidance of this barrier depends upon its visibility to fish, success at night or in turbid water is limited (Riesbol and Gear, 1972; Mayo et al., 1972).

Water jets, hanging chains, and other visual-mechanical systems also have limited effectiveness (Raney, 1972). Numerous other combinations of physical and behavioral systems for separating aquatic organisms from intake water have the potential for improving fish protection, but further investigation is needed before complete evaluations can be made.

3.4.5 Alternative Railroad Systems

Four alternative railroad routes were established and evaluated for connecting the proposed power plant with existing railway facilities (Fig. 3-3). The railroad spur facilities will be used for delivery of materials during power plant construction and for delivery of limestone and other supplies during plant operation.

As is shown in Fig. 3-3, the alternative routes involved either connecting to the Atchison, Topeka and Santa Fe Railroad (AT&SF) to the southwest or west (Alternates A and B) or connecting to the Texas and Pacific Railroad (T&P) to the north (Alternates C-1 and C-2). Alternate A parallels I-20 to a point where it joins the AT&SF Railroad southeast of Longview. Alternate Route B proceeds southwest of the plant site, crosses the Sabine River, and joins the AT&SF Railroad near Easton. Alternate routes C-1 and C-2 both proceed north from the power plant site and join the T&P railroad. Route C-1 joins the T&P Railroad in an easterly direction, while route C-2 joins it in a westerly direction. Alternate routes C-1 and C-2 are much shorter in length than routes A and B.

Route C-2 is considered the preferred railroad spur route. It is much shorter in length than routes A or B; does not cross the Sabine River; and joins the T&P Railroad in a westerly direction, which is the preferred direction.

3.4.6 Alternate Mining Systems

3.4.6.1 Mine Layout Alternatives

The general area considered for surface mining is bounded by I-20 on the north, the Sabine River on the south, the Henry W. Pirkey Power Plant - Unit 1 complex on the east, and by a north-south line from about 2 miles west of the intersection of I-20 and Clarks Creek, south to the Sabine River on the west (Fig. 1-1). Some 38,300 acres of available lignite are present within this area, and two mine layout alternatives were considered.

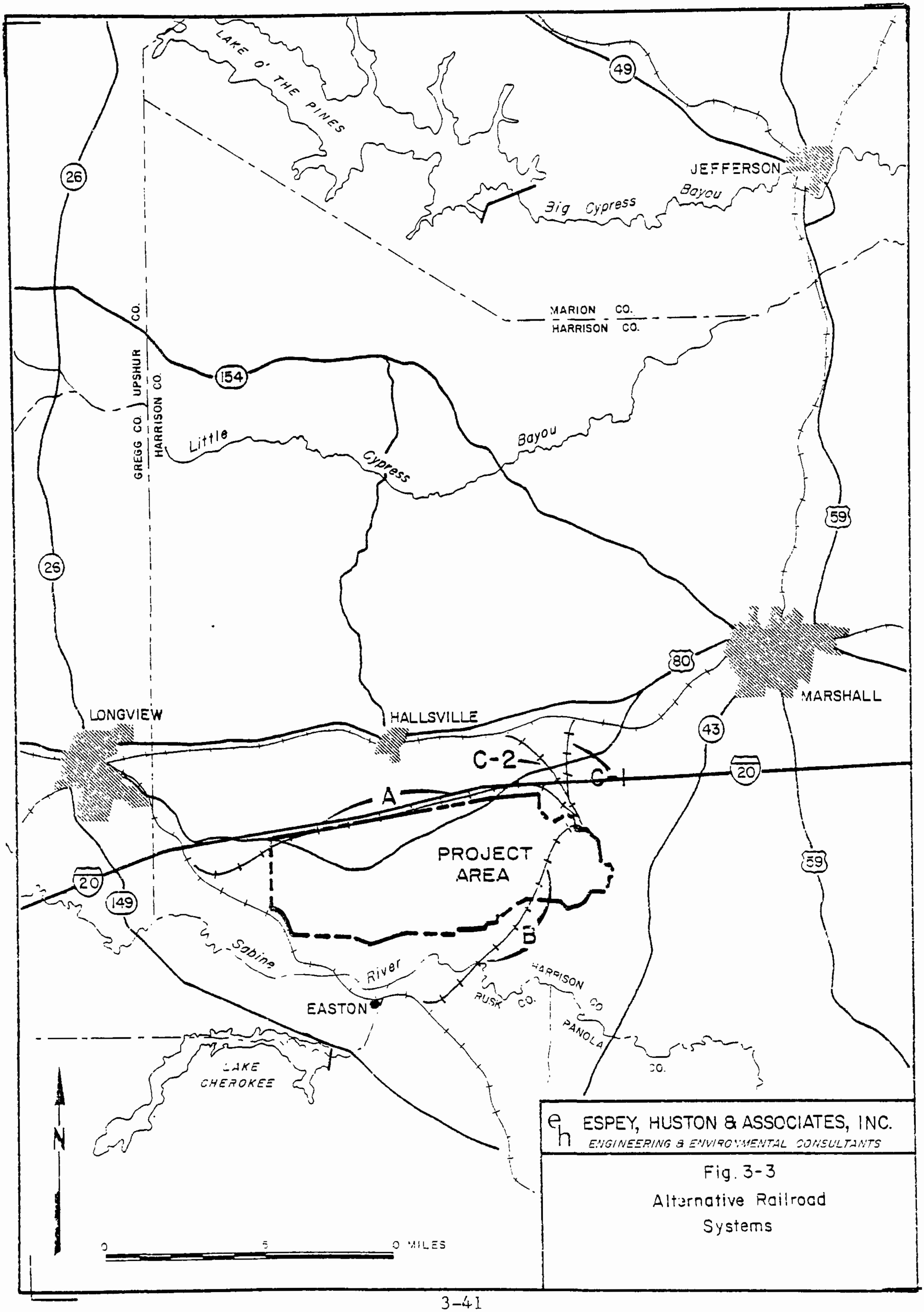


Fig. 3-3
Alternative Railroad
Systems

Total Area

The total area alternative involves mining the entire 38,300 acres of available lignite. Such an operation would require (1) the mining of four streams (Hardin, Rogers, Clarks, and Hatley creeks) and preemption of important riparian wildlife habitats and potential cultural resources areas associated with these streams (particularly Clarks and Hatley creeks) within the project area; (2) mining the entire portion of the Sabine River floodplain and related wetlands, agricultural lands, and potential cultural resource areas contained in the 38,300-acre boundary; and (3) relocation of 13 cemeteries reported in the area.

Partial Area

In the proposed partial area plan, approximately 8,751 of the 38,300 acres available will be surface mined. A portion of the Sabine River floodplain will be mined, and a small portion of Clarks and Hatley creeks' floodplains may be impacted by mining activities. A 100-foot buffer zone will be established around all cemeteries.

3.4.6.2 Mine Operation Alternatives

Lignite Extraction Alternatives

Three alternative mining technologies can be used for coal extraction: 1) underground mining; 2) auger mining; and 3) surface mining.

Underground Mining

Underground mining of lignite is no longer practiced in the United States. Sediments overlying the mineable lignite are largely unconsolidated and would be extremely difficult to support safely and economically. The lignite seam is too thin to leave an appreciable thickness as roof material to provide sufficient vertical clearance for mining equipment and personnel. Mining recovery by the underground room and pillar technique averages about 50 percent of the recoverable resource compared with the typical 85 percent mining recovery by surface mining. Due to the relatively shallow overburden over the South Hallsville Lignite Deposit and the generally flat nature of the topography, underground mining would cause subsidence of the ground surface resulting in shallow depressions. Due to these adverse technical factors and the anticipated high cost of underground mining, this mining method is not suitable for the South Hallsville Lignite Deposit.

Auger Mining

Auger mining uses a horizontal boring-type machine to recover 20 to 30 percent of the coal resource remaining beyond the final cut highwall of a surface mine. This type of mining is most prevalent in steep-slope contour surface mines and has not been applied to any appreciable extent to lignite surface mining. Much of the reserve limit in the South Hallsville Deposit is defined by lignite that is either quite thin or of substandard quality. Final cuts delimited by depth of overburden beyond which lignite could be effectively recovered are excavated in only four places during the life of the project. Resource recovery and the area affected would be negligible. However, keeping augering equipment and trained operating personnel on hand for such limited and occasional use would render the augering operation uneconomic. Keeping the final cut open until augering could be completed would hinder contemporaneous reclamation.

Surface Mining

All lignite presently mined in the United States is surface mined. The lignite seam is exposed by excavating equipment, such as bucketwheel excavators or draglines, and loaded onto a means of conveyance (e.g., haul trucks) by power shovels, backhoes, or front-end loaders. After the lignite has been removed from the mine pit, the pit is backfilled with overburden material removed from the excavation of the next mining cut.

Surface mining will provide a maximum recovery level (normally ranging from 85 to 95 percent) of the proposed South Hallsville Mine's lignite reserve. Also, the potential for ground-surface subsidence is minimal (see Sec. 4.1.3.4, Subsidence), allowing the mine site to be returned to its original or a higher land-use productivity.

Overburden Removal Alternatives

Two overburden removal methods are generally accepted when operating a lignite surface mine: (1) bucketwheel excavator and (2) dragline.

Bucketwheel Excavators

The use of bucketwheel excavators to excavate overburden and conveyors to transport overburden has not been successfully applied on a long-term basis in the United States coalfields. Experience and technology is largely European. Depth of overburden over much of the deposit would dictate a multiple benched bucketwheel system, which would result in larger disturbed areas, as compared to a dragline system.

Draglines

In the lignite region of Texas, draglines are employed extensively for overburden removal. A dragline will work from a bench on the mine pit highwall and cast overburden into a mine cut from which lignite has been previously removed. Dragline pits are normally long (i.e., more than 1 mile long) and relatively narrow, varying from 90 to more than 150 feet wide. During the course of excavation, rehandling excavated material may be necessary when overburden thickness approaches 90 to 100 feet. When slope stability is poor, mining lesser overburden thicknesses may be required to have a highwall with a flatter slope. Under these circumstances, the volume of overburden removed from a mine cut becomes greater than the capacity available within the mined-out pit in the reach of the dragline. To obtain sufficient capacity for the spoil, the dragline will rehandle a predetermined amount of overburden by moving it farther away from the working mine pit. However, in the South Hallsville Mine, the nature and depth of the overburden materials are well-suited to dragline stripping and will result in a minimum disturbed area. Where applicable, the use of draglines for overburden removal has been demonstrated to be the most reliable, most flexible, and least costly stripping method and, therefore, was chosen for use at the South Hallsville Mine.

Lignite-Loading Alternatives

Three lignite-loading methods are generally accepted: (1) power shovel, (2) front-end loader, and (3) hydraulic backhoe.

Power Shovel

Power shovels are employed extensively when loading lignite in Texas. A high breakout force enables a power shovel to remove lignite without blasting or ripping. Shovels can load a haul truck parked on top of the lignite seam, thus keeping trucks off the potentially soft mine-pit floor. Further, crawlers on the shovels provide greater flotation in the event a wet, soft mine-pit floor is encountered during later stages of lignite seam removal. However, the loading arc of a shovel bucket is relatively fixed by machine geometry. This arrangement would result in poor lignite recovery and unacceptable lignite dilution if used on the thin seam of the South Hallsville deposit.

Front-End Loaders

Front-end loaders require good floor conditions to work efficiently since much of their breakout force is gained through driving into the face of the lignite seam. Further, good traction is required to minimize cycle times, and trucks must be loaded while on the mine-pit floor.

Hydraulic Backhoe

Throughout the United States, hydraulic backhoes are gaining acceptance as a primary lignite-loading method. The hydraulic backhoe is diesel powered and has both good mobility and the high breakout force necessary for digging unshot lignite. When loaded by a hydraulic backhoe located on top of the lignite seam, trucks are not required to locate on the mine-pit floor, eliminating potential haulage problems caused by soft bottom conditions. The hydraulic backhoe operator can also maneuver the bucket position to avoid loading waste material, while extracting virtually all the exposed lignite seam.

Lignite Transportation Alternatives

Three methods for transporting lignite to a mine-mouth power plant are generally accepted: (1) conveyors (2) haul trucks and (3) trains.

Conveyors

Use of conveyors to transport lignite directly from the loading machine to the power plant's lignite-handling facility provides a relatively continuous hauling system. Conveyor haulage reduces the need for a complex haul road system. However, conveyor systems must be moved as mining progresses and require a great deal of maintenance.

Haul Trucks

Compared with conveyors, trucks offer the distinct advantage of higher mobility and flexibility. When a fleet of haul trucks is employed, mine production to the power plant can be maintained in the event that several haul trucks are being repaired.

Trains

A rail system would have to be frequently moved as the mining areas advance. Rail systems are quite limited in grades that can be traversed and are economically suited to longer hauls than required at the South Hallsville Mine.

<u>Reclamation Alternatives</u>

Currently two alternative reclamation options are evident. These are (1) total mixed overburden utilization and (2) utilization of near surface oxidized overburden.

The following are four potential scenarios for land use within the mine area following mining and reclamation.

1) The present land use would change from primarily unimproved timber to managed pasture after mining and reclamation.
2) The land use would be returned to the original configuration following mining and reclamation.
3) The present land use would be changed to commercial forest after mining and reclamation.
4) The present land use would be changed to unimproved fish and wildlife habitat following mining and reclamation.

The first scenario is considered to be the preferred alternative for land use following mining and reclamation. Presently, of the leases with local landowners that have been signed call for reclaiming the land to managed pasture following mining. This is the land use preferred by the landowners. The leases would have to be renegotiated if any of the other scenarios were to be followed.

Total Mixed Overburden

Reclamation of total mixed overburden is a common operating procedure in the East Texas lignite fields. However, the application of this reclamation option is somewhat questionable for the South Hallsville Project area.

Overburden core chemical data for the South Hallsville Project area indicate that a total nonsegregated overburden mix might produce surface materials that have high levels of acid-producing materials and soluble salts. Reclamation costs for the "worst case" of this alternative are considered high when compared with a reclamation plan utilizing a segregated zone of near-surface oxidized and weathered materials.

Near Surface Oxidized Overburden

Reclamation success, using a combination of soil and near surface oxidized overburden, seems highly probable. Mine site overburden data indicate that the oxidized overburden is equal to or better than the natural B and C horizon materials. The oxidized overburden data, in particular, percent sand, silt, clay; percent N; ppm K; available water capacity; and acidity for many of the soil series support the utilization potential of this zone as a topsoil (6 inches) substitute. Comparisons between key soil parameters indicate that no significant difference exists between the materials. Consequently, topsoiling may not cause a significant postmining crop performance advantage.

3.5 DESCRIPTION OF PREFERRED ALTERNATIVE (Proposed Project)

A description of the proposed Henry W. Pirkey Unit 1 Power Plant site facilities is presented in Sec. 3.5.1. A description of the preferred alternative for the proposed South Hallsville mine is presented in Sec. 3.5.2.

3.5.1 Plant Systems and Operating Procedures

Preliminary arrangement of the major facilities for Unit 1 of the proposed H.W. Pirkey Power Plant is shown in Fig. 3-4. Provisions for a future second unit are indicated. Orientation of the proposed plant site facilities is shown in Fig. 3-5.

3.5.1.1 Boiler and Steam-Electric System

The proposed steam generator is a Babcock and Wilcox balanced draft, single-reheat, drum-type boiler, designed for opposed firing of pulverized lignite. The unit will be rated at 4.9 million pounds of steam per hour, with superheater outlet pressure of 2,600 psig and 1,005°F. The proposed turbine is a Westinghouse Electric four-flow, tandem-compound, reheat-type, with 28.5-inch, last-stage blades. The turbine will have throttle-valve steam conditions of 2,500 psig and 1,000°F. The electric generator will be inner-cooled with hydrogen gas at 75 psig and stator-cooled with deionized water.

The unit will have seven stages of regenerative feedwater heating, with extraction steam for heating taken from the turbine. The lowest stage heater will be a split-shell, horizontal-type mounted in the condenser neck. Five feedwater heaters will be a single-shell, vertical-type located in the turbine room. The deaereating heater is an open type horizontal heater located outdoors on the boiler structure.

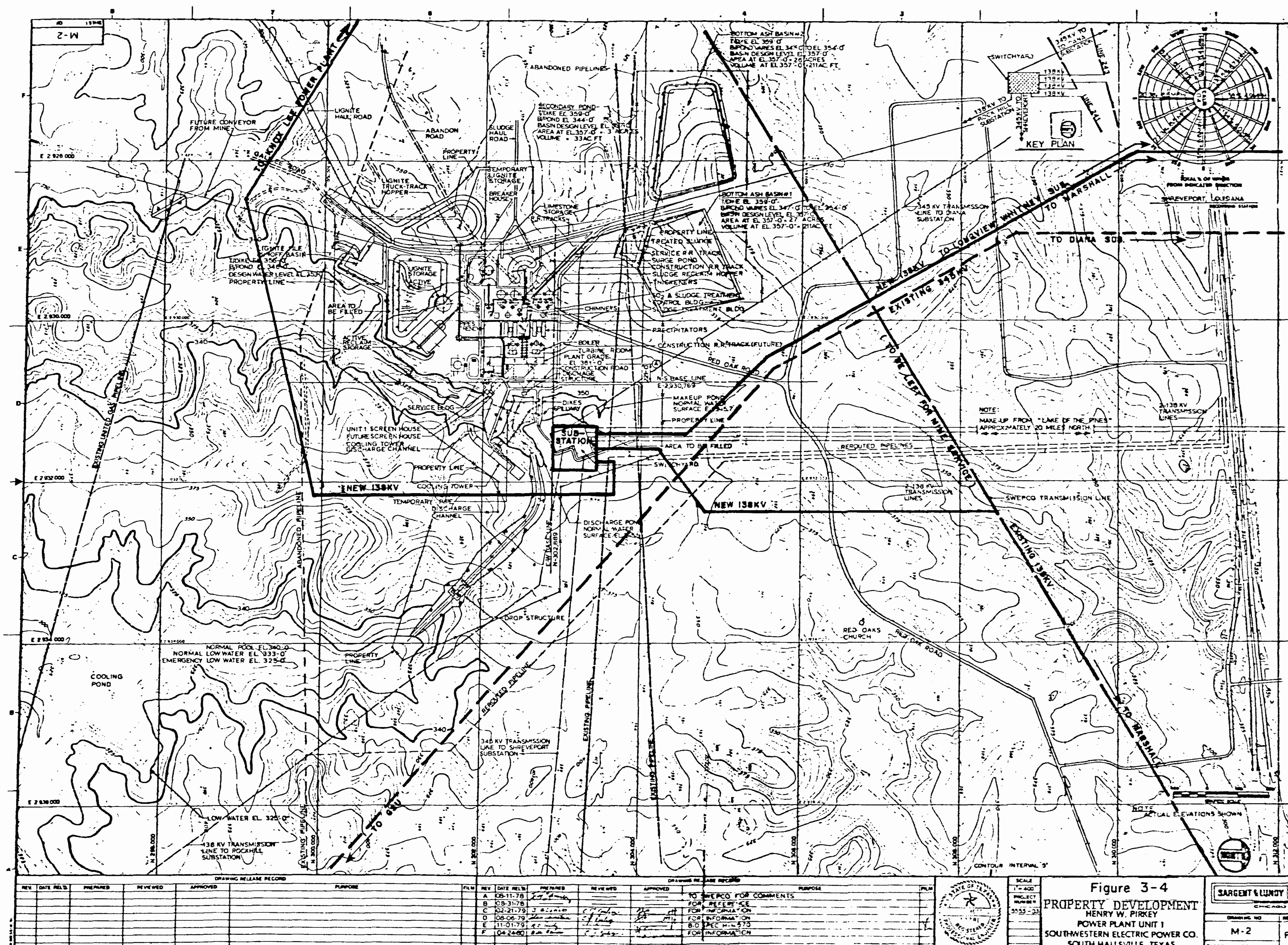


Figure 3-4
PROPERTY DEVELOPMENT
HENRY W. PIRKEY
POWER PLANT UNIT 1
SOUTHWESTERN ELECTRIC POWER CO.
SOUTH HALLSVILLE, TEXAS

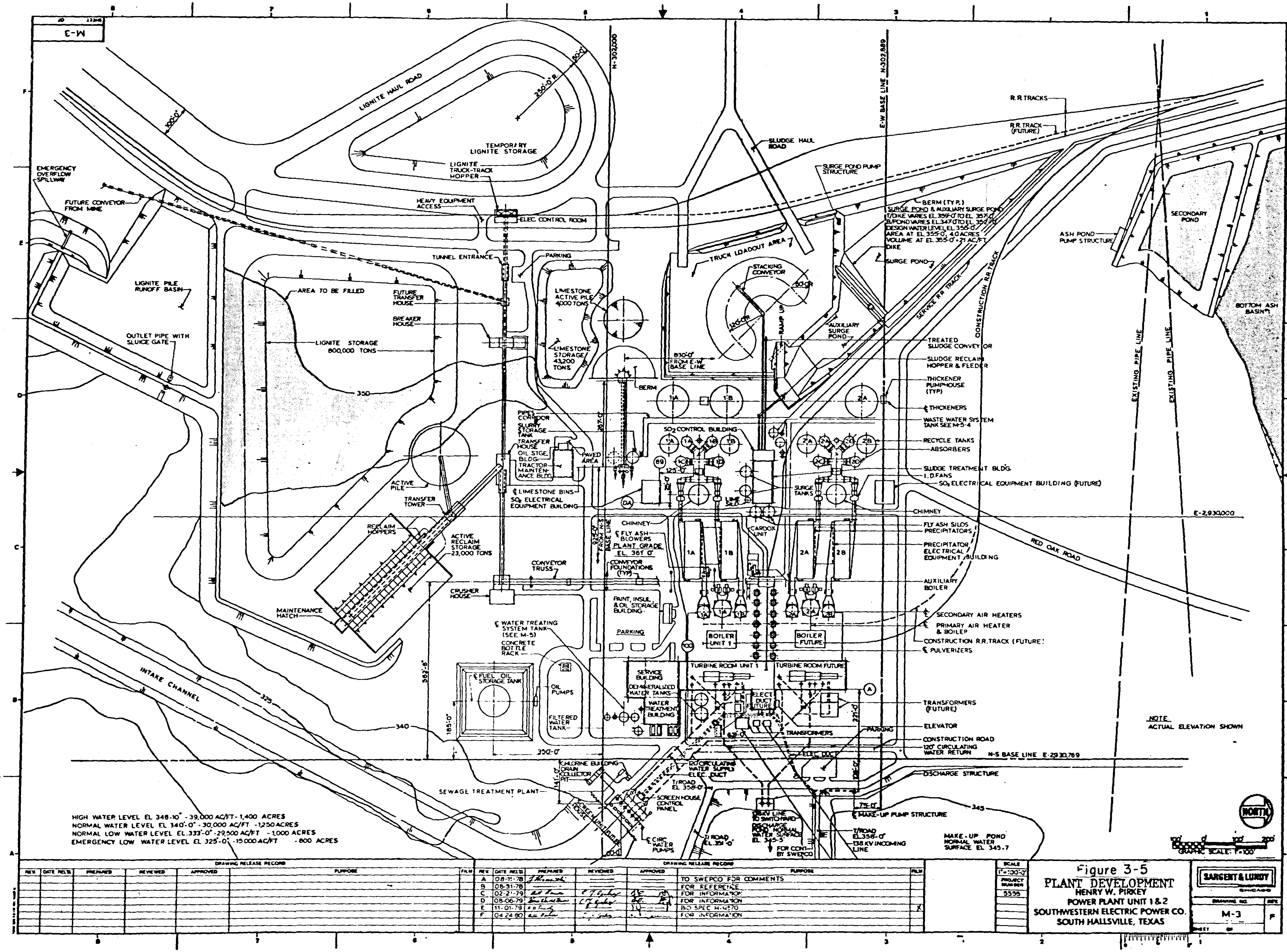


Figure 3-5
PLANT DEVELOPMENT
HENRY W. PIRKEY
POWER PLANT UNIT 1 & 2
SOUTHWESTERN ELECTRIC POWER CO.
SOUTH HALLSVILLE, TEXAS

The turbine will be operated with a combination sequential-valve/sliding-pressure (hybrid) procedure. The boiler will be operated from maximum continuous rating, down 70 percent, turbine throttle flow by maintaining a constant superheater outlet pressure of 2,600 psig and by operating a sequential valve on the turbine. Below 70 percent throttle flow, the turbine valve position will be kept constant and the boiler superheater outlet pressure will be varied by adjusting the firing rate on the boiler.

When operating at maximum continuous rating, each unit will generate from 707 to 720 MW (depending on condenser backpressure). Approximately 8 percent of the power generated by the unit will be consumed by various unit auxiliaries, which leaves about 640 MW leaving the plant as marketable power.

The boiler is designed to burn lignite from an adjacent surface mine immediately west of the plant site. The unit will consume approximately 541 tons of lignite per hour. The lignite will be delivered to the plant by 120-ton bottom dump trucks. The seven lignite storage silos in the main plant unit will hold about a 12-hour supply of fuel. An inactive storage pile of 800,000 tons will be located on the plant property and will hold about a 60-day supply of fuel. Additionally, a ready supply of lignite (23,000 tons) will be stored in the active reclaim structure.

3.5.1.2 Heat Dissipation System

Steam exhaust from the turbine will be condensed in Foster Wheeler twin-shell, single-pressure, two-pass surface condensers, each with a surface area of 371,200 square feet and a design backpressure of 4 inches mercury absolute. Each condenser will contain 44,656 1-inch, 20 BWG copper-nickel tubes, each 30 feet long. Cleanliness of the tubes during operation will be maintained at 95 percent by screening incoming water and by chlorine treatment of the circulating water system. A small auxiliary condenser will condense the small amount of steam used to drive the feedwater pump turbine.

3.5.1.3 Cooling Reservoir

Circulating water for condensing the turbine exhaust steam will be provided by a cooling reservoir, formed by constructing a dam across Brandy Branch. Maximum temperature of the water supplied to the condenser will be 102^{O}F. When passing through the condenser, the water temperature will be raised to 120^{O}F.

The area of the cooling reservoir at normal pool elevation (340 feet msl) will comprise about 1,388 acres, and the capacity will be about 29,500 acre-feet. Due to surface irregularities, the effective area for cooling will be about 985 acres and effective capacity will be about 25,033 acre-feet.

Makeup for the cooling reservoir will be pumped from Big Cypress Bayou, approximately 1 mile south of Ferrell's Bridge Dam (Lake O' The Pines) and will be stored in the makeup pond adjacent to the cooling reservoir.

An emergency spillway will be provided so the cooling reservoir can overflow to Brandy Branch. Some seepage is assumed to occur through the dam, which will serve as blowdown for the cooling reservoir.

3.5.1.4 Makeup Water Pipeline and Intake Structure

Makeup water will be withdrawn from Big Cypress Bayou below Ferrell's Bridge Dam for transfer by pipeline to the cooling reservoir. SWEPCO has contracted with the Northeast Texas Municipal Water District for purchase of the makeup water and has obtained necessary permits from the TDWR for the withdrawal and use of this water. Additionally, SWEPCO has received a Section 404 Permit from the U.S. Army Corps of Engineers (USCE) for the pipeline and intake structure (July 30, 1981, see Sec. 5.0).

Figure 3-6 shows the proposed location of the makeup water intake and pump station on the bank of an unnamed oxbow of Big Cypress Bayou, approximately 1 mile below Ferrell's Bridge Dam.

Approximately 10,000 cubic yards of native material will be dredged from an abandoned creek running from the water's edge to the pump station site, a distance of about 400 feet (Fig. 3-7). The dredge material will be deposited on dry land as fill for the pump station site. Dredging operations will be performed by dragline, backhoe, clam shell, conventional scraper, and/or truck combination. The channel bottom will be 10 feet wide, expanding to 20 feet at the pump station site.

The pump station site will be located at the end of the channel, about 400 feet from the water's edge. This position will place the structure above the all time record high water level for Big Cypress Bayou, an essential consideration for operation of the pumps. Normal water level in the channel will be 9 feet. Figure 3-8 presents section views of the proposed pump station site.

Stainless steel fixed screens with small mesh (0.5 x 0.5 inches) will be used at the intake opening. Should the screen become clogged due to vegetation or impinged fish, a float control will cut off the pumps when the water level behind the screens draws down to a predetermined level. This will prevent pump damage and allow healthy impinged fish to escape. No antifouling chemicals will be used at the site. The structure will be low to minimize aesthetic impact.

Diversions rate will be 33.4 cubic feet per second (cfs), equivalent to 15,000 gallons per minute (gpm) with an annual diversion of 18,000 acre-feet of water for industrial use. Screen openings will be 0.5 inch and intake velocity through the screens will not exceed 0.5 feet per second. An access road to the pump station site, shown in Fig. 3-6, is proposed to be developed by rehabilitation of an old road ROW using crushed stone or road gravel, as needed, and by providing necessary culverts and drainage.

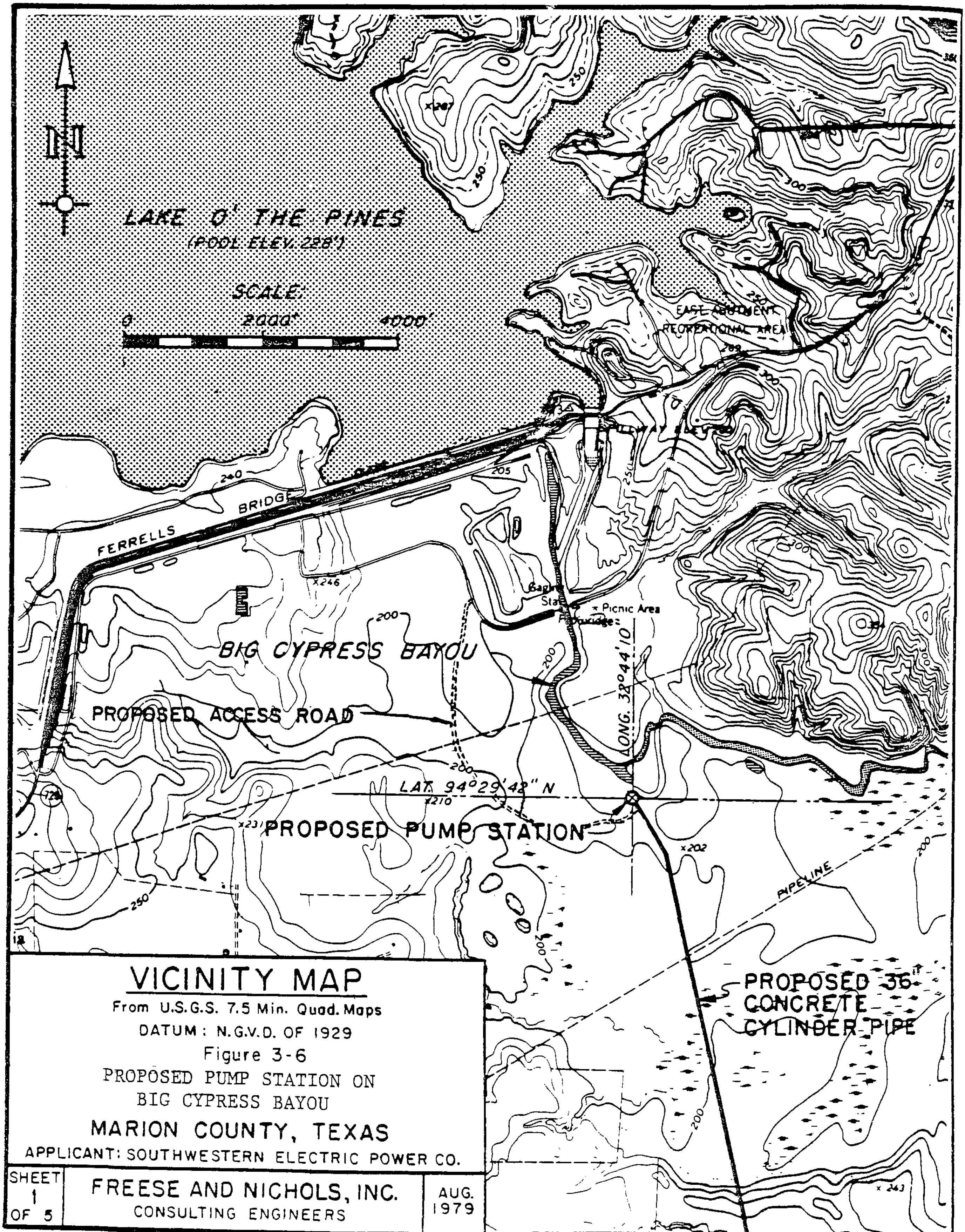


Figure 3-6
PROPOSED PUMP STATION ON
BIG CYPRESS BAYOU

Source: SWEPCO, 1980b.

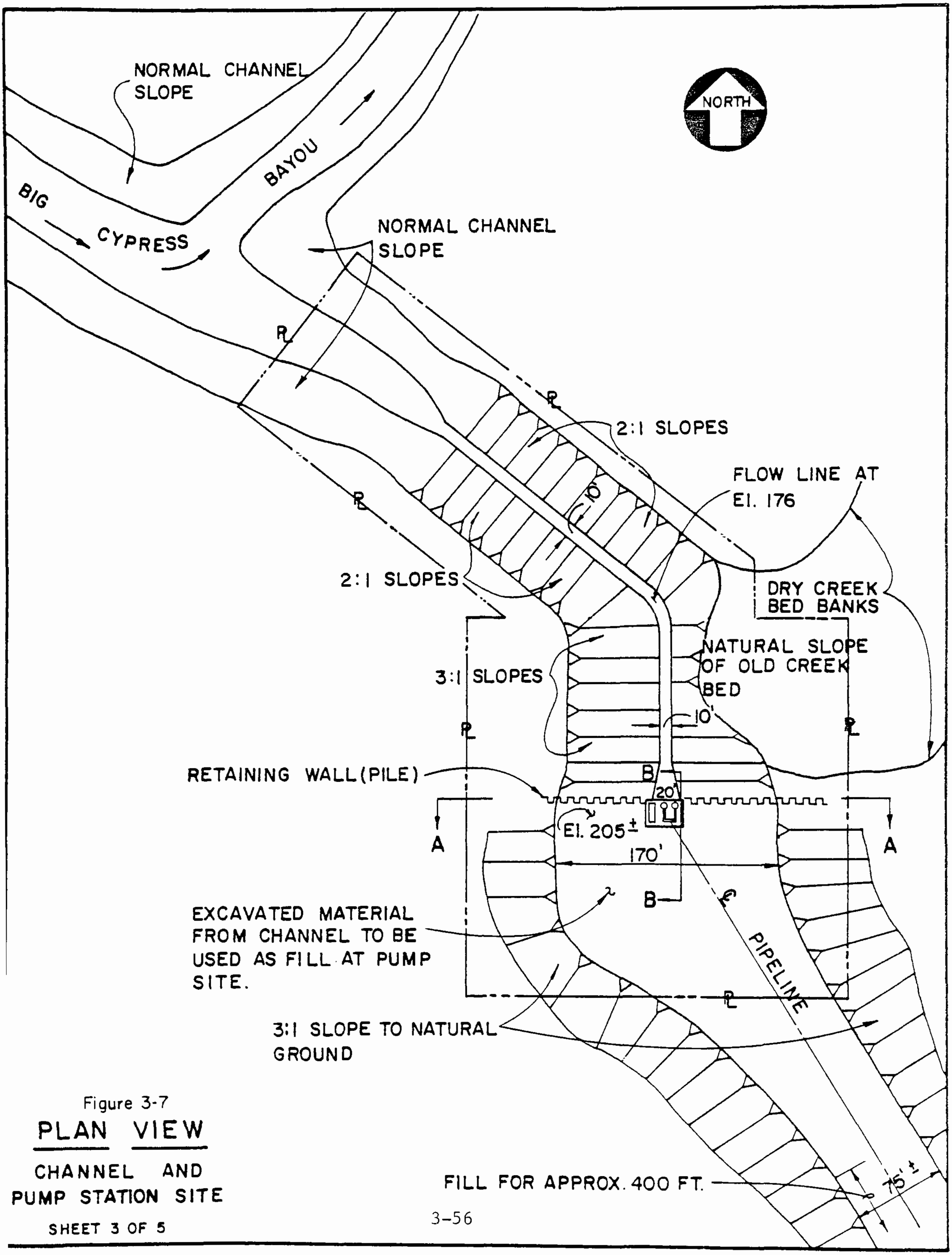
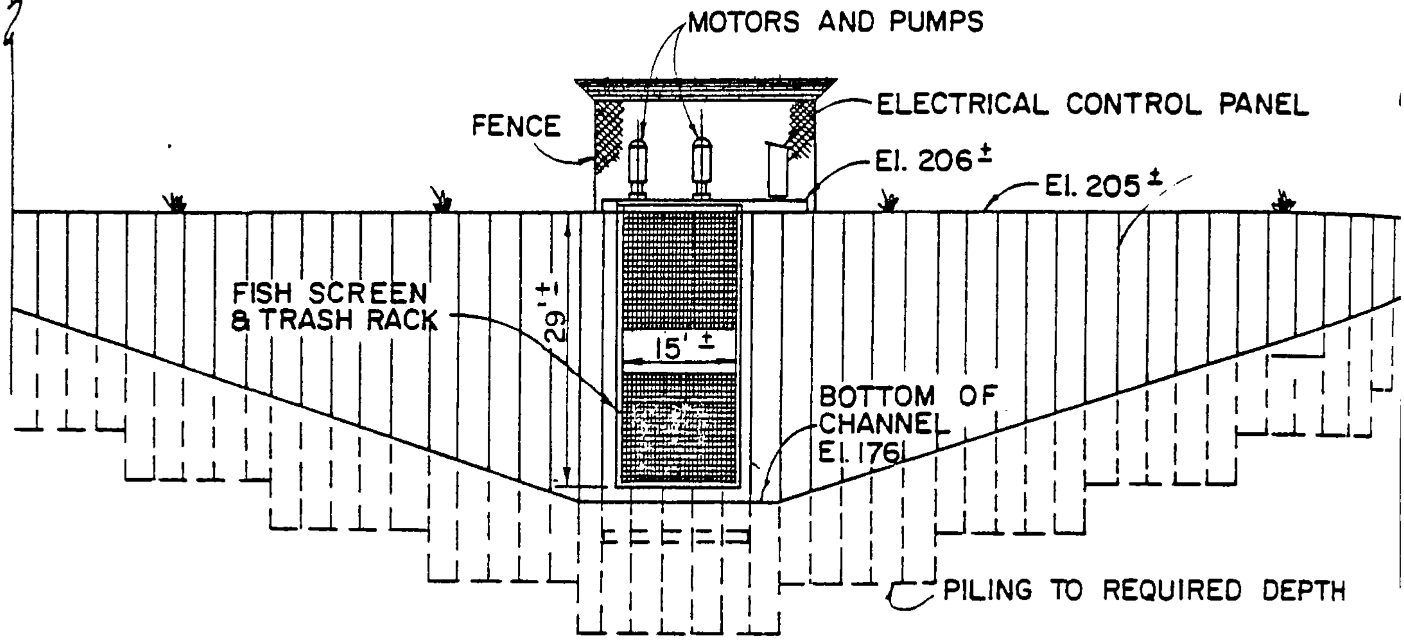


Figure 3-7

PLAN VIEW

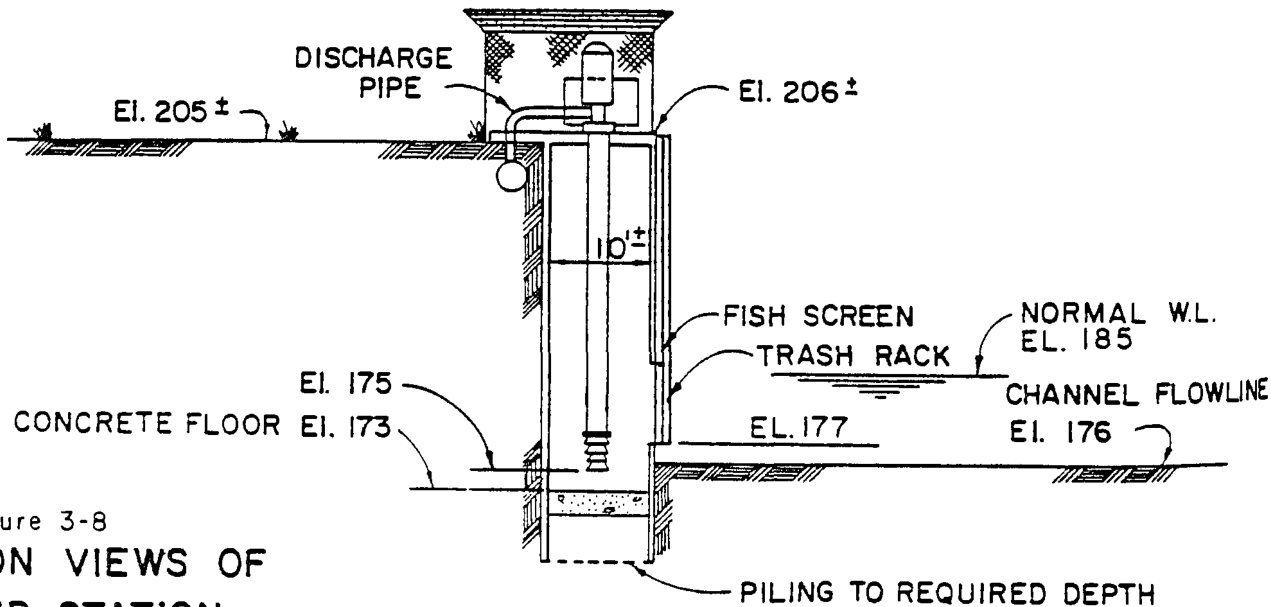
CHANNEL AND PUMP STATION SITE

SHEET 3 OF 5



SECTION A-A

SCALE: 1"= 20'



SECTION B-B

SCALE: 1"= 20'

Figure 3-8
SECTION VIEWS OF
PUMP STATION

SHEET 4 OF 5

Source: SWEPCO. 1980b.

The proposed route for the makeup water pipeline is shown in Fig. 3-9. The proposed pipeline will be 36-inch concrete cylinder pipe (Fig. 3-10). Normally, the pipeline will be covered by 2.5 feet of the native soil removed from the ditching operation. Excess bedding will be placed on top of the pipeline and spread smoothly on the ROW. The pipeline will extend over approximately 700 acres and cross two wetlands, identified in Fig. 3-9 as Big Cypress Bayou and Little Cypress Bayou. Special bedding or structural support may be required in these areas. Typical trench sections for wet areas and creek crossings are presented in Fig. 3-10.

3.5.1.5 Intake and Discharge System

Condenser cooling water will be supplied by three vertical wet-pit circulating water pumps located in the screen house at the northwestern end of the cooling reservoir. Water from the cooling reservoir will pass through a bar grill and then through travelling water screens consisting of a series of overlapping self-draining screen trays mounted on rotating mechanisms. Material small enough to pass through the bar grill will be deposited on the traveling screen cloth. Periodically, the screen trays will be rotated and washed with high-pressure screen wash water. The spray water will wash the debris from the screen cloth into a trough in the screen house floor, where it will drain by gravity to a debris cart. Additional water draining from the debris while in the cart will return to the cooling reservoir by gravity. Debris will be disposed of on-site.

Water entering the screen house will be chlorinated to inhibit growth of microbiological matter on the condenser's heat-exchanging surfaces. Chlorine will be provided by a gas chlorination system located in the nearby chlorine building. The chlorine dosage will be sufficient to maintain a residual chlorine level of 0.5 ppm in the circulating water system during chlorination.

In addition to the circulating water pumps, the screen house will also contain the diesel-driven, emergency fire pump and electric motor driven screen wash pumps. Both are vertical wet-pit-type pumps.

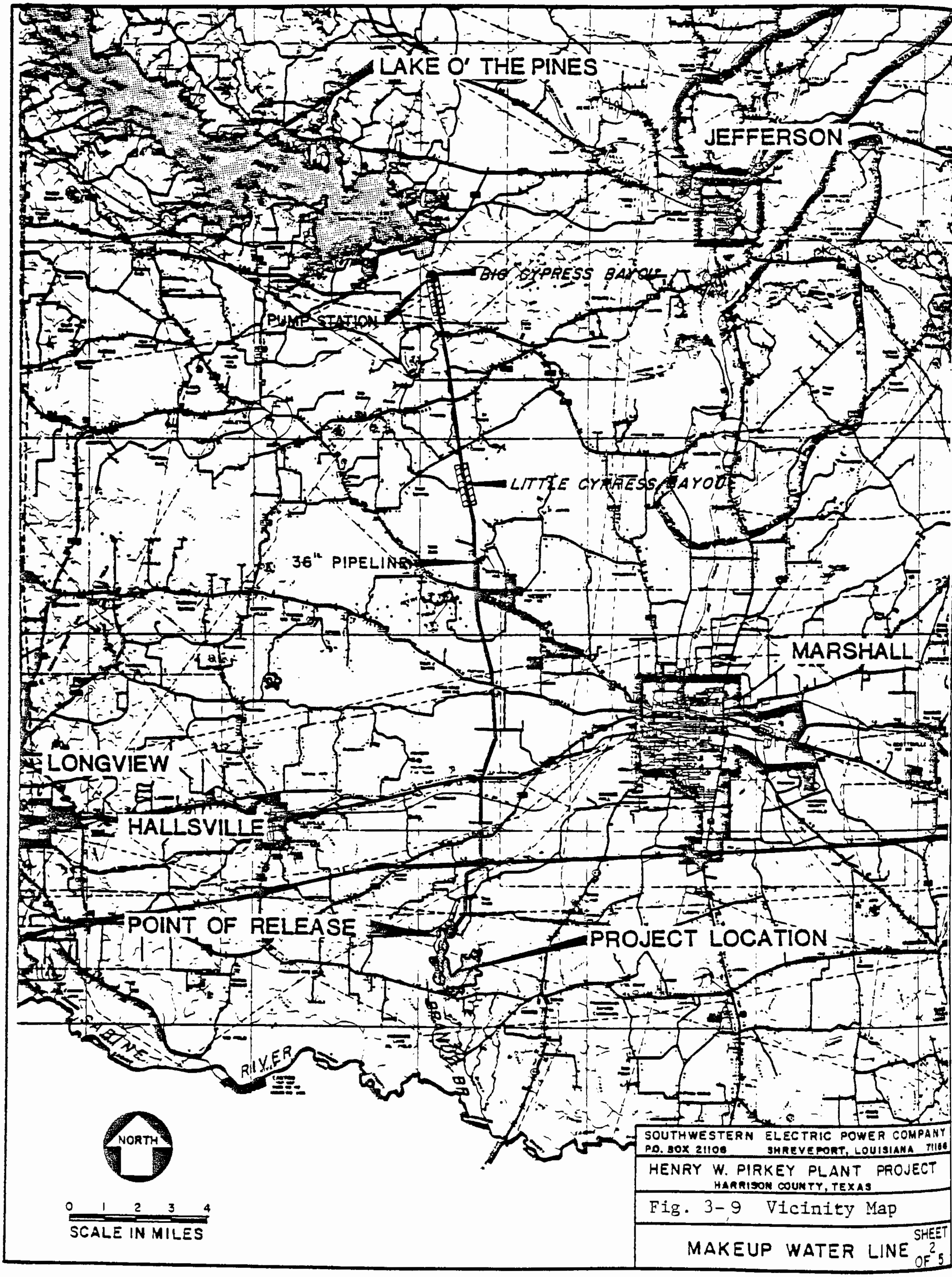


Fig. 3-9 Vicinity Map

SOURCE: SWEPCO, 1980b

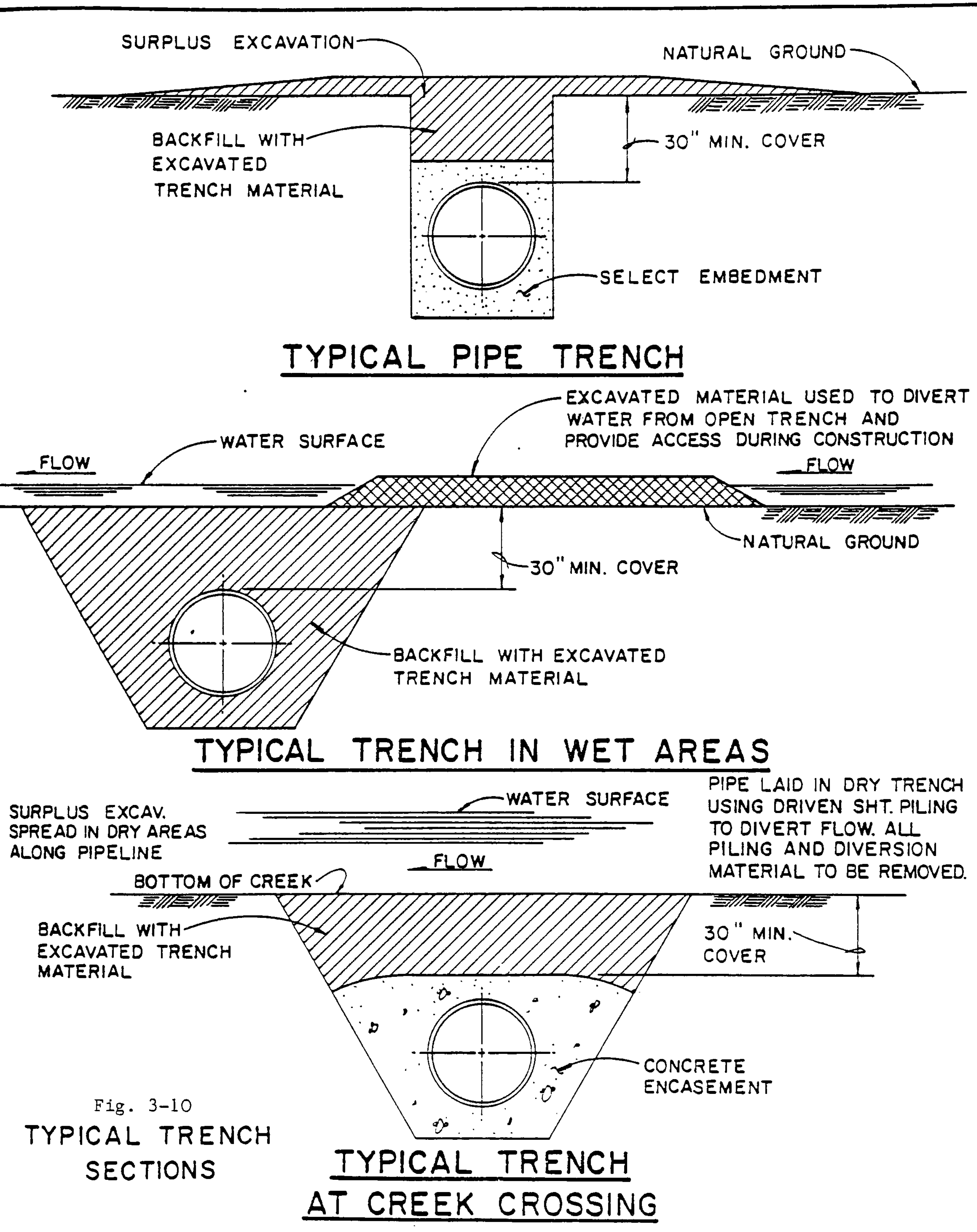


Fig. 3-10
TYPICAL TRENCH SECTIONS

SHEET 5 OF 5

Source: SWEPCO, 1980b.

Warm cooling water from the condenser will be discharged back to the cooling reservoir through a seal well and discharge canal. A seal well is essentially a concrete box that keeps a circulating water discharge pipe sealed so that a siphon can be maintained in the condenser.

Water will overflow from the seal well into a pool area called the discharge pond. This pond will be formed by two small man-made dikes and will serve only to channel the condenser discharge water to the discharge canal.

The discharge canal will carry the condenser discharge water to the northeastern corner of the cooling reservoir at the most extreme point in the water flow circuit from the screen house, thus maximizing retention time of the cooling reservoir. Because of a difference in the water surface elevation of the discharge pond and the cooling reservoir, a drop structure will be used in the discharge canal to lower water elevation.

3.5.1.6 Other Plant Water Systems

Makeup Water Pond

Plant makeup water from Big Cypress Bayou will be stored in the makeup water pond. Makeup water will be supplied to the plant by a makeup pump. Makeup water pond overflow will be routed to the discharge pond and then to the cooling reservoir.

Screen Wash Water

Traveling screens in the circulating water screen house will be washed periodically with high-pressure water. This screen wash water will be supplied by discharge from a screen wash pump located in the screen house.

Low-Pressure Service Water

Low-Pressure Service Water (LPSW) will be used to cool various unit auxiliaries, as makeup to the bottom ash hopper, and as makeup to the SO_2 removal system. LPSW will be supplied by three LPSW pumps, which will take suction from the circulating water system. Before being used in the plant, the LPSW will be passed through a parallel pair of twin basket strainers with straining media 3/16-inch-diameter holes.

High-Pressure Service Water

High-Pressure Service Water (HPSW) will be used throughout the plant where water pressure demand exceeds the capabilities of the LPSW system. HPSW will be used to seal or to lubricate slurry pumps; to flush sump pump discharge lines; to wash the boiler regenerative air heaters; and to suppress dust in the lignite-handling system. HPSW will be taken from the LPSW system and will be boosted in pressure by the HPSW pumps.

Fire Protection Water

The fire protection water system will be interconnected with the HPSW system. Service water connections located throughout the plant for general use will also serve as fire protection hose stations. Various underground fire headers will surround the main plant building. The lignite-handling system will also have a pre-action-type fire protection system.

Boiler Makeup Water Pretreatment System

Boiler makeup water from the makeup water pond will be pumped to the makeup water pretreatment system. The makeup water will be chlorinated and clarified to remove organic matter and suspended solids. The pH of the makeup water will then be adjusted in the clearwell.

Filtered Water

The clearwell transfer pumps will pump the pretreated water through a series of sand and carbon filters, where any residual chlorine and remaining organic or suspended matter will be removed. The filtered water will then be stored in the filtered water storage tank.

Demineralized Water

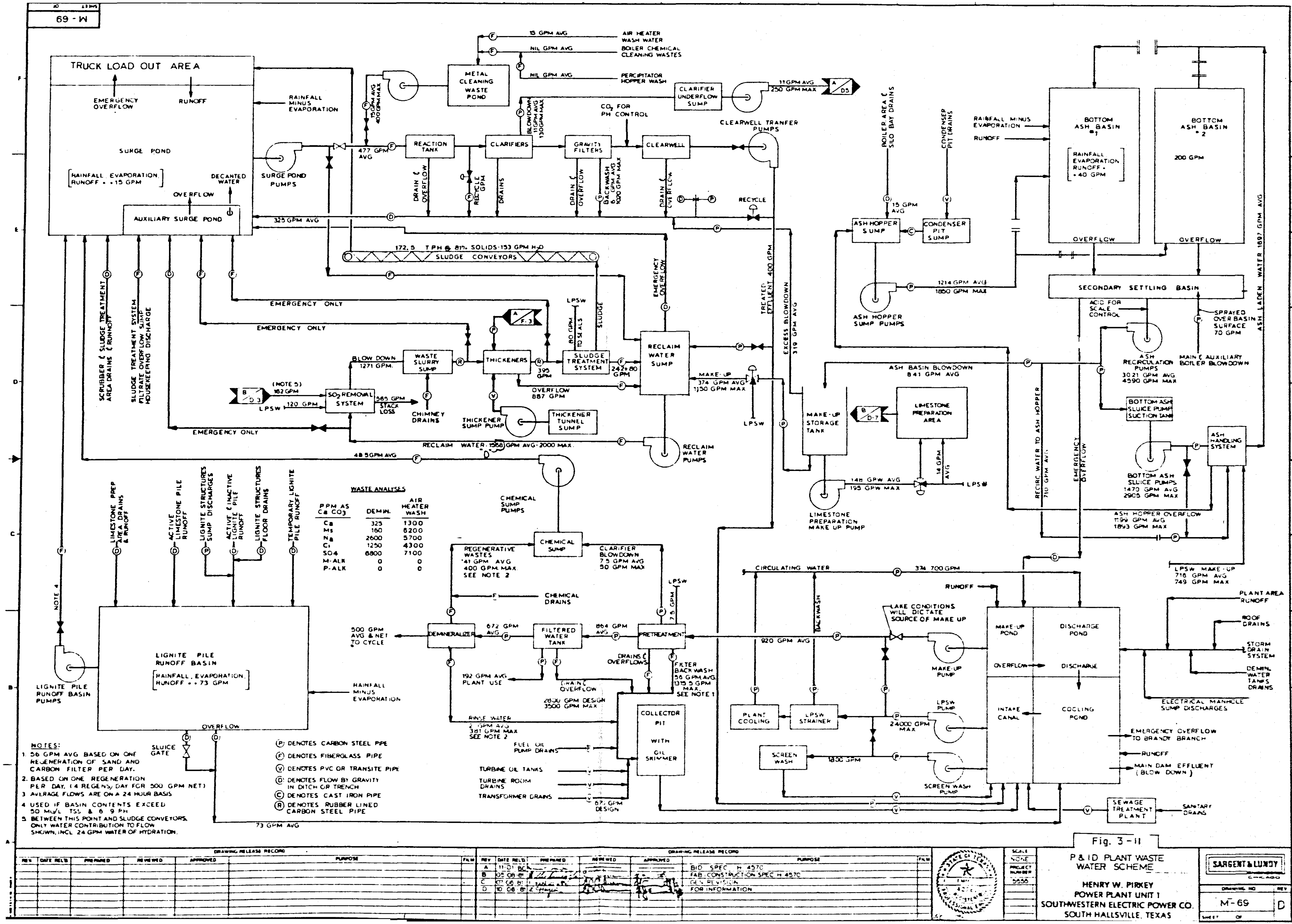
The filtered water pumps will supply filtered water to two parallel, mixed-bed demineralizer trains, each capable of producing 250 gpm (net) water for boiler makeup. While passing through the demineralizer, the metal and salt ions in the filtered water will be exchanged or removed chemically. The demineralized effluent will be essentially neutral and will be stored in the demineralized water storage tanks.

Potable Water

Filtered water from the filtered water storage tank will be pumped by the potable water pump through a chlorinator and into a 1,000-gallon, pressure-type, potable water storage tank. Potable water will be used in the plant for lavatories, drinking water, eyewashes, and showers, and as makeup to the condenser vacuum-producing equipment.

3.5.1.7 Waste Schemes

The plant wastewater scheme for the proposed South Hallsville Project is presented in Fig. 3-11.


M - 69
TRUCK LOAD OUT AREA
EMERGENCY OVERFLOW
RUNOFF
RAINFALL MINUS EVAPORATION
SURGE POND
RAINFALL EVAPORATION RUNOFF + 15 GPM
DECANTED WATER
OVERFLOW
AUXILIARY SURGE POND
SURGE POND PUMPS
15 GPM AVG
AIR HEATER WASH WATER
NIL GPM AVG
BOILER CHEMICAL CLEANING WASTES
PERCIPITATOR HOPPER WASH
METAL CLEANING WASTE POND
15 GPM AVG 400 GPM MAX
477 GPM AVG
REACTION TANK
CLARIFIERS
BLOWDOWN 11 GPM AVG 130 GPM MAX
CLARIFIER UNDERFLOW SUMP
11 GPM AVG 250 GPM MAX
CO_2 FOR PH CONTROL
GRAVITY FILTERS
CLEARWELL
CLEARWELL TRANFER PUMPS
DRAIN & OVERFLOW
RECYCLE 6 GPM
DRAINS
BACKWASH 8 GPM AVG 1020 GPM MAX
RECYCLE
325 GPM AVG
172.5 TPH @ 81% SOLIDS-153 GPM H_2O
SLUDGE CONVEYORS
EMERGENCY ONLY
EMERGENCY OVERFLOW
TREATED EFFLUENT 400 GPM
EXCESS BLOWDOWN 319 GPM AVG
BLOW DOWN 1271 GPM.
WASTE SLURRY SUMP
THICKENERS
395 GPM
80 GPM TO SEALS
LPSW
SLUDGE
SLUDGE TREATMENT SYSTEM
242+80 GPM
RECLAIM WATER SUMP
OVERFLOW 887 GPM
MAKE-UP 374 GPM AVG 1350 GPM MAX
(NOTE 5) 182 GPM
SO_2 REMOVAL SYSTEM
585 GPM STACK LOSS
120 GPM
CHIMNEY DRAINS
THICKENER SUMP PUMP
THICKENER TUNNEL SUMP
RECLAIM WATER-1588 GPM AVG-2000 MAX
RECLAIM WATER PUMPS
48.5 GPM AVG
SCRUBBER & SLUDGE TREATMENT AREA DRAINS & RUNOFF
SLUDGE TREATMENT SYSTEM FILTRATE OVERFLOW SUMP HOUSEKEEPING DISCHARGE
BOILER AREA & SILO BAY DRAINS
CONDENSER PIT DRAINS
15 GPM AVG
ASH HOPPER SUMP
CONDENSER PIT SUMP
ASH HOPPER SUMP PUMPS
1214 GPM AVG 1850 GPM MAX
RAINFALL MINUS EVAPORATION
RUNOFF
BOTTOM ASH BASIN #1
RAINFALL EVAPORATION RUNOFF + 40 GPM
BOTTOM ASH BASIN #2
200 GPM
OVERFLOW
SECONDARY SETTLING BASIN
ACID FOR SCALE CONTROL
SPRAYED OVER BASIN SURFACE 70 GPM
ASH LADEN WATER 1897 GPM AVG
ASH RECIRCULATION PUMPS 3021 GPM AVG 4590 GPM MAX
MAIN & AUXILIARY BOILER BLOWDOWN
ASH BASIN BLOWDOWN 841 GPM AVG
MAKE-UP STORAGE TANK
LIMESTONE PREPARATION AREA
14 GPM AVG
148 GPM AVG 195 GPM MAX
LIMESTONE PREPARATION MAKE UP PUMP
BOTTOM ASH SLUICE PUMP SUCTION TANK
ASH HANDLING SYSTEM
BOTTOM ASH SLUICE PUMPS 1470 GPM AVG 2905 GPM MAX
RECIRC WATER TO ASH HOPPER 710 GPM AVG
EMERGENCY OVERFLOW
ASH HOPPER OVERFLOW 1199 GPM AVG 1893 GPM MAX
LPSW MAKE-UP 718 GPM AVG 749 GPM MAX
WASTE ANALYSES
PPM AS $CaCO_3$ | DEMIN. | AIR HEATER WASH
Ca | 325 | 1300
Mg | 160 | 8200
Na | 2600 | 5700
Cl | 1250 | 4300
SO4 | 6800 | 7100
M-ALK | 0 | 0
P-ALK | 0 | 0
CHEMICAL SUMP PUMPS
CHEMICAL SUMP
REGENERATIVE WASTES 41 GPM AVG 400 GPM MAX SEE NOTE 2
CLARIFIER BLOWDOWN 7.5 GPM AVG 50 GPM MAX
CHEMICAL DRAINS
LIMESTONE PREP AREA DRAINS & RUNOFF
ACTIVE LIMESTONE PILE RUNOFF
LIGNITE STRUCTURES SUMP DISCHARGES
ACTIVE & INACTIVE LIGNITE PILE RUNOFF
LIGNITE STRUCTURES FLOOR DRAINS
TEMPORARY LIGNITE PILE RUNOFF
NOTE 4
LIGNITE PILE RUNOFF BASIN
RAINFALL, EVAPORATION, RUNOFF + 73 GPM
RAINFALL MINUS EVAPORATION
LIGNITE PILE RUNOFF BASIN PUMPS
OVERFLOW
SLUICE GATE
73 GPM AVG
500 GPM AVG & NET TO CYCLE
DEMINERALIZER
672 GPM AVG
FILTERED WATER TANK
864 GPM AVG
PRETREATMENT
7.5 GPM
192 GPM AVG PLANT USE
DRAIN & OVERFLOW
2800 GPM DESIGN 3500 GPM MAX
DRAINS & OVERFLOWS
FILTER BACK WASH 56 GPM AVG 1315.5 GPM MAX SEE NOTE 1
RINSE WATER 2 GPM AVG 381 GPM MAX SEE NOTE 2
COLLECTOR PIT WITH OIL SKIMMER
FUEL OIL PUMP DRAINS
TURBINE OIL TANKS
TURBINE ROOM DRAINS
TRANSFORMER DRAINS
67 GPM DESIGN
CIRCULATING WATER
374 700 GPM
RUNOFF
BACKWASH
LAKE CONDITIONS WILL DICTATE SOURCE OF MAKE UP
920 GPM AVG
MAKE-UP PUMP
LPSW PUMP
24000 GPM MAX
SCREEN WASH PUMP
PLANT COOLING
LPSW STRAINER
SCREEN WASH
1800 GPM
MAKE-UP POND
DISCHARGE POND
OVERFLOW
DISCHARGE
INTAKE CANAL
COOLING POND
PLANT AREA RUNOFF
ROOF DRAINS
STORM DRAIN SYSTEM
DEMIN. WATER TANKS DRAINS
ELECTRICAL MANHOLE SUMP DISCHARGES
EMERGENCY OVERFLOW TO BRANDY BRANCH
RUNOFF
MAIN DAM EFFLUENT (BLOW DOWN)
SEWAGE TREATMENT PLANT
SANITARY DRAINS
NOTES:
1. 56 GPM AVG BASED ON ONE REGENERATION OF SAND AND CARBON FILTER PER DAY.
2. BASED ON ONE REGENERATION PER DAY. (4 REGENS/DAY FOR 500 GPM NET)
3. AVERAGE FLOWS ARE ON A 24 HOUR BASIS
4. USED IF BASIN CONTENTS EXCEED 50 MG/L TSS & 6-9 PH
5. BETWEEN THIS POINT AND SLUDGE CONVEYORS, ONLY WATER CONTRIBUTION TO FLOW SHOWN, INCL 24 GPM WATER OF HYDRATION.
(P) DENOTES CARBON STEEL PIPE
(F) DENOTES FIBERGLASS PIPE
(V) DENOTES PVC OR TRANSITE PIPE
(D) DENOTES FLOW BY GRAVITY IN DITCH OR TRENCH
(C) DENOTES CAST IRON PIPE
(R) DENOTES RUBBER LINED CARBON STEEL PIPE
A | 11-01-80 | BID SPEC H 4570
B | 05-08-81 | FAB. CONSTRUCTION SPEC H 4570
C | 07-06-81 | GEN REVISION
D | 10-08-81 | FOR INFORMATION
P & I D PLANT WASTE WATER SCHEME
HENRY W. PIRKEY POWER PLANT UNIT 1
SOUTHWESTERN ELECTRIC POWER CO.
SOUTH HALLSVILLE, TEXAS
SARGENT & LUNDY CHICAGO
M-69 D
Fig. 3-11

Drain Collector Pit

A drain collector pit will serve as a collecting point and oil skimmer for various plant low-volume drains. This pit will be located near the screen house and will discharge to the cooling intake canals. Various drains routed to the collector pit will include; turbine room floor drains, transformer drains, pretreatment system overflows and backwashes, and the filter water tank drain and overflow.

Service Water Returns

Discharges from various equipment coolers operating on LPSW will be collected in the LPSW surge tank before being discharged to the cooling reservoir. The LPSW strainer backwash will be discharged to the cooling reservoir. Backwash (screen wash) water from the traveling screen will be discharged to the forebay area of the screen house (after debris removal).

Storm Drains

Roof drains will lead to the storm drainage system, as will electrical manhole sump discharges. The demineralized water storage tanks will also drain into the storm drainage system. The storm drainage system will discharge directly into the cooling reservoir.

Bottom Ash Basins

Blowdown from the makeup-water pretreatment clarifier will be routed to the chemical sump. Chemical drains from the demineralizer and floor drains from the water-treating building will also be routed to this sump. Discharges from the boiler area ash-hopper pit sump will be pumped into the bottom ash basins. Blowdown from the main and auxiliary boilers will also be routed to these bottom ash basins. Blowdown from these basins will be treated by the wastewater treatment system.

Lignite Pile Runoff Basin

The lignite-pile runoff basin will be an equalization pond for lignite pile runoff. Runoff from the lignite dead storage and temporary piles will drain through ditches to the lignite-pile runoff basin. Floor drains, conveyor drains, etc., from the lignite-handling system buildings will drain by gravity to the lignite-pile runoff basin using the same ditch system. The sump pumps in the lignite-handling system structures will discharge into the aforementioned ditches and will drain into the basin by gravity.

Runoff in the lignite-pile runoff basin will not normally require more treatment than sedimentation. Once suspended solids are within acceptable limits, basin contents will be returned to the cooling reservoir by means of a sluice gate. If additional treatment (such as pH adjustment) is required, basin contents will be pumped to a surge pond and then to the wastewater treatment system.

Waste Slurry Sump

Waste slurry from the SO_2 removal system will be bled to the waste slurry sump and from there will be pumped to thickeners. Moisture condensing or falling out in the chimney will flow by gravity to the SO_2 removal system waste slurry sump since chemical composition will range between waste slurry and reclaimed water, with some acid from the flue gas. Rain runoff and housekeeping drains from the absorber area will also drain to the waste slurry sump and will be dewatered with the waste slurry. If the sludge treatment system is down, these flows will be pumped to the auxiliary surge pond and allowed to dewater by evaporation.

Surge Pond

The surge pond will be divided into two sections: surge pond and auxiliary surge pond. The auxiliary surge pond will be a storage basin and evaporation pond for SO_2 removal system waste slurry, either from the waste slurry pumps, thickener underflow pumps, or filtrate overflow sump pumps. Effluent from the chemical sump will be pumped to the surge pond. Flows will be routed to the auxiliary surge pond only under abnormal conditions. After waste slurry has been placed in the auxiliary surge pond and allowed to thicken by evaporation, the sludge will be removed by front-end loader and conveyed to the sludge treatment system for stabilization. The auxiliary surge pond will overflow into the surge pond.

The surge pond will be a collection basin for various plant waste streams. Drains, overflows, backwash, blowdown, and recycle from the wastewater treatment system will drain into the surge pond by gravity. The reclaim water sump will overflow into the surge pond. Rainwater runoff from the stabilized sludge-truck load-out area, from under the sludge conveyors, and from the sludge reclaim area will drain into the surge pond by gravity. Water in the lignite-pile runoff basin requiring treatment will be pumped to the surge pond.

The effluent from the surge pond will normally be pumped to the reclaimed water sump. The effluent can also be pumped to the wastewater treatment system.

In an emergency only, the surge pond will overflow to the truck load-out area, which is impounded. This emergency measure will prevent surge pond overflow from entering the plant storm drainage system.

Reclaimed Water Sump

Water reclaimed from the SO_2 removal system waste slurry, including additional miscellaneous drains, will not be sufficient to meet makeup requirements of the SO_2 removal system. To meet this difference, water will be added to the reclaim water sump from the bottom ash basins, from the wastewater system effluent, or from the LPSW system. Preference will be given to bottom ash water.

A full-capacity makeup line will also be provided from the LPSW system to give SO_2 removal system makeup in the event the wastewater system or the bottom ash pumps are not operating. The reclaimed water sump will overflow into the surge pond.

Filtrate Overflow Sump

Housekeeping drains in the sludge treatment building and chemical drains from skid-mounted wastewater treatment system equipment will be routed to the filtrate overflow sump. The effluent will normally be pumped to the surge pond for dewatering. If the sludge treatment system is down, the effluent will be diverted to the auxiliary surge pond.

Wastewater Treatment System

The wastewater treatment facilities will be provided to treat the contents of the surge pond when the need arises. This system will consist of a reaction tank where pH is adjusted, two clarifiers where solids are removed, a gravity-type sand filter where suspended solids are removed, and a clearwell for final adjustment of effluent pH.

Treated effluent from the wastewater treatment system will normally go to the cooling reservoir, with alternative provisions for routing it to the reclaimed water sump as SO_2-removal system makeup.

The wastewater system gravity filter backwash will flow by gravity into the surge pond. Drains and overflows from the other system vessels will also be routed to the surge pond.

3.5.1.8 Ash-Handling System

The bottom ash produced by the steam generator will be stored in a lined bottom ash hopper. This will be an independently supported structure, located under the steam generator and having an air-tight water trough seal arrangement that connects with the steam generator.

The bottom ash hopper will have a means of cooling its internal lining, a method of limiting water level by discharging any excess, and provision for water-assisted material discharge. This hopper will be furnished with four discharge points, and each discharge point will have a sluice door and surrounding enclosure. Beneath each enclosure, a material crusher will size the accumulated ash.

The discharge system will be the jet pump type; these four jet pumps will discharge through two transport lines to ash basins. These pumps will be isolated from each other by individual branch discharge sluice gates. The bottom-ash jet pump arrangement will be able to remove collected bottom ash at the rate of 100 tons per hour.

Bottom ash will be sluiced to either of the two bottom-ash basins. While one basin is being used to store ash, the other basin can be isolated and cleaned of stored, dewatered ash. This bottom ash will ultimately be removed from the plant property and sold, or disposed of or used onsite.

Sluice water from the bottom ash basins will be collected in the secondary settling basin. The combined effluent from the secondary settling basin will be recirculated back to the plant to transport more bottom ash. A high-capacity bleed from the bottom ash recirculation line will lead to the reclaimed water sump and will be used as SO_2 removal system makeup.

Material rejected by the lignite pulverizers (pyrites) will be discharges into a collection hopper located on each pulverizer. Each collection hopper will have a wet-type jet pump. The hopper jet pumps discharge collectively into the pyrite storage tank. Each hopper jet pump will be able to remove collected materials at a rate of 30 tons per hour.

The pyrites stored in the pyrite storage tank will be removed by a larger transfer jet pump system. A single-line discharge will tie into the two main sluice discharge headers, allowing the pyrites to be sluiced to the bottom ash basins. The transfer jet system will be able to remove materials from the pyrite storage tank at the rate of 100 tons per hour.

Sintered fly ash falling from the flue gas stream in the rear pass of the steam generator will collect in 10 economizer hoppers. No material will be allowed to remain in these hoppers. Two storage/transfer tanks will be provided beneath these hoppers into which the ash will fall and be stored.

Individual removal systems will be provided for each storage/transfer tank. These dry conveying systems will be a negative-pressure type, with motive force created by water exhausters. Exhausters will mix the ash with water in the air separator, creating a slurry that will discharge through the main discharge lines to the ash basins. A booster jet pump system will assure minimum velocity in the sluice discharge line.

Two individual dry removal systems will be able to remove collected material at a combined rate of 100 tons per hour.

Fly ash collected in the precipitator hoppers will be removed by two dry conveying systems of the positive-pressure type. Each hopper will be provided with an air-lock-type feeder that allows material to transfer from the low-pressure collection hopper to the higher-pressure conveyor line. Motive force for these systems will be created by two rotary, positive-displacement blowers. Fly ash will be removed from the precipitator hoppers by gravity and will be blown to the unit fly ash silo. The fly ash silo will be vented to the precipitator inlet, where any fugitive dust will be collected. Each of the two fly-ash conveying systems will be able to convey collected materials at a rate of 150 tons per hour.

A venting system will be provided to allow air lock feeders under the precipitator hoppers to change pressure during the filling/discharging cycle. Each air lock feeder will be vented through a common header to the precipitator inlet.

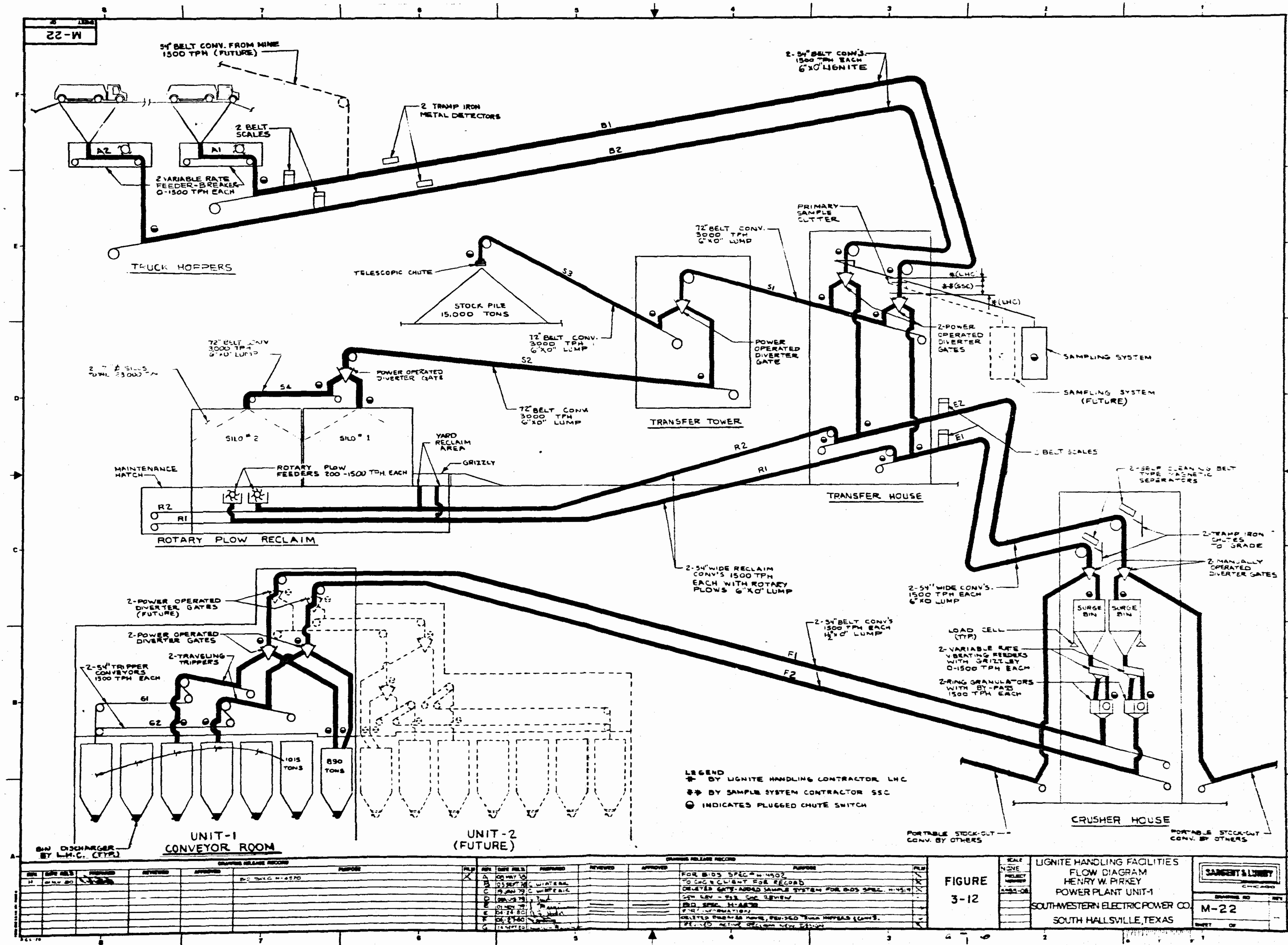
Fly ash stored in the fly ash silo will be mixed with the dewatered SO_2 removal system sludge in the waste treatment building. Fly ash will be fed directly into sludge mixers by screw conveyors. Fly ash may also be unloaded from the silo into trucks and transported to the mine area for disposal in a designated landfill site. See Sec. 3.5.1.7 for details of the waste disposal operation plan.

3.5.1.9 Fuel Handling Systems

The primary fuel for the steam generator will be unwashed Texas lignite from a nearby surface mine located in Harrison County. This fuel is of lignitic rank and belongs to the Lower Eocene Calvert Bluff Formation of the Wilcox Group.

"Run-of-mine" lignite will be delivered to the plant site by bottom dump trucks of 120 tons capacity each. There will be 470 deliveries per week, or 24,000 deliveries per year.

Figure 3-12 presents a schematic plan of the lignite-handling facilities. A truck hopper will unload the lignite from bottom dump trucks. Each truck hopper will discharge into a feeder-breaker. The feeder-breakers will size the lignite into 6 x 0 inch lumps and discharge a controlled flow onto conveyors B_1 and B_2. Conveyors B_1 and B_2 will be equipped with belt scales to weigh the lignite in transit to determine the quantity of material received.



M-22
54" BELT CONV. FROM MINE 1500 TPH (FUTURE)
2-54" BELT CONV'S. 1500 TPH EACH 6"X0" LIGNITE
2 TRAMP IRON METAL DETECTORS
2 BELT SCALES
2 VARIABLE RATE FEEDER-BREAKER 0-1500 TPH EACH
B1
B2
A2
A1
TRUCK HOPPERS
PRIMARY SAMPLE CUTTER
72" BELT CONV. 3000 TPH 6"X0" LUMP
TELESCOPIC CHUTE
STOCK PILE 15,000 TONS
S3
S1
S2
S4
POWER OPERATED DIVERTER GATE
2-POWER OPERATED DIVERTER GATES
SAMPLING SYSTEM
SAMPLING SYSTEM (FUTURE)
TRANSFER TOWER
POWER OPERATED DIVERTER GATE
SILO #2
SILO #1
YARD RECLAIM AREA
GRIZZLY
MAINTENANCE HATCH
ROTARY PLOW FEEDERS 200-1500 TPH EACH
R2
R1
ROTARY PLOW RECLAIM
E2
E1
2 BELT SCALES
TRANSFER HOUSE
2-SELF CLEANING BELT TYPE MAGNETIC SEPERATORS
2-TRAMP IRON CHUTES TO GRADE
2-MANUALLY OPERATED DIVERTER GATES
2-54" WIDE RECLAIM CONV'S 1500 TPH EACH WITH ROTARY PLOWS 6"X0" LUMP
2-54" WIDE CONV'S. 1500 TPH EACH 6"X0 LUMP
2-POWER OPERATED DIVERTER GATES (FUTURE)
2-POWER OPERATED DIVERTER GATES
2-TRAVELING TRIPPERS
2-54" TRIPPER CONVEYORS 1500 TPH EACH
G1
G2
1015 TONS
890 TONS
2-54" BELT CONV'S 1500 TPH EACH 6"x0" LUMP
F1
F2
SURGE BIN
SURGE BIN
LOAD CELL (TYP)
2-VARIABLE RATE VIBRATING FEEDERS WITH GRIZZLEY 0-1500 TPH EACH
2-RING GRANULATORS WITH BY-PASS 1500 TPH EACH
LEGEND
BY LIGNITE HANDLING CONTRACTOR LHC
BY SAMPLE SYSTEM CONTRACTOR SSC
INDICATES PLUGGED CHUTE SWITCH
UNIT-1 CONVEYOR ROOM
UNIT-2 (FUTURE)
BIN DISCHARGER BY L.H.C. (TYP)
CRUSHER HOUSE
PORTABLE STOCK-OUT CONV. BY OTHERS
PORTABLE STOCK-OUT CONV. BY OTHERS
FIGURE 3-12
SCALE NONE
LIGNITE HANDLING FACILITIES
FLOW DIAGRAM
HENRY W. PIRKEY
POWER PLANT UNIT-1
SOUTHWESTERN ELECTRIC POWER CO.
SOUTH HALLSVILLE, TEXAS
SARGENT & LUNDY
CHICAGO
M-22

Conveys B_1 and B_2 will transport the lignite to the transfer house where two-position, power-operated diverter gates will direct the lignite flow from Conveyor B_1 to Conveyors E_1 or Conveyor S_1, and from Conveyor B_2 to Conveyor E_2 or Conveyor S_1. Conveyor B_2 chutework will accomodate the "as received" sample system.

Conveyor S_1 will transport the lignite from the transfer house to the transfer tower. This discharge (Conveyor S_1) will be equipped with a two-position, power-operated diverter gate. Lignite will be diverted to Conveyor S_2 or another stackout Conveyor S_3.

Stackout Conveyor S_3 will transport the lignite from the transfer tower to a 15,000-ton-capacity active stock pile or an 800,000 ton long-term storage pile. This discharge of Conveyor S_3 will be equipped with a motor-equipped telescopic chute to reduce dusting of the lignite as it is deposited on the pile.

Tripper Conveyor S_2 will transport the lignite from the transfer tower to two active reclaim storage silos. Conveyor S_2 will be furnished with a two-position, power-operated diverter gate to direct the lignite flow into silo #1 or out Conveyor S_4 that will discharge into silo #2.

A rotary plow reclaim tunnel will be used to reclaim lignite from the active reclaim storage silos. Conveyors R_1 and R_2 in the reclaim tunnel will each be equipped with a variable-rate rotary plow reclaimer. Conveyors R_1 and R_2 will transport the reclaimed lignite to the transfer house and will discharge lignite onto Conveyors E_1 and E_2.

A yard reclaim hopper will be located outside the active reclaim storage silos. The rotary plow reclaimer will be capable of parking under the yard reclaim hopper to discharge lignite reclaimed from long-term storage onto Conveyors R_1 and R_2.

Conveyors E_1 and E_2 will transport the lignite from the transfer house to the crusher house. At the start of Conveyors E_1 and E_2 a belt scale with local and remote totalization and local and remote flow indication will be provided. Each discharge end of Conveyors E_1 and E_2 will be equipped with a self-cleaning, belt-type magnetic separator for removing tramp iron from lignite. A tramp iron chute will deposit tramp iron into a container located at grade outside the crusher house. Conveyors E_1 and E_2 will discharge lignite through chutes into the crusher house surge bins.

Two separate surge bins in the crusher house will be equipped with a variable-rate vibrating feeder at each bin's outlet. Each surge bin will be supported on load cells to monitor the lignite level and to control the vibrating feeder rate.

From the surge bins, variable-rate vibrating feeders will feed lignite to two ring-type granulator crushers to produce a uniform product size of 1½ x 0 inches. Material not requiring crushing will bypass the crushers. Lignite from the crushers will be deposited onto Conveyors F_1 and F_2.

Conveyors F_1 and F_2 will transport lignite from the crusher house to the conveyor room in the main plant building, where Conveyors F_1 and F_2 will be discharged onto tripper conveyors G_1 and G_2. These tripper conveyors G_1 and G_2 will be furnished with a traveling tripper that will distribute lignite into lignite storage silos.

3.5.1.10 Atmospheric Emission Sources and Control Systems

The chimney for the unit will consist of a concrete shell with a freestanding, internal, acid-resistant brick liner. This chimney will be 525 feet high, with a 25-foot-diameter exit. The chimney will be 58 feet wide at its base, and flue gas velocity will be about 85 feet per second when exiting.

NO_x emissions will be controlled using burner design, burner arrangement, and furnace design. The burner design will minimize the amount of combustable air introduced into the burner to that required to obtain fuel ignition and to sustain combustion. The remainder of the secondary air required for complete combustion will be introduced and mixed with the fuel in the furnace, which will maintain an oxidizing atmosphere near the furnace walls, resulting in lower NO_x.

Particulate matter will be removed from the flue gas stream by Universal Oil Products', Cold-side, twin-casing, weighted-wire type electrostatic precipitator. Each precipitator will be 99.75 percent efficient and the Specific Collecting Area (SCA) is 544. The unit has 10 electrical fields in the direction of gas flow and provides a flue gas treatment time of 12.2 seconds. The ash collected in the precipitator hoppers will be removed pneumatically and stored in the fly ash silo.

SO_2 will be removed from the flue gas stream by a Universal Oil Products', limestone, double-loop-type scrubbing system consisting of four vertical, freestanding absorber modules. The system will treat 85 percent of the boiler flue gas. The remaining 15 percent of untreated gas will be mixed with saturated, treated flue gas to raise its temperature and to improve plume buoyancy.

An automatic spray-type dust suppression system will be used to control the dust at the truck hopper, conveyor feed and discharge points, telescopic chute discharge, breakers, and rotary plows.

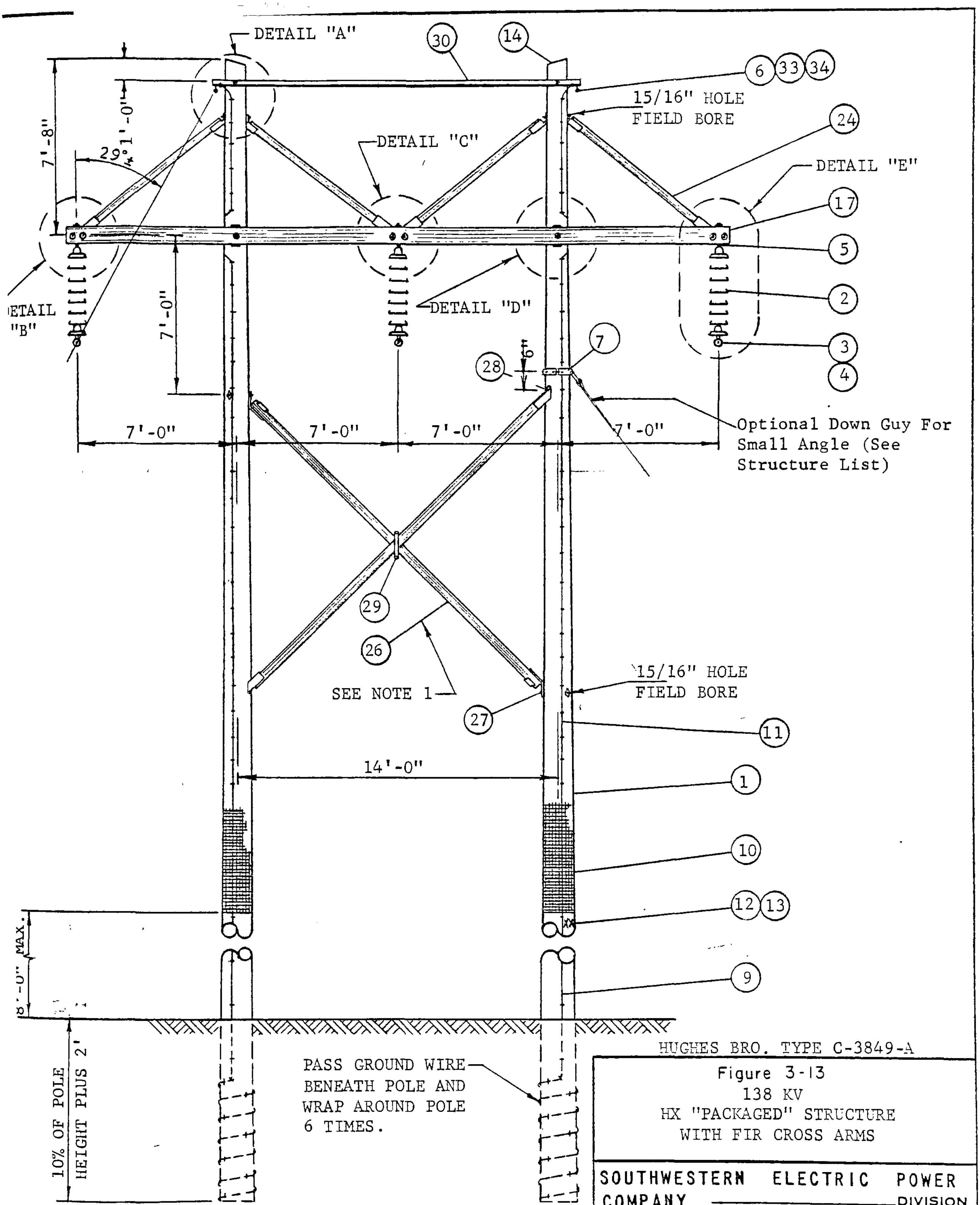
Lignite stored in the silos in the main plant building will be supplied to the steam generator pulverizers by means of gravimetric coal feeders. The feeders will supply fuel to the pulverizers at a rate consistent with boiler load demand.

These pulverizers will be Babcock and Wilcox MPS 118, slow-speed roll-and-race type units, using three large-diameter rolls equally spaced around the mill to grind the lignite. The pulverizers will also dry the raw lignite by means of preheated primary air supplied to the pulverizer and based on a predetermined air/fuel ratio. A total of seven pulverizers will be used, each serving eight burners on the furnace wall. Each pulverizer will have a maximum capacity of 105 tons per hour. The preheated primary air used to dry the lignite will also be used to transport the pulverized lignite dust to individual burners.

3.5.1.11 Transmission Lines

In order to tie the Pirkey Power Plant into its bulk transmission system, SWEPCO plans to construct three (3)-138 kV transmission lines (4 circuits) from the plant to tie into two (2) existing 138 kV lines in the immediate plant area. The two (2) existing 138 kV lines will be up-graded in capacity to carry the 640 MW output into the Major East Texas load centers of Longview and Marshall. An existing 345 kV line in the plant area will also be tied into the plant and will provide a direct tie to the Welsh Power Plant (Fig. 3-13). While the primary purpose of the 345 kV line is an interconnection with Gulf States Utilities to the south, and will not carry the power from the plant, it will provide for transient stability in the operation of the generator.

The following is a list and description of each transmission line section shown in Fig. 3-14.



HUGHES BRO. TYPE C-3849-A

Figure 3-13
138 KV
HX "PACKAGED" STRUCTURE
WITH FIR CROSS ARMS

SOUTHWESTERN ELECTRIC POWER COMPANY ______ DIVISION	
APPROVED ______ DIV. SUPT.	
DRAWN BY: RLS	WORK ORDER
DATE: 3-1-72	
SCALE: 3/16"=1'-0"	DRWG. NO 138-HX-27

CTES:

1. NO X-BRACE FOR POLE HEIGHTS 55' OR LESS.
   1 SET OF X-BRACES FOR POLE HEIGHTS 60' & 65'.
   2 SETS OF X-BRACES FOR POLE HEIGHTS 70' & OVER.

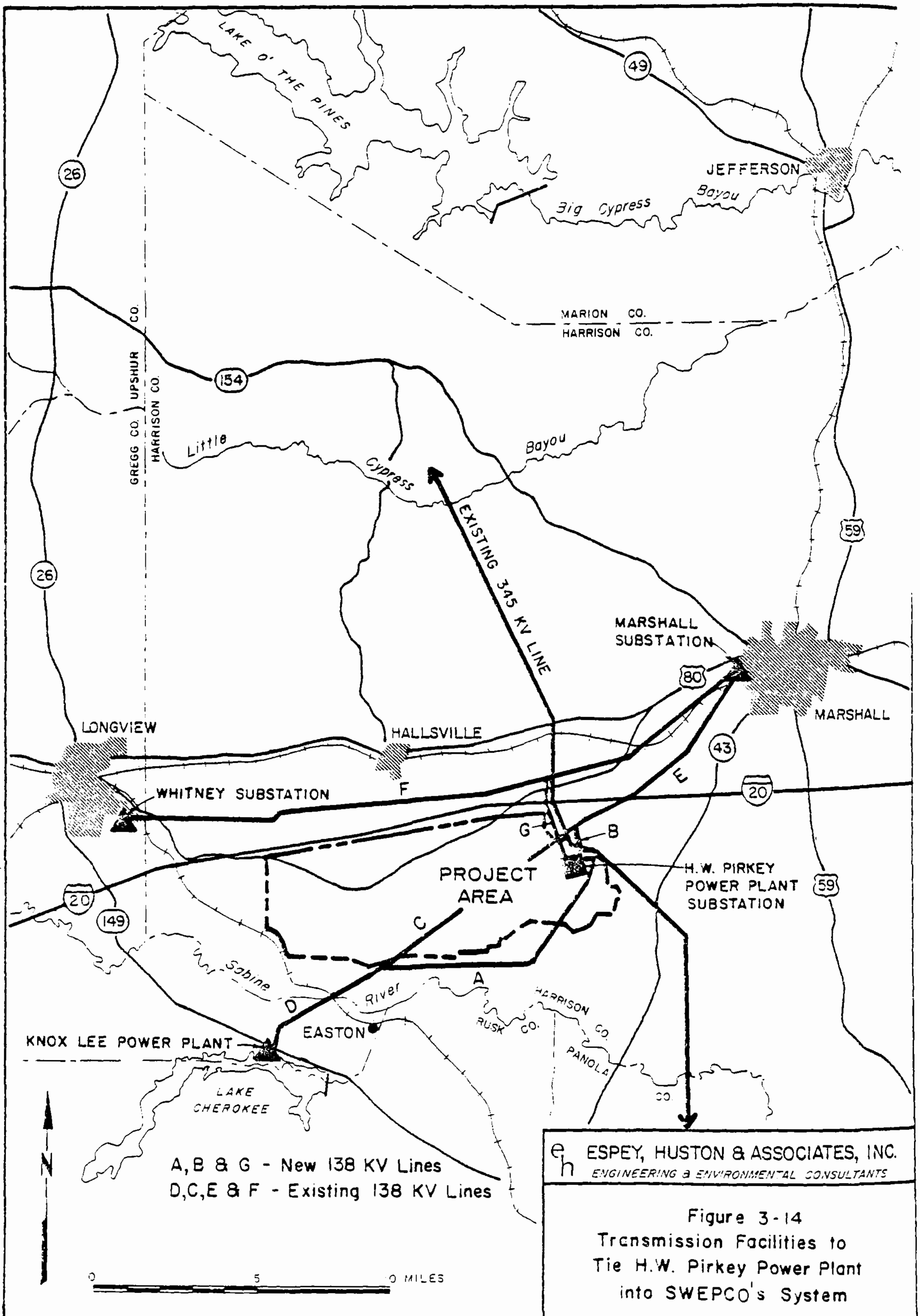


Figure 3-14
Transmission Facilities to Tie H.W. Pirkey Power Plant into SWEPCO's System

Transmission Line Section	Length	Description
"A"	7.2 mi	Relocated section Knox Lee - Marshall 138 kV around mine area, (Pirkey Knox Lee)
"B"	1.5 mi	Cut Knox Lee - Marshall 138 into Pirkey Sub (Pirkey - Marshall S.)
"C"	6.2 mi	Section of Knox Lee - Marshall 138 kV to be removed from mine area as mining proceeds
"D"	5.8 mi	Section of Knox Lee - Marshall 138 kV to be rebuilt to 2000 A (Pirkey Knox Lee)
"E"	6.8 mi	Section of Knox Lee - Marshall 138 kV to be left at 1200 A (Pirkey - Marshall S.)
"F"	19.2 mi	Marshall - Whitney 138 kV to be rebuilt to 2000 A (Pirkey - Whitney) (Pirkey - Marshall N.)
"G"	3.0 mi	Loop Whitney - Marshall 138 kV into Pirkey Plant (Pirkey - Whitney) (Pirkey - Marshall N.)

The 138 kV line between Marshall Substation and Whitney Substation at Longview (Section F; Fig. 3-14) will be rebuilt and upgraded to 2000 Amp capacity and supported on wood pole H-Frame structures as shown in Fig. 3-13. Approximately 3 miles of new 138 kV double circuit line (Section G) will be constructed on 100' wide ROW, to loop the line in and out of the Plant Substation (Fig. 3-14). The ROW for the new line section will be adjacent to the existing 345 kV line coming into the plant from the north.

The 138 kV line between Marshall Substation and Knox Lee Power Plant (SE of Longview) will also be looped through the Pirkey Plant Substation. A section of this line is located in the mine area (Section C) and will be used to provide power to the mining operation (Fig. 3-14). A new section of line will be constructed from a point 1.5 miles north of the proposed power plant to the Plant Substation (Section B) and a 7.2 mile section will be constructed from the plant, south of the mine area to a point on the existing line (Section A) 5.8 miles from Knox Lee Plant (ig. 3-14). The 5.8 mile section of line to Knox Lee will be rebuilt and upgraded to 2000 Amp capacity on wood pole H-Frame structures. The 6.8 mile existing section back to Marshall (Section E) will not be rebuilt since the 1200 Amp capacity will be adequate.

3.5.1.12 Railroad Spur

A 3.5-mile railroad spur has been constructed from the plant site to an existing Texas & Pacific Railroad line to the north. This spur required the construction of an overpass over Interstate Highway 20 and a grade crossing of State Highway 968. The right-of-way varies from 100 to 350 feet in width and covers a total of 100 acres outside of the plant site area. No stream crossings were required.

The spur will be used for delivery of materials during construction and of limestone and other supplies during plant operation.

3.5.2 Facilities Layout and Operation of the Mining Area

The proposed South Hallsville Mine is a single-seam. dragline surface mining operation designed to produce an average of 2.8 million tons of lignite per year for a period of 24 years. All mining and reclamation activities will be performed according to Railroad Commission of Texas (RRC) regulations for surface coal mining (RRC, 1980). The mine will be operated for SWEPCO by SMC. The orientation of the mine and mine facilities is presented in Fig. 3-15.

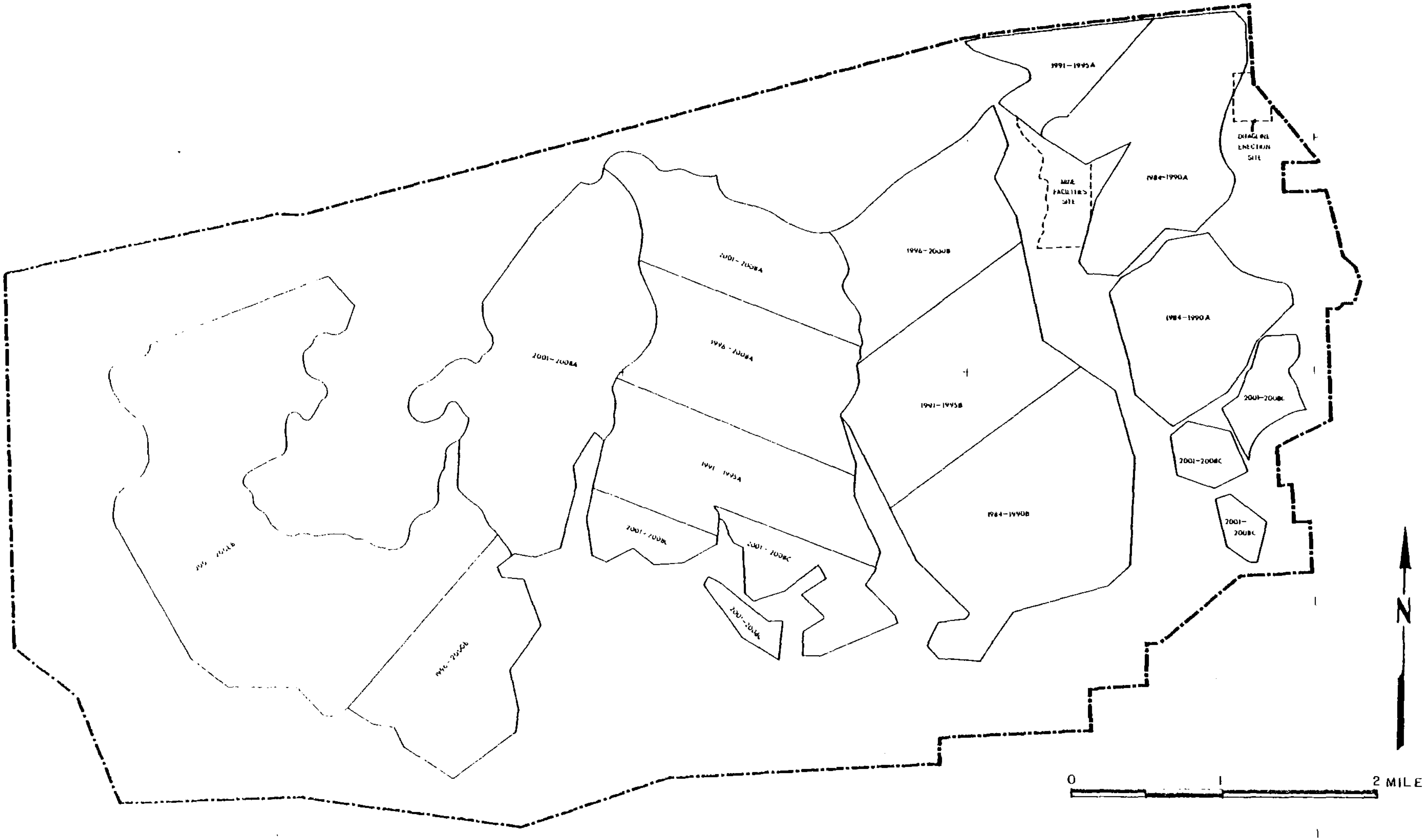


Fig. 3-15 Mining Sequence and Facilities, South Hallsville Project

The total area to be affected or potentially affected by the operation of the mine is approximately 20,771 acres. Of this total area comprising the mine site, approximately 10,545 acres will be disturbed over the life of the mine by mining activities, 430 acres by construction of haul roads, and 43 acres by mine facilities. Portions of the remaining 9,753 acres in the mine site may potentially be affected by mining activities as mining progresses.

Of the total 10,545 acres to be disturbed by mining, approximately 8,751 acres will be mined, with an average of 365 acres to be mined (439 acres to be disturbed) each year for 24 years (Table 3-1). The disturbed areas generally will be reclaimed concurrent with overburden removal. The average ungraded acreage resulting from mining operations will be 439 per year, with a maximum of 741 acres ungraded in 2008.

The area to be disturbed by mining is surrounded by approximately 10,226 acres and comprises the mine ancillary activities area. About 430 acres of this area will be disturbed by the mine roads over the life of the mine, with a maximum of 57 acres disturbed in 1990. Areas disturbed by roads will be reclaimed in accordance with RRC surface coal mining regulations when no longer needed. Within the mine ancillary activities area, approximately 20 acres will be occupied by mine facilities. About 23 acres will be disturbed by the dragline erection site; this area may be used as an industrial site when dragline erection activities are completed. The potential exists for disturbance of portions of the remaining 9,753 acres in the mine ancillary activities area, as mining progresses.

3.5.2.1 Mineable Reserves and Engineering Techniques

Through an analysis of 2,052 drill holes, an economically recoverable single-seam deposit containing approximately 72 million recoverable tons of lignite was outlined. Two additional lower seams, with sufficient continuity to be correlatable, were identified during the drilling program. However, these seams are

TABLE 3-1

ESTIMATED ANNUAL DISTURBED AREAS

SOUTH HALLSVILLE MINE

Year	Acres Mined	Total Acres Disturbed By Mining	Acres Disturbed By Roads	Acres Disturbed By Mine Facilities	Total Acres Disturbed	Total Acres Regraded	Net Acres Ungraded
1981	---	---	5	20	25	---	25
1982	---	---	---	23	23	---	48
1983	---	---	23	---	23	---	71
1984	39	76	1	---	77	51	97
1985	320	424	13	---	437	308	226
1986	318	355	12	---	367	378	215
1987	409	490	27	---	517	445	287
1988	391	429	17	---	446	449	284
1989	379	432	30	---	462	431	315
1990	353	408	57	---	465	416	364
1991	324	445	11	---	456	433	387
1992	324	341	10	---	351	376	362
1993	323	340	10	---	350	340	372
1994	326	344	10	---	354	343	383
1995	311	329	10	---	339	334	388
1996	307	325	11	---	336	326	398
1997	311	331	12	---	343	329	412
1998	315	339	38	---	377	336	453
1999	393	492	18	---	510	441	522
2000	423	466	15	---	481	475	528
2001	443	468	13	---	481	467	542
2002	527	601	22	---	623	557	608
2003	538	704	16	---	720	669	659
2004	406	477	14	---	491	553	597
2005	389	443	10	---	453	454	596
2006	325	359	8	---	367	387	576
2007	281	323	6	---	329	335	570
2008	276	304	11	---	815	644	741
2009	---	---	---	---	---	741	---
TOTAL	8,751	10,545	430	43	11,018	11,018	0

Source: NACI, 1980a.

too deep, too thin, and too discontinuous to be economically recoverable. Criteria used in outlining this deposit include:

- lignite in-place density: 80.35 pounds per cubic foot.
- mining recovery: 85 percent of in-place tonnage.
- minimum mineable lignite thickness: 2 to 3 feet, depending upon overburden depth.
- weathering depth: 20 feet of overburden. Lignite with less than this amount of cover was judged to be of too poor quality to be burned in the power plant.
- maximum overburden depth: 140 feet.

Maps depicting ground elevation, lignite elevation, and lignite thickness were prepared on a 1 inch = 1,000 feet scale. Overburden yardage and lignite tonnage for small specific mining areas were then estimated from these maps throughout the economic deposit.

A mining sequence was then developed to provide the design tonnage of 2.8 million tons per year. Criteria used in selecting this mining sequence include:

- averaging the amount of overburden to be moved annually over the life of the project.
- minimizing the number of dragline moves and box cut yardage.
- minimizing disruption of the natural drainage system consonant with maximum recovery of the lignite resource.
- minimizing the length of haul roads and electrical transmission lines, especially during the early years of mining.

Based on this mining sequence, mine facilities were layed out and equipment selected on a class-type basis to handle the estimated quantities of excavation, haulage, and construction activities required.

The in-place quality of the lignite is based on laboratory analysis of 62 lignite cores of the Green Bed. The average estimated as-mined lignite quality over the life of the mine (24 years) is as follows:

GREEN BED (As Received at Power Plant)

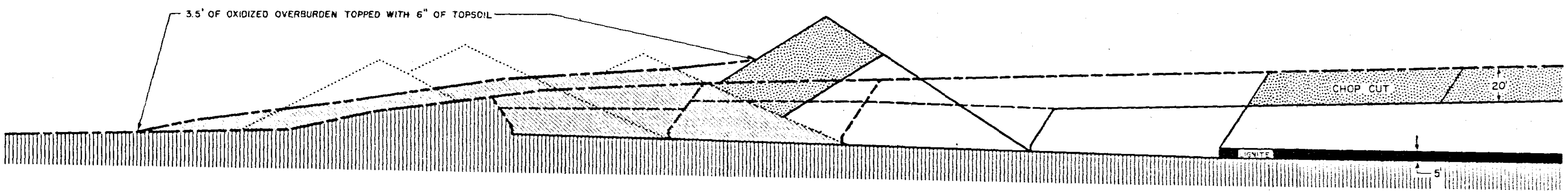
Diluted
14.7 percent Ash
1.08 percent Sulfur
6,418 Btu/lb.

3.5.2.2 Mining Sequence

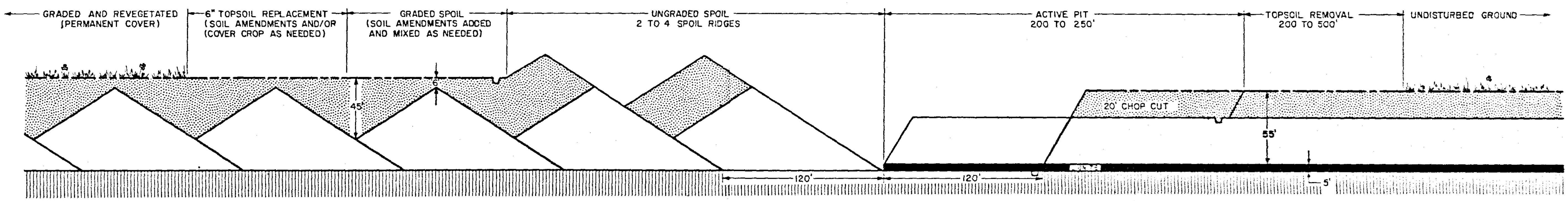
Figure 3-15 shows the areas to be affected by mining and mine-related activities and Table 3-1 lists the annual acreages scheduled to be disturbed by mining and ancillary activities. Figure 3-16 portrays in cross section the sequence of mining and reclamation activities under typical mining conditions. Box cutting for the two draglines (designated A and B) will commence during the third quarter of 1984 along the southern margins of mining blocks 1984-1990A and 1984-1990B and continue through 2008. The proposed sequence of mining for the two draglines and the timing of major dragline moves is as follows:

DRAGLINE A	DRAGLINE B	MOVES
1984-1990 A	1984-1990 B	
1991-1995 A	1991-1995 B	"A" in 1991
1996-2000 A	1996-2000 B	"B" in 1999
2001-2008 A	2001-2008 B	"A" in 2003

Specific routes for the proposed moves have not yet been designated, but in general the routes will be cleared and graded using crawler bulldozers to an approximate width of 110 feet. The dragline routes will be regraded to approximate



TYPICAL BOX CUT SEQUENCE



TYPICAL MINE CUT SEQUENCE

LEGEND

- ORIGINAL GROUND SURFACE
- REGRADED SURFACE
- PREVIOUS SPOIL
- PREVIOUS MINE CUT
- UNGRADED SPOIL AND ACTIVE MINE CUT
- UNOXIDIZED OVERBURDEN AND SPOIL
- UNDIFFERENTIATED SPOIL
- OXIDIZED OVERBURDEN AND SPOIL
- UNDISTURBED MATERIAL

REVISED BY DATE	THE SABINE MINING COMPANY SOUTH HALLSVILLE MINE
	Fig. 3-16 TYPICAL MINE CUT CROSS SECTIONS
	SCALE 1"=40' DRAWN BY E.K. KEEVER DATE 2/10/81 APPROVED S.W.I. DATE 2/10/81
	North American Consultants, Inc.
	PROJECT NO. 102 DRAWING NO. P111 MAP SHEET NO. 1 of 1

original contour and revegetated to an approved postmining land use compatible with the surrounding area as soon as practicable after the routes are no longer needed. Temporary earthen bridges with suitable culverts will be constructed for stream crossings.

The C mining blocks will be mined by either of two methods. They will be mined using dragline area mining wherever practicable. Otherwise, a modified block cut mining method will probably be used with mobile equipment (scrapers, loaders, crawler bulldozers, and/or trucks) as the overburden removal equipment. This mining method consists of sequentially stripping relatively small (approximately 250- x 250-feet) blocks of lignite and hauling the excavated overburden to fill in an adjacent block (from which the lignite has been previously removed) to the approximate original contour.

There will be no surface mining within 100 feet, measured horizontally, of a cemetery. Access to the cemeteries will be maintained at all times.

3.5.2.3 Mining Methods and Equipment

The proposed mine will use conventional single-seam area mining procedures with two dragline pits. Several small outlying reserve blocks may be mined using scrapers or other mobile equipment. Table 3-2 lists, by function, the major items of mining equipment scheduled to be used. A narrative description of mining procedures, mining equipment, and mine-related ancillary structures is presented in the following subsections.

Land Clearing

Timber and brush will be cleared as shortly as practicable in advance of mining operations. Merchantable timber will be removed by the landowner or local contractors. The remaining subeconomic timber, brush, and tree stumps will be used

TABLE 3-2

MAJOR EQUIPMENT LIST
SOUTH HALLSVILLE MINE

Function*	Description	Class Type	Number Required
Land Clearing	Crawler Bulldozer	D7, D8, D9	1
Overburden Removal	Walking Dragline	70-120 C.Y.	2
Overburden Removal	Crawler Bulldozer	D9, D10	2
Overburden Removal	Scraper	20-35 C.Y.	2-8
Lignite Cleaning	Wheel Bulldozer	150-250 H.P.	1
Lignite Loading	Backhoe or Front-End Loader	12-18 C.Y.	2
Lignite Hauling	Bottom Dump Truck	100-170 Ton	3-9
Spoil Grading	Crawler Bulldozer	D8, D9, D10	1-2
Spoil Grading	Motor Grader	150-250 H.P.	1-2
Miscellaneous Construction	Front-End Loader	8-12 C.Y.	1
Miscellaneous Construction	Backhoe Loader	4-6 C.Y.	1
Miscellaneous Construction	Truck or Crawler Dragline	4-8 C.Y.	1
Miscellaneous Construction	Scraper	15-25 C.Y.	1
Miscellaneous Construction	Motor Grader	150-250 H.P.	1-2
Miscellaneous Construction	Crawler Bulldozer	D7, D8, D9	2
Miscellaneous Construction	Compactor	150-350 H.P.	1
Road Maintenance	Water Truck	8,000-12,000 Gallon	1
Miscellaneous Hauling	Rear Dump Truck	15-25 Ton	1-2
Miscellaneous Hauling	Rear Dump Truck	30-50 Ton	1
Supply and Service	Various Trucks	1/2-10 Ton	5-10
Personnel Transport	Various Vehicles	1/2-1 1/2 Ton	7-14

*Miscellaneous construction and hauling equipment to be used for construction, maintenance, and reclamation of roads and drainage structures, with occasional use in overburden removal and mine reclamation.

Source: NACI, 1980a.

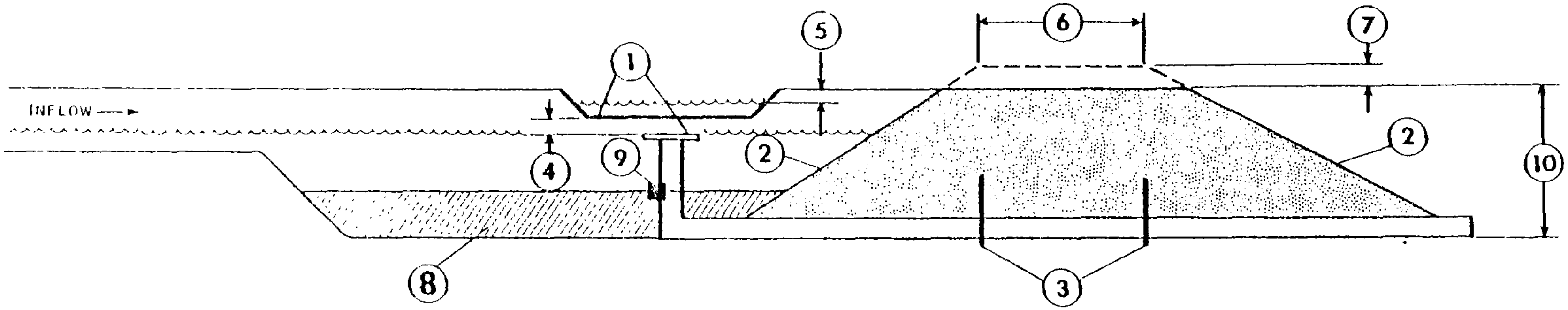
to construct brush piles for wildlife cover and/or burned or buried in accordance with applicable Federal, State, and local regulations. Houses and other structures will be relocated or salvaged, when possible, prior to mining.

Drainage and Erosion Control

Sedimentation Ponds

Prior to surface disturbance in the permit area, sediment control structures will be constructed to receive and detain the runoff from the disturbed areas. It is anticipated that three types of sediment control structures will be used. Type 1 (Fig. 3-17) is a sedimentation pond consisting of an embankment with principal and emergency spillways. The design specifications for the type 1 Sedimentation Pond are detailed in the figure. The figure described the spillway capacities, embankment configurations, use of anti-seep devices, sediment storage volume, and dewatering device. The Type 1 Sedimentation Pond will be used in natural drainageways near the head of small drainage areas. The Type 2 Sedimentation Pond (Fig. 3-18) is an excavated pond to be located offstream, as needed. The crest of the spillway will be at an elevation that will provide storage equivalent to the volume of runoff from a 10-year, 24-hour storm and 0.1 acre-foot of sediment storage per acre disturbed. When the water level in the pond reaches the elevation of the spillway after a storm event, the pond will be dewatered to the sediment storage level by pump or siphon. The design specifications of this pond are detailed in the figure. The Type 3 Sedimentation Pond (Fig. 3-19) is a combination of excavated and embankment types. Water will be pumped to the pond from the disturbed area. This type of pond will be used in lowland areas. Design specifications for this pond are shown in the figure. The drawings shown in Figs. 3-17 through 3-19 are representative typical drawings only.

Sizing of the sedimentation ponds is based on RRC requirements for sediment storage and detention of runoff. Runoff volume for each sedimentation

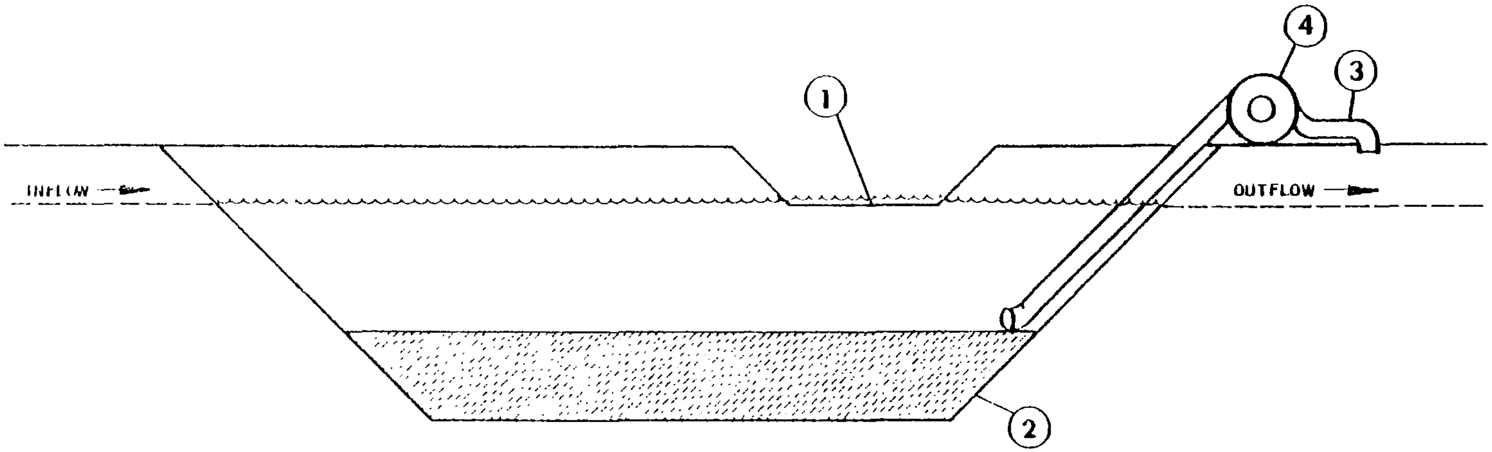


LEGEND

NUMBER	DESCRIPTION	< 20 FEET HEIGHT OR 20 ACRE-FEET	> 20 FEET HEIGHT OR 20 ACRE-FEET
(1)	COMBINED SPILLWAY CAPACITY	25 YEAR/24 HR. RUNOFF	100 YEAR/24 HR. RUNOFF
(2)	EMBANKMENT SLOPE	2:1 MAX., 5:1 MIN. COMBINED	2:1 MAX., 5:1 MIN. COMBINED 1.5 + FACTOR OF SAFETY
(3)	ANTI-SEEP DEVICE	NOT INSTALLED	INSTALLED
(4)	ELEVATION OF EMERGENCY SPILLWAY CREST ABOVE PRINCIPAL SPILLWAY	1.0 FOOT MINIMUM	
(5)	HEIGHT OF SETTLED EMBANKMENT ABOVE WATER SURFACE IN EMERGENCY SPILLWAY	1.0 FOOT MINIMUM	
(6)	TOP WIDTH OF EMBANKMENT (FEET)	(H + 35)/5	
(7)	ADDITIONAL CONSTRUCTED EMBANKMENT HEIGHT FOR SETTLEMENT (FEET)	.05 x H	
(8)	SEDIMENT STORAGE	0.1 ACRE-FOOT/ACRE DISTURBED LAND OR 3-YEAR ACCUMULATION	
(9)	DEWATERING DEVICE	MAINTAINED AT TOP OF SEDIMENT STORAGE ELEVATION	
(10)	DAM HEIGHT (H)	MEASURED FROM UPSTREAM TOE TO TOP OF EMBANKMENT	

TYPE 1 SEDIMENTATION POND DESIGN SPECIFICATIONS

Fig. 3-17

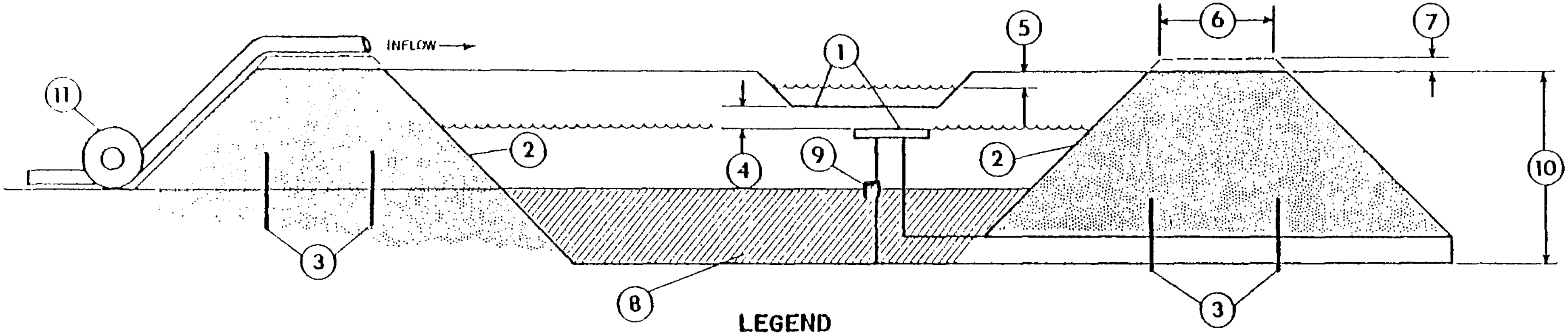


LEGEND

NUMBER	DESCRIPTION	< 20 ACRE FEET	> 20 ACRE FEET
(1)	SPILLWAY CAPACITY	25 YEAR/24 HR. RUNOFF	100 YEAR/24 HR. RUNOFF
(2)	SEDIMENT STORAGE	0.1 ACRE-FOOT/ACRE DISTURBED LAND OR 3-YEAR ACCUMULATION	
(3)	DEWATERING DEVICE	MAINTAINED AT TOP OF SEDIMENT STORAGE ELEVATION	
(4)	PUMP	MAINTAINED AT TOP OF SEDIMENT STORAGE ELEVATION	

TYPE 2 SEDIMENTATION POND DESIGN SPECIFICATIONS

Fig. 3-18



LEGEND

NUMBER	DESCRIPTION	<20 FEET HEIGHT OR 20 ACRE-FEET	>20 FEET HEIGHT OR 20 ACRE-FEET
1	COMBINED SPILLWAY CAPACITY	25 YEAR/24 HR. RUNOFF	100 YEAR/24 HR. RUNOFF
2	EMBANKMENT SLOPE	2:1 MAX., 5:1 MIN. COMBINED	2:1 MAX., 5:1 MIN. COMBINED 1.5+ FACTOR OF SAFETY
3	ANTI-SEEP DEVICE	NOT INSTALLED	INSTALLED
4	ELEVATION OF EMERGENCY SPILLWAY CREST ABOVE PRINCIPAL SPILLWAY	1.0 FOOT MINIMUM	
5	HEIGHT OF SETTLED EMBANKMENT ABOVE WATER SURFACE IN EMERGENCY SPILLWAY	1.0 FOOT MINIMUM	
6	TOP WIDTH OF EMBANKMENT (FEET)	(H+35)/5	
7	ADDITIONAL CONSTRUCTED EMBANKMENT HEIGHT FOR SETTLEMENT (FEET)	.05 x H	
8	SEDIMENT STORAGE	0.1 ACRE-FOOT ACRE/DISTURBED LAND OR 3-YEAR ACCUMULATION	
9	DEWATERING DEVICE	MAINTAINED AT TOP OF SEDIMENT STORAGE ELEVATION	
10	DAM HEIGHT (H)	MEASURED FROM UPSTREAM TOE TO TOP OF EMBANKMENT	
11	PUMP		

TYPE 3 SEDIMENTATION POND DESIGN SPECIFICATIONS

Fig. 3-19

pond was computed using Soil Conservation Service (SCS) procedures. Each sedimentation pond will be designed to have a detention capacity equal to the runoff volume (from the effective drainage area) resulting from a 10-year, 24-hour storm (7.1 inches of rainfall) plus a required sediment storage capacity of 0.1 acre-foot for each acre of disturbed area. The total required runoff and sediment storage volume of each sedimentation pond will be contained at an elevation equal to or below the elevation of the overflow channel or principal spillway crest. Locations of the sedimentation ponds and required diversion channels for diverting overland flow into the ponds have been determined (EH&A, 1981a). Each pond is numbered according to the year in which it should be completed. Effective drainage and disturbed areas, estimated storm runoff and sediment storage volumes, and estimated total capacities for each pond are listed in Table 3-3.

Ditches and Diversion Structures

As mining progresses, a series of ditches and diversion structures will be installed to control surface water runoff. These ditches will consist of two types: upstream interceptor ditches and sediment diversion ditches. Upstream interceptor ditches will be used to direct drainage from undisturbed areas away from disturbed areas to prevent co-mingling of drainage. Sediment diversion ditches will direct runoff from the disturbed areas to sediment control structures.

All ditches and diversion structures will be designed according to RRC specifications depending upon the nature of the structure (temporary or permanent). Figure 3-20 depicts the characteristics of typical temporary and permanent diversion structures.

Runoff from undisturbed areas is not required to pass through a sedimentation pond. Therefore, to minimize the sizes of sedimentation ponds, much of the runoff from undisturbed areas will be diverted away from channels leading to the sedimentation ponds or will be detained in upstream reservoirs to be released

TABLE 3-3

CONCEPTUAL SURFACE WATER AND SEDIMENTATION CONTROL FACILITIES FOR THE SOUTH HALLSVILLE MINE

Pond Number	Drainage Area (acres)	Disturbed Area (acres)	Design Storm[a] Runoff Volume (acre-feet)	Sediment[b] Storage (acre-feet)	Total Pond Capacity (acre-feet)
1982MF1	5.1	5.1	2.1	0.5	2.6
1982MF2	7.8	7.8	3.2	0.8	4.0
1982MF3	4.9	4.9	2.0	0.5	2.5
1982DE1	9.8	9.8	4.0	1.0	5.0
1982DE2	18.9	18.8	7.7	1.9	9.6
1984A1	43.4	42.4	17.7	4.2	21.9
1984A2	27.9	26.9	11.4	2.7	14.1
1985A1	18.4	14.7	7.5	1.5	9.0
1985A2	36.0	34.9	14.7	3.5	18.2
1985A3	29.2	27.4	11.9	2.7	14.6
1985A4	23.8	22.7	9.7	2.3	12.0
1985A5	40.9	40.0	16.7	4.0	20.7
1985A6	7.1	6.6	2.9	0.7	3.6
1985B1	72.8	29.4	13.4	2.9	16.3
1985B2	61.5	45.0	25.1	4.5	29.6
1985B3	35.3	27.9	14.4	2.8	17.2
1985B4	23.3	19.0	9.5	1.9	11.4
1985B5	9.8	7.8	4.0	0.8	4.8
1985B6	60.0	56.6	24.5	5.7	30.2
1985B7	31.1	28.0	12.7	2.8	15.5
1985B8	33.6	26.5	13.7	2.7	16.4
1985B9	35.3	33.3	14.4	3.3	17.7
1985B10	28.4	23.2	11.6	2.3	13.9
1986A1	58.3	54.7	23.8	5.5	29.3
1986A2	9.1	8.4	3.7	0.8	4.5
1986A3	20.1	19.0	8.2	1.9	10.1
1986A4	34.3	28.0	14.0	2.8	16.8
1986A5	48.5	46.3	19.8	4.6	24.4
1986A6	19.4	19.2	7.9	1.9	9.8
1986A7	2.5	1.0	1.0	0.1	1.1
1986B1	52.9	52.4	21.6	5.2	26.8
1986B2	6.1	5.4	2.5	0.5	3.0
1986B3	7.1	6.1	2.9	0.6	3.5
1986B4	9.3	3.8	3.8	0.4	4.2
1986B5	57.4	51.3	23.4	5.1	28.5
1986B6	39.7	36.7	16.2	3.7	19.9
1986B7	12.3	11.0	5.0	1.1	6.1
1987A1	59.3	47.8	24.2	4.8	29.0
1987A2	108.3	95.5	44.2	9.6	53.8

TABLE 3-3 (Cont'd)

Pond Number	Drainage Area (acres)	Disturbed Area (acres)	Design Storm[a] Runoff Volume (acre-feet)	Sediment[b] Storage (acre-feet)	Total Pond Capacity (acre-feet)
1987A3	32.4	27.8	13.2	2.8	16.0
1987A4	24.5	17.6	10.0	1.8	11.8
1987A5	29.4	16.2	12.0	1.6	13.6
1987A6	24.5	16.4	10.0	1.6	11.6
1987A7	75.0	73.9	30.6	7.4	38.0
1987B1	11.3	9.5	4.6	1.0	5.6
1987B2	54.2	54.1	22.1	5.4	27.5
1987B3	72.1	64.3	29.4	6.4	35.8
1987B4	48.8	47.2	19.9	4.7	24.6
1988A1	30.9	23.7	12.6	2.4	15.0
1988A2	21.8	16.9	8.9	1.7	10.6
1988A3	24.8	23.0	10.1	2.3	12.4
1988A4	47.3	45.0	19.3	4.5	23.3
1988A5	13.7	8.6	5.6	0.9	6.5
1988A6	14.0	10.2	5.7	1.0	6.7
1988A7	39.2	33.7	16.0	3.4	19.4
1988A8	27.5	26.4	11.2	2.6	13.8
1988A9	1.7	0.9	0.7	0.1	0.8
1988A10	11.0	10.3	4.5	1.0	5.5
1988A11	8.1	6.6	3.3	0.7	4.0
1988A12	9.1	7.7	3.7	0.8	4.5
1988A13	4.2	4.1	1.7	0.4	2.1
1988A14	4.4	3.8	1.8	0.4	2.2
1988A15	40.7	38.9	16.6	3.9	20.5
1988B1	47.5	40.6	19.4	4.1	23.5
1988B2	30.1	29.2	12.3	2.9	15.2
1988B2A	30.6	29.6	12.5	3.0	15.5
1988B3	15.7	10.1	6.4	1.0	7.4
1988B4	41.9	38.8	17.1	3.9	21.0
1988B5	6.6	5.6	2.7	0.7	3.4
1988B6	7.1	7.0	2.9	0.7	3.6
1988B7	10.1	10.1	4.1	1.0	5.1
1989A1	49.5	39.1	20.2	3.9	24.1
1989A2	179.9	178.7	73.4	17.9	91.3
1989B1	33.3	31.4	13.6	3.1	16.7
1989B2	35.0	30.3	14.3	3.0	17.3
1989B3	66.2	60.0	27.0	6.6	33.6
1989B4	23.5	21.0	9.6	2.1	11.7
1989B5	28.9	25.3	11.8	2.5	14.3

TABLE 3-3 (Cont'd)

Pond Number	Drainage Area (acres)	Disturbed Area (acres)	Design Storm[a] Runoff Volume (acre-feet)	Sediment[b] Storage (acre-feet)	Total Pond Capacity (acre-feet)
1990A1	82.0	35.5	33.5	3.6	37.1
1990A2	70.0	39.8	28.6	4.0	32.6
1990A3	123.3	123.3	50.2	12.3	62.5
1990A4	51.1	26.1	20.8	2.6	23.4
1990A5	51.9	42.6	21.2	4.3	25.5
1990B1	42.5	42.5	17.3	4.3	21.6
1990B2	22.5	15.2	9.2	1.5	10.7
1990B3	17.0	17.0	6.9	1.7	8.6
1990B4	69.3	69.3	28.5	7.0	35.5
1990B5	36.0	28.0	14.7	2.8	17.5
1991A1	145.7	115.9	59.4	11.6	71.0
1991A2	810.9	490.1	330.8	49.0	379.8
1991A3	2,259.3	1,133.8	921.8	113.4	1,035.2
1991B1	301.6	250.3	123.1	25.1	148.2
1991B2	2,408.9	1,386.3	982.8	138.6	1,121.4
1993B1	234.2	184.6	95.6	18.5	114.1
1995B1	83.3	67.5	34.0	6.8	40.8
1997B1	171.7	152.0	70.1	15.2	85.3
1997B2	94.5	94.5	38.6	9.5	48.1
1998B1	71.5	29.4	29.2	2.9	32.1
1999B1	2,232.6	1,714.7	910.9	171.5	1,082.4
1999B2[c]	---	---	---	---	---
2000B1	702.9	655.3	286.8	65.6	352.3
2000B2	92.2	19.7	37.6	2.0	39.6
2000B3	246.8	205.0	100.7	20.5	121.2
2000B4	110.1	99.6	44.9	10.0	54.9
2001B1[c]	---	---	---	---	---
2001S1	31.7	25.7	12.9	2.6	15.5
2001S2	27.1	14.7	11.1	1.5	12.6
2001S3	98.3	47.8	40.1	4.8	44.9
2001S4	28.0	12.9	11.4	1.3	12.7
2001S5	40.9	15.2	16.7	1.5	18.2
2001S6	35.8	18.3	14.6	1.9	16.5
2001S7	78.5	51.4	32.0	5.1	37.1
2001S8	67.5	48.2	27.5	4.8	32.3
2001S9	84.0	70.7	34.3	7.1	41.4
2001S10	33.5	24.8	13.7	2.5	16.2
2003A1	57.4	36.3	23.4	3.6	27.0
2004B1	439.4	336.1	179.3	33.6	212.9

TABLE 3-3 (Concluded)

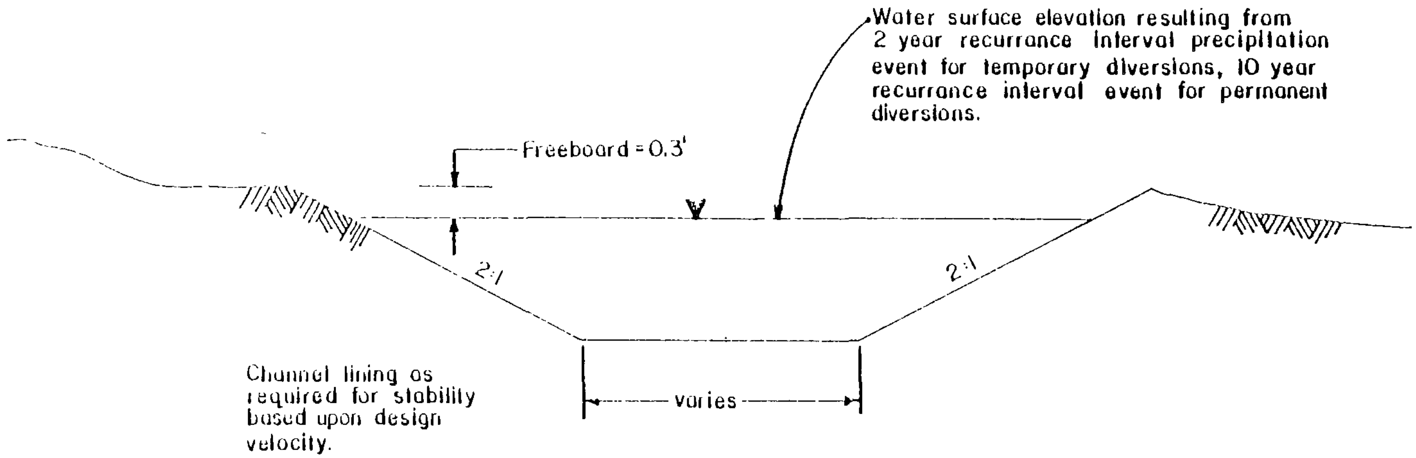
Pond Number	Drainage Area (acres)	Disturbed Area (acres)	Design Storm[a] Runoff Volume (acre-feet)	Sediment[b] Storage (acre-feet)	Total Pond Capacity (acre-feet)
2005B1	222.9	83.3	90.9	8.3	99.2
2007B1	75.1	34.1	30.6	3.4	34.0
2007S1	44.1	13.3	18.0	1.3	19.3

[a] Volume of runoff resulting from a 10-year, 24-hour rainfall event.

[b] Sediment storage computed as 0.1 acre-foot per each acre of disturbed area.

[c] Ponds 1999B2 and 2001B1 are used only for extra (preliminary) sediment control before reaching pond 1999B1, which will be constructed with a capacity to contain the total sediment and runoff volumes from the drainage area.

Source: EH&A, 1981a.



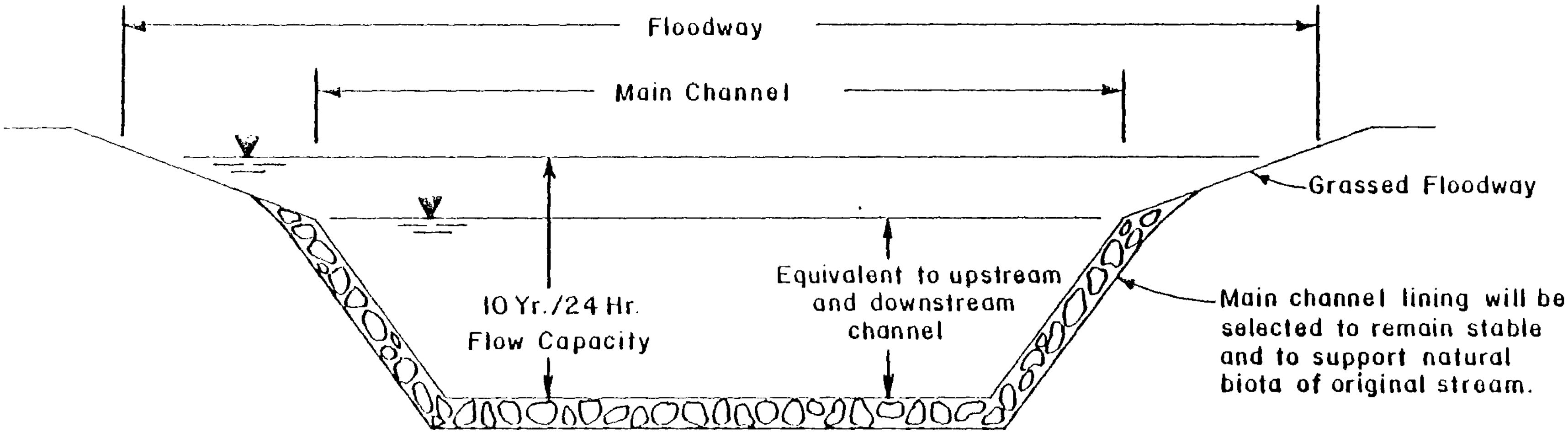
Typical Runoff Diversion Ditch

Fig. 3-20

after runoff from disturbed areas has passed through the sedimentation ponds. These reservoirs will be completed according to a predetermined schedule (EH&A, 1981b). Three of the largest of these reservoirs are located upstream of the mine area to detain runoff from the upper watershed of Clarks Creek. The reservoirs will be completed by the year 2000 to help minimize the size of sedimentation pond 2000B1. Four other ponds will also be constructed by the year 2000 upstream of sedimentation pond 2000B1. One of these ponds will be used only for detaining runoff from an upstream undisturbed area. The other three (2000B2, 2000B3, and 2000B4) will be used initially to detain runoff from undisturbed areas and will be used later as sedimentation ponds for runoff from disturbed areas as the mine progresses. Similar runoff control schemes are conceived for the other watersheds in the mine area. Additionally, storage capacities of several existing ponds in the project area may be used to minimize runoff to sedimentation ponds.

Diversion and Rerouting of Streams

To control drainage from upstream areas, it will be necessary to construct stream channel diversions for a portion of Hatley Creek and several of its unnamed tributaries. It is anticipated that these diversions will be temporary in nature and will be designed to prevent contribution of sediment to streamflow or runoff from outside the permit area. These temporary diversions will be designed so that the channel, bank, and adjacent floodplain will safely pass the peak runoff from a 10-year, 24-hour precipitation event. The capacity of the channel itself will be designed to equal the capacity of the unmodified stream channel immediately upstream and downstream of the diversion itself. When no longer needed (years of completion for various segments are indicated in EH&A, 1981b), the diversions will be removed and the stream will be returned to a configuration that approximates premining stream channel characteristics. Figure 3-21 shows the pertinent design characteristics of a stream channel diversion.



TYPICAL TEMPORARY STREAM DIVERSION
CROSS SECTION

Fig. 3-21

Permanent diversions may be required to enable mining through or near the existing channels and to prevent flood flows from interfering with mining operations. Permanent stream diversions will be designed to pass the peak discharge resulting from a 100-year, 24-hour storm event.

Flood Prevention Levees

Levees will be necessary to prevent flooding caused by backwater from the Sabine River and other streams in the project area. These levees will be designed for a flood resulting from a 100-year, 24-hour storm. In some cases, the levee will also be used as a haul-road embankment and/or a pond embankment. Where a levee is used for a sedimentation pond embankment, the emergency spillway for the sedimentation pond will consist of culverts with flap gates to prevent flooding by backwater during high stage conditions.

Control of Overland Flow

Overland flow must be controlled during mining operations to prevent runoff from entering active mine pits. An illustration of the planned method of overland flow control is contained in EH&A, 1981b, which shows overland flow diversion channels and catchment basins temporarily located for various stages during the life of the mine. As mining progresses, runoff toward the mine pit will be diverted around the pit or, in cases where diversion channel excavations would be too great, catchment basins will be formed by temporary dikes to keep water out of the pit. Runoff water in the catchment basins will be pumped to a channel to convey the water downstream of the pit. Other overland flow diversions will be necessary to direct runoff from disturbed areas toward sedimentation ponds. Temporary overland flow diversion channels will be designed for a 2-year storm, as required by the RRC regulations. Permanent overland flow diversion channels will be designed for a 10-year storm.

Overburden Removal

Overburden will be removed using two 70- to 120-yard electric-powered walking draglines utilized in a conventional dig and sidecast manner. These machines require a relatively firm and level working surface, which will be constructed by a combination of dragline chop cutting (digging at or above the level of the dragline base) and bulldozer grading. The depth of this working surface (bench) will vary between 10 and 40 feet below the ground surface, depending on soil/rock bearing strength, overburden depth, and drainage requirements.

Average pit width from the toe of the spoil to the base of the highwall will be approximately 120 feet. Overburden depth varies from 20 to 140 feet and averages 66 feet. Pit length ranges from 800 to 10,000 feet and averages about 6,000 feet.

Overburden removal for the initial dragline cuts (box cuts) will commence during the third quarter of 1984, using scrapers and other mobile equipment as the excavating units. Scrapers, bulldozers, and the two draglines will complete the box cutting during the fourth quarter of 1984. Full dragline stripping production is scheduled to be reached during early 1985. Figure 3-15 shows, in cross section, the sequence of mining and reclamation activities under typical mining conditions.

Lignite Loading and Hauling

The top of the lignite seam will be cleaned and any persistent thick partings will be removed by mobile equipment and deposited at the baseline of the spoil pile. Two 12- to 18-cubic yard hydraulic backhoes, or comparably sized front-end loaders, will load lignite from the two active pits. Lignite blasting will not be required. Bottom dump coal haulers will haul the lignite to the truck dump.

Spoil Grading

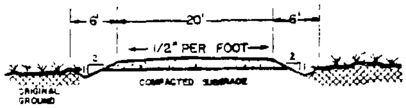
Spoil piles left by the dragline will be rough graded using large crawler bulldozers. Final grading and ditching will be accomplished using a motor grader. Final graded slopes and drainage patterns will approximate the general nature of premining topography and drainage.

Road Construction and Maintenance

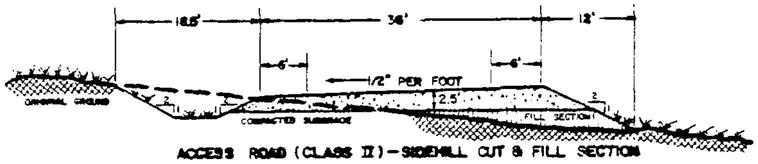
Three major types of roads are to be constructed in the mine area: lignite haul roads, access roads, and temporary access roads. Roads will be constructed in accordance with prudent engineering and regulatory standards, according to the size, type, and density of scheduled vehicular traffic. Typical cross sections of these three types of roads are presented in Fig. 3-22. The road surfaces will be maintained, as needed, on a regular basis by grading, ditch cleaning, and adding additional surfacing material. A water truck will be used, as needed, to control fugitive dust. When roads are no longer needed, surfacing material and culverts will be salvaged, whenever possible, and the surface will be regraded and reclaimed to an approved postmining land use compatible with the surrounding area.

Stream crossings by roads within the permit area will be designed in compliance with RRC regulations, Rules 400 through 420. These rules specify the requirements for roads according to Classes I, II, and III. Culverts and bridges for Class I roads (lignite haul road) will meet the following minimum requirements:

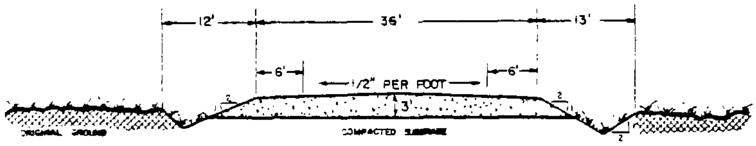
- Culverts with an end area of 35 square feet and bridges with spans of 30 feet or less will be designed to safely pass the 10-year, 24-hour precipitation event without a head of water at the entrance. Culverts with an end area of greater than 35 square feet or less, will be designed to safely pass the 20-year, 24-hour precipitation event. Bridges with spans of more than 30 feet will be designed to safely pass the 100-year, 24-hour precipitation event or a larger event as specified by the RRC.



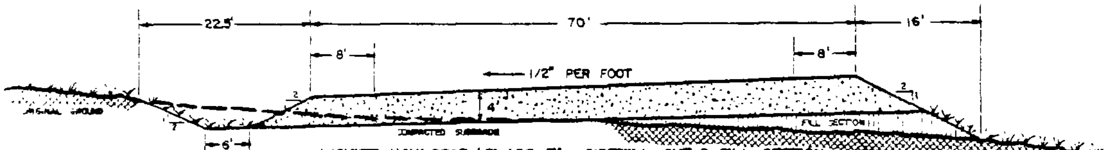
TEMPORARY ACCESS ROAD (CLASS III)



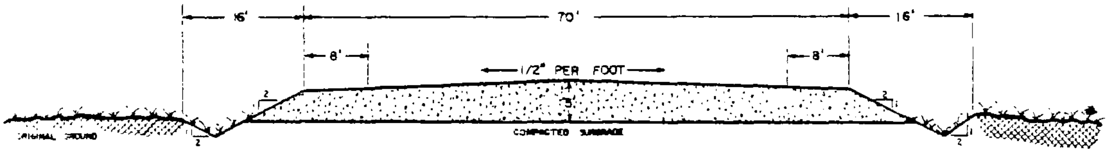
ACCESS ROAD (CLASS II)—SIDEHILL CUT & FILL SECTION



ACCESS ROAD (CLASS II)—UPLAND SECTION



LIGNITE HAULROAD (CLASS I)—SIDEHILL CUT & FILL SECTION



LIGNITE HAULROAD (CLASS I)—UPLAND SECTION

NOTE: DEPTH OF SURFACING MATERIAL AND CUT AND FILL SLOPES WILL VARY DEPENDING ON THE STRENGTH OF NATIVE SOIL MATERIALS. DITCH DIMENSIONS AND LINING MATERIALS WILL VARY DEPENDING ON LOCAL HYDROLOGIC PARAMETERS

REVISED BY	DATE	THE SABINE MINING COMPANY SOUTH HALLSVILLE MINE
		FIG. 3 - 22 TYPICAL HAULROAD CROSS SECTIONS
		SCALE 1"=10'
		DRAWN BY S.K.S. DATE 9/10/80
		APPROVED S.W.I. DATE 9/10/80
		North American Consultants, Inc. 7516 LBJ Freeway, Park Central Dallas, Texas 75251
		PROJECT NO. 02 DRAWING NO. P13 MAP SHEET NO. 1 OF 1

- Drainage pipes and culverts will be constructed to avoid plugging or collapse and erosion at inlets and outlets.
- All culverts will be covered by compacted fill to a minimum depth of 1 foot.
- Culverts will be designed, constructed, and maintained to sustain the vertical soil pressure, the passive resistance of the foundation, and the weight of vehicles to be used.

Culverts and bridges for Class II roads (access roads) will meet the following requirements:

- Culverts with an end area of 35 square feet or less will be designed to safely pass the 10-year, 24-hour precipitation event without a head of water at the entrance. Culverts with an end area of greater than 35 square feet and bridges with spans of 30 feet or less, will be designed to safely pass the 20-year, 24-hour precipitation event. Bridges with spans of more than 30 feet will be designed to safely pass the 100-year, 24-hour precipitation event or larger event as specified by the regulatory authority.
- Drainage pipes and culverts will be constructed to avoid plugging or collapse and erosion at inlets and outlets.
- Culverts will be covered by compacted fill to a minimum depth of 1 foot.
- Culverts will be designed, constructed, and maintained to sustain the vertical soil pressure, the passive resistance of the road foundation, and the weight of vehicles to be used.

For Class III roads (temporary access roads) temporary culverts will be installed for all flowing drainages and stream crossings. Temporary culverts and bridges will be sized to safely pass the 1-year, 6-hour precipitation event.

Figure 3-23 is a cross section and end view of a typical stream crossing showing the pertinent design characteristics.

Reclamation and Revegetation

General Reclamation Procedure

Surface (soil) reconstruction and revegetation reclamation operations for the South Hallsville Lignite Surface Mine to be operated by the Sabine Mining Company involve the segregation and redistribution of topsoil and near- surface oxidized overburden for use as a postmining soil. The surface 6 inches of soil (topsoil) remaining in place after initial vegetation removal operations, will be removed and redistributed as the final postmining surface layer. A mixture of the remaining soil and near-surface oxidized overburden will be segregated and redistributed on top of unoxidized overburden and will comprise the layer immediately beneath the replaced 6 inch topsoil layer. The two reconstructed layers will provide a minimum of 48 inches of cover over the unoxidized overburden material. Final surface reconfiguration will approximate the original premining contour. The reconstructed postmining soil will be revegetated with approved plant species that are adapted to the region.

Soil Assessment

A detailed soil survey was performed by the SCS in order to identify soil types and their physical location within the 24-year mine area.

Table 3-4 contains summarized data for the area's major soil mapping units. A careful review of the data shows that the natural soils (1) are very sandy within the solum (A and B horizons); (2) have solum cation exchange capacities of generally less than 15 meq/100 g; (3) have base saturation levels of the cation exchange sites of generally less than 20 percent; (4) generally have low to extremely

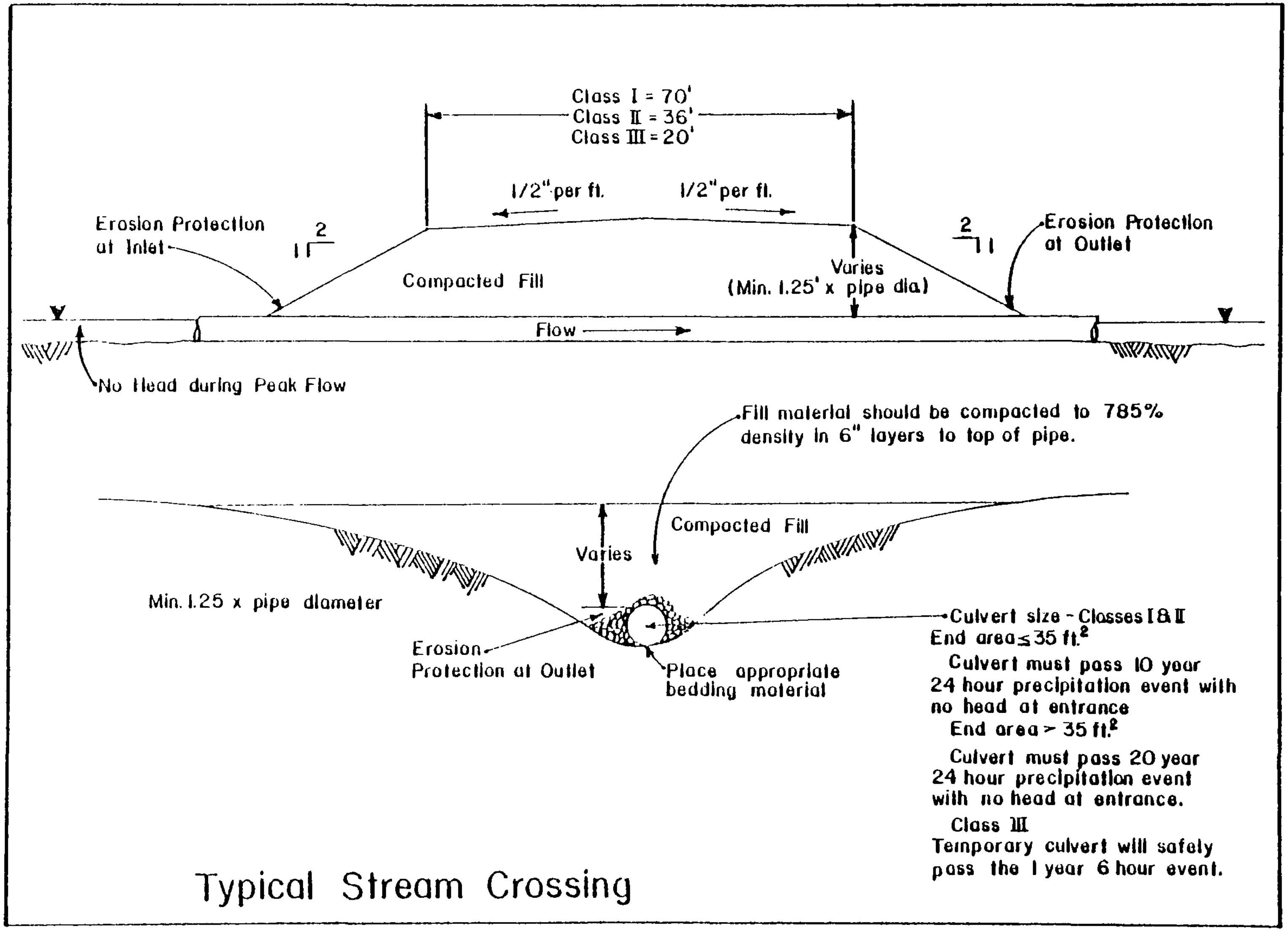

Class I = 70'
Class II = 36'
Class III = 20'
1/2" per ft.
1/2" per ft.
Erosion Protection at Inlet
2
1
Compacted Fill
Varies (Min. 1.25' x pipe dia)
2
1
Erosion Protection at Outlet
Flow
No Head during Peak Flow
Fill material should be compacted to 785% density in 6" layers to top of pipe.
Compacted Fill
Varies
Min. 1.25 x pipe diameter
Erosion Protection at Outlet
Place appropriate bedding material
Culvert size - Classes I & II
End area ≤ 35 ft.²
Culvert must pass 10 year 24 hour precipitation event with no head at entrance
End area > 35 ft.²
Culvert must pass 20 year 24 hour precipitation event with no head at entrance.
Class III
Temporary culvert will safely pass the 1 year 6 hour event.
Typical Stream Crossing

Fig. 3-23

TABLE 3-4

CHARACTERISTICS OF SOUTH HALLSVILLE MINE
SURFACE SOIL HORIZONS

Soil Series	Horizon	Depth (inches)	Sand	Silt	Clay	CEC (meq/100 g)	Base Saturation		Acidity (meq/100 g)	OM (percent)	N (percent)	Available	
			(percent)				(meq/100 g)	(percent)				P (ppm)	K (ppm)
Bowie	A	0-11	56.95	27.96	15.09	7.4	1.52	20.5	5.9	0.38	0.03	4	80
	B21+	11-22	51.09	22.52	26.39	10.0	1.73	17.3	8.3	0.48	0.03	4	96
	B22+	22-35	38.50	45.89	15.61	12.4	1.26	10.2	11.1	0.17	0.02	4	60
	B23+	35- 44	37.96	33.31	28.73	10.2	0.59	5.6	9.6	0.07	0.02	4	50
Bowie	A	0-13	72.82	24.57	2.61	2.2	0.33	15.0	1.9	0.55	0.03	4	80
	B21+	13-22	51.02	30.06	18.92	10.9	1.23	11.8	9.67	0.32	0.03	4	80
	B22+	22-31	44.33	8.44	47.23	10.4	1.06	10.2	9.3	0.2	0.02	4	82
	B23+	31-39	41.81	33.23	24.96	11.3	0.99	8.8	10.3	0.12	0.02	4	73
	B24+	39- 45	37.34	38.20	24.46	9.7	0.92	9.5	8.8	0.21	0.03	4	60
Cart-Erno	A23	0-20	74.07	17.30	8.63	1.7	0.3	17.6	1.4	0.34	0.02	4	30
	B21+	20-23	57.00	30.21	12.79	6.7	1.58	23.6	5.1	0.25	0.03	4	90
	B22+A	23-37	56.52	23.05	20.43	10.2	2.19	21.5	8.0	0.28	0.03	4	90
	BX1	37-44	58.14	24.75	17.11	7.2	1.14	15.8	5.9	0.07	0.01	4	70
	BX2+A'2	44- 47	56.88	22.27	20.85	5.9	0.99	16.8	4.9	0.07	0.01	4	80
Cuthbert	A	0-6	86.14	10.92	2.94	8.5	1.52	17.9	7.0	2.3	0.09	4	134
	B21+	6-26	54.23	10.90	34.87	13.5	1.63	12.1	11.9	0.71	0.05	4	204
	B22+	26-32	46.93	19.70	33.37	13.7	0.72	5.3	13.0	0.25	0.03	4	110
	Cr	32- 42	53.27	15.47	31.26	14.8	0.48	3.2	14.3	0.91	0.02	4	180
Cuthbert	A1+A2	0-9	70.43	20.77	8.80	9.1	1.04	11.4	8.1	3.64	0.10	4	140
	B21+	9-38	68.24	8.79	22.97	5.9	0.46	7.8	5.4	0.52	0.03	4	180
	B22+	38-48	77.22	8.66	14.12	8.9	0.65	7.3	8.3	0.52	0.05	4	205
	B3+C	48-56	55.00	16.45	28.55	13.0	0.71	5.5	12.3	0.80	0.04	4	255
	Cr	56-60	54.56	10.17	35.27	14.8	0.72	4.9	14.1	0.22	0.03	4	116

TABLE 3-4 (Cont'd)

Soil Series	Horizon	Depth (inches)	Sand	Silt (percent)	Clay	CEC (meq/100 g)	Base Saturation (meq/100 g)	Base Saturation (percent)	Acidity (meq/100 g)	OM (percent)	N (percent)	Available P (ppm)	Available K (ppm)
Kirvin	A1+A2	0-9	71.47	23.93	4.60	6.1	0.56	9.2	5.5	0.56	0.03	4	110
	B21t	9-22	28.37	22.76	48.87	19.6	1.99	10.2	17.6	0.49	0.05	4	221
	B22t	22-40	31.00	14.52	54.48	23.5	1.05	4.5	22.4	0.28	0.04	4	90
	B23t	40- 47	9.39	25.74	64.87	35.7	0.97	2.7	34.7	0.15	0.03	4	291
Kirvin	A	0-14	82.38	10.97	6.65	3.9	0.88	22.6	3.0	0.75	0.05	4	70
	B21t	14-26	54.22	14.12	31.66	23.5	2.51	10.7	21.0	0.45	0.04	4	170
	B22t	26-35	47.18	10.77	42.05	16.7	1.54	9.2	15.2	0.43	0.04	4	200
	B23t	35- 47	37.65	20.30	42.05	20.4	1.04	5.1	19.4	0.49	0.03	4	260
Kullit	A1	0-4	72.72	24.66	2.62	5.9	2.38	40.3	3.5	2.68	0.13	4	70
	A2	4-10	73.12	22.12	4.76	3.7	0.91	24.6	2.8	0.73	0.03	4	29
	B21t	10-23	53.24	23.66	23.10	8.4	2.06	24.5	6.3	0.41	0.02	4	70
	B22t	23- 40	48.24	26.27	25.49	9.8	1.33	13.6	8.5	0.26	0.03	4	70
Kullit	A1	0-3	66.99	31.60	1.41	7.6	1.75	23.0	5.8	2.27	0.13	20	80
	A2	3-15	65.29	35.71	1.00	2.9	1.02	35.2	1.9	0.52	0.04	8	40
	B21t	15-23	48.65	23.79	27.56	10.0	1.9	19.0	8.1	0.41	0.05	4	90
	B22t	23- 40	27.42	18.81	53.77	26.7	2.2	8.24	24.5	0.52	0.06	4	210
Sacul	A1	0-2.5	64.39	32.98	2.63	7.0	1.98	28.3	5.0	1.99	0.10	6	290
	A2	2.5-8	53.16	27.92	18.92	7.2	1.84	25.5	5.4	0.90	0.05	4	330
	B21t	8-16	17.05	26.49	56.46	18.9	2.52	13.3	16.4	0.30	0.03	4	700
	B22t	16-26	3.00	47.05	49.95	20.0	2.25	11.2	17.8	0.61	0.05	4	340
	B23t	26-36	2.01	46.70	51.29	27.9	1.55	5.55	26.3	0.31	0.04	4	310
	B24t	36- 44	6.24	45.49	48.27	24.4	1.15	4.71	23.2	0.43	0.04	4	245

TABLE 3-4 (Concluded)

Soil Series	Horizon	Depth (inches)	Sand	Silt	Clay	CEC (meq/100 g)	Base Saturation (meq/100 g)	Base Saturation (percent)	Acidity (meq/100 g)	OM (percent)	N (percent)	Available P (ppm)	Available K (ppm)
			(percent)										
Thenas	A1+A2	0-4	58.41	30.69	10.90	20.0	3.38	16.9	16.6	4.72	0.24	4	210
	B21	4-11	58.73	26.49	14.78	7.6	2.72	35.8	4.9	0.84	0.06	4	60
	B22	11-31	57.82	35.50	6.68	3.9	1.02	26.1	2.9	0.50	0.03	4	43
	B23	31-44	58.66	23.07	18.27	9.4	1.82	19.4	7.6	0.30	0.03	4	110
	B24	44-48	57.28	17.33	25.39	10.7	1.72	16.1	9.0	0.17	0.03	4	120

Source: Brown, 1980.

low levels of organic matter (OM), plant-available phosphorus (P), plant-available potassium (K), and organic nitrogen (N). The capacity of the natural soils to produce sufficient quantities of forage dry matter is low to very low, based upon available N without supplemental N additions. An estimate of the potential inorganic N supply from the organic N pool (assuming that one surface acre 6 inches deep weighs 2.0×10^6 pounds) reveals that on an average, only 800 to 1,400 pounds of mineralizable organic N are present in the soil. Assuming an inorganic N release rate of 5 percent per year (a high value), an average of only 40 to 70 pounds of NH_4^+-N and NO_3^--N, products of mineralized organic N, are potentially available for crop utilization. Generally, 200 to 400 pounds of NH_4^+-N and NO_3^--N are recommended for improved pasture production systems. In addition, the capacity of these soils to supply other major and minor nutrients is low to very low. A review of the data clearly indicates that the existing soils are not good intensive agricultural soils. An earlier but similar assessment of these soils was made as early as 1931 by W.T. Carter. He described these soils as nonintensive agricultural soils due to their adverse physical properties and low natural fertility.

Overburden Assessment

Nine continuous overburden cores were collected from the project site by the Paul Weir Company during the lignite-drilling and mine-development study for the South Hallsville Project. Overburden core samples were transported to Texas A&M University's Departments of Soil and Crop Sciences and Geology, where the overburden cores were analyzed for various chemical and physical properties. Texas A&M researchers stated that the top 16 to 20 feet of overburden (apparently oxidized zone) is the most desirable reclamation material when compared with native soil A horizon materials.

Lithologic samples and logs obtained during hydrogeologic and lignite-exploration drilling programs produced data showing that the surface 15- to 23-foot increment is oxidized, based upon the vivid yellow, orange, and brown colors associated with the overburden. Statistical analyses of overburden core data show that the mean levels of acidity, electrical conductivity, pyritic sulfur, soluble salts, sulfate sulfur, and total sulfur in the oxidized zone (0 to 23 feet) are significantly lower than the unoxidized zone (23 feet). The oxidized overburden data presented in Table 3-5, are equal to, if not better than the B and C soil horizon data presented in Table 3-4. The oxidized overburden data (Table 3-5) tend to be equal to the undisturbed A horizon values of many soil mapping units (Table 3-4) for percent sand, silt, and clay; percent N; ppm available K; available water capacity; and acidity.

The oxidized overburden data indicate that this material potentially could be used as a topsoil substitute. However, firm support for using oxidized overburden as a topsoil substitute will require further research on organic matter level and microbial transformation influences on postmining crop performance. Until the results of the research are obtained, replacement of the surface 6-inch layer, which contains the maximum supply of organic matter and maximum expected microbial diversity in this region, is planned as an added measure to maximize the postmining revegetation potential.

The Sabine Mining Company proposes to utilize the select oxidized overburden zone as a portion of the reconstructed root zone (7 to 48 inch layer), and will further investigate the potential of the near surface oxidized overburden material as a topsoil substitute. The Sabine Mining Company also will investigate the reclamation feasibility potential of mixed overburden as a soil substitute material.

Topsoil and Oxidized Overburden Handling Procedures

Topsoil segregation operations will begin after the removal of vegetation. Topsoil will be removed by mobile field equipment (e.g., scrapers, bulldozers, etc.) and redistributed on the oxidized overburden. Redistribution will begin after

TABLE 3-5

OXIDIZED OVERBURDEN CORE DATA
SOUTH HALLSVILLE MINE

Variable[1]	Mean	Standard Deviation
Sand	58.20	21.13
Silt	19.50	11.23
Clay	22.23	13.53
OM	0.28	0.26
N	0.053	0.086
P	1.26	1.53
K	92.80	52.30
H_20 available	12.30	4.23
Acidity	6.54	7.80
Electrical Conductivity	4.70	9.30

[1] Sand = percent
Silt = percent
Clay = percent
OM = organic matter concentration, percent.
N = nitrogen concentration, percent.
P = available phosphorus, ppm.
K = available potassium, ppm.
H_20 available = plant-available water, percent.
Acidity = measurable potential acidity, meq/100 g of oxidized overburden.
Electrical Conductivity = saturated paste conductance, mmhos/cm.

Source: NACI, 1981.

the topsoil redistribution surface (interface plane) has been prepared to reduce slippage potential and when chemical and physical topsoil properties can be protected and erosion minimized (or controlled). If prompt topsoil redistribution becomes impractical, the material will be routed to predetermined storage areas. The stockpiled topsoil will be protected from wind and water erosion, unnecessary compaction, and contaminants which lessen the capability of the topsoil to support postmining vegetation. Nutrients and other soil amendments will be added to the reconstructed soil in amounts determined by tests or experience in order to promote stability of the approved postmining land use and maintain the vegetation as required in the Texas surface mining revegetation rules.

Draglines or mobile field equipment will be used to excavate and place near-surface oxidized overburden materials. The draglines will selectively chop cut the oxidized overburden and deposit it on top of the unoxidized overburden so as to ensure that the unoxidized materials are covered by a minimum of 3.5 feet of oxidized materials. The distances between the regraded surfaces and the top of the unoxidized overburden spoil piles are independent of spoil pile height. This distance is independent of the overburden depth within the range capabilities of the draglines at any given chop cut depth and spoil angle. When 20 feet or more of oxidized overburden is present, unoxidized material will be placed in a normal, single, high ridge. When a sufficient depth of oxidized overburden is not available to cover the spoil, using the single ridge placement, the unoxidized spoil will be placed in a series of low ridges. This is accomplished by reducing the length of cut at each dragline position and varying the swing angle.

Wherever the nature and depth of the oxidized zone is insufficient for segregating the material using draglines, reclaimable oxidized material will be excavated by scrapers or other mobile field equipment and redistributed on a prepared site without storage in a manner which ensures that unoxidized materials are covered by at least 3.5 feet of oxidized materials.

Revegetation

Revegetation will begin during the first favorable planting period after the reconstructed soil has been conditioned and prepared by planting operations. Species selection for vegetative cover is directly related to the reclamation stage, reconstructed soil conditions, warm- or cool-season, and proven success capabilities of the plant species selected. Table 3-6 lists the plant species to be selected for each reclamation stage.

Three revegetation stages are proposed in this plan. Reclamation Stage 1 is a temporary stage and requires establishment of a temporary cover crop or mulch cover. Stage 2 is designed to prepare the site for the permanent vegetative cover crop and requires establishment of the prepermanent cover crop. Stage 2 can be initiated instead of Stage 1 if reconstructed soil conditions are favorable. Vegetative species will be selected (1) to produce greater levels of dry matter than the permanent vegetation; (2) to produce an initial supply of high nitrogen-containing residues; and (3) to produce both deep roots and numerous near-surface fibrous roots. During Stage 2, crop residues will be incorporated into the reconstructed soil to improve both the physical condition of the material, with respect to water movement and air diffusion, and the microbiological community. This intermediate step has been shown to enhance the establishment of the permanent vegetative species (Stage 3). Stage 3 will continue until the regulatory authority, RRC, approves the postmining revegetation efforts and declares the area successfully reclaimed.

Waste Disposal Operation Plan

Characteristics of the Waste

The fly ash and scrubber sludge will be mixed at the power plant site (see Process Flow Diagram-Blending, Fig. 3-24). The blended fly ash and sludge will

TABLE 3-6

PLANT SELECTION LIST FOR RECLAMATION STAGES
SOUTH HALLSVILLE MINE

Temporary Cover (Reclamation Stage 1)

Rye (Secale cereale) Wheat (Triticum vulgare) Oats (Avena sativa) Annual ryegrass (Bolium multiflorum) Pearl millet (Perrisetum typhoideum) Sorghum sudangrass hybrids (Sorghum sp.) Mulch

Prepermanent Cover (Reclamation Stage 2)

Bahiagrass (Paspalum notatum) Bermudagrass (Cynadon daclylon) Weeping lovegrass (Eragrostis curvula) Switchgrass (Panicum virgatum) Deertongue (Panicum clandestinum) Arrow leaf clover (Trifolium vesiculosum Savi) Crimson clover (Trifolium incarnatum L.) Hairy vetch (Vicia villosa Roth) Subterranean clover (Trifolium subterraneum) Sweet clover (Melilotus spp.) Kobe lespedeza (Lespedeza striata) Korean lespedeza (Lespedeza stipulacea) Sericea lespedeza (Lespedeza cuneata)

Permanent Cover (Reclamation Stage 3)

Bahiagrass Bermudagrass Kleingrass 75 (Panicum coloratum L.) Arrowleaf clover Crimson clover Amur honeysuckle (Lonicera maackii) Autumn olive (Elaeagnus umbellata) Bicolor lespedeza (Lespedeza bicolor) Loblolly pine (Pinus taeda) Southern red Oak (Quercus falcata) Sweetgum (Liquidambar styracilflua)

Source: NACI, 1981.

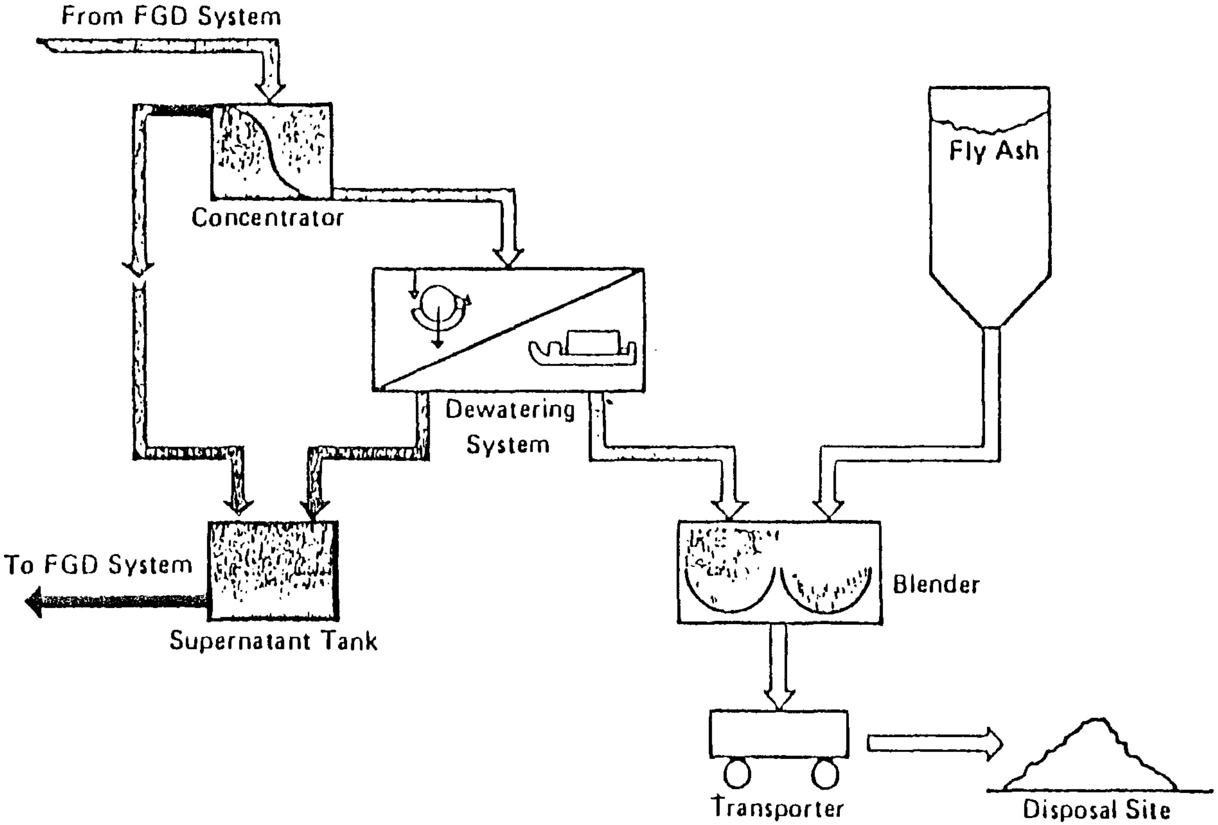


Fig. 3-24

Process Flow Diagram-Blending.
Source: NACI, 1981.

have the consistency of damp earth with a permeability range of 10^{-4} to 10^{-6} cm/s. If desired, lime may be added as a fixing agent, which will cause the mixed ash and sludge to set up like concrete (see Process Flow Diagram-Fixation, Fig. 3-25). The mixed waste material will have a very low permeability (10^{-5} to 10^{-7} cm/s) and will be suitable for lining waste disposal pits. The maximum rate of waste production will be 172 tons per hour (tph) (150 cubic yards/hour). The average rate of waste production will be 100 tph (87 cubic yards/hour). The total volume of waste to be generated during the 30-year life of the plant is 25×10^{6} cubic yards (15,517 acre feet).

The characteristics of leachate from ash and sludge from the proposed Henry W. Pirkey Power Plant-Unit 1 are expected to be similar to other lignite ash wastes, but until ash has been produced and tested, actual characteristics will remain unknown.

Waste Classification

Lignite ash wastes are at present classified as nonhazardous solid waste by the EPA. The TDWR presently is classifying the waste as Class 1 or Class 2 industrial solid waste.

Disposal Plan

A waste disposal plan featuring initial landfill and research into the use of the sludge/fly ash wastes as a soil amendment for mine reclamation and/or mine disposal is planned. The waste will be disposed of within the boundaries of a tract of land owned and controlled by SWEPCO. The disposal site will only accept waste from the proposed Henry W. Pirkey Power Plant.

The waste loadout system will consist of one (1) 400 tph, covered, inclined, movable, radial stacking conveyor with walkway and internally lined

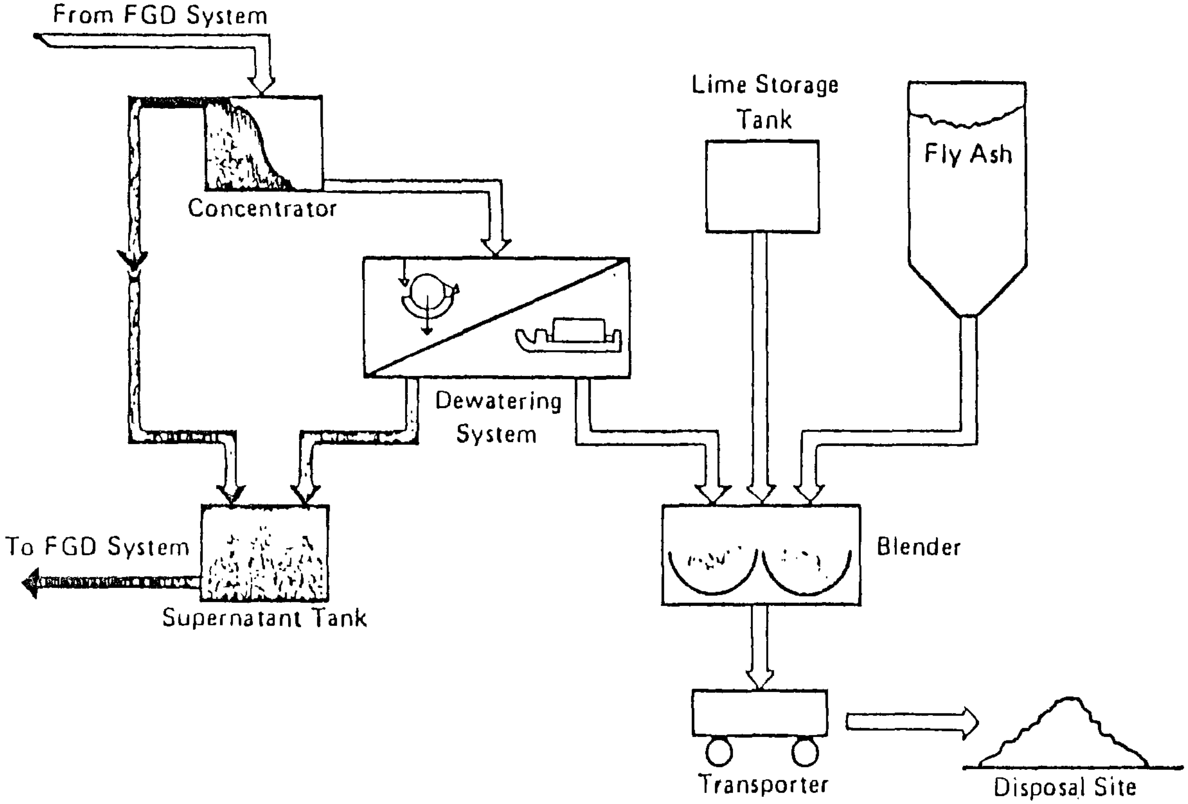
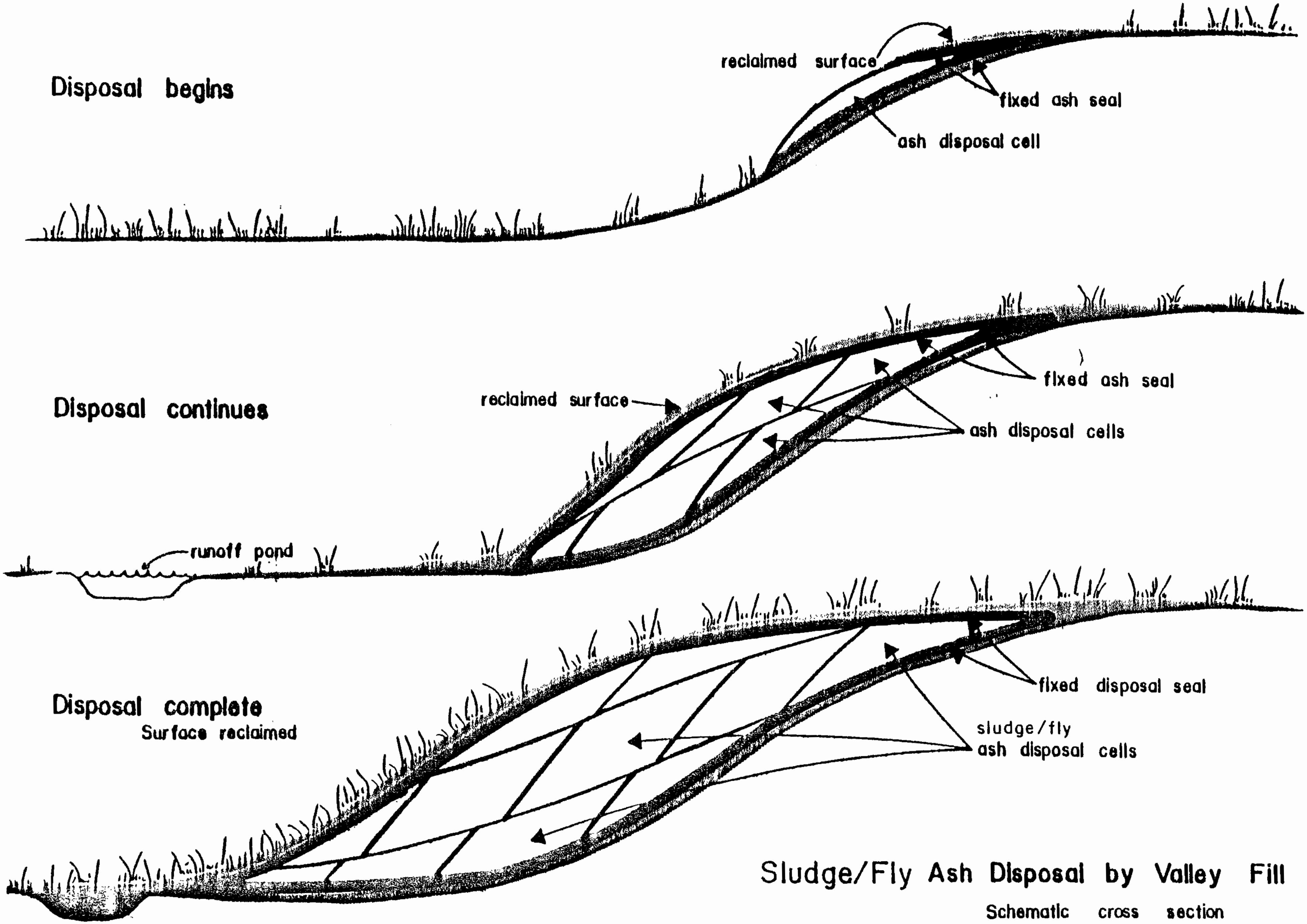


Fig. 3-25
Process Flow Diagram-Fixation.
Source: NACI, 1981.

loading hopper, suitable for loading trucks or depositing directly on the designated temporary storage area. The radial stacker will be 36 inches wide by 120 feet center-to-center, will operate at 350 feet per minute, and will be supplied with a 40-hp conveyor drive, a 3-hp motor for power travel, and a 15-hp motor for vertical positioning. Sludge/fly ash wastes will be hauled from the power plant by trucks. The trucks will be dumped and the sludge/fly ash wastes graded into disposal cells as illustrated in Fig. 3-26. The landfill generally will be constructed and progress as identified in Fig. 3-26.

The type of landfill planned for the initial disposal is a valley fill in the vicinity of the power plant. The initial disposal area (identified in Fig. 3-27) has a total volume of approximately 1,100 acre-feet and has sufficient volume for 2 years production of sludge/fly ash sludge wastes. A landfill site in the upper reaches of the drainage system was chosen so that the base of the landfill will be above the ground-water table at all times. Sediment and/or treatment ponds for surface-water runoff will be located as identified in Fig. 3-27. The clay pan of the soil in the vicinity of the waste disposal area is expected to retard the downward migration of any waste leachate generated within the disposal site. Field investigations to determine vertical permeability of the soil in the proposed disposal site will be performed. The placement of a fixed sludge/fly ash liner to inhibit seepage during disposal will be provided, if necessary. Ground-water monitoring wells will be installed around the perimeter of the landfill and monitored for quality and level changes.

During the initial landfill disposal of sludge/fly ash wastes, research into the technical feasibility and environmental suitability of use of these ash wastes as a soil amendment (substitute for lime) and/or "in-mine disposal" will be conducted. If the results of the research are positive, alternative disposal practices will be adopted. In the event the results of the research are negative or inconclusive, additional landfill disposal sites will be selected and the landfill practice continued.



Sludge/Fly Ash Disposal by Valley Fill
Schematic cross section

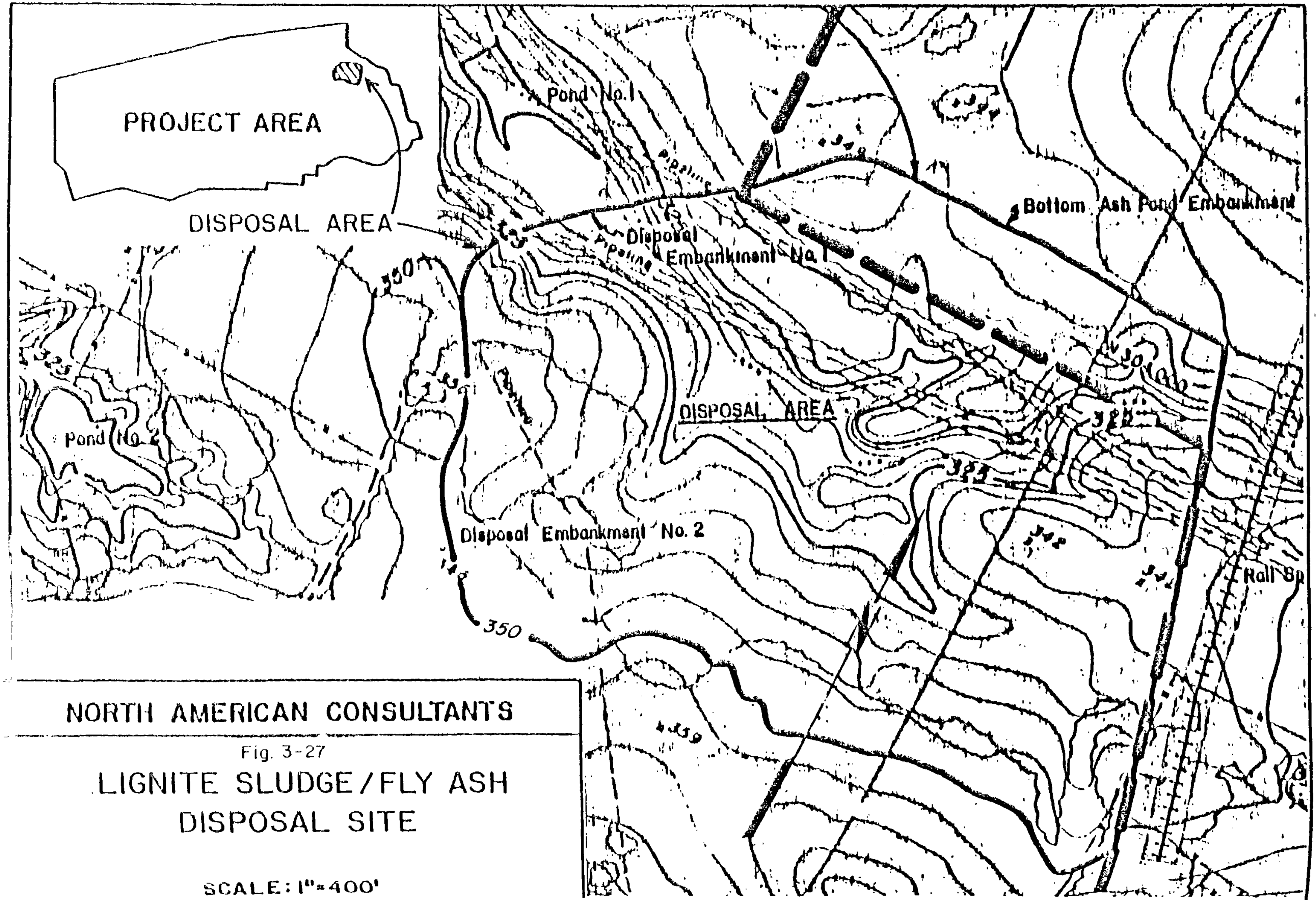


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Fig. 3-27

LIGNITE SLUDGE/FLY ASH DISPOSAL SITE

SCALE: 1"=400'

Mine Facilities

Mine facilities will be localized in two separate areas: one for dragline erection and the other for permanent mine personnel, storage, and maintenance facilities. These areas are identified in Fig. 3-28 and 3-29. All facilities will be constructed and operated in accordance with the Mine Safety and Health Act regulations.

The proposed dragline erection area (Fig. 3-28) includes two graded areas for erection of the draglines, a railroad spur and access road, a shop and warehouse building, trailers as temporary office and bathhouse, parking areas for equipment and vehicles, and sufficient utilities to support the intended use. These facilities will be designed with worker safety and comfort as prime criteria.

Permanent mine facilities (Fig. 3-29) include an office with bathhouse, a shop and warehouse building, an outside storage area, parking for equipment and vehicles, and a diked fuel storage yard and fueling area. Mine facilities will occupy an area of 20 acres. A potable water supply will be provided and all sewage will be treated to applicable water quality standards prior to discharge. Fencing and lighting will be installed for safety and security. These facilities will be designed, constructed, and maintained to meet or exceed all applicable mining, safety, environmental, and building regulations and codes.

Treatment of Sensitive Areas

There will be no mining within 100 feet, measured horizontally, of a cemetery. Access to the cemeteries will be maintained at all times.

Electric Power

Power to the mine site will be provided by SWEPCO from a 138-kV transmission line that passes through the mining area. This transmission line will be

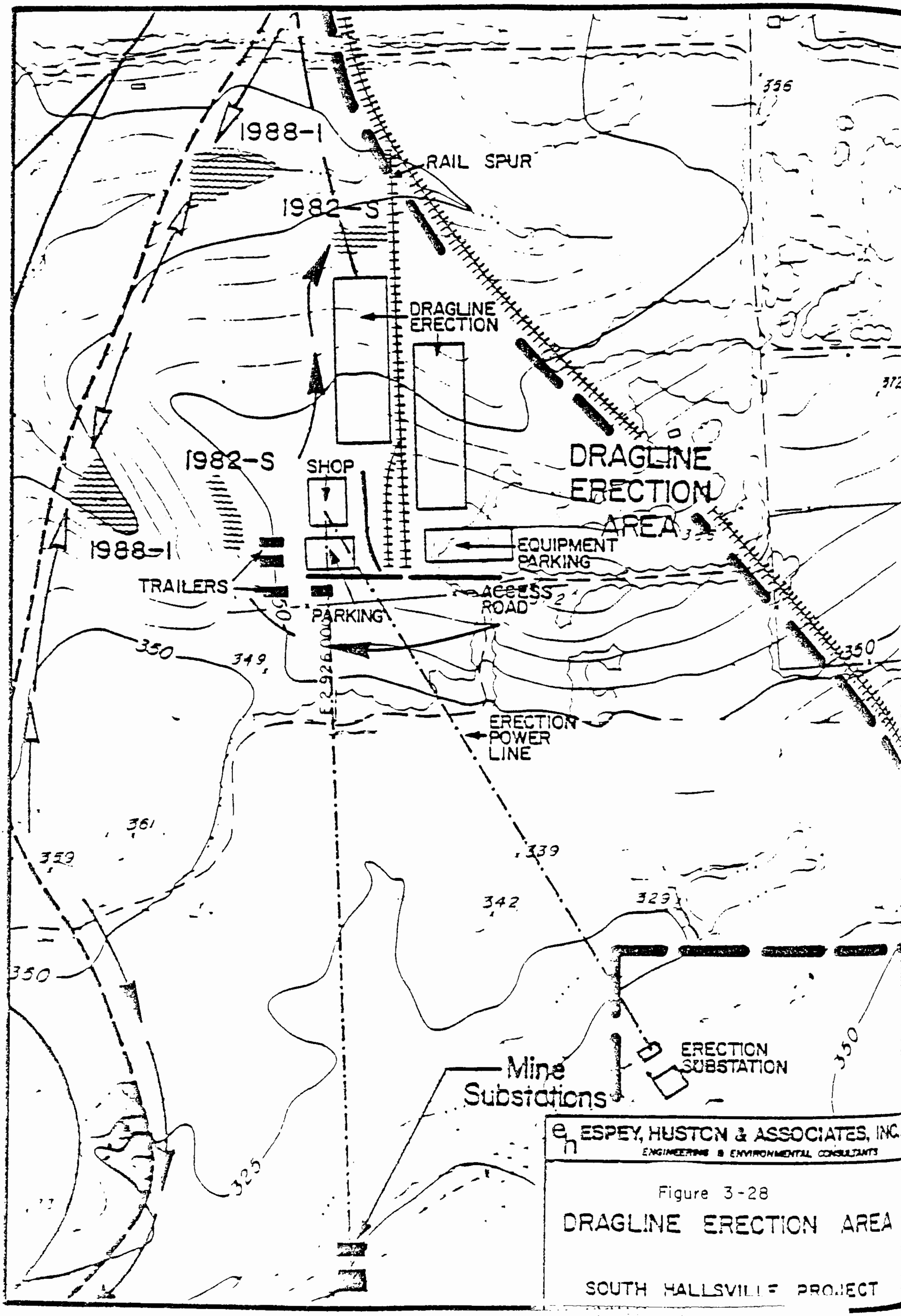

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Figure 3-28

DRAGLINE ERECTION AREA

SOUTH HALLSVILLE PROJECT

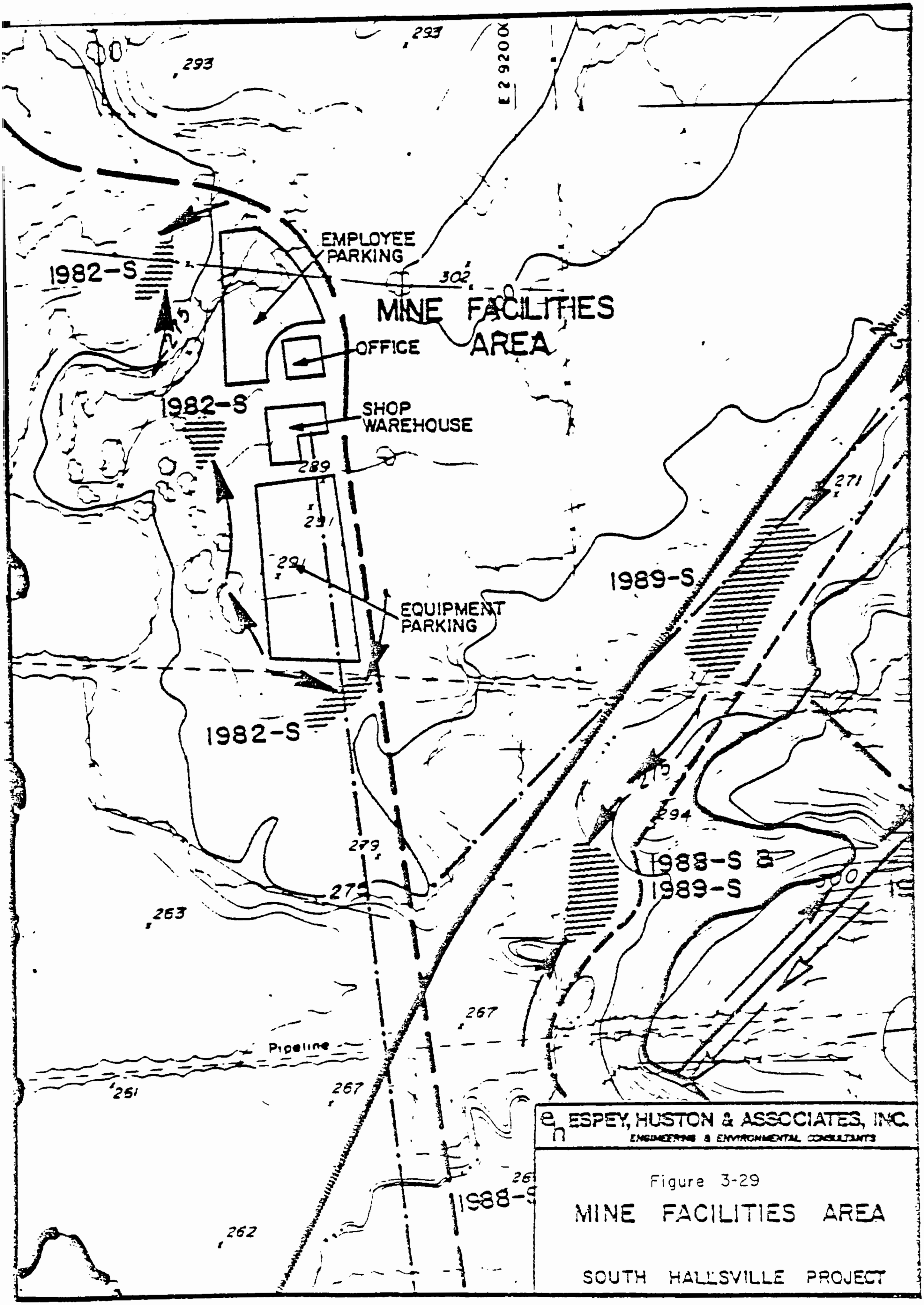

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Figure 3-29

MINE FACILITIES AREA

SOUTH HALLSVILLE PROJECT

rerouted around the mining area prior to mining. Mine distribution will be routed via pole lines to the dragline erection area, to the mine facilities area, and to within 6,000 to 8,000 feet of each of the two active mining pits. Further transmission to the pits will be by trailing cable.

Labor Requirements

Tables 3-7 and 3-8 present schedules of the two estimated average annual hourly and salaried personnel on the mine payroll. During full production 45 salaried and an average of 126 hourly personnel are scheduled, for a total of 171 on the mine payroll.

Contractors with their own personnel will be hired to erect the draglines and construct the mine facilities. These activities are scheduled to occur from mid-1981 through the end of 1984. It is expected that contractor's mine site personnel will vary between 10 and 100, with 1984 being the peak year.

3.6 ALTERNATIVES AVAILABLE TO EPA

Three alternatives are available to EPA regarding its permit action. These are: (1) issue the NPDES permit as proposed; (2) issue the NPDES permit with certain conditions; or (3) deny the NPDES permit. The issuance of the NPDES permit as proposed would allow SWEPCO to construct and operate the power plant mining facilities as described in Section 3.5 and to discharge wastewater to the limits set forth in the permit. However, EPA may determine that special conditions should be added to the NPDES permit where necessary to minimize or avoid adverse environmental impacts. Also, EPA may deny the NPDES permit if certain environmental considerations are significantly adversely impacted and mitigation measures are unacceptable. These considerations include violations of water quality standards, significant impacts on the human environment, endangered species, cultural resources, wetlands, floodplains and prime farmlands. Denial of the NPDES

TABLE 3-7

HOURLY MINE LABOR SCHEDULE

Year	Clearing	Lignite Loading/ Hauling	Dragline Stripping	Scraper Stripping	Spoil Grading	Supply and Maintenance	Drainage	Electrical Distribution	TOTAL
1981	---	---	---	---	---	---	---	---	---
1982	---	9	---	---	---	4	4	---	17
1983	2	14	---	11	---	15	12	3	57
1984	2	23	24	---	6	35	12	3	105
1985	2	23	24	9	6	35	12	3	114
1986	2	27	16	---	6	35	12	3	101
1987	2	27	19	---	6	35	12	3	104
1988	2	29	21	---	6	41	12	3	114
1989	2	29	19	---	6	41	12	3	112
1990	2	29	21	---	6	41	12	3	114
1991	2	29	22	---	6	41	12	3	115
1992	2	27	24	---	6	41	12	3	115
1993	2	27	26	---	6	41	12	3	117
1994	2	27	31	---	6	41	12	3	122
1995	2	27	31	---	6	41	12	3	122
1996	2	27	30	---	6	41	12	3	121
1997	2	27	28	---	6	41	12	3	119
1998	2	27	28	16	6	41	12	3	135
1999	2	27	38	15	6	41	12	3	144
2000	2	27	34	28	6	41	12	3	153
2001	2	32	28	15	6	41	12	3	139
2002	2	32	29	16	8	41	12	3	143
2003	2	34	31	12	8	41	12	3	143
2004	2	34	30	20	8	41	12	3	150
2005	2	34	36	24	6	41	12	3	158
2006	2	34	34	20	6	41	12	3	152
2007	2	36	42	18	6	41	12	3	160
2008	---	---	---	---	---	---	---	---	---
TOTAL	50	718	666	204	150	979	304	75	3,146*

* Hourly Personnel Yearly Average = 3,146 ÷ 25 = 126.

Source: NACL, 1980a.

TABLE 3-8

SALARIED MINE LABOR SCHEDULE

Position	1981 (Quarter) 1st	2nd	3rd	4th	1982 (Quarter) 1st	2nd	3rd	4th	1983 (Quarter) 1st	2nd	3rd	4th	1984 (Quarter) 1st	2nd	3rd	4th	1985 Thru 2008	2009
Vice President Operations	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	(1)
Project Manager	1	---	---	---	---	---	---	---	---	---	---	---	(1)	---	---	---	---	---
Mine Manager	---	---	---	---	---	---	---	---	---	---	---	---	1	---	---	---	---	---
Project Engineer	1	---	---	---	---	---	---	---	---	---	---	---	---	---	(1)	---	---	---
Chief Engineer	---	---	---	---	---	---	---	---	---	---	---	---	---	---	1	---	---	(1)
Mining Engineer	2	---	---	1	---	---	---	---	---	---	---	---	---	---	(1)	---	---	(2)
Environmental Engineer	---	---	---	---	1	---	---	---	---	---	---	---	---	---	---	---	---	---
Geological Engineer	1	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	(1)
Electrical Engineer	---	---	---	---	---	1	---	---	---	---	---	---	---	---	---	---	---	(1)
Transitman	---	---	---	---	---	---	1	---	---	---	---	---	---	---	---	---	---	(1)
Rodman	---	---	---	---	---	---	1	---	---	---	---	---	---	---	---	---	---	(1)
Draftsman	1	1	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	(2)
Safety & Training Supv.	---	---	---	---	---	---	---	1	---	---	---	---	---	---	---	---	---	(1)
Safety & Training Assist.	---	---	---	---	---	---	---	---	---	---	---	---	1	1	---	---	---	(2)
Admin. & Personnel Supv.	---	---	---	---	---	---	---	1	---	---	---	---	---	---	---	---	---	(1)
Employee Relations Supv.	---	---	---	---	---	---	---	---	---	---	---	---	---	1	---	---	---	(1)
Purchasing Agent	---	---	---	---	---	1	---	---	---	---	---	---	---	---	---	---	---	---
Warehouse Man	---	---	---	---	---	---	---	---	1	---	---	---	---	---	1	---	---	(2)
Budget Coordinator	1	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	(1)
Accountant	---	---	---	---	---	---	---	---	1	---	---	---	---	---	---	---	---	---
Clerks	---	---	---	---	---	---	---	---	---	---	---	---	1	---	---	1	---	(1)
Secretary	1	1	---	---	---	---	1	---	---	---	---	---	---	---	---	---	---	(2)
Maintenance Supertindent	---	---	---	---	---	---	---	---	---	1	---	---	---	---	---	---	---	(1)
Maintenance Foreman	---	---	---	---	---	---	---	---	---	---	---	---	---	---	1	2	---	(3)
Electrical Foreman	---	---	---	---	---	---	---	---	---	---	---	1	---	---	---	1	---	(2)
Shop Foreman	---	---	---	---	---	---	---	---	---	---	---	---	---	---	1	---	---	(1)
General Mine Foreman	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	1	---	(1)
Asst. General Mine Foreman	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	1	---	(1)

TABLE 3-8 (Concluded)

Position	1981 (Quarter) 1st	2nd	3rd	4th	1982 (Quarter) 1st	2nd	3rd	4th	1983 (Quarter) 1st	2nd	3rd	4th	1984 (Quarter) 1st	2nd	3rd	4th	1985 Thru 2008	2009
Pit Foreman	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	8	---	(8)
Haulage & Reclam. Foreman	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	1	---	---
Construction Engineer	---	---	---	---	---	---	1	1	---	---	---	---	---	---	---	(2)	---	---
TOTAL	8	2	---	1	1	2	4	3	2	1	---	1	2	2	2	13	---	(38)
CUMULATIVE TOTAL	8	10	10	11	12	14	18	21	23	24	---	25	27	29	31	44	---	6

( ) Indicates decrease in number of personnel.

Source: HACI, 1980a.

permit by EPA could cause SWEPCO to redesign the project for no effluent discharge or pursue the no action alternative.

3.7 ALTERNATIVES AVAILABLE TO OTHER PERMITTING FEDERAL AGENCIES

The USCE may require Section 10/404 permits for certain activities. The overall review of the Section 10/404 permit applications for this project, including the environmental assessment, is the responsibility of the Fort Worth District USCE. Each application is evaluated to determine the probable impact the project will have on the environment, with particular interest given to wetland and aquatic habitat. As a part of the environmental review conducted by the USCE District Office, the information is made a matter of public record through the issuance of a public notice. A comment period, normally of 30 days, is allowed during which the application is reviewed by interested agencies, organizations, and individuals. Other agencies having review responsibilities are: Texas Department of Water Resources, EPA, Texas Parks and Wildlife Department, and U.S Fish and Wildlife Service (FWS). After the comment period, a public hearing may be held. Alternatives available to USCE include: 1) approval, 2) approval with conditions or modifications, or 3) disapproval.

3.8 OTHER REASONABLE ALTERNATIVES

Other reasonable alternatives, not within the jurisdiction of the lead agency or any cooperating agency, could be discussed but none have been identified.

4.0 ENVIRONMENTAL CONSEQUENCES OF ALTERNATIVES ON THE AFFECTED ENVIRONMENT

This section presents an assessment of potential impacts associated with the proposed Henry W. Pirkey Power Plant - Unit 1/South Hallsville Surface Lignite Mine, and associated transportive systems. For the purposes of discussion, the 3,997-acre power plant site is divided into the following components: plant facilities (272 acres), cooling reservoir (1,388 acres), plant site ancillary activities area (1,451 acres), and transportive systems corridors (886 acres). The proposed mine site area comprises 20,771 acres of land. Of this total acreage, 10,545 acres will be disturbed by mining at an approximate rate of 439 acres each year for the 24-year life of the mine. An additional 473 acres will be disturbed by construction of roads and mine facilities. Portions of the remaining 9,753 acres in the proposed mine site area will be potentially affected by mining activities as mining progresses. The project transportive systems consist of the following: 1) makeup water pipeline (20 miles long; 75-foot construction ROW and 50-foot operation ROW), 2) railroad spur (3.5 miles long; 200-feet operation ROW) and, 3) three transmission lines (total of 11.7 miles long; 100-foot construction and operation ROW width).

Section 4.0 is arranged to present a description of existing conditions under an "Existing and Future Environments" heading for each environmental resource of the project area, followed by a discussion of the "Effects of No Action". The impacts that have already occurred as a result of construction completed or underway are addressed first, if applicable. This early construction was undertaken at the Company's own risk, as stipulated in 40 CFR 6.906, the NPDES regulations in effect at that time. Then, the potential "Construction Impacts" for the proposed power plant and mine are discussed for each environmental resource. This is followed by a discussion of the potential "Operation Impacts" of the proposed power plant and mine. Construction impacts are defined as those impacts associated with power plant and transportive systems construction, and construction of mine facilities (e.g., shop, dragline erection pad, access/haul roads, etc.). Operation impacts are defined as those impacts associated with power plant and transportive systems operations, and actual mining operations. The potential construction and operation impacts for the transportive systems are discussed under the power plant subheadings. Each environmental resource section is concluded with a discussion of the "Combined Impacts of the Plant and Mine". At the conclusion of Sec. 4.0, a section is provided that addresses the cumulative impacts of the proposed project with respect to other projects in the area.

An exception to the overall format of this section focuses on socio-economics. The existing conditions for socioeconomic resources combine plant site, mine site, and transportive system features because the overall implications of proposed project activities encompass a rather large area of impact.

Construction and operation of the proposed project will have both beneficial and adverse effects on the existing biophysical and socioeconomic environment of the project site and surrounding area. Environmental effects can be either long-term or short-term, depending upon the interaction of project-related activities with existing environmental parameters. Short-term impacts are defined as those associated with the construction phase of the project and may last up to 4 or 5 years. Long-term impacts are defined as those associated with operation activities and may last a number of years.

4.1 EARTH RESOURCES

4.1.1 Topography

4.1.1.1 Existing and Future Environments

The proposed project site lies within the Sandy Hills region of the Gulf Coastal Plain Province. The region is typified by a rolling plain dissected by intermittent and/or ephemeral tributaries of the Sabine River. Land surface elevations within the project area range from 225 feet mean sea level (msl) along the Sabine River, to 400 feet msl in the northwestern portion of the area.

4.1.1.2 Effects of No Action

No impacts to the topography would result from the no action alternative.

4.1.1.3 Construction Impacts

Power Plant

Plant Site

Construction of plant site facilities has resulted in an adverse impact with respect to a general overall leveling of plant site topography over approximately 272 acres of land surface.

Transportive Systems

Construction of the transportive systems (makeup water pipeline, railroad spur, and transmission lines) has and will conform to the present land surface; minimal adverse impacts to the topography are associated with this phase of the project.

Mine

Construction of mine facilities (e.g., shop and dragline erection pad) will involve the disturbance of approximately 43 acres of land and will result in some alteration to local topographic features, with minimal impact.

4.1.1.4 Operation Impacts

Plant Site

Although the topography will be altered by necessity due to fly ash disposal, it is believed that infilling of a lowland area is more desirable than discarding the refuge of an area of positive relief. The placement of the disposal material at the upper reaches of the drainage system, as suggested in Sec. 4.2.2.4 (surface water), will reduce any erosion or scouring due to high winds or heavy rainfall that might otherwise occur. The change in topography that may result from the fly ash disposal is necessary to avoid adverse impacts associated with alternative disposal areas exhibiting high relief.

Mine Area

Short-term adverse impacts to local topography will be experienced during mining of a given area. However, reclamation will be generally concurrent with mining of new areas; 1 to 2 years will be required to reclaim mined areas. The mined surface will be shaped to a configuration similar to premining topography, and sedimentation ponds constructed on graded surfaces will be removed later when they are no longer needed. Furthermore, because overburden materials removed during mining are texturally similar to those presently existing on the surface, no adverse impacts to topography as a result of subsidence are anticipated (see Sec. 4.1.3.4). As discussed in the EID (EH&A, 1981b), it is expected that a 3- to 12-percent net volume increase will occur in the replaced overburden after the initial swelling and compaction is completed.

4.1.1.5 Combined Impacts of Plant and Mine

Construction of the plant site facilities has resulted in an adverse impact with respect to topography. Construction of the transportive systems and mine facilities will cause minimal adverse impacts. Plant site topography will be altered by disposal of fly ash, and short-term adverse impacts will be experienced during mining and reclamation. However, the mined surface will be shaped to a configuration similar to premining topography.

4.1.2 Geology

4.1.2.1 Existing and Future Environments

The geologic formations that exist in the project area are lower Eocene and Quaternary in age and are, in descending stratigraphic order, alluvium and terrace deposits; the Queen City, Reklaw, and Carrizo formations of the Claiborne Group; and the lignite-bearing Wilcox Group. Sediments within the project area are predominately shales, clayey sands, and sandy clays.

The Wilcox Group has a cumulative thickness in the area ranging from 400 to 1,400 feet and consists of three major lithologic facies: interlaminated sands and clays, finely laminated clays, and lignites. The bulk of the Wilcox section is comprised of the interbedded sands and clays that were deposited during overbank discharge in low-lying interchannel areas associated with the Mount Pleasant Fluvial System. The finely laminated clays and lignites were deposited in freshwater swamps. The main lignite seam occurs near the top of the Wilcox section and ranges from 0 to 140 feet below the ground surface in the area to be mined.

The Carrizo Formation overlies the Wilcox Group unconformably and consists of interbedded sands and clays, and sands that were deposited in a fluvial environment. The Reklaw Formation conformably overlies the Carrizo and ranges in thickness from 0 to 140 feet. Sediments of the Reklaw were deposited in a shallow-water, transgressive marine environment. The lower member of the formation, the Newby Sand, is made up of glauconitic sands and clayey sands, while the upper member, the Marquez Shale, consists of bioturbated clays and shales. Unconformably overlying the Reklaw Formation is the Queen City Formation, a clean sand, ranging from 0 to 25 feet thick, deposited as point bars in a fluvial environment. Unconformably overlying the older Eocene formations are thin Quaternary age sediments consisting predominately of loosely packed sands deposited by the ancient and modern Sabine River and its tributaries. A more detailed description of the geological formations within the project area is located in the Surface Mining Permit Application document (Sabine Mining Company, 1981).

4.1.2.2 Effects of No Action

No adverse or beneficial impacts to the geology of the proposed area will result from the no action alternative.

4.1.2.3 Construction Impacts

Power Plant

Plant Site

Clearing, grubbing, leveling, and construction of foundations at the power plant site and cooling reservoir has resulted in localized long-term displacement of shallow subsurface sediments.

Transportive Systems

Construction activities associated with transportive systems (i.e., transmission lines, makeup water pipeline, and railroad spur) has resulted or will result in localized long-term displacement of shallow subsurface sediments.

Mine

Construction activities in the mine area will be limited principally to the construction of shop facilities, dragline erection pad, and haul roads. The majority of these activities will be confined to the mine ancillary activities area, and impacts to geological features will be minor.

4.1.2.4 Operation Impacts

Power Plant

Plant Site

The principal impact of plant and cooling reservoir operations on the geology of the area would be the possible preclusion of development of some natural resource during the life of the project. Given the relatively small area to be occupied by the facilities, adverse impacts are negligible.

Transportive Systems

No adverse impacts to geological resources are anticipated to occur as a result of operation of power plant transportive systems.

Mine

Within the mine area, the geologic units overlying the mineable lignite will experience unavoidable long-term adverse impacts as the overburden above the lignite resource is removed. While the overall texture of the material (i.e., sand, silt, or clay) will generally be unchanged, the stratigraphic relationships and the physical characteristics of the specific geologic units above the lignite will be permanently altered.

4.1.2.5 Combined Impacts of Plant and Mine

Adverse impacts on geological resources of the power plant and mine site focus on the alteration of the geologic units located above the mineable lignite and possible short-term preclusion of the development of other geological resources (e.g. oil and gas, gravel) during operation of the proposed project.

4.1.3 Soils

4.1.3.1 Existing and Future Environments

A detailed soil survey does not exist for the plant site. The general soil map of Harrison County (USDA, 1974) and the adjoining soil survey of the mine area (Galloway and Roberts, 1979) indicate that Bowie, Cuthbert, and Kirvin soils dominate the plant site. Characteristics of these soils are described in the following paragraphs. A combination of slope, gravelly surfaces, acidity, and heavy clay subsoils preclude the Cuthbert and Kirvin soils from being considered prime farmland by the U.S. Soil Conservation Service (SCS). Bowie is classified as prime farmland under criteria defined in Section 657.5(a) of the Federal Register, Vol. 43, No. 21, Tues., January 31, 1978. However, under historical land-use criteria defined by both the Office of Surface Mining (OSM) and Railroad Commission of Texas (RRC) it is highly doubtful if the Bowie soils on the plant site qualify as prime farmland. Land-use history in this area is one of increasing pasture and forestry at the expense of cropland.

A detailed soil survey of the mine area has been completed by the SCS (Galloway and Roberts, 1979). Thirteen soil map units, listed in Table 4-1, occur within the mine area.

The Bibb and Thenas map units consist of nearly level, acid, sandy bottomland soils that flood too frequently to support cultivated crops. Because of flooding they are not designated as prime farmland.

TABLE 4-1

SOILS OF THE SOUTH HALLSVILLE MINE AREA

Soil	Percent of Area	Prime Farmland
Bibb fine sandy loam, frequently flooded	0.7	No
Bowie find sandy loam, 2 to 5 percent slopes	22.7	Yes
Cart-Erno complex, 0 to 2 percent slopes	4.1	Yes
Cuthbert fine sandy loam, 5 to 20 percent slopes	7.8	No
Cuthbert gravelly fine sandy loam, 5 to 20 percent slopes	19.9	No
Kirvin fine sandy loam, 2 to 5 percent slopes	4.4	No
Kirvin gravelly fine sandy loam, 1 to 5 percent slopes	17.8	No
Kirvin, graded	2.2	No
Kullit fine sandy loam, 1 to 3 percent slopes	3.3	Yes
Lilbert loamy fine sand, 2 to 6 percent slopes	3.4	No
Ruston fine sandy loam, 3 to 5 percent slopes	0.3	Yes
Sacul fine sandy loam, 5 to 20 percent slopes	6.5	No
Thenas fine sandy loam, frequently flooded	6.8	No
TOTAL	100	
Prime Farmland[1]		30.4 percent

[1] Prime farmland as defined in Sect. 657.5(a) of the Federal Register, Vol. 43, No. 21, Tues., Jan. 31, 1978.

The Cuthbert, Kirwin, and Sacul soils have fine sandy loam or gravelly fine sandy loam surfaces and clayey subsoils that grade into stratified sandstone and shale at depths of 20 to 60 inches. The Kirvin graded map unit consists primarily of Kirvin soils from which the gravelly topsoil has been stripped (or graded) for use as foundation material, roadbeds, or other construction purposes. These are all acid, highly weathered upland soils. Because of acidity, heavy clayey subsoil and, in some instances, gravelly surfaces or stripping, none of these soils are designated as prime farmland.

The Bowie, Cart, Erno, Kullit, and Ruston soils are deep upland soils that have fine sandy loam surface layers and loamy subsoils. They are acid and highly weathered, but have fairly good soil-plant relationships. On slopes less than 5 percent, all are designated as prime farmland.

The Lilbert soils consist of deep upland soils that have thick (20 to 40 inches), sandy surface layers and loamy subsoils. They are highly weathered and acid. The thick, sandy surfaces have a low water-holding capacity and the soils tend to be droughty during dry spells. Primarily due to this, these soils are not considered prime farmland.

In general all of the soils within the mine area require lime and fertilizer for most crops and improved pastures. The upland soils, where cultivated for crops, require erosion control practices in order to sustain production.

Table 4-1 shows that 30.4 percent of the soils within the mine area are designated prime farmland as defined by the USDA-SCS in the Federal Register (Sect. 657.5(a), Vol. 43, No. 21, Tues., January 31, 1978). This is defined as land that has the soil quality, growing season, and moisture supply needed to economically produce sustained high yields of crops when treated and managed, including water management, according to acceptable farm methods. The disturbance of these soils during mining and reclamation will cause an adverse impact.

In addition to these criteria, OSM and RRC regulations require that such lands must also have been used for cropland for any 5 years or more out of the 10 years immediately preceeding acquisition of the land for the purpose of determining whether special reclamation techniques are required to return the land to its original productivity following surface coal mining. The RRC defines cropland as land used for the production of adapted crops for harvest along or in rotation with grasses and legumes, and includes row crops, small grain crops, hay crops, nursery crops, orchard crops, and other specialty crops. A study by Brown (1979) identified only 52.6 acres as being prime farmland under these critiera. Of these, most were in small gardens, used for home consumption. The Sabine Mining Company applied for a negative determination of all lands not used historically to produce commercial crops. An additional 40 acres (approximate) was identified in the project area during later investigations; however, mining will not occur in this area. The permit application that contained the request for the negative determination was approved by RRC on 9 November 1981.

4.1.3.2. Effects of No Action

The effects of no action on soils of the project area depend to a large extent on future land use and management. For several decades, land-use trends within the area have seen a reduction in cropland, with a corresponding increase in improved pastures and timber production. Within the foreseeable future, there is no reason to predict a change in this pattern. Accelerated erosion under these uses should be minimized, although erosion will continue where vegetative cover is sparse. The acreage of "graded" soils will increase to some extent, as gravelly surfaces of Cuthbert and Kirvin soils are removed for use in road foundations and other construction purposes. Small bottomland areas of Bibb and Thenas soils may be protected from flooding, thus becoming eligible for designation as prime farmland. Large scale practices of this nature are highly unlikely because of the expense involved versus monetary returns. In summary, under a no action alternative, soils should experience few changes from that of the existing soils environment.

4.1.3.3 Construction Impacts

Power Plant

Plant Site

The principal impacts of construction on soils within the plant site and cooling reservoir will be associated with the potential for accelerated erosion during construction stages. Land-clearing has taken place on the cooling reservoir (1,388 acres) site and the plant site (272 acres) prior to constructing plant facilities. The exposed soils. on most of these sites are subject to erosion. This impact is short-term, but unavoidable and has been lessened by employment of appropriate erosion control techniques.

Transportive Systems

Approximately 700 acres and 142 acres will be required for makeup water pipeline and transmission line construction, respectively. The potential for soil erosion will exist on exposed soils during construction. These adverse impacts will be short-term, but unavoidable and will be lessened by prompt revegetation following construction.

The construction of the railroad spur resulted in the clearing of approximately 100 acres. The exposed soils are subject to erosion. The adverse impacts were short-term and unavoidable. The impacts have been lessened by prompt revegetation.

Mine

Land-clearing prior to construction of mine facilities within the mine ancillary activity area will have short-term adverse impacts associated with accelerated erosion, particularly on soils with steep slopes. These effects are unavoidable, but lessened by delaying land-clearing until construction is necessary and by prompt revegetation following construction activities.

4.1.3.4 Operations Impacts

<u>Power Plant</u>

Plant Site

There will be little adverse impacts on soils as a result of power plant operations. However, the use of soils will be converted from agricultural and forestry use to plant facilities (industrial) use. This impact is unavoidable for the life of the project.

Transportive Systems

Small areas actually occupied by the proposed transmission line towers, pipeline, and the railroad spur along their ROW will be converted from existing agricultural and forestry uses to industrial use. Some of these areas may contain SCS prime farmland soils. These areas, however, will comprise only a minor portion of the ROW. On steeper slopes, roadside erosion will be a potential hazard along roads used to maintain the facilities. Proper control measures can significantly reduce the potential for long-term impacts associated with soil erosion.

<u>Mine</u>

The impacts of the mining operations on soils will concern:

- chemical and physical properties;
- potential for accelerated erosion;

- subsidence; and
- changes in prime farmland status.

Chemical and Physical Properties

A 2-year study by Brown et al. (1979) was designed to evaluate the potential for revegetating the spoil material to be generated during mining operations. Lithological layers down to the first layer below the lignite were analyzed for a full range of physical and chemical parameters. These were compared to studies of Brown (1980) concerning the physical and chemical characteristics of predominant soils to be disturbed during mining. In addition, greenhouse comparisons were made of the potential productivity of overburden versus existing soils.

The overburden is devoid of concentrations of heavy metals that would be considered toxic. However the unoxidized zone below 16 to 20 feet contains pyrite in sufficient amounts to cause undesireable acidity without very large applications of lime. The oxidized zone above these depths does not present this problem. The water retention of the upper layer of overburden material is generally greater than those of native topsoils, offering a greater yield potential than exists in the present soils. Greenhouse tests indicated that additions of lime and fertilizer to meet soil fertility test recommendations will allow yields from mixed overburden materials to be as great as those from the native soils. The amount of lime and fertilizer required is variable and will be added on an individual soil test basis.

It was concluded from the study that it will be possible to reclaim any of the strata above the lignite without the replacement of topsoil. The 16-20-foot thick layer closest to the surface is, however, the most desirable material and would require the least amount of lime and other management inputs. The study also concluded that topsoiling with the rather sandy existing topsoil might be less desirable than a mixture of the top 16 to 20 feet.

The mine plan proposes to use the select oxidized overburden zone (top 16 to 20 feet) as a portion of the reconstructed root zone (7- to 48-inch layer) and to replace the 0- to 7-inch layer with the existing topsoil. Continued investigations are proposed to determine if the near surface oxidized overburden material and mixed overburden will provide a suitable substitute for topsoiling.

For the area as a whole, the initial overburden handling program should provide beneficial impacts. The clayey subsoils of the Kirvin, Cuthbert, and Sacul soils would be replaced with loamier material, more suitable as a root medium. The thick, droughty sandy surface of the Lilbert soils would be largely replaced with materials having higher water holding and cation exchange capacities. Overburden coring and testing data indicate that, in these areas, the reconstructed soil would be more responsive to good management practices than the existing soils. The reconstructed Bowie, Cart, Erno, Kullit, and Ruston areas would be somewhat similar to the existing soils. Thus, the relatively short-term use of soils for mining purposes will, through reconstruction of soil profiles, eliminate undesirable properties (as listed above) in many of the soils. This will enhance long-term productivity on these soils.

The effects on soils will be long-term, much longer than the life of the proposed mine, because in nature, soils properties change very slowly. In this sense, the effects are irreversible, although continuing tests are designed to alter mining operations should the need arise.

Potential Accelerated Erosion

Short-term effects of accelerated erosion will exist on sloping areas that have been cleared of vegetation prior to mining. This adverse impact is unavoidable, but will be minimized by clearing only the land immediately ahead of the overburden removal process and by initiating vegetation establishment measures as soon as possible following soil reconstruction. The affected areas will be prorated over the life of the mine, thus only small areas will be exposed to erosion at any given time. This impact is reversible in that erosion rates should return to normal existing rates when vegetation is reestablished.

Subsidence

The potential for subsidence will be minimal. Studies in Texas (Schneider, 1977) investigated the volume changes of mine overburden at the Alcoa lignite surface mine near Rockdale in east central Texas. The conditions at this site are geologically similar to those at the South Hallsville site, and reported volume changes and settlement values are expected to be similar.

Schneider found that mined overburden had 24 to 47 percent increase in volume. Over a period of time, mixed overburden consolidated 17 to 24 percent for a net volume increase of 3 to 12 percent. Ultimate settlement is affected by hydrologic conditions, since intermittently wetted soils tend to settle to a greater degree than saturated soils.

Settlement rates vary widely with time. A fresh spoil pile settles at rates of .85 to .02 feet/day for the first 20 days. These rates decrease rapidly and range from zero to 0.221 feet/year within 2.5 to 10 years after mining.

The total amount of settlement as calculated from these rates indicates that 75 percent of all settlement will occur within the first year after mining, 80 percent within the first five years, and most of the remainder over the next 30 years. The net increase in mixed overburden volume is generally equal to the volume of lignite removed, thus yielding no gross change in surface elevation.

Differential settlement of up to 0.1 feet/year can be expected over a distance of 350 feet on disturbed lands if no additional surface loads are imposed. Differential settlement over short distances of 10 to 15 feet will occur at a rate of up to 0.02 feet/year if no surface loads are imposed. This may cause a micro-relief of highs and lows that, if not modified, may cause localized drainage problems. This impact will primarily affect areas devoted to intensive row crop production. It is irreversible for a short period of time, but can be corrected by land-leveling.

4.1.3.5 Combined Impacts of Plant and Mine

Accelerated erosion will result in short-term adverse impacts on soils during construction activities associated with the plant site, transportive systems, and mine facilities. These impacts are unavoidable, but minimized by employing erosion control measures. Combined operational impacts will involve conversion of soils from agricultural and forestry uses to power plant and mine facilities (industrial) use. Prime farmland that exists within the project boundaries under both SCS and RRC criteria will be adversely impacted during mining and reclamation.

4.2 WATER RESOURCES

4.2.1 Ground Water

4.2.1.1 Existing and Future Environments

Usable ground water in the region is contained in four hydraulically interconnected geologic units: the Queen City, Reklaw, and Carrizo formations, and the Wilcox Group, which collectively make up the Cypress Aquifer. Some ground water is also contained in the alluvial deposits of area streams. Throughout the Cypress Aquifer, and specifically in the overburden material of the project area, ground water exists in thin layers (1 to 20 feet thick) of fine sands that are physically separated, but hydraulically connected, through the interbedded clays and silts. These lateral changes of alternating lithofacies over short distances within the strata are common and reflect the fluvial-deltaic environment of deposition.

The shallow ground-water system within the project area is recharged by infiltration of precipitation. Ground water in the saturated material moves in reponse to local hydraulic gradients, generally toward discharge points along surface drainages. Ground-water discharge occurs as springs and seeps, by evapotranspiration (plant respiration), and by pumpage. Movement of ground water, as indicated by a potentiometric map developed by North American Consultants, Inc. from water level data collected (Sabine Mining Company, 1981), is generally in a southerly direction, with localized topographically controlled flow towards discharge sites along area streams.

Vertical leakage from the shallow saturated zone is inhibited by lignite and a thick clay zone that underlies the lignite. The piezometers were installed and completed in saturated material both above and below the impermeable zone (Sabine Mining Company, 1981). Differences in static water level between the upper and lower piezometers of 27.5 feet demonstrate the poor hydraulic connection that exists between the sandy strata above and below the confining lignite and clay strata.

To further define the ground-water flow characteristics within the project area aquifer, pumping tests were performed by North American Consultants, Inc. A detailed description of the tests and methods of determining aquifer characteristics is located in the RRC surface mining permit application (Sabine Mining Company, 1981). Results indicate that most of the strata above the lignite contain limited area sources of potable ground water. Data were analyzed using a Standard Theis Non-equilibrium Type Curve matching technique, and the non-equilibrium flow formulae were used to calculate the aquifer coefficients. Also used in the analysis, when situations warranted, was a technique for matching data to a type curve for a leaky artesian aquifer system and associated modified formulae developed by Cooper (1963). Transmissivities of the aquifer ranged from 16.4 gallons per day per foot (gpd/ft) to 4,825 gpd/ft, permeabilities ranged from 0.4 gpd/ft^2 to 170 gpd/ft^2, and storage coefficients ranged from 1.5×10^{-4} to 2.35×10^{-1}.

The Cypress Aquifer provides limited quantities of potable ground water that is used throughout Harrison County, principally for single-household domestic use. Well locations within and adjacent to the project site are located on Fig. 4-1. In all, 177 wells were identified in service, and an additional 51 dry or abandoned wells were located. The majority of the wells in the project area are less than 75 feet deep. Ground-water quality deteriorates with depth and is considered unsuitable for most uses below depths of 400 feet. Water quality data from project area wells (Table 4-2) indicate that concentrations of total dissolved solids increase with increasing depth, and concentrations of many dissolved metal species decrease with increasing pH and increasing depth. In general, pH averaged about 6.9, and total dissolved solids ranged from 94 to 1,652 parts per million (ppm).

4.2.1.2 Effects of No Action

No impacts to the ground water of the project area would result from the no action alternative.

4.2.1.3 Construction Impacts

Power Plant

Plant Site

Changes in ground-water flow and/or quality characteristics brought about by construction of the power plant facilities will be minimal. Slight reduction in infiltration rates in the vicinity of construction activities may have occurred; however, no regional impacts to the ground-water system will occur because of the relatively small area affected and the relatively short construction time.

Fig. 4- I

LEGEND

Private Well Data

SYMBOL	CLASSIFICATION	DEPTH (FT)	NO. OF WELLS	% OF TOTAL
	Shallow	[illegible]	[illegible]	[illegible]
	Intermediate	[illegible] 200	5	[illegible]
	Deep	[illegible] 600	25	[illegible]
		Total	[illegible]	[illegible]

Approximate Mine Area

Ground Water Surface Elevation Contour Cypress Aquifer

● PZ-7 Monitor or Test Well Location

Ground Water Flow Line

Project Boundary

REVISED DATE	BY	
		EXHIBIT 11
		GROUND-WATER SYSTEM MAP
		SOUTH HALLSVILLE PROJECT
		DRAWN BY EK DATE 12/10/80
		SCALE 1" 2000'
		PROJECT S. HALLSVILLE No. 1 of 1

TABLE 4-2

GROUND-WATER CHEMISTRY[1]

Parameters[2]	Well Numbers 2	3	4	5B
Date Collected	10/14/80	9/3/80	9/10/80	9/17/80
Total Well Depth	68 ft	46 ft	88 ft	22 ft
Screen Interval	45-60 ft	27-37 ft	50-60 ft 68-88 ft	12-17 ft
pH/25°C (Standard Units)	7.1	6.4	6.8	7.2
Total Dissolved Solids	94	96	344	1,052
Nitrogen, Nitrate as N	0.08	0.10	0.40	0.06
Sulfate as SO_4^{--}	7	30	180	315
Chloride as Cl^-	2.9	12.0	23.0	349.0
Fluoride as F^-	< 0.01	0.10	0.80	1.70
Bicarbonate	24.00	0.48	2.40	4.80
Aluminum	0.1	0.2	0.1	0.1
Arsenic	< 0.01	< 0.01	< 0.01	< 0.01
Cadmium	< 0.01	< 0.01	< 0.01	< 0.01
Calcium, as $CaCO_3$	34	10	84	136
Chromium	< 0.05	< 0.05	< 0.05	< 0.05
Copper	0.02	0.04	0.03	0.02
Iron	0.2	2.5	16.4	11.5
Lead	< 0.05	< 0.05	< 0.05	< 0.05
Magnesium, as $CaCO_3$	0	10	6.	168
Manganese	< 0.1	0.2	0.1	0.2
Mercury	<0.001	<0.001	< 0.001	<0.001
Molybdenum	< 0.1	< 0.1	< 0.1	< 0.1
Nickel	0.02	0.02	0.04	0.02
Potassium	7.8	10.9	18.0	13.5
Selenium	<0.005	<0.005	< 0.005	<0.005
Sodium	3.6	6.8	45.0	400.0
Zinc	0.30	0.90	0.03	0.02

[1] Analyses performed by SWEPCO environmental laboratory.

[2] All values reported as mg/l (ppm) unless otherwise indicated.

Source: NACI, 1981.

Transportive Systems

Construction activities associated with transportive systems will only affect near surface geological features; therefore, no adverse impacts on ground-water quantity or quality will be associated with this phase of the project.

Mine

Mine construction activities focus on the dragline erection pads, haul and access roads, and shop and office facilities. These construction activities will cause some disturbance of surface materials over approximately 1 percent of the project area, but will not result in adverse ground-water quantity or quality impacts.

4.2.1.4 Operation Impacts

Power Plant

Plant Site

Operation impacts of the power plant on ground water consists of effects of water consumption by the heat dissipation system and effects of power plant wastes. Approximately 29,500 acre-feet of water will be impounded in the proposed cooling reservoir. Some ground-water seepage from the reservoir is expected to occur, causing a subsequent rise of ground-water levels in the reservoir vicinity; however, this would be minor. Reduction of infiltration amounts in areas paved or covered by buildings will not create adverse local or regional impacts and will be volumetrically offset by the increased infiltration in the vicinity of the cooling reservoir. Drainage from coal storage and waste disposal areas will be precluded by impermeable liners and/or ponds and treated before release into the surface water system, thereby preventing untreated water to infiltrate into the subsurface to contaminate the shallow ground-water supply. Therefore, there will be no adverse impacts on the ground-water resource of the area due to operation of the power plant.

Transportive Systems

No adverse impacts to ground-water quantity or quality are anticipated as a result of transportive systems operation.

Mine

Because of the fluvial nature of the Coastal Plain physiographic province, which includes the East Texas Gulf Coast lignites, extensive horizontal and vertical aquifers can only be conceptualized on a regional basis. Locally, regional aquifers are more accurately envisioned as a series of sand lenses or stringers with little hydraulic connection with adjacent, underlying or overlying lenses or stringers. For this reason, disturbing near surface aquifers would not impact the deeper and unassociated sand horizons.

An adverse impact of the mining operation concerns the water wells in the mining area which will be abandoned or removed during mining or construction activities. The extent of the loss of wells is indicated by Fig. 4.1 (provided by NACI), which illustrates the water well inventory for the project area and its relation to the mining plan.

When a well is not destroyed by excavating, it is subject to a water-level drawdown dependent upon the depth of mining and distance the well is from the excavated pit. In general, when excavation occurs to any level below the potentiometric surface of the saturated sediments, movement of ground water in the vicinity of the mine may be expected to be toward the open cut and/or its dewatering system. For any given mine cut, the volume of ground-water inflow and area influenced by ground-water dewatering and/or depressurizing will vary and depend upon the following variables:

- o depth of active cut;
- o duration of cut;
- o position of potentiometric surface(s);
- o exposed aquifer thickness;
- o aquifer permeability;
- o aquifer storage coefficient; and
- o methods of dewatering.

During mining, the quantity of ground water removed due to dewatering and/or depressurizing will vary, and withdrawal rates will depend upon the ground-water conditions and control methods employed at any given time at the mine. The primary result of the dewatering and/or depressurizing operation will be a general lowering of ground-water levels over the area, thereby decreasing the yield of wells within the area of influences of the core of depression created by the operation. Although the net water level reduction and areal extent of influence for any given cut will depend upon the variables aforementioned, a ground-water level reduction between 2 and 15 feet at an appropriate distance of 3,000 feet has been estimated (NACI, 1981). A more detailed discussion containing estimated drawdowns and areal influence is located in the RRC permit application (Sabine Mining Company, 1981). Dewatering in the mine will be achieved, in most cases, with sump pumping systems along the highwall. In special cases (i.e., cuts in alluvial deposits where the highwall may not be stable with a seep face) wells, well points, and/or other devices will be employed to assist in the dewatering.

Once mining and dewatering have been completed, the spoil will be subject to resaturation. There are three potential sources of water for resaturation of the mine: (1) infiltration of precipitation, (2) upward leakage from sand bodies beneath the mine, and (3) inflow from sand bodies adjacent to the mine.

Post-mine recharge from precipitation may be slightly reduced since the overall permeability of the mine spoil is expected to be less than that of the pre-mine overburden. NACI approximated the existing perennial recharge to be about 0.025 feet per year by calculating the base flow of Big Sandy Creek and dividing by the area of the watershed. Therefore, post-mine recharge should be less than this pre-mine recharge rate.

Recharge from below the mine is expected to be minimal, due to the fact that the mine is underlain by a clay unit.

The mining operation will also result in the alteration of horizontal stratification of the overburden materials. The horizontal permeability and transmissivity is expected to be reduced, causing a reduction in the lateral flow through the cast overburden material. With respect to inflow of ground water from adjacent sand bodies, it is anticipated that inflow will be slower because the horizontal permeability is lower than the undisturbed pre-mine overburden. From studies by Schneider (1977) in eastern Texas on the effects of settlement of cast overburden on its permeability, it may be surmised that the permeabilities in the reclaimed areas will decrease with increasing depth through the cast overburden.

Recharge from adjacent sand bodies was evaluated using the Darcy equation as follows:

$$v = \frac{ki}{n} \quad \text{(Cedergren, 1967)}$$

where:

- v = velocity, in ft/day
- k = expected permeability of lower overburden = 2.0×10^{-4} cm/sec (204 ft/yr) (based upon observations in East Texas by Kennedy and Pepper, (1980)
- i = hydraulic gradient = 40 ÷ 60,000
- n = effective porosity (20% assumed)

The resulting recharge velocity equals 0.68 ft/day. The actual rate may be lower due to capillary pressure heads in the unsaturated overburden. Consequently, it is believed that recharge from lateral inflow to the replaced overburden should only be effective within a few hundred feet of the mine periphery due to high water table conditions adjacent to the mining area, and low toward the interior of the mine due to the low velocity of lateral inflow and the relatively large distances ground water would have to travel to saturate the more interior portions of the mine. Therefore, this source of inflow is expected to saturate only the more peripheral portions of the mine, with infiltration of precipitation serving as the major sources of recharge to the interior portions.

In general, aquifer productivity in reclaimed spoil areas containing shallow ground-water supplies may be diminished with respect to the original conditions, in terms of the maximum possible yield, due to the decrease in horizontal permeability of the overburden material. However, wells placed in the reclaimed area should be able to produce, upon resaturation of the spoil material, a yield of 5 to 10 gpm, which is the existing typical private consumption rate. The amount of decrease in maximum yield will also depend upon the interrelationship of altered ground-water levels and changes in aquifer storage characteristics. Wells located within 3,000 feet of the mine area could be drawn down between 2 and 15 feet. Any private wells in the mining area will be eliminated and the water supply will be replaced following mining.

As a result of the mining operations, mixed overburden material will be subject to oxidation processes. The exposure of many mineral assemblages to oxidation will result in their alteration and partial dissolution when contacted by runoff or infiltration of surface or ground water. The concentration of any dissolved ion species that may occur as a result of leaching of the cast overburden material at any particular place or time will depend upon the following variables:

- rate, volume, and composition of recharge water;

- o nature, rate, and extent of chemical alteration of the cast overburden;
- o composition and volume of surrounding ground water; and
- o duration of contact of recharge water with altered cast overburden.

Overburden that lies below the existing water table exists under anaerobic (chemically reducing) conditions. Once the water table is lowered by dewatering, and the overburden is excavated and replaced as spoil, the material is exposed to the atmosphere and oxidizing conditions. In this new environment, certain mineral species are susceptible to chemical alteration to a leachable form. The parameter of greatest concern in post-mine ground-water quality is total dissolved solids (NACI, 1981). Most probably, the constituent that will contribute to total dissolved solids is sulfate. However, this constituent poses no significant health problem. Water high in sulfate tends to act as a laxative to people not accustomed to it. The other constituents contributing to total dissolved solids (i.e., calcium, sodium, magnesium, etc.) are associated with taste preferences. Other less common elements, such as the heavy metals, may become mobilized if pH of the overburden is lowered to 4.0 or less, through oxidation of iron disulfides. Some zones were identified as having sufficient amounts of pyrite to cause undesirable acidity that may mobilize heavy metals. However, heavy metal concentrations are sufficiently low such that significant water quality impacts are not anticipated. Upon recovery of ground-water levels within the mined area, chemically reducing conditions will be re-established in the zone of saturation (James et al., 1976). Such conditions are expected to retard the dissolution of minerals and the resulting alteration of ground-water quality.

Once the water table is re-established, any leachate will have the potential to flow from the mine to adjacent, down-gradient (i.e, southward), ground-water bodies. As previously mentioned, the permeability of the spoil is expected to be lower than pre-mine conditions. Consequently, the quantity of flow from the spoil to adjacent ground-water bodies should also be reduced.

Typically, peak leachate concentrations are found in the first pore volume of water contained in leachate generating materials. Subsequent pore volumes generally have lower concentrations. Therefore, the maximum potential impact will exist during the time period when the first pore volume is migrating from the mine spoil. The length of the time period is dependent upon the permeability, porosity, and the hydaulic gradient in the spoil. General indications based on these paramenters are that any leachate would move slowly from the spoil area and would take several years to be completely flushed from the system. Therefore, any plume of leachate should attain a steady-state condition. Based upon experience of similar studies, it is probable that the edge of any steady-state plume down-gradient of the mine will be within 2,500 feet of the mine area.

The leachate concentrations in any plume will be reduced with distance from the mine area. The concentrations of dissolved constituents down-gradient of the mine will be primarily dependent upon the ambient ground-water velocity, physical processes of mechanical dispersion, and dilution by infiltrating precipitation. It is anticipated that concentrations exceeding water-quality standards will be restricted to within a few hundred feet downgradient (i.e, southward) of the mine. Therefore, it is anticipated that ground-water contamination should not be a significant problem at the site. Monitoring wells will be installed to assess the extent of migration of any leachate.

The aquifer units below the mineable zone exist under confined conditions and are protected by a thick, impermeable clay stratum and will not be adversely affected by mining operations. Water supply wells can be installed into this aquifer upon completion of reclamation activities to mitigate the loss of shallow wells as a result of mining activities.

4.2.1.5 Combined Impacts of Plant and Mine

The impacts of the power plant operation and construction and mine area construction activities are considerably less than the impacts of the mining operation activity. Impacts of project construction activities will consist of the disturbances of the unsaturated surface of a relatively small area. The principal combined impacts on the ground-water system will be a local lowering of water levels due to dewatering in active mine areas and a slight offsetting recharge of ground water in the vicinity of the power plant's cooling reservoir.

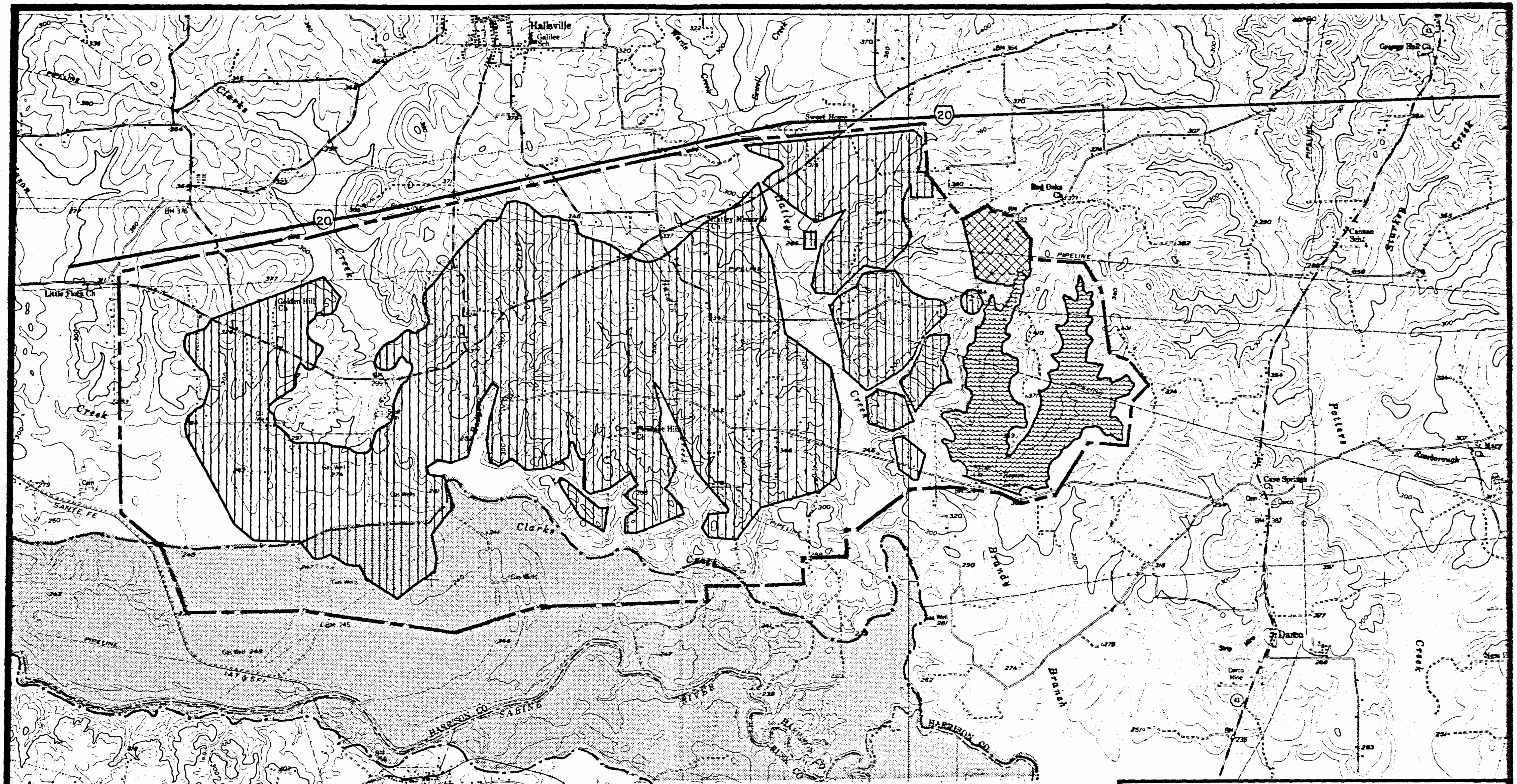
4.2.2 Surface Water

4.2.2.1 Existing and Future Environments

Hydrology

The locations of the proposed power plant and mine area with respect to natural drainage are shown in Fig. 4-2. Approximately 80 percent of the power plant area is located within the Brandy Branch watershed. The remainder is drained by a small tributary of Hatley Creek. The proposed mine site is located primarily within the hydrographic boundaries of Clarks Creek, Hatley Creek, and Brandy Branch watersheds. The southern portion of the mine area extends into the Sabine River floodplain. The three streams traversing the mine site drain into the Sabine River, and their drainage patterns are generally oriented in a southeastward direction. Additionally, approximately 15 percent of the mine area is drained by minor tributaries of Mason Creek, located to the west of Clarks Creek watershed. Mason Creek drains into the Sabine River upstream of the South Hallsville Project site.

Historical streamflow records for streams traversing the project site are not available. Therefore, to characterize the runoff in the general area, information from gaged watersheds in the vicinity was analyzed. Information on these gaging stations, including mean discharges in cubic feet per second (cfs) and drainage areas in square miles (sq. mi.), is presented in Table 4-3. The mean flow per unit area in the vicinity of the project varies from 0.72 to 0.95 cubic feet per



BOUNDARY OF PROJECT AREA

AREAS TO BE DISTURBED BY MINING

COOLING POND

POWER PLANT

APPROXIMATE BOUNDARY OF 100-YR FLOOD PLAIN

SCALE 1:62 500

1 .5 0 1 2 MILES

3000 0 3000 6000 9000 12000 FEET

N

ESPEY, HUSTON & ASSOCIATES, INC.

ENGINEERING & ENVIRONMENTAL CONSULTANTS

Fig. 4-2

HYDROGRAPHIC BOUNDARIES AND LOCATION OF 100-YR FLOOD PLAIN

SOUTH HALLSVILLE PROJECT

TABLE 4-3

STREAMFLOW RECORDS FOR SELECTED GAGES

SOUTH HALLSVILLE PROJECT

Number	Stream	Basin	USGS Station Number	Period of Record	Mean Discharge (cfs)	Drainage Area square miles (sq mi)	Mean Discharge per unit area (csm)
1	Frazier Creek	Cypress	07346140	1965-1975	45.7	48.0	0.95
2	Little Cypress Creek	Cypress	07346050	1963-1975	293.0	383.0	0.76
3	Big Sandy Creek	Sabine	08019500	1939-1975	185.0	231.0	0.80
4	Prairie Creek	Sabine	08020200	1968-1975	37.1	48.9	0.76
5	Rabbit Creek	Sabine	08020700	1963-1975	54.8	75.8	0.72
6	Tenaha Creek	Sabine	08023200	1952-1975	79.6	97.8	0.81

Source: EH&A, 1977a.

second (cfs) per square mile (csm). The watersheds in the project area and the expected mean flows at their outlet as a function of drainage area are shown in Table 4-4.

The SCS's TR-20 rainfall-runoff computer model was used to determine the hydrologic response of the watersheds in Fig. 4-2. The storm events used in the analyses are listed in Table 4-5. Hydrologic response of the watersheds for other storm events is presented in a baseline surface water report for the project area (EH&A, 1977a).

The long period of flow records for the Sabine River at Tatum were analyzed to determine flow frequencies. The 10-, 25-, 50-, and 100-year return periods on the Sabine River were determined, and the HEC-2 computer program was used to determine the corresponding water surface profiles. The delineation of the 100-year floodplain of the Sabine River along the project area is shown in Fig. 4-2. Portions of the mine site are within the 100-year floodplain. As the probability of a 100-year flood occurring within the 24-year period of lignite production is about 21 percent, flood protection levees along the southern boundaries of the mine site near the Sabine River floodplain boundary will be necessary, as well as along floodplain boundaries of major streams within the project site.

Water Quality

Although no historical water-quality data are available for the minor streams in the project area, an extensive data base is available for the nearby Sabine River (Segment 0505) from the TDWR and the U.S. Geological Survey (USGS). These water-quality data base were supplemented with a data collection program designed to characterize baseline water quality of project-area streams (EH&A, 1979e). During the period November 1977 through September 1978, monthly physical and chemical data were obtained at several locations on Brandy Branch, Hatley and Clarks creeks, and the Sabine River. In addition, stormwater data were

TABLE 4-4

DRAINAGE AREA AND MEAN DISCHARGE
OF PROJECT AREA STREAMS AT CONFLUENCE
WITH THE SABINE RIVER

Stream	Drainage Area (sq mi)	Mean Discharge (cfs)
Clarks Creek	27.1	22
Hatley Creek	37.5	30
Brandy Branch	10.2	8
Mason Creek Tributaries	3.4	3

Source: EH&A. 1977a.

TABLE 4-5

STORM EVENTS USED FOR THE DETERMINATION OF CRITICAL RATES AND VOLUMES OF RUNOFF

Storm Event Number	Return Period (years)	Duration (hours)	Depth of Rainfall (inches)
1	10	24	7.10
2	25	24	8.30
3	50	24	9.30
4	100	24	10.40
5	10	6	5.00
6	25	6	5.80
7	50	6	6.50
8	100	6	7.30

Source: Hershfield, 1961.

collected on Hatley and Clarks creeks during a period of surface runoff resulting from rainfall on June 6, 1978.

The TDWR's water-quality standards for the segment of the Sabine River near the project site are presented in Table 4-6, along with the observed ranges for the period 1973-1978. Water uses deemed desirable in this segment include noncontact recreation, propagation of fish and wildlife, and domestic raw water supply. Regarding TDWR water-quality standards, several instances of noncompliance with the dissolved oxygen criterion for Segment 0505 have occurred at the State Highway 43 monitoring station. Occasional deviations of pH, temperature, and fecal coliform from allowable levels have also been recorded. For the period of data analyzed, other prescribed TDWR water-quality standards have been achieved.

The TDWR has indicated that water-quality problems in Segment 0505 of the Sabine River are primarily associated with dissolved oxygen deficits due to loading of oxygen-demanding material and variable streamflow. Significant waste loadings are introduced by the City of Longview and Texas Eastman discharges upstream of the mine site (TWQB, 1975).

Baseline water quality at Clarks Creek, Brandy Branch, and Hatley Creek have been characterized using data collected during the period November 1977 through September 1978 (EH&A, 1979e). Although water-quality standards have not been promulgated by the TDWR for these streams, observed ranges for constituents previously discussed are displayed in Table 4-7 for comparative purposes. Low dissolved oxygen levels were common in the local project-area streams, most likely due to the low or negligible streamflow conditions frequently encountered. Occasional high concentrations of total dissolved solids were detected in Hatley Creek, which may also be attributed to the observed lack of streamflow. High levels of fecal coliform were detected on two occasions in Clarks Creek. Livestock, wildlife, or some other form of nonpoint source were possible contributors.

TABLE 4-6

SABINE RIVER WATER QUALITY

Parameter	TDWR Standards (Numerical Criteria)		Observed Range[a]
Chloride (mg/l)	Not to exceed	175	14-140
Sulfate (mg/l)	Not to exceed	75	9-63
Total Dissolved Solids (mg/l)	Not to exceed	400	8-354
Dissolved Oxygen (mg/l)	Not less than	5.0	2.8-12.8
pH		6.0-8.5	5.5-7.7
Fecal Coliform organisms per 100 milliliters (org/100 ml)	Not to exceed	2,000[b]	0-4,600
Temperature (^{o}F)	Not to exceed	93	40.0-86.8

[a] From data collected at State Highway 43 monitoring stations, 1973-1978.

[b] Log (geometric) mean not to exceed 2,000.

Source: EH&A, 1979b.

TABLE 4-7

WATER QUALITY IN PROJECT AREA STREAMS

Parameter	Observed Range		
	Clarks Creek	Brandy Creek	Hatley Creek
Chloride (mg/L)	7-35	6-22	14-54
Sulfate (mg/L)	5-53	3-12	3-63
Total Dissolved Solids (mg/L)	60-266	22-128	78-598
Dissolved Oxygen (mg/L)	1.2-13.9	2.5-14.4	0-16.0
pH	6.2-7.6	3.5-7.4	4.9-7.7
Fecal Coliform (org/100 mL)	< 10-3,980	< 10-1,300	< 10-920
Temperature (^{o}C)	1.5-29.0	3.8-28.0	2.0-26.0

Source: EH&A, 1979b.

The TDWR has encountered low dissolved oxygen levels on Hatley Creek and attributed these depressed levels to the inability of the creek to fully assimilate the wastewater discharged by the City of Hallsville (TWQB, 1975). The City of Hallsville has recently constructed a wastewater treatment plant that discharges into Ward Creek, a tributary of Hatley Creek. The discharge permit issued by the TDWR allows an average discharge rate of 0.32 million gallons per day (mgd) and a maximum discharge rate of 0.80 mgd. In addition, the Texas State Department of Highways and Public Transportation has a discharge permit allowing an average discharge rate of 0.02 mgd and a maximum discharge rate of 0.04 mgd into Hatley Creek (TDWR, 1981a).

In summary, water quality in the project area appears generally acceptable for a wide variety of uses. No constituents or unusual concentrations of constituents were detected that would seriously impair use. Occasional instances of low dissolved oxygen content are probably attributable to excess point-source organic loadings on the Sabine River and to the critically low stream-flow conditions that project-area streams experience seasonally.

4.2.2.2 Effects of No Action

If the "no action alternative" is implemented, the surface water regime of the project area should remain essentially unchanged from existing conditions, barring the possibility that other independent development may occur in the vicinity.

4.2.2.3 Construction Impacts

Power Plant

Plant Site

Minor adverse impacts due to construction activities associated with the proposed plant site and cooling reservoir are unavoidable. Clearing of brush and trees will result in temporary increases in overland runoff from the cleared areas. Some erosion is unavoidable, producing increased surface water transport of sediments and increased turbidity in receiving streams during periods of heavy rainfall and increased streamflow. During such periods, creeks in the project area normally experience increased turbidity.

As in most dam construction projects, streamflow diversion is required during dam construction, thereby resulting in little interruption of existing flows in Brandy Branch. Upon completion of the dam, approximately 20 percent of the upper Brandy Branch drainage area will be preempted by the inundating waters of the cooling reservoir. Further, no discharges (except during flooding) will be made from the cooling reservoir to Brandy Branch; makeup water will be transported by pipeline from Big Cypress Bayou (Sec. 4.2.2.4). The existing intermittent nature of flows in Brandy Branch will be adversely affected downstream due to the construction of the cooling reservoir, which will only allow discharge during peak runoff periods, thereby reducing the overall flow downstream. The establishment of vegetative cover on the slopes of the dam and other areas of construction will prevent impacts due to erosion.

In the impounded portion of Brandy Branch, certain changes in water quality will occur. Initially, an increase in dissolved nutrient and organic material leached from terrestrial soils and decaying vegetation will occur. Detention and impoundment of waters will result in decreased suspended solids and lower turbidity than pre-impounded waters. Ranges in dissolved oxygen and pH fluctuation will increase because of the influence of increased biological activity. Concentrations of dissolved solids will increase due to evaporation.

Transportive Systems

Construction activities involving the transportive systems (makeup water pipeline, railroad spur, and transmission lines) will result in some adverse, short-term effects on the surface water resources of the area. The primary adverse surface water impact of construction will be increased sediment loading to streams resulting from such activities as tree and brush clearing, excavation, and grading. However, revegetation of construction areas will reduce potential, long-term soil erosion and subsequent increases in sediment loading in the area streams.

A 36-inch pipeline and associated intake structure will be used to divert makeup water for the cooling reservoir from Big Cypress Bayou approximately 1 mile downstream of Ferrell's Bridge Dam (Lake O' The Pines), which is approximately 20 miles north of the power plant site. A permit from TDWR authorizes an annual diversion of 18,000 acre-feet at a maximum diversion rate of 33.4 cfs (see Sec. 5.0). Additionally, a Section 404 permit has been issued by the USCE (see Sec. 5.0). Little Cypress Bayou is the only major stream crossed by the makeup water pipeline. The pipeline also crosses several minor streams near the project area. Some increased turbidity during construction of pipeline crossings with these streams is unavoidable. However, these construction activities are short-term in nature and are not expected to result in long-term adverse impacts on water quality.

The construction of the railroad spur across minor tributaries of Hatley Creek and Brandy Branch will involve some disturbance along the banks and stream beds. The construction of both the railroad spur and transmission lines will result in such activities as vegetative clearing and grading. Increased turbidity of the affected watersheds is likely to occur if periods of intense or prolonged rainfall occur during construction. Localized control measures will be implemented as necessary to minimize these adverse impacts. Adverse impacts on streamflow rates and volumes due to construction activities are expected to be very minor due to the relatively small acreages being affected during construction. Adverse impacts on surface water due to construction of transportive facilities will be of short-term duration and will essentially cease upon completion of the facilities and revegetation of the affected areas.

Mine

Activities related to mine construction will result in some short-term impacts on the surface water hydrology on and adjacent to the mine site. Sedimentation ponds and other erosion control measures will be constructed before any mining activity takes place, as is required by the RRC Surface Mining Regulations. Activities such as clearing of vegetation, road relocation and construction, and site preparation and construction of shop and personnel facilities will result in some increases in peak runoff rates and sediment loading. Existing drainage patterns may be altered somewhat by road construction. In addition, excavation and grading activities in connection with the construction of overland flow diversion facilities and sedimentation ponds are expected to result in short-term increases in local surface water sediment concentrations. Adverse, short-term hydrologic impacts resulting from construction-related increases in potential soil erosion and subsequent sediment yield will be minimized by the establishment of vegetative cover on disturbed areas as soon as possible after construction and by the use of such temporary sediment-control measures as straw dikes or vegetative filter strips in collection ditches.

Unavoidable short-term effects of the mining activities on surface water hydrology will result primarily from increases in sediment production (soil erosion) during premining construction activities and during the mine development. Mine-related construction activities expected to cause the greatest potential increases in sediment yield are timber and brush clearing, road and pipeline relocations and construction, and excavation and grading during construction of drainage channels and sedimentation ponds. Other activities, such as local site preparation and construction of shop facilities, are expected to result in minor increases in sediment production.

Current available technology will be employed, as necessary, to minimize the potential adverse effects of construction on runoff and surface water quality. Therefore, overall effects of mine-related construction activities on the surface water of the project area should be minor in magnitude and of short-term duration.

4.2.2.4 Operation Impacts

Power Plant

Plant Site

Due to the small area of the power plant site relative to the total drainage areas of the Hatley Creek and Brandy Branch watersheds, no major impact on downstream flooding and normal streamflows are anticipated. However, the existence of the power plant cooling reservoir (Fig. 4-2) will have a much more pronounced effect upon the hydrology of Brandy Branch. The cooling reservoir has a surface area of approximately 1,240 acres and a storage volume of about 29,500 acre-feet at the normal operating elevation of 340 feet msl. Approximately 20 percent of the Brandy Branch watershed is inundated by the cooling reservoir. Assuming the pond would be at normal operating level prior to the occurrence of a storm, peak discharges of Brandy Branch are estimated to increase by approximately 50 percent for a 100-year, 24-hour storm event and as much as approximately 80 percent for the 10-year, 6-hour and 10-year, 24-hour storm events.

Impacts on local water quality may result from the operation of the proposed power plant's cooling water system. A maximum of 18,000 acre-feet per year of makeup water from Lake O' The Pines in the Cypress Basin will be released and diverted from Big Cypress Bayou, approximately 1 mile downstream from Ferrell's Bridge Dam, to the cooling reservoir on Brandy Branch, which is located in the Sabine River Basin. The operation of the cooling water system will result in discharges of heated waste water and chlorine to the cooling reservoir. Discharges of heated water to the cooling reservoir will result in increased evaporation rates of water from the reservoir. Levels of conservative substances, such as total dissolved solids (TDS), chlorides, and sulfates within the reservoir, may increase due to the concentrating effect of evaporation. A portion of the water diverted from the Cypress Basin, as well as runoff water from the cooling reservoir's watershed, will eventually enter the Sabine River during flood events and through seepage. If levels of conservative substances become sufficiently high, these discharges could adversely impact local water quality.

Projected levels of TDS within the cooling reservoir have been calculated for 25 years of project operation and are presented in Table 4-8. TDS is shown to increase over the life of the project, reaching a maximum value of 314 mg/l. This projected concentration of TDS is below the 400 mg/l TDS criterion of the TDWR water-quality standards promulgated for the segment of the Sabine River proximal to the project site (Segment 0505).

The TDS concentations in the cooling reservoir were estimated by means of a mass balance analysis that used local water quality and meteorlogical data, plant heat load, and assumptions concerning plant operation and waste characteristics. Sources of TDS loadings included Brandy Branch, makeup water from Big Cypress Bayou, and runoff from the limestone-lignite storage area. Losses of TDS occur from seepage and water consumed in fly ash, bottom ash, and scrubber sludge disposal. Water losses occur from natural and forced evaporation from the pond and from evaporative losses in the power plant. Forced evaporation was estimated using

TABLE 4-8

PROJECTED TDS CONCENTRATIONS IN COOLING RESERVOIR

Year After Plant Startup	TDS Concentrations in Cooling Reservoir mg/l
0	120
5	185
10	233
15	268
20	295
25	314

Source: Calculations based on data from EH&A, 1979b.

the Harbeck diagram and assuming a power plant heat load based on operation at 100 percent capacity. Assumed TDS concentrations in Big Cypress Bayou (120 mg/l) and in Brandy Branch (70 mg/l) were estimated from historical data. The TDS concentration of limestone-lignite runoff was assumed to be 500 mg/l. The makeup water flow to the pond from Big Cypress Bayou was assumed equal to the volume necessary to maintain the pond at a constant operating level.

The analysis was shown to be fairly sensitive to changes in the seepage estimate, which is, by far, the most difficult estimate to accurately ascertain. If the seepage estimate of 1,447 acre-feet per year was halved, TDS concentrations in the pond would reach 381 mg/l after 25 years of operation, still below promulgated State and Federal standards.

Based on this analysis, it is concluded that the operation of the power plant's cooling system should not cause the concentrations of conservative dissolved substances in the cooling reservoir to exceed State or Federal standards. Therefore, no impact on local water quality is expected as a result of occasional discharges from the cooling reservoir to Brandy Branch.

Condenser cooling water will be chlorinated periodically to prevent the growth of fouling organisms within condenser tubes, which reduces heat transfer efficiently. Chlorination will be performed within the intake bay, immediately beyond the traveling screens in front of the intake pumps. Doses will be injected at a maximum of three times daily for periods of 15 minutes each. The total dosage of chlorine will be administered to achieve a free residual of 0.1 to 0.5 ppm at the condenser outlet. This free residual concentration will comply with allowable release concentrations under effluent limitation guidelines (40 CFR Part 423). Chlorination will only occur seasonally, when water temperatures are at or above 70°F. Due to the projected limited use of chlorine, both on a daily and seasonal basis, and the limited dosage that will be applied, no chlorine should be detected in the cooling reservoir and, therefore, only minor adverse impacts, if any, on pond ecology will occur. These low concentrations will preclude toxic effects on downstream aquatic organisms.

The disposal of fly ash and scrubber sludge by landfill will result in an elevation increase of the original land surface within the disposal area from 2 feet at the upper end of the valley to 40 feet at the lower end of the valley. The initial disposal area has a total volume of approximately 1,100 acre-feet and has sufficient volume for 2 years' production of ash/sludge wastes. A landfill site in the upper reaches of the drainage system was chosen so that the base of the landfill will be above the ground-water table at all times. Sediment and/or treatment ponds will be located to capture surface water runoff from the disposal area.

Transportive Systems

Operations effects of the transportive systems on the surface water resources of the area will be related primarily to the transbasin diversion of makeup water from the Cypress Basin to the Sabine River Basin. Any consumptive use of water due to evaporation and other losses represents an unavoidable deficit in the overall water balance of the area. However, the diversion of the power plant water from the Cypress Basin to the Sabine River Basin is not expected to result in adverse impacts on the water resources of either basin. The total permitted or claimed surface water for consumptive uses in Cypress Basin is approximately 375,000 acre-feet per year, while the maximum reported consumptive use has been only about 80,000 acre-feet in any one year (TDWR, 1981b). Additionally a study by the Texas Water Development Board (TWDB) in 1977 indicates that the Cypress Basin would still have an estimated surplus of 334,200 acre-feet per year by the year 2030 (TWDB, 1977). Water diverted from the Cypress Basin into the cooling reservoir will represent a surface water gain in the Sabine River Basin. This impact will not be adverse considering the large magnitude of streamflows already present in the Sabine River. No major effects on the surface water regime of the Cypress Basin are expected because makeup water, which is supplied by the Lake O'The

Pines, has already been appropriated to the Northeast Texas Municipal Water District for consumptive use (TDWR Permit No. 1897C), and a contractual permit (CP-454) based on this water right has been issued to SWEPCO by the State of Texas for the diversion of 18,000 acre-feet/year (see Sec. 5.0).

The crossing of minor tributaries by the railroad spur will result in minor alteration of the floodflow regime in the Hatley Creek and Brandy Branch watersheds. Normal overland flowpaths will be interrupted by the railroad spur embankment and directed toward stream crossing structures. Major increases in upstream flood elevations will be avoided due to the design of the stream crossing structures. Operation impacts on surface water by the proposed transmission line should be negligible after the completion and revegetation of affected areas.

Mine Area

Runoff control and management measures implemented prior to construction will be adequate to handle runoff and to control sediment loadings to levels that are acceptable to the regulatory agencies. Runoff and sediment volumes resulting from rainfall events with frequencies up to 25 years and durations up to 24 hours will be positively controlled at the mining front, with the objectives of arresting flooding potential and settling sediment-laden runoff originating at the mine front or in the general vicinity. Off-channel sediment ponds with detention times of 24 hours or greater will ensure the impoundment of storm runoff waters for sufficient time to allow settling of most suspended sediment before any releases are made. The sediment ponds will be located off the main channels. Therefore, there will be little or no interference with streamflow during periods of normal flow. The sediment ponds will be restored to initial capacities when 60 percent of the storage volume has been filled with sediment. This activitiy will be implemented as a general management practice throughout the life of the mine and during the reclamation period, as is required under the RRC Surface Mining Regulations.

A range of storm events of different magnitudes was simulated in order to determine the hydrologic response of the watersheds affected by mining under pre- and postmining (post-reclamation) conditions. For the post-reclamation simulations it was assumed that land use in the reclaimed area would consist of approximately 90 percent bermuda grass and 10 percent forestland.

By comparing the results obtained for the pre-and postmining hydrologic simulations of the watersheds affected by mining activities, it was determined that there would be a large percent increase in peak runoff for all storm events for the Rogers Creek area of the Clarks Creek watershed. The increases vary from 62 to 92 percent. The increase for the remainder of the sub-basins in the Clarks Creek watershed was determined to be fairly small and ranged from approximately 3 to 21 percent. Very small increases in peak runoff were determined for the Hatley Creek watershed. Increases in peak flows from the Mason Creek tributary sub-basins ranged from 7 to 23 percent. The computer simulations of the watersheds do not reflect the attenuating effect of sediment ponds on runoff peaks due to ponds that would be present at the site during and after reclamation. Therefore, the simulated increases in peak runoff are conservative estimates.

Volumes of overland flow for the range of storm events were also calculated for pre- and postmining conditions. Percent increases in volumes of overland flow for the Rogers Creek sub-basin (Clarks Creek watershed) were about 68 percent for the 10-year, 24-hour storm event and about 57 percent for the 25-year, 24-hour storm event. Volumes of overland flow for sub-basins 13 and 16 of the Clarks Creek watershed were determined to have been reduced by approximately 20 and 4 percent, respectively, for these storm events. Percent increases for the other sub-basins in the Clarks Creek watershed varied from about 3 to 32 percent for the 10-and 25-year, 24-hour storm events. Overland flow volumes for the Mason Creek sub-basins for the 10- and 25-year, 24-hour storm events increased and varied from approximately 8 to 19 percent. Computations for sub-basin 14 of the Hatley Creek watershed showed a decrease in overland flow volumes of approximately 10 percent for postmining conditions. Increases in overland flow volumes for the other sub-basins of the Hatley Creek watershed were moderate and varied from about 6 to 39 percent.

The greatest volumes of overland flow for various storm events occur from cleared land prior to removal of overburden. Assuming average antecedent soil moisture conditions, estimated maximum increases in volumes of overland flows (acre-feet per acre) resulting from the 10-year, 24-hour storm event would be 156 percent for soils in hydrologic soil group B, 61 percent for soils in hydrologic soil group C, and 43 percent for soils in hydrologic soil group D. For the 25-year, 24-hour storm event, the increases are estimated to be 120 percent for B soils, 54 percent for C soils, and 37 percent for D soils. These estimates are based on previously wooded lands and assume a 5-percent land cover after clearing. Peak discharge rates for the various storm events would be expected to change throughout the mining phase due to changes in drainage characteristics associated with diversion channels, dikes, sedimentation ponds, and other necessary flood prevention and flood control structures.

The impacts of mining activities upon water quality of the project area streams on the Sabine River have been investigated, considering discharges from active mining areas and disturbed areas. A mining plan, developed by Sabine Mining Company, was used to evaluate mining impacts upon water quality. The plan presented a projected mining scenario, with delineation of the temporal and spatial extent of mining activities. The mining plan was included as part of the mining application to the RRC. The mining permit application was approved by the RRC on 9 November 1981 and is available for review.

One phase of this analysis examined water-quality impacts associated with discharges from the active pit area and from the entire mining area in a disturbed state. Therefore, this analysis constitutes a "worst-case" evaluation for any particular storm event. The 10-year, 24-hour storm event was used for purposes of this analysis. In reality, as mining progresses, only a portion of the mining area will be in a disturbed state, while other portions will have been restored and others will be as yet undisturbed.

For all disturbed areas, sedimentation ponds (and other treatment facilities, if necessary) will be maintained until restoration is complete and the areas exhibit compliance with promulgated discharge requirements. Ponds will be designed to contain runoff from the 10-year, 24-hour precipitation event. Discharges from disturbed areas are subject to the numerical effluent limitations described in Table 4-9, promulgated by the OSM (U.S. Dept. of Interior, 1979) and adopted by the RRC. The EPA has promulgated effluent limitations applicable to discharges from active mining areas, which differ from OSM regulations in that a 30-day average concentration of total iron of 3.0 mg/l is prescribed for both existing and new sources.

The present impact analysis addressed discharges from disturbed areas in response to the 10-year, 24-hour precipitation event. Volumes of runoff were derived from the baseline hydrology studies using the projected watershed areas subject to mining activities. These volumes of runoff were assumed to be contained in sedimentation ponds in each sub-watershed area. No specifications were available describing discharge schedules from the sedimentation ponds. The analysis assumed that ponds would be drained during a 2-week period, allowing quantification of discharge rates. In addition to runoff water, discharges derived from groundwater accumulation in the active mine area were also considered. Discharges from the ponds were then routed to the Sabine River. Impact of these discharges upon the Sabine River was examined upon a median flow of 800 cfs. A mass balance technique was employed to evaluate impacts on the Sabine River. This technique was particularly appropriate since the parameters addressed may be treated as conservative materials; that is, they are assumed to exhibit no significant decay. Discharges from the sedimentation ponds were assigned quality characteristics in compliance with the promulgated effluent limitations. Background concentrations

TABLE 4-9

EFFLUENT LIMITATIONS FOR DISTURBED AREAS,
OFFICE OF SURFACE MINING, AND
NEW SOURCE PERFORMANCE STANDARDS

Effluent Characteristics	Maximum Allowable	30-Day Average
Iron, total*	6.0 mg/l	3.0 mg/l
Manganese, total**	4.0 mg/l	2.0 mg/l
TSS	70.0 mg/l	35.0 mg/l
pH	6.0 to 9.0	6.0 to 9.0

* Existing sources are limited to a maximum 7.0 mg/l and an average 3.5 mg/l total iron concentration.

** Manganese limitations do not apply to untreated discharges that are alkaline as defined by the EPA.

Source: EH&A, 1979b.

in the Sabine River were estimated from USGS data for Station 08022000 near Tatum and from the baseline sampling program. Background concentrations in Hatley and Clarks creeks were estimated from the baseline data collection program (see Table 4-7). Characteristics of Mason Creek were assumed similar to Clarks Creek. The impact of discharges from disturbed areas on project area streams was also investigated. Streamflow from undisturbed areas was estimated at mean flow levels, and quality characteristics were estimated from the baseline stormwater runoff data. Input data and results of the mass balance analyses are described in Table 4-10. In response to pond discharges following the 10-year, 24-hour precipitation event, total suspended solids in project-area streams are shown to increase by approximately 0.5 mg/l (1.2 mg/l maximum). The effects on the Sabine River are very slight. Total suspended solids will decrease by 1.2 mg/l due to pond discharges from the project area. Iron and manganese are projected to increase by 0.14 and 0.17 mg/l, respectively. It should be realized that this analysis represents a "worst-case," as all areas to be mined over the project life were considered in a disturbed state, and the effects of reclamation were not included. However, reclamation will proceed concurrently with mining and this "worst-case" condition will not be realized under actual conditions.

Also addressed in the analysis were impacts from pond discharges derived solely from the active mine area unaffected by runoff discharges from disturbed areas. Mine discharges will be composed primarily of ground-water seepage and direct rainfall on the active pits. Estimated discharge rates were supplied by Paul Wier Company. Effluent limitations promulgated by the EPA were assumed to characterize the quality of the discharges. These sedimentation pond discharges were routed to the Sabine River as discussed previously. Impact upon the Sabine River was examined under the 2-year, 7-day low flow of 62 cfs. Impacts of active mine area discharges on project area streams (i.e., Clarks, Hatley, and Mason creeks) were also investigated. Input data and results are presented in Table 4-11. Calculations indicate impacts upon the Sabine River and the project-area streams would be very minor.

TABLE 4-10

MASS BALANCE DISCHARGES FROM DISTURBED AND ACTIVE MINE AREAS

	Baseline Conditions (Undisturbed Area)	Discharge from Disturbed Area*	Discharge from Active Mine Area**	Mass Balance Results	Change in Concentration
CLARKS CREEK					
Flow (cfs)	14.8	42.8	6.2	63.8	
Quality					
TSS (mg/l)	10.0	35.0	35.0	29.2	+ 19.2
Total Iron (mg/l)	1.82	3.0	3.0	2.30	+ 0.48
Total Manganese (mg/l)	0.42	2.0	2.0	1.63	+ 1.21
HATLEY CREEK					
Flow (cfs)	25.5	26.7	6.2	58.4	
Quality					
TSS (mg/l)	15.0	35.0	35.0	26.3	+ 11.3
Total Iron (mg/l)	3.61	3.0	3.0	3.27	- 0.34
Total Manganese (mg/l)	0.72	2.0	2.0	1.44	+ 0.72
MASON CREEK					
Flow (cfs)	31.3	11.9	6.2	49.4	
Quality					
TSS (mg/l)	10.0	35.0	35.0	19.1	+ 9.1
Total Iron (mg/l)	1.82	3.0	3.0	2.25	+ 0.43
Total Manganese (mg/l)	0.42	2.0	2.0	0.99	+ 0.57
SABINE RIVER					
Flow (cfs)	800	81.4	6.2	887.6	
Quality					
TSS (mg/l)	47.5	35.0	35.0	46.3	- 1.2
Total Iron (mg/l)	1.54	3.0	3.0	1.68	+ 0.14
Total Manganese (mg/l)	0.29	2.0	2.0	0.46	+ 0.17

* Discharges from disturbed areas assumed a 2-week duration.
** Each watershed examined with entire mine area discharge.

Source: Calculations based on data from EH&A, 1979b.

TABLE 4-11

MASS BALANCE ANALYSIS

DISCHARGES FROM ACTIVE MINE AREA

	Baseline Conditions (Undisturbed Area)	Active Mine Discharge*	Mass Balance Results	Change in Concentration
CLARKS CREEK				
Flow (cfs)	14.8	6.2	21.0	
Quality				
TSS (mg/l)	10.0	35.0	17.4	+ 7.4
Total Iron (mg/l)	1.32	3.0	2.17	+ 0.35
Total Manganese (mg/l)	0.42	2.0	0.39	+ 0.47
HATLEY CREEK				
Flow (cfs)	25.5	6.2	31.7	
Quality				
TSS (mg/l)	15.0	35.0	18.9	+ 3.9
Total Iron (mg/l)	3.61	3.0	3.49	- 0.12
Total Manganese (mg/l)	0.72	2.0	0.97	+ 0.25
MASON CREEK				
Flow (cfs)	31.8	6.2	38.0	
Quality				
TSS (mg/l)	10.0	35.0	14.1	+ 4.1
Total Iron (mg/l)	1.82	3.0	2.01	+ 0.19
Total Manganese (mg/l)	0.42	2.0	0.68	- 0.26
SABINE RIVER				
Flow (cfs)	62	6.2	68.2	
Quality				
TSS (mg/l)	25.1	35.0	26.0	+ 0.9
Total Iron (mg/l)	1.54	3.0	1.67	+ 0.13
Total Manganese (mg/l)	0.29	2.0	0.45	+ 0.16

* Each watershed examined with entire mine area discharge.

Source: Calculations based on data from EH&A, 1979b.

The development of the mine and associated facilities will result in some long-term changes in the hydrologic regime of the area. The primary long-term adverse impacts expected as a result of mining activities will be alterations in peak runoff rates and volumes resulting from changes in the site topography, topsoil characteristics, vegetative cover patterns, and land use. Flood peaks will be reduced if sedimentation ponds are allowed to remain in place permanently to be used as runoff detention basins and for livestock, wildlife, and recreational purposes. Major streams through the mine area will be altered due to permanent rerouting, resulting in straighter stream channels and shorter flow lengths. The installation of energy dissipation structures in areas of high streamflow velocities and establishment of vegetative cover will reduce the potential for stream channel erosion. The levees, which will be required to protect the mine from flooding on the Sabine River, will remove a small portion of the existing Sabine River floodplain. Minor rectification of the Sabine River floodplain in the affected reach should offset the reduction in overbank conveyance.

In the project area, ditches will be provided along new roads to direct runoff into local drainage channels. During mining, diversion ditches, channels, and berms will be constructed to intercept runoff from disturbed areas and to divert it to sedimentation ponds that will be constructed using various combinations of dams, levees, and excavations. Runoff from undisturbed areas will either be diverted away from the areas controlled by sedimentation ponds or will be detained in upstream reservoirs to be released after runoff from disturbed areas has passed through the sedimentation ponds.

4.2.2.5 Combined Impacts of the Plant and Mine

The combined effects of the construction activities of the mine and power plant on the surface water hydrology will not be any more severe than the sum of their separate effects considered independently. Furthermore, all of the construction-related hydrologic impacts of the combined project will not occur simultaneously. Most of the construction activities for the power plant will essentially be completed prior to mining, and further construction will occur during the sequential development of the mine.

The overall effects of the proposed power plant and mine construction activities on the surface water hydrology of the area will be minor in magnitude and of short-term duration. These impacts are temporary and will diminish with increasing distance downstream of the construction site. Current available technology will be employed, as necessary, to minimize the effects of construction on runoff and sediment production in the project area.

The combined effects resulting from operation of the proposed power plant and mine include effects on the Sabine River and its associated floodplain, changes in topography and runoff patterns of local watersheds due to construction of the power plant and development of the mine, and water quality considerations associated with the various waste streams generated by the combined project.

Construction of the power plant cooling reservoir has reduced runoff to the Sabine River. However, as the drainage area above the dam is very small in comparison to the total drainage area of the Sabine River at the project site, there will be only a very minor reduction in Sabine River flows. Also, only minor decreases in the Sabine River flows due to mining operations are anticipated, as the total drainage areas of the watersheds affected by the mine area are only about 1.5 percent of the total drainage area of the Sabine River at the project site. A minor change in the floodplain boundary of the Sabine River and a minor increase in flood elevations are expected due to required flood prevention levees along the southern boundary of the project in the Sabine River floodplain.

Operational impacts of the combined project on the hydrologic regime of the local (on-site) watersheds will also be composed of the separate effects of the power plant and mine as discussed in Sec. 4.2.2.4. The hydrologic impacts of the mine development on local watersheds, including changes in site topography and alterations in peak runoff rates and volumes, will occur concurrently with mining and reclamation activities throughout the life of the project. Sedimentation ponds installed to control runoff and sediment from disturbed areas will be in operation at various locations and at different times, as dictated by the mine plan. The sequential development of the mine will result in greater overall impacts on local watersheds during later stages of the project than in earlier years, while the hydrologic impacts of the power plant facilities will essentially remain uniform throughout the project life.

The combined effects of power plant and lignite mine operation on surface water quality do not differ significantly from their individual impacts. Occasional discharges from the power plant's cooling reservoir will affect only Brandy Branch. Discharges from disturbed mining areas will affect Hatley, Clarks, and Mason creeks. Discharges from both mine and power plant operations will eventually enter the Sabine River. Any iron and manganese additions will be from mining; power plant operations will not add to the levels of iron, manganese, and total suspended solids in the Sabine River. Mine discharges may contain TDS concentrations that are slightly higher than background levels, but should be well below the 400 mg/l TDS standard for the segment of the Sabine River near to the project area (Segment 0505).

4.3 CLIMATOLOGY/AIR QUALITY

4.3.1 Existing and Future Environments

4.3.1.1 Climatology

Proximity to the Gulf of Mexico (approximately 200 miles to the south) greatly influences local meteorology and climatology. The climate of the project area is a transition from the primarily humid, subtropical areas to the south and the less humid, continental areas of the Plains States to the north. The project area experiences generally warm summers punctuated by occasional thundershowers. Winters are mild to cool, with cold air intrusions every 3 to 5 days during the coldest months. A more detailed discussion of the project area's climatology is contained in a baseline climatology and air quality report (EH&A, 1979a).

Temperature

The average annual temperature for the project area is 65.2°F. Average afternoon highs vary from the low 90's in July and August to the upper 50's in December and January. Average nighttime lows range from the low 70's during July and August, to the upper 30's during December and January (U.S. Dept. of Commerce, 1972). The highest temperature on record is 106°F, and the lowest is 2°F.

Precipitation

Rainfall is generally abundant in the project area, with most monthly averages exceeding 3 inches (U.S. Dept. of Commerce, 1972). Most of the precipitation, both in quantity and number of occurrences, is from convective showers. Excessive rains of short duration occur frequently from thundershowers during the April through September period. Heavy rains may also be associated with squall lines during the spring or fall months. Rains of longer duration are normally the result of warm- or stationary-frontal activity south of the area during the colder months, or are associated with dissipating tropical weather systems during summer or fall. Averages during the 1951-1970 period of record reveal an annual average precipitation rate of 46.28 inches (U.S. Dept. of Commerce, 1972). During a typical year, approximately one-fourth of the days will experience measurable precipitation. September is the driest month, with an average precipitation of 2.3 inches, while December is the wettest, with 4.9 inches. In the project area, a record annual maximum precipitation of 67.23 inches was measured in 1957, and a record minimum of 23.10 inches was recorded in 1899 (U.S. Dept. of Commerce, 1972).

Snowfalls of measureable amounts rarely occur, averaging only once every 2 years. Heavy snows have occurred, however, as in February 1960, when 5.7 inches fell. Such rare and infrequent snows distort mean data so that such data are not useful for determining expected amounts. For that reason, mean data are not presented here. Sleet occurs more often than snow, but amounts and durations are generally small (U.S. Dept. of Commerce, 1972). Sleet or icing conditions occur most frequently from mid-December to mid-February.

Surface Winds

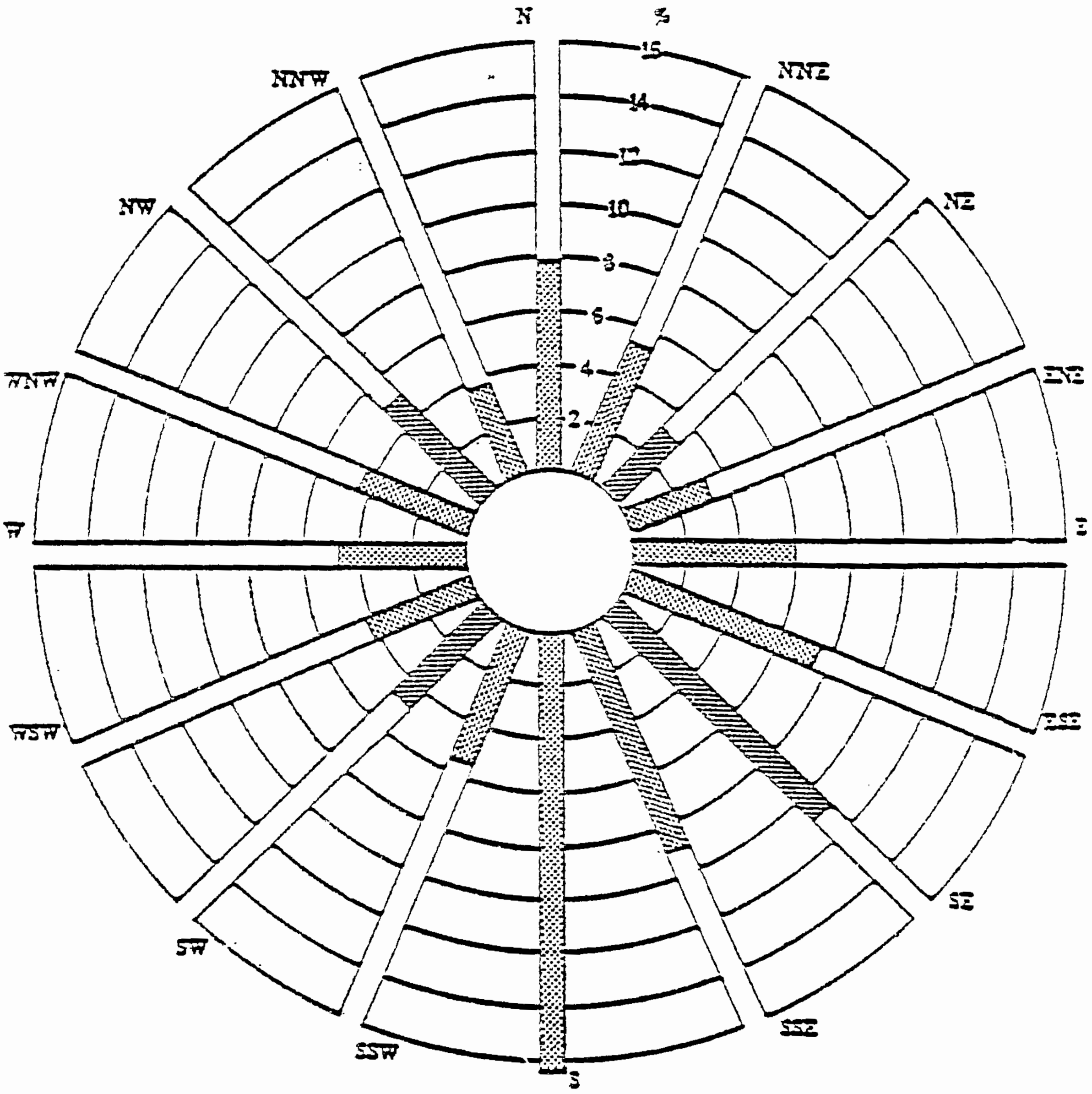
The windiest seasons are winter and spring, each with an average speed of 8.5 mph (U.S. Dept. of Commerce, 1975). Fall is the next windiest season (7.1 mph) and then summer (6.2 mph). The average annual wind speed for Shreveport is 7.6 mph. The frequency distribution of wind direction ("wind rose") for the annual case is presented in Fig. 4-3. The wind radials for each direction represent the percentage of time the wind blows from that particular direction.

The most frequent annual wind direction is south (based on a 16-point compass), occurring 16.4 percent of the time. Seasonal occurrences of the southerly direction are 19.1 percent (summer), 18.8 percent (spring), 15.3 percent (winter), and 12.7 percent (fall). Annually, southeast is the second-highest occurring direction (10.9 percent). The least frequent annual wind direction is northeast (3.1 percent). Calm conditions prevail 12.2 percent of the time.

Severe Weather

Severe weather in northeastern Texas results from the occurrence of decaying tropical storms and large thunderstorms (including tornadoes). During the

Fig. 4-3 Annual Wind Rose for Shreveport, Louisiana
1970-1974



0-3	4-6	7-10	11-16	17-21	21+
17.7	33.7	34.3	13.3	0.9	0.1

knots

CALM
12.2%

Source: EH&A, 1979a.

coldest months ice storms may occur, but are very infrequent events. Thunderstorms are generally limited to the spring and early summer months. In the project area, maximum thunderstorm frequency usually occurs in the afternoon and evening hours. Remnants of hurricanes and tropical storms may affect the project area from June to November, while tornadoes can occur during any month of the year.

Dispersion Meteorology

Thermal and mechanical turbulence in the atmosphere act to disperse air pollutants. A method for estimating the degree of turbulence in the surface layer is used by the National Climatic Center (NCC) to produce a computer summary of stability conditions for selected National Weather Service (NWS) stations. The summary is called Stability Array (STAR) and was obtained for Shreveport for the period 1970-1974. On an annual average, unstable conditions (Classes A, B, and C) are estimated to occur 20.7 percent of the time. The most frequently occurring class is the neutral Class D (D-day plus D-night) at 46.8 percent. Stable conditions (Classes E and F) are estimated to occur 30.2 percent of the time (U.S. Dept. of Commerce, 1975).

Mixing heights and mean transport wind speeds determine the volume into which pollutants will eventually be mixed. Low mixing heights and light wind speeds can mean high concentrations of pollutants, resulting from trapping of pollutant plumes or decreased dilution of area source emissions. Holzworth (1974) has analyzed worst-case annual and seasonal values of mixing heights and transport winds for 62 United States stations, including Shreveport. Shreveport consistently ranked high in the absence of extended periods with poor dispersion.

Strong atmospheric stability resulting from atmospheric temperature inversions can effectively form a barrier limiting vertical dispersion of pollutants. Hosler (1961) has estimated the frequency of occurrence of low-level inversions below 500 feet. In the Shreveport area, the frequency of low-level inversions based below 500 feet (in percent of total hours) varies from 26 percent in the spring to 41 percent in the fall. The annual frequency of low-level inversions is 32 percent. These inversions usually do not last more than a few hours.

Maximum concentrations of air pollutants also often occur at ground level during periods of anticyclone (high pressure system) stagnation. A study by Korshover (1971) indicates that the proposed project area experienced approximately 96 stagnation days and 23 stagnation cases (four or more continuous stagnant days) during a 35-year study period. Based on his results, the maximum frequency of stagnation days occurs during the fall, and the minimum frequency occurs during the winter.

Relative dispersive capacity is estimated from the information on atmospheric stability, mixing heights, and frequencies of inversions and stagnating anticyclones for the project area. In general, the proposed project area is characterized by atmospheric conditions favorable for the satisfactory dispersion of air pollutants.

4.3.1.2 Existing Air Quality

Inventory of Emission Sources in the Project Area

Point sources of air pollution are industrially oriented and include items such as flares, stacks, and vents. The largest individual source of sulfur dioxide (SO_2), total suspended particulates (TSP), and nitrogen oxides (NO_x) emissions within an eight-county region surrounding the proposed project is Texas Utilities Services' Martin Lake Steam Electric Station (SES), located 15 miles south-southwest of the Pirkey Power Plant site. The Martin Lake SES emits 154,268 tons per year of SO_2, 13,006 tons per year of TSP, and 90,008 tons per year of NO_x. Another potentially large individual source is Texas Utilities Services' proposed Mill Creek SES to be located 18 miles southwest of the proposed power plant site. The Mill Creek SES has been permitted to emit 73,374 tons per year of SO_2, 6,918 tons per year of TSP, and 41,514 tons per year of NO_x. Together these two sources emit approximately 60 percent of each of the three types of pollutants discussed for the eight-county region (Sargent and Lundy, 1979).

To conservatively investigate possible air quality impacts due to other large sources in the region, an inventory of emission sources was compiled for an area twice the radius of that of the maximum possible area of impact (50 km) and defined by EPA's PSD guidelines.

These sources, whose emission rates exceed 5,000 tons per year for one or more of the three aforementioned pollutants, are presented in Table 4-12 along with the two Texas Utilities Services' stations and the proposed Henry W. Pirkey Power Plant. Included in the table are plant locations and emission rates. The sources are also located on a map of the region surrounding the project (Fig. 4-4). Each source is identified with a number listed in Table 4-12. Of those sources, several were permitted for construction or modification after the 1979 emissions inventory was compiled for the purpose of permit application review under the Prevention of Significant Deterioration (PSD) of air quality regulations.

Ambient Air Quality Levels in the Project Area

The region surrounding the project area is primarily rural, much of which is pasture or heavily wooded land. Few point emission sources of atmospheric pollutants are located within 62 miles (100 km) of the site. The dispersed nature of emissions in the region and the large distances to major industrial areas make the air quality generally good in the project area.

Ambient air quality standards set limits on concentrations of pollutants in the air accessible to the general public. The existing applicable Federal standards are the National Ambient Air Quality Standards (NAAQS), which encompass seven

TABLE 4-12

LARGE POLLUTANT EMISSION SOURCES (>5000 TONS PER YEAR) WITHIN 62 MILES (100 km) OF THE PROPOSED PROJECT

Map ID	Source	County/ Parish	Distance/ Direction (mi/ 16 p + compass)	Pollutants TSP	SO2 (ton/yr)	NOx
*	SWEPCO Pirkey	Harrison	—	—	35,730	17,865
2	Texas Eastman	Harrison	12 W	—	—	15,217
3	TUSI Martin Lake	Rusk	14 SSW	13,006	154,268	90,008
4	TUSI Mill Creek	Rusk	18 SW	6,918	73,374	41,514
5	SWEPCO Wilkes	Marion	27 N	—	—	8,794
6	Lone Star Steel	Morris	35 NNW	—	10,421	15,425
7	Shell Oil Bryons Mill	Cass	52 N	—	5,692	—
8	SWEPCO Welsh	Titus	47 NW		71,898	38,386
9	TUSI Monticello	Titus	55 NW	18,464	222,524	53,180
12	SWEPCO Dolet Hills	DeSoto	60 ESE	8,266	53,527	39,854
11	International Paper	DeSoto	53 ESE		8,678	
1	ICI United States	Harrison	7 NNE	—	5,164	—
10	Exxon Hawkins	Wood	44 WNW	—	—	5,230

Source: Files of EPA's National Emissions Data System, Texas Air Control Board, and Louisiana Office of Environmental Affairs, Air Quality Division (1979-1981).

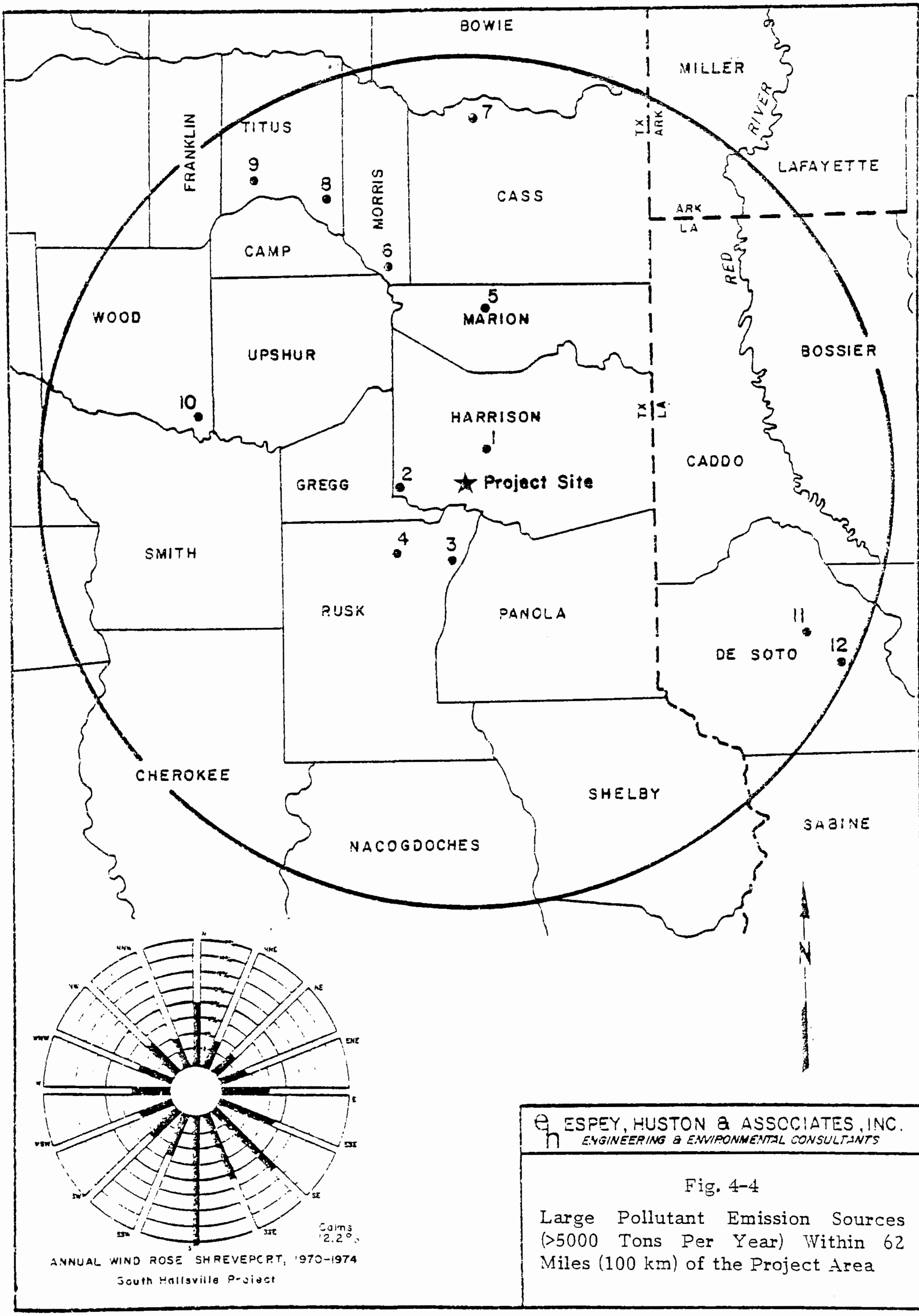


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Fig. 4-4

Large Pollutant Emission Sources (>5000 Tons Per Year) Within 62 Miles (100 km) of the Project Area pollutants (Table 4-13) including NO_2, SO_2, and TSP. Generally, data from monitoring programs are compared with the NAAQS to determine compliance status for the area monitored.

As of 1980, the three state-operated monitoring stations closest to the proposed plant site, which collected TSP, SO_2, and NO_2 data, were: (1) Longview (15 miles to the west-northwest), (2) Tyler (43 miles west), and (3) Shreveport, Louisiana (43 miles east). Five additional TSP monitoring stations were located in Shreveport. Other nearby monitoring stations include: one in Mt. Pleasant (TSP, SO_2, and NO_2), 56 miles north-northwest; one in Texarkana, Texas (TSP, SO_2, and NO_2), 72 miles north-northeast; and two in Texarkana, Arkansas (TSP, SO_2, and NO_2).

The monitoring station closest to the proposed project is the Longview station. It is also the only station that collects SO_2 and NO_2 data using continuous sampling methods. Table 4-14 presents measured concentrations of SO_2, NO_2, and TSP for Longview for the period 1977-1980. As indicated in the table, all measured data were far below the applicable NAAQS. In addition, the SO_2 and NO_2 concentrations measured at the other state-operated stations have remained well below the NAAQS. However, SO_2 and NO_2 data from these sites were derived from gas bubbler monitoring devices, which are considered unreliable. Standards for TSP were exceeded at one of four stations in Shreveport, indicating that the high values were due to very localized effects. In addition, the secondary annual TSP standard was exceeded in 1978 in Tyler.

The area surrounding the proposed project site has been designated as an attainment area for all criteria pollutants. The area is designated Class II under PSD regulations. The nearest Class I area is Caney Creek National Wilderness Area in Arkansas, approximately 130 miles north-northeast of the project site.

TABLE 4-13

NATIONAL AMBIENT AIR QUALITY STANDARDS

National Standards	Primary*	Secondary**
Total Suspended Particulate Matter (TSP)	260 $\mu g/m^3$ 24-hour average, not to be exceeded more than once a year	150 $\mu g/m^3$ 24-hour average, to be exceeded more than a year
	75 $\mu g/m^3$ annual geometric mean	60 $\mu g/m^3$ annual geometric mean+
Sulfur Dioxide (SO_2)	365 $\mu g/m^3$ (0.14 ppm) 24-hour average, not to be exceeded more than once a year	1,300 $\mu g/m^3$ (0.5 ppm) 3-hour average, not to be exceeded more than once a year
	80 $\mu g/m^3$ (0.03 ppm) annual average	
Carbon Monoxide (CO)	40,000 $\mu g/m^3$ (35 ppm) hourly average, not to be exceeded more than once a year	Same as primary
	10,000 $\mu g/m^3$ (9 ppm) 8-hour average, not to be exceeded more than once a year	
Nitrogen Dioxide (NO_2)	100 $\mu g/m^3$ (0.05 ppm) annual average	Same as primary
Non-methane Hydrocarbons+	160 $\mu g/m^3$ (0.24 ppm) 6-9 a.m. average, not to be exceeded more than once a year	Same as primary
Ozone (O_3)	235 $\mu g/m^3$ (0.12 ppm) hourly average, not to be exceeded more than 1 day each year	Same as primary
Lead (Pb)	1.5 $\mu g/m^3$ maximum arithmetic mean averaged over a calendar quarter	Same as primary

* Primary standards define levels of air quality which the EPA Administrator judges necessary to protect the public health with an adequate margin of safety.

** Secondary standards define levels of air quality which the EPA Administrator judges necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.

+ These are for use as guides in achieving other standards. The non-methane hydrocarbon level relates to the ozone standard; the 60 $\mu g/m^3$ annual geometric mean for TSP relates to the 24-hour standard for particulates.

Source: 40 CFR, Part 50, National Ambient Air Quality Standards.

TABLE 4-14

AMBIENT AIR MONITORING SUMMARY FOR NEAREST TACB STATION: LONGVIEW, TEXAS

Pollutant	Year	Annual Mean+	Annual NAAQS	24-Hour 2nd Highest	24-Hour NAAQS	3-Hour 2nd Highest	3-Hour NAAQS
SO_2	1977	0[a,b]	80	0[a]	365	52	1300
($\mu g/m^3$)	1978	0[a]	80	0[a]	365	52	1300
	1979	0[a,b]	80	0[a]	365	104	1300
	1980	0[a]	80	26	365	260	1300
NO_2	1979	20	100	NA	NA	NA	NA
($\mu g/m^3$)	1980	20[b]	100	NA	NA	NA	NA
TSP	1978	34[b]	75	63	150	NA	NA
($\mu g/m^3$)	1979	33	75	72	150	NA	NA
	1980	34	75	72	150	NA	NA

\+ Annual means for SO_2 and NO_2 are arithmetic, annual mean for TSP is geometric.

++ SO_2 and NO_2 concentrations were measured by the TACB in parts per million (ppm). These data have been converted to $\mu g/m^3$ using a conversion factor of 2600 for SO_2 and 2000 for NO_2.

a Monitored value below the threshold of the instrument.

b Insufficient number of samples were collected for the annual mean to be statistically valid.

Source: TACB, 1977-1980.

4.3.2 Effects of No Action

With the possible exception of future construction and operation of other nearby facilities proposing to emit large quantities of atmospheric pollutants, the project area's air quality will remain unchanged from its present condition if the proposed project is not constructed. If anticipated industrial development occurs in the project area, the NAAQS or the allowable Class II PSD increments could become constrained at some future date. The greatest potential air quality problem would be encountered if two or more major industrial facilities attempt to locate or build adjacent to one another. Future new sources and modifications of existing sources would not exceed the NAAQS, or violate of the PSD regulations or any other existing or future air pollutant regulations. Most of the maximum PSD increment concentrations predicted by computer modeling (Sargent and Lundy, 1979) for the region surrounding the proposed plant are the result of emissions from other permitted increment-consuming sources. For the maximum 24-hour and 3-hour SO_2 concentrations, the Mill Creek SES is predicted to be the major consumer of the allowable PSD increments at a location approximately 18 miles southwest of the proposed plant. The maximum annual means for SO_2 was modeled to be located at 18 miles west-northwest of the proposed project. At this location, the proposed plant's annual mean SO_2 concentration will be negligible.

Without the proposed plant, the maximum SO_2 concentrations resulting from permitted PSD increment sources are 10, 37, and 288 $\mu g/m^3$ for the annual mean, 24-hour maximum and 3-hour maximum, respectively. These concentrations represent a consumption of 50, 41, and 56 percent of each of the allowable PSD increments for SO_2. With the proposed project, the maximum SO_2 PSD increment concentrations are 10, 42, and 307 $\mu g/m^3$ for the annual mean, 24-hour maximum, and 3-hour maximum, respectively. These values represent a consumption of 50, 46, and 60 percent of each of the allowable increments for SO_2. Therefore, the total increase in the percentage of the allowable increment consumed, due to operation of the proposed plant, is less than 1 percent for the maximum annual mean, 5 percent for the 24-hour maximum, and 4 percent for the 3-hour maximum.

4.3.3 Construction Impacts

4.3.3.1 Power Plant

Plant Site

Pollutant emissions resulting from construction and preparation of the power plant site will cause some minor adverse air quality impacts in the area immediately surrounding the construction activity. These impacts will be short-term and localized, and air pollution levels will only occasionally exceed normal background levels as a result of construction.

On-site open burning during clearing activities will cause periodic short-term, minor, adverse impacts on air quality. All controlled burning adheres to State, Federal, and local regulations. Burning was conducted during the hours designated for such procedures and under meteorological conditions that would allow for burning in a safe manner (TACB Reg. 131.03.01.002). Debris resulting from clearing and grubbing activities was stockpiled to facilitate access to and control of burning. These materials were left to dry for variable periods of time before burning; time of burning was determined by dryness of the piles. Workers and equipment were on-site during burning operations. Burning operations and safeguards were designed to minimize adverse impacts on surrounding areas and wildlife habitats.

Some smoke will also be produced by the operation of diesel engines and by construction activities such as welding. Other vehicular exhaust emissions will include small amounts of carbon monoxide, hydrocarbons, and oxides of nitrogen. These mobile source emissions will not exceed any Federal or State standard.

On-site fugitive dust will result primarily from heavy earth-moving equipment involved in excavation of fill material and from vehicular traffic on unpaved roads. When dust problems arise during construction, sprinkler trucks will be employed to control dust in the area. These trucks will be used on the roadways and in immediate construction areas where problems persist. The moderately high frequency of occurrence of precipitation at the plant site area could, on the average, further reduce the presence of fugitive dust. Dust and smoke emissions will be controlled so that they will not cause or intensify any traffic hazard due to impairment of visibility on nearby public roads.

Transportive Systems

Pollutant emissions resulting from construction of transportive systems (e.g., vehicle exhaust emissions, fugitive dust) will cause some short-term air quality impacts in areas immediately surrounding construction activities.

4.3.3.2 Mine

As with construction of the power plant, some fugitive dust emissions will be produced by construction of mine support facilities. Any adverse air quality impacts will be temporary and localized, and air pollutant levels will only occasionally exceed normal background levels as a result of facility construction.

On-site open burning from clearing will cause periodic short-term, minor, adverse impacts on air quality. All controlled burning will adhere to applicable State, Federal, and local regulations. Burning will be conducted during the hours designated for such procedures, and under meteorological conditions that will allow for burning in a safe manner. Debris resulting from clearing and grubbing activities will be stockpiled to facilitate access to and control of burning. Men and equipment will be on-site during burning operations. Burning operations and safeguards will be designed to minimize undesirable effects on adjacent areas and wildlife habitats.

Some smoke will be produced by the operation of diesel engines and by construction activities such as welding associated with construction of draglines and buildings. On-site fugitive dust will result from heavy earth-moving equipment involved in excavation of fill material. When dust problems arise, sprinkler trucks will be employed to control dust in the construction area and on nearby roadways.

4.3.4 Operations Impacts

4.3.4.1 Plant Site

Air Pollutant Emissions

The principal air pollutants to be emitted by the proposed Henry W. Pirkey Power Plant - Unit 1 are sulfur dioxide (SO_2), oxides of nitrogen (NO_x), and particulate matter (TSP). Minor amounts of carbon monoxide (CO), and hydrocarbons (HC) will also be emitted. In addition to these pollutants, some trace radioactive elements will also be emitted.

Impacts of Stack Emissions

The Henry W. Pirkey Power Plant - Unit 1 is located in a rural area, with only one other major point source within a 10-mile radius of the plant. That source is the ICI United States facility, located 7 miles to the north-northeast. Its emission rates are as follows: 5,164 tons per year (tpy) of SO_2, 315 tpy of TSP, and 285 tpy of NO_x. The predicted areas of impact due to emissions from the proposed project were determined by dispersion modeling results (Sargent and Lundy, 1979). TSP and CO were determined to have no area of impact as their emissions will be insignificant. Thirty-one miles (50 km) was determined to be the area of impact for SO_2 and was conservatively assumed as the area of impact for NO_x. Specific discussions of various aspects of the stack emissions are included in the following paragraphs.

Emission Limitations

The proposed Henry W. Pirkey Power Plant - Unit 1 stack emission rates are to be limited by the New Source Performance Standards (NSPS) for fossil fuel-fired steam boilers. The NSPS applicable to Unit 1 of the power plant are those that were in effect when Unit 1's boiler was purchased. The best available control technology (BACT) proposed for the generating unit conforms with the applicable NSPS. Detailed descriptions of the emission control equipment for SO_2 and TSP are provided in the PSD application and its revision (Sargent and Lundy, 1978b and 1979). The maximum proposed SO_2, TSP, and NO_x emission rates are all in compliance with the applicable NSPS. The maximum emission rates of 1.2 pounds of SO_2 per million British thermal units (Btu) of heat input and 0.1 pounds of TSP per million Btu of heat input will be in compliance with the NSPS of 1.2 and 0.1 pounds per million Btu of heat input for SO_2 and TSP, respectively. Also, the maximum emission rate of 0.6 pounds of NO_x per million Btu or heat input will be in compliance with the applicable NSPS for NO_x of 0.6 pounds per million Btu of input. These emission rates per unit heat input correspond to 8,180 pounds per hour of SO_2, 682 pounds per hour of TSP, and 4,090 pounds per hour of NO_x, as indicated in the revision to the original PSD application (Sargent and Lundy, 1979). Emissions of SO_2 will be controlled by a wet limestone flue gas desulfurization system. TSP emissions control will be accomplished by electrostatic precipitators, and NO_x emission control will be accomplished by the use of a specific boiler burner design and the use of controlled combustion.

Atmospheric Dispersion Modeling Results

To determine the future impact of Unit 1 of the proposed plant on ambient air quality, Sargent and Lundy performed two computer modeling analyses: one as part of the PSD permit application (1978b), and one as a revision to the application (1979). The revised analysis was performed to determine the effect of a decrease in the Unit 1 stack height, from 625 feet to 525 feet. The EPA has reviewed the plant's PSD application (PSD-TX-064) and subsequent revision and has determined that the proposed project will not violate the NAAQS for SO_2, TSP, NO_2, CO, or HC, nor the Class II PSD increments for SO_2 or TSP. The original permit was issued March 30, 1978, while the revision to the permit was granted during October 1979 (see Sec. 5.0).

Detailed descriptions of the modeling techniques employed (and results) are contained in the PSD application and its revision (Sargent and Lundy, 1978b and 1979). The predicted SO_2 concentrations (maximum annual mean, 24-hour maximum, and 3-hour maximum) resulting from emissions from the proposed plant plus all other inventoried point sources were 12, 61, and 307 $\mu g/m^3$, respectively. These concentrations represent 15, 17, and 24 percent of the applicable NAAQS for SO_2. To determine compliance with the Class II PSD increments for SO_2, Sargent and Lundy (1979) modeled emissions from the proposed plant combined with emissions from other increment sources permitted within the area of impact (31 miles) of the proposed plant. The resulting concentrations were 10, 42, and 307 $\mu g/m^3$ for the annual mean, 24-hour average, and 3-hour average, respectively. These values represent a consumption of 50, 46, and 60 percent of each of the allowable PSD increments for SO_2. The proposed plant's maximum individual contribution to the ambient SO_2 concentration was modeled to be 4, 38, and 213 $\mu g/m^3$ for the annual mean, 24-hour average, and 3-hour average, respectively. These concentrations represent 20, 42, and 42 percent of each of the respective allowable Class II PSD increments.

The predicted TSP concentrations (maximum annual geometric mean and 24-hour maximum) due to proposed plant emissions alone were 0.4 and 3 $\mu g/m^3$, respectively. Because these values fell below the PSD significance levels for modeling impacts, no further PSD analyses were performed for TSP. The predicted maximum annual average NO_x concentration resulting from plant emissions alone was only 2 $\mu g/m^3$ and will not interfere with the attainment or maintenance of the NAAQS for NO_2. Modeling performed for CO and HC indicated that concentrations of these pollutants as a result of emissions from the proposed power plant will be negligible, and will not interfere with the attainment or maintenance of the NAAQS.

To further demonstrate that the ground level concentrations (GLC's) in the project area will not exceed the NAAQS, the predicted GLC's for the proposed plant can be added to the ambient pollutant concentrations measured at regional monitoring stations. As indicated in Sec. 4.3.1.2, the closest monitoring station and the only one that uses reliable continuous monitoring methods for SO_2 and NO_2 is Longview, Texas. The existing ambient SO_2, TSP, and NO_2 levels measured at Longview are well below the NAAQS. Therefore, the predicted SO_2, TSP, and NO_2 GLC's for emissions from the proposed project are far below the NAAQS when added to existing ambient concentrations measured at Longview. A comparison of the concentrations resulting from combining the highest-measured Longview monitoring values with predicted GLC's due to plant emissions is presented in Table 4-15.

Ecology

The maximum average SO_2 concentrations predicted for the proposed power plant are far less than the 8-hour vegetation injury threshold of 800 $\mu g/m^3$ reported by Hindawi (1970). The maximum predicted annual, 24-hour, and 3-hour SO_2 concentrations due to emissions from the proposed plant plus all other inventoried sources are 12 $\mu g/m^3$, 61 $\mu g/m^3$, and 307 $\mu g/m^3$, respectively (Sargent and Lundy, 1979). The predicted maximum 3-hour concentration of SO_2 is also less than the respective 4-hour and 8-hour injury thresholds of 1,333 $\mu g/m^3$ and 667 $\mu g/m^3$ for sensitive plant species as reported by Shurtleff et al. (1972).

The effects of predicted NO_x concentrations from the proposed power plant are expected to be negligible. Results from experiments indicate that dosage rates necessary to produce vegetative injury (2,000 $\mu g/m^3$ for one day (Mudd and Kozlowski, 1975)) far exceed the predicted concentrations.

TABLE 4-15

MAXIMUM PREDICTED AIR QUALITY CONCENTRATIONS
DUE TO EMISSIONS FROM THE PROPOSED POWER PLANT
($\mu g/m^3$)

Pollutant	Averaging Time	Modeled Power Plant Concen- tration	Maximum Baseline Concen- tration (1977-1980)	Predicted Air Quality Concen- tration+	NAAQS
SO_2	Annual	4	0	4	80
	24-Hour	38	26	64	365
	3-Hour	213	260	473	1300
TSP	Annual	0.4	34	34.4	75
	24-Hour	3	72	75	150
NO_2	Annual	2	20	22	100

+ Values obtained by adding results of CRSTER modeling analysis (column 3) to maximum baseline value recorded at Longview during 1977-1980 (column 4).

Radioactive Emissions

Trace amounts of uranium and thorium are present in lignite, primarily as Uranium-238 and Thorium-232, respectively, along with their 28 daughter products. An analysis of the lignite from the proposed mine indicates that an average value of 2.6 ppm of uranium is present in the fuel (Paul Weir Company, 1978). Thorium was not analyzed, but a conservative value of 5 ppm may be considered representative, based on typical lignite deposits in the region. The lignite will be mined from the Wilcox Formation. Typical values of uranium and thorium found in lignite from this formation range from 1 to 5 ppm. Typical values of uranium and thorium found in South Texas lignite range from 2 to 20 ppm (White, 1979). When the lignite is burned, some of these radionuclides are released into the atmosphere. The particulate radionuclides will be collected by the electrostatic precipitators (ESP's) with expected control efficiencies ranging from 98.5 to 99.75 percent. These expected radionuclide control efficiencies are different from the overall particulate control efficiency of 99.75 percent because of the expected enrichment of radionuclides as they go through the ESPs. Studies have shown that the relative proportions of radionuclides going with various size fractions of the fly ash are not uniform. Enrichment factors as high as 5 were found for the fine particles (Coles, 1978). Radon gas (Rn-222) will be released into the atmosphere with no planned control and is expected to present a negligible impact.

Based on the maximum expected individual dose rate of 1.8 millirems per year due to estimated radioactive emissions from the proposed power plant stacks, very small, if any, adverse health impacts resulting from exposure to radionuclides released from the power plant are expected. Existing Federal standards protect the general public from exposure to radiation of 170 millirems per year. A maximum dosage of 500 millirems per year is allowed for a person who would receive a hypothetical "worst-case" dosage (10 CFR 20). Because the dose rate presented is based on a hypothetical worst-case, it should be added to the existing environmental background dosage of 100 millirems per year before being compared to the

500 millirems per year standard. The resulting dose rate is 102 millirems per year, far less than the existing Federal standard.

Currently, no standards exist that specifically address the increases of dose rates received by an individual or the general public due to the introduction of a coal or lignite power plant. In an attempt to evaluate these increases, authors of several articles and reports written during the past 3 years have presented comparisons of the estimated dose rates from coal or lignite power plants with the Federal guidelines for nuclear power plants. This approach to determine the level of impact is not valid. The guideline (10 CFR 50, Appendix I), which permits an individual to receive 5 millirems per year to the total body resulting from gaseous effluents released from light-water-cooled nuclear power reactors, was developed as a design criteria for the power reactors. This guideline cannot be used as an indicator of whether or not adverse health effects will occur as a result of exposure to radioactive effluents. This guideline was developed for use as a numerical guide for design objectives and limiting conditions for operation of the nuclear power reactor to meet the criterion for emissions to be "as low as practicable." These figures were based on what power reactors would emit under optimum operating conditions. They were not developed as a criterion for maximum allowable dosages (above the natural background) for the general public.

It must be emphasized that the estimated dose rate presented here was based on worst-case assumptions. The assumptions used in the algorithm that predicted that an individual would receive a total body dose of 1.8 millirems per year would be that the individual would have to live at a single location 500 meters from the stack, and grow and consume all his food at that same location for one year. The algorithm used gave no credit for stack heights greater than 100 m, a result of claims that ground-level concentrations have little dependence on stack height when continuous washout factors are used (McBride, 1977 and 1978). Periods of intermittent rainfall were averaged to be used as a scaled-down one year continuous rainfall. This technique overestimates the action of intermittent rainfall activity as a washout process and leads to an overestimate of the dosage (Slade, 1968; Christiansen, 1980).

The introduction of the proposed lignite power plant will cause only very small, if any, adverse health impacts resulting from the release of uranium and thorium decay series' radionuclides. The maximum expected individual dose rate for the total body is 1.8 millirems per year. In comparison, the dosages obtained by individuals from naturally-occurring radionuclides in the soil (the same radionuclides that will be released from the lignite power plant) range from 15 to 55 millirems per year throughout the country. Exposure to the body from the decay of potassium-40 in the bones of a typical human is about 20 millirems per year (National Council on Radiation Protection and Measurement, 1975).

Impacts of Fugitive Emissions

In addition to stack emissions, there will be fugitive dust emissions from the lignite and limestone handling, processing, and storage operations. During project operations, fugitive dust may be generated at loading and unloading points, at the crusher-sampler house, at conveyor transfer points, and from storage areas. Such emissions are not easily quantified but will cause minor, short-term, localized, adverse impacts. All reasonable air pollution control measures will be undertaken to prevent fugitive dust from becoming airborne.

Control technology to be applied at these emission sources will include: wet dust suppression at the crusher-sampler house and at all transfer points, compaction of the lignite storage pile, and bag-type dust elimination at enclosed material storage points.

Permanent roads and parking lots will be surfaced to reduce any vehicle-associated dust emissions. These emissions are small and will not exceed any Federal or State ambient air quality standard, nor cause an impairment of visibility on nearby public roads, nor create a nuisance on adjacent properties.

In addition to fugitive dust emissions, there will be emissions of other pollutants from vehicular activity. These emissions will be small and will not exceed any Federal or State ambient air quality standard.

Cooling Reservoir Impacts

Fog produced by the cooling reservoir will probably occur during atmospheric conditions conducive to the formation of natural fog. In general, the cooling reservoir may slightly increase the duration and density of naturally occurring fog. Although the cooling reservoir continually adds water vapor to the air, the atmosphere will generally accept this vapor without producing significant fog unless the atmosphere is already near saturation and capable of forming natural fog. This occurs most frequently during the nighttime and early morning hours, when the atmosphere has cooled to its dewpoint temperature and saturation has occurred.

Depending on the existing atmospheric conditions, the fog produced by the cooling reservoir will normally be observed only within a one-half mile distance from the edge of the pond. Occasionally, the fog will evaporate a short distance above the pond and recondense after rising to a higher level, forming a stratus cloud that is visible a few miles downwind of the pond.

Icing from the cooling reservoir will occur when atmospheric water droplets come in contact with objects that are at temperatures below freezing. Icing from the transport and dispersion of water vapor results in very little accumulation on horizontal surfaces such as highways. However, soft rime icing may occur on vertical surfaces such as tree trunks and transmission towers. Even though freezing temperatures occur periodically in the project area, the occurrence of icing from the cooling reservoir operation is expected to be very slight.

Transportive Systems

Lignite from the mine will be delivered by trucks. Limestone for the SO_2 emission control systems will be delivered to the power plant by train. As addressed in the impacts of fugitive emissions section, there will be some fugitive dust generated at the rail and truck load-out points. These emissions will be effectively controlled by the application of water sprays. In addition, there will be some exhaust emissions from the railroad vehicles and trucks. The impacts of these emissions will be localized and very minor. No adverse air quality impacts are anticipated from operation of the makeup water pipeline and transmission lines.

Acid Rain

Recent studies have demonstrated that there is no confirmed trend toward the occurrence of increasingly acidic rainfall in the eastern and northeastern United States. The extent to which the utility industry may contribute to acid deposition is the subject of much controversy. In Texas, acid deposition has not been a major issue in the past. However, a plan to assess acid rain effects within Texas is currently being developed. A TACB rainfall collection monitor has been in operation at Tyler since 1979. The average sampling results have indicated the presence of slightly acidic rainfall in the region. Any effect the emissions from the proposed power plant may have on the regional precipitation chemistry cannot be determined at this time. However, an acid precipitation monitor sponsored by SWEPCO was scheduled to begin operation near Marshall in October 1981. This monitor may provide data important for evaluating the effects of emissions from the proposed plant.

4.3.4.2 Mine

Air Pollutant Emissions

The operation of the proposed mine will cause particulate matter to be emitted into the atmosphere. These particulate emissions will originate from fugitive (non-point) sources.

Impact of Stack Emissions

The proposed mine will include no lignite processing facilities, and therefore will produce no stack emissions.

Impact of Fugitive Emissions

The proposed mining operation, consisting primarily of removal and replacement of large amounts of overburden material and the haulage of lignite, will generate fugitive dust. However, because the emissions from the mine will be intermittent and spread over a large area, and because significant particle settling will occur very close to each source, air quality impacts are expected to be minor. The surface mine does not include any coal preparation plant facilities or conveyors; therefore, PSD permit review is not applicable to the mine.

Emission Limitations

The proposed mine will have no processing facilities that would constitute point sources requiring compliance with performance standards. Emission controls will be limited to the minimizing of fall distances at transfer points and the application of water sprays to haul roads.

Ecology

Dust traveling off the mine site can be expected occasionally to produce a nuisance condition near the mine boundary. Dust particles will settle on vegetation, potentially reducing its attractiveness. Dust control measures applied at the mine, in combination with the abundance of annual precipitation and the high moisture content of the overburden and lignite, should minimize any potential adverse effects of fugitive dust on vegetation.

4.3.5 Combined Impacts of Plant and Mine

The combined effects of construction of the proposed power plant and mine on air quality will be an increase in fugitive dust during the time when both construction projects are at peak activity. However, any potential adverse impacts associated with construction-related dust emissions will be short-term.

Operation of proposed power plant and mine, located at adjacent sites, will adversely impact the air quality of the project area. However, the maximum adverse impacts from the mine and plant operations will not necessarily coincide. Mining operation emissions (fugitive dust emitted at ground level) will impact at points immediately adjacent to the mining area and will decrease rapidly with distance. Power plant emissions (gases and particulate matter emitted at stack-top level) will impact at greater distances downwind.

The power plant and the mine will each have an impact on the local meteorology of the area. The primary impact from the power plant will be the development of fog above and downwind of the cooling reservoir during humid, stable conditions. The primary impact from the mine will be the potential of locally reduced visibility due to blowing dust during dry, windy conditions. Therefore, combined project-related meteorological impacts will be minor, as the impacts of each operation generally occur during dissimilar atmospheric conditions.

4.4 SOUND QUALITY

Neither the State of Texas nor Harrison County has any noise regulations limiting maximum noise levels from power plant and/or mining operations such as those levels proposed for the proposed South Hallsville Project. As directed by Congress in the Noise Control Act of 1972 and amended by the Quiet Communities Act of 1978, EPA has developed appropriate noise level guidelines. EPA generally recognizes rural areas to have an average day-night noise level (L_{dn}) of less than 50 dBA (EPA, 1978). L_{dn} is the 24-hour equivalent sound level with the nighttime (10:00 p.m. to 7:00 a.m.) sound level penalized by the addition of 10 dBA. Average outdoor noise levels in excess of 55 dBA for 24 hours are considered annoying for some persons, while levels of 70 dBA or more for 24 hours can result in hearing loss (EPA, 1974). EPA has developed guidelines for a short-term goal L_{dn} of 65 dBA and a long-term goal L_{dn} of 55 dBA for noise levels outside of structures such as buildings, residences, etc. (EPA, 1977).

4.4.1 Existing and Future Environments

The proposed project area can be best classified as a rural, agriculturally oriented (principally cattle grazing) environment. As such, it is anticipated that sound levels within the proposed project boundaries are at or below the optimal standard L_{dn} level of 55 dBA. An exception is that several county roads transect the project site and a major highway (I-20) is in close proximity to the project's northern boundary. Local traffic (e.g., farm equipment and passenger cars) along project area county roads could periodically result in day-night sound levels above 55 dBA, particularly during work hour traffic (6:00 a.m. to 8:00 a.m. and 5:00 p.m. to 7:00 p.m.). Also, one can reasonably assume that L_{dn}'s associated with traffic along I-20 will frequently exceed 65 dBA, with periodic levels exceeding 75 dBA, when measured beyond 100 feet from the highway.

4.4.2 Effects of No Action

Higher traffic volumes on I-20 in association with general population growth in the area could increase highway traffic noise levels by 1 to 2 dBA. Otherwise, little or no change in the project area's baseline ambient sound level is anticipated with the no action alternative.

4.4.3 Construction Impacts

Noise-producing site preparation and construction activities at the South Hallsville Project can be categorized into two basic activities; power plant construction and mine facilities construction. Typical major noise producing sources and the equivalent sound level contribution (L_{eq}) during each activity are estimated from data published by the Edison Electric Institute (EEI, 1978) and EH&A files.

4.4.3.1 Power Plant

Plant Site

The construction of the power plant facilities is considered to be similar to the construction of an average industrial facility. The use of such equipment as backhoes, bulldozers, scrapers, and dump trucks during clearing and excavation related to site preparation will constitute the noisiest period of construction. Railway and vehicular traffic will also contribute to construction noise levels. The equivalent sound level (L_{eq}) during this period is estimated to be 84 dBA at 50 feet from the center of activity. Hemispheric sound radiation analysis techniques show noise levels to be within the EPA short-term goal of 65 dBA and the long-term goal of 55 dBA beyond 450 feet and 1,425 feet, respectively, from the center of construction activities. Power plant construction noise levels are expected to attentuate to 49 dBA at the nearest residence to the project boundary (2,800 feet) and to 46 dBA at the Red Oaks Church northeast of the plant site (4,200 feet). Foundation finishing and structure erection noise levels may result in a short-term increase in overall noise levels when these jobs are performed simultaneously with excavation and clearing at adjoining construction sites within the plant facility. In summary, only minor short-term adverse impacts on local ambient noise levels are anticipated as a result of power plant construction activities.

Transportive Systems

The construction of the railroad spur, transmission lines, and makeup water pipeline, will occur during various stages of overall project construction. Equipment such as backhoes, cranes, graders, and scrapers will be involved in all aspects of the transportive systems' construction. The equivalent sound level is estimated to be 84 dBA and 82 dBA at 50 feet from the center of railroad construction and each of the other construction activities, respectively.

4.4.3.2 Mine

Noise levels associated with the construction of the mine facilities (i.e., shop and personnel facilities, dragline erection yard, etc.) and haul roads will be similar to the levels produced at the power plant construction site. Hence, an equivalent sound level of 84 dBA can be expected at 50 feet from the center of the mine facilities construction activities, though construction in the mine area will be of a shorter duration than at the power plant site. The noise level will be within the EPA short-term goal of 65 dBA and the long-term goal of 55 dBA beyond 450 feet and 1,425 feet, respectively, from the center of construction activity. Mine facilities construction noise levels are expected to attentuate to 41 dBA at the nearest residence to the project boundary (7,400 feet) and to 42 dBA at the Sweet Home Church north of the mine facilities site (6,100 feet). The plant and mine construction sites are at a distance of approximately 8,000 feet apart, hence their noise levels are not additive. In summary, only minor short-term adverse impacts on local ambient noise levels are anticipated as a result of mine facilities construction.

4.4.4 Operation Impacts

4.4.4.1 Power Plant

Plant Site

Noise-producing operations of the proposed power plant can be categorized into two separate activities: power production and lignite handling. These activities can occur simultaneously and will be confined to an area of approximately 272 acres.

The noise assessment for the proposed power plant is based on a single unit operating on a 24-hour per day basis. The major noise-producing equipment associated with power production operations are: the two boilers, various induced draft fans, and the two turbine generators. Noise levels were determined for each piece of equipment at a distance of 6 feet with enclosure level attenuations of 10 to 30 dBA considered for applicable equipment (EEI, 1978).

An acoustic center can be determined for the proposed power plant facility using a procedure provided by EEI (1978). Once the acoustic center is located, it can be considered a point source with an attenuation rate of 6 dBA per doubling of distance from the noise source. The acoustic center was found to be near the turbine building and to have an L_{dn} of 103 dBA, with noise levels calculated at a distance of 6 feet from each piece of equipment. Hemispheric sound radiation analysis techniques show noise levels to be within the EPA short-term goal of 65 dBA and the long-term goal of 55 dBA beyond 504 feet and 1,600 feet, respectively, from the acoustic center. Power plant noise levels are expected to attentuate to 50 dBA at the nearest residence to the project boundary (2,800 feet) and to 47 dBA at the Red Oaks Church northeast of the plant site (4,200 feet). In summary, only minor adverse impacts on local ambient noise levels are anticipated as a result of power plant activities.

Transportive Systems

No adverse impacts on sound quality should result from the operation of the transportive systems. Increased noise levels associated with occasional ROW maintenance activities will be short-term. The train trips on the railroad spur will occur about once every 1 to 2 weeks. Only minor short-term adverse impacts will result from operation of the transportive systems.

4.4.4.2 Mine

Noise producing operation activities of the proposed lignite surface mine can be divided into four major categories; timber and brush removal, overburden removal, lignite mining, and spoil grading and revegetation. Overburden removal will be the loudest activity with an expected L_{eq} contribution at 50 feet of 92 dBA. The mining of lignite (69 dBA at 50 feet) will occur on a 24-hour per day basis.

Based on a "worst-case" scenario with all mine operations occurring simultaneously and within proximity to each other, day-night sound levels will be within the EPA short-term goal of 65 dBA and the long-term goal of 55 dBA beyond 2,263 feet and 7,183 feet, respectively, from the center of mining activity. With mining operations occurring along the project boundary, noise levels will attenuate to 75 dBA at the nearest residence (700 feet) and 57 dBA at the Little Flock Church northwest of the project area (5,900 feet). It should be emphasized that these are worst-case noise levels with mining operations occurring along the project boundary. With operations occurring towards the center of the mine, noise levels will decrease to near the ambient baseline level beyond the project boundary.

In summary, any increased noise levels associated with mining operations will be localized, of relatively short duration, and attenuated with distance from the source. Hence, no adverse impacts on local ambient noise levels will result from mining activities.

4.4.5 Combined Impacts of Plant and Mine

Construction activities at the proposed plant and mine and along the transportive ROWS will be carried out at various sections of the combined project's 24,768-acre area. The mine ancillary facilities construction area will occupy 43 acres of this site and the proposed power plant will occupy 272 acres. Thus, only a small percentage of the total acreage will be involved in the noise-producing activities during the 39-month construction period of the mine facilities and the 56-month construction period of the power plant. The pieces of noise-producing equipment used on the two sites are sufficiently distant from each other and of such a nature that the combined effects, during the period when construction of the power plant and mine are occurring simultaneously, are not measurably different from the individual effects. Traffic flow along I-20 will increase slightly and will result in only minor contributions to the ambient noise levels.

The combined effects of operation noise from the proposed power plant and mine are additive in that noise-producing activities will occur simultaneously. However, the overall size of the combined site (24,768 acres) and orientation of the respective operations on their individual sites (particularly the transient nature of mining operations) are such that any combined effects will be changing as the mining operations approach or recede from the stationary power plant. Noise impacts will not be significantly more (less than 3 dBA) for the combined sites than for the independently operating sites.

The indicated noise levels are based on "worst-case" conditions. The attenuating effect of trees, vegetation, and earth barriers were not considered when determining the expected noise levels and, therefore, it is expected that the levels will be lower than indicated.

4.5 ECOLOGY

The following sections describe major baseline ecological characteristics of the proposed South Hallsville Project site and potential project impacts. A more detailed treatment of on-site ecological conditions is presented elsewhere (EH&A, 1977b, 1978a, and 1980a).

4.5.1 Vegetation

4.5.1.1 Existing and Future Environments

The South Hallsville Project site is situated in the Pineywoods Region of Texas (Thomas, 1975). This area is included in the Deciduous Formation, which is the characteristic vegetation assemblage of the eastern half of the United States (Braun, 1950). The Pineywoods Region is characterized as gently rolling or hilly country, averaging 200 to 499 feet in elevation, with numerous streams and several large rivers. Land uses include extensive pine and pine-hardwood forests, with intermittent swamps and occasional pastureland or cultivated land. This is an area of high rainfall (35-50 inches per year), which is fairly uniformly distributed throughout the year. Humidity and tempertures are also relatively high (Thomas, 1975).

Vegetational Communities

Of the 24,768 acres associated with the mine site, plant site, and transportive systems, a total of about 13,257 acres is forested land (Fig. 4-5). Approximately 11,487 acres of the forestland occurs in the uplands and 1,770 acres in the bottomlands. The remaining 11,511 acres is composed of pastureland and hayfields (10,386 acres), wetlands (i.e., swamps and marshes (753 acres)), aquatic habitats (161 acres), and pine plantation (211 acres). These vegetation types are

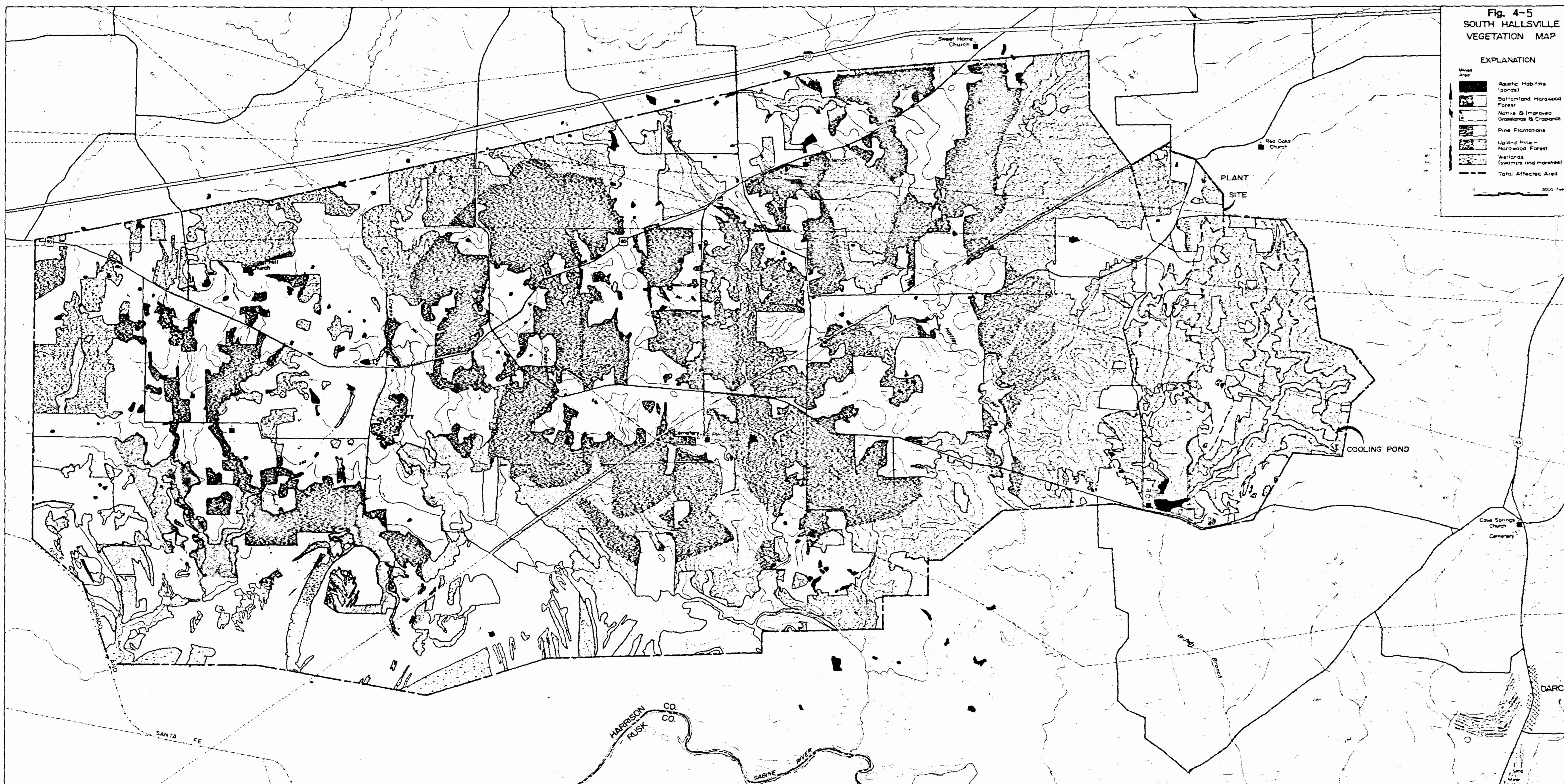


Fig. 4-5
SOUTH HALLSVILLE
VEGETATION MAP

further delineated in terms of vegetation preempted by the plant island, cooling reservoir, pipeline corridor (Table 4-16), individual mining areas, total affected mine area, and mine ancillary activities area (Table 4-17). Figure 4-5 and EH&A (1981b) present the areal extent of these vegetation types.

Upland Pine/Hardwood Forest

Upland forest communities vary in tree species composition from predominantly pine through pine-hardwood mixtures to predominantly hardwoods. This variation is the result of differences in topography, soils, and land-management practices. For example, protected topographic situations with relatively high soil moisture content frequently support sweetgum (Liquidambar styraciflua), white oak (Quercus alba), red maple (Acer rubrum), black cherry (Prunus serotina), and flowering dogwood (Cornus florida). The more exposed, drier areas tend to favor blackjack oak (Quercus marilandica), post oak (Quercus stellata), black oak (Quercus velutina), and shortleaf pine (Pinus echinata). Loblolly pine (Pinus taeda) occurs throughout the upland forests on both relatively mesic and xeric sites. Management practices, such as periodic burning and selective hardwood cutting or girdling, favor the maintenance of pure pine stands, whereas protection from burning favors the development of hardwood stands. Cutover upland stands, which are presently being regenerated by young tree species, are included in the upland pine/hardwood mapping unit.

Pine Plantation

Pine plantations on the South Hallsville Project site are composed of even-aged shortleaf pine and/or loblolly pine in the overstory. Most pine plantations presently being harvested date from the mid-to late-1950's. Understory vegetation is usuall sparse or absent as a result of periodic controlled burning. Fire is used as a management tool in southern pine forests to eliminate undesirable transgressive

TABLE 4-16

ACREAGES OF EXISTING VEGETATION TO BE PREEMPTED BY THE POWER PLANT, COOLING POND, AND TRANSPORTIVE SYSTEMS SOUTH HALLSVILLE PROJECT

Vegetation Type	Plant Island	Cooling Pond	Plant Site Ancillary Activities Area	Total Plant Site Area	Pipe-line Corridor	Trans-mission Line Corridors	Railroad ROW	Total
Upland Pine-Hardwood Forest	150	1,020	634	1,804	303	55.6	54.7	2,217
Pine Plantation	0	0	20	20	50	0.9	0	71
Bottomland Hardwood Forest	0	140	131	271	51	7.3	0.6	330
Pastureland and Hayfields	122	200	655	977	273	21.7	42.9	1,315
Wetland (Swamps and Marshes)	0	5	0	5	23	0	0	28
Aquatic Habitat	0	23	11	34	0	0.5	1.9	36
GRAND TOTAL	272	1,388	1,451	3,111	700	86*	100**	3,997

* An additional 56 acres of transmission line ROW is located in the power plant site.
** This includes only the area outside of the plant site.

TABLE 4-17

ACREAGES OF EXISTING VEGETATION TO BE AFFECTED
BY THE LONG-TERM MINING AND ANCILLARY ACTIVITIES ASSOCIATED WITH
THE SOUTH HALLSVILLE PROJECT

Vegetation Type	1984-1990 A_1	1984-1990 A_2	1991-1995 A_1	1991-1995 A_2	1996-2000 A	2001-2008 A_1	2001-2008 A_2	1984-1990 B	1991-1995 B	1996-2000 B_1	1996-2000 B_2	2001-2008 B	2001-2008 C_1	2001-2008 C_2	Mine Disturbed Area	Mine Ancillary Activities Area	Grand Total Acreage
Upland Pine-Hardwood Forest	192	417	112	312	366	362	678	669	469	236	52	582	184	432	5,063	4,206	9,269
Pine Plantation	0	0	0	0	0	0	0	0	0	11	0	0	0	0	11	130	141
Bottomland Hardwood Forest	11	0	0	0	0	0	61	0	0	0	166	248	68	14	568	872	1,440
Pastureland and Hayfields	307	330	142	314	259	322	447	369	270	319	285	1,287	47	40	4,738	4,333	9,071
Wetland (Swamps and Marshes)	0	0	0	0	0	0	0	0	0	0	84	32	0	0	116	609	725
Aquatic	0.8	2.7	0.5	3.4	6.1	3.0	0	7.2	2.7	5.3	0	17.3	0	0	49	76	125
TOTAL	511	750	255	629	631	687	1,186	1,045	742	571	587	2,166	299	486	10,545	10,226	20,771

species from the understory and to reduce the amount of accumulated fuel on the forest floor, thereby reducing the severity of uncontrolled wildfire.

Bottomland Hardwood Forest

Bottomland forest communities occur along drainageways and in floodplains throughout the project site. The structure of lowland stands (i.e., the floristics, size, distribution, and density of the components) is determined by the frequency and duration of flooding, as well as those factors instrumental in upland forest structure, discussed previously. At the South Hallsville Project site, the best developed lowland forest stands occur along lower Hatley Creek and in the Sabine River floodplain, which are more frequently inundated by floodwaters. Typical trees in the bottomland forests include willow oak (Quercus phellos), sweetgum, American hornbeam (Carpinus caroliniana), water oak (Quercus nigra), sugarberry (Celtis laevigata), overcup oak (Quercus lyrata), and water hickory (Carya aquatica).

Pastureland and Hayfields

Pastureland within the project site consists predominantly of tame pastures composed of common and coastal bermudagrass (Cynodon dactylon) and native pastures composed mostly of broomsedge (Andropogon virginicus) or other bluestem grasses. Hayfields are dominated by coastal bermudagrass. Broomsedge is a common invader of abandoned upland farmlands and pastures and usually predominates by the third year. These upland oldfield sites provide habitat for pine seedlings and other woody species, so that within 10 years pines frequently form even-aged stands. This successional trend is occurring in the uplands at the South Hallsville Project site, as evidenced by the presence of pine saplings and other woody species in areas previously used for agriculture. Abandoned bottomland farmlands and pastures are more typically invaded by such successional tree species as sweetgum and persimmon (Diospyros virginiana).

Wetlands

According to recent tentative interpretations of the Section 404 wetlands definition by the U.S. Army Corp of Engineers Waterways Experiment Station (USCE, 1978), wetland communities within the project area consist of wet bottomland forests, swamps, marshes, bogs, and aquatic communities. The most extensive wetland type within the project area, therefore, would tentatively be wet bottomland mixed hardwood forest.

Bottomland hardwood forests (described above as a discrete vegetation type) that border streams traversing the project area contain species preliminarily determined by the USCE (1978) to be wetland indicators. The specific type of wetland so indicated is "lowland hardwood forest occurring along the floodplains of streams lacking second bottoms". The determination of exactly how much, if any, of such floodplains is subject to permit regulation under Section 404 of Public Law 92-500 (Federal Water Pollution Control Act Amendments of 1972) is not final (USCE, 1978). However, "bottomland hardwoods technically satisfy the conditions of the Section 404 wetlands definition because these floodplain forests are characterized by cyclic inundation or soil saturation during portions of the growing season and by the presence of plant communities and associations that have been selected and maintained because of their ability to tolerate regular inundation or saturation" (USCE, 1978). The majority of the dominant overstory species in the bottomlands of the project area: loblolly pine, sweetgum, water oak, sugarberry, American hornbeam, black-gum (Nyssa sylvatica), red maple, overcup oak, and water hickory are tentatively listed by the USCE (1978) as wetland indicators.

The EPA has ultimate responsibility for Section 404 wetland determinations, though responsibility is usually delegated to the USCE unless a special case is determined to exist. In addition to vegetational criteria, the EPA and the USCE also consider hydrologic and edaphic variables. The variables related to hydrology include drift lines, silt deposition, water marks, an active water table in the root zone, stream gage data, flood predictions, historical records, visual observations, and drainage patterns. Soil variables include a mottled or gleyed soil horizon, the presence of iron or manganese concretions or nodules, the presence of free water within the root zone, and hydric classification of soil series. The general consensus among the regulatory agencies is that the definition of 404 wetlands should also include annual inundation for a period of 30 days during the growing season.

The USCE Fort Worth District has determined that there are 3,780 acres of wetlands in the project area (see Appendix C). However, it is anticipated that the actual amount of wetland acreage may be as low as 1,500 acres (EH&A - in-house data). More detailed field studies will be conducted in order to determine a more accurate acreage. Additional coordination with the USCE will occur throughout these studies, and USCE and EPA personnel will be present during the field work. The results of these studies will be included in the FEIS.

Within the project site, marshes are less common than swamps. These areas generally occur near swamps and stock ponds and where road construction impedes drainage. Frequently, the marshes border pastures and are grazed to some extent. Many marshes are dominated by a shrub layer consisting of black willow (Salix nigra), bastard indigo (Amorpha fruticosa), common buttonbush (Cephalanthus occidentalis), and woolly rose-mallow (Hibiscus lasiocarpos). The herb layer in these shrubby marshes includes such common species as water horehound (Lycopus rubellus), horned-rush (Rhynchospora corniculata), camphor-weed (Heterotheca subaxillaris), smart weed (Polygonum sp.), red-root flatsedge (Cyperus erythrorhizos), and late eupatorium (Eupatorium serotinum). The marshes that lack a well-developed shrub layer are dominated by powder-puff (Mimosa strigillosa), canela (Pluchea purpurascens), creeping lovegrass (Eragrostis curvula), smartweed, turnsole (Heliotropium indicum), and soft-rush (Juncus effusus var. solutus) in the drier, more elevated areas, and by lizard's-tail (Gaura parviflora), cinnamon fern (Osmunda cinnamomea), and hemp-weed (Mikania scandens) in the wetter, boggy areas.

Swamps within the project site are limited to the southern portion of the mining area (Fig. 4-5) and where the northern portion of the pipeline route crosses Big Cypress and Little Cypress bayous (EH&A, 1981b). Seasonal swamps associated with broad depressions within the bottomlands have an overstory dominated by overcup oak and green ash (Fraxinus pennsylvanica var. integerrima), an understory dominated by water-elm (Planera aquatica) and water hickory, and a sparse herb layer containing camphor weed, lizard's tail, and smartweed. Many of these overcup oak-green ash swamps have been invaded by beaver. The prolonged inundation caused by the beaver dams kills the overcup oak, while the green ash is eliminated due to the feeding activities of the beaver. Other preferred foods of the beaver are sugarberry and black willow. Therefore, a second type of swamp impacted by beaver dams may be characterized by a dead overstory of overcup oak and green ash, an emerging overstory of water-elm, a shrub layer of common buttonbush, and a scattered herb layer almost solely consisting of beggar-ticks (Bidens frondosa). The third major type of swamp within the project site is associated with narrow sloughs. The short-statured overstory within these sloughs is dominated by water-elm, though scattered individuals of bald cypress (Taxodium distichum), black willow, and water locust (Gleditsia aquatica) also occur. Dominant shrubs are common buttonbush and swamp privet (Forestiera acuminata), while dominant vines are eardrop vine (Brunnichia ovata) and hemp-weed.

Bogs constitute less than 1 percent of the project site. They occur in wooded areas at the base of slopes and in draws where seepage water is continuous. Herb species comprising the more or less distinctive flora of the bogs include peat mosses, yellow fringed orchid (Habenaria ciliaris), southern twayblade (Listera australis), violet (Viola primulifolia), and others. Uncommon herb species found in bogs include monkey flower (Mimulus sp.), burmannia (Burmannia sp.), green adder's mouth (Malaxis unifolia), three birds orchid (Triphora trianthophora), and green rein-orchid (Habenaria clavellata). Dominant tree species in bogs include sweet-gum, blackgum, American holly (Ilex opaca), red maple, and American hornbeam, whereas dominant shrubs include possum-haw (Viburnum nudum), viburnum (Viburnum sp.), tassel-white (Itea virginica), and azalea (Rhododendron sp.). These seepage bogs were only found within the project site along Brandy Branch in the cooling reservoir site and along the northern portion of the proposed makeup water pipeline route to Big Cypress Bayou.

Aquatic Habitats

Plant communities characteristic of streams and ponds occur throughout the project area. Woody species occurring along the margins of such aquatic habitats include trees such as black willow, river birch (Betula nigra), overcup oak, water-elm, red maple, and sugarberry, along with shrubs like common bottombrush, giant cane (Arundinaria gigantea), common elder-berry (Sambucus canadensis), swamp privet, wax-myrtle (Myrica sp.), sassafras (Sassafras albidum), and sea-myrtle (Baccharis halimifolia). Among herbaceous species, mosquito-fern (Azolla caroliniana) and water lentil (Lemna minor) often occur in ponds, while lizard's-tail (Saururus cernuus), smartweed (Persicaria spp.), meadow beauty (Rhexia sp.), false nettle (Boehmeria cylindrica), and water-primrose (Ludwigia leptocarpa) are common along the margins of ponds and streams.

Important Plant Species

Important species are defined as those that (a) are commercially or recreationally valuable; (b) are threatened or endangered; (c) affect the well being of some important species within criteria (a) or (b); or (d) are critical to the structure and function of the ecological system or are biological indicators.

Threatened and Endangered Plant Species

None of the 10 species currently listed as endangered or threatened in Texas by the U.S. Fish and Wildlife Service (FWS) (45 FR 82479-82569, 46 FR 3183-3186) were observed in the South Hallsville Project area. None of these species are known to occur in Harrison County (see FWS letter in Sec. 5.2, Coordination).

Three species are currently proposed as endangered or threatened in Texas by FWS (45 FR 82479-82569). These species were not observed in the South Hallsville Project area and are not known to occur in Harrison County (see FWS letter in Sec. 5.2, Coordination).

Approximately 240 species are currently considered as candidate species in Texas by the FWS (45 FR 82479-82569). Though these candidate species are not federally protected, they "should be considered in environmental planning" (45 FR 82479-82569). Table 4-18 lists those candidate species that may occur in the vicinity of the South Hallsville Project. Of these 10 species, one is known to occur in the project area. Trillium texanum was found in the vicinity of the proposed cooling reservoir. This species is listed as Status 2 in Table 4-18. However, T. texanum is neither listed nor expected in the near future to be listed as threatened or endangered by the FWS (Kologiski, 1981; Smith, 1981).

T. texanum is also listed on the Watch List of the Texas Organization for Endangered Species (TOES, 1980), as is another plant that was observed on the site, great Solomon's seal (Polygonatum biflorum). However, the species listed by TOES (1980) are not protected since the State of Texas has not promulgated an official list of endangered or threatened plant species.

Other Important Species

Commercially important species in the South Hallsville Project area include hardwoods (American elm (Ulmus americana), southern red oak, water oak, shumard oak (Quercus shumardii) and others), pines (loblolly pine, shortleaf pine), and both forage and row crops. Coastal bermudagrass is the most important species in the area's extensive improved pastures.

Dominant species are, by definition, critical to the structure and function of the ecological system and, therefore, qualify as important species under

TABLE 4-18

PLANT SPECIES OF POTENTIAL OCCURRENCE IN THE SOUTH HALLSVILLE PROJECT AREA CITED BY THE FWS "NOTICE OF REVIEW"[1]

Common Name[2]	Scientific Name[3]	Status[4]	Habitat Distribution[3]
Creeping slimpod	*Amsonia repens*	2	On prairies and along railroad tracks in eastern Texas; endemic
Roughstem aster	*Aster scabricaulis*	2	Rare in boggy ground, eastern Texas; endemic
Texas screwstem	*Bartonia texana*	1	On sphagnum moss along wooded streams in southeastern Texas; endemic
Golden wave tickseed	*Coreopsis intermedia*	2	Extremely rare in sandy woods in eastern Texas; endemic
Atlantic coreopsis	*Coreopsis tripteris* var. *subrhomboidea*	3B	Rare in extreme northeastern Texas
Bigtree hawthorn	*Crataegus berberifolia*	2	In low wet woods and on dryish hills in eastern Texas; endemic
Warner hawthorn	*Crataegus warneri*	2	In sandy woods and on dry banks in eastern Texas; endemic
Smallhead pipewort	*Eriocaulon kornickianum*	2	In springy places on prairies and wet sandy soil in eastern Texas
Drummond nailwort	*Paronychia drummondii* ssp. *parviflora*	2	In sandy soils in dry oak and pine woods and in loose sand of dunes in southeastern Texas; endemic
NCN	*Trillium texanum**	2	Extremely rare in low moist woods, bogs, and stream banks in eastern Texas

1 USDOI - FWS (1980).

2 Primary source for common names is Gould (1975); secondary source is Correll and Johnston (1970); USDOI - FWS (1980) followed when no common name is given in the preceding sources; NCN = no common name.

3 Correll and Johnston (1970).

4 Status categories (USDOI - FWS,1980):

1 - Species currently under review that appear to be good candidates.
2 - Species whose status is insufficiently known and that need more study.
3B - Species no longer under consideration. Names that do not represent taxa meeting the definition of "species" under the Endangered Species Act of 1973.

* Also listed on the Texas Organization for Endangered Species Watch List (1980).

criterion (d). Plant species important as browse or forage materials for wildlife in the project area qualify as important species under three different criteria: (a), (c), and (d). Removal of these species from the project area could temporarily alter the structure and productivity of the ecosystem. The alterations would be primarily local in effect and would not extend far into surrounding areas.

The importance of a particular area in terms of wildlife habitat varies from one plant community to another. Pine plantations offer little in the way of plant species diversity or structural diversity and, hence, are poor wildlife habitat. The understory in mature bottomland hardwood stands is usually quite shady and, hence, depauperate in forage and browse plants. The overstory is structurally diverse, however, and a relatively large number of bird species occur there. In immature or disturbed bottomland stands, herbs, shrubs, and saplings are usually abundant and offer a variety of food sources for wildlife. The same is true of the edges of most forested stands. Upland oak/hickory/pine stands in the project area offer the most diversity in understory and overstory plant species in terms of available wildlife food and structural characteristics. Improved pasturelands in the South Hallsville Project area generally lack the cover necessary for good wildlife habitat, but are used sporadically for forage. Oldfields and native pastures, however, do provide good wildlife cover, especially for birds and small mammals.

Ecologically Sensitive Areas

No plant communities within the project area are unique to the area. Similar vegetation occurs in the area contiguous to the project site as well as throughout the Pineywoods region of northeastern Texas (Thomas, 1975) and the Oak-Pine Forest Region (Braun, 1950) of the southeastern United States. Little, if any, of the vegetation of the project area is undisturbed; nearly all of the existing forest has been subjected to selective logging or clear-cutting in the past. The possible exceptions are a few small stands that occur on mesic slopes along streams or in lowlands, where a few trees are well over 100 years old.

The FWS, although not a permitting agency, has significant reviewing responsibilities for Federal actions such as the granting of permits for power plants and associated transportive systems. In regard to vegetation, the FWS is concerned with impacts to unusual or sensitive plant communities, including wetlands. In general, an area may be considered sensitive if (1) it supports a rare plant community or a rare, endangered, or threatened plant species, (2) it is a highly productive plant community having substantial commercial or recreational value for fish and wildlife, and/or (3) it supports plant species considered to be wetland indicators by a regulatory agency (e.g., USCE).

Wetlands in the project area (i.e., bogs, swamps, and marshes) qualify as sensitive habitats according to the preceding definition. Bogs are also ecologically sensitive, since they are rare plant communities that potentially support endangered or threatened plant species. Additionally, the wet bottomland hardwood forests that border streams and bayous traversing the project area may be considered ecologically sensitive, since these forests contain species preliminarily determined by the USCE (1978) to be wetland indicators. The specific type of wetland so indicated is "lowland hardwood forest occurring along the floodplains of streams lacking second bottoms." The determination of exactly how much, if any, of such floodplains is subject to permit regulation under Section 404 of Public Law 92-500 (Federal Water Pollution Control Act Amendments of 1972) is not final (USCE, 1978).

4.5.1.2 Effects of No Action

The no action alternative would eliminate the impacts of plant operation and mine construction and operation detailed below. Impacts that have already occurred as a result of clearing and construction activity on the plant site could, in large measure, be reversed by recontouring and revegetating. Initial reclamation combined with natural ecological succession should restore productivity and floral diversity. In the absence of the project, changes in the terrestrial vegetation could be expected if current trends continue. The TPWD has stated that vegetation cover is changing drastically in East Texas due to man's activities (Lay, 1969). In many portions of the lignite belt, forest and shrub areas are being converted to pure grasslands or farms. Natural hardwood forests are being replanted with pure stands of pine. These changes to terrestrial vegetation generally result in reduction of plant species diversity and less native, natural vegetation.

4.5.1.3 Construction Impacts

Power Plant

Plant Site

Plant site construction has impacted local biological communities by the direct elimination of vegetation. About 2,460 acres of vegetation and wildlife habitat were preempted by construction of the proposed power plant, cooling reservoir, railroad spur, and pipeline corridor (Table 4-12). An additional 1,451 acres comprising the plant site ancillary activities area may potentially be affected during construction. The plant site preempted 272 acres, which were composed of about 150 acres of upland forest and 122 acres of pastureland and cropland. The 1,388 acres inundated by the proposed cooling reservoir consisted primarily of about 1,020 acres of upland forest, 140 acres of lowland forest, 200 acres of pastureland and cropland, 5 acres of wetland, and 23 acres of aquatic habitat. The most sensitive plant communities preempted by the cooling reservoir were the hillside bogs along Brandy Branch. Though the total acreage occupied by these bogs was less than 10 acres, the greatest number of uncommon plant species in the project area occurred there.

Construction within the plant site boundary will continue to be performed in such a manner as to minimize adverse impacts on the vegetational communities adjacent to and downstream from the plant site. Primary production in vegetation immediately adjacent to construction sites may have been reduced due to dust accumulation on foliage or foliar injury due to exhaust emissions. During construction activities, erosion will continue to be controlled by commonly accepted procedures such as sedimentation ponds, hay-bale barriers, and diversion ditches. As soon as possible after construction activities cease within the site, pipeline corridor, and ancillary activities area, perennial grasses recommended by the local state agricultural extension agent will be planted to control erosion permanently. The margins of the cooling and ash runoff control ponds will be allowed to revegetate naturally with herbs and shrubs, though tree species will be discouraged. The power plant facilities site will be artificially surfaced and not allowed to revegetate during construction activities. Therefore, vegetation within the plant site boundary will be unavoidably eliminated or converted to mowed grasslands as a result of clearing the aforementioned areas. This represents a long-term loss of local productivity for the duration of the proposed project (24 years) or longer.

The permanent establishment of the proposed cooling reservoir will help mitigate the modification or loss of aquatic and wetland habitats within the power plant site. For mitigative purposes, two uncommon plant species (*Trillium texanum* and whorled pogonia) found within the area of the proposed cooling reservoir were relocated during construction activities to a large estate near Nacogdoches, Texas, under the supervision of Dr. Elray Nixon.

Transportive Systems

Approximately 700 acres were preempted by pipeline corridor construction. These 700 acres consisted of 303 acres of upland forest, 50 acres of pine plantation, 51 acres of bottomland forest, 273 acres of pastureland and cropland, and 23 acres of wetland.

The preferred route of the pipeline ROW was altered within the pipeline corridor in order to avoid wetlands, timberland, and cropland where possible. Clearing within the pipeline ROW was by shearing, not grubbing, in order to keep soil disturbance to a minimum and promote the regrowth of shoots and root sprouts of woody species. Clearing was done only where necessary to provide access and working space. Through wooded areas, the edges of the ROW were "feathered back" to produce a smooth transition from the herbaceous and low woody vegetation in the center of the ROW and the adjacent tree growth. Revegetation of areas denuded by construction activities was accomplished as soon after construction as was feasible. Grasses and legumes recommended by the state agricultural extension service were seeded into the operational ROW as soon as feasible following construction to prevent erosion.

Approximately 142 acres of existing vegetation (Table 4-19) will be cleared during construction of the three transmission line ROWS. Approximately 56 acres of area proposed for the transmission line corridors have been previously impacted by power plant site construction. The vegetation that was present within the power plant site and the impacts associated with construction have been previously discussed. The major vegetational communities to be preempted in the remaining 86.0 acres are grasslands/croplands (21.7 acres), upland pine/hardwood forest (55.6 acres), pine forest/plantation (0.9 acres), and bottomland hardwood forest (7.3 acres).

The preferred routes of the ROW will be altered in order to avoid wetlands, timberland, and cropland where possible. Impacts to sensitive habitats associated with the transmission line routes will also be minimized through the use of poles with long spans. Clearing within transportive systems ROW will be by shearing, not grubbing, in order to keep soil disturbance to a minimum and promote the regrowth of shoots and root sprouts.

TABLE 4-19

ACREAGES OF VEGETATION TYPES PRESENT ALONG THE THREE PROPOSED 138-kV TRANSMISSION LINES

	Transmission Line Corridor A		Transmission Line Corridor B		Transmission Line Corridor C	
	Dis-turbed	Undis-turbed	Dis-turbed	Undis-turbed	Dis-turbed	Undis-turbed
Aquatic Habitats		0.3 ac (0.5%)			0.2 ac (1.6%)	0.2 ac (0.8%)
Bottomland Hardwood Forest	1.9 ac (6.0%)	4.2 ac (7.6%)				3.1 ac (13.1%)
Upland Pine-Hardwood	20.4 ac (63.8%)	44.8 ac (80.9%)	3.8 ac (33.3%)	4.4 ac (64.7%)	5.0 ac (38.8%)	6.4 ac (26.9%)
Pine Plantation		0.9 ac (1.6%)	5.2 ac (45.8%)			
Grassland	9.6 ac (30.2%)	5.2 ac (9.4%)	2.4 ac (20.9%)	2.4 ac (35.3%)	7.7 ac (59.7%)	14.1 ac (59.2%)
Total	31.9 ac (100%)	55.4 ac (100%)	11.4 ac (100%)	6.8 ac (100%)	12.9 ac (100%)	23.8 ac (100%)
	87.3 ac		18.2 ac		36.7 ac	

A = 7.21 mi.
B = 1.49 mi.
C = 3.02 mi.

Vegetation types previously present in the 3.5 mile railroad spur include upland forest, 54.7 acres; grassland, 42.9 acres; bottomland forest, 0.6 acres; and aquatic, 1.9 acres.

Mine

Site preparation and construction activities include the removal of natural vegetation in those portions of the mine area to be mined, development of haul roads, dragline pads, surface water control structures, powerlines, service structures, and the various ROW relocations. During the life of the mine (24 yrs), approximately 10,545 acres of primarily upland forest and pasture vegetation will be cleared prior to actual mining activities. All merchantable timber will be sold and removed prior to overburden removal. Thereafter, stumps and underbrush will be removed by bulldozers and pushed into mined-out pits to be covered by waste. This will be a continuous operation in advance of the overburden removal to minimize the amount of disturbed area as mining progresses. The premining clearing will proceed incrementally over a span of 24 years and will be followed by reclamation. The impacts to vegetation from premining clearing are considered to be long-term.

Construction of the various ancillary facilities will remove vegetation in a portion of the 10,226-acre ancillary area. Some of the ancillary facilities will be maintained for the life of the mine (24 years) or longer and, therefore, represent a relatively long-term removal of existing vegetation. Construction of haul roads will eliminate 430 acres of vegetation on the project site. This will have effects similar to those resulting from other clearing operations previously described. Oil, grease, and asbestos also may be found in runoff from haul roads, haul trucks, and other vehicles. Any effects on terrestrial vegetation from these pollutants should be localized and of short duration. Approximately 43 acres of pastureland and upland pine/hardwood forest will be disturbed by construction of mine and dragline erection facilities.

Approximately 20 acres of pastureland/hayfield and upland pine hardwood forest will be preempted for the life of the mine by the construction of mining facilities. Approximately 430 acres of various vegetation types will be disturbed by construction of haul roads over the life of the mine. Additionally, a small portion of the remaining 9,753 acres of the mine ancillary activities area (see Table 4-17 for vegetation types) may potentially be disturbed by mining activities as mining progresses.

In order to minimize soil erosion and associated adverse impacts on downstream plant communities, including wetlands, a vegetative cover will be established on areas disturbed by construction as soon as feasible. Vegetation establishment on these areas will be done by use of equipment, such as hydroseeders, that can apply seed, mulch, binder, and amendments in the same operation or by using other acceptable equipment. Reclamation procedures are delineated in the mine plan.

Site preparation and construction will produce some unavoidable negative impacts to vegetation left standing adjacent to cleared areas. Such impacts are associated with the production of gaseous exhaust emissions and dust. Primary production in vegetation immediately adjacent to construction sites may be reduced due to dust accumulation on foliage or foliar injury due to exhaust emissions. In addition to the natural dust suppression provided by the abundance of annual precipitation in the region, several dust suppression measures will be incorporated during construction activities to further reduce the entrainment of fugitive emissions into the atmosphere. Such measures will include the spraying of roads and disturbed areas by water trucks, as needed, and the control of vehicle speeds along roads.

During construction activities, erosion and flooding will be controlled by commonly accepted structures such as minor stream diversions, sedimentation ponds, hay-bale barriers, catchment basins, and overland flow-interceptor channels.

The impacts on surface and ground-water regimes in adjacent floodplains due to construction of surface water control structures are short-term and minimal; therefore, no adverse, water-related construction impacts will occur to vegetation in the floodplain.

The potential impacts associated with construction activities of any increased sedimentation in bottomlands within the mine area will be the same as during operation activities discussed in Sec. 4.5.1.4.

4.5.1.4 Operations Impacts

Power Plant

Plant Site

Operation of the plant site facilities will result in the revegetation of areas cleared or otherwise disturbed during construction. The extent to which revegetation is accomplished will depend on management policies and the types of reclamation plans to be implemented. The cooling reservoir and ash and runoff control ponds will be allowed to revegetate naturally with herbs and shrubs around their margins, although the establishment of trees will be prevented. The remaining area comprising the proposed power plant facilities site will be artificially surfaced and will not, for the most part, be allowed to revegetate for the life of the project (30 years) or longer.

The heat dissipation associated with the proposed power generating facility will cause some elevation of water temperatures in the cooling reservoir. Aquatic vegetation may increase in biomass, but only minimally. No impacts on vegetation are expected to occur along Big Cypress or Little Cypress bayous from operation of the makeup water pipeline.

Impacts to vegetation resulting from power plant emissions are expected to be minimal since NAAQS will be met. Local vegetation will be the first to be affected, if adverse levels of air contaminants are reached during operation of the proposed power plant. The limits of air contamination by particulates and gases, beyond which biotic impacts become unacceptable, are considerably higher than those concentrations predicted to be attained in the project area. Specifically, concentrations of SO_2 predicted from operation of the proposed plant are discussed in Sec. 4.3. The maximum predicted ground-level 3-hour, 24-hour, and annual concentrations of SO_2 are 307, 61, and 12 $\mu g/m^3$, respectively. The maximum average SO_2 concentrations predicted for the plant are far less than the injury threshold of 800 $\mu g/m^3$ sustained for 8 hours reported by Hindawi (1970). The predicted maximum 3-hour concentration of SO_2 is less than the injury threshold for sensitive plant species of 1,333 $\mu g/m^3$ for 4 hours and 667 $\mu g/m^3$ for 8 to 24 hours reported by Shurtleff et al. (1972).

Regional impacts on vegetation due to air contaminants will be minimal. The predicted low stack emissions of suspended particulates (fly ash), SO_2, and NO_x will not have any adverse effects on the region as a whole, due to dispersion. When stack emissions from the proposed power plant are reviewed in combination with other regional sources of such air contaminants, the regional effects will be alleviated due to the ecological adaptation of vegetation to the generally acidic soils of the region.

It has been suggested that coal-fired power plants and other sources of pollutants, particularly SO_2 and NO_x, may contribute to lower pH in precipitation. However, since any effect these sources may have on acid rain is still undetermined, it is inappropriate to speculate regarding adverse impacts on vegetation.

Information reported in the literature on the effects of particulates on vegetation is limited. Particulate emissions from power plants with properly operating fly-ash removal systems will cause minor (if any) injury to vegetation, however.

Transportive Systems

Operation of the proposed transportive system corridors will mitigate some adverse impacts to the areas previously disturbed during construction activities. The area within the operational ROW will be maintained in grassland, pastureland, and other low herbaceous or shrub communities. The additional acreage of construction ROW cleared along the makeup water pipeline will be allowed to naturally revegetate as forest, shrub, or herbaceous communities.

The revegetation of these ROWS will be enhanced by the planting of grasses recommended by the State agricultural extension service. Since the clearing during construction was done by shearing, not grubbing, soil disturbance will be minimal and native seed sources will be preserved. Also, woody species will more rapidly reinvade the ROW as shoots and root sprouts. Foliage along the operational ROW will be sprayed with herbicides within 4 to 6 years or mowed within 2 to 4 years after construction in order to maintain low herbaceous or shrub communities. A maintenance cycle using one of the two above methods will continue for the life of the project (30 years) or beyond in order to keep the height of woody species low.

Operation of the proposed transmission line corridors will result in beneficial impacts to the areas previously disturbed during construction activities. The 142 acres contained within the operational ROW will be maintained in grassland, pastureland, and other low herbaceous or shrub communities.

The revegetation of these ROWS will be enhanced by the planting of grasses recommended by the state agricultural extension service. Since the clearing during construction will be done by shearing, not grubbing, soil disturbance will be minimal and native seed sources will be preserved. Also, woody species will more rapidly reinvade the ROW as shoots and root sprouts. Foliage along the operational ROW will be sprayed with herbicides within 4 to 6 years or mowed within 2 to 4 years after construction in order to maintain low herbaceous or shrub communities. A maintenance cycle using one of the two above methods will continue for the life of the project (30 years) or beyond in order to keep the height of woody species low.

The actual ROWS will provide a greater diversity of vegetation and subsequently will benefit wildlife species by providing "edge" habitats along the borders.

Mine

Impacts upon vegetation within the mine site during operations will include those noted previously for construction activities. A major adverse impact during operation is the destruction of vegetation within the mine area. Other impacts are associated with changes in environmental variables to which adjacent biotic communities, including wetlands, have adapted.

A major impact of mine operation will be the preemption of existing vegetation in the proposed mine area. During the 24-year life of the mining operations, a total of 10,545 acres of vegetation within the mine site will be disturbed by mining. Table 4-13 identifies the vegetation types to be affected, by mining blocks, over the life of the mine. Mining will occur progressively, with disturbed areas to be revegetated within 2 years following mining. Consequently, an average of 439 acres will be disturbed per year and an average of 439 acres will be revegetated per year. A maximum of 741 acres of disturbed acreage will occur in the year 2008; however, this area will be reclaimed in the following year. Sensitive areas to be disturbed during the 24-year life of the total mining operations include approximately a total of 116 acres of swamps and marshes, 49 acres of streams and ponds, and an undetermined portion of 568 acres of bottomland hardwood forest (see Sec. 4.5.1, Wetlands).

The temporal nature of the impact of habitat modification will vary, depending on the type of plant community preempted and the reclamation plan adopted. Pine plantations and pasturelands can be restored relatively easily. Although agricultural systems contain ecologically complex communities of soil microorganisms and chemical balances that influence productivity, they are relatively simple with regard to both floral and faunal diversity when compared with undisturbed natural ecosystems such as forests, swamps, or prairies. Restoration of more natural plant communities, predominantly upland pine/hardwood forest, in the mined area will be more difficult and require a much longer period of time than for pine plantations, pastures, and hayfields. Therefore, the alteration of the more natural habitats will be a more long-term impact. Development of the natural species diversity and relatively complex community structure characteristic of natural forest ecosystems will depend to a large extent on the process of natural succession. This process will be accelerated, at least with respect to common species, by the planting of woody species. During the early stages of succession after reclamation, common, easily dispersed plant species will invade the area. The early stages will generally be characterized by high net community productivity and low species diversity.

The homogeneous environment of reclaimed surface-mined lands is not an ideal environment for the reestablishment of diverse, complex, plant communities. In natural communities, species diversity is directly correlated with habitat variability. Variability of and discontinuity in topography and subsurface features are necessary to allow development of diverse communities, such as bogs and their unique flora adjacent to seepages. As a result of general reconstruction of the surface contours of the land along with the natural influences of wind and water erosion and biotic factors, some habitat diversity should eventually become established. Micro-communities such as bogs will have a low probability of becoming reestablished. However, other suitable plant communities (e.g., mixed upland hardwood forest) will be established.

Surface water may be retained along diversion ditches and within local depressions lacking drainage within the proposed mine area during mining operations and reclamation periods. Such localized areas of surface water retention could create wetland habitat. However, the areal extent of wetland types so created is unknown.

Projected changes to the topography within proposed mine areas (i.e., smoothing of existing surface features and slight increase in surface elevation; Sec. 4.1.1), in addition to devegetating those areas, tend to increase surface runoff velocity from the slopes into adjacent bottomlands causing increased erosion and sedimentation. Increased sedimentation in the bottomlands, which otherwise could possibly raise the elevation and result in the desiccation of existing wetlands, will be prevented by the construction of sedimentation ponds and other erosion controls. The operation of surface water control structures, however, may reduce water flow with consequent vegetational changes downstream. The reduction of water inflow to forested and nonforested wetlands dependent upon these drainages may prevent nutrient regeneration from occurring, a process upon which the productivity of wetland communities depends (Darnell, 1976). The lowering of the water table along drainage structures may produce localized reductions in available soil moisture. Such desiccation effects would be most noticeable in wetland areas where the plants are highly sensitive to changes in soil moisture levels (Darnell, 1976).

A ground-water impact unique to the operational phase will be the lowering of the ground-water levels during dewatering in sands. This dewatering will lead to an unknown reduction of recharge to surface streams and springs, which, in turn, could locally lower water levels in areas adjacent to the proposed mine areas. Specific wetland areas to be affected would be those frequently and permanently inundated swamps and marshes at the base of slopes which are hydrologically dependent upon tributary streams and springs which are, in turn, dependent upon ground-water recharge. Hillside seepage bogs may be present in the mine area and adjacent areas. Any bogs present in adjacent areas may be dependent on ground-water recharge from the mine area. The elimination of any bogs in these areas during dewatering will be an adverse impact. However, no ground-water impacts to wetlands in the Sabine River floodplains that are not hydrologically dependent upon proposed mine areas are expected, since the normal flow and seasonal flooding of major drainages will not be impeded. Impacts of dewatering are generally temporary and exist for only a short period beyond the life of the mine. However, even minor changes to the water input may be detrimental to wetland communities that are dependent upon seeps and springs.

Impacts of the mining process caused by the redeposition of a generally homogenous spoil will be more enduring than the impacts of dewatering. The redistribution of geologic materials may prevent the up-gradient recharge of springs and seeps. The ground-water flow to streams in the vicinity of the mine area may be further reduced by being diverted around reclaimed areas and away from traditional discharge points. The alteration of recharge zones of both alluvial and shallow sand formations, in addition to the aforementioned ground-water impacts, will greatly reduce the long-term baseflow to springs and streams. The vegetational communities to be most adversely impacted by the disruption of recharge to streams and seeps will be hillside bogs, riparian communities, and downstream wetlands that are dependent on that discharge.

Dust and exhaust emissions associated with mine operations will have minor impacts on local vegetation in the project area. Land clearing, mining operations, and traffic will create wind-blown particulates of both soil and lignite, which will accumulate to some extent on foliage surfaces and possibly reduce primary production slightly in the area surrounding the mine. If sufficient pyritic material is present in the dust; aluminum, manganese, and other trace metals may be made available for uptake by plants, causing some minor toxic effects. This phenomenon has been documented in studies by Hons (1978) and Bryson (1973). However, these effects should be localized because the total amount of area affected at any time will be small, road surfaces will be sprayed with water as needed, low vehicle speed will be maintained, and reclamation will immediately follow mining.

The reclamation plan provides for proper reconstruction of mining block contours, soil preparation, establishment of vigorous ground cover, and proper management of vegetation following establishment. Erosion control prior to the establishment of a permanent vegetative cover will include temporary cover crops and mulching. If the mixed overburden technique is used, the pyritic material generally found in association with lignite will undergo oxidation. The oxidation of these materials can result in more acid soil conditions (Hons, 1978) and potentially allow the accumulation of toxic concentrations of metals. Therefore, soils will be tested regularly and chemically treated if necessary to ensure proper pH and successful revegetation of the land during reclamation. Other potential effects on terrestrial vegetation during reclamation may result from earth moving; use and removal of haul roads; application of lime, pesticides, and fertilizers; seeding; and planting of trees, which are current agricultural practices on-going in the area. Effects arising from these operation may include increased vehicle exhaust emissions and, increased fugitive dust emissions. However, these are not considered to be adverse impacts on vegetation because of their short duration.

In addition to the effects from mining and associated activities, disturbances will occur to vegetation from the construction of ROW for railroads and electric transmission faciltiies. The expedient reclamation of these areas will help mitigate the adverse effects to vegetation.

4.5.1.5 Combined Impacts of Plant and Mine

Upland forest, lowland forest, and grassland to be preempted by the construction of both the power plant and mine facilities will be converted to industrial use for the life of the project (30 years). About 1,660 acres occupied by the power plant and cooling reservoir and the portion of the 10,226-acre ancillary area occupied by mine facilities will be removed from existing vegetation for the life of the project. About 10,545 acres in the mine site will be disturbed incrementally and a small portion of the 10,226-acre total ancillary area may potentially be disturbed over the life of the project.

Since mining and reclamation will proceed sequentially, the adverse impacts of habitat preemption by mining are generally considered to be short term. Long-term impacts will result from the mining of lands presently supporting relatively mature, diverse communities such as riparian vegetation along intermittent tributaries of project area streams. Reestablishment of such communities, even after contouring and revegetation, will be largely dependent on natural succession and will require many years. The reconfiguration of surface contours, along with the natural influences of wind and water erosion and biotic factors, should produce the heterogeneity necessary for the development of forest community diversity. However, some micro-communities, such as bogs, which are dependent on local hillside seeps, will have a low probability of reestablishment.

4.5.2 Wildlife

4.5.2.1 Existing and Future Environments

Wildlife Habitats and Species

The proposed South Hallsville Project site lies within the Austroriparian Biotic Province (Blair, 1950). This province, which stretches from eastern Texas through the southeastern United States to the Atlantic Ocean, is characterized by extensive forests of pine and hardwood. In Texas, this province generally corresponds with the Pineywoods Region.

The major wildlife habitats of the project site are upland pine-hardwood forest; bottomland hardwood forest; hayfields and pastures; and wetlands and aquatic habitats. These habitats are distributed as a mosaic within the project site, which results in intermixing of forest-adapted species with prairie or grassland species. This is especially true of birds and the larger, more mobile mammals. During the ecological survey, 28 species of amphibians and reptiles, 108 species of birds, and 21 species of mammals were identified on the project site.

Upland pine-hardwood forest constitutes the most extensive wildlife habitat on the project site. This general habitat type varies from pure pine to mixtures of pine and hardwood to pure hardwood stands. Common mammals associated with this habitat are the White-tailed Deer (Odocoileus virginianus), Fox Squirrel (Sciurus niger), Eastern Cottontail (Sylvilagus floridanus), Raccoon (Procyon lotor), White-footed Mouse (Peromyscus leucopus), and Nine-banded Armadillo (Dasypus novemcinctus). Common breeding birds include the Downy Woodpecker (Picoides pubescens), Cardinal (Cardinalis cardinalis), Carolina Chickadee (Parus carolinensis), Tufted Titmouse (Parus bicolor), Carolina Wren (Thryothorus ludovicianus), Mourning Dove (Zenaida macroura), Black-and-white Warbler (Mniotilta varia), Pine Warbler (Dendroica pinus), and Blue Jay (Cyanocitta cristata). The density of breeding birds in upland forest habitats on the project site was estimated at 438 birds per 100 acres (EH&A, 1977b). Amphibians and reptiles characteristic of this habitat include the Three-toed Box Turtle (Terrapene carolina), Green Anole (Anolis carolinensis), Ground Skink (Scincella lateralis), Texas Rat Snake (Elaphe obsoleta), Southern Copperhead (Agkistrodon contortrix) and Timber Rattlesnake (Crotalus horridus).

Bottomland hardwood forest comprises about 7 percent of the total project site. Common mammals associated with lowland forest situations are the White-tailed Deer, Raccoon, Swamp Rabbit (Sylvilagus aquaticus), Gray Fox (Urocyon cinereoargenteus), Opossum (Didelphis virginiana), and Cotton Mouse (Peromyscus gossypinus). The most characteristic breeding birds include the Cardinal, Barred Owl (Strix varia), Red-Shouldered Hawk (Buteo lineatus), Red-bellied Woodpecker (Melanerpes carolinus), Carolina Wren, White-eyed Vireo (Vireo griseus), Hooded Warber (Wilsonia citrina), and Prothonotary Warbler (Protonotaria citrea). The density of breeding birds in bottomland forest was estimated at 526 birds per 100 acres (EH&A, 1977b). Common amphibians and reptiles in lowland forest habitats include the Gray Treefrog (Hyla versicolor), Rough Green Snake (Opheodrys aestivus), Five-lined Skink (Eumeces fasciatus), Ground Skink, and Three-toed Box Turtle.

Pasture and hayfield habitats are only slightly less extensive than upland forest habitats on the South Hallsville Project site, accounting for over 40 percent of the total on-site acreage. Mammals common in open, non-forested habitats on-site include the Nine-banded Armadillo, Eastern Cottontail, Hispid Cotton Rat (Sigmodon hispidus), Fulvous Harvest Mouse (Reithrodontomys fulvescens), and Plains Pocket Gopher (Geomys bursarius). Breeding birds characteristic of open areas include the Painted Bunting (Passerina ciris), Lark Sparrow (Chondestes grammacus), Field Sparrow (Spizella pusilla), Eastern Meadowlark (Sturnella magna), Common Crow (Corvus brachyrhynchos), Mockingbird (Mimus polyglottus), Scissor-tailed Flycatcher (Muscivora forficata), Mourning Dove, Bobwhite (Colinus virginianus), Red-tailed Hawk (Buteo jamaicensis), and Turkey Vulture (Cathartes aura). Breeding bird density in grassland habitats on-site was estimated at 46 birds per 100 acres (EH&A, 1977b). Reptiles and amphibians found in open habitats on the project site include the Slender Glass Lizard (Ophisaurus attenuatus) and Racer (Coluber constrictor).

Wetland (marsh, swamp) and aquatic (stream, pond) habitat make up about 3 percent of the total project site. Common mammals associated with these habitats on-site are the Raccoon and Beaver (Castor canadensis). Common birds include the Blue-winged Teal (Anas discors), Common Snipe (Capella gallinago), Great Blue Heron (Ardea herodias), and American Bittern (Botaurus lentiginosus). Hydric communities on the project site support a diverse herpetofauna which includes such species as the Northern Cricket Frog (Acris crepitans), Bullfrog (Rana catesbeiana), Southern Leopard Frog (Rana sphenocephala), Woodhouse's Toad (Bufo woodhousei), Red-eared Slider (Chrysemys scripta), False Map Turtle (Graptemys pseudogeographica), Southern Water Snake (Nerodia fasciata), Diamondback Water Snake (Nerodia rhombifera), and Cottonmouth (Agkistrodon piscivorus).

Important Species

"Important species" are defined as those that are (1) commercially or recreationally valuable; (2) threatened or endangered; (3) critical to the survival of a species satisfying criterion (1) or (2); or (4) critical to the structure or function of the ecosystem, or biological indicators. No species present on site are judged to satisfy criterion (3) or (4). Those which satisfy criterion (1) or (2) are discussed below.

Threatened and Endangered Species

The Red-cockaded Woodpecker (Picoides borealis) and American Alligator (Alligator mississippiensis) are the only species considered threatened or endangered by the FWS (45 FR 33678-33781) that may permanently reside in the project area. Neither species was observed on the project site. No habitats meeting the specific requirements of the Red-cockaded Woodpecker were located during site surveys, nor are any large areas of suitable habitat expected to occur in the project area since logging practices preclude large stands of mature pine. The possibility does exist, however, that some small areas of suitable habitat exist in isolated portions of the project area.

American Alligators are known to occur in Caddo Lake (northeastern Harrison County) and probably exist in the Sabine River south of the project area. The lower portions of the small drainages on the project site may provide limited habitat for the alligator, although none were observed during baseline surveys of the area. The total alligator population in Harrison County has been estimated at 100, with an average of 1.1 alligators per square mile of good habitat (Potter, 1981).

In addition to potential resident species, two federally listed endangered raptorial birds may occasionally pass through the area as migrants or winter visitors. These are the Bald Eagle (Haliaeetus leucocephalus) and Peregrine Falcon (Falco peregrinus). Neither of these species were observed during field surveys, nor were any habitats found that would be expected to harbor either species for a significant amount of time.

Coordination with the FWS, pursuant to Section 7 of the Endangered Species Act, has been initiated (see correspondence, Sec. 5.2). The FWS has requested a biological assessment of potential impacts of the project on the American Alligator, Red-cockaded Woodpecker, and Bald Eagle. Plans for conducting this assessment are currently being formulated in cooperation with the FWS.

Commercially and Recreationally Valuable Species

Several species of mammals and birds are hunted in the South Hallsville Project area and, therefore, represent an important recreational and economic resource. The White-tailed Deer is the most important big game mammal in the state (Davis, 1974). During the on-site ecological survey, deer tracks were fairly common in the bottomland areas, especially along water courses. Texas Parks and Wildlife Department (TPWD) population estimates for deer in Harrison County averaged 13.2 deer per square mile during the period 1977-1979 (TPWD, 1980). Deer densities in southern Harrison County (which includes the project area) tend to be lower than those in the northwestern part of the county (Wallace, 1977).

The Bobwhite is an important game bird over much of Texas, although densities of this species are relatively low in the Pineywoods region. The density of Bobwhite in the project area is not known. However, the TPWD has annually conducted a spring census of whistling birds along a 20-mile transect in Harrison County with one station per mile. The average number of singing birds per station for the period 1966-1975 in Harrison County was 2.48 (Wallace, 1977). This datum, which should be representative of the South Hallsville Project area, is consistent with the generally low density estimates for the Pineywoods region as a whole (TPWD, 1980b).

The Mourning Dove is the most widespread and abundant game bird in Texas. No TPWD dove transects are located in Harrison County, but the data collected in the Pineywoods Region are representative of that county. The average number of doves heard per transect route in the Pineywoods Region for the period 1966 to 1979 was 13.5 (TPWD, 1980c). This is lower than the average of 20.1 dove per transect for the entire state.

The Fox Squirrel and the Gray Squirrel (Sciurus carolinensis) are important small game mammals over much of the eastern half of the state. The average density of squirrels in good habitat in northeastern Texas obtained by time-area counts over a 19-year period is about one squirrel per acre (Wallace, 1977). This estimate is probably representative of the squirrel habitat in the South Hallsville Project area.

Rabbits (e.g., Eastern Cottontail and Swamp Rabbit), although not strictly defined as game animals, are hunted throughout Texas. Population data for rabbits in Harrison County were collected by TPWD personnel in conjunction with deer track count census activities during the summer of 1976. The average number of track exits per mile for southern Harrison County was 5.7 (Wallace, 1977). This should be representative of the project area. Site survey data on the number of rabbit pellets per 1.1 square feet sampled indicated that rabbits were much more abundant in grassy areas than in either upland or bottomland forest habitats.

Furbearers (e.g., Raccoon, Opossum, Gray Fox, Striped Skunk (Mephitis mephitis), Bobcat (Lynx rufus), and Mink (Mustela vision)) are of some economical and recreational importance in Texas. Except for the Raccoon, Opossum, and

Striped Skunk, furbearers do not appear especially numerous in the project area. According to Boone (1977), a very low percentage of the furbearing animals harvested in Texas is taken from the Pineywoods Region. Furbearers are most abundant in wooded stands, especially riverine forests.

Waterfowl provide a fairly important recreational resource in the project area. Ponds and marshes within the floodplain of the Sabine River seem to provide the best habitat for migrating or wintering ducks. A site field survey in January 1978 revealed that the "Duck Pond" (located in the Sabine River floodplain) was the most important waterfowl habitat in the project area. However, very few ducks were observed in the area, even though decoys and blinds were present on the pond.

Ecologically Sensitive Habitats

No wildlife habitats identified on the project site are unusual or unique to the site. All are locally well- represented outside the site boundaries. The most sensitive habitats on site, bottomland forest and wetlands, have, for the most part, been previously impacted by human activity, including selective cutting and other management techniques. These areas comprise about 10 percent of the total project site.

The FWS, although not a permitting agency, has significant reviewing responsibilities for Federal actions such as the granting of permits. The FWS is concerned with impacts to wildlife and their habitat, especially unusual or sensitive habitats, including wetlands. In general, an area may be considered sensitive from a wildlife standpoint if it (1) supports a rare animal community, (2) supports an endangered or threatened species, or (3) is a highly productive wildlife habitat (e.g., wetland). Habitats on the project site that meet these criteria are bottomland forest and wetlands. Both of these habitats are considered highly productive wildlife habitat, and, in addition, wetlands are potential habitat for the American Alligator. No Red-cockaded Woodpecker habitat has been located on the project site; however, any such habitat found to occur there would be considered sensitive according to the above criteria.

4.5.2.2 Effects of No Action

Should EPA decline issuance of the requested permit and the project be terminated, the projected impacts to wildlife on the project site will not occur. Therefore, the wildlife on the mine site would remain in its present natural state. Impacts that have already occurred as a result of construction activities on the power plant, cooling reservoir, railroad spur, and makeup water pipeline could be reversed by recontouring and revegetating cleared areas. Initial reclamation combined with natural successional processes should restore the impacted areas to some semblence of their natural states. Eventually, wildlife diversity and productivity in these areas should approach that which existed prior to initiation of construction.

4.5.2.3 Construction Impacts

Power Plant

The primary impact of construction of the power plant, cooling reservoir, railroad spur, and makeup water pipeline has been the direct disturbance of wildlife habitat resulting from clearing operations.

Plant Site

The removal of vegetation (see Sec. 4.5.1.3) has rendered most of the plant site unsuitable for wildlife. Larger, more mobile organisms have been displaced into appropriate adjacent habitats. Although the initial effect of such displacement is an increase in wildlife population density in adjacent areas, these populations eventually will return to their normal levels (i.e., the carrying capacities of these habitats). The net result will be a decrease in local wildlife equivalent to the carrying capacities of the habitats subject to direct impacts of clearing and construction. Since most of the plant site was upland forest, the wildlife associated with this habitat type (see Sec. 4.5.2.1) sustained the greatest adverse impact. Habitat preemption for plant site facilities must be considered a major, long-term adverse impact.

Transportive Systems

Construction of the makeup water pipeline, railroad spur, and transmission lines, will result in short-term, adverse impacts due to habitat modification primarily in the forest communities through which the ROW are cleared. This clearing has removed or will remove some upland forest (464 acres) and a small amount of bottomland forest (59 acres). This reduction in available forest habitat will be mitigated, to some degree, by the development of increased edge habitat along the ROW, which typically attracts many wildlife species (including deer, rabbits, Bobwhite, and Mourning Dove) and generally increases species diversity through woodland habitats. Construction through non-wooded pasture and hayfield habitats has or will have little effect on local wildlife beyond short-term habitat disturbance. Overall, construction of the transportive systems is expected to result in minimal, long-term, adverse impact to local wildlife.

Mine

The principal adverse impact of site preparation and construction on terrestrial wildlife will be the removal of natural vegetation and wildlife habitat in portions of the ancillary area. A portion of the ancillary area will be used for the construction of the shop, dragline erection pad, haul and access roads, sedimentation ponds, diversion ditches, and for topsoil storage. The construction of roads and mine facilities will require 473 acres. The displacement of mobile wildlife into adjacent areas will temporarily increase local wildlife population densities. However, the adjacent habitats are at or near their normal carrying capacities. Population stresses due to increased densitites will activate density-dependent population regulating mechanisms that will push local populations back toward their normal pre-project levels. This impact will be long-term, extending over the life (24 years) of the facilities. With proper grading and revegetating, these areas can be restored to their approximate pre-mining biological productivity following decommissioning and dismantling of the facilities.

Some small, relatively immobile forms (e.g., many amphibians, reptiles, and small mammals) will be destroyed by heavy equipment. If construction occurs during reproductive seasons (e.g., spring and early summer for most passerine birds and many other animals), breeding activities will be disrupted and many young-of-the-year lost.

Site preparation and construction will produce some unavoidable adverse impacts to wildlife and vegetation associated with the production of gaseous exhaust emissions, dust, and noise. Primary production in vegetation immediately adjacent to construction sites may be reduced as a result of dust accumulation on foliage or foliar injury due to exhaust emissions. Wildlife should be minimally affected by dust and gaseous emissions. Large, mobile forms may retreat from the immediate area of construction and may modify normal activity patterns in response to noise and human activity.

4.5.2.4 Operation Impacts

Power Plant

Plant Site

Operation of the power plant will produce minimal impacts on local wildlife. Revegetation of certain areas originally cleared within the plant site boundary will mitigate to some degree, the original habitat loss for wildlife species tolerant of man. Although the noise and human activity at the plant site will cause some species to avoid the periphery of the plant site and immediately adjacent areas, many species readily adapt to human proximity. The ecotone that will develop at the periphery of the plant site will attract certain species (e.g., many species of songbirds) that favor edge situations.

Operation of the cooling reservoir should have no adverse impacts on local terrestrial wildlife. The cooling reservoir will develop shoreline vegetation and thereby provide increased habitat diversity. Terrestrial wildlife, which rely to some extent on aquatic or shoreline habitats for food, shelter, and/or reproduction (e.g., shorebirds, fish-eating birds, waterfowl, many reptiles and amphibians, some mammals), should increase in abundance in the area and then stabilize during the first few years of existence of the cooling reservoir. This could help mitigate the initial loss through inundation of about 170 acres of bottomland forest, wetland, and aquatic habitat.

Transportive Systems

Operation of the transportive systems (makeup water pipeline, railroad spur, and transmission lines) should produce no major adverse effects on local wildlife. Natural revegetation of the ROWs with shrubs and herbs will enhance the value of the area for numerous wildlife species that favor edge situations. Maintenance of clear (non-wooded) corridors will sustain early successional, highly productive plant communities that are valuable as sources of food and shelter for many animal species. Maintenance requiring the movement of trucks or other machinery along the ROWS may cause some local disturbance producing short-term impacts. However, no long-term adverse impacts to terrestrial wildlife should accrue from operation of the transportive systems.

Mine

By far the most direct adverse impact of mining activities on the terrestrial ecology of the mine site will be the preemption of existing vegetation and wildlife habitat and the alteration of many physical and chemical variables with which the biotic communities have reached an ecological balance. A total of 4,738 acres of pasture and hayfields, 5,074 acres of upland forest, and 733 acres of bottomland forest and wetland will be used for actual mining. Because the mined area will be developed incrementally, habitat modifications will be distributed over the 24-year life of the project. Mining will occur progressively with disturbed areas (averaging 439 acres per year) to be revegetated within 2 years following mining. Maximum areal disturbance (741 acres) will occur in the year 2008.

A short-term adverse impact of incremental habitat modification will be the reduction of some local wildlife populations and the migration of some fauna into adjacent areas. Migration will occur in response to the noise and human activities associated with mining, as well as to habitat losses. Mobile fauna will move from the mined area to similar habitats contiguous to the impacted area; less mobile forms will be lost. The migration of wildlife into surrounding areas will temporarily stress local populations, resulting in increased mortality and/or decreased reproductive success. The magnitude of this impact will depend on the relative amount of migration; the carrying capacities and population levels of surrounding habitats; and the amount of appropriate habitat in close enough proximity to the site, as well as the speed and success of revegetation efforts. Reproductive activities of local fauna will be adversely impacted where clearing and mining activities occur during natural reproductive seasons (e.g., the spring-early summer breeding period of most birds).

As previously discussed (Sec. 4.5.1.4), the temporal nature of the adverse impact of habitat modification will vary depending on the type of community preempted and the reclamation plan adopted. Pasture, hayfields, and pine forests can be restored relatively easily. Postmining areas revegetated with suitable mixtures of pasture grasses should quickly be recolonized by appropriate birds, small mammals, and other wildlife such that communities similar to those of premining pastureland should develop within a few years after reclamation. However, restoration of more complex natural communities in the mined area (e.g., upland forest, bottomland forest, swamps, and marshes) will be more difficult and require a much longer period of time (i.e., several decades for upland forest and, perhaps, centuries for bottomland forests and swamps). Thus, the alteration of these habitats is a long-term adverse impact. Natural species diversity characteristic of natural forest ecosystems will develop as natural succession progresses. The early stages will be characterized by high net community productivity and low species diversity. Among the wildlife species favored in early successional communities are such recreationally valuable species as the White-tailed Deer, Eastern Cottontail, Bobwhite, and Mourning Dove. As woody vegetation becomes dominant and the forest community develops, faunal diversity should increase while net community productivity decreases.

Section 4.5.2.2 discusses adverse mine operational impacts to floodplain and wetland habitats as a result of surface water diversion, changes in topography, increased sedimentation, and dewatering. Any such activities producing adverse impacts of floodplain or wetland habitats on the mine or in adjacent areas will impact terrestrial wildlife (Sec. 4.5.2.1) associated with habitats.

The activity of men and machinery along with associated noise, dust, and exhaust emissions will have minor adverse impacts on local wildlife over the life of the project. Traffic on haul roads and access roads will increase road mortality of terrestrial vertebrates. Some mobile mammals and birds may modify their behavior patterns to avoid contact with men and machinery or leave the immediate vicinity of the mine entirely.

4.5.2.5 Combined Impacts of Plant and Mine

Construction and operation of the South Hallsville Project will preempt upland forest, bottomland forest, pasture and cropland, and wetland aquatic habitats within the 24,768-acre project site. The most sensitive of these habitats, bottomland forest and wetlands (swamp and marsh), comprise less than 10 percent of the total area. This habitat preemption will adversely impact local wildlife by reducing local populations for the life of the project. Reclamation of the mine site will restore the carrying capacity of preempted wildlife habitats, rapidly (a few years) for nonwooded habitats and slowly (decades or centuries) for forested and wetland habitats. Creation of the cooling reservoir will increase shoreline and aquatic habitats in the area, thereby increasing habitat diversity and mitigating, and to some degree, the preemption of wetland and aquatic habitats by the plant and mine facilities. The combined effects of construction and operation of the mine and power plant should not exceed the sum of their separate effects.

4.5.3 Aquatic

4.5.3.1 Existing and Future Environments

Aquatic Habitats

The following description of aquatic ecosystems is based on the results of an initial comprehensive baseline survey conducted in April 1977 (EH&A, 1977b) and a bimonthly sampling program initiated in November 1977 that continued through September 1978 (EH&A, 1978a).

The aquatic environment of the proposed South Hallsville Project site includes six tributary streams that discharge into the Sabine River, two convergent bayous, a few small impoundments (stock tanks), and seasonally inundated bottomland areas. The mean annual rainfall in the region (about 48 inches) is not evenly distributed; low summer rainfall, together with the general prevalence of permeable, sandy soils, contributes to a high degree of variability in water levels in both streams and impoundments.

The Sabine River, the floodplain of which forms the southern border of the project site, constitutes a permanent riverine habitat. The reach is characterized by nearly vertical, sandy clay banks that allow only minor development of rooted aquatic vegetation. The river channel varies from 65 to 130 feet in width, and the substrate is of variable composition, consisting of a mosaic of scoured, sandy clay, sand and gravel bars, and stoney riffles. Lignite outcrops are evident at a number of locations. The water is typically turbid, of circumneutral pH, and of moderate conductivity.

The small streams within the project site (i.e., Mason, Clarks, Hardin, Rogers, Hatley, and Brandy Branch creeks) are all intermittent tributaries of the Sabine River. Numerous seeps occur in the stream channels on the upland portion of the project site. Many of these seeps are marked by luxuriant growths of iron-precipitating microorganisms. The substrate in all the streams is sandy clay, although small areas of pure sand or gravel riffles are present at some locations. Physical habitat diversity is low, for the most part, being a function of channel morphology (e.g., pools, shallow areas) and the amount and type of organic debris present. No major stands of aquatic vegetation are found in these streams. Although circumneutral pH is the rule in these aquatic systems, water quality, as reflected by conductivity, can vary considerably among streams and also varies seasonally in a given stream.

In addition to several small intermittent streams, three perennial streams, Big Cypress Bayou, Little Cypress Bayou, and Cold Water Creek, are transected by the proposed cooling-pond makeup water pipeline. The two bayous converge below Lake O' The Pines and ultimately discharge into Caddo Lake, while Cold Water Creek is a tributary of the Sabine River. All of these stream systems typically flow through dense second-growth woodland and, consequently, are heavily shaded in most places and receive a large amount of vegetative debris.

Impoundment (i.e., stock tank) habitats within the project site are not common. They are typically shallow, mud-bottomed impoundments containing dense stands of submerged and emergent aquatic vegetation. All of these ponds are perched impoundments, except the largest (Rogers Lake), which resulted from the damming of Brandy Branch.

The seasonally inundated bottomland areas are pasture and woodlands within the Sabine River floodplain. These areas are of minor importance as aquatic habitats, except for their periodic value as fish-breeding areas (spring) and waterfowl refuges (winter).

Aquatic Biota

With respect to water-quality parameters studied and planktonic organisms sampled, the Sabine River was considerably more stable than tributary streams. In particular, conductivity and dissolved oxygen exhibited a wide range of values in tributary streams during the year of study. The Sabine River tended to be dominated by phytoplankton and zooplankton populations typical of warm, permanent river systems. The tributary streams, on the other hand, showed wide variation in population sizes and dominant taxa. Many dominants were typical of pool or littoral habitats, as expected in intermittent stream systems. The widest variations in water quality and planktonic assemblages were observed in Clarks Creek and Hatley Creek. During low-water periods, phytoplankton assemblages in these streams appeared to be stressed by acidity from natural lignite outcrops in the stream channels.

.Macroinvertebrate assemblages were generally dominated by oligochaetes and dipteran larvae; groups usually regarded as tolerant of enrichment and low oxygen concentrations. These organisms are common in fine-grained substrates, particularly where large amounts of detrital material are present, as is the case in the vicinity of the South Hallsville Project site. The presence of appreciable numbers of taxa in more sensitive groups (e.g., Trichoptera and Plecoptera) only during the winter, when water levels and dissolved oxygen concentrations are high, reflected the somewhat stressed conditions in these streams during other seasons of the year.

The fish species observed in the project area were typical of this region of Texas. The small stream samples produced a number of species of small minnows, topminnows, and sunfish typical of the habitats represented. Observed larger fish species common to the Sabine River are gar, carp, shad, catfish, and black bass.

The extended periods of no flow in most of the project streams, with accompanying high conductivities and low dissolved oxygen concentrations, have resulted in assemblages capable of tolerating wide variations in environmental conditions or of responding to those variations by rapid dispersal and population growth. Water quality and, consequently, biological conditions are probably affected by the natural lignite outcrops occurring in the stream channels. These outcrops are the probable sources of the high concentration of metals, such as iron, magnesium, and manganese, observed in water-quality samples. High iron concentrations have resulted in luxuriant growths of iron-precipitating microorganisms in quiet water areas in all tributary streams.

Important Species

"Important Species" are defined as those that are (1) commercially or recreationally valuable; (2) threatened or endangered; (3) critical to the survival of a species satisfying criterion (1) or (2); or (4) critical to the structure or function of the ecosystem, or biological indicators. No species present on site are judged to satisfy criterion (3) or (4). Those that satisfy criterion (1) or (2) are discussed below.

Threatened or Endangered Species

No rare or endangered aquatic species (e.g., fish, macroinvertebrates, etc.) are known to occur or could potentially occur within the South Hallsville Project site or in any area surrounding the project.

Recreationally or Commercially Important Species

A number of species belonging to the families Ictaluridae (catfish) and Centrarchidae (bass and sunfish) are common in the waters of the project area. While these are important sportfish species, the project site creeks are too small to support significant recreational fishing. Due to limited public access of the Sabine River in Harrison County and the close proximity of a number of reservoir fishing sites, sportfishing in the immediate vicinity of the project site is considered light.

In addition to catfish, smallmouth buffalo (*Ictiobus bubalus*) and river carpsucker (*Carpiodes carpio*) are considered commercially valuable species. However, no commercial fishing is currently permitted in Harrison County (EH&A, 1977b).

4.5.3.2 Effects of No Action

The effects on the aquatic systems of the project area resulting from selection of the no action alternative are unpredictable. One result could be no change from present condition, but alteration of land use or population density in the area could have substantial impacts.

4.5.3.3 Construction Impacts

<u>Power Plant</u>

Plant Site

The proposed power plant occupies approximately 272 acres of uplands, largely in the Brandy Branch drainage area; although the western portion of the site, which encompasses the ash storage basins, is in the Hatley Creek drainage area. Aside from some siltation, the partially completed power plant facility is not expected to have any impact on the aquatic systems of the site during construction. Siltation in the streams of the project area will constitute only a minor, short-term impact because the streambeds are predominately composed of fine-grained materials, and the biological communities are well-adapted to withstand or rapidly recover from periodic siltation, such as occurs following storm events.

Siltation in the lower reaches of Brandy Branch resulting from construction may be expected to occur. However, any effects should be minimal and of short duration since standard erosion control techniques were used during dam construction.

Construction of the proposed 1,388-acre cooling reservoir has adversely affected existing aquatic stream communities as a result of inundation of the uppermost portion of Brandy Branch and its main tributary. The reach of Brandy Branch inundated by the western arm of the cooling reservoir is small, although it flows most of the year (except during extreme dry periods) due to a large number of seeps in this area. The eastern arm of the proposed cooling reservoir has inundated an intermittent creek that flowed through mixed woodland and pasture. Neither creek channel is large enough to contain permanent populations of fish. The reach of Brandy Branch above Rogers Lake is fed by a large number of seeps, and water quality appears to be relatively poor because of low pH and high iron concentrations.

In effect, cooling reservoir construction has enlarged the surface area of Rogers Lake from 5 to 1,388 acres. It is expected to have caused no adverse biological impacts relative to its former condition.

The approximately 1,388-acre cooling reservoir should constitute a considerably more diverse aquatic habitat than previously existed in Rogers Lake. These changes are functions primarily of the larger size, increased shoreline area, and greater depth of the cooling reservoir. Rogers Lake has a mud bottom almost entirely covered by dense stands of aquatic vegetation. While stands of aquatic vegetation may eventually be expected to develop in marginal areas of the cooling reservoir, the deeper water in this impoundment will result in extensive areas free of vegetation. This, together with the other substrates available in the much larger area of the cooling reservoir, and warmer year-round water temperatures, should ensure conditions much more favorable for the growth and reproduction of sportfish populations.

Transportive Systems

Adverse impacts to aquatic ecosystems associated with construction of the transportive systems may include temporary erosion and sedimentation in the immediate vicinity of stream crossings. Potential adverse impacts to stream systems resulting from sedimentation may include temporarily reduced phytoplankton, zooplankton, benthic invertebrates, and fish populations; temporary reductions in benthic habitat diversity; temporary increases in stream nutrient levels; and temporarily reduced primary productivity. Temporary and localized sedimentation is not expected to result in adverse impacts to area streams since these streams are characterized by low zooplankton populations; benthic invertebrate populations adapted to soft, muddy substrates; and fish communities dominated by species tolerant of turbid environments. The duration of any potential impacts would be short-term and restricted to the duration of construction activities at each stream crossing. Moreover, erosion control measures have been implemented to reduce potential adverse impacts.

Mine

Site preparation and construction will include clearing of terrestrial vegetation for access roads, haul roads, service building sites, and a dragline erection pad. Some of the roads will cross area streams. Each activity could potentially discharge effluents to these streams, adversely impacting aquatic biota. The immediate effluent constituent of concern, in addition to increased rainwater runoff, is suspended solids (silt) delivered to streamflow. Initial changes to the aquatic environments in the project area will be caused by clearing and disruption of ground cover. Sedimentation ponds will be constructed to eliminate runoff water carrying an increased load of suspended solids into the small tributary streams draining the upland forest area. Some small amounts of suspended solids may nevertheless reach these streams. The degree to which changes occur in the aquatic biota will primarily be a function of the suspended solid load. Larval insects of the Trichoptera and Plecoptera are usually the first riffle inhabitants to be adversely impacted by high suspended solid loads. Clams (e.g., Sphaerium spp.) will also be reduced or eliminated by the same conditions in pool areas of Clarks Creek.

Diptera (especially chironomid larvae) will be little affected, if at all, by the changes in the aquatic environment. Oligochaetes, however, might increase in abundance in areas where the suspended solids settle out. Also, there will be a short-term increase in organic load to the streams from the deforested areas, which will create a more suitable habitat for both chironomids and oligochaetes.

Fish will generally leave areas of high suspended solids and return when conditions are more favorable. Suspended solid loads may have an abrasive action on the gills of fish, and sudden increases due to extremely heavy precipitation on the project site could temporarily eliminate some species of fish from the local creeks.

Potential changes in the algal populations are very difficult to predict. Increased suspended solids and organic loading may result in increased populations of certain species of blue-green algae. However, the more acidic water conditions normally present in the area may result in the dominance of various euglenoid species.

The immediate increase in leaching of soil nutrients commonly associated with clearing of vegetation ("nutrient dumping") may temporarily enrich streams in the project area. If this is accompanied by the clearance of riparian vegetation for access roads, etc., the increased nutrient and light levels will probably cause algal blooms in pool areas, if suspended solids concentrations are sufficiently low. Nutrient release rates from cleared areas will decrease following the initial pulse; however, nutrient enrichment is not anticipated to be a long-term effect.

4.5.3.4 Operation Impacts

Power Plant

Plant Site

Operation of the power-generating facility will cause some elevation of water temperatures in the cooling reservoir above those temperatures expected without the facility. Considerable experience exists within the State of Texas for stocking and management of sport fisheries in small impoundments receiving heated discharges. Radian Corporation (1973) summarized fish standing-crop data from both heated and unheated impoundments in the State of Texas. Their results showed no difference in biomass, size, or condition factors between fish collected in heated and unheated impoundments. The cooling reservoir will be stocked with forage and sport fish by TPWD and will be open to the public for recreational fishing.

Transportive Systems

Impacts associated with operation of the transportive systems may result from ROW maintenance and intake of water from Big Cypress Bayou for the makeup water pipeline. Maintenance of the transportive systems will require that woody vegetation be restricted from colonizing within the ROW. Therefore, long-term, but localized, impacts to aquatic ecosystems at ROW crossings will include localized elevated temperatures, increased solar insolation, and increased phytoplankton production at stream crossings. Rooted aquatic plants may also become established in areas where canopy cover is permanently removed.

The makeup water intake and pump station will be located near the south bank of Big Cypress Bayou, with the pump station located 400 feet from the water's edge. Stainless steel fixed screens with 0.5 x 0.5 inch mesh will be used at the intake opening. Diversion rate will be 33.4 cfs and intake velocity through the screens will not exceed 0.5 feet per second. No antifouling chemicals will be used at the site. The shore area around this structure is not expected to be an area of high biological productivity, particularly with respect to fish spawning or nursery waters. Therefore, impingement and entrainment of aquatic organisms is expected to be minimal.

Mine

Because the upland portions of the drainages of the streams of the project area will be mined, disruption of normal volumes and patterns of flow may be expected until backfilling has been completed, with minor adverse impacts on aquatic species.

Much of the disturbance from mine operation will result from the increased suspended solids loads entering the creeks, which will be a function of rainfall and surface water runoff. Most of the runoff and other discharges from the mine site proper will be regulated by sedimentation ponds, and the releases from the ponds will be controlled and treated to meet the standards set by regulatory agencies. Adverse impacts of such releases will, therefore, probably be minimal. The effects of siltation will be the same as those discussed.

Additional constituents of runoff from roads and service areas will be oil and grease deposited during operation of vehicles. Runoff from service areas and road surfaces will be well-controlled by sedimentation ponds

Under the proposed mining plan, Hatley Creek will be the first creek influenced; disturbance in this drainage area should cease by the year 2000. Clarks Creek would be affected next, in a manner similar to Hatley Creek. Crossing streams with mining equipment will cause temporary, localized disturbances. As revegetation of the backfilled areas progresses, the creeks will gradually sustain lower suspended solid loads and will eventually return to a condition similar to that observed prior to mining. Riparian vegetation will remain undisturbed in downstream reaches. The loss of woodland in surrounding areas will decrease the input of organic matter. Although this means that the net energy base of these aquatic systems will theoretically decrease, this decrease is not expected to be large since most organic matter reaching the stream channels comes from the riparian vegetation immediately adjacent to the channel. Where riparian woodland is cleared, the resultant decreased shading and subsequent increase in water temperature can be expected to cause an increase in algal and vascular plant development.

Disruption of natural stratification in the replaced overburden will result in alterations in ground-water quantity and quality. The overburden will have lower hydraulic conductance, resulting in less flowthrough to remaining portions of minor shallow aquifers supplying seeps and springs along local creeks. This will make minor tributaries more ephemeral and intermittent. Because most of the flow in the larger creeks is supplied from areas upstream of the site, the effect of this reduction is expected to be slight. If the mine pit is deeper than the level of existing streams, stream dewatering into the refilled mine pit will occur until saturation is achieved.

4.5.3.5 Combined Impacts of Plant and Mine

The combined effects of construction of the mine, power plant, and associated facilities on the aquatic communities of the project area include the removal (until backfilling is completed) of some upland, intermittent stream habitat; disturbance of some habitat parameters in the lower reaches of project area streams; creation of a large pond habitat; and fluctuations in resident species population sizes and distributions. Population fluctuations are expected to be manifested as local decreases in some fish, larval insect, and clam species, and by increases in chironomids, oligochaetes, vascular aquatic plants, and certain algal and microbial species. A minor net loss in the aquatic energy base may occur. The ephemeral ecosystems and associated biotic communities in upper Brandy Branch have been permanently replaced by a 1,388-acre lake, resulting in a significant net increase in habitat diversity, species diversity, and biomass. Some degree of increased intermittency is expected to occur in certain project area streams, resulting in the replacement of some aquatic species in existing communities by others.

The combined effects of operation of the mine, power plant, and associated facilities on the aquatic ecology of the project area include fluctuations in species populations associated with vegetation removal and watershed disturbance. Vegetation removal can be expected to decrease some fish, larval insect, and clam species, while concurrently increasing populations of chironomids, oligochaetes, vascular aquatic plants, and certain algal species. A minor net loss in the aquatic energy base may occur as a result of decreased detrital production associated with vegetation removal.

Although the mining plan avoids the more productive bottomlands of the lower reaches of the project area streams and the Sabine River, both the channels and drainage areas of the upland reaches will be adversely impacted during operation. Since the biota of the upland reaches consists primarily of organisms adapted to ephemeral environments, these areas can be expected to be recolonized rapidly by similar assemblages following backfilling and contouring.

The addition of small amounts of hydrocarbons in the runoff from roads and vehicle service areas is not expected to produce any changes in species composition, abundance, primary production, or benthic respiration on the streams of the project area that could be demonstrated by a field program.

4.6 CULTURAL RESOURCES (PREHISTORIC AND HISTORIC)

4.6.1 Existing and Future Environments

Two reconnaissance-type studies of the general project area recorded 13 prehistoric sites (Whitsett, 1977; Dibble, 1977). Twelve of these sites have been recommended for further testing to determine their eligibility for inclusion in the National Register of Historic Places (NRHP).

During a 100 percent survey of the proposed power plant site, 20 cultural resources sites were located, including four prehistoric and 16 historic sites (EH&A, 1978b, 1979). One prehistoric and one historic site were recommended for further testing to determine their eligibility for inclusion on the NRHP.

A 20 percent survey of the proposed mine area was conducted, resulting in a predictive model for the remaining 80 percent of the area (EH&A, 1978b, 1979c, 1981b). One hundred and seventy-six cultural resources sites were located; 88 prehistoric and 72 historic, including 14 cemeteries. Further testing has been recommended for 40 prehistoric and 11 historic sites to assess their eligibility for inclusion on the NRHP. It is estimated that 287 prehistoric sites and an equal number of historic sites may be located in the remaining 80 percent of the area. A number of these sites may be significant and further investigations may have to be conducted. Until a survey of the remaining 80 percent is completed, it is not possible to indicate either the number of sites or the number that will require further study.

In September 1980, a records survey of the proposed makeup water pipeline route was conducted by EH&A. Eleven sites identified in the 100 percent survey of the plant site (EH&A 1979c, 1981b) are located in the vicinity of the southern portion of the proposed pipeline route. None of these have been included in or nominated to the NRHP. Based upon the previous survey, it is likely that additional unknown historic and prehistoric sites will be found along the streams and terraces that will be crossed by the proposed makeup water pipeline.

A literature review of three proposed transmission lines was conducted by EH&A in November 1981. Four cultural resource sites located during previous surveys, one prehistoric, one historic and two multi-component, are located in the vicinity of transmission line A (EH&A 1978b, 1979c) (see Fig. 3-14). Two of these sites, one prehistoric and one multi-component have been recommended for further testing to determine their eligibility for inclusion on the NRHP. No sites have been recorded near lines B and G (see Fig. 3-14). Line G, the central portion of line A, and the northern segment of line B have not been subjected to a cultural resources survey. Based upon previous surveys, it is likely that unknown historic and prehistoric sites will be found in high potential areas crossed by these proposed transmission lines.

A records search of the recently constructed 3.5 mile railroad spur north of the plant site was conducted at the Texas Archeological Research Laboratory. No previously recorded sites were located within the ROW of the route. The effects of this railroad spur on unrecorded cultural resources is unknown.

A 100 percent archaeological survey was conducted of a 30-acre dragline erection site (La Vardera, 1981). This site was located in the northeastern section of the mine area. No cultural resource sites were recorded during the survey.

4.6.2 Effects of No Action

Construction to date has resulted in the irreversible and irretrievable commitment of the one historic site that was recommended for testing to determine its significance. If the proposed project is not developed, existing cultural sites would not be adversely impacted, and there would be no need for determinations of eligibility or any further work.

4.6.3 Construction Impacts

4.6.3.1 Power Plant

Plant Site

Cultural resources survey work completed to date has been coordinated with and reviewed by the State Historic Preservation Officer (SHPO). The SHPO concluded (see letter of response dated 11 August 1981) that compliance procedures for Section 106 of the National Historic Preservation Act (NHPA) have been only partially accomplished and that a cultural resource assessment of all facets of the Henry W. Pirkey Power Plant and South Hallsville Mine area must be dealt with in order to be in compliance with Federal regulations.

No sites presently listed on the NRHP lie within the areas of the proposed plant site and cooling reservoir. As a result of a 100 percent survey, 20 cultural resources sites have been recorded. One historic site has been recommended for testing to determine its significance; the prehistoric site previously recommended for testing fell outside of final plant site boundaries. The historic site was associated with the Andrew Blair House Site. It consisted of several abandoned buildings, one of log construction and the others of plank construction; and a hand dug well. Situated in light timbers with some associated brush, it appears to have been either an extensive farm site or possibly several homesites. Construction began on the power plant site during the spring of 1979. The power plant area has been cleared and graded, and the cooling reservoir area has been cleared. Adverse impacts to the historic site, as a result of the construction activity, have resulted in the total commitment of this cultural resource.

A Memorandum of Agreement (MOA) will be drafted between EPA, SHPO, and the Advisory Council on Historic Preservation to avoid or minimize further adverse impacts on cultural resources in compliance with Section 106 of the NHPA. During the course of future construction activities, if any significant cultural resources are located, the SHPO will be contacted to afford an opportunity to develop appropriate mitigative measures.

Transportive Systems

No sites presently listed on the NRHP lie within the 24 mile length of the makeup water pipeline. Approximately one-half of the construction of the pipeline has been completed. Construction-related activities may have caused an adverse impact on any site that may have existed in this segment of the pipeline. The possibility exists that cultural resources sites may occur along the yet-to-be constructed portions of the pipeline north of the plant site, especially along the streams and terraces to be crossed by the pipeline.

Construction-related activities along the proposed transmission lines may create potential adverse impacts to any cultural resources determined to be eligible for the National Register. No cultural resource sites known to be significant will be affected by the proposed transmission lines (two recorded sites have been recommended for further testing to determine their eligibility). How ever, as portions of these lines have not been surveyed, the possibility exists that additional cultural resource sites may be located. Possible impacts will be coordinated with the SHPO.

Construction-related activities along the railroad spur may have created adverse impacts to any cultural resources that might have been eligible for inclusion on the National Register. No cultural resources sites known to be significant have been affected by the railroad spur. However, as the ROW has not been surveyed, the possibility exists that cultural resource sites may be located within the ROW.

4.6.3.2 Mine

Construction-related activities within the proposed mine and ancillary areas may create adverse impacts on cultural resources determined to be significant. Building new roads (including haul roads) and rerouting existing roads could increase public accessibility to some cultural sites, which may increase collecting, vandalism, and looting. However, this is not expected to occur as access to the mine roads will be controlled.

No sites presently listed in the NRHP lie within the proposed mine and ancillary areas. A 100 percent survey of the first 5-year mining plan (excluding those portions already surveyed as a part of the initial survey) and all haul roads, access roads to the mine, and other associated ancillary activities will be conducted to locate additional potential NRHP sites that may exist in the unsurveyed portion of the mine area. Cultural resources sites located during these surveys will be assessed as to their eligibility for inclusion on the NRHP and their degree of mitigation. The type and extent of mitigation will be negotiated for each site with the Texas Historic Commission (EH&A, 1981b). If, during the course of construction, any additional important cultural resources are located, the SHPO will be contacted to develop appropriate mitigation measures.

4.6.4 Operations Impacts

4.6.4.1 Power Plant

Plant Site

Plant site operations will not impact cultural resources. No sites presently listed in the NRHP lie within the areas of the proposed plant site and cooling reservoir. However, if at any time during operational activities, any important cultural resources are encountered, the SHPO will be contacted to develop appropriate mitigative measures.

4.6.4.2 Mine

No sites presently listed in the NRHP lie within the proposed mine and ancillary areas. However, operation-related activities within the proposed mine and ancillary areas may create adverse impacts on cultural resources determined to be significant.

A 100 percent survey of the first 5-year mining plan, excluding those portions already surveyed as a part of the initial survey, and all haul roads, access roads to the mine, and other associated ancillary activities, will be conducted to locate additional potential NRHP sites that may exist in the unsurveyed portion of the project area. Cultural resources sites located during these surveys will be assessed as to their eligibility for inclusion on the NRHP. If, during the course of operation, any additional significant cultural resources are located, the SHPO will be contacted to develop appropriate mitigation measures.

4.6.5 Combined Impacts of Plant and Mine

Recommendations concerning cultural resources sites encountered during field surveys of the mine/power plant project site are given in Sec. 4.6.3 and 4.6.4. The operation of the plant site and mine can result in a total commitment of any cultural resources that lie within its bounds. Operational facilities such as maintenance shops, offices, parking lots, landscaped lawns and sidewalks will present differential effects on archaeological sites, causing heavy impacts in the direct lines of construction, while peripheral areas may be left unexposed or subject to minor disturbances. Facilities for mine operations also adversely impact cultural resources sites. In ancillary areas, haul roads, highways relocations, railroad spurs, power lines and pipelines all pose similar threats to cultural resources sites, yet vary in degree of ultimate adverse effects. Maintenance of power line and pipeline corridors will increase both pedestrian and vehicular traffic across any sites which they affect, thereby creating a long-term, yet indirect, impact on the site. These potential impacts can be reduced by altering plans to avoid significant sites, adequately recording the data contained within the sites or, when possible, relocating architecturally significant historic sites.

The mine and plant sites will have both short- and long-term effects upon any cultural resources that they impact. Cultural resources are both limited in number and non-renewable. These undertakings represent a total commitment of any cultural resources site that is affected. However, adequate mitigation measures would lessen these effects by preserving the data for research and the education of future generations.

Combined activity at the two construction sites should not have any more impact on the cultural sites than would the two sites independently. The construction activities at one site do not affect the construction activities at the other; therefore, the combined effects are no greater than the total of the separate effects.

Activities associated with both the proposed plant site and mine have the potential of adversely affecting over 500 sites. The migitation of project-related adverse impacts on significant cultural resources will be coordinated with the SHPO. If, during the course of both power plant and mine-related activities, any significant cultural resources are encountered, the SHPO will be afforded an opportunity to develop or comment on appropriate mitigative plans.

4.7 SOCIOECONOMICS

4.7.1 Existing and Future Conditions

4.7.1.1 Economic Profile

Labor Force

Between 1974 and 1979, the labor force growth for Gregg and Harrison counties (3.96 percent average annual growth) was approximately equal to the growth of the state labor force as a whole (3.97 percent average annual growth). The average 1979 unemployment rate was 5.3 percent in Harrison County, 4.2 percent for Texas, and 4.9 percent in Gregg County (Texas Employment Commission (TEC), 1980).

Employment Characteristics

The average unemployment rate for 1976 was 7.2 percent for the Longview-Marshall Standard Metropolitan Statistical Area (SMSA) (Gregg and Harrison counties), while the total labor force was 57,820. In 1979, the average unemployment was 5.1 percent, and the labor force was 66,568 for the same area. Unemployment had dropped 2.1 percentage points and the labor force increased 15.1 percent, suggesting a remarkable economic growth for the SMSA.

By the fourth quarter of 1979, the manufacturing sector accounted for 48.8 percent of Harrison County covered employment (TEC covered employment) and 21.2 percent of Gregg County covered employment. The relatively high proportion indicated for Harrison County is due to data-collecting biases and the existence of the large ordinance plant at Karnack (Harrison County), Texas.

Leading Industries

Manufacturing is one of the most important industries for Harrison and Gregg counties, accounting for 48.8 and 21.2 percent, respectively, of the total covered employment during the fourth quarter of 1979 (TEC, 1980). Retail sales, another important industry, grew to 18.5 and 14.6 percent in Harrison and Gregg counties, respectively, from 1975 to 1976. Mineral production in the two-county area has historically been based on oil and gas production; however, lignite development will substantially increase in the near future. Oil and gas production dropped 18.4 and 7.7 percent, respectively, in Gregg County between 1975 and 1978. Harrison County's oil and gas activities also decreased 20.1 percent in oil and 7.7 percent in gas production; natural gas production fell by 7.9 percent in the same period. The construction industry has shown significant growth as authorized building permits in the Longview SMSA were up 59.0 percent between 1976 and 1977. Agricultural income in the two counties is dominated by timber production and livestock sales; livestock sales in 1976 slightly led value paid for delivered timber products ($12.8 million and $11.5 million, respectively).

Income Characteristics

Between 1970 and 1973, total personal nominal income in the State of Texas grew by an average annual 11.7 percent, exceeding the nominal growth in income of 8.3 percent for Harrison County and 10.7 percent for Gregg County (U.S. Dept. of Commerce, Bureau of Economic Analysis, 1977). However, for the years 1973-1978, total personal income grew by average annual nominal rates of

13.5 percent, 14.2 percent, and 15.4 percent for the State of Texas, Harrison County, and Gregg County, respectively. In 1978, the per capita income levels in Gregg and Harrison counties were $8,392 and $6,689, respectively, or 108.3 and 86.4 percent of the state per capita income level. Both project area counties exceeded the regional level of per capita income of 1978 (U.S. Dept. of Commerce, Bureau of Economic Analysis, 1980).

4.7.1.2 Demographic Profile

Population Trends

Even though the regional population (the 14-county East Texas Council of Governments (ETCOG) region) declined 8.2 percent between 1940 and 1970, the area population in 1980 had rebounded to a total higher than the 1940 figure. Migration trends of rural movement to urban areas outside the region have been replaced by population movement to urban areas within the region.

Major population centers in the two-county area that have shared in this urban growth are Longview (Gregg County) and Marshall (Harrison County). The project site is located approximately midway between the two cities.

Population Projections

Taking into account 1980 Census data and 1960-1970 and 1970-1980 economic trends, "without project" population projections indicate that the Gregg County population will expand by nearly 30 percent between 1985 and 2000. This projection yields a Gregg County population of 137,500 in the year 2000. Harrison County is projected to increase by 10.8 percent during this period, resulting in a population of 60,800 by the year 2000.

4.7.1.3 Housing

Based upon 1970 and 1980 Census information and discussions with regional planners and local realtors, housing availability in the project area ranges from poor to good in local communities. Longview experienced the greatest increase in housing starts over the last 10 years. Accordingly, single-family and multi-family units are available, although many of the 400 apartment units are rented at the present time. Sufficient developable land within and outside the city limits should enable continued building activity.

Marshall currently has a 6 percent vacancy rate, although the city perceives a shortage in terms of the continuing demand for certain types of housing. New apartment construction is anticipated within the year (Yaco, 1981).

The City of Hallsville experienced a temporary housing shortage due to nearby energy projects. However, 200 single-family units have been built in the last year, and housing is available.

4.7.1.4 Community Facilities and Services

Marshall

Water treatment capacity in Marshall is 10 mgd, with a maximum daily use of 8.2 mgd. The current water system is estimated to have sufficient capacity to serve approximately 2,000 additional connections, although the Texas Department of Health (TDH) recommends development of additional raw water sources (TDH, 1981). Marshall also has a surplus of wastewater treatment capacity, estimated to serve an additional 22,500 people.

The teacher-student ratio in Marshall is 19.4, slightly higher than the recommended 18.6. Marshall has adequate health service provision, with a 142-bed hospital and slightly greater than one doctor for every 1,000 residents. Police and fire protection services are adequate to serve the existing population.

Longview

Longview is the largest urban and industrial center within a 50-mile radius of the project site. The city has a water treatment capacity of 34.0 mgd, with a maximum daily use of 21.0 mgd. Surplus capacity is estimated at slightly less than 12,000 additional connections. The municipal sewage system is estimated to have a surplus of 4,000 additional connections.

The teacher-student ratio in Longview is 17.8. Major health services consist of two hospitals and 12 clinics, and a favorable doctor-population ratio of 1.6 doctors per 1,000 population. Police and fire protection services meet existing needs and also allow for future population growth.

Hallsville

The municipal water supply system in Hallsville has a treatment capacity of 2.7 mgd and a maximum daily use of 0.2 mgd. The city has recently completed a 12-inch line connecting its system with facilities in Longview, allowing for contract purchase of a maximum 20 million gallons per month from Longview (TDH, 1981). Hallsville has a surplus capacity of approximately 6,000 additional connections. Sewage treatment facilities in Hallsville were deficient in meeting 1980 permit parameters (TDWR, 1981a). However, a new plant is expected to be completed in the fall of 1981 with a service capacity for 3,200 people (Hatley, 1980).

The teacher-student ratio in Hallsville is 17.3. There are no major health services in Hallsville, although proximity to Longview enables residents to obtain adequate health care. Hallsville has one full-time police officer and a 30-member volunteer fire department.

4.7.1.5 Local Government Finances

The effective 1980 tax rates in Gregg and Harrison counties are 0.26 and 0.37 per $100 assessed valuation, respectively. The effective municipal tax rates are 0.24 in Hallsville, 0.34 in Longview, and 1.16 in Marshall. However, only Longview uses a 100 percent basis of assessment. Under Senate Bill 621, all Texas cities must use 100 percent by January 1982, the result of which will be an adjustment in Hallsville and Marshall tax rates. Effective school district tax rates range from 0.65 in Longview to 1.13 in Marshall.

Water and wastewater system debt coverage is greater than one in all three cities, indicating an ability to service current debt. Hallsville has the lowest debt coverage ratio of the three cities, and may experience difficulty raising funds for improvements and/or expansions without raising service costs or taxes.

4.7.1.6 Transportation Facilities

The major form of personal transportation within Gregg and Harrison counties is the private automobile; the major highways serving the area are I-20 and U.S. Highway 80, north of the project site; U.S. Highway 259, west of the project site; and State Highway 43, east of the project site. There is no intracity bus system in the two counties (although taxi service is available in Longview and Marshall), but bus service between cities is available in Longview, Hallsville, and Marshall.

Motor freight service is available in Longview from 12 terminals and in Marshall from five terminals. Amtrak rail passenger service is available in Longview on the St. Louis to Laredo route, both north- and southbound, daily. Rail freight service is provided by three railroads in Longview and by one railroad in Marshall. Air transportation facilities are available at Gregg County Airport, 10 miles south of Longview, and at Harrison County Airfield near Marshall. Gregg

County Airport has comprehensive passenger and freight service, while the Harrison County Airfield has no regular commercial schedule.

4.7.1.7 Recreation Facilities and Aesthetics

The major water resources closest to the project site are Lake O' The Pines and Caddo Lake, approximately 18 and 33 miles away, respectively. The southern boundary of the project area occurs within the floodplain of the Sabine River. However, the nearest active mining will be approximately one mile from the Sabine River. The Sabine River from the headwaters of the Toledo Bend Reservoir upstream to the town of Easton near Lake Cherokee is included in the Nationwide Inventory as a potential component of the National Wild and Scenic Rivers Systems. This segment of the river passes through Panola, Harrison, and Rusk counties. The Sabine River is characterized by a low gradient streambed, infrequent riffle, rapid and waterfall areas, and a broad, deeply cut channel. Associated with the river is a diverse mixture of bottomland hardwood and pine forest. Sloughs, bayous, oxbows, and wetland habitats, with a minimum of human development, characterize the river floodplain.

The Texas Natural Area Survey inventoried seven natural areas and landmarks within a mile of the river channel. In Panola County, the Sabine River bottomland was characterized as potentially the most varied natural southern floodplain forest in Texas (Fritz, 1966). No public recreation areas are located on the power plant or mine sites; the closest facilities are in Longview and Marshall. The major recreational activities of the general area include water sports, fishing, hunting, sightseeing, hiking, and camping.

Longview has the largest array of urban recreational opportunities within a radius of about 50 miles of the project site. Urban recreational opportunities within Longview include a museum, movie theatres, nightclubs, and several parks. Marshall and Hallsville have parks and golf clubs; Marshall has a wider variety of recreation than Hallsville.

Two museums exist in the area: the Harrison County Historical Museum in Marshall and the Caddo Indian Museum in Longview. Throughout the year, Longview has many cultural activities: the Civic Music Association and Longview Symphony Orchestra sponsor concerts and the Community Theatre presents five productions annually. Other places and events contributing to the local historical appreciation and cultural enjoyment also exist in Marshall and Longview.

4.7.2 Effects of No Action

4.7.2.1 Employment and Income

Despite the project area's slowly increasing unemployment rate since 1974, unemployment is expected to remain below the national rate, which is currently 7.1 percent. Various manufacturing and potential energy-related activities in the area enhance the likelihood of expanded employment opportunities in the near future. Occupational skills in the area indicate that the labor force is sufficiently skilled to meet a reasonable share of expanding employment needs. The most consistently recurring skills among those employed in the area include craftsmen, foremen, and operatives.

Personal and per capita income growth are directly related to employment growth and should similarly follow expanding trends. Mining, manufacturing, and trades and services are expected to be the major sources of personal income in the foreseeable future in the project area.

4.7.2.2 Population

Taking into account 1980 Census data and 1960-1970 and 1970-1980 economic trends, "without project" population projections indicate that Gregg County population will expand by nearly 30 percent between 1985 and 2000. Harrison County is projected to grow by a smaller 10.8 percent over the same time period.

4.7.2.3 Community Facilities and Services

Under the no action alternative, community facilities and services in the project area will expand as necessary to meet "without project" population projections. Local water and sewage systems are currently well below capacity levels. Police and fire protection are adequate for existing populations, and local communities foresee adding one or two personnel if large population influxes occur. Medical and school facilities can accommodate a moderate increase in demand, although two to three additional teachers are expected to be hired over the next several years.

4.7.2.4 Housing

Housing availability varies among communities in the project area, although most cities anticipate continued shortages in certain types of housing. Building activity is expected to increase to accommodate the planned energy projects in the region. Rental property is foreseen as a high priority. However, any construction activity (single-family or apartments) will be greatly dependent upon interest rates and financing arrangements.

4.7.3 <u>Construction Impacts</u>

The following discussion addresses the socioeconomic impacts of power plant construction including the associated transportive systems (makeup water pipeline, railroad spur, and transmission lines) and the mine.

4.7.3.1 Economic

<u>Employment Effects</u>

The clearing and construction phase of the Henry W. Pirkey Power Plant - Unit 1 began in April 1979 and is expected to require a peak construction force of 832 in the second half of 1983, along with construction employment for the proposed South Hallsville Mine (Table 4-20).

Major categories of workers needed for the primary project work force during the construction phase include equipment operators, ironworkers, pipefitters, electricians, carpenters, boilermakers, insulators, sheet metal workers, glaziers, concrete finishers, painters for the power plant, and equipment operators, steel workers, and manual laborers for the mine. Skills needed in the local secondary work force include service-oriented skills and industrial skills associated with materials supply and residential construction.

The maximum combined-project employment peak of 832 new primary jobs is expected to induce approximately 849 secondary jobs for a total of 1,681 project-related employment positions. The 82 new jobs created by the mine construction are projected to induce 84 secondary jobs; the power plant construction force peak of 750 is projected to induce 765 secondary jobs. The creation of both direct project construction jobs and secondary support jobs represents a beneficial impact to the local/regional economies insofar as contributing to a stable employment base.

The breakdown of locally supplied vs. in-migrant construction-related employment is listed in Table 4-20. Total local employment (within 50 miles commuting distance of the project sites) will consist of total primary employment plus that share of local secondary employment attributable to wage expenditures of primary workers. Assuming a 60 percent wage capture rate and one economic cycle, locally based peak secondary employment is expected to consist of about 50 mine-related jobs and about 459 power plant-related jobs.

Given the size and spatial distribution of the existing construction work force, local workers are estimated to supply about 73 percent, or 60 of the 82 primary mine work force (SWEPCO, 1980a). Because of greater skill

TABLE 4-20

COMBINED CONSTRUCTION EMPLOYMENT

SOUTH HALLSVILLE MINE/HENRY W. PIRKEY POWER PLANT-UNIT 1

1979-1985

Year	Total Employment[a]			Total Locally Based Employment			Jobs Filled by Local Residents			In-migrants		
	Primary	Secondary[b]	Total	Primary	Secondary[c]	Total	Primary[d]	Secondary[e]	Total	Primary[d]	Secondary[e]	Total
1979	20	20	40	20	12	32	4	6	10	16	6	22
1980	30	31	61	30	19	49	6	10	16	24	9	33
1981	111	113	224	111	68	179	28	34	62	83	34	117
1982	404	412	816	404	247	651	109	124	233	295	123	418
1983	832	849	1,681	832	509	1,341	210	255	465	622	254	876
1984	825	842	1,667	825	505	1,330	205	253	458	620	252	872
1985	300	306	606	300	184	484	60	92	152	240	92	332

Note: Numbers represent highest projected employment for any quarter in a given year.

[a]Includes the 40 percent of the secondary employment captured outside of the project area.

[b]Using a 1.02 construction employment multiplier for secondary workers.

[c]60 percent local capture rate for secondary employment.

[d]Power plant construction workers: 20 percent locally hired; mine construction workers: 73 percent locally hired.

[e]Secondary workers: 50 percent locally hired.

Sources: Southwestern Electric Power Company (SWEPCO), 1980a; Denver Research Institute, 1979; EH&A, 1972.

requirements associated with power plant construction, only 20 percent, or 150 of the total 1983 peak power plant construction work force of 750, is expected to be supplied locally. Approximately 50 percent, or 230 of the total 459 locally based secondary jobs arising from power plant construction activities and 25 of the total 50 locally based secondary jobs arising from mine construction activities will be filled from the local labor force.

A peak of approximately 876 in-migrating workers will be required in 1983 for those jobs not filled by local workers. Mine-related in-migration will supply an estimated 22 primary and 25 secondary workers; power-plant-related in-migration is estimated at 600 primary skilled workers and 229 secondary workers.

Income Effects

Assuming an average annual income of $25,000 (1980 dollars) for power plant construction workers, and $21,120 (1980 dollars) for mine construction workers, the total local annual income generated from primary employment at the power plant and mine project during peak construction is estimated to be approximately $18.75 million and $1.73 million, respectively. Secondary employment, averaging a $15,000 annual salary, could contribute a maximum of $7.64 million to the local economy during the peak period.

Because of the proximity of numerous other retail markets to the project sites, project-related retail sales on the local two-county level will average about 30 percent of the total local income growth from project-related earnings, or about $8.44 million. Total locally based employment associated with the combined peak construction phase of the power plant and mine, 1,341 employees, will represent a 2 percent increase in the 1979 Harrison-Gregg County labor force (ETCOG, 1980).

Total construction expenditures (1980 dollars) are estimated to be $89.68 million for the mine and $400.00 million for the power plant, for a combined total of $489.68 million during the 7-year construction period (Table 4-21).

TABLE 4-21

TOTAL DIRECT PROJECT-RELATED EXPENDITURES BY YEAR

CONSTRUCTION PHASE

(millions of 1980 dollars)

	Construction Year							
	1	2	3	4	5	6	7	Totals
Labor	1.35	2.85	4.21	20.49	22.02	12.14	3.75	66.81
Machinery	6.30	13.30	21.19	99.96	110.76	67.67	17.50	336.68
Materials	.90	1.90	2.78	13.52	14.35	7.63	2.50	43.58
Other	.36	1.76	2.66	8.77	13.85	14.21	1.00	42.61
TOTAL	8.91	19.81	30.84	142.74	160.98	101.65	24.75	489.68

Source: NACI, 1980b; SWEPCO, 1980a.

Approximately 13.6 percent of the total project construction costs are estimated to be for labor, 68.8 percent for machinery, and 8.9 percent for materials. Construction expenditures for the power plant will peak 36 to 42 months into the project, or in the 1982-1983 period; mine construction will peak around 1984. Overall construction expenditures (mine and power plant) will peak in 1983 at approximately $162.24 million.

Of the total $489.68 million construction expenditures, $108.67 million, or roughly 22 percent, will be spent in the local area for labor services and materials such as concrete, fuel, lubricating oil, and other consumables.

Based upon a regionalized input-output model estimated for the Longview SMSA, a series of income and employment multipliers were estimated for the local economy in order to assess local secondary income effects. Of the $489.68 million in overall project construction expenditures, $108.67 million is expected to be spent in the local economy; this amount will generate approximately $103.24 million in secondary income growth for an estimated total income growth of $211.91 million during the 7-year construction period.

Increase income associated with project worker wages, as well as non-labor project expenditures, represents a beneficial impact to the local/regional economies. Project-related benefits would be reflected in a greater potential for increased consumer spending (particularly in trade and service sectors) and increased business investment and expansion.

4.7.3.2 Population

The peak construction phase of the mine/power plant project, with 832 primary employees in 1983, will support a project-related local population of about 3,260 persons (residents plus in-migrants). Of this total, 1,135 persons will comprise the secondary population, assuming 60 percent of secondary employment is locally based.

Total population in-migration associated with project construction is estimated at 2,155 with 734 new households in-migrating; these households are expected to add 482 school-age children into the two-county area. Table 4-22 gives data for the project-supported population in-migration during the construction.

The age distribution of in-migrants is likely to be slightly lower than the existing population (median age equals 29 years). About 38 percent of in-migrants will be in the 0 to 17 age group, 61 percent in the 18 to 64 age group, and 1 percent in the 65 and older age group.

The expected 2,155 project-associated additional persons in the local population will not cause a noticeable increase to the overall population density. The location of the project is such that employees could choose to reside in almost any portion of Longview, Hallsville, or Marshall and still be within commuting distance of the project site, thus reducing the likelihood of a concentrated work force population in the immediate project vicinity.

4.7.3.3 Housing

Based upon interviews of energy-related employees in a large development area in the west and EH&A's in-house data, projected housing preferences of direct construction and secondary service employees were compared with wage constraints and current housing costs in the project area. Table 4-22 shows housing preference of employees. Total housing demand can be calculated by comparing preference with housing types that families would be able to afford if expending 35 percent of gross family income for housing (assuming one wage earner per household).

Using wage data provided by SWEPCO for construction personnel income and the U.S. Dept. of Labor's Handbook of Labor Statistics (1979) for service employment income, it is estimated that in-migrants will need about 285 new single-

TABLE 4-22

TOTAL CONSTRUCTION-RELATED POPULATION IN-MIGRATION IN THE PROJECT AREA
1979-1985

Year	Population			New Households			New Students		
	Primary[a]	Secondary[b]	Total	Primary[c]	Secondary[d]	Total	Primary[e]	Secondary[f]	Total
1979	41	13	54	15	4	19	9	3	12
1980	61	20	81	22	6	28	13	5	18
1981	212	76	288	75	23	98	46	19	65
1982	753	274	1,027	268	82	350	163	67	230
1983	1.589	566	2,155	565	169	734	343	139	482
1984	1,583	562	2,145	524	168	732	342	138	480
1985	613	205	818	218	61	279	132	50	182

Note: Numbers represent highest projected for any quarter of a given year.

[a] 60 percent of construction workers are heads of household, 40 percent live alone; average family size is 3.59.

[b] 60 percent of secondary workers are heads of household, 30 percent are not heads of household; 10 percent live alone; average family size is 3.55.

[c] 1.1 primary workers per household.

[d] 1.5 secondary workers per household.

[e] Average number of school-age children per construction worker = 0.92.

[f] Average number of school-age children per secondary worker = 0.91.

Source: Denver Research Institute, 1979.

family homes, 102 multi-family units, 291 mobile homes, and 56 other housing types (based on 734 new households for immigrating construction workers and housing preference in Table 4-23). This housing demand will be spread throughout the two-county area, but will probably concentrate in Longview, Marshall, and Hallsville. Less than 20 percent of the total land area of the two-county area is suitable for septic tanks, thereby limiting the degree of settlement in unincorporated areas (ETCOG, 1977). Table 4-24 depicts the vacancy rates of housing in the two-county region.

In 1979, there were 9,092 unsubsidized housing units in Marshall, with a vacancy rate of 7.5 percent, or 679 vacant units (ETCOG, 1979). There is ample developable land within the city limits, and local builders are active; city subdivision regulations offer substantial inducements to developers through refunding agreements whereby the developer is repaid for new utility construction as additional revenue from expansion is realized by the city.

Mobile home ordinances in Marshall allow mobile homes on single-family zoned lots in some areas; mobile home parks are regulated to ensure adequate density, utility infrastructure, and paved streets (Yaco, 1981).

The 1980 U.S. Census estimates a total of 9,310 housing units in Marshall, an increase of 11.89 percent since 1970. Provided local builders remain active in response to existing and proposed regional energy developments, the demand for additional housing will not represent a significant adverse impact. This also assumes that in-migrant residence preferences will be distributed among other cities in the project area as well (i.e., Longview, Hallsville).

Sufficient developable land within the Longview city limits and a capable, active building/construction sector should allow accommodation of power plant/mine-related in-migrants. In addition, Longview has subdivision regulations that should prove extremely attractive to developers. The city furnishes the

TABLE 4-23

HOUSING PREFERENCE BY TYPE OF HOUSING
AND LEVEL OF INCOME
CONSTRUCTION PHASE

	Type of Employment	
Type of Unit	Construction ($20,000-23,000 Annual Income) (percent)	Secondary (Service) ($15,000 Annual Income) (percent)
Single-Family	46	15
Multi-Family	9	30
Mobile Home	38	45
Other	7	10

Source: Old West Regional Commission, 1975.

TABLE 4-24

UNSUBSIDIZED HOUSING UNITS AND VACANCY RATES, GREGG AND HARRISON COUNTIES

	Total Units	Vacant Units	Vacancy Rate (percent)
GREGG COUNTY	34,457	2,361	6.9
Longview	20,542	1,591	7.7
Kilgore	3,963	196	4.9
Gladewater	2,701	257	9.5
Balance of County	7,251	317	
HARRISON COUNTY	18,977	1,451	7.6
Hallsville	445	15	3.4
Marshall	9,092	679	7.5
Balance of County	9,440	757	

Source: ETCOG, 1979; Buchanan, 1981.

materials for new subdivisions, with the developer paying the costs of installation (Barrett, 1980). Mobile homes are restricted to licensed mobile home parks.

Because of current activity in manufacturing and oil and gas, Longview is experiencing a considerable building boom, with over 400 apartment dwelling units under construction as of October 1980. Of a total 20,542 housing units in 1979, 1591 or 7.7 percent, were vacant (ETCOG, 1979; Barrett, 1980). The 1980 Census estimates a total of 24,352 housing units in Longview, an increase of 50.4 percent since 1970. The availability of developable land, current construction activity, and current industrial activity in the Longivew area are expected to contribute to a favorable housing market in the city. Continued rental unit construction in Longview will minimize potential adverse impacts stemming from proposed project in-migration.

Hallsville has undertaken a progressive housing program to control anticipated growth, while accommodating the maximum number of permanent in-migrants consonant with the prevailing quality of life. Hallsville city officials have been working with local and area developers through the newly passed Housing Revenue Bond Program in Texas, whereby a county or city can issue tax-exempt bonds for new home financing. Hallsville has participated with Harrison County's Housing Bond Program and has a working agreement with the City of Tyler for participation in that city's Housing Bond Program (Hatley, 1980).

In 1979, Hallsville had approximately 100 new homes built; another 100 are under construction or planned for 1980 and an additional 200 are planned for 1981 through the Housing Bond Program. Hallsville has a subdivision ordinance requiring the developer to install 100 percent of all streets and utilities; there are no payback provisions or sharing of development costs by the city. However, city officials work closely with developers in facilitating City Housing Bond new home financing. As of October 1980, two subdivisions were under construction, and another 200 building lots will be available in 1981. Current residential construction activity in Hallsville, including both single family units and apartments, is anticipated to lessen potential adverse impacts of in-migrant housing demand.

Mobile home placements within the city limits of Hallsville are controlled by a mobile home ordinance, which stipulates that city council approval must be obtained before placing a mobile home anywhere outside a licensed mobile home park. Two such parks were under construction as of October 1980.

4.7.3.4 Community Facilities and Services

Construction of the combined power plant/mine project will support an estimated locally-based population of approximately 3,260 persons, or 1,096 total households (existing residents plus in-migrants) during the peak construction phase from 1983 to 1984. Of the total project-related employment, approximately 75 percent, or 622 primary workers are estimated to in-migrate into the area, while approximately 254 workers are estimated to in-migrate to fill jobs in secondary industries. These total 876 in-migrating workers for the combined project represent an in-migrating population of 2,155 in 734 households.

Based upon recent per capita water, sewer, police, fire protection and educational services in the two-county project area, the 1983 in-migrating peak construction work forces of the proposed mine/power plant are projected to require an additional 0.903 mgd in potable water supplies, 0.404 mgd in wastewater treatment or septic tank capacity, 2 firemen, 5 policemen, and 33 teachers.

The distribution of the in-migrants in the local area will depend on availability of housing, adequacy of utility infrastructure, availability of services, and the commuting distance to the project site. Longview, 12 miles to the west of the site; Marshall, 10 miles to the east; and, to a lesser extent, Hallsville, directly north of the site, will most likely receive in-migrants as new residents. Their respective community resources are discussed in the following sections.

Marshall

Existing water and sewer facilities in this city of 24,192 are apparently adequate to accommodate in-migrants. Water treatment facilities have a capacity of 10 mgd and an average peak daily consumption of 8.2 mgd; the wastewater treatment plant capacity should be adequate for a population of 40,000.

Marshall is a progressively managed city offering a number of community-supported inducements to in-migrating industry. Three industrial parks with Industrial Revenue Bond financing are sponsored by the city. All of the city streets are paved, and a well-timed program of bond issues has kept utility infrastructure expansion capacity at a high level.

In summary, the City of Marshall appears to have the administrative capability and physical infrastructure to accommodate a significant amount of in-migration, thereby lessening potential adverse impact.

Longview

Longview, the county seat of Gregg County, is the largest and most populous (61,085 in 1980) city in the study area. Longview has experienced substantial growth in the past decade, with a large industrial/manufacturing employment base.

Capacity of Longview's water treatment is 34 mgd, with an average maximum daily consumption of 21 mgd, leaving a substantial margin for expansion. The sewage treatment capacity of 15.6 mgd is roughly double the existing present load and should be sufficient for a population of 110,000 (SWEPCO, 1980a). No adverse impact is anticipated as a result of the proposed project.

Longview sponsors three industrial parks totaling 1,331 acres, and offers Industrial Foundation-assisted financing for in-migrating industries (SWEPCO, 1980a). In addition, the city has an arrangement with a large manufacturer that stipulates payments in-lieu-of-taxes in return for a non-annexation agreement through 1985. Such arrangements encourage industry to locate near the city, use the city's utilities, and pay a set, agreed-upon amount instead of ad valorem taxes, which can fluctuate from year to year (Municipal Advisory Council of Texas, 1980).

Hallsville

Hallsville is located directly north of the mine/power plant site and is the community nearest the project, with a 1980 population of 1,556.

In anticipation of nearby lignite development, the City of Hallsville has taken numerous positive steps to meet potential impacts. In 1978, Hallsville signed a contract with the City of Longview for the purchase of a minimum of 1 million gallons of treated water per month, up to a maximum of 20 million gallons per month. The additional water gives Hallsville a total system capacity of 2.7 mgd. The existing system should be able to handle an additional 6,000 connections.

A new EPA-financed sewage treatment plant is under construction and will increase treatment capacity to 0.320 mgd when completed in the fall of 1981. A current loading of 0.180 mgd on the existing plant exceeds the design capacity of 0.110 mgd. The new plant should be adequate for a population of about 3,200 persons, well in excess of potential in-migration stemming from the proposed project.

4.7.3.5 Transportation

The project site is located in the south-central portion of the overall study area, approximately 10 miles southwest of the City of Marshall and 12 miles east-southeast of the City of Longview. Based upon the geographical distribution of the surrounding area construction work forces, it is projected that approximately 50 percent of the project workers will come from the west (Gregg County) and 26 percent from the east (Shreveport-Bossier SMSA), using I-20 for access (EH&A, 1977c). Using a ridership factor of 1.5 persons per car, this would result in a peak of 416 workers using 554 vehicle trips per day between Gregg County and the project site on Interstate Highway 20. From the Shreveport-Bossier City area, an estimated 216 workers using 288 vehicle trips per day would use I-20 to the project site.

I-20 west of the site averaged 13,620 vehicle trips per day in the most recent available traffic count, while east of the site traffic was reported at 12,690 vehicle trips per day. The projected addition of 554 project-related vehicle trips west of the site on I-20 would result in a 4-percent increase over reported existing traffic levels, while the 288 additional vehicle trips on I-20 east of the project site would result in a 2-percent increase.

Another 13 percent of the total project construction force, or 108 workers, are expected to commute from the City of Marshall using State Highway 43 and U.S. Highway 80/Farm-to-Market Road 968 to gain access to the site. Assuming 1.5 riders per car, this will result in an additional 144 vehicle trips per day to be divided between the two access routes. The total combined reported average daily traffic volume of 4,080 vehicle trips for State Highway 43 and FM 968 will increase by 3.5 percent over reported existing traffic levels. It is expected that these slight additional increases in average daily traffic on I-20, State Highway 43, and FM 968 will result in a significant increase in traffic congestion, or create significant adverse impacts.

The remaining 11 percent of the construction work force, or 92 workers, are expected to originate from surrounding counties such as Rusk, Panola, Marion, and Upshur. This would result in an additional 122 vehicle trips per day spread over a variety of access routes from every direction.

4.7.3.6 Recreation

The power plant construction will continue to have minor adverse impacts to existing recreational activities, but will provide expanded opportunities for water-based leisure activities in the future. The area of the proposed power plant has been used previously for hunting activities. A private gun club operated in the area at one time.

The completion of the partially constructed cooling reservoir will have beneficial effects upon expanding water-based recreation. The cooling reservoir will be within easy driving distance of Longview, Hallsville, and Marshall.

Construction of the proposed mine is not expected to have a noticeable effect on recreation facilities, although local roads will experience an increase in traffic. In addition, construction of transportive and transmission line facilities will cause temporary disruption of local traffic flow through the area, potentially affecting recreational users. No existing or proposed recreational lands will be directly impacted by mining activities.

The expected in-migration of 876 workers and their families associated with power plant and mine construction will also create additional demands upon available recreational resources in the area. It is likely that these additional recreational demands will be most pronounced in the provision of urban leisure activities, as this portion of the East Texas area has a large amount of outdoor, rural recreational activities in nearby lakes, reservoirs, and national forests and preserves.

4.7.3.7 Aesthetics

Construction activities of the proposed Henry W. Pirkey Power Plant - Unit 1 will continue to have rather minimal adverse impact upon existing local aesthetics. The power plant is located 2.8 miles from State Highway 43 on the east, 1.7 miles from I-20 on the north, and 3.6 miles from the intersection of I-20 and FM 968 on the northeast, the closest areas of intense human activity.

The site is surrounded by higher elevation terrain on three sides (31-foot difference on the east, 21-foot difference on the north, and 6-foot difference on the south) as well as forested areas on all sides (40- to 50-foot upland tree species and 75- to 80-foot bottomland tree species) between itself and the local highways. On the east-northeast side, within about 1 mile, the terrain falls off to elevations 63 to 38 feet below the power plant construction site. However, the closest highway is about 3.6 miles away, and tall trees generally abound in this direction.

The tallest structure to be erected during the construction phase is a 525-foot stack. About 460 feet of the stack will rise above the terrain difference on the north and will probably be visible in certain portions of I-20, 1 to 3 miles away. However, nearby forested terrain generally intervenes in most areas and will provide a barrier to visual contact of either the power plant construction or the chimney stack presence.

The creation of the proposed cooling reservoir will certainly change the existing aesthetics, but will provide water storage, recreational facilities, and its own aesthetic values.

The proposed mining activities will alter local visual resources, although the project site is sufficiently removed from population concentrations and heavy traffic movement that the local impact will be minimal. Upon reclamation of the mine site, local aesthetics will be restored.

4.7.4 Operations Impacts

The following discussion addresses the socioeconomic impacts of the operation of the power plant including the associated transportive systems (makeup water pipeline, railroad spur, and transmission lines) and the mine.

4.7.4.1 Economic

Employment Effects

The initial operations phase of the proposed South Hallsville Mine is scheduled for July 1984, reaching full operation in January 1985, coincident with the start of the proposed Henry W. Pirkey Power Plant - Unit 1. The project life is estimated at approximately 30 years. During the long-term operations and maintenance activities of the project, approximately 100 workers will be directly employed at the power plant and 171 at the mine, for a total direct employment of 271, representing a beneficial impact to the local/regional economies.

Major employment skills needed at the power plant during the long-term operations phase include plant operators, coal handlers, machinists, welders, electricians, instrument repairmen, security, and janitorial services. Major employment skills at the mine include heavy machinery operators, oilers and maintenance men, mechanics, laborers, machinists, electricians, welders, engineers, and clerical workers.

Of the 100 workers directly employed at the power plant, approximately 40 will be hired from the local labor market and 60 will be transferred in by SWEPCO. About 80 percent or 137 of the 171 mine workers will be hired locally, with the remaining 20 percent, or 34 mine workers, in-migrating (SWEPCO, 1980a).

The creation of 271 long-term direct jobs is estimated to create another 273 jobs in secondary (support) industries for a total of 544 long-term jobs related to the project activities. Employment multipliers, of 2.05 for mining activities and 1.93 for power plant activities, were derived from the Longview SMSA regional input-output model, which estimates 180 secondary jobs related to mining and 93 secondary jobs related to power plant operations.

Assuming a 60-percent local capture rate for secondary employment, the operations and maintenance phase of the mine/power plant will create a total of 164 secondary jobs in the two-county area. However, because of the large increase in secondary employment arising from the peak construction phase, it is likely that the majority of these secondary jobs will carry over into the long term. Thus, it is assumed that all local secondary employment associated with the operations phase will not represent additional secondary jobs over those created by mine/power plant construction.

Table 4-25 differentiates between jobs likely to be filled by local residents and those filled by in-migrants. Total in-migration is limited to 94 primary employment positions at the mine/power plant, as all of the 164 locally based secondary employment positions will be filled by area residents, some of whom in-migrated during the construction phase.

Income Effects

Tables 4-26 and 4-27 indicate income effects of the mine and power plant, respectively, and Table 4-28 shows the combined mine/power plant national and local income effects. Total annual operations expenditures of $28.44 million (1980 dollars) for the mine are estimated to generate a secondary income of $20.92 million on the national level (U.S. Dept. of Commerce, 1979). Assuming that 78 percent of mine operations expenditures will be made in the local area, or about $22.18 million (SWEPCO, 1980a), approximately $15.85 million annually in secondary

TABLE 4-25

COMBINED OPERATIONS AND MAINTENANCE EMPLOYMENT

SOUTH HALLSVILLE MINE/HENRY W. PIRKEY POWER PLANT

Year	Total Employment[a]			Total Locally Based Employment			Jobs filled by Local Residents[b]			Jobs filled by Inmigrants		
	Primary	Secondary	Total	Primary	Secondary	Total	Primary	Secondary	Total	Primary	Secondary	Total
1983	100	93	193	100	56	156	40	56	96	60	0	60
1984	202	200	402	202	120	322	122	120	242	80	0	80
1985	255	256	511	255	154	409	164	154	318	91	0	91
1986	271	273	544	271	164	435	177	164	341	94	0	94
1987	271	273	544	271	164	435	177	164	341	94	0	94

[a]Includes out-of-area secondary employment; local capture rate is estimated at 60 percent.

[b]40 percent of the primary power plant employees and 80 percent of the primary mine employees will be hired locally (SWEPCO, 1980a); 100 percent locally based secondary employees will be hired locally.

Note: Numbers represent highest projected for any quarter of a given year. Secondary employment multiplier of 2.05 for mine operations and 1.93 for power plant operations (Longview SMSA Regional Input-Output Model, 1972).

Sources: SWEPCO, 1980a; Denver Research Institute, 1979; EH&A, 1972.

TABLE 4-26

ESTIMATED DIRECT AND SECONDARY
PROJECT-RELATED INCOME GROWTH
OPERATIONS PHASE
SOUTH HALLSVILLE MINE
(millions of 1980 dollars)

Estimated Annual Expenditures	
Labor	$ 5.13
Lease Payments	5.66
Machinery/Equipment	2.77
Materials	4.59
Power	4.76
Taxes, Insurance, Interest	4.87
Other	0.66
TOTAL	$ 28.44
Estimated Total Income Effect*	
National Income	$ 49.36**
Local Income	38.03***

* Represents additional income growth over "without project" income growth for each year of mine operations.

** Income multiplier of 1.73554 obtained from U.S. Dept. of Commerce, Bureau of Economic Analysis, 1979.

*** Local income multiplier of 1.7145 obtained from Longview SMSA Input-Output Model, 1972. Assumes 78 percent of mine operation expenditures will be made in local area.

TABLE 4-27

ESTIMATED DIRECT AND SECONDARY
PROJECT-RELATED INCOME GROWTH
OPERATIONS PHASE
HENRY W. PIRKEY POWER PLANT
(millions of 1980 dollars)

Estimated Annual Expenditures	
Labor	$ 2.50
Materials	1.00
Machinery	1.00
Insurance, other	0.50
Power and Fuel	45.00
TOTAL	$ 50.00
Estimated Total Income Effect*	
National Income	$ 94.62**
Local Income	84.34***

* Represents additional income growth over "without project" income growth for each year of power plant operations.

** Income multiplier of 1.89245 obtained from U.S. Dept. of Commerce, Bureau of Economic Analysis, 1979.

*** Local income multiplier of 1.7389 obtained from Longview SMSA Input-Output Model, 1972. Assumes 97 percent of power plant operation expenditures will be made locally.

TABLE 4-28

ESTIMATED DIRECT AND SECONDARY
PROJECT-RELATED INCOME GROWTH
OPERATIONS PHASE
SOUTH HALLSVILLE MINE AND
HENRY W. PIRKEY POWER PLANT
(millions of 1980 dollars)

Estimated Annual Expenditures	
Labor	$ 7.63
Machinery/Equipment	3.77
Materials	5.59
Power and Fuel	49.76
Taxes, Insurance, Interest	5.37
Other	6.32
TOTAL	$ 78.44
Estimated Total Income Effect*	
National Income	$143.98
Local Income	122.37

*Represents additional income growth over "without project" income growth for each year of mine/power plant operations.

Sources: U.S. Department of Commerce, Bureau of Economic Analysis, 1979; Longview SMSA, 1972.

income will be generated locally by mining operations, making a total income (direct and secondary expenditures) of $38.03 million for the Harrison - Gregg County area.

Average annual incomes of $20,000 for power plant workers and $23,300 for mine workers (SWEPCO, 1980a) are comparable to wages paid in the two-county study area manufacturing sector, and are not anticipated to cause appreciable change in either the local labor market or spending patterns of the existing work force.

Total annual power plant operations expenditures are estimated at $50 million (1980 dollars) (SWEPCO, 1980a). This amount is anticipated to create a national secondary income of approximately $44.62 million (U.S. Dept. of Commerce, 1979). Approximately 97 percent of power plant operations expenditures will be spent locally, or about $48.50 million annually; this will generate an additional estimated local secondary income of $35.84 million, for a total local income of $84.34 million annually.

Combined total annual income generated by the project operations phase will be about $143.98 million, with $122.37 million generated in the local area.

4.7.4.2 Population

The population in the two-county study area will be minimally affected by changes in the local employment structure brought about by the operations phase of the mine/power plant.

Increase wage and salary income and project-related non-labor expenditures represent beneficial impact to the local/regional economies in terms of additional trade and service sector activity and potential business investment and expansion.

Table 4-29 shows the population effects of the 271 long-term direct jobs at the project. An estimated total of 273 secondary jobs are to be created by the operations phase, for a total of 544 project-related jobs. In-migrants will fill approximately 94 direct jobs at the project, bringing with them an estimated total of 276 persons, or 78 households. The estimated 164 locally based secondary jobs created by the operations phase of the project will most likely be filled by carry-overs from the large secondary employment force generated by the construction phase. Therefore, no in-migrants are anticipated to fill secondary jobs arising from operations.

Studies of large industrial locations have shown that operations and maintenance workers may initially commute relatively long distances (i.e., up to 90 minutes travel time) if local housing is unavailable, but will locate close to the work site if possible. The worker's choice of residential location is dependent upon proximity to the site, the availability of services and housing, and educational, cultural, and recreational opportunities (Summers, 1976). Assuming that all 94 in-migrating workers, and the 273 long-term secondary employees carried over from the short-term construction secondary work force will seek permanent residence in the two-county area, a significant demand for single-family housing in the area would prevail.

The operations phase of the mine/power plant will support a project-related local population of about 1,163, or about 335 households (Table 4-30) (Stenehjem and Metzger, 1976). Based on western energy-development county averages, these households will contribute about 287 school-age children to the project area.

As discussed in Sec. 4.7.3.2, the age distribution of the in-migrating population is likely to be slightly lower than the existing local population (median age equals 29 years). The age distribution of in-migrants is projected to be around 38 percent in the 0 to 17 age group, 61 percent in the 18 to 64 age group, and 1 percent in the 65 and older age group.

TABLE 4-29

PROJECTED OPERATIONS- AND MAINTENANCE-RELATED POPULATION IN-MIGRATION 1983-1987

	New Population[a]	New Households[b]	New Students[c]
1983	176	50	44
1984	235	67	58
1985	268	76	66
1986	276	78	68
1987	276	78	68

Note: Population consists only of families of primary operations and maintenance workers; secondary workers are assumed to be 100 percent local.

[a]0.8 (in-migrating primary workers) X 3.55 + 0.1 (in-migrating workers).

[b]1.2 primary workers per household.

[c]0.8 (in-migrating primary workers) X 0.91.

Source: Denver Research Institute, 1979.

TABLE 4-30

PROJECT-SUPPORTED POPULATION

OPERATIONS PHASE

	Population Supported				Total Local Population Supported by Operations Phase	Households				Total Local Households Supported by Operations Phase	Local School-Age Children		
	Primary[1]		Secondary[2]			Primary[3]		Secondary[4]					
	Total	Local	Total	Local		Total	Local	Total	Local		Primary[5]	Secondary[6]	Local
1983	294	294	207	125	419	83	83	62	37	120	73	31	104
1984	594	594	446	268	862	168	168	133	80	248	147	66	213
1985	750	750	571	343	1,093	213	213	171	103	316	186	84	270
1986	797	797	609	366	1,163	226	226	182	109	335	197	90	287
1987	797	797	609	366	1,163	226	226	182	109	335	197	90	287

Assumes:

[1] 80 percent of primary operations employees are heads of family household; 10 percent live alone; 10 percent share households; average family size is 3.55.

[2] 60 percent of secondary employees are heads of family household; 30 percent are not heads of household; 10 percent live alone; average family size is 3.55.

[3] 1.2 primary employees per household.

[4] 1.5 secondary employees per household.

[5] Average school-age children per primary employee family = 0.91.

[6] Average school-age children per secondary employee family = 0.91.

Sources: SWEPCO,1980a; Denver Research Institute, 1979.

The in-migration associated with the operations and maintenance phase of the proposed project will be of considerably less magnitude than in-migration associated with the construction phase, and will coincide with the out-migration of construction workers leaving the completed project.

4.7.4.3 Housing

The additional 94 in-migrating workers and their families associated with the operations phase of the proposed project will represent an additional long-term demand on local housing. However, requirements will differ somewhat from those of the peak construction period of the project. Table 4-31 shows anticipated housing preferences of the operations work force; because operations workers tend toward longer-term employment than construction workers, a larger percentage prefers to invest in single-family dwellings. Of the total operations work force of 271, 70 percent are estimated to settle in single-family dwellings. Thus, 158 single-family homes will be occupied by operations workers in the two-county area. Because of the large peak construction force, of which 46 percent are estimated to acquire single-family dwellings, the housing needs of the operations work force should be met without additional housing or infrastructure requirements, as some out-migration of construction workers can be expected after 1984.

Table 4-32 shows estimated project-related housing needs by preference and income for the construction and operations phases. Peak demand for housing will occur during the 1983-1984 period as the locally based, project-related construction force reaches its highest level, requiring an estimated 399 single-family homes and 440 mobile homes. As the construction phase ends, a maximum net surplus of 225 single-family homes and 353 mobile homes could become available in the two-county region as a result of construction worker out-migration. However, the "without project" overall shortage of housing in the area and the area's general upward economic trend, especially in manufacturing, should result in absorption of a substantial percentage of the surplus single-family units.

TABLE 4-31

HOUSING PREFERENCE BY TYPE OF HOUSING
AND LEVEL OF INCOME
OPERATIONS PHASE

	Type of Employment	
Type of Unit	Operations ($20,000-23.000 Annual Income) (percent)	Secondary (Service) ($15.000 Annual Income) (percent)
Single-Family	70	15
Multi-Family	11	30
Mobile Home	17	45
Other	2	10

Source: Old West Regional Commission, 1975.

TABLE 4-32

LOCALLY-BASED, PROJECT-RELATED POPULATION
HOUSING NEEDS DURING CONSTRUCTION AND OPERATION PHASES
SOUTH HALLSVILLE MINE/HENRY W. PIRKEY POWER PLANT

Type of Unit	Construction Phase 1979-1984			Operations Phase 1984-2014		
	Primary	Secondary	Total	Primary	Secondary	Total
Single-Family	348	51	399	158	16	174
Multi-Family	68	102	170	25	33	58
Mobile Home	287	153	440	38	49	87
Other	53	34	87	5	11	16

Source: Old West Regional Commission, 1975; Denver Research Institute, 1979.

4.7.4.4 Community Facilities and Services

Operations phase population in-migration will require approximately 0.04 mgd of potable water supplies and 0.05 mgd of sewage treatment capacity over the life of the project. As Sec. 4.7.3.4 points out, all three potentially impacted cities will have substantial capacity for expansion by the time operations in-migration stabilizes at its peak of 276 in 1986.

The operations-related in-migration should be able to rely on police and fire service expansion and health care expansions occurring during project construction, thereby minimizing increased service improvements and any overall adverse impacts. The peak in-migration of 68 new students during operations represents a need for four additional teachers. The increased tax revenue gained by county, city, and school district jurisdictions as a result of the project represents a beneficial impact to the project area, and is expected to offset any additional service demands. Harrison County and the Hallsville Independent School District will gain substantial tax revenue increases with the addition of the $489.68 million mine/power plant project in their taxing jurisdictions. Project-related growth occurring in Longview, Hallsville, and Marshall will add a minimum estimated $20 million to local tax rolls in new home construction alone.

4.7.4.5 Transportation Facilities

The addition of 94 in-migrating workers to the two-county area should have minimum impact on existing loads of transportation routes to the project. As described in Sec. 4.7.3.5, the most heavily travelled routes are likely to be I-20, State Highway 43, and U.S. Highway 80/FM 968.

The total 271 direct employees at the project will be split into three work shifts, with about 52 percent on the day shift, 29 percent on the swing shift, and 19 percent on the graveyard shift. This would place a maximum of 219 workers on area highways during peak rush hours. Given a ridership factor of 1.2 persons per vehicle, this will result in an additional 182 vehicle trips per day (one way) on local area highways during the shift change between the day and swing shift, about 4 to 5 p.m. Because the above local highways have ample room for this additional traffic, no significant adverse impacts are projected to occur from this source.

The additional 94 in-migrant workers and their families in the local area will also add traffic pressures on local streets and highways, especially if many of them settle in Hallsville. In all cases, operations-related traffic levels will be less than those occuring during the peak construction phase.

4.7.4.6 Recreation

While the additional 276 persons in the local population associated with the mine and power plant operation will place some additional demands on local recreational resources, the creation of a 1,388-acre cooling reservoir will provide expanded outdoor recreational opportunities. However, there will be added demands placed on urban-based recreational resources.

The operation and maintenance activities in the long-term will deter hunting in the immediate plant area, although additional fishing opportunities will be provided by the cooling reservoir.

4.7.4.7 Aesthetics

As discussed in Sec. 4.7.3.7, the tallest structure at the South Hallsville Mine and the Henry W. Pirkey Power Plant - Unit 1 will be the 525-foot power plant stack. The closest nearby major roads are 1.7 miles (I-20 on the north), 3.6 miles (Interstate Highway 20 and FM 968 on the northeast), and 2.8 miles (State Highway 43 on the east) away. On all four sides, forested lands intervene between the power plant and local highways, and surrounding terrain exceeds the ground elevation of the power plant on three sides.

While the power plant chimney may be visible from certain portions of local highways, the remoteness of its location from these highways and the presence of intervening areas of higher elevation and forestlands will help mitigate the stack's visual presence on the landscape. Further, emissions from the stack will comply with applicable State and Federal standards. Opacity levels (measure of transparency) of stack emissons should not exceed 20 percent reduction in transparency levels. Again, due to its isolated location, noise sources attributed to mine and power plant activities should not generally affect local aesthetic characteristics.

Noise levels during normal operations of the mine and plant should not have any adverse impact in areas outside the power plant property. During testing periods and during emergencies at the power station, the safety valves will release large volumes of steam, which will create extemely high dBA levels. This does not pose a long-term threat because of their infrequent occurrence, short duration, and remoteness of source from population centers.

4.7.5 Combined Impacts of Mine and Plant

Due to the overlapping schedules of the mine and power plant, as well as the nature of the socioeconomic analysis, the combined employment, income, population, labor, housing, transportation, and recreation impacts of the mine and power plant have been addressed in Sec. 4.7.3 for construction and Sec. 4.7.4 for operation. The associated community facilities combined impacts of the mine and power plant are discussed below.

4.7.5.1 Community Facilities and Services

Water and sewage requirements of the combined construction and operation phases of the mine/power plant are shown in Table 4-33. Ongoing facility expansions in Longview and Hallsville are expected to provide the impacted cities

TABLE 4-33

TOTAL PROJECT-RELATED POPULATION IN-MIGRATION
WATER AND SEWAGE REQUIREMENTS,
GREGG AND HARRISON COUNTIES
1979-LIFE OF THE PROJECT
(Construction and Operations Phases)

Year	Water Supply		Sewage Facilities		Solid Waste Disposal
	Average Use[a] (gpd)	Maximum Use[b] (gpd)	Additional Lagoon Acres[c]	Maximum Need[d] (gpd)	Additional Landfill Acres[e]
1979	8,250	20,625	0.6	9,240	0.01
1980	12,300	30,750	0.8	13,776	0.02
1981	43,800	109,500	2.9	49,056	0.06
1982	156,150	390,375	10.4	174.888	0.22
1983	353,850	884,625	23.6	396.312	0.50
1984	361,350	903,375	24.1	404.712	0.51
1985	164.550	411.375	11.0	184,296	0.23
1986	68,850	172,125	4.6	77.112	0.10
1987	68,850	172,125	4.6	77,112	0.10

[a]Average 150 gpd per person.

[b]2.5 x the average, or 375 gpd per person.

[c]10 acres per 1,000 people, estimated in tenths of acres.

[d]168 gpd per person.

[e]0.21 acres per 1,000 people, estimated in hundredths of acres.

Source: Chalmers and Anderson, 1977.

with additional service capacity for project in-migration, and therefore, adverse impact will be slight.

Table 4-34 provides a breakdown of the potential public safety, health and recreational requirements induced by combined project-related in-migration. The greatest demand is associated with the peak employment period in 1983-1984. Table 4-35 indicates anticipated educational service expansions due to the mine/power plant.

4.7.5.2 Government Finances

The increased tax revenue gained by county, city, and school district jurisdictions as a result of the mine and power plant is expected to offset additional service improvements and/or expansions. Harrison County and the Hallsville ISD will gain substantial tax revenues with the addition of the estimated $490 million mine/power plant in their taxing jurisdictions. Using 1980 tax rates, the proposed project represents approximately $1.8 million in property taxes to Harrison County and approximately $4.2 million to the Hallsville ISD. In addition, project-related growth occurring in Longview, Hallsville, and Marshall will add a minimum estimated $20 million to local tax rolls in new home construction.

4.7.5.3 Combined Project Mitigation

Mitigating measures are available to three entities: local municipal and county officials, regional planning bodies, and the proposed power plant and mine owners-operators.

To assist local planners to rationalize the complex projected growth process and to avoid local service and facility overload, a regional comprehensive evaluation of overall in-migrant levels and project scheduling associated with cumulative area development is recommended. In-migrant population increases

TABLE 4-34

ADDITIONAL COMBINED PROJECT-RELATED COMMUNITY SERVICE REQUIREMENTS,
GREGG AND HARRISON COUNTIES,
1979-LIFE OF THE PROJECT
(Construction and Operations Phases)

	Public Safety			Health Care			Recreation
	Police Officers[a]	Office Space[b] (ft^2)	Fire Officers[c]	Doctors[d]	Dentists[e]	Hospital Beds[f]	Park Acreage[g]
1979	0	0	0	0	0	0	0.2
1980	0	0	0	0	0	0	0.3
1981	1	200	0	0	0	1	1.0
1982	2	400	1	1	1	5	3.6
1983	5	1,000	1	3	1	11	8.3
1984	5	1,000	1	3	1	11	8.4
1985	2	400	1	2	1	5	3.8
1986	1	200	0	1	0	2	1.6
1987	1	200	0	1	0	2	1.6

[a]2.1 officers per 1,000 persons.

[b]200 square feet of office space per officer.

[c]Two fulltime officers per 1,000 dwelling units.

[d]1.4 doctors per 1,000 persons (Texas state average).

[e]One dentist per 2,000 persons.

[f]4.5 hospital beds per 1,000 persons.

[g]3.5 acres per 1,000 persons, estimated in tenths of acres

TABLE 4-35

ADDITIONAL COMBINED PROJECT-RELATED
PUBLIC EDUCATIONAL REQUIREMENTS
GREGG AND HARRISON COUNTIES,
1979-LIFE OF THE PROJECT
(Construction and Operations Phases)

	Teachers[a]	Administrative Staff[b]	Additional Cost[c]
1979	1	0	$ 20.086.44
1980	1	0	30.129.66
1981	4	1	108.801.55
1982	14	2	384.990.10
1983	32	4	880.455.62
1984	33	4	900.542.06
1985	15	2	415.119.76
1986	7	1	195.842.79
1987	7	1	189.147.31

[a]Based on a teacher:student ratio of 1:16.53 for Texas during the 1979-1980 school year.

[b]One administrative staff per eight teachers.

[c]Based on a per pupil cost of $1,673.87 for Texas during the 1979-1980 school year.

Source: Texas Education Agency, 1980; Denver Research Institute. 1979.

attributable to the proposed power plant and mine construction and operations will contribute to the overall increases in population, but unrelated additional (other project) industrial activities will present an even larger cumulative impact.

New housing construction, facility requirements, and service expansions necessitate planning and securing of resources approximately 3 to 5 years prior to expected need. Early identification of financial alternatives available to local counties, municipalities and other public and private providers of goods and services will facilitate an orderly growth process.

Also, important mitigation action will include the coordination of local zoning regulations through a regional planning body. Local zoning regulations tailored to facilitate efficient and non-disruptive rapid expansion have been developed in energy-related growth areas in western states. Planned development strategies include requirements to phase subdivision expansion in coordination with the ability of local municipalities to expand public facilities. A second planning alternative available to local municipalities is that of annexation of developable areas that may rely (in the future) upon municipal water and/or sewage requirements. The capture of growth-related taxable property will enable the local communities to use in-migration as a primary source of additional tax revenues, as in-migrants are likely to locate, in many instances, in areas just outlying the municipal bounds. Some mitigative measures existent in local counties and municipalities will tend to shift costs of growth to new permanent residents, who will require additional services.

4.8 LAND USE

4.8.1 Existing and Future Environments

Harrison County's leading land-use classifications in 1976 (ETCOG, 1977) were woodlands (63 percent) and agricultural land (24.1 percent), totalling

87 percent of the county area. Of the total woodlands in Harrison County, 59 percent is commercial forest (Texas Forest Service, 1976). In contrast to the rural nature of Harrison County, urban land uses accounted for 63 percent of Gregg County, with the most rapid urbanization occurring in Longview where the population is expected to double by 1996. Woodlands made up 17.2 percent, and agricultural lands comprised 20.2 percent of Gregg County.

Agricultural acreage (land devoted to grazing and hay production) and woodland acreage is expected to decrease by 33,700 and 38,346 acres for Gregg and Harrison counties, respectively, by 1996, regardless of the proposed project. The loss of agricultural lands is attributed to urbanization and major industrial site acreage. An increase in surface water acreage in the two counties should contribute to the loss of agricultural lands with the construction of two proposed reservoirs, Marshall Reservoir and Caddo Reservoir.

In 1979, the major crop in Harrison County was hay (Texas Dept. of Agriculture, 1979). Other crops of minor importance cultivated in the county are oats, peaches, watermelons, and other vegetables. Cash receipts from all crops accounted for only an average 14.2 percent of the total cash receipts from farm marketings for 1979, not including timber marketings or government payments. Receipts from livestock and livestock products accounted for the remaining 86 percent.

The following land-use discussion and associated mapping effort used RRC land-use definitions with minor additions to more clearly identify existing land use patterns (RRC, 1980). Although 934 acres of cropland are identified, in the following narrative and on the land-use map, these areas are generally used for production of hay and support of livestock raising.

As shown in Table 4-36 land uses of the 3,111-acre plant site include pasture (955 acres), undeveloped forestry (2,068 acres), forestry (20 acres), developed water resources (26 acres), and cropland (42 acres).

TABLE 4-36

LAND USES PREEMPTED BY THE POWER PLANT, COOLING POND, AND
TRANSPORTIVE SYSTEMS
SOUTH HALLSVILLE PROJECT

Land-use Type	Plant Island	Cooling Pond	Plant Site Ancillary Activities Area	Total Plant Site Area	Pipe-line Corridor	Trans-mission Line Corridors	Railroad ROW	Total
Pasture	151	182	622	955	273	21.7	42.9	1,293
Undeveloped Forestry	120	1,183	765	2,068	354	63.1	55.3	2,540
Forestry	0	0	20	20	50	1.1	0	71
Undeveloped Water Cover	0	0	0	0	23	0	0	23
Developed Water Resources	1	14	11	26	0	0	1.9	28
Cropland	0	9	33	42	0	0	0	42
TOTALS	272	1,388	1,451	3,111	700	86*	100**	3,997

* An additional 56 acres of transmission line ROW is located in the power plant site.
** This includes only the area outside of the plant site.

Land uses identified within the 700-acre makeup water pipeline corridor include pastureland (273 acres), undeveloped forestry (354 acres), forestry (50 acres), and undeveloped water cover (23 acres) (Table 4-31). The makeup water pipeline is discussed in vegetation, Sec. 4.5.1.1 and EH&A (1981b). Land uses present along the proposed railroad spur and transmission lines are discussed in Sec. 4.8.3.1.

Land uses within the 20,771-acre South Hallsville mining and ancillary activities area are shown on Table 4-37 and Fig. 4-6. Existing land uses are pasture (38.4 percent), undeveloped forestry (47.3 percent), forestry (0.7 percent), cropland (4.3 percent), developed water resources (0.4 percent), undeveloped water cover (2.8 percent), undeveloped land (5.5 percent) and commercial-industrial (0.6 percent).

4.8.2 Effects of No Action

Trends in land use in the regional project area would follow a similar pattern to those now occurring, should the no action alternative be adopted. Other industrial development projects in existence and planned for the region will cause increased urbanization and industrialization of the predominantly rural area. This growth will likely be at the expense of land used for agricultural purposes, including crop, livestock, and timber production.

Though management practices may increase production, farmland will continue to decline. Existing trends show decreases in land used for production of crops as well as that used for pasture (U.S. Dept. of Commerce, Bureau of the Census, 1981).

TABLE 4-37

AREAS OF EXISTING LAND USE TO BE AFFECTED BY
THE SOUTH HALLSVILLE MINING AND ANCILLARY ACTIVITIES

Land Use Type	1984-1990 A_1*	1984-1990 A_2	1991-1995 A_1	1991-1995 A_2	1996-2000 A	2001-2008 A_1	2001-2008 A_2	1984-1990 B	1991-1995 B	1996-2000 B_1	1996-2000 B_2	2001-2008 B	2001-2008 C_1	2001-2008 C_2	Mine Disturbed Area	Mine Ancillary Activities Area	Grand Total Acreage
Pasture	227	150	73	199	341	287	607	458	376	326	122	1,341	107	88	4.702	3.276	7.978
Undeveloped Forestry	274	425	176	319	206	394	565	518	362	237	241	676	192	398	4,983	4.852	9.835
Forestry	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	148	148
Cropland	10	175	6	108	76	6	7	62	---	5	33	43	---	---	531	361	892
Developed Water Resources	---	---	---	3	8	---	7	7	4	3	---	---	---	---	32	42	74
Undeveloped Water Cover	---	---	---	---	---	---	---	---	---	---	56	6	---	---	62	514	576
Undeveloped	---	---	---	---	---	---	---	---	---	---	135	190	---	---	235	907	1.142
Commercial/ Industrial	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	126	126
GRAND TOTAL	511	750	255	629	631	687	1,186	1,045	742	571	587	2.166	299	486	10,545	10.226	20,771

*A,B,C, = mining blocks.

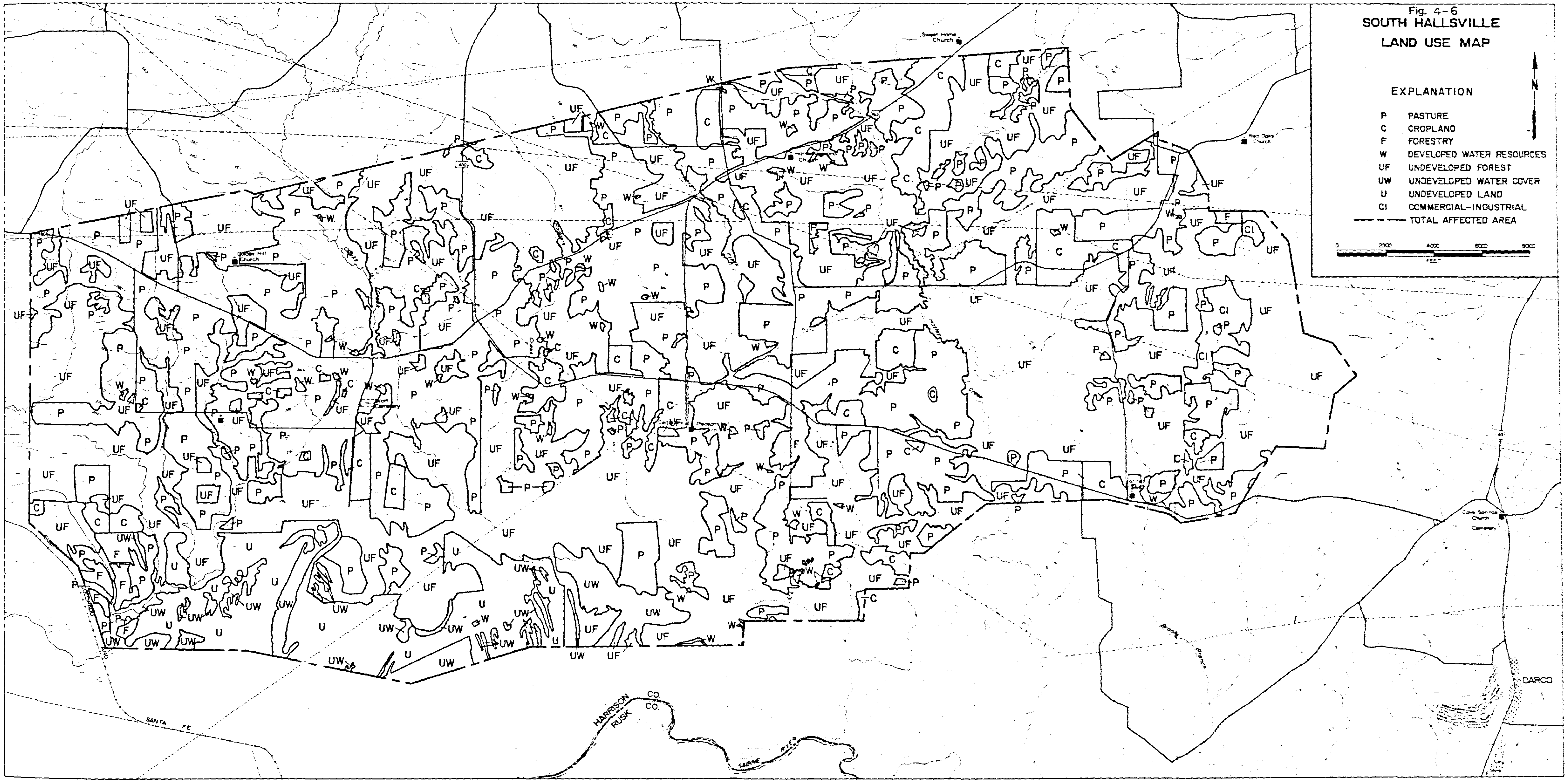


Fig. 4-6
SOUTH HALLSVILLE
LAND USE MAP

4.8.3 Construction Impacts

4.8.3.1 Power Plant

Plant Site

Approximately 272 and 1,388 acres of land for construction of the proposed Henry W. Pirkey Power Plant - Unit 1 and cooling reservoir, respectively, have been preempted from existing land use. Additionally, portions of the 1,451-acre plant ancillary activities area have been affected by construction of the plant and cooling reservoir. Timberland production in Harrison County is valued at $625 to $1,200 per acre (EH&A, 1981b). Thus, the removal of 2,088 acres of forested land (undeveloped forestry and forestry) from production for the long-term for construction of the power plant and cooling reservoir is costing $1,305,000 - $2,505,600 (1981) in timber production. An estimate of the cost of removal of 997 acres of agricultural land (pasture and cropland) is also available. The average value per acre of farmland in Harrison County is $636 (1978) (U.S. Department of Commerce, Bureau of the Census, 1981). Thus the removal of agricultural land for construction of the plant site and cooling reservoir is costing $634,092 (1978), excluding the value of foregone production. This loss represents a major irretrievable commitment of resources and a significant, long-term impact.

Transportive Systems

Approximately 700 acres in the makeup water pipeline corridor have or will be affected during construction of the pipeline. Thus, the removal of 404 acres of forested land (undeveloped forestry and forestry) from production in the long term for construction of the pipeline corridor is costing $252,500 - $484,800 (1981) in timber production. The removal of 273 acres pasture for construction of the pipeline corridor is costing $173,628 (1978), excluding the value of previous production.

Land uses of the transmission line corridors were interpreted from color infrared aerial photograpy (1:65,000, 2-26-80). The three segments of transmission lines have a combined length of 11.7 miles and total acreage of 142 acres (100-foot ROW) approximately 56 acres of which have been previously disturbed by power plant construction. Segment A is 7.2 miles in length, transversing the southeastern extreme of the South Hallsville Mine site east-west from an existing 138 kV transmission line to just east of Hatley Creek. The proposed segment A crosses the Henry W. Pirkey Power Plant site in a southwest-northeast direction. This section of segment A has been disturbed by construction of the power plant. Impacts to land use have been previously discussed. Existing land uses of the undisturbed portion of segment A are undeveloped forestry (89 percent), pasture (19 percent) and forestry (2 percent).

Segment A crosses a 16" Arkansas-Louisiana Gas line, a 16" United Gas line and an 18" Exxon Crude pipeline. Approximately 87.3 acres of existing and previous land uses will be disturbed by construction of segment A.

Segment B is 1.5 miles in length, extending from the Henry W. Pirkey Power Plant to an existing 138 kV transmission line. Approximately 1.4 acres of the 18.2 acres ROW have been disturbed by construction of the plant and land use impacts previously discussed. Existing land uses of the undisturbed portion of segment B are undeveloped forestry (65 percent), and pasture (35 percent). Segment B crosses a 10" United Gas pipeline. Approximately 18.2 acres of previous and existing land uses will be disturbed by construction of segment B.

Segment G of the proposed transmission line extends from the plant site north to an existing 138 kV transmission line. Segment G of the proposed transmission line is 3 miles in length, approximately 12.9 acres of which has been disturbed by power plant construction. Existing land uses of the undisturbed portion of segment G are undeveloped forestry (40 percent) and pasture (60 percent). Two large reservoirs are crossed by segment G. Segment G crosses I-20 and FM 965 and an existing 138 kV transmission line. Approximately 36.7 acres of existing and previous land uses will be disturbed by construction of segment G.

The 64.2 acres of forested land along the three transmission line segments is valued at $40,125 - $77,040 (1981). The 21.7 acres of pastureland along the three transmission line segments is valued at $13,801 (1978).

The railroad spur associated with the Henry W. Pirkey Power Plant is approximately 3.5 miles long. The ROW width varies from 100 feet to 350 feet. Construction of the railroad spur has impacted approximately 100 acres of land. Previous land uses of the railroad spur include pastureland (42.9 acres), undeveloped forest (55.3 acres) and developed water resources (1.9 acres). The pastureland is valued at $27,284 (1978) and the undeveloped forest at $34,567 - $66,360 (1981).

4.8.3.2 Mine Area

Construction impacts of the proposed South Hallsville Mine area include preemption of the mine ancillary activities area from existing land uses totalling 10,226 acres, 473 of which will actually be consumed by construction of roads and mine facilities. Land uses that will be replaced by the mine ancillary activities area are pasture (3,276 acres), undeveloped forestry (4,852 acres), forestry (148 acres), cropland (361 acres), developed water resources (42 acres), undeveloped water cover (514 acres), undeveloped land (907 acres), and commercial-industrial (126 acres). Using the methodologies employed in Sec. 4.8.3.1 for estimation of the cost of removal of timberland and agricultural land, cost for removal of 5,000 acres of undeveloped forestry and forestry for construction activities of the South Hallsville ancillary activities area would range from $3,125,000 to $6,000,000 (1981). Cost of removal of 3,637 acres of pasture and cropland is estimated at $2,313,132 (1978), excluding value of previous production. This loss represents a major irretrievable commitment of resources and a significant, long-term impact.

4.8.4 Operations Impacts

4.8.4.1 Power Plant

Operations impacts of the power plant, cooling reservoir, makeup water pipeline, transmission lines, and railroad spur to existing land uses are the ongoing affects of construction (Sec. 4.8.3.1) over the long-term.

4.8.4.2 Mine

The proposed mine site area comprises 20,771 acres of land. Of the total site acreage, 10,545 acres will be disturbed and reclaimed at a rate of approximately 439 acres each year for the 24-year life of the mine. (An additional 473 acres will be disturbed by construction of roads and mine facilities.) The remaining 9,753 acres will potentially be affected by mining activities as mining progresses.

Before land-clearing operations begin, existing buildings, pipelines, roadways, fences, and power and telephone lines within the boundaries of each mine activitiy site will be cleared or relocated. In addition to clearing man-made objects, all trees and brush will be felled, stacked and burned. The land-clearing operation will be continued intermittently. As stated previously, an average 439 acres per year must be disturbed, but this figure may vary as a result of the density of vegetation and man-made objects on the proposed mine site.

Fourteen mining blocks, totaling 10,545 acres will be mined alternately from the years 1984-2008 (Table 4-32). Current land uses in the mining blocks are undeveloped forestry (47.3 percent), pasture (44.6 percent), cropland (5 percent), undeveloped land (2.2 percent), undeveloped water cover (0.6 percent), and developed water resources (0.3 percent). From 1984-1990, 2,306 acres will be disturbed by mining activities. Between the years 1991 and 1995, 1,626 additional acres will be mined while the previous mining blocks are reclaimed. Two additional phases of mining will occur between 1996-2000 and 2001-2008 preempting 1,789 acres and 4,824 acres from existing land uses, respectively. Since the land will be reclaimed within several years of mining, the amount of disturbed surface at any one time will be a small portion of the cumulative total. Additionally, as mining progresses, there is a potential for disturbance of part of the 10,226-acre mine ancillary activities area (Table 4-32).

A series of short-term, but intense land-use impacts will result from the surface mining project. Lignite extraction activities scheduled for the sequential mining area include: (1) land clearing, (2) topsoil removal, (3) overburden/lignite removal, and (4) reclamation.

Potential land-use changes on the entire 20,771 acre mine and ancillary activities area caused by the lignite extraction activities include the removal of 9,835 acres of undeveloped forestry, 148 acres of forestry, 7,978 acres of pasture, and 892 acres of cropland. As mentioned in Sec. 4.8.3.1, per acre value for timberland capable of producing pine ranges from $625 to $1,200 (1981) in Harrison County (Risner, 1981). Commercial timbering will take place prior to mining. However, it is possible that future timber production will not be practical and future timber revenues would therefore be lost. The average value per acre of farmland in Harrison County is $636 (1978) (U.S. Dept. of Commerce, 1981). Therefore, the 8,872 acres of agriculture land (pasture and cropland) is valued at $5,641,320 (1978), excluding the value of previous production.

As described in Sec. 3.5, General Reclamation Procedure, the surface 6 inches of topsoil remaining in place after land clearing operations will be removed and redistributed as the final postmining surface layer, unless a mixed overburden technique is used. Topography of the site will be restored to approximate premining contours.

As described in Sec. 3.5, (Revegetation), after the reconstructed soil has been conditioned, and during a favorable planting period, revegetation will begin. Three revegetation stages are proposed in the South Hallsville Mine Reclamation Plan. The first two stages are preparatory for the establishment of permanent postmining vegetation. Stage 3 will continue until the RRC considers the site successfully reclaimed.

Species selected for permanent cover (Reclamation Stage 3) are listed in Table 3-6. These species should provide vegetational cover capable of supporting pasture, woodland, and wildlife habitat. Distribution of postmining land uses has not been determined for the entire project area at the present time. However, reclamation plans have been proposed for the 5-year permit area. In agreement with many land owners, the proposed prominant land use for the 5-year permit area is pasture (Sabine Mining Company, 1981).

RRC regulations (051.07.04.399-Post Mining Land Use) require that the permit area be restored in a timely manner to conditions capable of supporting premining land uses or to conditions capable of supporting approved alternative land uses. Alternative land uses may be approved by the RRC after consultation with the landowner and land management agency having jurisdiction over the site. The proposed alternative land use must also be compatible with adjacent land uses and with local, state, and federal land-use policies and plans. The proposed alternative must also meet other criteria detailed in the regulations (RRC, 1980). Although the RRC does recommend species diversification in reclamation, final postmining land uses are ultimately decided upon by the landowner (Launieus, 1981).

Greatest land-use effects will occur between the years 2001-2008 in five mining blocks. A total of 4,824 acres will be committed to industrial land use during this period. Additionally, 20 acres occupied by the mine facilities, 1,660 acres occupied by the power plant and cooling reservoir and a small area for the pipeline, railroad spur, and transmission lines ROW will be removed from existing land use for the life of the project.

As previously mentioned, regulations require either that disturbed areas be reclaimed to previous land uses or an alternative land use approved by the RRC, giving a short-term aspect to lignite development. However, long-term effects of lignite mining can involve possible impairment of potential future use of the land as recreational or wildlife habitat. Surface mining may preempt or greatly modify wildlife habitat and aesthetic qualities by altering chemical and physical properties and topography of the land. Potential adverse effects upon significant wildlife habitats or site-specific aesthetic/recreational values will be reviewed by regulating authorities, and appropriate mitigative measures will be developed.

Increased urbanization due to in-migrant workers' housing, schools, wastewater, and water treatment facilities will affect the surrounding area for the long-term. Expansion of cities is at the expense of open lands generally used for agricultural purposes. Marshall, Longview, and Shreveport are expected to receive in-migrant populations.

4.8.5 Combined Impacts of Plant and Mine

Impacts of the power plant included the long-term removal of 3,997 acres for construction of the power plant, cooling reservoir, and transportive systems. While 10,545 acres will be disturbed by mining, regulations require that the land be reclaimed, giving a short-term aspect to lignite mining. Long-term impacts of lignite mining involve the possible impairment of potential future use of the land as recreational or as wildlife habitat.

Surface mining may disturb or greatly modify wildlife habitat and aesthetic qualities by altering chemical and physical properties and topography of the land. The RRC recommends that reclamation practices stress the importance of multiple uses and the introduction of vegetation species that offer food and cover for wildlife as well as those used for forestland or pastureland (Launieus, 1981).

During the construction and operation of the two sites, existing land uses in the 24,768-acre project area will be partially converted from agricultural land/forestland/wetland uses to industrial use. As construction of the power plant is underway, impacts to existing land uses are now being realized. During operation, reclamation will proceed on the surface-mined acreage. When operations cease, aquatic habitat will be increased by an approximately 1,388-acre cooling reservoir on the proposed power plant site, which can be used to support certain aquatic biota. On the mine site, 10,545 acres will have been disturbed by mining and 10,226 acres in the mine site ancillary activities area could potentially have been disturbed. On the power plant site, cooling reservoir, and transportive system, 2,546 total acres will be disturbed, plus some additional acreage in the ancillary area. Further, in the regional area, permanent urban expansion will cause the long-term conversion of existing land uses (primarily agricultural) into urban areas.

4.9 CUMULATIVE IMPACTS

To this point, the impact analysis covered in the EIS has been developed in terms of the primary and secondary impacts associated with the H. W. Pirkey Power Plant - Unit 1 and the South Hallsville Surface Lignite Mine. Assessing the cumulative environmental effects of many power plants and surface mines located in different locations is much more difficult. However, certain requirements and characteristics relating to energy development demonstrate that cumulative environmental impacts resulting from existing and planned projects are a real concern. Therefore, for this assessment, "cumulative" refers to:

1) What? - Energy projects, primarily those associated with lignite mines.

2) Where? - In Texas, mainly along the lignite belt.

3) When? - Over the next 20-25 years.

The coal (bituminous and lignite) development picture for Texas is placed in perspective as follows:

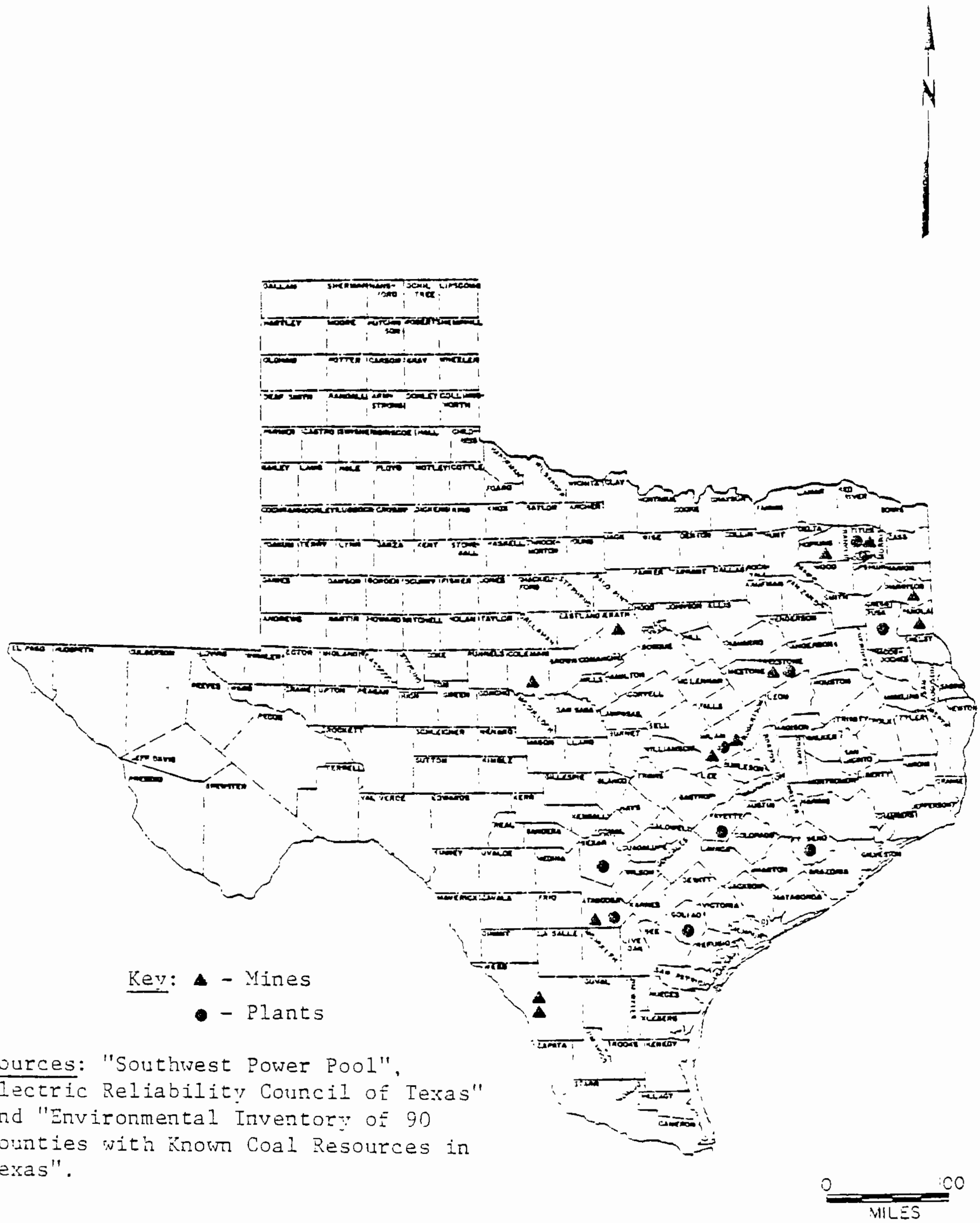
1) In 1981, roughly 95 percent of all coal produced in Texas was lignite (about 40 million tons), and production is estimated to more than double by 1990.

2) At this time, there are 12 coal mines and 10 coal-fired electric generating stations operating in Texas (see Fig. 4-7).

3) By 1990, an additional 15 coal mines and 16 coal-fired electric generating stations are estimated to be operating in Texas (see Fig. 4-8).

In considering the cumulative effects of Texas energy development on the environment, the following areas are addressed:

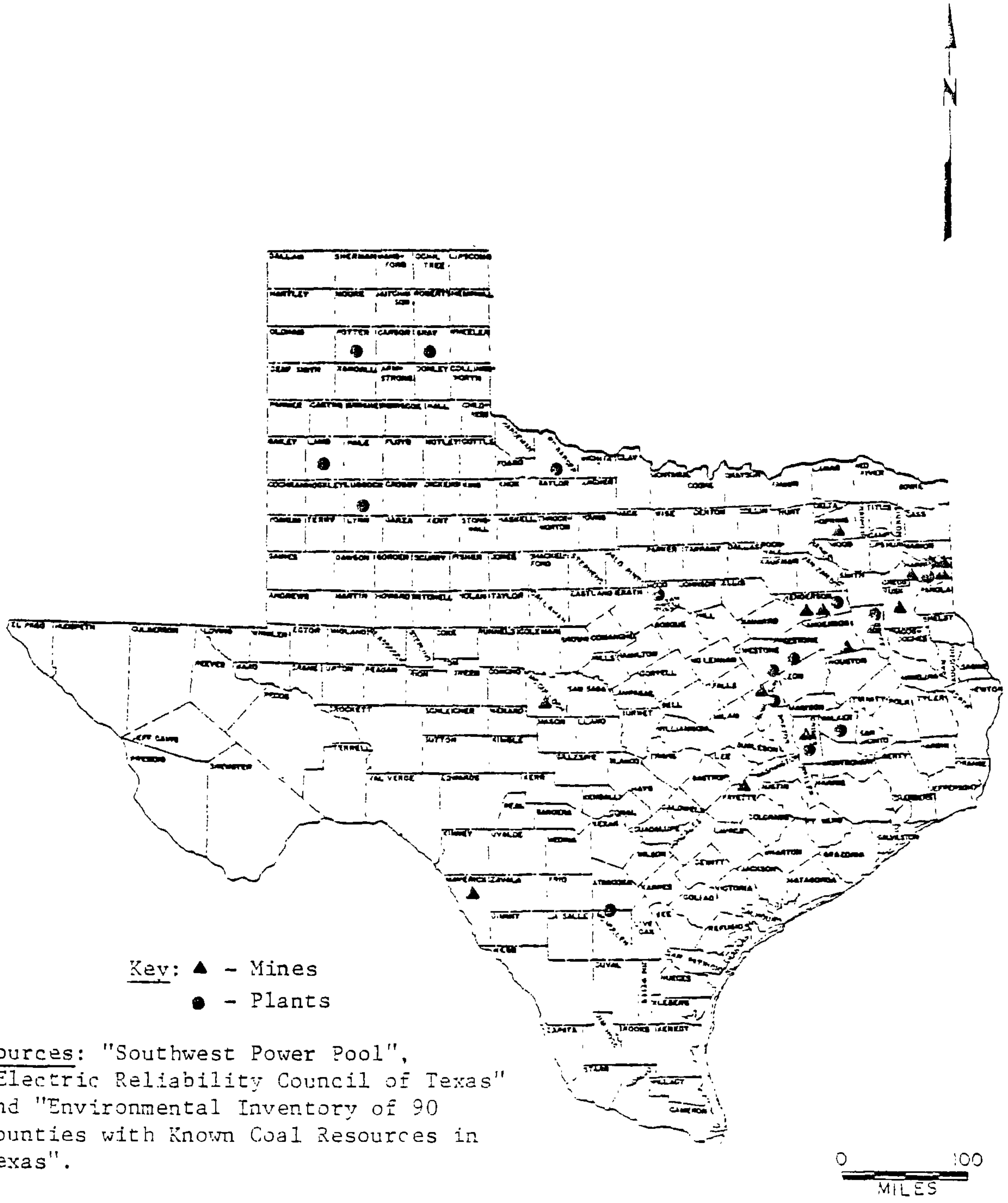
1) Air Quality - The cumulative impact on air quality of several projects, particularly those located in the same general area, is an issue because power plant emissions are usually carried for many miles by the wind. However, the cumulative impact of criteria pollutant emissions from these large point sources is modeled in the PSD permit application and controlled by the PSD permit. Therefore, our concern centers on the possible formation of acid rain. Acid rain deposition effects on the environment are the subject of many large on-going studies that directly involve EPA. Some of them show predicted changes in pH and locations of acid precipitation. Also, some promising abatement technology is being explored that may reduce potential adverse impacts. Recognizing that acid rain formation is a subject of nationwide concern, there is still widespread study and discussion on how to



Sources: "Southwest Power Pool", Electric Reliability Council of Texas" and "Environmental Inventory of 90 Counties with Known Coal Resources in Texas".

FIGURE 4-7:

EXISTING COAL MINES AND GENERATING UNITS



Sources: "Southwest Power Pool", "Electric Reliability Council of Texas" and "Environmental Inventory of 90 Counties with Known Coal Resources in Texas".

FIGURE 4-3:

PLANNED COAL MINES AND GENERATING UNITS

accurately assess cumulative effects of coal development in Texas on this aspect of air quality. As future projects are developed, more accurate and extensive monitoring is accomplished, and other studies are complete, a more definite assessment may be made on acid rain formation and impact.

2) Wildlife/Habitat - Since wildlife species and habitat are impacted primarily from the land requirements associated with these energy projects, the cumulative impacts can be assessed in terms of the total acreages affected. It is expected that a total of about 375,000 acres will be disturbed in Texas by surface mining. Generally, each mining area includes some good quality wildlife habitat, especially along waterways and in bottomlands. The cumulative impacts of these projects include the loss of various wildlife habitat types during mining, and more importantly, the possibility that many of the more sensitive habitat types (e.g., marshes, swamps, bogs, etc.), cannot or may not be fully re-established after reclamation. Therefore, these potential, cumulative adverse impacts constitute an irretrievable commitment of these important natural resources. Also, landowner preference usually dictates the ultimate land-use type after mining, and the trend appears to be more conversion to improved pasture. A long-term cumulative effect of this trend would be an adverse impact on wildlife habitat.

3) Land Use - Since this environmental category is also related to overall land requirements, the cumulative impacts also relate to the numbers of acres affected. Using the same habitat figures of 375,000 acres, it is clear that the amount of land affected is very large. However, an important long-term criterion in assessing impacts is the change in land use on the acreages affected. In this

regard, it is important to note that a change in itself is not necessarily an adverse impact. Generally, the value of the land should remain the same since the productivity of reclaimed land must, by law, be as good or better than it was before mining. But the cumulative adverse impacts at the numerous power plant sites could constitute a loss in land use from each of those areas. These potential losses would depend on the amount of land involved and whether mitigation plans compensate for these adverse impacts in other areas.

4) Ground Water and Surface Water - Because of factors associated with ground water, cumulative impacts are more difficult to distinguish. These factors include the distances between projects, the relatively low velocities of flow, and the natural forces that help to replenish and cleanse ground-water resources. Nevertheless, these energy products collectively can affect large amounts of ground-water reserves, and many projects could cause long-term impacts on individuals who may be in competition for this resource, particularly if the reserve is depleted faster than it can be recharged. Another important point is that for adverse ground-water quality impacts, long-term may not only include a 20-year mining operation, but also some time after mining and reclamation since the natural process to improve any ground-water degradation is very slow. Therefore, cumulatively, increased mining operations could increase the potential for more ground-water resources to be adversely impacted. And adverse impacts on ground-water quality could last beyond actual mining if left to natural forces for improvement or recovery.

Cumulative impacts of surface water resources are also difficult to distinguish because of the distances between projects and the natural forces that replenish this resource. Nevertheless, there could be cumulative adverse impacts from these large energy projects that divert water courses, increase runoff, and consume water in operation. But since reclamation activities greatly reduce the occurrence and severity of many surface hydrology impacts, the long-term cumulative effects would be minimal.

5) Socioeconomics - Since these energy projects usually provide jobs and income to individuals and families, there are beneficial impacts from productivity and growth in local communities, towns, and cities. However, because rapid population growth sometimes increases the need and demand on public services faster than they can be effectively provided, there may also be recognizable adverse impacts. The greatest potential for cumulative adverse impacts is in areas where projects are close together. But because of the time required to develop these large-scale projects, many potential problem areas can be anticipated, and city planning can be done in advance. Therefore, these effects should be short-term and not generally of a scale to constitute "cumulative" concerns.

6) Cultural Resources - Cultural resources are likely to be affected by these energy projects because of the large land areas that are required. However, State and Federal law dictates that impacts on cultural resources be considered in each of these projects. Compliance with these requirements should adequately protect these resources. Cumulatively, an overall beneficial impact may be derived from the expansion of knowledge regarding past cultures through surveys provided with this compliance.

The cumulative impact assessment of coal development in Texas has been directed in this assessment primarily at air quality, wildlife/habitat, land use, ground water, surface water, socioeconomics, and cultural resources. However, these are not the only environmental areas in which cumulative impacts can or will occur. On the contrary, there could be some cumulative impacts from energy projects in every environmental category. What is intended, is to recognize that impact assessment and environmental review of cumulative impacts is complex and is only now beginning to be understood. As more projects are planned, constructed, operated, and monitored, more accurate assessments of cumulative impacts in each environmental category will be possible.

5.0 COORDINATION

Coordination with other Federal agencies, State agencies, and the public are set forth in EPA's implementation procedures on NEPA (44 FR 64174-64193) and in public participation final regulations (44 FR 10286-10297). Letters of comment, notices, and other coordination documentation are presented in chronological order at the end of this section.

5.1 SCOPING PROCESS

Pursuant to the requirements of NEPA, a notice of intent to prepare an EIS on the issuance of an NPDES permit for the proposed South Hallsville Project was issued by EPA, Region 6, on 10 July 1981. Federal, State, and local agencies, and the public were invited to participate in the process for determining the scope of issues to be addressed and for identifying the significant issues related to a proposed action. A public meeting was held on 18 August 1981 at the Marshall High School Auditorium in Marshall, Texas. There were, however, no comments made or questions asked by those who attended the public meeting.

On 10 July 1981, EPA sent the Notice of Intent to public interest groups and to interested Federal, State, and local agencies; they were invited to participate in the EIS process. Cooperating agencies for this statement are:

U.S. Army Corps of Engineers
  Fort Worth District

U.S. Department of the Interior
  Bureau of Reclamation
  Fish and Wildlife Service
  National Park Service
  Office of Surface Mining

U.S. Department of Agriculture
  Soil Conservation Service
  U.S. Department of Energy
  NEPA Affairs Division

Federal Emergency Management Agency

State of Texas
- Railroad Commission
- Surface Mining and Reclamation Division
- Historical Commission

Department of Highways and Public Transportation
- Air Control Board
- Department of Health
- Department of Water Resources
- Bureau of Economic Geology

5.2 AGENCY COORDINATION

5.2.1 Section 7 Consultation - FWS

In accordance with the Endangered Species Act of 1973, as amended, EPA requested information concerning the presence of threatened and endangered species in the area of proposed power plant and adjacent lignite mine in Gregg, Harrison, and Rusk counties. FWS responded with a letter dated 3 September 1981, listing three federally listed endangered or threatened species as potentially occurring in the project area. These species are the Red-cockaded Woodpecker, American Alligator, and the Bald Eagle. The potential for each of these species occurring on the project site has been previously mentioned (see section 4.5.2.1).

Informal conversation with FWS began in September 1981, for the purpose of developing a suitable methodology for satisfying the requirement of Section 7 of the Endangered Species Act. These and subsequent telephone conversations with FWS (Curtis Carley and Gary Halverson (Region 2 FWS-Albuquerque), primarily on 1-2 October and 21 December 1981) have resulted in a tentative plan for conducting the Section 7 biological assessment.

Because of the fact that many of the project activities associated with the South Hallsville mine will not take place for many years in the future, the biological assessment activities will be conducted in a time-phased manner. At this time, a biological assessment of a mining block, which will not be mined until the year 2000 or later, is not appropriate since many factors may change during the interim period (e.g. land use, vegetation and even the status, of the endangered species which may occur on the project site). Therefore, prior to initiation of physical activities (e.g. clearing, mining, etc.) associated with each phase of the project, a biological assessment specific to that phase will be conducted and provided to EPA for evaluation. This assessment will be completed in a timely manner so as to allow sufficient time for comment by FWS and any formal consultation procedures that may be necessary.

Specific survey and assessment methodologies are currently being finalized; however, general aspects have been tentatively proposed. General areas (i.e., upland forest) which may contain Red-cockaded Woodpecker habitat will be determined through the use of infrared and black-and-white aerial photography as well as existing baseline vegetation and land use maps. These general areas will then be investigated on the ground by an experienced wildlife biologist with Red-cockaded Woodpecker survey experience in order to determine if each block of similarly managed land appears to fulfill the specific habitat requirements of the Red-cockaded Woodpecker (e.g., age of stand, openness of stand, lack of hardwoods in excess of 15 feet in height, etc.). Any areas which then appear to be potential habitat for the species will be searched in detail (100 percent coverage if practical) so as to determine the actual presence or absence of the woodpecker.

Potential habitat for the Bald Eagle and American Alligator is believed to be much more limited in extent and areal distribution. Any areas on the project site which appear to be good habitat for either of these species will be noted, photographed and evaluated in terms of the potential for usage by these endangered species. Signs of the American Alligator will be searched for along the edges of any good potential habitat which may be affected by project activities.

5.2.2 Section 404/10 - USCE

The Ft. Worth District of the USCE was invited to participate as a cooperating agency because their District boundary transects the proposed project area (see letter of response dated 30 July 1981). The pipeline and water intake structure for the proposed power plant was authorized under Section 404 of the Clean Water Act and Section 10 of the River and Harbor Act of 1899 by Department of the Army permit SWF-80-MARION-280 (see enclosures as stated in letter of response dated 30 July 1981).

5.2.3 Section 106 - NHPA

Under Section 106 of the NHPA of 1966, as amended, the SHPO was contacted concerning the proposed South Hallsville Project. The Notice of Intent was forwarded to the SHPO for review (10 July 1981). The SHPO staff concurred that compliance procedures for Section 106 of NHPA and the pertinent federal regulations have only been partially accomplished (see letter of response dated 11 August 1981). A Memorandum of Agreement (MOA) will be drafted between EPA, SHPO, and the Advisory Council on Historic Preservation to avoid or minimize adverse impacts on cultural resources in compliance with Section 106 of the National Historic Preservation ACE of 1966.

5.2.4 Executive Order 11514, Avoid or Mitigate Adverse Effects on Rivers in the Nationwide Inventory

In response to the EPA's notice of intent to prepare an EIS, the U.S. Dept. of the Interior, National Parks Service in their 13 August 1981 letter requested a discussion on potential adverse effects on the scenic, historic, and wildlife values of the segment of Sabine River included in the Nationwide Inventory (Federal Register, September 8, 1980). In accordance with this request, the EIS examines the relationship of the mining and power plant operation to the Inventory river segment in Sec. 4.7.1.7 and 4.9.5. No impacts that would lessen or foreclose the options to classify any portion of the inventory segment as wild, scenic, or recreational river area would occur.

5.2.5 Other Agency Concerns

Concerns expressed in letters from other Federal and State agencies are listed below:

- o Effects of discharges of dredge and fill material into waters of United States on aquatic and terrestrial organisms, water quality parameters, and the overall aquatic ecosystem (USCE, 30 July 1981; TDWR, 25 August 1981).
- o A description of the proposals for restoration or mitigation of wetlands adjacent to the Sabine River that will be affected by the projects (USCE, 30 July 1981).
- o Discussion of hydrologic impacts, including cumulative effects of other projects affecting the same aquifer/recharge areas (OSM, 31 July 1981).
- o Assess different overburden handling techniques and the resulting potential for vegetation (OSM, 31 July 1981).
- o Discussion of land-use changes, including a comparison of pre- and post-mining scenarios (OSM, 31 July 1981).
- o Impacts of construction and mining activities on natural and cultural resources (National Park Service, 13 August 1981).
- o Any possible adverse effects on the scenic, historic and wildlife values of the segment of Sabine River included in the "Nationwide Inventory" (Federal Register, September 8, 1980) (National Park Service, 13 August 1981).
- o Discussion of steps that will be taken to mitigate erosion, increased run-off, and impact to the 100-year flood plain during mining operation (FEMA, 13 August 1981).

Additional letters from agencies acknowledging the notice of intent and requesting copies of this EIS are included in this section. Also included are letters from agencies granting various permit applications for construction of project-related structures.

5.3 EIS REVIEW PROCESS

Upon notice of availability of this Draft EIS in the Federal Register, a 45-day comment period is initiated during which comments are solicited from Federal, State, and local agencies, from the applicant, and from the public. A public hearing will be scheduled. After the comment period and public hearing, and after comments have been responded to by EPA, the Final EIS will be prepared and distributed. The Final EIS will have a 30-day comment period, after which EPA can issue a record of decision on the NPDES permit action.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION VI
1201 ELM STREET
DALLAS, TEXAS 75270

July 10, 1981

NOTICE OF INTENT TO PREPARE AN ENVIRONMENTAL IMPACT STATEMENT

AGENCY: U.S. Environmental Protection Agency (EPA)

ACTION: Notice of Intent to prepare an Environmental Impact Statement (EIS) on the H. W. Pirkey Power Plant and the South Hallsville surface lignite mine.

PURPOSE: In accordance with Section 102(2)(C) of the National Environmental Policy Act, EPA has identified a need to prepare an EIS and publishes this Notice of Intent pursuant to 40 CFR 1501.7.

FOR FURTHER INFORMATION CONTACT: Mr. Clinton B. Spotts
Regional EIS Coordinator
U.S. EPA, Region 6 (SA-F)
1201 Elm St., Suite 2800
Dallas, Texas 75270
Telephone: (214) 767-2716 or (FTS) 729-2716

SUMMARY:

1. Description of Proposed Project - Southwestern Electric Power Company (SWEPCO) is developing a lignite-fired steam electric generating station near Hallsville, Harrison County, Texas. This facility, designated the H. W. Pirkey Power Plant, will consist of one generating unit with a net capacity of 640 megawatts. Major appurtenances of the outdoor steam generator (boiler) and the indoor turbine generator will be a 1,250-acre cooling pond for condenser heat dissipation and a wet limestone flue gas desulfurization system for control of sulfur dioxide air emissions. Makeup water for the plant will be provided by a pipeline from Cypress Bayou. Construction of the power plant was begun in April 1979, and the unit is scheduled to enter commercial operation during the spring of 1985.

   Fuel for the power plant will be provided by an adjacent surface lignite mine in Harrison County, Texas, designated the South Hallsville mine. This mine will be owned by SWEPCO but mining operations will be conducted by the Sabine Mining Company, a subsidiary of North American Coal Company, under contract to SWEPCO. The surface mine will produce approximately 2.8 million tons per year and actual surface mining is scheduled to commence in late 1984.

2. Alternatives - The EIS will evaluate the impacts of reasonable alternatives to project(s) construction and operation, including no action, as well as alternatives regarding issuance or denial of EPA's NPDES permits. In addition, the EIS will discuss any alternatives available to other Federal and/or State agencies, and any reasonable alternatives not within the jurisdiction of EPA.

3. Scoping - EPA, Region 6, has initiated the "scoping process" and will conduct a public meeting for the purpose of identifying issues for consideration in the preparation of the EIS. The scoping meeting will be held at 7:30 p.m. on August 18, 1981 at the Marshall High School, 1900 Maverick Drive, in Marshall, Texas.

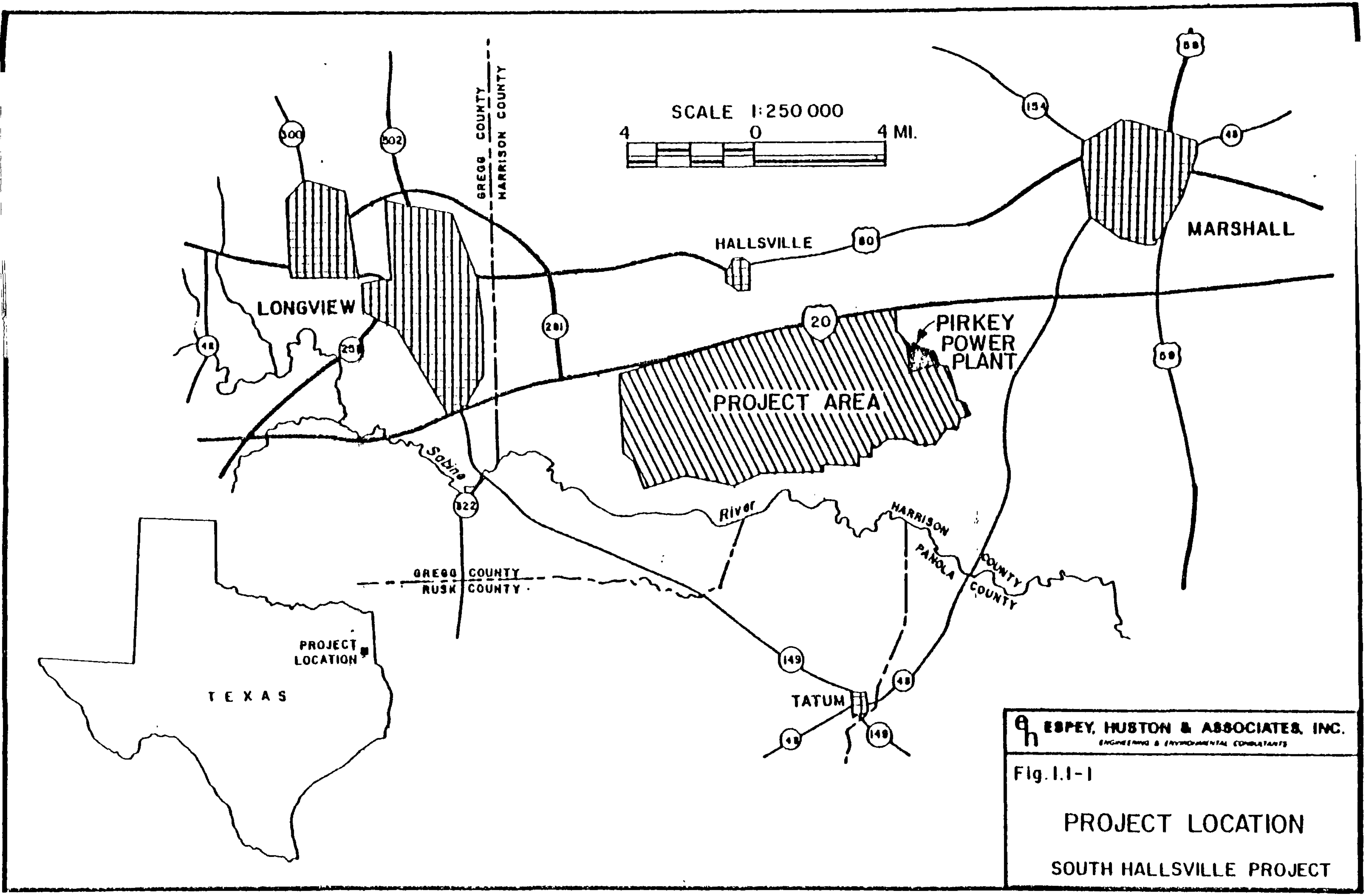
4. Public and Private Participation in the EIS Process - The issues and concerns identified during the scoping process will help determine the nature and extent of the impact analysis in the EIS. EPA invites full participation by individuals, private organizations, and local, State, and Federal agencies. EPA will involve and encourage the public to participate in the planning and EIS process to the maximum extent possible.

5. Timing - EPA estimates the Draft EIS will be available for public review and comment in November 1981. Time requirements have been estimated for the environmental review at the following milestones:

° Developing Scope of EIS	September 1981
° Availability of Draft EIS	November 1981
° Record of Decision	March 1982

6. Mailing List - If you wish to be placed on this EPA mailing list, please submit your name and address to Mr. Clinton B. Spotts at the above address and reference the South Hallsville Project.

Frances E. Phillips
Acting Regional Administrator



ESPEY, HUSTON & ASSOCIATES, INC.
ENGINEERING & ENVIRONMENTAL CONSULTANTS

Fig. 1.1-1

PROJECT LOCATION

SOUTH HALLSVILLE PROJECT

RAILROAD COMMISSION OF TEXAS
SURFACE MINING AND RECLAMATION DIVISION

JAMES E. (JIM) NUGENT, Chairman
MACK WALLACE, Commissioner
BUDDY TEMPLE, Commissioner

J. RANDEL (JERRY) I
Dire
CHESLEY N. BLEV
Assistant Dire

105 W. RIVERSIDE DRIVE — CAPITOL STATION — P. O. DRAWER 12967 — AUSTIN, TEXAS 78

July 15, 1981

RE: Sabine Mining Company, South Hallsville No. 1 Mine Docket No. 13

Mr. Clinton B. Spotts
Regional EIS Coordinator
U. S. Environmental Protection Agency
Region VI
1201 Elm Street
Dallas, Texas 75270

Dear Mr. Spotts:

I have received your letter dated July 10, 1981, in which you discuss the proposed H. W. Pirkey Power Plant being developed by the Southwestern Electric Power Company (SWEPCO) to be located in Harrison County. The lignite mine to be developed to supply fuel for the plant would also be located in Harrison County and operated by the Sabine Mining Company.

Your letter specifically requests agencies wishing to cooperate in the project review to notify you in writing. The Railroad Commission of Texas' Surface Mining and Reclamation Division wants to participate in the process, at least to the extent that such review might in any way affect the Sabine Mining Company mining operation.

As you are probably aware, pursuant to the federal Surface Mining Control and Reclamation Act of 1977, the Railroad Commission of Texas is the exclusive permitting and regulatory authority for surface coal mining operations in this state. The Sabine Mining Company operation must be reviewed in detail by our staff and permitted prior to commencement of any mining activities. This review is very detailed and requires the submission by the Sabine Mining Company of an application which addresses water resources, hydrology, wildlife, vegetation mining and reclamation techniques, and a myriad of other related areas.

In the interest of avoiding duplicitous review of the mining operation, the Surface Mining and Reclamation Division would like to conduct its review as a cooperating agency in conjunction with its review as Regulatory Authority. This would also assure that any comments we might have are based on complete information which is required by the state as a part of any mining application. To the extent that the Railroad Commission does participate in the review process, we would ask that our comments be made a part of the official administrative record.

Please let me know if there is anything further you need from us at this time.

Sincerely,

J. Randel (Jerry) Hill

J. Randel (Jerry) Hill
Director

JRH/csp

RECEIVED

AUG 3 1981

OFFICE OF THE GOVERNOR

WILLIAM P. CLEMENTS, JR.
GOVERNOR

July 22, 1981
TRANSMITTAL MEMORANDUM

TO: Review Participants

DATE COMMENTS DUE Budget/Planning
BUDGET AND PLANNING OFFICE: 8/27/81

_ Aeronautics Commission
X Air Control Board
_ Animal Health Commission
X Bureau of Economic Geology
_ Coastal and Marine Council
X Department of Agriculture
X Department of Health
X Department of Highways and Public Transportation
X Department of Water Resources
X Texas Forest Service
X General Land Office
X Historical Commission
_ Industrial Commission
X Parks and Wildlife Department
_ Public Utilities Commission
X Railroad Commission
X Soil and Water Conservation Board
_ Texas Energy and Natural Resources Advisory Council
_ Governor's Office of Regional Development

[ ] Draft EIS [X] Other Notice of Intent EIS Number 1-07-50-008

Project Title Pirkey Power Plant/South Hallsville Surface Lignite Mine Harrison County

Originating Agency U.S. Environmental Protection Agency

Pursuant to the National Environmental Policy Act of 1969, Office of Management and Budget Circular A-95, and the Texas Policy for the Environment (1975), the Governor's Budget and Planning Office is responsible for securing the comments and views of loca[l] and State agencies during the environmental impact statement review process.

Enclosed for your review and comment is a copy of the above cited document. This Office solicits your comments and asks that they be returned on or before the above due date. You may find the questions, listed on the reverse side, useful in formulat[ing] your comments.

For questions on this project, contact Ward Goessling at (512) 475-2427.

Please address your agency's formal comments to: Mr. Paul T. Wrotenbery, Director
Governor's Budget and Planning Offi[ce]
Attention: General Government Secti[on]
P.O. Box 12428
Austin, Texas 78711

SAM HOUSTON BUILDING • P. O. BOX 12428 CAPITOL STATION • AUSTIN, TEXAS 78711

Suggested Questions to be Considered by Reviewing Agencies:

1. Does the proposed project impact upon and is it consistent with the plans, programs and statutory responsibilities of your agency?

2. What additional specific effects should be assessed?

3. What additional alternatives should be considered?

4. What better or more appropriate measures and standards should be used to evaluate environmental effects?

5. What additional control measures should be applied to reduce adverse environmental effects or to avoid or minimize the irreversible or irretrievable commitment of resources?

6. How serious would the environmental damage from this project be, using the best alternative and control measures?

7. What specific issues require further discussion or resolution?

8. Does your agency concur with the implementation of this project?

As a part of the environmental impact statement review process, the Budget and Planning Office forwards to the originating agency all substantive comments which are formally submitted. If, after analyzing this document, you conclude that substantive comments are unnecessary, you may wish to so indicate by checking the box below and forwarding the form to this office. This type of response will indicate receipt of this document by your agency and that no formal response will be prepared.

[X] No Comment.

E. G. Wermund, Associate Director
Name and Title of Reviewing Official

Bureau of Economic Geology
The University of Texas at Austin
University Station Box X
~~Austin, Texas 78712~~
Agency

OFFICE OF THE GOVERNOR

WILLIAM P. CLEMENTS, JR.
GOVERNOR

July 22, 1981

TRANSMITTAL MEMORANDUM

TO: Review Participants

DATE COMMENTS DUE TO BUDGET AND PLANNING OFFICE: 8/27/81

- _ Aeronautics Commission
- X Air Control Board
- _ Animal Health Commission
- X Bureau of Economic Geology
- _ Coastal and Marine Council
- X Department of Agriculture
- X Department of Health
- X Department of Highways and Public Transportation
- X Department of Water Resources
- X Texas Forest Service
- X General Land Office
- X Historical Commission
- _ Industrial Commission
- X Parks and Wildlife Department
- _ Public Utilities Commission
- X Railroad Commission
- X Soil and Water Conservation Board
- _ Texas Energy and Natural Resources Advisory Council
- _ Governor's Office of Regional Development
- _ __________
- _ __________
- _ __________
- _ __________

☐ Draft EIS ☒ Other Notice of Intent EIS Number 1-07-50-008

Project Title Pirkey Power Plant/South Hallsville Surface Lignite Mine

Harrison County

Originating Agency U.S. Environmental Protection Agency

Pursuant to the National Environmental Policy Act of 1969, Office of Management and Budget Circular A-95, and the Texas Policy for the Environment (1975), the Governor's Budget and Planning Office is responsible for securing the comments and views of local and State agencies during the environmental impact statement review process.

Enclosed for your review and comment is a copy of the above cited document. This Office solicits your comments and asks that they be returned on or before the above due date. You may find the questions, listed on the reverse side, useful in formulatir your comments.

For questions on this project, contact Ward Goessling at (512) 475-2427.

Please address your agency's formal comments to: Mr. Paul T. Wrotenbery, Director
Governor's Budget and Planning Office
Attention: General Government Sectio
P.O. Box 12428
Austin, Texas 78711

Suggested Questions to be Considered by Reviewing Agencies:

1. Does the proposed project impact upon and is it consistent with the plans, programs and statutory responsibilities of your agency?

2. What additional specific effects should be assessed?

3. What additional alternatives should be considered?

4. What better or more appropriate measures and standards should be used to evaluate environmental effects?

5. What additional control measures should be applied to reduce adverse environmental effects or to avoid or minimize the irreversible or irretrievable commitment of resources?

6. How serious would the environmental damage from this project be, using the best alternative and control measures?

7. What specific issues require further discussion or resolution?

8. Does your agency concur with the implementation of this project?

As a part of the environmental impact statement review process, the Budget and Planning Office forwards to the originating agency all substantive comments which are formally submitted. If, after analyzing this document, you conclude that substantive comments are unnecessary, you may wish to so indicate by checking the box below and forwarding the form to this office. This type of response will indicate receipt of this document by your agency and that no formal response will be prepared.

[X] No Comment.

Ray Prewett Asst. Commissioner
Name and Title of Reviewing Official

Texas Dept of Agriculture
Agency

COMMISSION

A. SAM WALDROP, CHAIRMAN
ROBERT H. DEDMAN
JOHN R. BUTLER, JR.

STATE DEPARTMENT OF HIGHWAYS
AND PUBLIC TRANSPORTATION
AUSTIN, TEXAS 78701

ENGINEER-DIRECTOR
MARK G. GOODE

July 24, 1981

IN REPLY REFER TO
FILE NO.

D8-E 854

1-07-50-008

Notice of Intent to Prepare EIS
Pirkey Power Plant/South Hallsville
Surface Lignite Mine

Mr. Paul T. Wrotenbery, Director
Governor's Budget and Planning Office
Sam Houston Building, 7th Floor
Austin, Texas

Dear Mr. Wrotenbery:

Thank you for your memorandum dated July 22, 1981, transmitting the Environmental Protection Agency's notice of intent to prepare an environmental impact statement covering the Pirkey Power Plant/South Hallsville Surface Lignite Mine in Harrison County.

The notice of intent was also received directly from EPA. Our District Office responsible for Harrison County has been advised of the scoping meeting to be held on the proposed project, and we have requested that EPA furnish us a copy of the EIS when available.

Sincerely yours,

M. G. Goode
Engineer-Director

By: Marcus L. Yancey Jr.
Marcus L. Yancey, Jr.
Deputy Engineer-Director

RECEIVED
JUL 28 1981
Budget/Pla

United States Department of Agriculture

Soil Conservation Service

P. O. Box 648
Temple, TX
76503

July 27, 1981

RECEIVED
JUL 29 1981
S & A DIVISION

Mr. Clinton B. Spotts
Regional EIS Coordinator
U.S. Environmental Protection Agency
1201 Elm Street
Dallas, TX 75270

Dear Mr. Spotts:

In regard to your letter of July 10 requesting our participation in the preparation of an environmental impact statement for the proposed H. W. Pirkey Power Plant and the South Hallsville surface lignite mine, Harrison County, Texas; Mr. Paul Leggett, district conservationist at Marshall, plans to attend the Scoping Meeting to be held August 18 as the Soil Conservation Service representative.

Sincerely,

C. Bud Fountain

For GEORGE C. MARKS
State Conservationist

cc: Blake E. Lovelace, Area Conservationist, SCS, Mt. Pleasant, Texas
Paul Leggett, District Conservationist, SCS, Marshall, Texas

United States Department of the Interior

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXE
BUREAU OF RECLAMATION
SOUTHWEST REGION
COMMERCE BUILDING, 714 S. TYLER, SUITE 201
AMARILLO, TEXAS 79101

IN REPLY
REFER TO: 150

RECEIVED
JUL 31 1981
S & A DIVISION

JUL 29 1981

Mr. Clinton B. Spotts
Regional EIS Coordinator
Environmental Protection Agency, Region 6
1201 Elm Street, Suite 2800
Dallas, TX 75270

Dear Mr. Spotts:

We have received your July 10, 1981, notice of intent to prepare an environmental impact statement (EIS) and notice to Federal agencies inviting participation in EIS preparation regarding a proposed H.W. Pirkey powerplant and the South Hallsville surface lignite mine, Hallsville, Harrison County, Texas.

The Bureau of Reclamation (Bureau) has historically been involved in energy development primarily at hydroelectric sites; accordingly, our staff expertise is in the hydroelectric field and not in thermal power generation. Because of this and reductions in personnel assigned to our power division, we do not have the personnel to participate in the subject scoping meetings or to assist in preparation of the subject document.

Regarding data that may be of help to you, the Bureau is presently in the first phase of study for the Bon Wier Water Supply Project, which is in the geographic area of the power project. In-house water availability studies are currently underway concerning the Sabine River. This information may be available in early 1982. Should you need this information or have further questions about this project, please contact Mr. Dan Rubenthaler, team leader, at this office, telephone FTS 735-5473 or (806) 378-5473.

Sincerely yours,

H.A. Lansberry

FOR Robert H. Weimer
Regional Director

Texas Department of Health

Robert Bernstein, M.D., F.A.C.P.
Commissioner

1100 West 49th Street
Austin, Texas 78756
(512) 458-7111

Robert A. MacLean, M.D.
Deputy Commissioner

RECEIVED

AUG 4 1981

Budget/Planning

July 29, 1981

Mr. Paul T. Wrotenbery, Director
Governor's Budget and Planning Office
P.O. Box 12428
Austin, Texas 78711

ATTENTION: General Government Section

SUBJECT: Pirkey Power Plant, South Hallsville
Surface Lignite Mine, Harrison County
Notice of Intent to Prepare EIS
EIS No. 1-07-50-008

Dear Mr. Wrotenbery:

In accordance with a Notice of Intent to prepare an Environmental Impact Statement (EIS) for the Pirkey Power Plant and South Hallsville Lignite Mine published by the U.S. Environmental Protection Agency (EPA) on July 10, 1981, a representative of the Texas Department of Health will plan to attend the scoping meeting to be held on August 18, 1981, in Marshall, Texas.

We appreciate the opportunity to participate in the EIS preparation process.

Sincerely,

David M. Cochran, P.E.
Deputy Commissioner for Environmental
and Consumer Health Protection

DLH/bkh

cc: Public Health Region 7, TDH
Marshall-Harrison County Health District
Program Budgetary Services, TDH

DEPARTMENT OF THE ARMY
FORT WORTH DISTRICT. CORPS OF ENGINEERS
P. O BOX 17300
FORT WORTH. TEXAS 76102

REPLY TO
ATTENTION OF:

SWFOD-O

30 July 1981

RECEIVED
AUG 3 1981
S & A DIVISION

Mr. Clinton M. Spotts
Regional EIS Coordinator
Environmental Protection Agency
1201 Elm Street
Dallas, Texas 75270

Dear Mr. Spotts:

Thank you for your public notice and letter of July 10, 1981, concerning the proposed H. W. Pirkey Power Plant and the South Hallsville surface lignite mine near Hallsville, Texas.

The pipeline and water intake structure for the proposed power plant has been authorized under Section 404 of the Clean Water Act and Section 10 of the River and Harbor Act of 1899 by Department of the Army permit SWF-80-MARION-280. It appears that our responsibilities for additional portions of the project will be limited to authorization of any discharges into waters of the United States resulting from the lignite mine.

The following comments are in response to questions in your letter of July 10, 1981, and are presented in the same order as listed in the referenced letter.

1. It appears that the mining operation may involve discharges of dredged and fill material into waters of the United States. If so, you should evaluate the work using the 404(b)(1) guidelines published in 40 CFR 230. This analysis should include a discussion of how such discharges will affect aquatic and terrestrial organisms, water quality parameters, and the overall aquatic ecosystem. Additional requirements for a Department of Army permit will include construction details such as amount, type, and location of fill material, a description of the applicant's proposals for restoration or mitigation of wetlands adjacent to the Sabine River which will be affected by the project, and any additional information necessary for a full public interest review of the proposed project.

2. Analysis of the issues described above should be as complete and thorough as possible within the limits of available data.

3. Special expertise which we can provide includes determination of the limits of our jurisdiction under Section 404 and Section 10.

4. Under Section 404, the U.S. Army Corps of Engineers regulates the discharge of dredged and fill material into waters of the United States including adjacent wetlands. Under Section 10, we regulate any work or structures in or affecting a navigable water of the United States.

5. The Statement of Findings, Environmental Assessment, and a copy of permit number SWF-80-MARION-280 authorizing the makeup water intake structure and pipeline are attached for your information.

I hope this information will assist you in development of the Scope of Work for the EIS. If you should require further information on this matter, please contact Ms. Vicki Goodknight at 817-334-2681.

Sincerely,

ALLIE J. MAJORS
Chief, Operations Division

3 Incl
As stated

United States Department c

OFFICE OF SURFACE MINING
Reclamation and Enforcement
818 Grand Avenue, Scarritt Building
Kansas City, Missouri 64106

EVP 7-9

July 31, 1981

RECEIVED
AUG 6 1981
S & A DIVISION

Mr. Clinton B. Spotts
Regional EIS Coordinator
U.S. Environmental Protection Agency (SA-F)
1201 Elm Street, Suite 2800
Dallas, Texas 75270

Dear Mr. Spotts:

Thank you for your letter of July 10, 1981, requesting OSM's participation as a cooperating agency in preparing the Pirkey Power Plant/South Hallsville Lignite Mine Environmental Impact Statement (EIS).

Under the provisions of 40 CFR 1501.6 and 1508.5, OSM agrees to be a cooperating agency. As stated in our letter of July 23, 1981, on the Dolet Hills project, the level of our participation may be limited because of the reorganization OSM is currently undergoing. Until further notice, however, the principal OSM contact for this project will be Julie Elfving, Regional Environmental Scientist (FTS 758-5109).

In your letter you also requested information on several questions as part of the scoping process.

1. Significant issues: Cumulative hydrologic impacts, restoration of a suitable growing medium for vegetation, land use changes.

2. Scope of analysis: Analysis of these issues should be detailed. Discussion of hydrologic impacts should include cumulative effects of other projects affecting the same aquifer/recharge areas. The EIS should assess different overburden handling techniques and the resulting potential for revegetation. The discussion of land use changes should include a comparison of pre- and post-mining scenarios. All these discussions should be within the context of the Texas Rules on Surface Mining and Reclamation.

3. Special expertise: OSM has a variety of technical disciplines that might be helpful. These include various earth sciences, hydrology, soils, soil-plant relationships, forestry, wildlife biology, and others.

4. Jurisdiction by law: OSM's jurisdiction is indirect and probably would not apply during the EIS preparation stage.

5. Information: Attached for your use is a list of references that might be helpful.

Because there is no field tour planned, OSM will not have a representative at the scoping meeting on August 18, 1981. However, we would be interested in going on a site visit when one is arranged.

Sincerely,

RAYMOND L. LOWRIE
Regional Director

Enclosure

cy to: Eruce Blanchard
Frank Anderson
Ray Churan

Adams, J., and Vanston, J. H. July, 1975. Coal and lignite in Texas: a brief review. Public Information Report No. 1. Center for Energy Studies. The University of Texas at Austin.

Askenasy, P. E. 1977. Soil factors influencing row crop production and phosphate adsorption on leveled lignite mine spoil banks. Ph.D. Thesis. Texas A&M University. 110 pp.

Baker, J. September 11, 1977. South Texas ranchers vs. strip miners. Austin American-Statesman.

Bryson, H. L. 1974. Early survival, total height, and foliar analysis of eleven tree species grown on strip mine spoil in Freestone County, Texas. M.S. Thesis. Stephan F. Austin State University. Nacogdoches, Texas.

Groat, C. G. 1973. Inventory and environmental effects of surface mining in Texas: preliminary report. Bureau of Economic Geology. University of Texas at Austin.

Henry, C. D., Kaiser, W. R., and Groat, C. G. 1976. Reclamation at Big Brown Steam Electric Station near Fairfield, Texas: geologic and hydrologic setting (Research Note 3). Bureau of Economic Geology. University of Texas at Austin.

Hightower, J. January 20, 1978. Spoiling the soil. The Texas Observer.

Hons, F. M. 1974. Potassium sources and availability in three east Texas soils. Master of Science Thesis. Texas A&M University. 77 pp.

Hons, F. M., Dixon, J. B., and Matocha, J. E. 1976. Potassium sources and availability in a deep, sandy soil of east Texas. Soil Sci. Soc. Am. J. 40:370-373.

Hons, F. M. 1978. Chemical and physical properties of lignite spoil and their influence upon successful reclamation. Ph.D. Dissertation Texas A&M University. College Station, Texas.

Hons, F. M., Askenasy, P. E., Hossner, L. R., and Whiteley, E. L. 1978. pp. 209-217. IN W. R. Kaiser (ed.). Gulf Coast Lignite Conference: Geology, Utilization, and Environmental Aspects. Bureau of Economic Geology. The University of Texas. Austin, Texas.

Hossner, L. R., Dixon, J. B., Senkayi, A. L., and Ahlrichs, J. S. 1980. Chemistry and mineralogy of lignite overburden. pp. 15.1-15.11. IN Christopher C. Mathewson (ed.). Lignite: Texas A&M University Lignite Symposium. Center for Energy and Mineral Resources. Texas A&M University. College Station, Texas.

House Report to Accompany HR 2. April 22, 1977. Interior and Insular Affairs Committee. No. 95-218.

House Report to Accompany HR 13950. August 31, 1976. Interior and Insular Affairs Committee. No. 95-218.

TEXAS AIR CONTROL BOARD

6330 HWY. 290 EAST
AUSTIN, TEXAS 78723
512/451-5711

August 3, 1981

Mr. Paul T. Wrotenbery, Director
Governor's Budget and Planning
Office
Attn: General Government Section
P. O. Box 12428
Austin, Texas 78711

Subject: Notice of Intent to Prepare a Draft Environmental Impact Statement of the Pirkey Power Plant and South Hallsville Surface Lignite Mine, Harrison County, Texas; EIS Number 1-07-50-008

Dear Mr. Wrotenbery:

Our records indicate that the following Texas Air Control Board permits have been applied for and have been issued for the above cited facilities: (1) Number 6269--Indoor turbine generator, and (2) Number 6270--a lignite handling facility. If new or additional facilities become necessary, this agency should be contacted regarding permit requirements. Call AC 512 451-5711.

Harrison County meets the national primary and secondary air quality standards for carbon monoxide, nitrogen dioxide, sulfur dioxide and particulates (TSP) and is, therefore, in a designated "attainment area" for these criteria pollutants. The county is designated "unclassifiable" for ozone. There has been no designation established for lead.

Thank you for the opportunity to provide assistance. If additional information is needed, please contact me.

Sincerely,

Roger R. Wallis, Deputy Director
Standards and Regulations Program

cc: Mr. Richard Leard, P.E., Regional Supervisor, Tyler

Department of Energy
Washington, D.C. 20585

RECEIVED
AUG 11
S & A DIVISION

Mr. Clinton B. Spotts
U. S. Environmental Protection Agency
Region 6
1201 Elm Street, Suite 2800
Dallas, Texas 75270

Dear Mr. Spotts:

We have reviewed the notice of intent to prepare an environmental impact statement (EIS) for the H. W. Pirkey Power Plant and the South Hallsville surface lignite mine and your request for our participation as a cooperating agency.

Thank you for the opportunity to participate as a cooperating agency in the preparation of the EIS for the proposed project. We do not have the resources available to participate at this time, however, we would appreciate receiving a copy of the draft EIS when it is available for review and comment.

Sincerely,

R. J. Stern

Robert J. Stern, Director
NEPA Affairs Division

cc: Curtis E. Carlson, Jr.

TEXAS HISTORICAL COMMISSION

TRUETT LATIMER
EXECUTIVE DIRECTOR

P.O. BOX 12276
AUSTIN TEXAS 78711

August 11, 1981

RECEIVED
AUG 13 1981
S & A DIVISION

Clinton B. Spotts
Regional EIS Coordinator
U.S. Environmental Protection
Agency
Region VI
1201 Elm Street
Dallas, Texas 75270

Re: EIS Preparation - South Hallsville surface lignite mine & Pirkey Power Plant

Dear Mr. Spotts:

We have received the Notice of Intent on July 24, 1981, regarding the proposed action referenced above. In reviewing our files on this matter pursuant to Section 106 of the National Historic Preservation Act of 1966 and the pertinent regulations, 36 C.F.R., Part 800, we note that the proposed area of the undertaking, i.e., the Pirkey Power Plant was surveyed by archeologists in 1979. Recommendations for further testing at one site (41 HS 147) have been made. Further work determining the significance of the site in light of National Register criteria has not been completed. A 20% sample survey of the mine area has been accomplished (1979). Potential eligibility of some sites located during the survey have not been determined as of yet. It has been requested by this office that a 100% archeological survey of the initial permit area be accomplished before construction and mining takes place (letter to R.R.C., June 22, 81). The makeup water pipeline from Cypress Bayou to the Pirkey Power Plant has not been archeologically surveyed or assessed. This pipeline and any railroad spurs and attendant transmission corridors have not been located or dealt with by this agency. Cultural resource assessment of all these facets of the Pirkey Power Plant and the South Hallsville Mine Area must be dealt with in order to be in compliance with the federal regulations.

According to our files and reports compliance procedures for Section 106 of NHPA and the pertinent federal regulations have been only partially accomplished. Archeological testing of recommended sites both historic and prehistoric to determine their eligibility for inclusion in the National Register and further survey and assessment on the initial permit area has of yet not been accomplished.

Our review of this proposed action (the EIS) and subsequent studies are appropriate and we look forward to completing these procedures in a timely manner.

Attached please find a list of the studies and reports generated as a result of the compliance procedures thus far accomplished. We look forward to participating in the review process in the future. If there are any questions, please advise us.

Sincerely,

Truett Latimer
State Historic Preservation Officer

by

LaVerne Herrington

LaVerne Herrington, Ph.D.
Director
Resource Conservation

PEP/LH/lft

cc: Paul T. Wrotenbery

Enclosure

Dibble, David S.

1977 Cultural Resource Survey - Phase I Reconnaissance South Hallsville Project, Harrison County. Espey, Huston & Associates for SWEPCO

Espey, Huston & Associates

1979 Cultural Resources Survey Phase II Plant Site/Cooling Pond Survey Mine Area Predictive Model South Hallsville Project, for SWEPCO

Freeman, Martha D.

1978 A Preliminary Assessment of the Historical Resources of the South Hallsville Project Area, Harrison County, Texas. Espey, Huston and Associates, for SWEPCO

FEDERAL EMERGENCY MANAGEMENT AGENCY
REGION VI
FEDERAL CENTER
DENTON, TEXAS 76201

REC'D

AUG 19 1981

EPA
REGION VI

August 13, 1981

RECEIVED
AUG 18
S & A DIVISION

Mr. Frances E. Phillips
Acting Regional Administrator
U.S. Environmental Protection Agency
1201 Elm Street
Dallas, Texas 75270

Dear Mr. Phillips:

This letter is in reference to the Notice of Intent to Prepare an EIS on the H. W. Pirkey Power Plant and the South Hallsville surface lignite mine. Harrison County has been identified by the Federal Emergency Management Agency (FEMA) as having areas of special flood hazard, 100-year flood plain, however is not participating in the National Flood Insurance Program (NFIP). This would be a good opportunity to encourage the County to apply for participation in the NFIP.

We would like to see the EIS address steps that will be taken to mitigate erosion, increased run-off, and impacts to the 100-year flood plain during mining operations. Will the generating units be located in the flood plain, and if so, will they be protected from flooding? We would like to comment on the EIS when it is completed.

We hope our comments will be helpful in preparing the EIS. If we may be of further assistance, please let us know by writing or calling (817) 387-5811, extension 271.

Sincerely,

Cheryl A. Hoke

Cheryl A. Hoke
Emergency Management Specialist
Insurance and Mitigation

United States Department of the Interior

NATIONAL PARK SERVICE
SOUTHWEST REGION
State and Local Affairs
5000 Marble N.E., Room 211
Albuquerque, New Mexico 87110

RECEIVED
AUG 17 1981
S & A DIVISION

IN REPLY REFER TO:
L7619(SWR)SNR
ER 81/1493

AUG 13 1981

Mr. Clinton B. Spotts
Regional EIS Coordinator
Environmental Protection Agency
1201 Elm Street
Dallas, Texas 75270

Dear Mr. Spotts:

This responds to the Notice of Intent to prepare an environmental impact statement for the H. W. Pirkey Power Plant and South Hallsville Surface Lignite Mine, South Hallsville, Harrison County, Texas. The following comments are provided on a technical assistance basis.

Planning for the proposed project should include appropriate consideration of historical and archeological resources, as required by the National Environmental Policy Act of 1969 and implemented by the Council on Environmental Quality regulations, and in accordance with historic preservation laws and regulations. The Council on Environmental Quality regulations (40 CFR 1502.25) specify that draft statements should integrate surveys, studies and impact analyses required by the National Historic Preservation Act. In addition, the draft statement should describe impacts to historical and archeological resources, and discuss how these impacts will be mitigated (1502.14(f), 1502.16(g) and (h)). Further guidance is provided by the regulations of the Advisory Council on Historic Preservation (36 CFR 800.9), which direct that compliance with the National Historic Preservation Act be initiated no later than during the preparation of the environmental assessment/draft environmental statement, and that the assessment/draft statement "should fully describe any National Register or eligible properties within the area of the undertaking's potential environmental impacts and the nature of the undertaking's effect on them."

To comply with these requirements, please contact the State Historic Preservation Officer (SHPO) to determine if any cultural resources of local significance and any cultural resources which may be listed on or eligible for the National Register of Historic Places are located within the affected area. In addition, you should obtain the opinion of the SHPO on the adequacy of present knowledge of cultural resources in the areas to be affected, as well as the type and level of resource inventory that may be needed. If the SHPO indicates that a survey is needed, it should be undertaken early in the planning process and results reported in the draft statement. The statement should also include determinations of eligibility for the National Register of

Historic Places, pursuant to 36 CFR 1204 (formerly 36 CFR 63), for any resources which might be affected. The SHPO in Texas is Mr. Truett Latimer, Texas Historical Commission, P. O. Box 12276, Capitol Station, Austin, Texas 78711.

Information concerning possible impacts on recreational resources on a statewide basis can be obtained from Mr. Charles D. Nash, Jr., P. O. Box 1007, San Marcos, Texas 78666. In addition, local parks department officials should be contacted for impacts to specific parks.

Possible impacts to significant natural resources should be considered in project planning. Coordination with Mr. John Hamilton, Texas Conservation Foundation, P. O. Box 12845, Capitol Station, Austin, Texas 78711, would be helpful in identifying natural resources in the project area.

A 50 mile segment of the Sabine River, from the upper end of Toledo Bend Reservoir upstream to the town of Easton, has been included on the Nationwide Rivers Inventory prepared by this agency. It is recognized for its significant scenic, historic, and wildlife values. If impacts on this segment of the Sabine River are anticipated, please contact this office, pursuant to the "Procedures for Interagency Consultation to Avoid or Mitigate Adverse Effects on Rivers in the Nationwide Inventory," (Federal Register, September 8, 1980).

We appreciate the opportunity to comment on this proposal.

Sincerely yours,

Mare A. Koenings

for James J. Donoghue
Chief, Division of Natural Programs

TEXAS DEPARTMENT OF WATER RESOURCES
1700 N. Congress Avenue
Austin, Texas

August 25, 1981

Mr. Paul T. Wrotenbery, Director
Governor's Budget and Planning Office
P. O. Box 13561, Capitol Station
Austin, Texas 78711

Dear Mr. Wrotenbery:

Re: U. S. Environmental Protection Agency (USEPA)—Public Notice of Intent to Prepare Environmental Impact Statement: H. W. Pirkey Lignite-Fired Steam Electric Generating Station and South Hallsville Surface Lignite Mine Project, Near City of Hallsville, Harrison County, Texas. July 10, 1981. (State Reference: EIS-1-07-50-008).

In response to your July 22 memorandum, the staff of the Texas Department of Water Resources (TDWR) suggests that in the pending preparation of the environmental impact statement (EIS) relative to the issuance of NPDES waste discharge permits for the referenced energy facilities project, USEPA should consider and discuss the following topics relative to water resources:

1. The potential site-specific impacts of the project on local water resources and water quality. Since the impact on the local environment of power plant and related surface mining operation is principally a function of the water it withdraws, alters, or discharges, we believe that it is important to examine the critical characteristics of the project design that affect this water requirement and usage.

2. The feasible measures (e.g., special dewatering of excavations; proper sloping of excavations and fills) which will be adopted during construction and future operations to reduce and control soil erosion; stream sedimentation and turbidity; and acidified or ferruginous drainage from mining operations and from coal stockpiles and fly-ash piles at the power plant into adjacent bodies of water.

The adoption of proper procedures can produce a substantial improvement in the control of temporary pollution generated by power plant and associated mining projects. The suspended impurities that originate from site excavations and equipment cleaning should be made to collect in leak-proof settling basins. Rainfall runoff, usually rich in suspended solids prior to plant completion, as well as that extracted during dewatering operations, should be retained until it clears sufficiently to be released in conformance with water pollution standards. The use of chemical feed equipment, filters, and oil skimmers can help hasten the process when large quantities of water are involved. Construction of intake and effluent structures within dikes and weirs would also mitigate some of the temporary adverse earth excavation and fill effects.

3. The monitoring plan to be adopted to ensure protection of existing local authorized water rights and applicable stream water quality standards, and also to ensure compliance with the provisions and terms of waste discharge and industrial or hazardous solid waste permits to be issued by USEPA under the NPDES Program of the federal Clean Water Act, and by TDWR under the Waste Discharge Program (Chapter 26, Texas Water Code) and the Hazardous Waste Management Program (Article 4477.7, Texas Civil Statutes). Special mention should be made of the proposed measures to be adopted to detect and to prevent or reduce the potential leaching of metals and other toxins associated with unburned lignite, fly-ash that results from the partial combustion of coal, or with sludge produced from stack-gas scrubbers.

TDWR appreciated this opportunity to offer suggestions on the scope of the pending EIS to be prepared by USEPA in connection with the issuance of federal NPDES waste discharge permits for the proposed H. W. Pirkey Steam Electric Generating Station and associated Hallsville Lignite Mine Project. TDWR will be pleased to review the draft EIS when it is received from USEPA through the State A-95 Clearinghouse in November 1981. Please advise if we can be of further assistance.

Sincerely yours,

for Harvey Davis
Executive Director

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION VI
1201 ELM STREET
DALLAS, TEXAS 75270

Fact Sheet on Environmental Impact Statement
H. W. Prikey Power Plant and
South Hallsville Surface Lignite Mine
August 31, 1981

TO: EIS MAILING LIST:

The following is a brief update of project EIS events of public interest:

1. The Availability of the Scoping Meeting Responsiveness Summary - the Responsiveness Summary (copy enclosed) presents the Environmental Protection Agency's (EPA) response to comments received during the subject EIS scoping process which ended August 28, 1981.

2. Information Depository Established - an Information Depository has been established at the Marshall Public Library, located at 300 South Alamo, in Marshall, Texas. An EIS project file is available for public review at this location, and it will be updated with the latest information regarding EPA's environmental review of the proposed projects. The library is open from 9:00 a.m. to 6:00 p.m., Monday through Friday. Copies of the material in EPA's file can be made at the library for $0.20 per page (8 1/2" x 11" size). Please ask at the Circulation Desk for access to this EPA file.

3. Distribution of Draft EIS - In addition to the Federal and State agencies that will receive and review the EIS, many groups and individuals have demonstrated interest in these projects and are on the EIS mailing list. However, we believe that some of these persons may not still want a copy of the EIS, or may be satisfied with receiving and reviewing only the Summary instead of the complete document. Therefore, in the interest of conserving time and resources in the printing and distribution of the Draft EIS, please provide your name and mailing address to me at the above address if you still wish to receive a copy of either the Summary or the complete document (see below).

Thank you for your cooperation.

Sincerely,

Clinton B. Spotts

Clinton B. Spotts
Regional EIS Coordinator

Enclosure

(detach here)

Please send me a copy of:

_____ only the Summary to the South Hallsville EIS to:

_____ the complete Draft

Name: ____________________

Address: ____________________

City: ____________________

State: ____________ Zip: ________

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION VI

1201 ELM STREET

DALLAS, TEXAS 75270

Responsiveness Summary
to the Public Scoping Meeting on the
H. W. Pirkey Power Plant and
South Hallsville Lignite Mine EIS

The U.S. Environmental Protection Agency (EPA) held a public meeting at 7:30 p.m. on August 18, 1981 at the Marshall High School Auditorium in Marshall, Texas. The public was invited to identify significant issues which they believed should be addressed, and the extent to which they should be evaluated, in the Environmental Impact Statement (EIS). There were, however, no comments made or questions asked by those who attended the public meeting.

To date, ~~the~~ issues ~~identified~~ during the scoping process resulted from written comments received from other Federal and State agencies. After reviewing these comments, EPA has determined that they are all significant, and therefore shall be included in the scope of the Draft EIS. The following is a list of those issues:

1. Effects of discharges of dredge and fill material into waters of United States on aquatic and terrestrial organsims, water quality parameters, and the overall aquatic ecosystem.

2. A description of the proposals for restoration or mitigation of wetlands adjacent to the Sabine River which will be affected by the projects.

3. Discussion of hydrologic impacts, including cumulative effects of other projects affecting the same aquifer/recharge areas.

4. Assess different overburden handling techniques and the resulting potential for revegetation.

5. Discussion of land use changes, including a comparison of pre- and post-mining scenarios.

6. Impacts of construction and mining activities on natural and cultural resources.

7. Any possible adverse effects on the scenic, historic and wildlife values of the segment of Sabine River included in the "Nationwide Inventory" (Federal Register, September 8, 1980).

8. Discussion of steps that will be taken to mitigate erosion, increased run-off, and impact to the 100-year flood plain during mining operation.

Clinton B. Spotts

Clinton B. Spotts
Regional EIS Coordinator

Date: 8-31-81

OFFICE OF THE GOVERNOR

WILLIAM P. CLEMENTS, JR.
GOVERNOR

RECEIVED
SEP 10 19[illegible]
S & A DIVISION

September 2, 1981

Mr. Clinton B. Spotts
Regional EIS Coordinator
Region VI, Environmental Protection Agency
1201 Elm Street
Dallas, Texas 75270

Dear Mr. Spotts:

The notice of intent to prepare an environmental impact statement on the Pirkey Power Plant/South Hallsville Surface Lignite Mine, Harrison County, prepared by your Office, has been reviewed by the Budget and Planning Office and interested state agencies. Copies of the review comments are enclosed for your information and use. The State Environmental Impact Statement Identifier Number assigned to the project is 1-07-50-008.

The Budget and Planning Office appreciates the opportunity to review this project. If we can be of any further assistance during the environmental review process, please do not hesitate to call.

Sincerely,

William C. Hamilton

William C. Hamilton, Manager
General Government Section
Budget and Planning Office

kle

Enclosures: Comments by Texas Department of Health
Texas Air Control Board
Texas Department of Agriculture
Texas Department of Water Resources
Bureau of Economic Geology
State Department of Highways and Public Transportation

R TO:

UNITED STATES
DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE

SE

POST OFFICE BOX 1306
ALBUQUERQUE, NEW MEXICO 87103

RECEIVE

September 3, 1981

Mr. Clinton B. Spotts
Regional EIS Coordinator
U.S. Environmental Protection Agency
1201 Elm Street
Dallas, Texas 75270

Dear Mr. Spotts:

This is in reply to your letter of August 21, 1981, which requested information about species which are listed or proposed to be listed as threatened or endangered, as provided by the Endangered Species Act. Your area of interest is the Pirkey Power Plant and South Hallsville Surface Lignite Mine; Gregg, Harrison, and Rusk Counties, Texas.

As provided by Section 7(c)(1) of the Endangered Species Act, the Fish and Wildlife Service is required to furnish a list of those species, both proposed and listed, that may be affected by Federal construction activities.

Upon receipt of the Fish and Wildlife Service's species list, the Federal agency authorizing, funding or carrying out the construction action is required to conduct a biological assessment for the purpose of identifying listed and proposed species which are likely to be affected by such action.

The biological assessment shall be completed within 180 days after receipt of the species list, unless it is mutually agreed to extend this period. If the assessment is not initiated within 90 days after receipt of the species list, I suggest its accuracy be verified before conducting the assessment.

Biological assessments should include as a minimum:

1) an onsite inspection of the area affected by the proposed activity or program, which may include a detailed survey of the area to determine if species are present and whether suitable habitat exists for either expanding the existing population or potential reintroductions of populations;

2) interview recognized experts on the species at issue, including the Fish and Wildlife Service, State conservation departments, universities, and others who may have data not yet found in scientific literature;

3) review literature and other scientific data to determine the species distribution, habitat needs, and other biological requirements;

4) review and analyze the effects of the propos. on the species, in terms of individuals and populations, including consideration of the cumulative effects of the proposal on the species and its habitat;

5) analyze alternative actions that may provide conservation actions;

6) other relevant information;

7) report documenting the assessment results.

For purposes of providing interim guidance, the Fish and Wildlife Service considers construction projects to be any major Federal action authorized, funded or carried out by a Federal agency which significantly affects the quality of the human environment and which is designed primarily to result in the building or erection of man-made structures such as dams, buildings, roads, pipelines, channels, and the like.

If the biological assessment indicates the proposed project may affect listed species, the formal consultation process shall be initiated by writing to the Regional Director, Region 2, U.S. Fish and Wildlife Service, P.O. Box 1306, Albuquerque, New Mexico 87103. If no effect is evident, there is no need for further consultation. I would, however, appreciate the opportunity to review your biological assessment.

In addition, the Act (Sec. 7(c)(1)) now requires Federal agencies to confer with the Service on any agency action which is likely to jeopardize the continued existence of any species proposed to be listed as endangered or threatened or adversely modify critical habitat proposed to be designated for such species. The purpose of this requirement is to identify and resolve at the early planning stage of an action, all potential conflicts between the action and the respective species and critical habitat. The informal consultation process can accomplish this requirement.

The attached sheet provides information on listed species which may occur in the area of interest. If you have need of further assistance, please call the Office of Endangered Species at (505) 766-3972 or FTS 474-3972.

Sincerely yours,

R. F. Stephen

Assistant Regional Director

Attachment

cc: Austin Area Office, Austin, Texas
Ecological Services Field Office, Fort Worth, Texas

Pirkey Power Plant and Hallsville Lignite Mine
Gregg, Harrison, and Rusk Counties, Texas

LISTED SPECIES

Red-cockaded woodpecker (*Picoides borealis*) - may occur in pine forests with mature trees 50-years-old or older.

American bald eagles (*Haliaeetus leucocephalus*) - over-winter and forage on any large body of water and a few pairs may nest in east Texas.

American alligator (*Alligator mississipiensis*) - may occur on any permanent body of water or wetland.

PROPOSED SPECIES

None.

CRITICAL HABITAT

None.

DEPARTMENT OF THE ARMY
FORT WORTH DISTRICT, CORPS OF ENGINEERS
P. O. BOX 17300
FORT WORTH, TEXAS 76102

REPLY TO
ATTENTION OF:

SWFOD-R

1 December 1977

Mr. Jay A. Pruett
Southwestern Electric Company
P. O. Box 21106
Shreveport, Louisiana 71156

Dear Mr. Pruett:

This will acknowledge receipt of your letter of November 22, 1977, with map attached, regarding your proposed electric generating station, cooling pond and lignite mining operation in Harrison County, Texas.

Under present criteria, the headwaters of Brandy Branch, Hartley and Clark's Creeks occur at the mouth of these streams or their confluence with the Sabine River. Any discharge of dredged or fill material in non-tidal streams, including their impoundments and adjacent wetlands located above the headwaters, is permitted by a nationwide permit for purposes of Section 404, provided the following conditions are satisfied: (See paragraph 323.4-2(a)(1) published July 19, 1977).

a. That the discharge will not destroy a threatened or endangered species as identified under the Endangered Species Act or endanger the critical habitat of such species.

b. That the discharge will consist of suitable material free from toxic pollutants in other than trace quantities.

c. That the fill created by the discharge will be properly maintained to prevent erosion and other non-point sources of pollution.

d. That the discharge will not occur in a component of the National Wild and Scenic Rivers System or in a component of a State wild and scenic river system.

This declaration does not relieve you of the responsibility to determine and obtain other applicable Federal, State, or local permits or certifications. Other agencies you may wish to contact regarding work under

SWFOD-R
Mr. Jay A. Pruett

1 December 1977

their jurisdiction would include but would not necessarily be limited to: Department of Interior, Bureau of Mines; Environmental Protection Agency and Texas Department of Water Resources.

If we may be of further assistance, please advise.

Sincerely yours,

ALLIE J. MAJORS
Chief, Operations Division

TEXAS AIR CONTROL BOARD

8520 SHOAL CREEK BOULEVARD
AUSTIN, TEXAS 78758
512/451-5711

May 5, 1978

Mr. Jay A. Pruett
Environmental Coordinator
SOUTHWESTERN ELECTRIC POWER COMPANY
Post Office Box 21106
Shreveport, Louisiana 71156

Re: Permit No. C-6269 & 6270
Boiler (720 MW Lignite Fired) and
Lignite Handling Facilities
Marshall, Harrison County

Dear Mr. Pruett:

A construction permit for your new facility is enclosed. We appreciate your cooperation in sending us the information necessary for us to evaluate your proposed facility.

We have enclosed an application for a permit to operate (Form PI-3). Section 3.28(a) of the Texas Clean Air Act requires that you apply for such permits within sixty (60) days after the facility has begun operation. Please complete and return each application in triplicate.

We also wish to inform you of federal regulations promulgated by the Environmental Protection Agency (EPA) which may apply to the subject facility regarding "Prevention of Significant Deterioration". These regulations, in Title 40 Code of Federal Regulations Part 52, (40 CFR 52), require review of the plans for your proposed facility and approval by the Administrator of the EPA prior to commencing construction. For additional information on this requirement, the EPA requests that you contact Mr. Oscar Cabra of the Region VI office at 1201 Elm Street, Dallas, Texas 75270, telephone (214)767-2742.

Sincerely,

Bill Stewart, P.E.
Executive Director

Enclosures

cc: Mr. Richard Leard, P.E., Regional Supervisor, Tyler

TEXAS AIR CONTROL BOARD

A CONSTRUCTION PERMIT
IS HEREBY ISSUED TO

SOUTHWESTERN ELECTRIC POWER COMPANY

AUTHORIZING CONSTRUCTION OF

Boiler - 720 MW Lignite Fired
No. 1

TO BE LOCATED AT
Marshall, Harrison County, Texas
Lat. 32°26'44" Long. 94°28'05"

and which is to be constructed in accordance with and subject to the Texas Clean Air Act, as amended (Article 4477-5, VATS), and all Rules, Regulations and Orders of the Texas Air Control Board. Said construction is subject to any additional or amended rules, regulations and orders of the Board adopted pursuant to the Act, and to all of the following conditions:

1. This permit may not be transferred, assigned, or conveyed by the holder and applies only to the location specified herein.

2. This permit is automatically void if construction is not begun within one year of the date of issuance.

3. This permit is automatically void when an operating permit is issued or denied.

4. The facility covered by this permit shall be constructed as specified in the application for permit to construct.

5. The Board shall be notified prior to the start-up of the facility authorized by this permit in such a manner that a representative of the Texas Air Control Board may be present at the time of start-up.

6. The Board shall be notified prior to the start of any required monitoring of the facility authorized by this permit in such a manner that a representative of the Texas Air Control Board may be present during monitoring.

7. This permit is not a guarantee that the facility will receive an operating permit at the end of the construction period, nor does it absolve the holder from the responsibility for the consequences of non-compliance with all Rules and Regulations and orders of the Texas Air Control Board or with the intent of the Texas Clean Air Act.

8. Emissions from this facility must not cause or contribute to a condition of 'air pollution' as defined in Section 1.03 of the Texas Clean Air Act or violate Section 4.01 of the Texas Clean Air Act, Article 4477-5, V.A.T.S. If the Executive Director of the Texas Air Control Board determines that such a condition or violation occurs, the holder shall implement additional abatement measures as necessary to control or prevent the condition or violation.

9. Special Provisions: See attachments labeled "General Provisions C-6269", 1-7, and "Special Provisions C-6269", 1-9.

Acceptance of the permit constitutes an acknowledgement and agreement that the holder will comply with all Rules, Regulations and Orders of the Board issued in conformity with the Act and the conditions precedent to the granting of this permit. Failure to comply with all special provisions of this permit will subject the holder to the enforcement provisions of the Texas Clean Air Act, Article 4477-5, V.A.T.S.

PERMIT NO. C- 6269 DATE 5-5-78

EXECUTIVE

GENERAL PROVISIONS

C-6269

1. This permit covers only those sources of emissions listed in the attached table entitled "Emission Sources - Maximum Allowable Emission Rates" and those sources are limited to the emission limits and other conditions specified in that attached table.

2. Where measured emission values are not available, calculated emission levels shall be based on emission factors published in the current AP-42, where applicable. When valid measured emission values become available they shall take precedence over calculated values.

3. Records of production and operating hours, fuel type and fuel sulfur content shall be maintained at the site of the permitted unit(s) and made available at the request of the Executive Director of the Texas Air Control Board or any appropriate local air pollution control agency.

4. When required, sampling and testing shall be conducted in accordance with appropriate procedures of the Texas Air Control Board Sampling Manual or with applicable EPA Code of Federal Regulation procedures. Any deviations from these procedures must be reviewed and approved by the Executive Director prior to sampling or testing.

5. If sampling is required the holder of this permit is responsible for providing sampling and testing facilities and operations at his own expense.

6. Start of construction, construction delays exceeding 45 days, completion of construction and start of operation shall be reported to the appropriate regional office of the Texas Air Control Board not later than ten (10) working days after occurrence of the event.

7. If special provisions are attached to this permit and there is a conflict between any general provision and any special provision, the special provision shall be followed.

SPECIAL PROVISIONS

C-6269

1. The holder of this permit shall forward to the staff of the Texas Air Control Board more detailed engineering data on the particulate and sulfur dioxide abatement equipment as it becomes available. In no event shall any on-site work be done with regard to the abatement equipment until the staff has reviewed and the Executive Director has approved the final detailed engineering data. Operation of the boiler while firing coal shall not begin until the approved abatement equipment has been installed and is operational.

2. Within 180 days of start-up of this facility the holder of this permit shall perform stack sampling and other testing as required to establish the actual pattern and quantities of air contaminants being emitted into the atmosphere. Sampling must be conducted in accordance with appropriate procedures of the Texas Air Control Board Compliance Sampling Manual or in accordance with applicable EPA Code of Federal Regulations procedures. Any deviations from those procedures must be approved by the Executive Director prior to sampling. The Executive Director or his designated representative shall be afforded the opportunity to observe all such sampling.

3. Air contaminants to be tested for include (but are not limited to) particulates, sulfur dioxide, nitrogen oxides, hydrocarbons, and carbon monoxide.

4. Operation, monitoring, recording and testing of the facility shall comply with Environmental Protection Agency Regulations on Standards of Performance for New Stationary Sources existing for fossil-fired steam generators in Title 40 Code of Federal Regulations Part 60, (40 CFR 60).

5. Three copies of all sampling reports shall be furnished to the Executive Director within sixty days after completion of sampling.

6. Upon request by the Executive Director or any local air pollution control program having jurisdiction, the holder of this permit shall provide a sample and/or an analysis of the fuel(s) utilized in this facility or shall allow air pollution control agency representatives to obtain a sample for analysis.

7. An instrument system shall be installed which continuously records sulfur dioxide concentrations in parts per million and computes and records from this data hourly averages of pounds of sulfur dioxide emitted per million BTU heat input.

8. Opacity of emissions from the boiler and the fly ash handling system must not exceed 20%, averaged over a five-minute period, except for those periods described in Rule 131.03.03.001 of Regulation I.

9. Disposal of ash must be accomplished in a manner which will prevent the ash from becoming airborne

C-6269

This table lists all sources of air contaminants on applicant's property emitted by the facilities covered by this permit. The emission rates shown are those derived from information submitted as part of the application for permit and are the maximum rates allowed for these facilities. Any proposed increase in emission rates may require an application for a modification of the facilities covered by this permit.

EMISSION POINT ID (1)	SOURCE NAME (2)	AIR CONTAMINANT DATA											
		EMISSION RATES*											
		HC (3)		NOx (4)		SO_2 (5)		PART (6)		(7) CO		(7)	
		#/HR	T/Y	#/HR	T/Y	#/HR	T/Y	#/HR	T/Y	#/HR	T/Y	#/HR	T/Y
1	Unit 1 Boiler Stack	600		4124		8248		687		600			
2	Fly Ash Handling System							7.2					

(1) Emission point identification - either specific equipment designation or emission point number from plot plan.
(2) Specific point source name. For fugitive sources use area name or fugitive source name.
(3) Hydrocarbons or carbon compounds as defined in General Rule 131.01.00.001(5) excluding carbon monoxide.
(4) Total oxides of nitrogen.
(5) Sulfur dioxide
(6) Particulate matter
(7) Other contaminants not listed; should be specific.

* Emission rates are based on the following operating schedule:
Hrs/day 24 Days/week 7 Weeks/year 52 or Hrs/year ____

TEXAS AIR CONTROL BOARD

A CONSTRUCTION PERMIT
IS HEREBY ISSUED TO

SOUTHWESTERN ELECTRIC POWER COMPANY

AUTHORIZING CONSTRUCTION OF

Lignite Handling Facilities
No. 1

TO BE LOCATED AT

Marshall, Harrison County, Texas
Lat. 32°26'44" Long. 94°28'05"

and which is to be constructed in accordance with and subject to the Texas Clean Air Act, as amended (Article 4477-5, VATS), and all Rules, Regulations and Orders of the Texas Air Control Board. Said construction is subject to any additional or amended rules, regulations and orders of the Board adopted pursuant to the Act, and to all of the following conditions:

1. This permit may not be transferred, assigned, or conveyed by the holder and applies only to the location specified herein.

2. This permit is automatically void if construction is not begun within one year of the date of issuance.

3. This permit is automatically void when an operating permit is issued or denied.

4. The facility covered by this permit shall be constructed as specified in the application for permit to construct.

5. The Board shall be notified prior to the start-up of the facility authorized by this permit in such a manner that a representative of the Texas Air Control Board may be present at the time of start-up.

6. The Board shall be notified prior to the start of any required monitoring of the facility authorized by this permit in such a manner that a representative of the Texas Air Control Board may be present during monitoring.

7. This permit is not a guarantee that the facility will receive an operating permit at the end of the construction period, nor does it absolve the holder from the responsibility for the consequences of non-compliance with all Rules and Regulations and orders of the Texas Air Control Board or with the intent of the Texas Clean Air Act.

8. Emissions from this facility must not cause or contribute to a condition of 'air pollution' as defined in Section 1.03 of the Texas Clean Air Act or violate Section 4.01 of the Texas Clean Air Act, Article 4477-5, V.A.T.S. If the Executive Director of the Texas Air Control Board determines that such a condition or violation occurs, the holder shall implement additional abatement measures as necessary to control or prevent the condition or violation.

9. Special Provisions: See attachments labeled "General Provisions C-6270", 1-7, and "Special Provisions C-6270", 1-3.

Acceptance of the permit constitutes an acknowledgement and agreement that the holder will comply with all Rules, Regulations and Orders of the Board issued in conformity with the Act and the conditions precedent to the granting of this permit. Failure to comply with all special provisions of this permit will subject the holder to the enforcement provisions of the Texas Clean Air Act, Article 4477-5, V.A.T.S.

PERMIT NO. C- 6270 DATE 5-5-78

EXECUTIVE DIRECTOR

GENERAL PROVISIONS

C-6270

1. This permit covers only those sources of emissions listed in the attached table entitled "Emission Sources - Maximum Allowable Emission Rates" and those sources are limited to the emission limits and other conditions specified in that attached table.

2. Where measured emission values are not available, calculated emission levels shall be based on emission factors published in the current AP-42, where applicable. When valid measured emission values become available they shall take precedence over calculated values.

3. Records of production and operating hours, fuel type and fuel sulfur content shall be maintained at the site of the permitted unit(s) and made available at the request of the Executive Director of the Texas Air Control Board or any appropriate local air pollution control agency.

4. When required, sampling and testing shall be conducted in accordance with appropriate procedures of the Texas Air Control Board Sampling Manual or with applicable EPA Code of Federal Regulation procedures. Any deviations from these procedures must be reviewed and approved by the Executive Director prior to sampling or testing.

5. If sampling is required the holder of this permit is responsible for providing sampling and testing facilities and operations at his own expense.

6. Start of construction, construction delays exceeding 45 days, completion of construction and start of operation shall be reported to the appropriate regional office of the Texas Air Control Board not later than ten (10) working days after occurrence of the event.

7. If special provisions are attached to this permit and there is a conflict between any general provision and any special provision, the special provision shall be followed.

SPECIAL PROVISIONS

C-6270

1. Opacity of emissions from the lignite handling facility must not exceed 20%, averaged over a five-minute period, except for those periods described in Rule 131.03.03.001 of Regulation I.

2. The holder of this permit shall forward to the staff of the Texas Air Control Board more detailed engineering data on the abatement equipment as it becomes available. In no event shall construction of the abatement equipment begin until the staff has reviewed and the Executive Director has approved the final detailed engineering data. Operation of the lignite handling facility shall not begin until the approved abatement equipment has been installed and is operational.

3. Operation, monitoring, recording and testing of the facility shall comply with Environmental Protection Agency Regulations on Standards of Performance for New Stationary Sources existing for coal preparation plants in Title 40 Code of Federal Regulations Part 60, (40 CFR 60)

This table lists all sources of air contaminants on applicant's property emitted by the facilities covered by this permit. The emission rates shown are those derived from information submitted as part of the application for perm and are the maximum rates allowed for these facilities. Any proposed increase in emission rates may require an application for a modification of the facilities covered by this permit.

EMISSION POINT ID (1)	SOURCE NAME (2)	AIR CONTAMINANT DATA — EMISSION RATES*													
		HC (3)		NOx (4)		SO_2 (5)		PART (6)		(7)		(7)			
		#/HR	T/Y	#/HR	T/Y	#/HR	T/Y	#/HR	T/Y	#/HR	T/Y	#/HR	T/Y		
Fugitive	Coal Transfer Points							10							

(1) Emission point identification - either specific equipment designation or emission point number from plot plan.
(2) Specific point source name. For fugitive sources use area name or fugitive source name.
(3) Hydrocarbons or carbon compounds as defined in General Rule 131.01.00.001(5) excluding carbon monoxide.
(4) Total oxides of nitrogen.
(5) Sulfur dioxide
(6) Particulate matter
(7) Other contaminants not listed; should be specific.

* Emission rates are based on the following operating schedule:
Hrs/day 8 Days/week 7 Weeks/year 52 or Hrs/year ____

TEXAS AIR CONTROL BOARD

6330 HWY. 290 EAST
AUSTIN, TEXAS 78723
512/451-5711

October 25, 1979

Mr. Jay A. Pruett
Environmental Coordinator
SOUTHWESTERN ELECTRIC POWER COMPANY
Post Office Box 21106
Shreveport, Louisiana 71156

Re: Permit Amendment
Construction Permit C-6269
Boiler No. 1
Marshall, Harrison County

Dear Mr. Pruett:

This is in response to your recent letter concerning your proposal to install on the above referenced facility a chimney having a height of 525 feet rather than 625 feet as originally proposed. We also understand that the latest design information on the proposed facility indicates that the emission of air contaminants will be less than originally expected. Pursuant to Rule 131.08.00.005 of Regulation VI of the Texas Air Control Board, Permit C-6269 is hereby amended in accordance with your proposals. This information will be incorporated into the existing permit file. Enclosed is a revised emission allowable table. Please return the original table to this office.

Your cooperation in this matter is appreciated. If you have further questions, please contact Mr. James Caraway of our Permits Section.

Sincerely,

E.L. Bell

for Bill Stewart, P.E.
Executive Director

Enclosure

cc: Mr. Richard Leard, P.E., Regional Supervisor, Tyler

This table lists all sources of air contaminants on applicant's property emitted by the facilities covered by this permit. The emission rates shown are those derived from information submitted as part of the application for permit and are the maximum rates allowed for these facilities. Any proposed increase in emission rates may require an application for a modification of the facilities covered by this permit.

EMISSION POINT ID (1)	SOURCE NAME (2)	AIR CONTAMINANT DATA											
		EMISSION RATES*											
		VOC (3)		NOx (4)		SO_2 (5)		PART (6)		(7)		(7)	
		#/HR	T/Y	#/HR	T/Y	#/HR	T/Y	#/HR	T/Y	#/HR	T/Y	#/HR	T/Y
1	Unit 1 Boiler Stack	5		4090		8180		682		541			
2	Fly Ash Handling System							7.2					

) Emission point identification - either specific equipment designation or emission point number from plot plan.
) Specific point source name. For fugitive sources use area name or fugitive source name.
) Volatile organic compounds as defined in General Rule 131.01.00.001(68) including methyl chloroform and Freon 113.
) Total oxides of nitrogen.
) Sulfur dioxide.
) Particulate matter.
) Other contaminants not listed; should be specific.

* Emission rates are based on the following operating schedule:
Hrs/day 24 Days/week 7 Weeks/year 52 or Hrs/year 8760

PERMIT NO. 02496
(Corresponds to
NPDES PERMIT NO. TX 0087726

TEXAS WATER COMMISSION
Stephen F. Austin State Office Building
Austin, Texas

PERMIT TO DISPOSE OF WASTES
under provisions of Chapter 26
of the Texas Water Code

Southwestern Electric Power Co.

whose mailing address is

P.O. Box 21106
Shreveport, Louisiana 71156

is authorized to dispose of wastes from the Henry W. Pirkey Power Plant (SIC-4911)

located adjacent to Red Oak Road, at a point approximately 6 miles southeast of the City of Hallsville, Harrison County, Texas

to Brandy Branch; thence to the Sabine River in Segment 0505 of the Sabine River Basin

in accordance with effluent limitations, monitoring requirements and other conditions set forth herein. This permit is granted subject to the rules of the Department, the laws of the State of Texas, and other orders of the Commission.

This permit and the authorizations contained herein shall expire at midnight, five years after the date of Commission approval.

APPROVED, ISSUED, AND EFFECTIVE this 21st day of September, 1981.

ATTEST: Mary Ann Hefner [signature]

For the Commission

A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

During the period beginning effective date and lasting through expiration date the permittee is authorized to discharge from outfall(s) serial number(s) 010, Intermittent flow, sewage treatment plant effluents.***
Such discharges shall be limited and monitored by the permittee as specified below:

Effluent Characteristic	Discharge Limitations				Monitoring Requirements	
	kg/day (lbs/day)		Other Units (Specify)			
	Daily Avg	Daily Max	Daily Avg	Daily Max	Measurement Frequency	Sample Type
Flow-m^3/Day (MGD)	N/A	N/A	(Report)	(Report)	1/day	Instantaneous
Biochemical Oxygen Demand (5-day)	1.2(2.5)	N/A	20 mg/l	65 mg/l*	1/week**	Grab
Total Suspended Solids	1.2(2.5)	N/A	20 mg/l	65 mg/l*	1/week**	Grab

* Instantaneous Maximum.
** When discharging.
*** This waste stream shall be chlorinated sufficiently to maintain a 1.0 mg/l. chlorine residual after at least 20 minutes contact time (based on peak flow).

The pH shall not be less than 6.0 standard units nor greater than 9.0 standard units and shall be monitored 1/week by grab sample

There shall be no discharge of floating solids or visible foam in other than trace amounts.

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location(s): At outfall 010, at the flow measuring device after the chlorination chamber prior to mixing with any other waters.

B. SCHEDULE OF COMPLIANCE

1. The permittee shall achieve compliance with the effluent limitations specified for discharges in accordance with the following schedule:

   None.

2. No later than 14 calendar days following a date identified in the above schedule of compliance, the permittee shall submit either a report of progress or, in the case of specific actions being required by identified dates, a written notice of compliance or noncompliance. In the latter case, the notice shall include the cause of noncompliance, any remedial actions taken, and the probability of meeting the next scheduled requirement.

C. MONITORING AND REPORTING

1. Representative Sampling

Samples and measurements taken as required herein shall be representative of the volume and nature of the monitored discharge.

2. Reporting* (See Footnote for Applicable State Requirements)

Monitoring results obtained during the previous three months shall be summarized and reported on a Discharge Monitoring Report Form (EPA No. 3320-1), postmarked no later than the 28th day of the month following the completed reporting period. The first report is due following the reporting period during which the permit becomes effective. These quarterly reporting periods shall end on the last day of the months of March, June, September and December, unless requested by the Executive Director to be submitted more frequently. Duplicate signed copies of these, and all other reports required herein, shall be submitted to the Regional Administrator and the Texas Department of Water Resources at the following addresses:

(a) Environmental Protection Agency
Region VI
First International Bank Bldg.
1201 Elm Street
Dallas, Texas 75270

(b) Executive Director
Texas Department of Water Resourc
P. O. Box 13087, Capitol Station
Austin, Texas 78711

3. Definitions

a. The "daily average" discharge means the total discharge by weight during a calendar month divided by the number of days in the month that the production or commercial facility was operating. Where less than daily sampling is required by this permit, the daily average discharge shall be determined by the number of days during the calendar month when the measurements were made.

*This section does not apply to permits issued by the Texas Water Commission. Until notified by the Executive Director, Texas Department of Water Resources, or the Commission to do otherwise, the permittee shall comply with the reporting requirements of Rules 156.19.05.001-.010, Rules of the Department.

b. The "daily maximum" discharge means the total discharge by weight during any calendar day.

4. Test Procedures

Test procedures for the analyses of pollutants shall comply with procedures specified in Rules of the Department of Water Resources and shall conform to regulations published pursuant to Section 304(g) of the Act, under which such procedures may be required.

5. Recording of Results

For each measurement or sample taken pursuant to the requirements of this permit, the permittee shall record the following information:

a. The exact place, date, and time of sampling;
b. The dates the analyses were performed;
c. The person(s) who performed the analyses;
d. The analytical techniques or methods used; and
e. The results of all required analyses.

6. Additional Monitoring by Permittee

If the permittee monitors any pollutant at the location(s) designated herein more frequently than required by this permit using approved analytical methods as specified above, the results of such monitoring shall be included in the calculation and reporting of the values required in the Discharge Monitoring Report Form (EPA No. 3320-1). Such increased frequency shall also be indicated.

7. Records Retention

All records and information resulting from the monitoring activities required by this permit including all records of analyses performed and calibration and maintenance of instrumentation and recordings from continuous monitoring instrumentation shall be retained for a minimum of three (3) years or longer if requested by the Regional Administrator of the Environmental Protection Agency or the Texas Department of Water Resources.

PART II

A. MANAGEMENT REQUIREMENTS

1. Change in Discharge

All discharges authorized herein shall be consistent with the terms and conditions of this permit. The discharge of any pollutant identified in this permit more frequently than or at a level in excess of that authorized shall constitute a violation of the permit. Any anticipated facility expansions, production increases, or process modifications which will result in new, different, or increased discharges of pollutants must be reported by submission of a new application or, if such changes will not violate the effluent limitations specified in this permit, by notice to the permit issuing authority of such changes. Following such notice, the permit may be modified to specify and limit any pollutants not previously limited.

2. Noncompliance Notification

If, for any reason, the permittee does not comply with or will be unable to comply with any daily maximum effluent limitation specified in this permit, the permittee shall provide the Regional Administrator and the Executive Director, Texas Department of Water Resource with the following information, in writing, within five (5) days of becoming aware of such condition:

a. A description of the discharge and cause of noncompliance; and

b. The period of noncompliance, including exact dates and times; or, if not corrected, the anticipated time the noncompliance is expected to continue, and steps being taken to reduce, eliminate and prevent recurrence of the noncomplying discharge.

3. Facilities Operation

The permittee shall at all times maintain in good working order and operate as efficiently as possible all treatment or control facilities or systems installed or used by the permittee to achieve compliance with the terms and conditions of this permit.

4. Adverse Impact

The permittee shall take all reasonable steps to minimize any adverse impact on the waters to the State of Texas resulting from noncompliance with any effluent limitations specified in this permit, including such accelerated or additional monitoring as necessary to determine the nature and impact of the noncomplying discharge.

5. Bypassing

Any diversion from or bypass of facilities necessary to maintain compliance with the terms and conditions of this permit is prohibited, except (i) where unavoidable to prevent loss of life or severe property damage, (ii) where excessive storm drainage or runoff would damage any facilities necessary for compliance with the effluent limitations and prohibitions of this permit, or (iii) where authorized under a program of preventive or corrective maintenance as approved by the Environmental Protection Agency or the Executive Director, Texas Department of Water Resources. The permittee shall promptly notify the Regional Administrator and the Executive Director, Texas Department of Wate Resources, in writing of each such diversion or bypass.

6. Removed Substances

Solids, sludges, filter backwash, or other pollutants removed from or resulting from treatment or control of wastewaters shall be disposed of in a manner such as to prevent any pollutant from such materials from entering the waters of the State of Texas.

7. Power Failures

In order to maintain compliance with the effluent limitations and prohibitions of this permit, the permittee shall either:

a. In accordance with the Schedule of Compliance contained in Part I, provide an alternative power source sufficient to operate the wastewater control facilities;

   or, if no date for implementation appears in Part I,

b. Halt, reduce or otherwise control production and/or all discharges upon the reduction, loss, or failure of one or more of the primary sources of power to the wastewater control facilities.

B. RESPONSIBILITIES

1. Right of Entry

The permittee is hereby notified that the State and/or local governments specifically reserve all rights of entry and inspection granted them by the law.

The permittee shall allow the Regional Administrator of the Environmental Protection Agency and/or his authorized representative, upon the presentation of credentials:

a. To enter upon the permittee's premises where an effluent source is located or in which any records are required to be kept under the terms and conditions of this permit; and

b. At reasonable times to have access to and copy any records required to be kept under the terms and conditions of this permit; to inspect any monitoring equipment or monitoring method required in this permit; and to sample any discharge of pollutants.

2. Transfer of Ownership or Control

In the event of any change in control or ownership of facilities from which the authorized discharges emanate, the permittee shall notify the succeeding owner or controller of the existence of this permit by letter, a copy of which shall be forwarded to the Regional Administrator and the Texas Department of Water Resources.

3. Availability of Reports

Except for data determined to be confidential under Rule 156.01.01.013, Rules of the Department, Section 26.134 of the Water Code and Section 308 of the Act, all reports prepared in accordance with the terms of this permit shall be available for public inspection at the offices of the Texas Department of Water Resources and the Regional Administrator. As required by the Act, effluent data shall not be considered confidential. Knowingly making any false statement on any such report may result in the imposition of criminal and/or civil penalties.

4. Permit Modification

After notice and opportunity for a hearing, this permit may be modified, suspended, or revoked in whole or in part during its term for cause including, but not limite to, the following:

a. Violation of any terms or conditions of this permit;

b. Obtaining this permit by misrepresentation or failure to disclose fully all relevant facts; or

c. A change in any condition that requires either a temporary or permanent reduction or elimination of the authorized discharge.

5. Toxic Pollutants

Notwithstanding Part II, B-4 above, if a toxic effluent standard or prohibition (including any schedule of compliance specified in such effluent standard or prohibiti is established under Section 307(a) of the Federal Water Pollution Control Act Amendment of 1972 for a toxic pollutant which is present in the discharge and such standard or prohibition is more stringent than any limitation for such pollutant in this permit, this permit shall be revised or modified in accordance with the toxi effluent standard or prohibition and the permittee so notified.

6. Civil and Criminal Liability

Except as provided in permit conditions on "Bypassing" (Part II,A-5) and "Power Failure" (Part II,A-7), nothing in this permit shall be construed to preclude the institution of any legal action nor relieve the permitte from any responsibilities, liabilities or penalties established pursuant to any applicable State law or regulation under authority preserved by Section 510 of the Act.

7. Oil and Hazardous Substance Liability

Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities, or penalties to which the permittee is or may be subject under Section 311 of the Federal Water Pollution Control Act Amendments of 1972.

8. State and Federal Laws

Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities, or penalties established pursuant to any applicable State or Federal law or regulation.

9. Property Rights

The issuance of this permit does not convey any property rights in either real or personal property, or any exclusive privileges, nor does it authorize any injury to private property or any invasion of personal rights, nor any infringement of Federal, State, or local laws or regulations.

10. Severability of Conditions

The conditions of this permit are severable, and if any provision of this permit, or the application of any provision of this permit to any circumstance, is held invalid, the application of such provision to other circumstances, and the remainder of this permit, shall not be affected thereby.

PART III

OTHER REQUIREMENTS

For the purpose of Part I of this permit, the following definitions shall apply in lieu of those under "Part I, Section C, 'Monitoring and Reporting'", where limitations are expressed in concentration:

a. The "daily average" concentration means the arithmetic average (weighted by flow value) of all the daily determinations of concentration made during a calendar month. Daily determinations of concentration made using a composite sample shall be the concentration of the composite sample. When grab samples are used, the daily determination of concentration shall be the arithmetic average (weighted by flow value) of all the samples collected during that calendar day.

b. The "daily maximum" concentration means the daily determination of concentration for any calendar day.

For the purpose of Part III of this permit, the following definition shall apply:

Grab sample quality means the quality determined by measuring the concentration in milligrams per liter parts per million or other appropriate units of measurement in a single grab sample of the discharg of a defined waste.

When three, four or five consecutive grab samples have been collected at various times on separate days by the same entit the existence of concentrations of any specific pollutant in more than two samples in excess of the value shown for the specific pollutant in Column 1 of Table 1, Part III of this permit, is a violation. Each failure to comply with the abov requirement for a specific pollutant is a separate violation except the case where the pollutant parameters involved are expressions of the same characteristic of the effluent.

Each grab sample containing pollutants in excess of the concentrations shown for such pollutant in Column 2 of Table 1, Part III of this permit, is a violation. Each failure to comply with the above requirement for a specific pollutant is a separate violation except the case where the pollutant parameters involved are expressions of the same characteristic of the effluent.

The foregoing requirements shall be applied with judgment, and in the context of the other relevant information availab

PART III

OTHER REQUIREMENTS

1. The following additional limits apply to Outfall 010:

   Volume: Not to exceed a daily average flow of 15,000 gpd.
   Not to exceed a daily maximum flow of 30,000 gpd.

Table 1

Pollutant	Grab Samples, mg/l Column 1	Column 2
Biochemical Oxygen Demand (5-day)	35	65
Total Suspended Solids	35	65

2. Stormwater runoff from any point source associated with the construction equipment maintainance area or the fuel storage area shall comply with the following maximum grab sample limits; Chemical Oxygen Demand - 200 mg/l, Oil and Grease - 15 mg/l, pH range 6.0 to 9.0 standard units.

3. The permittee is hereby placed on notice that this permit may be reviewed by the Texas Department of Water Resources after the completion of any new intensive water quality survey on Segment No. 0505 of the Sabine River and any subsequent updating of the water quality model for Segment No. 0505, in order to determine if the limitations and conditions contained herein are consistent with any such revised model. The permit may be amended, pursuant to Rule 156.25.31.005 of the Texas Department of Water Resources, as a result of such review.

DEFINITIONS

All definitions contained in Section 26.001 of the Texas Water Code Paragraph 502 of the Act shall apply to this permit and are incorporated therein by reference. Additional definitions of words or phrases used in this permit are as follows:

1. The term "Act" means the Federal Water Pollution Control Act, as amended, Public Law 92-500 (33 USC 1251 et seq).

2. The term "Environmental Protection Agency" means the U. S. Environmental Protection Agency.

3. The term "Administrator" means the Administrator of the U. S. Environ mental Protection Agency.

4. The term "Regional Administrator" means one of the Regional Administrators of the U. S. Environmental Protection Agency.

5. The term "National Pollutant Discharge Elimination System" (hereinaft referred to as "NPDES") means the system for issuing, conditioning, and denying permits for the discharge of pollutants from the point sources into the navigable waters, the contiguous zone, and the oceans, by the Administrator of the Environmental Protection Agency pursuant to section 402 of the Federal Water Pollution Control Act, as amended.

6. The term "applicable effluent standards and limitations" means all State and Federal effluent standards and limitations to which a discharge is subject under the Act, including, but not limited to, effluent limitations, standards of performance, toxic effluent standards and prohibitions, and pretreatment standards.

7. The term "applicable water quality standards" means all water quality standards to which a discharge is subject under the Act and which have been (a) approved or permitted to remain in effect by the Administrator following submission to him pursuant to Section 303(a) of the Act, or (b) promulgated by the Administrator pursuant to section 303(b) or203(c) of the Act.

8. The term "sewage" means human body wastes and the wastes from toilets and other receptacles intended to receive or retain body wastes.

9. The term "sewage sludge" shall mean the solids and precipitates separated from wastewater by unit processes.

10. The term "treatment works" means any devices and systems used in the storage, treatment, recycling, and reclamation of municipal sewage or industrial wastes of a liquid nature to implement section 201 of the Act, or necessary to recycle or reuse water at the most economical cost over the estimated life of the works, including intercepting sewers, sewage collection systems, pumping, power, and other equipment, and their appurtenances; extension, improvement, remodeling, additions, and alterations thereof; elements essential to provide a reliable recycled supply such as standby treatment units and clear well facilities; and any works, including site acquisition of the land that will be an integral part of the treatment process or is used for ultimate disposal of residues resulting from such treatment.

11. The term "grab sample" means an individual sample collected in less than 15 minutes.

12. The term "uncontaminated water" means water which has no direct contact with any product or raw material and which does not contain a level of constituents detectably higher than that of the intake water.

13. The term "permitting authority" means the State water quality control agency or the Environmental Protection Agency, who physically issue the permit.

14. Items stamped N.P.D.E.S. REQUIREMENTS ONLY do not apply to this permit and are retained in this permit to preserve the form and numbering system of a National Pollutant Discharge Elimination System permit. The items stamped N.P.D.E.S. REQUIREMENTS ONLY in this permit were secured from a standard U.S. Environmental Protection Agency permit format existent in February, 1974, and they may or may not be identical to the requirements or conditions of the actual N.P.D.E.S. permit applicable to the facility covered by this permit. It is necessary to examine the issued N.P.D.E.S. permit authorizing discharge to determine the actual N.P.D.E.S. requirements.

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
Southwest Region
P. O. Box 1689
Fort Worth, Texas 76101

IN REPLY REFER TO
AERONAUTICAL STUDY
NO. 81-ASW-468-OE
CORRECTED *

DETERMINATION OF NO HAZARD TO AIR NAVIGATION

SPONSOR		CONSTRUCTION LOCATION	
	Southwestern Electric Power Company P. O. Box 21106 Shreveport, Louisiana 71156 Attn: Jay Pruett	PLACE NAME Marshall, Texas	
		LATITUDE 32°27'38"	LONGITUDE 94°29'06"
CONSTRUCTION PROPOSED	DESCRIPTION Concrete Chimney	HEIGHT (IN FEET) ABOVE GROUND 526	ABOVE MSL 887

An aeronautical study of the proposed construction described above has been completed under the provisions of Part 77 of the Federal Aviation Regulations. Based on the study it is found that the construction would have no substantial adverse effect on the safe and efficient utilization of the navigable airspace by aircraft or on the operation of air navigation facilities. Therefore, pursuant to the authority delegated to me, it is hereby determined that the construction would not be a hazard to air navigation provided the following conditions are met:

Conditions: The structure should be lighted and monitored in accordance with Chapter 4, 6, and 9 or Chapters 4, 7, and 9 of FAA Advisory Circular 70/7460-1, Obstructi Marking and Lighting. The circular is available free of charge from the Departme of Transportation, Publication Section M443.1, 400 7th Street, S.W., Washington, D.C. 20590.

Supplemental notice of construction is required any time the project is abandoned (use the enclosed FAA form), or

(XX) At least 48 hours before the start of construction (use the enclosed FAA form).
(XX) Within five days after the construction reaches its greatest height (use the enclosed FAA form).
( ) Not required.

This determination expires on * January 15, 1983 unless:
(a) extended, revised or terminated by the issuing office;
(b) the construction is subject to the licensing authority of the Federal Communications Commission and an application for a construction permit is made to the FCC on or before the above expiration date. In such case the determination expires on the date prescribed by the FCC for completion of construction, or on the date the FCC denies the application.

This determination is subject to review if an interested party files a petition on or before July 5, 1981. In the event a petition for review is filed, it should be submitted in triplicate to the Chief, Airspace Obstruction and Airports Branch, AT-240, Federal Aviation Administration, Washington, D.C. 20590, and contain a full statement of the basis upon which it is made.

This determination becomes final on July 15, 1981 unless a petition for review is timely filed, in which case the determination will not become final pending disposition of the petition. Interested parties will be notified of the grant of any review.

An account of the study findings, aeronautical objections, if any, registered with the FAA during the study, and the basis for the FAA's decision in this matter will be found on the following page(s).

If the structure is subject to the licensing authority of the FCC, a copy of this determination will be sent to that Agency.

for Clair M Billington
SIGNED Donald R. Guempel TITLE Chief, Airspace and Procedures Branch

ISSUED IN Fort Worth, Texas 5-68 ON June 5, 1981

FAA Form 7460-9 (4-71) SW OP-1 (3/81) Obsoletes Previous Edition

DO NOT REMOVE CARBONS

Form Approved O.M.B. No. 04-R0001

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

NOTICE OF PROPOSED CONSTRUCTION OR ALTERATION

FOR FAA USE ONLY

AERONAUTICAL STUDY NO.

FAA will either return this form or issue a separate acknowledgement.

A. The proposed structure:

- ☐ Does not require a notice to FAA.
- ☐ Would not exceed any obstruction standard of Part 77 and would not be a hazard to air navagation.
- ☐ Should be obstruction ☐ marked ☐ lighted per FAA Advisory Circular 70/7460—1, Chapter(s) ______
- ☐ Obstruction marking and lighting are not necessary.
- ☐ Requires supplemental notice. Use FAA form enclosed.

B. FCC ☐ was ☐ was not advised.

REMARKS:

ISSUING OFFICE:

REVIEWING OFFICER | DATE

1. NATURE OF STRUCTURE

A. TYPE	B. CLASS	C. PROPOSED LENGTH OF TIME TO COMPLETE (*Months*)
[x] NEW CONSTRUCTION [ ] ALTERATION	[x] PERMANENT [ ] TEMPORARY	6

2. NAME AND ADDRESS OF INDIVIDUAL, COMPANY, CORPORATION, ETC. PROPOSING THE CONSTRUCTION OR ALTERATION (*Number, Street, City, State and Zip Code*)

TO

Southwestern Electric Power Co.
P.O. Box 21106
Shreveport, Louisiana 71156

3. COMPLETE DESCRIPTION OF STRUCTURE (*Include effective radiated power of proposed or modified AM, FM or TV station and assigned frequency; size and configuration of power transmission line in vicinity of FAA facilities as appropriate*).

2-171 ft high concrete coal silos having 77.5 ft outside diameter at top with one silo having a 20'-0" x 37'-6" x 54'-0" high open steel frame structure over it.

4. LOCATION OF STRUCTURE

A. COORDINATES (*To nearest second*)

LATITUDE °	'	"	LONGITUDE °	'	"
32	27	26.7	94	29	10.7

B. NEAREST CITY OR TOWN, AND STATE: Marshall, Texas

(1) DISTANCE FROM 4B: 9.3 MILES

(2) DIRECTION FROM 4B: SW

C. NAME OF NEAREST AIRPORT, HELIPORT, OR SEAPLANE BASE: Harrison Co. (near Marshall, Texas)

(1) DISTANCE FROM NEAREST POINT OF NEAREST RUNWAY: 11.2

(2) DIRECTION FROM AIRPORT: SW

D. DESCRIPTION OF LOCATION OF SITE WITH RESPECT TO HIGHWAYS, STREETS, AIRPORTS, PROMINENT TERRAIN FEATURES, EXISTING STRUCTURES, ETC. (*Attach a highway, street, or any other appropriate map or scaled drawing showing the relationship of construction site to nearest airport(s). If more space is required, continue on a separate sheet of paper and attach to this notice.*)

The site is located in Harrison County, Texas, approximately 9 miles southwest of Marshall, Texas. The site is bounded by Interstate Route 20 at the north, the Sabine River on the south, State Route 43 on the east and Hatley's Creek on the west. The site consists of wooded pastureland.

5. HEIGHT AND ELEVATION (*Complete A, B and C to the nearest foot*)

A. ELEVATION OF SITE ABOVE MEAN SEA LEVEL	356'-0"
B. HEIGHT OF STRUCTURE INCLUDING APPURTENANCES AND LIGHTING (*if any*) ABOVE GROUND, OR WATER IF SO SITUATED	225'-0"
C. OVERALL HEIGHT ABOVE MEAN SEA LEVEL (*A + B*)	581'-0"

6. WORK SCHEDULE DATES

A. BEGINNING

B. END

7. OBSTRUCTION MARKED AND/OR LIGHTED IN ACCORDANCE WITH CURRENT FAA ADVISORY CIRCULAR 70/7460-1, OBSTRUCTION MARKING AND LIGHTING

	YES	NO
A. MARKED		X
B. AVIATION RED OBSTRUCTION LIGHTS		X
C. HIGH INTENSITY WHITE OBSTRUCTION LIGHTS		X
D. DUAL LIGHTING SYSTEM		X

I HEREBY CERTIFY that all of the above statements made by me are true, complete, and correct to the best of my knowledge.

DATE	TEL. NO. (*Give area code*)	TYPED NAME TITLE OF PERSON FILING NOTICE	SIGNATURE

5-6^

Notice ... ion Regulations (14 C.F.R. Part 77) pursuant to Section 1101 of the Federal Aviation Act of 1958 ...

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
Southwest Region
P. O. Box 1689
Fort Worth, Texas 76101

IN REPLY REFER TO
AERONAUTICAL STUDY
NO. 81-ASW-468-OE

DETERMINATION OF NO HAZARD TO AIR NAVIGATION

		CONSTRUCTION LOCATION	
SPONSOR	Southwestern Electric Power Company P. O. Box 21106 Shreveport, Louisiana 71156	PLACE NAME Marshall, Texas	
		LATITUDE 32°27'38"	LONGITUDE 94°29'06"
CONSTRUCTION PROPOSED	DESCRIPTION Concrete Chimney	HEIGHT (IN FEET) ABOVE GROUND 526	ABOVE MSL 887

An aeronautical study of the proposed construction described above has been completed under the provisions of Part 77 of the Federal Aviation Regulations. Based on the study it is found that the construction would have no substantial adverse effect on the safe and efficient utilization of the navigable airspace by aircraft or on the operation of air navigation facilities. Therefore, pursuant to the authority delegated to me, it is hereby determined that the construction would not be a hazard to air navigation provided the following conditions are met:

Conditions: The structure should be lighted and monitored in accordance with Chapters 4, 6, and 9 or Chapters 4, 7, and 9 of FAA Advisory Circular 70/7460-1, Obstruction Marking and Lighting. The circular is available free of charge from the Department of Transportation, Publication Section M443.1, 400 7th Street, S.W., Washington, D.C. 20590.

Supplemental notice of construction is required any time the project is abandoned (use the enclosed FAA form), or

(XX) At least 48 hours before the start of construction (use the enclosed FAA form).
(XX) Within five days after the construction reaches its greatest height (use the enclosed FAA form).
( ) Not required.

This determination expires on January 15, 1982 (3) unless:
(a) extended, revised or terminated by the issuing office;
(b) the construction is subject to the licensing authority of the Federal Communications Commission and an application for a construction permit is made to the FCC on or before the above expiration date. In such case the determination expires on the date prescribed by the FCC for completion of construction, or on the date the FCC denies the application.

This determination is subject to review if an interested party files a petition on or before July 5, 1981. In the event a petition for review is filed, it should be submitted in triplicate to the Chief, Airspace Obstruction and Airports Branch, AT-240, Federal Aviation Administration, Washington, D.C. 20590, and contain a full statement of the basis upon which it is made.

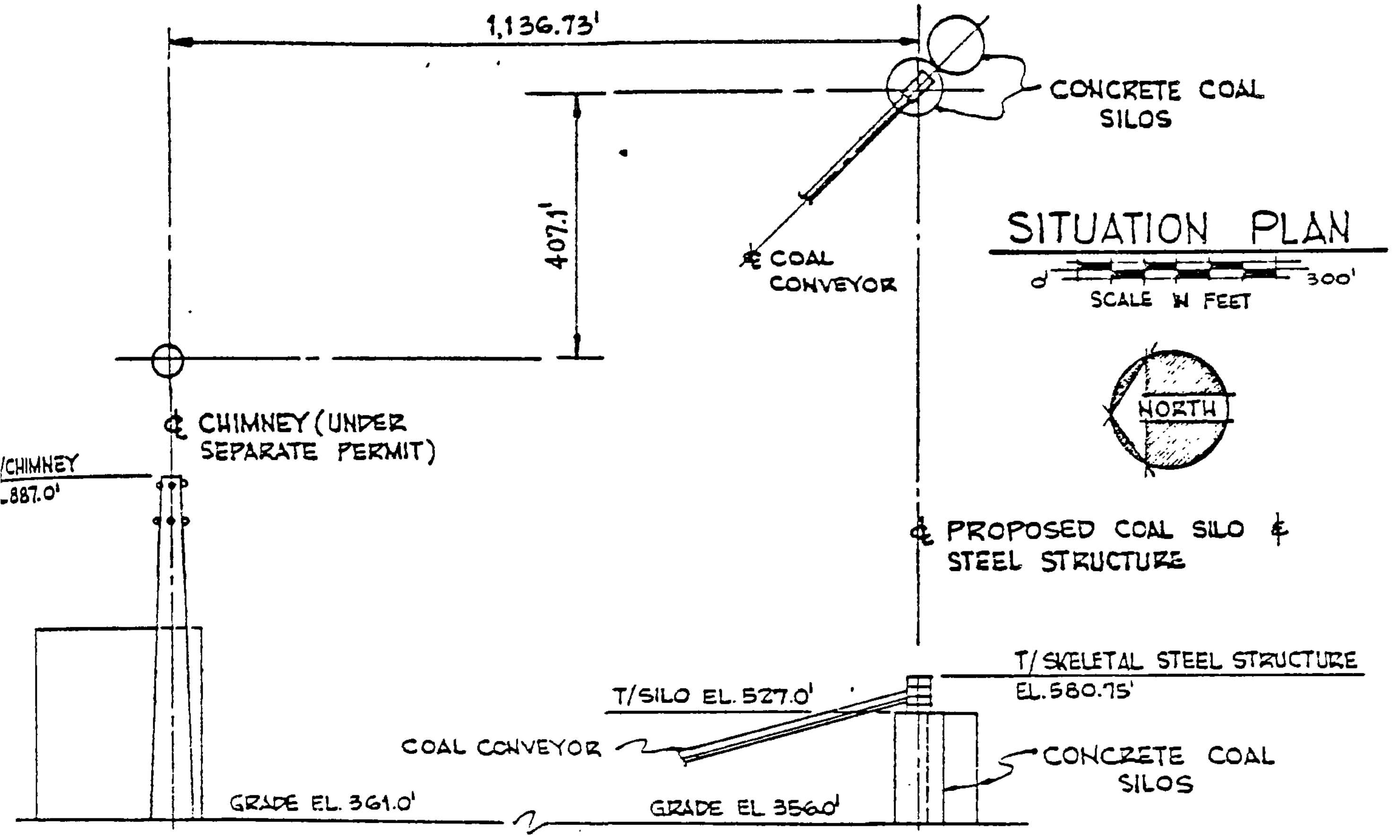
This determination becomes final on July 15, 1981 unless a petition for review is timely filed, in which case the determination will not become final pending disposition of the petition. Interested parties will be notified of the grant of any review.

An account of the study findings, aeronautical objections, if any, registered with the FAA during the study, and the basis for the FAA's decision in this matter will be found on the following page(s).

If the structure is subject to the licensing authority of the FCC, a copy of this determination will be sent to that Agency.

SIGNED: Donald R. Guempel   TITLE: Chief, Airspace and Procedures Branch

Fort Worth, Texas   5-70

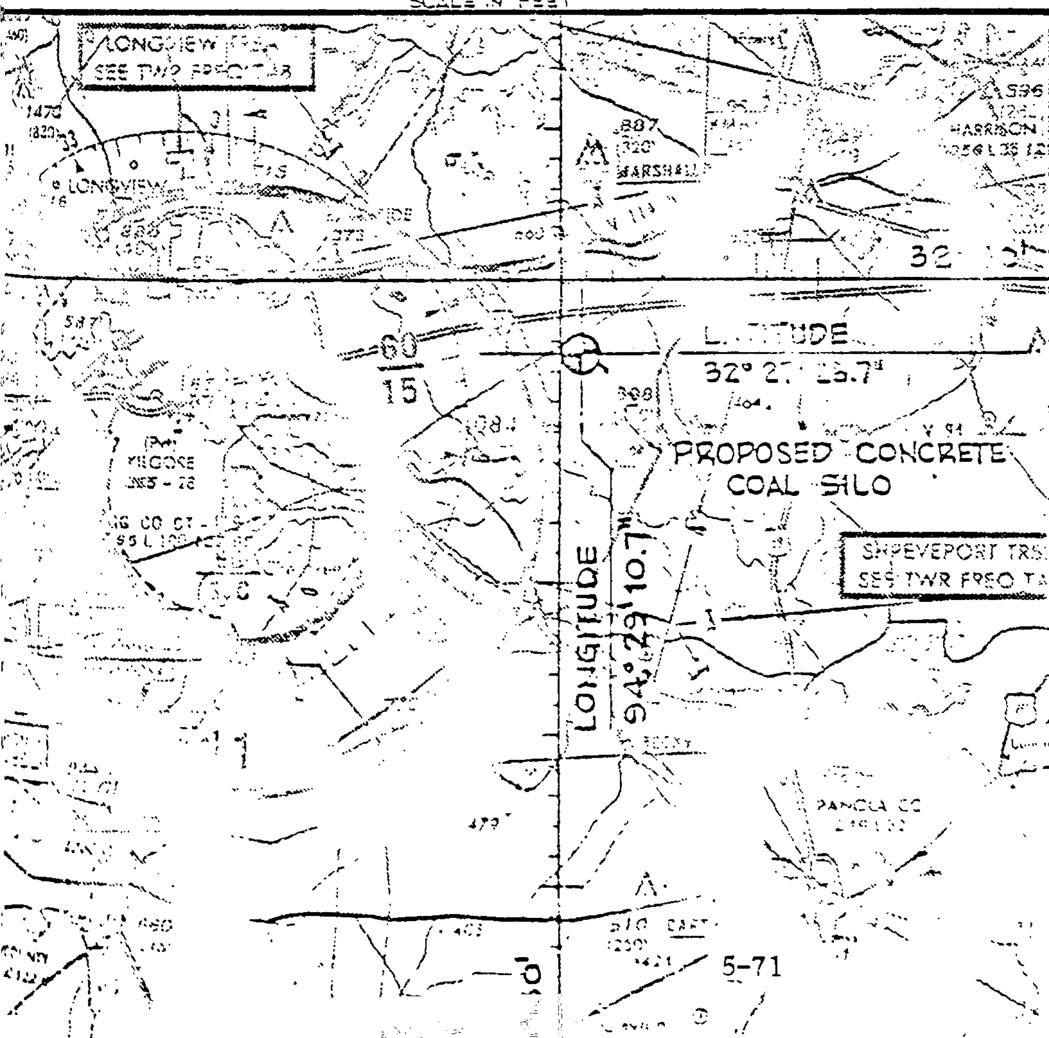


SITUATION PLAN

0' — 300'
SCALE IN FEET

WEST ELEVATION

0' SCALE IN FEET 300'



LOCATION PLAN

0 — 10
SCALE IN MILES

COPIED FROM MEMPHIS SECTIONAL AERONAUTICAL CHART BY U.S DEPT. of COMMERCE, NAT'L. OCEANIC AND ATMOSPHERIC ADMINISTRATION, 26TH EDITION, DATED: MAY 14, 1981.

PIRKEY POWER PLANT UNIT 1

PROPOSED CONCRETE COAL SILO
AT HENRY W. PIRKEY POWER PLANT
COUNTY OF HARRISON, STATE OF TEXAS
APPLICATION BY
SOUTHWESTERN ELECTRIC POWER CO.
SHREVEPORT, LOUISIANA

SCALE AS SHOWN
DRAWN
CHECKED
ENGINEER
APPROVED

SARGENT & LUNDY

DRAWING NO

September 3, 1980

Mr. Jay A. Pruett
Environmental Coordinator
Southwestern Electric Power Company
P. O. Box 21106
Shreveport, Louisiana 71156

Dear Mr. Pruett:

The information which you submitted July 1979, regarding the construction of a surface lignite mine, has been reviewed. The purpose of this letter is to inform you of the applicability of Prevention of Significant Deterioration (PSD) regulations to Southwestern Electric Power Company's proposed surface lignite mine described in the PSD application (PSD-TX-273).

The mine as proposed, will provide fuel for the planned expansion (beginning 1983) of Southwestern Electric Power Company's adjacent existing electric generating plant (PSD-TX-64). Based on the previous PSD regulations (June 19, 1978), the new mine proposed by Southwestern Electric Power Company was defined as a modification to their existing power plant and therefore subject to the necessary permit requirements. However, the definition of "Source" has been redefined in the new PSD regulations promulgated on August 7, 1980.

Based upon the definitions in the revised PSD regulations (45 FR 52735), stationary source is defined as any structure, building, facility, or installation, which emits or may emit any air pollutant regulated under the act, which belongs to the same industrial grouping, located on one or more contiguous or adjacent properties, and are under the common control of the same person. Pollutant emitting activities which belong to the same "Major Group" (i.e. which have the same two digit Standard Industrial Code) are considered as part of the same industrial grouping.

The proposed surface lignite mine is classified in "Major Group" 12 according to the Standard Industrial Classification Manual, 1972, as amended by the 1977 supplement. The adjacent existing power plant, also owned by Southwestern Electric Power Company is classified in "Major Group" 40. Therefore, the proposed mine is now defined as a new lignite mine, rather than a modification to the existing power plant.

The proposed PSD regulations list 26 source categories for which fugitive emissions are to be considered when calculating potential to emit. The proposed surface lignite mine is not one of the 26 source categories and therefore fugitive emissions from the proposed source need not be quantified when calculating potential emissions. Since the only emissions from the proposed new mine are fugitive emissions, this new source will not have the potential to emit greater than 250 tons/year of any applicable pollutant regulated under the act. Therefore, the proposed South Hallsville surface lignite mine is not a major stationary source and therefore is exempt from PSD review requirements. However, this determination in no way exempts the new mine from any other necessary permit requirements including those of the Texas Air Control Board (TACB).

If you have any questions concerning this matter, please call Mr. Tom Diggs at (214) 767-1594.

Sincerely,

Jack Divita

Jack S. Divita, Chief
Air Programs Branch

cc: Eli Bell
Deputy Director, Prevention & Control
Texas Air Control Board
6330 Hwy. 290 East
Austin, Texas 78723

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION VI
1201 ELM STREET
DALLAS, TEXAS 75270

Mr. Jay A. Pruett
Environmental Coordinator
Southwestern Electric Power Company
P. O. Box 21106
Shreveport, Louisiana 71156

Dear Mr. Pruett:

This letter is to notify you that permit number PSD-TX-64 issued to Southwestern Electric Power Company has been amended per your request of July 24, 1979. As you requested, the reduction in your permitted stack height from 625 to 525 feet has been made. It is also necessary to amend the third condition of your permit. The condition listed below is to be substituted for the condition with the same number on page 2 of said permit:

3. The maximum emission rates of SO_2 and TSP for the proposed unit shall not exceed 8180 pounds per hour and 682 pounds per hour, respectively.

Please contact us if you have any questions concerning this change.

Sincerely,

Diana Dutton, Director
Enforcement Division

cc: Bill Stewart
Texas Air Control Board

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

FIRST INTERNATIONAL BUILDING
1201 ELM STREET
DALLAS, TEXAS 75270

CERTIFIED MAIL: RETURN RECEIPT REQUESTED (856421)

MAR 30 1978

Mr. Jay A. Pruett
Environmental Coordinator
Southwestern Electric Power Company
P. O. Box 21106
Shreveport, Louisiana 71156

Dear Mr. Pruett:

A review of your application for authority to construct a steam generating unit near Hallsville, Texas as specified in your Significant Deterioration Review, Application Number PSD-TX-64 dated November 30, 1977, has been completed by the Environmental Protection Agency (EPA). A determination has been made to approve your project. Our final determination indicates that you have met the requirements of the prevention of significant deterioration regulations of 40 CFR 52.21, as amended by the Clean Air Act Amendments of 1977, that is, the operation of your proposed project at the location specified, (1) will not cause a violation of the Class II air quality deterioration increments, (2) will not cause a violation of the National Ambient Air Quality Standards, (3) will not have an impact on the air quality of any mandatory Class I areas, and (4) will use best available control technology to control emissions of sulfur dioxide (SO2) and particulate matter (TSP).

A violation of any condition issued as part of this approval as well as any construction which proceeds at variance with information submitted in the application is regarded as a violation of construction authority and is subject to enforcement action. Also, before you start construction you must meet, if applicable, all other Federal EPA requirements such as the 40 CFR part 60 (New Source Performance Standards), the National Pollutant Discharge Elimination System (NPDES), and the National Environmental Policy Act (NEPA). Commencement of construction prior to the completion of the NEPA process may result in enforcement action pursuant to Section 6.906 of 40 CFR Part 6, Preparation of Environmental Impact Statement. Furthermore, it must be pointed out that issuance of your prevention of significant deterioration certification does not free you of the responsibility to comply with other air pollution control strategies and all local, State, and Federal regulations which are part of the Texas State Implementation Plan.

This approval is issued in accordance with the following conditions:

1. The source will be constructed in accordance with the application and supportive facts submitted for EPA review.

2. The source shall meet the requirements for the application of best available control technology as follows:

    a) The source shall comply with the requirements of the New Source Performance Standards (NSPS) for Coal-Fired Steam Generators (40 CFR, Part 60, Subpart D); i.e., the maximum emissions of sulfur dioxide (SO2) and total suspended particulate (TSP) shall be 1.2 and 0.1 pounds per million BTU, respectively.

    b) The source shall comply with the NSPS for Coal Preparation Plants (40 CFR, Part 60, Subpart Y).

3. The maximum emission rates of SO2 and TSP for the proposed unit shall not exceed 8234 pounds per hour and 686 pounds per hour, respectively.

4. Compliance with the above required emission limitations shall be determined by the test methods and procedures as outlined in 40 CFR, 60.46 and 60.254.

5. Approval under the prevention of significant deterioration requirements shall take effect on the date of this notice. In accordance with the proposed prevention of significant deterioration rules which appeared in the Federal Register of December 8, 1977, construction must commence before December 1, 1978. If construction is not commenced by December 1, 1978, (where the term "commenced" is defined under 40 CFR 52.21(b)(7) as promulgated in the Federal Register on November 3, 1977), then this approval shall become invalid, and it will be necessary to resubmit an application under the new prevention of significant deterioration regulations which are expected to be promulgated on March 1, 1978.

The complete analysis including public comments, which justifies this approval, has been fully documented by the EPA Regional Office for future reference, if necessary. Any questions concerning this approval may be directed to Oscar Cabra by phone at (214) 767-2742 or by letter to this office.

Sincerely,

Myron O. Knudson

for Adlene Harrison
Regional Administrator

cc: Bill Stewart, P. E.
Executive Director
Texas Air Control Board

AFFIDAVIT OF INTENT

Southwestern Electric Power Company
P. O. Box 21106
Shreveport, Louisiana 71156

PSD-TX-64

Construction of a steam generating unit near Hallsville, Texas.

This permit would have been issued on or before this date, February 28, 1978, but for the order entered in Environmental Defense Fund v. Environmental Protection Agency, No. 78-281 (D.D.C.) on February 24, 1978.

Adlene Harrison
for Regional Administrator

PERMIT TO
APPROPRIATE STATE WATER

APPLICATION NO. 3908 PERMIT NO. 3618 TYPE: Section 11.121

Permittee	: Southwestern Electric Power Company	Address	: P. O. Box 21106 Shreveport Louisiana 71156
Received	: April 17, 1978	Filed	: August 21, 1978
Granted	: November 6, 1978	County	: Harrison
Watercourse	: Brandy Branch, tributary of Sabine River	Watershed	: Sabine River Basin

WHEREAS, the Texas Water Commission finds that jurisdiction of the application is established; and

WHEREAS, a public hearing has been held and Southwestern Electric Power Company named as a party; and

WHEREAS, by law the Executive Director and the Public Interest Advocate of the Department of Water Resources are parties; and

WHEREAS, no person appeared to protest the granting of this application; and

WHEREAS, the issuance of this permit granting this application is not adverse to any party; and

WHEREAS, the Commission has assessed the effects of issuance of this permit on the bays and estuaries of Texas.

NOW, THEREFORE, this permit to appropriate and use State water is issued to Southwestern Electric Power Company subject to the following terms and conditions:

1. IMPOUNDMENT

   Permittee is authorized to construct, and before acquiring any right hereunder shall construct, a dam and reservoir on Brandy Branch and impound therein not to exceed 29,513 acre-feet of water at an elevation of 340 feet above mean sea level. The dam will be located in the Wm. Watson Survey, Abstract A-748, and the Winny Mann Survey, Abstract A-439, Harrison County, Texas. Station 0 + 00 on the centerline of the dam is N 04° 17' W, 6217 feet from the southeast corner of the aforesaid Watson Survey, 10 miles southwest of Marshall, Texas.

2. USE

   (a) Permittee is authorized to divert and use not to exceed 200 acre-feet of water per year from Brandy Branch for five years for construction of the dam, plant and ancillary facilities.

   (b) Permittee is authorized to impound in the reservoir for industrial purposes the following sources and quantities of water:

      (1) Not to exceed 5500 acre-feet of water per annum of the surface runoff of Brandy Branch, and

      (2) Not to exceed 18,000 acre-feet of water per annum based on a contract dated December 5, 1977, as amended, with Northeast

(c) Permittee is authorized to divert, circulate and recirculate water from the reservoir for industrial purposes and to use consumptively, through forced evaporation and other miscellaneous industrial uses, not to exceed 11,000 acre-feet of water per annum.

3. DIVERSION

(a) Point of Diversion: a point on the perimeter of the reservoir which is S 74° 02' W, 5,929 feet from the northeast corner of the Zion Roberts Survey, Abstract No. 595, Harrison County, Texas.

(b) Maximum Diversion Rate: 1850 cfs (828,000 gpm).

4. TIME LIMITATIONS

Construction of the dam herein authorized shall be in accordance with plans approved by the Commission and shall be commenced within two years and completed within five years from date of issuance of this permit unless extended by the Commission.

5. SPECIAL CONDITIONS

(a) Failure to construct the dam in accordance with Time Limitations herein shall make this permit null and void unless the permittee applies for an extension of time prior to the date stated in Time Limitations and the application is subsequently granted.

(b) Permittee shall pass their proportional part of water required to maintain a minimum flow of the Sabine River at the Stateline in accordance with the Sabine River Compact.

6. POINTS OF RETURN

(a) Water diverted but not consumed will be returned to a point on the perimeter of the reservoir which is S 52° 58' W, 3464 feet from the northeast corner of the aforesaid Roberts Survey.

(b) Water diverted but not used beneficially will be returned to Brandy Branch at a point which is N 12° 14' E, 5028 feet from the SE corner of the aforesaid Watson Survey.

This permit is issued subject to all superior and senior water rights in the Sabine River Basin.

Permittee agrees to be bound by the terms, conditions and provisions contained herein and such agreement is a condition precedent to the granting of this permit.

All other matters requested in the application which are not specifically granted by this permit are denied.

This permit is issued subject to the Rules of the Texas Department of Water Resources and to the right of continual supervision of State water resources exercised by the Department.

TEXAS WATER COMMISSION

Date Issued:

November 28, 1978

Attest:

Mary Ann Hefner, Chief Clerk

Felix McDonald, Chairman

Joe R. Carroll, Commissioner

Dorsey B. Hardeman, Commissioner

AMENDMENT TO
PERMIT TO
APPROPRIATE STATE WATER

APPLICATION NO. 2065C PERMIT NO. 1897C TYPE: Amendment

Permittee	: Northeast Texas Municipal Water District	Address	: P. O. Box 680 Daingerfield Texas 75638
Received	: June 6, 1978	Filed	: August 21, 1978
Granted	: November 6, 1978	Counties	: Marion and Harrison
Watercourse	: Big Cypress Creek to Brandy Branch, tributary of Sabine River	Watershed	: Cypress Basin to Sabine River Basin

WHEREAS, the Texas Water Commission finds that jurisdiction of the application is established; and

WHEREAS, applicant has requested an amendment to Permit No. 1897B to authorize a transwatershed diversion of not to exceed 18,000 acre-feet of industrial use water per annum as released from Lake O' the Pines, Cypress Basin, for bed and banks conveyance; and for pipeline transfer to the Sabine River Basin; and

WHEREAS, a public hearing has been held and Northeast Texas Municipal Water District named as a party; and

WHEREAS, by law the Executive Director and the Public Interest Advocate of the Department of Water Resources are parties; and

WHEREAS, no person appeared to protest the granting of this application; and

WHEREAS, the Commission has assessed the effects of issuance of this permit on the bays and estuaries of Texas; and

WHEREAS, the issuance of this permit granting this application is not adverse to any party.

NOW, THEREFORE, this amendment to Permit No. 1897B is issued to Northeast Texas Municipal Water District subject to the following terms and conditions:

1. USE

Permittee is authorized to release sufficient amounts of industrial use water from Lake O' the Pines on Big Cypress Creek, Cypress Basin, Marion County, to provide for the transwatershed diversion of 18,000 acre-feet of water per annum to the Sabine River Basin. Water released will be transported approximately one mile by bed and banks of Big Cypress Creek, thence via pipeline to Southwestern Electric Power Company's cooling pond on Brandy Branch, tributary of Sabine River, Harrison County. The transfer of the water is pursuant to the terms of of a contract dated December 5, 1977, with Southwestern Electric Power Company upon which Contractual Permit No. CP-454 is based.

This amendment is issued subject to all superior and senior water rights in the Cypress Basin.

Permittee agrees to be bound by the terms, conditions and provisions contained herein and such agreement is a condition precedent to the granting of this amendment.

All other matters requested in the application which are not specifically granted by this amendment are denied.

This amendment is issued subject to the Rules of the Texas Department of Water Resources and to the right of continual supervision of State water resources exercised by the Department.

TEXAS WATER COMMISSION

/s/ Felix McDonald

Felix McDonald, Chairman

/s/ Joe R. Carroll

Joe R. Carroll, Commissioner

/s/ Dorsey B. Hardeman

Dorsey B. Hardeman, Commissioner

Date Issued:

November 28, 1978

(SEAL)

Attest:

/s/ Mary Ann Hefner

Mary Ann Hefner, Chief Clerk

STATE OF TEXAS
COUNTY OF TRAVIS

I, Mary Ann Hefner, Chief Clerk of the Texas Water Commission, do hereby certify that the foregoing is a true and correct copy of an instrument on file in the permanent records of said Commission of the Department of Water Resources.

Given under my hand and the seal of the Texas Water Commission on this the 29th day of November A.D. 19 78

Mary Ann Hefner, Chief Clerk

FILE NO. 13891 - T

PERMIT TO APPROPRIATE STATE WATER

APPLICATION NO. CA-454   PERMIT NO. CP-454   TYPE: Contractual

Permittee	: Southwestern Electric Power Company	Address	: P. O Box 21106 Shreveport Louisiana 71156
Received	: April 17, 1978	Filed	: August 21, 1978
Granted	: November 6, 1978	Counties	: Marion and Harrison
Watercourse	: Big Cypress Creek and Brandy Branch, tributary of Sabine River	Watershed:	Cypress Basin and Sabine River Basin

WHEREAS, the Texas Water Commission finds that jurisdiction of the application is established; and

WHEREAS, a public hearing has been held and Southwestern Electric Power Company named as a party; and

WHEREAS, by law the Executive Director and the Public Interest Advocate of the Department of Water Resources are parties; and

WHEREAS, no person appeared to protest the granting of this application; and

WHEREAS, the issuance of this permit granting this application is not adverse to any party.

NOW, THEREFORE, this permit to use State water is issued to Southwestern Electric Power Company, based on a contract dated December 6, 1977, with Northeast Texas Municipal Water District, owner of Permit No. 1897C, which authorizes the use of water granted by this permit. The terms and conditions of this permit are as follows:

1. IMPOUNDMENT

   The impoundment is Lake O' the Pines (formed by Ferrells Bridge Dam), as authorized by Permit No. 1897C.

2. USE

   Permittee is authorized to divert and use not to exceed 18,000 acre-feet of water per year for industrial use (steam electric power generation). Sufficient amounts of water to satisfy the diversions will be released from Lake O' the Pines on Big Cypress Creek, Cypress Basin, Marion County, and transported by the bed and banks of Big Cypress Creek and thence by pipeline to permittee's reservoir (cooling pond) on Brandy Branch, Sabine River Basin, Harrison County, which is authorized by Permit No. 1897C.

3. DIVERSION

   (a) Point of Diversion: On the right, or south, bank of Big Cypress Creek, about one mile downstream of Ferrells Bridge Dam and eight miles west of Jefferson, Texas.

   (b) Maximum Diversion Rate: 33.4 cfs (15,000 gpm).

4. SPECIAL CONDITIONS

(a) Nothing in this permit shall be construed as authorizing an appropriative right in excess of that presently held by Northeast Texas Municipal Water District as evidenced by the aforementioned permit. Those public waters diverted pursuant to this permit shall consist wholly of waters previously authorized to be diverted by Northeast Texas Municipal Water District which waters shall be released from Lake O' the Pines in such quantities as will satisfy commitments under the terms of the aforementioned contract as well as all channel losses resulting from said release and occurring between the point of release and the point of diversion herein specified.

(b) Northeast Texas Municipal Water District is authorized to use the bed and banks of Big Cypress Creek for the purpose of transporting stored waters from the lake to the point of diversion from Big Cypress Creek.

(c) Northeast Texas Municipal Water District shall measure and keep records of daily releases made from Lake O' the Pines for the purpose of satisfying its contractual obligations and the Special Conditions of this permit; and permittee shall measure and keep records of daily diversion made at the authorized point of diversion. Both permittee and Northeast Texas Municipal Water District shall report to the Commission annually in such form and manner as the Commission may from time to time prescribe, respectively;

(1) All diversions and the location of same made under provisions of this permit for the authorized use;

(2) All releases of water from Lake O' the Pines for use under the provisions of this permit.

(d) This permit shall expire upon termination of the contract.

Permittee agrees to be bound by the terms, conditions and provisions contained herein and such agreement is a condition precedent to the granting of this permit.

All other matters requested in the application which are not specifically granted by this permit are denied.

This permit is issued subject to the Rules of the Texas Department of Water Resources and to the right of continual supervision of State water resources exercised by the Department.

TEXAS WATER COMMISSION

Felix McDonald, Chairman

Date Issued:

November 28, 1978

Joe R. Carroll, Commissioner

Attest:

Mary Ann Hefner, Chief Clerk

Dorsey B. Hardeman, Commissioner

AGREEMENT

BETWEEN

NORTHEAST TEXAS MUNICIPAL WATER DISTRICT

and

SOUTHWESTERN ELECTRIC POWER COMPANY

THIS AGREEMENT, made and entered into this the 5th day of December 1977, by and between NORTHEAST TEXAS MUNICIPAL WATER DISTRICT (hereinafter called DISTRICT), a body politic and corporate, created and existing under and by virtue of a special act of the Legislature of the State of Texas (Acts 1953, 53rd Legislature, Page 114, Chapter 78), being Article 8280 - 147 of V.A.T.S., acting herein by Uvalde Stoermer, its Vice President, and B. B. Waldrop, its Secretary, both of whom are duly hereunto authorized by proper resolution of the Board of Directors of DISTRICT, and SOUTHWESTERN ELECTRIC POWER COMPANY, a Delaware corporation, having its principal place of business at 428 Travis Street, Shreveport, Louisiana (hereinafter called SWEPCO), being the owner and holder of a valid permit to do, and doing, a general business in northeast Texas of generating, transmitting, distributing and selling electric power and energy, acting herein by James Lamar Stall, its President, and W. Henry Jackson, its Secretary, both of whom are duly hereunto authorized by proper resolution of the Board of Directors of SWEPCO,

WITNESSETH:

That for and in consideration of the mutual covenants and agreements hereinafter set forth to be done, kept and performed by the parties hereto respectively, DISTRICT and SWEPCO have and do hereby contract and agree, each with the other, as follows:

1.1 SWEPCO contemplates the construction of a new steam electric generating station in Harrison County, Texas, upon land to be owned in fee by SWEPCO, and anticipates, without being obligated to do so, that it may eventually install therein steam turbine driven electric generating facilities of a capacity of approximately 1,400,000 kilowatts name plate rating.

1.2 DISTRICT proposes to provide for SWEPCO the necessary water for the generating of electric power and energy in said new steam electric generating station and water for other uses incidental to said station and SWEPCO agrees to purchase all of its water, other than that from the natural inflow and drainage of the reservoir water shed and available from mining operations for the plant, for said station from DISTRICT subject to the conditions hereof. In connection with this proposal, DISTRICT represents that it is the owner and holder of a permit granted by the Board of Water Engineers of the State of Texas, dated November 22, 1957, bearing No. 1897, and File No. 2236, under the terms of which DISTRICT is authorized and empowered to appropriate, impound, divert and use unappropriated public water of Cypress Creek, a stream in the Red River Watershed in Titus and Marion Counties, Texas, said water to be stored in Lake O' the Pines (formerly Ferrell's Bridge Reservoir) created by Ferrell's Bridge Dam, constructed by the Corps of Engineers, United States Army. Said permit authorizes and permits DISTRICT to appropriate and use not more than 42,000 acre feet of water per annum for municipal and domestic purposes and not more than 161,800 acre feet of water per annum for industrial use purposes.

DISTRICT further represents that it has, by contract with the United States of America, acquired rights and privileges of storing water in the conservation pool of said reservoir to the extent of 251,000 acre feet between elevations 201 feet and 228-1/2 feet.

DISTRICT expressly covenants with and warrants to SWEPCO that the water permit and storage rights and privileges described in this paragraph are valid and subsisting and that DISTRICT has taken all actions required by, and complied with all the terms, provisions and conditions of, said permit and said contract with the United States of America and that the rights and privileges of DISTRICT under and pursuant to said permit and said contract are in all things firm and effectual.

1.3 DISTRICT agrees that it will, acting in concert with SWEPCO cause to be filed an appropriate joint application or other pleading addressed to the Texas Water Commission, praying for an order of said Commission awarding SWEPCO, in its own right and for its own use and benefit, a contractual permit under the permit from the Board of Water Engineers of the State of Texas owned and held by DISTRICT, dated November 22, 1957, and described in Paragraph 1.2 hereof, insofar and to the extent that it may be necessary to effect and allow the award by said Texas Water Commission of the contractual permit in favor of SWEPCO described in this paragraph. The water rights under such permit will be assigned by SWEPCO to DISTRICT upon SWEPCO's determination it has no further use for said water.

1.4 DISTRICT agrees that insofar and to the extent that it may lawfully do so pursuant to Section 5.024 and allied and related sections of V.T.C.A. Water Code, it has and does hereby reserve water for the exclusive use and benefit of SWEPCO, to the extent of a maximum diversion of 18,000 acre feet in any one calendar year, of water stored by and permitted to DISTRICT in the conservation portion of Lake O' the Pines Reservoir, and does grant to SWEPCO the right and privilege, at its sole cost and expense, of taking water permitted to DISTRICT from that stored in Lake O' the Pines, and transmitting it to the lake to be built. It is expressly understood and agreed that the rate at which water is to be taken by SWEPCO need not be uniform but may vary from time to time and shall be at such rates of flow as in the sole option of SWEPCO may be best suited for SWEPCO's purposes and operations, except as may be modified by the requirements of prior permit holders, including Lone Star Steel Company.

1.5 If at any time during the term of this agreement, SWEPCO desires the reservation for use and consumption, in its steam electric generating station described in Paragraph 1.1 hereof, of water in addition to the maximum set out in preceding Paragraph 1.4 hereof, DISTRICT agrees that it will negotiate with SWEPCO to contract for such additional water as may be desired, if such water is available.

1.6 For the rights and privileges granted and accorded to SWEPCO in respect of the reservation of water stored and permitted to DISTRICT in the conservation portion of the Lake O' the Pines reservoir, SWEPCO covenants and agrees to pay to DISTRICT the sum of FIVE DOLLARS ($5.00) per acre foot per year (the sum of $90,000.00 per year) for the water reserved in accordance with Paragraph 1.4 hereof, which sum is in addition to the payments provided under Paragraph 1.7 following.

Said charge shall not commence until after the contractual permit has been issued, and said payment will be made by SWEPCO to DISTRICT in equal quarterly installments of $22,500.00, the first installment to be due and payable within the first twenty (20) days of the calendar quarter succeeding the date of issuance of a contractual permit by the Texas Water Commission, with a similar quarterly payment to be due and payable within the same period of each succeeding calendar quarter.

1.7 SWEPCO shall have the right to pump the water reserved in accordance with Paragraph 1.4 and 1.5 hereof from Lake O' the Pines, and/or Cypress Creek, and shall pay for such amounts of water in quarterly payments at the rate of fifteen dollars ($15.00) per acre foot, per calendar year. Payments shall begin with the pumping of water or no later than January 1, 1983, whichever occurs first.

For the first ten calendar years after payments begin of the duration of this agreement, payment for water pumped by SWEPCO from Lake O' the Pines will be based upon the greater of (a) the actual number of acre feet pumped by SWEPCO pursuant to this contract from Lake O' the Pines or Cypress Creek in any full calendar year or (b) the maximum number of acre feet pumped by SWEPCO from Lake O' the Pines or Cypress Creek in any previous full calendar year within the ten calendar year period, (c) a minimum of 12,000 acre feet per full calendar year.

After the first ten full calendar years after payments begin, payment for water pumped by SWEPCO from Lake O' the Pines or Cypress Creek pursuant to this contract in succeeding ten contract year periods which follow immediately after the last calendar year in the preceding ten calendar year period shall be based upon the greater of (a) actual acre feet pumped by SWEPCO from Lake O' the Pines in any contract year within the then appropriate ten year period, or (b) the maximum number of acre feet pumped by SWEPCO pursuant to this contract from Lake O' the Pines in any previous contract year within the then applicable ten calendar year period, (c) a minimum of 12,000 acre feet per full calendar year.

Water pumped under the provisions of Paragraph 1.7 shall be metered by calculating the flow from the Capacity-Head Test curve of the pump and by use of an hourly operation clock, or such other method as may be mutually agreed upon; SWEPCO shall furnish pump records to DISTRICT prior to the tenth day of each month, and payments for water pumped by SWEPCO under terms of this Paragraph 1.7 shall be due and payable quarterly within twenty days following the end of each calendar quarter.

Not later than 60 days after the elapse of each full five calendar year periods that this agreement may be in effect, the parties shall review all payments and water rates as set forth herein. The compensation due the DISTRICT under the terms of this agreement shall be adjusted if the review indicates there has been an increase or decrease in costs and the adjusted payments and water rates shall apply to the next ensuing five (5) year period following an adjustment of said payments and water rates. Such adjustments shall apply to the $5.00 per acre foot for water reserved, and shall not apply to the price for water actually diverted, provided, however, that the adjusted rate shall never be less than $5.00 per acre foot per annum.

The review of compensation of the DISTRICT shall be based upon the following matters:

(a) The base factor for determination of increases or decreases in cost shall be the average annual payment by the DISTRICT to the Corps of Engineers for maintenance and operation charges during the five (5) year period, 1972-1976, which amount is $34,671.01.

(b) The average annual payment by the DISTRICT to the Corps of Engineers for maintenance and operation charges during the five years immediately preceding the time of review shall be divided by the base factor to determine the cost increase or decrease ratio.

(c) If there has been an increase or decrease in costs as reflected by the above cost ratio, the payments for the reservation of water under Paragraph 1.6 of this agreement shall be adjusted by multiplying the cost change ratio times five ($5.00) dollars.

In the event that either party during the period for review is of the opinion that the foregoing formula is unfair or prejudicial and wants changes or revisions thereof, then said party shall endeavor to negotiate with the other party a new procedure and methods for the redetermination of payments and water rates.

1.8 SWEPCO agrees that it will, upon written request of DISTRICT, transmit water for DISTRICT's account through SWEPCO's facilities, if, at the time of such request and for so long thereafter as SWEPCO has in its sole judgement, facilities installed of sufficient unused and uncommitted capacity and kind to effect such transmission without interfering with SWEPCO's then operations or planned operations, the cost of which is to be paid by DISTRICT to SWEPCO on a basis to be mutually agreed upon by both parties.

1.9 Each of the parties hereto has and does hereby give, grant and convey unto the other, all such easements on, over and across their respective lands and premises as may be necessary or convenient for effecting the withdrawal of water from Lake O' the Pines or the flowing water of Cypress Creek and transmission thereof across property owned or controlled by SWEPCO or DISTRICT for delivery to SWEPCO or to DISTRICT's other customers. The reciprocal rights granted herein shall include the right of ingress and egress and the right to construct, operate and maintain such intake towers, conduits, pumps, pipelines, and other instrumentalities and facilities as shall be convenient or necessary to effect the transfer of water allowed or required under the terms of this agreement.

1.10 This agreement shall be for a term of thirty (30) years, and thereafter shall be extended automatically from year to year unless cancelled by SWEPCO by giving at least twelve months written notice of such cancellation prior to any anniversary date.

1.11 It is agreed that when DISTRICT's sales or commitments for sale of water in Lake O' the Pines reach an average of approximately 100,000,000 gallons per day, including the usage of Lone Star Steel Company and others, DISTRICT will notify SWEPCO in writing before DISTRICT sells any more water. SWEPCO shall have forty-five (45) days after receipt of such notice to exercise its option under Paragraph 1.5 hereof to purchase additional water at a price mutually agreeable. In the event SWEPCO does exercise its option to purchase additional water, payment for such water shall be made in equal quarterly payments beginning with the first calendar quarter after receipt of written notice by DISTRICT from SWEPCO of its intent to purchase additional water. In the event that SWEPCO elects not to purchase such additional water within the 45 days, or does not exercise its option, the DISTRICT is released from its obligation under Paragraph 1.5.

1.12 SWEPCO reserves the right to cancel this contract in its entirety by written notice twelve (12) months in advance should SWEPCO determine that the steam electric generating plant contemplated in Paragraph 1.1 hereof will not be constructed.

1.13 This agreement shall not become binding or effective, except for the reservation of water under Paragraph 1.4 pending the processing and approval by the Texas Water Commission, nor any water delivered unless and until:

(a) The Texas Water Commission shall have issued a contract permit in favor of SWEPCO covering the taking of water from Lake O' the Pines so that the right of SWEPCO to receive water under the terms of this agreement shall be in all things firm and effectual.

1.14 If by reason of force majeure beyond the control and without the fault or negligence of the party failing to perform, either party is rendered unable to carry out its obligations under this agreement, then on such party's giving notice and full particulars of such reasons in writing to the other party within a reasonable time after the occurrence of the cause relied on, then the obligation of the party giving such notice, so far as it is affected by such force majeure, shall be suspended during the continuance of any inability so caused, but for no longer period and such cause shall, so far as possible, be remedied with all reasonable dispatch.

"Force Majeure" as used herein shall mean acts of God, strikes, or other industrial disturbances, acts of public enemy, orders, laws, or actions of any kind of the government of the United States or of the State of Texas, or any civil or military authority, insurrections, riots, epidemics, landslides, lightning, earthquakes, fires, hurricanes, storms, floods, wash-outs, droughts, arrests, explosions, breakage or accident to dams, machinery, pipelines, or canals or other structures or machinery, partial or entire failure of water supply and inability on the part of DISTRICT to deliver water hereunder, or of SWEPCO to transport or receive water, on account of any other cause not within the control of the party claiming such inability. The above requirement that any force majeure shall be remedied with all reasonable dispatch shall not require the settlement of strikes and lock-outs by acceding to the demands of the opposing parties when settlement is unfavorable in the judgment of the party having the difficulty.

No damage shall be recoverable from DISTRICT or SWEPCO by reason of the suspension of the delivery of water, or acceptance of water, due to any of the causes above-mentioned. Force majeure shall not relieve SWEPCO of its obligation to make payments for water as provided herein, EXCEPT, HOWEVER, that if force majeure should cause a failure of the water supply, prevent DISTRICT from reserving, delivering or selling all or part of the water herein contracted for, or prevent SWEPCO from purchasing, reserving, storing or utilizing in whole or in part the water herein contracted for, then the obligation of SWEPCO to make payments for such water during such time shall be suspended, or if such force majeure causes an inability to deliver, reserve, or receive only partial amounts of the water herein contracted for, said obligation of SWEPCO to pay for water as provided herein shall be proportionately adjusted in a fair and equitable manner.

WITNESS the hands of the parties hereto.

NORTHEAST TEXAS MUNICIPAL WATER DISTRICT

ATTEST:

B. D. Mahaffey [signature] By [signature]

SOUTHWESTERN ELECTRIC POWER COMPANY

ATTEST:

[signature] By J. Lamar Stall [signature]

SECRETARY PRESIDENT

APPROVED:
[initials and dates]

6.0 LIST OF PREPARERS

This environmental impact statement was prepared by EH&A for the U.S. Environmental Protection Agency, Region VI under the guidance of the EPA Project Officer, Mr. Clinton Spotts, and the Project Monitor, Mr. Norman Thomas. Key personnel from EH&A include:

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Project Consultant	George L. Vaught M.S. Biology	Associate Ecologist
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Hydrology	Dwayne Stubblefield M.S. Civil Engineering	Senior Staff Hydrologist
Socioeconomics	Ellen Cross M.S. Urban and Regional Planning	Staff Urban and Regional Planner
Land Use	Dan M. Roark M.L.S. Library Sciences	Staff Urban and Regional Planner
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Noise	Arthur V. Bedrosian B.S. Physics	Senior Staff Meteorologist
Vegetation	Thomas D. Hayes M. For. Sci. Botany and Systems Ecology	Staff Ecologist

Topic	Principal Reporter	Title
Wildlife	Jerry C. Grubb Ph. D. Zoology	Associate Ecologist Manager, Environmental Division
Archeology	Clell L. Bond M.A. Anthropology	Staff Archeologist
Geology/Ground-Water	Tom Partridge M.S. Geological Engineering	Senior Ground-Water Hydrologist
Aquatic	Paul Price B.A. Zoology	Senior Staff Biologist
Project Coordinator	Diane Mumme B.S. Aquatic Biology	Environmental Technician
Editing	Pat Wilkins B.S. Fine Arts	Technical Editor

7.0 LIST OF AGENCIES, ORGANIZATIONS, AND PERSONS TO WHOM COPIES OF THE DRAFT STATEMENT ARE SENT

FEDERAL AGENCIES

U.S. Coast Guard, 8th District, New Orleans, LA

Central Region, U.S. Geological Survey, Denver, CO

Federal Emergency Management Agency Region VI, Denton, TX

Regional Manager, Office of Coastal Management, Washington, D.C.

Bureau of Land Management, Santa Fe, NM

U.S. Department Health, Education and Welfare; Public Health Service Center for Disease Control, Atlanta, GA

Office of Legislation, EPA (A-102), Washington, D.C.

Office of Environmental Project Review, U.S. Department of Interior, Washington, D.C.

Deputy Asst. Secretary for Environmental Affairs, U.S. Department of Commerce, Washington, D.C.

Asst. Secretary for Environmental and Urban Systems, U.S. Department of Transportation, Washington, D.C.

Environmental Quality Acts., Office of the Secretary, Department of Agriculture, Washington, D.C.

Water Resources Council, Washington, D.C.

Farmer's Home Administration, Washington, D.C.

Agricultural Stabilization and Conservation Service, Washington, D.C.

Director, Office of NEPA Affairs, Washington, D.C.

Federal Energy Regulatory Commission, Washington, D.C.

Advisory Council of Historic Preservation, Washington, D.C.

Office of Federal Activities, Washington, D.C.

U.S. Department of the Interior Geological Survey, Reston, VA

Office of Surface Mining, Denver, CO

U.S. Army Corps of Engineers, Fort Worth, TX and Dallas, TX

STATE AGENCIES AND ORGANIZATIONS

Director of Budget and Planning Office, Office of the Governor, Austin, TX

Texas Department of Highways and Public Transportation, Austin, TX

Texas Department of Water Resources, Austin, TX

Surface Mining and Reclamation Division, Texas Railroad Commission, Austin, TX

Texas Parks and Wildlife Department, Austin, TX

Texas Energy and Natural Resource Council, Austin, TX

Texas Environmental Coalition, Austin, TX

Texas Organization for Endangered Species, Austin, TX

Texas Water Conservation Assoc., Austin, TX

Honorable Bill Clements, Governor of Texas, Austin, TX

Texas Air Control Board, Austin, TX and Tyler, TX

Economic Development Administration, Austin, TX

Texas Department of Community Affairs, Austin, TX

Liaison Officer, Bureau of Mines, Austin, TX

Department of Agriculture, Austin, TX

Geological Survey, Austin, TX

Texas State Soil and Water Conservation Board, Temple, TX

Texas Department of Health Resources, Austin, TX

INTERESTED ORGANIZATIONS AND INDIVIDUALS

Honorable Lloyd Bentsen, U.S. Senate, Washington, D.C.

Honorable John Tower, U.S. Senate, Washington, D.C.

Environmental Defense Fund, Washington, D.C.

National Wildlife Federation, Washington, D.C.

Honorable Sam Hall, U.S. House of Representatives, Washington, D.C.

Honorable H. T. Atkinson, Jr., Gregg County Judge, Longview, TX

Honorable Richard Anderson, Harrison County Judge, Marshall, TX
Honorable T. T. Carlisle, Mayor of Longview, Longview, TX
Honorable Sam Birmingham, Mayor of Marshall, Marshall, TX
Honorable T. B. Hatley, Mayor of Hallsville, Hallsville, TX
Editor, News Messenger, Marshall, TX
Editor, Longview Morning Journal, Longview, TX
Grant R. Brown, Wayne, PA
Bob Witkiowski, Wilkes Barre, PA
Pat Wilson, Billings, MO
Scott Anderson, Austin, TX
Daniel E. Boxer, Portland, MA
Carl Huff, Longview, TX
Joe K. Ainsworth, Bremond, TX
Sportsmen's Club of Texas, Inc., Austin, TX
Greater Marshall Chamber of Commerce, Marshall, TX
James E. Hoelscher, Jr., Fayetteville, AR
A. J. Thompson, Tyler, TX
John Wallace, Marshall, TX
Sandra Cason, Marshall, TX
Monti G. Wade, Atlanta, TX
Paul Leggett, Marshall, TX
Jason Searcy, Marshall, TX
Scott Geister, Dallas, TX

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GLOSSARY

Acid Rain. Specifically, rain of low pH (usually less than 5.7) that has been postulated to have many detrimental effects on calcareous structures or on aquatic and terrestrial systems in areas with low buffering capacity. Caused by airborne gases and soluble particles that form acids in rainwater, either emitted from man-made (industrial, automobiles) or natural (fires, volcanoes) sources. In general use, includes dry deposition of acidifying materials as well.

Acoustic Center. A point source that is the sum of the sound levels of all sources that radiate in the direction of the receiver. When the distance from the plant to a receiver is more than twice the distance between the most separated major sources of the plant, the plant can be considered as a point source.

Algal Bloom. A pulse in the population density of algae in a water body caused usually by the occcurrence of optimal conditions for a few species. Frequently used in the negative sense to refer to conditions in which populations reach nuisance levels, producing surface scums, taste and odor problems, and/or dissolved oxygen depletion. Can cause fish kills.

Alluvial. Relating to clay, silt, sand, gravel, or similar detrital material deposited by running water.

Ambient. The surrounding environment or atmosphere.

Ancillary. Subsidiary or supplementary.

Aquifer. A water-bearing stratum of permeable rock, sand, or gravel.

BACT. An acronym for Best Available Control Technology. A regulatory air pollutant emissions limitation based on the maximum degree of reduction of a particular pollutant, taking into account energy, environmental, and economic impacts.

Baseline. Existing conditions.

Berm. A narrow shelf, path, or ledge at the top of bottom of a slope.

Biomass. The amount of living matter, as in a unit area or volume of habitat.

Bioturbate. Mixing of aquatic sediments by the activities of benthic organisms.

Boiler Blowdown. Method of preventing buildup of naturally occurring solids found in boiler feedwater.

Bottom Ash. Coal ash that either settles or adheres to the interior furnace surfaces in the form of fine particulate or sludge.

Chlorination. The application of chlorine to water or wastewater, generally for the purpose of disinfection, but frequently for accomplishing chemical results, such as oxidation of odor-producing compounds.

Circumneutral pH. Around neutral pH (~7.)

Conductivity. The ability to carry an electrical charge, in ions. The conductivity of aqueous solutions is increased by dissolved salts and thus is a measure of the amount of ionized salts in solution.

Convection. The transfer of heat by automatic circulation of a liquid at a nonuniform temperature.

Convective Showers. Precipitation falling from clouds induced by the solar heating of moist, unstable air.

Cubic feet per second (cfs). Units used to measure flow at a gaging station; equals the rate of flow in a channel with a one-square-foot cross-section and velocity of one foot per second. One cfs for a 24-hour period equals 86,400 cubic feet or 1.98 acre-feet.

dBa. The sound level obtained by the use of A-weighting. The unit is the decibel, dB, and is followed by the letter A to indicate A-weighting. The A-weighting network best simulates the human ear's response to sound pressure.

Dewater. Removal of water.

Dissolved Oxygen (DO). In the course of breaking down excess organic matter in water, microbes may deplete the oxygen, causing stress from lack of oxygen on fish and other aquatic life.

Diversions. The amount of water taken from a stream (or spring, well); also called withdrawals.

Ecosystem. A community and its environment treated together as a functional system of complimentary relationships involving the transfer and circulation of energy and matter.

Ecotone. The boundary line or transitional area between two adjacent ecological communities usually exhibiting competition between organisms common to both.

Effluent. Wastewater or other liquid, partially or completely treated, flowing out of a reservoir, basin, or treatment plant.

Electrostatic Precipitator. A device that uses an electrical charge to remove particulates from an effluent airstream.

Entrainment. Incorporation of organisms into water that flows through an industrial process (as in the cooling water of a power generating station) and are subsequently discharged. Entrainment effects may be incurred from mechanical impacts, turbulence, abrasion, and heat among other factors.

Ephemeral. Short-lived; taking place once only.

Evaporation. A physical process by which a liquid is transformed into a gaseous state.

Euglenoid. Any of a taxon of varied flagellates (as a euglena) that are typically green or colorless, stigma-bearing solitary organisms with one or two flagella emerging from a well-defined gullet.

Fecal Coliforms. A large and varied group of bacteria flourishing in the intestines and feces of warm-blooded animals, including man. Large amounts of these bacteria in the water indicate sewage or feedlot pollution.

FGD. (flue gas desulfurization) any process that removes sulfur containing compounds from the flue gas.

Fixed Ash. Fly ash that has been processed with FGD sludge to create a product that is easier to dispose than the powdery fly ash and that is suitable for landfilling.

Fixed Waste. Waste products that have been processed with one or more chemical additives to stabilize the untreated waste in order to improve its channel and/or physical properties for ponding or landfill disposal.

Floodplain. Level land that may be submerged by floodwaters; or a plain built up by stream deposition.

Floristics. A branch of phytogeography that deals numerically with plants and plant groups.

Flue Gas. Any gas that is ducted through flue or chimney and expelled to the atmosphere.

Fluvial. Relating to, or produced by stream or river action.

Fly Ash. Coal ash particulate matter that is entrained into the flue gas stream.

Fugitive Emissions. Air pollutant emissions that cannot be traced to a particular point or stack.

Gasification. To convert into gas.

GLC's. (ground level concentration) Pollutant concentrations in $\mu g/m^3$ measured or estimated at ground level at some distance away from the source.

Heavy Metals. Soluble trace elements found in the coal that tend to concentrate in the waste by products and that are leachable and potentially toxic.

Heterogeneity. The quality or state of consisting of dissimilar ingredients or constituents.

Herpetofauna. Reptiles and amphibians.

Hydrology. A science dealing with the properties, distribution, and circulation of water on the surface of the land, in the soil and underlying rocks, and in the atmosphere.

Impingement. The capture and retention of aquatic organisms on screening structures at the water intake point of a facility.

Infiltration. To enter, permeate, or pass through a substance or area by filtering gradually.

Infrastructure. The underlying foundation or basic framework, as in a system or organization.

In-migration. Movement of population into a community or region.

$L_{(dn)}$. Day-Night Sound Level. The 24-hour equivalent sound level with a penalty value of 10 dBA added to the average levels occurring during the nighttime hours of 10:00 p.m. to 7:00 a.m.

Lignite. A brownish-black coal in which the alternation of vegetal matter has proceeded further than peat, but not so far as sub-bituminous coal.

Lithological. Pertaining to the study of rocks and rock formations.

Littoral. Relating to the shore.

Long-term. Occurring over or involving a relatively long period of time.

Mean Sea Level (msl). The average height of the sea for all stages of the tide.

Megawat (gross) MW. The total amount of power that is produced in a power plant including that used by the plant itself.

Megawat (net) MW. The amount of power that is transmitted from a power plant.

Microbiocides. A substance that is destructive to many different organisms, microorganisms in particular.

Milligrams per litter (mg/l). One part by weight of dissolved chemical, or suspended sediment, in 7 million parts by volume (= 1 liter) of water. (see parts per million).

Million gallons per day (mgd). A unit of measurement for expressing the flow rate of water through a certain point.

Millirem. A unit of radiation dosage, a thousandth of a roentgen (rem).

Mitigate. To make less harsh or severe.

Monitoring. Periodic or continuous determination of the amound of pollutants present in the environment.

National Pollutant Discharge Elimination System (NPDES). The permitting system authorized under Section 402 of the Clean Water Act, including any state or interstate program that has been approved by the Administrator, in whole or in part, pursuant to Section 402.

$\underline{NO_2}$. Nitrogen dioxide. A gaseous atmospheric pollutant formed primarily duing combustion of fossil fuels.

$\underline{NO_x}$. A combination of various oxides of nitrogen, the most common of which are nitric oxide (NO) and nitrogen dioxide (NO_2). Formed by combustion processes.

<u>Overburden</u>. Material of any nature, consolidated or unconsolidated, that overlies a deposit of useful minerals, ores, or coal; especially those mined from the surface.

<u>Parts per million (ppm)</u>. One part by weight of dissolved chemical or suspended sediment in 1 million parts by weight of water.

<u>Particulates</u>. Small particles of solid or liquid materials that, when suspended in the atmosphere, constitute an atmospheric pollutant.

<u>Passerine Birds</u>. Songbirds with perching habitats.

<u>Permeability</u>. A quality of having pores or openings that permit liquids or gases to pass through.

<u>pH</u>. The measure of hydrogen-ion activity in solution. Expressed on a scale of 0 (highly acid) to 14 (alkaline) pH 7.0 is a neutral solution, neither acid not alkaline.

<u>Piezometer</u>. An instrument for measuring pressure or compressibility of a material subjected to hydrostatic pressure.

<u>Preempt</u>. To acquire by taking the place of: replace.

Radionuclide. A radioactive species of atom characterized by the energy level and the number of protons and neutrons contained in its nucleus.

Radiation. The emission of energy in the form of waves or particles.

Reclamation. Restoration to the original or some other use.

Revegetation. New vegetative cover.

Riparian. Relating to the bank of a natural water course, such as a river, lake, or stream.

Runoff. The portion of the precipitation on the land that ultimately reachs a stream(s), especially from rain that flows over the surface.

Scrubbers. An apparatus for removing impurities, especially from gases.

Sediment Control. The planning and construction of facilities for prevention of excessive damage by water in flood stages.

Short-term. Occurring or involving a short period of time.

Sludge. A concentrate in the form of a semi-liquid mass deposited as a result of waste treatment.

SO_2. Sulfur dioxide - a gaseous air pollutant that is produced primarily by the combustion of fossil fuels and petroleum refining.

Spoil piles. Piles of debris or waste material from a coal mine.

Stagnating Anticyclone. A area of slow-moving high pressure, dominated by light winds and limited vertical dispersion of pollutants.

Subsidence. A sinking of a large part of the earth's crust.

Surge Pond. Ponds designed to accommodate the surge of water resulting from gate closures on discharge pipelines.

Temperature Inversion. A stable layer in the atmosphere in which temperature increases with altitude.

Topography. The configuration of a surface including its relief and position of its natural and manmade features.

Total Dissolved Solids (TDS). The anhydrous residues of dissolved constituents in water. Actually, the term is defined by the method used in determination. Standard Methods are used in water and wastewater treatment.

Total Suspended Solids (TSS). The sum of the solids that either float on the surface or are in suspension in water, wastewater, or other liquids. These can be removed by filtering.

Turbidity. Defined as capacity of material suspended in water to scatter light. Highly turbid water is often called "muddy", although all manner of suspended particles contribute to turbidity.

Waste Slurry. A watery mixture produced by flue gas cleaning to remove SO_2 from the flue gas and that contains only 5-15 percent solids prior to dewatering.

Wastewater. The spent water of a plant or a community. A combination of liquid and water-carried wastes from residences, commercial buildings, industrial plants, and/or institutions.

Watershed. A region or area bounded peripherally by a water parting and draining ultimately to a particular watercourse or body of water.

"Worst Case". A situation in which the combination of factors that would produce the worst potential impact on the environment.

100-Year Floodplain. Land that becomes/or will become submerged by a flood that chances to occur every 100 years.

METRIC CONVERSION FACTORS

Approximate Conversions to Metric Measures

	Symbol	When You Know	Multiply by	To Find	Symbol
Length	in	inches	2.5	centimeters	cm
	ft	feet	30.48	centimeters	cm
	yd	yards	0.9	meters	m
	mi	miles	1.6	kilometers	km
Area	in^2	square inches	6.5	square centimeters	cm^2
	ft^2	square feet	0.09	square meters	m^2
	yd^2	square yards	0.8	square meters	m^2
	mi^2	square miles	2.6	square kilometers	km^2
		acres	0.4	hectares	ha
Mass (weight)	oz	ounces	28.3	grams	g
	lb	pounds	0.45	kilograms	kg
		short tons (2,000 lb)	0.9	tonnes	t
Volume	fl oz	fluid ounces	30.0	milliliters	ml
	qt	quarts	0.95	liters	l
	gal	gallons	3.8	liters	l
	ft^3	cubic feet	0.03	cubic meters	m^3
	yd^3	cubic yards	0.76	cubic meters	m^3
Temperature (exact)	°F	Fahrenheit degrees	5/9 (after subtracting 32)	Celsius degrees	°C
Speed	ft/s	feet per second	0.3048	meters per second	m/s
	ft/s	feet per second	1.097	kilometers per second	km/s
	mi/hr	miles per hour	0.447	meters per second	m/s
	mi/hr	miles per hour	1.6093	kilometers per hour	km/hr
	mi/hr	miles per hour	0.8684	knots	kts

APPENDIX A

REGULATORY REQUIREMENTS

APPENDIX A -REGULATORY REQUIREMENTS

National Energy Act

The National Energy Act of 1978 consists of five separate pieces of legislation:

1. National Energy Conservation Policy Act of 1978
2. Power Plant and Industrial Fuel Use Act of 1978
3. Public Utility Regulatory Policy Act of 1978
4. Energy Tax of 1978
5. Natural Gas Act of 1978

The National Energy Conservation Policy Act of 1978 contains provisions applicable to electric utility companies meeting specific requirements which are contained in Part 1 of Title II and Part 4 of Title VI of the Act. Part 1 of Title II contains provisions to effect residential energy conservation by requiring through State residential energy conservation plans, that each "public utility" implement a program to assist its customers in conservation efforts through education, energy audits, and other means. A "public utility" is defined as " . . . any persons, State agency or Federal agency which is engaged in the business of selling natural gas or electric energy . . . to residential customers for use in a residential building."

Because SWEPCO/CLECO sell electric energy directly to residential customers, it is considered a public utility by the Department of Energy's (DOE) definition and is therefore subject to Part 1 of the Act including the implementation of a utility program.

Part 4 of Title VI, Section 661, amends the Energy Policy and Conservation Act to incorporate, with one modification, the provisions of Section 125 of the

Clean Air Act that require the use of locally or regionally available coal or coal derivatives if such use is determined by the proper authorities to be necessary in order to minimize significant local or regional economic disruption or unemployment that would result from the use of other than locally or regionally available coal, petroleum products, or natural gas.

The primary purpose of the Power Plant and Industrial Fuel Use Act of 1978 (FUA) is to minimize the use of petroleum and natural gas in industrial and electric utility boilers. To accomplish this purpose, the FUA prohibits, except for exemptions that may be granted by DOE, the use of petroleum and natural gas by new electric utility power plants.

The Economic Regulatory Administration (ERA) of DOE has issued final rules (45 FR 38302-38308 (June 6, 1980)) to implement certain provisions of the FUA. Section 503.2 of the ERA/DOE rules impose prohibitions on: (1) the use of petroleum or natural gas as primary energy sources in any new electric power plant and, (2) the construction of any new electric power plant without the capability to use an alternate fuel as a primary energy source. According to Section 500.2(a)(66), "primary energy source" is defined as " . . . the fuel or fuels used for normal operation by any existing or new electric power plant . . . except . . . minimum amounts of fuel required for unit ignition, startup, testing, flame stabilization and control use . . . " "Alternate fuel" is defined in Section 500.2(a)(7) as "Electricity or any fuel other than natural gas or petroleum. The term (alternate fuel) includes . . . lignite . . . ".

SWEPCO/CLECO currently have mineral rights to an over 30,000-acre lignite reserve just south of the proposed power plant and will burn lignite as its primary energy source. Consequently, the prohibitions of Section 503.2 of the FUA do not apply to the proposed power plant.

National Historic Preservation Act of 1966 and Associated Statutes

Projects that require Federal financing, licensing or permitting also require cultural resource assessment. These requirements are included in and defined by Section 106 of the National Historic Preservation Act of 1966 (PL 89-655). These regulations stipulate that EPA, as the Federal permitting agency, shall afford the Advisory Council on Historic Preservation with a reasonable opportunity to comment on such undertakings that affected properties included in or eligible for inclusion in the National Register of Historic Places, as specified in 36 CFR Part 800.

Endangered Species Act of 1973, as Amended

Section 7 of the Endangered Species Act of 1973, as amended, requires that Federal agencies consult with the Secretary of the Interior and take such steps as are necessary to insure that activities and programs which are authorized, funded, or carried out by them do not jeopardize the continued existence of endangered or threatened species. Similar precautions are required for federal actions which could result in the destruction or modification of their critical habitat.

Fish and Wildlife Coordination Act of 1934

The Fish and Wildlife Coordination Act of 1934, as amended, requires that a public or private agency under Federal permit or license consult with the USFWS Service, as well as the State Wildlife Agency, with a view to the conservation of wildlife resources by preventing loss of and damage to these resources, and also by providing for the development and improvement there of in connection with the proposed action.

Wild and Scenic Rivers Act of 1968

The Wild and Scenic Rivers Act of 1968 establishes the policy of the United States that certain rivers of the nation, which " . . . possess outstanding remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural, or other similar values, shall be preserved in free-flowing condition, and that they and their immediate environments shall be protected for the benefit of future generations."

Executive Order 11990: Protection of Wetlands

Executive Order 11990: Protection of Wetlands directs each Federal agency to " . . . take action to minimize the destruction, loss of degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands in carrying out the agency's responsibilities for . . . (2) providing Federally undertaken, financed, or assisted construction and improvements; and (3) conducting Federal activities and programs affecting land use, including but not limited to water and related land resource planning, regulating and licensing activities." Specifically, the direction is to be carried out in furtherance of Section 101(b)(3) of NEPA and, to the extent possible, follow the procedures of the Council on Environmental Quality (CEQ) and Water Resources Council.

Wetlands on the plant site and transportive systems corridors were determined from aerial photographic analysis and field reconnaissance during environmental baseline studies. Assessment and mitigation of potential impacts are considered in Sec. 4.5 (Ecology).

Executive Order 11988: Floodplain Management

Executive Order 11988: Floodplain Management, directs that each Federal agency . . . " shall take action to reduce the risk of flood loss, to minimize the impact of floods on human safety, health and welfare, and to restore and preserve the natural and beneficial values served by floodplains in carrying out its responsibilities for . . . (2) providing Federally undertaken, financed or assisted construction and improvements; and (3) conducting Federal activities and programs affecting land use, including but not limited to water and related land resources planning, regulating and licensing activities."

Secretary's Memorandum No. 1827 Revised: Statement on Land-Use Policy

The Secretary's Memorandum No. 1827 Revised: Statement on Land Use Policy expresses concern for the continued loss of lands well suited to the production of food, forage, fiber, and timber, and the degradation of the environment resulting from those losses. Consequently, major consideration must be given to important farm, range, and forest lands, and the long-range need to retain the productive capability and environmental values of American agriculture and forestry.

The Secretary's Memorandum sets policy requiring that Department of Agriculture personnel carefully explore land-use alternatives which would minimize impacts on important farm, range and forestlands, and, where possible, avoid land-use decisions that irrevocably commit important lands to non-farmland and non-range land uses, thereby foreclosing the options of future generations.

Clean Air Act

Existing Federal and State air pollution standards and regulations are aimed at controlling atmospheric pollutant emissions from major proposed projects and modifications and minimizing their associated air quality impacts. Current standards and regulations include NSPS, NAAQS, and PSD of air quality regulations.

The NSPS are emission standards for air pollutants emitted by specific classes of new air pollution sources, including lignite-fired steam boilers. The NAAQS are ambient concentration standards for seven criteria pollutants, including the five principal air pollutants to be emitted from the proposed plant.

The NAAQS consist of two sets of standards: (1) the primary standards, which the EPA has promulgated to protect the public health with an adequate margin of safety, and (2) the secondary standards. which define levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects caused by the criteria pollutants.

PSD regulations have been promulgated by the EPA to ensure that the air quality in clean air areas, i.e., areas attaining the NAAQS, does not significantly deteriorate. Under PSD regulations, new sources and modifications proposing to emit significant quantities of air pollutants are required to submit a PSD permit application to the EPA or other delegated reviewing authority for approval. The application must demonstrate: (1) that the proposed project has utilized the best available pollution control equipment in designing the project. (2) that the proposed pollution emissions will not cause an exceedance of the NAAQS or allowable PSD pollutant concentration increments, and (3) that the proposed emissions will not cause significant adverse effects on local soils, vegetation, and atmosperic visibility. Allowable PSD increments are ambient pollutant concentration increases to be allowed above specified baseline air quality levels defined under the EPA's PSD regulations promulgated on June 19, 1978. and amended August 7, 1980.

The standards and regulations limit the design and operation of proposed new pollution-emitting sources such that source emissions will cause only small and infrequent impacts on air quality. In order to satisfy the limitations set by the NSPS, NAAQS, and PSD regulations on a proposed major source such as the proposed Dolet Hills Power Plant Project, the source must implement high-efficiency pollution control equipment. i.e., BACT. A complete BACT analysis considering energy, economic, and environmental impacts for various control alternatives is required for proposed sources under PSD review.

The applicant has submitted a PSD permit application to EPA and a draft permit has been issued that complies with NSPS, NAAQS and PSD regulations. In addition, BACT will be applied to emissions sources at the power plant (see Sec. 4.3, Climatology/Air Quality).

10/404 U.S. Corps of Engineers Permit

The Department of the Army (USCE) permit program is authorized by Section 10 of the River and Harbor Act of 1899, Section 404 of Public Law 92-500 and Section 103 of Public Law 92-532. These laws require permits to authorize structures and work in navigable waters of the U.S., the discharge of dredge or fill material, and the transportation of dredge material for the purpose of ocean dumping. Through this permit program the USCE seeks to protect the quality of the nation's water resources and to maintain water quality by protecting swamps, marshes, and similar wetland resources.

APPENDIX B

DEPARTMENT OF THE ARMY
PERMIT - MAKEUP WATER PIPELINE

Name of Applicant Southwestern Electric Power Company (SWEPCO)

Effective Date 3 February 1981

Expiration Date (If applicable)

DEPARTMENT OF THE ARMY PERMIT

Referring to written request dated 19 June 1980 for a permit to:

(X) Perform work in or affecting navigable waters of the United States, upon the recommendation of the Chief of Engineers, pursuant to Section 10 of the Rivers and Harbors Act of March 3, 1899 (33 U.S.C. 403);

(X) Discharge dredged or fill material into waters of the United States upon the issuance of a permit from the Secretary of the Army acting through the Chief of Engineers pursuant to Section 404 of the Federal Water Pollution Control Act (86 Stat. 816, P.L. 92-500);

( ) Transport dredged material for the purpose of dumping it into ocean waters upon the issuance of a permit from the Secretary of the Army acting through the Chief of Engineers pursuant to Section 103 of the Marine Protection, Research and Sanctuaries Act of 1972 (86 Stat. 1052; P.L. 92-532);

SWEPCO
P.O. Box 21106
Shreveport, Louisiana 71156

is hereby authorized by the Secretary of the Army:

to construct a makeup water intake structure, pump station, and distribution line

in Big Cypress and Little Cypress Bayous

at Marion and Harrison Counties, Texas

in accordance with the plans and drawings attached hereto which are incorporated in and made a part of this permit (on drawings: give file number or other definite identification marks.)

8 1/2 x 11 inch drawings designated Sheets 1-5 of 5

subject to the following conditions:

I. General Conditions:

a. That all activities identified and authorized herein shall be consistent with the terms and conditions of this permit; and that any activities not specifically identified and authorized herein shall constitute a violation of the terms and conditions of this permit which may result in the modification, suspension or revocation of this permit, in whole or in part, as set forth more specifically in General Conditions j or k hereto, and in the institution of such legal proceedings as the United States Government may consider appropriate, whether or not this permit has been previously modified, suspended or revoked in whole or in part.

ENG FORM 1 JUL 77 1721 EDITION OF 1 APR 74 IS OBSOLETE. (ER 1145-2-303)

b. That all activities authorized herein shall, if they involve, during their construction or operation, any discharge of pollutants into waters of the United States or ocean waters, be at all times consistent with applicable water quality standards, effluent limitations and standards of performance, prohibitions, pretreatment standards and management practices established pursuant to the Federal Water Pollution Control Act of 1972 (P.L. 92-500, 86 Stat. 816), the Marine Protection, Research and Sanctuaries Act of 1972 (P.L. 92-532, 86 Stat. 1052), or pursuant to applicable State and local law.

c. That when the activity authorized herein involves a discharge during its construction or operation, of any pollutant (including dredged or fill material), into waters of the United States, the authorized activity shall, if applicable water quality standards are revised or modified during the term of this permit, be modified, if necessary, to conform with such revised or modified water quality standards within 6 months of the effective date of any revision or modification of water quality standards, or as directed by an implementation plan contained in such revised or modified standards, or within such longer period of time as the District Engineer, in consultation with the Regional Administrator of the Environmental Protection Agency, may determine to be reasonable under the circumstances.

d. That the discharge will not destroy a threatened or endangered species as identified under the Endangered Species Act, or endanger the critical habitat of such species.

e. That the permittee agrees to make every reasonable effort to prosecute the construction or operation of the work authorized herein in a manner so as to minimize any adverse impact on fish, wildlife, and natural environmental values.

f. That the permittee agrees that he will prosecute the construction or work authorized herein in a manner so as to minimize any degradation of water quality.

g. That the permittee shall permit the District Engineer or his authorized representative(s) or designee(s) to make periodic inspections at any time deemed necessary in order to assure that the activity being performed under authority of this permit is in accordance with the terms and conditions prescribed herein.

h. That the permittee shall maintain the structure or work authorized herein in good condition and in accordance with the plans and drawings attached hereto.

i. That this permit does not convey any property rights, either in real estate or material, or any exclusive privileges; and that it does not authorize any injury to property or invasion of rights or any infringement of Federal, State, or local laws or regulations nor does it obviate the requirement to obtain State or local assent required by law for the activity authorized herein.

j. That this permit may be summarily suspended, in whole or in part, upon a finding by the District Engineer that immediate suspension of the activity authorized herein would be in the general public interest. Such suspension shall be effective upon receipt by the permittee of a written notice thereof which shall indicate (1) the extent of the suspension, (2) the reasons for this action, and (3) any corrective or preventative measures to be taken by the permittee which are deemed necessary by the District Engineer to abate imminent hazards to the general public interest. The permittee shall take immediate action to comply with the provisions of this notice. Within ten days following receipt of this notice of suspension, the permittee may request a hearing in order to present information relevant to a decision as to whether his permit should be reinstated, modified or revoked. If a hearing is requested, it shall be conducted pursuant to procedures prescribed by the Chief of Engineers. After completion of the hearing, or within a reasonable time after issuance of the suspension notice to the permittee if no hearing is requested, the permit will either be reinstated, modified or revoked.

k. That this permit may be either modified, suspended or revoked in whole or in part if the Secretary of the Army or his authorized representative determines that there has been a violation of any of the terms or conditions of this permit or that such action would otherwise be in the public interest. Any such modification, suspension, or revocation shall become effective 30 days after receipt by the permittee of written notice of such action which shall specify the facts or conduct warranting same unless (1) within the 30-day period the permittee is able to satisfactorily demonstrate that (a) the alleged violation of the terms and the conditions of this permit did not, in fact, occur or (b) the alleged violation was accidental, and the permittee has been operating in compliance with the terms and conditions of the permit and is able to provide satisfactory assurances that future operations shall be in full compliance with the terms and conditions of this permit; or (2) within the aforesaid 30-day period, the permittee requests that a public hearing be held to present oral and written evidence concerning the proposed modification, suspension or revocation. The conduct of this hearing and the procedures for making a final decision either to modify, suspend or revoke this permit in whole or in part shall be pursuant to procedures prescribed by the Chief of Engineers.

l. That in issuing this permit, the Government has relied on the information and data which the permittee has provided in connection with his permit application. If, subsequent to the issuance of this permit, such information and data prove to be false, incomplete or inaccurate, this permit may be modified, suspended or revoked, in whole or in part, and/or the Government may, in addition, institute appropriate legal proceedings.

m. That any modification, suspension, or revocation of this permit shall not be the basis for any claim for damages against the United States.

n. That the permittee shall notify the District Engineer at what time the activity authorized herein will be commenced, as far in advance of the time of commencement as the District Engineer may specify, and of any suspension of work, if for a period of more than one week, resumption of work and its completion.

the activity au[illegible] herein is not started on or before 3 day of February, 19 82, (one year from the date of issuance of this permit unless otherwise specified) and is not completed on or before 3 day of February, 19 8[illegible], (three years from the date of issuance of this permit unless otherwise specified) this permit, if not previously revoked or specifically extended, shall automatically expire.

p. That this permit does not authorize or approve the construction of particular structures, the authorization or approval of which may require authorization by the Congress or other agencies of the Federal Government.

q. That if and when the permittee desires to abandon the activity authorized herein, unless such abandonment is part of a transfer procedure by which the permittee is transferring his interests herein to a third party pursuant to General Condition t hereof, he must restore the area to a condition satisfactory to the District Engineer.

r. That if the recording of this permit is possible under applicable State or local law, the permittee shall take such action as may be necessary to record this permit with the Register of Deeds or other appropriate official charged with the responsibility for maintaining records of title to and interests in real property.

s. That there shall be no unreasonable interference with navigation by the existence or use of the activity authorized herein.

t. That this permit may not be transferred to a third party without prior written notice to the District Engineer, either by the transferee's written agreement to comply with all terms and conditions of this permit or by the transferee subscribing to this permit in the space provided below and thereby agreeing to comply with all terms and conditions of this permit. In addition, if the permittee transfers the interests authorized herein by conveyance of realty, the deed shall reference this permit and the terms and conditions specified herein and this permit shall be recorded along with the deed with the Register of Deeds or other appropriate official.

II. <u>Special Conditions</u>: (Here list conditions relating specifically to the proposed structure or work authorized by this permit):

Construction in the wetland areas adjacent to Big Cypress and Little Cypress Bayous will be accomplished during the drier portions of the year (June through October).

The following Special Conditions will be applicable when appropriate:

STRUCTURES IN OR AFFECTING NAVIGABLE WATERS OF THE UNITED STATES:

a. That this permit does not authorize the interference with any existing or proposed Federal project and that the permittee shall not be entitled to compensation for damage or injury to the structures or work authorized herein which may be caused by or result from existing or future operations undertaken by the United States in the public interest.

b. That no attempt shall be made by the permittee to prevent the full and free use by the public of all navigable waters at or adjacent to the activity authorized by this permit.

c. That if the display of lights and signals on any structure or work authorized herein is not otherwise provided for by law, such lights and signals as may be prescribed by the United States Coast Guard shall be installed and maintained by and at the expense of the permittee.

d. That the permittee, upon receipt of a notice of revocation of this permit or upon its expiration before completion of the authorized structure or work, shall, without expense to the United States and in such time and manner as the Secretary of the Army or his authorized representative may direct, restore the waterway to its former conditions. If the permittee fails to comply with the direction of the Secretary of the Army or his authorized representative, the Secretary or his designee may restore the waterway to its former condition, by contract or otherwise, and recover the cost thereof from the permittee.

e. Structures for Small Boats. That permittee hereby recognizes the possibility that the structure permitted herein may be subject to damage by wave wash from passing vessels. The issuance of this permit does not relieve the permittee from taking all proper steps to insure the integrity of the structure permitted herein and the safety of boats moored thereto from damage by wave wash and the permittee shall not hold the United States liable for any such damage.

MAINTENANCE DREDGING.

a. That when the work authorized herein includes periodic maintenance dredging, it may be performed under this permit for ________ years from the date of issuance of this permit (ten years unless otherwise indicated);

b. That the permittee will advise the District Engineer in writing at least two weeks before he intends to undertake any maintenance dredging.

DISCHARGES OF DREDGED OR FILL MATERIAL INTO WATERS OF THE UNITED STATES:

a. That the discharge will be carried out in conformity with the goals and objectives of the EPA Guidelines established pursuant to Section 404(b) of the FWPCA and published in 40 CFR 230;

b. That the discharge will consist of suitable material free from toxic pollutants in other than trace quantities;

c. That the fill created by the discharge will be properly maintained to prevent erosion and other non-point sources of pollution; and

d. That the discharge will not occur in a component of the National Wild and Scenic River System or in a component of a State wild and scenic river system.

DUMPING OF DREDGED MATERIAL INTO OCEAN WATERS:

a. That the dumping will be carried out in conformity with the goals, objectives, and requirements of the EPA criteria established pursuant to Section 102 of the Marine Protection, Research and Sanctuaries Act of 1972, published in 40 CFR 220-228.

b. That the permittee shall place a copy of this permit in a conspicuous place in the vessel to be used for the transportation and/or dumping of the dredged material as authorized herein.

This permit shall become effective on the date of the District Engineer's signature.

Permittee hereby accepts and agrees to comply with the terms and conditions of this permit.

[signature] ____________________ January 22, 1981

PERMITTEE DATE

BY AUTHORITY OF THE SECRETARY OF THE ARMY:

FOR THE DISTRICT ENGINEER:

____________________ ____________________

DONALD J. PALLADINO DATE

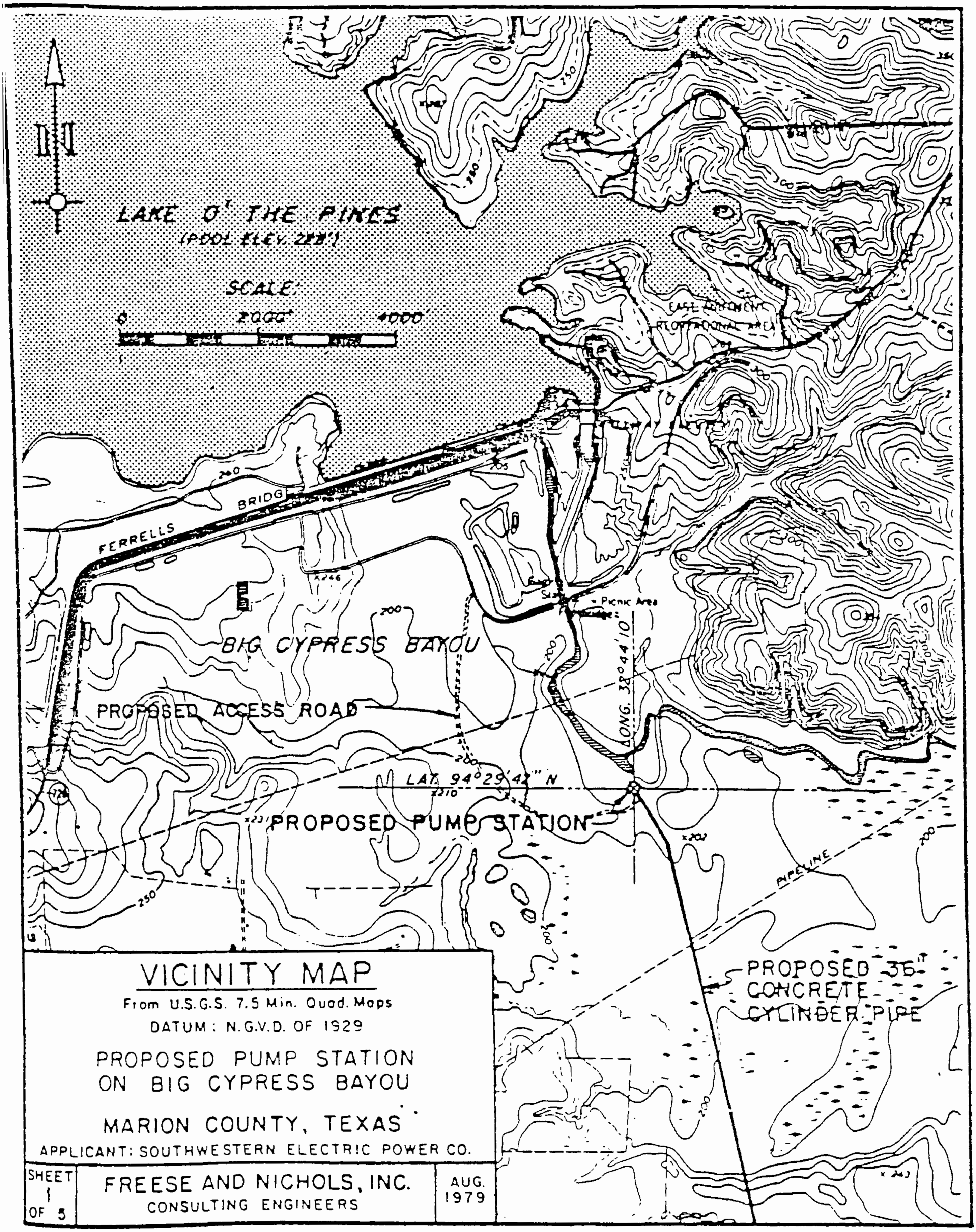
Colonel, CE

DISTRICT ENGINEER,
U.S. ARMY, CORPS OF ENGINEERS

Transferee hereby agrees to comply with the terms and conditions of this permit.

____________________ ____________________

TRANSFEREE DATE



VICINITY MAP

From U.S.G.S. 7.5 Min. Quad. Maps

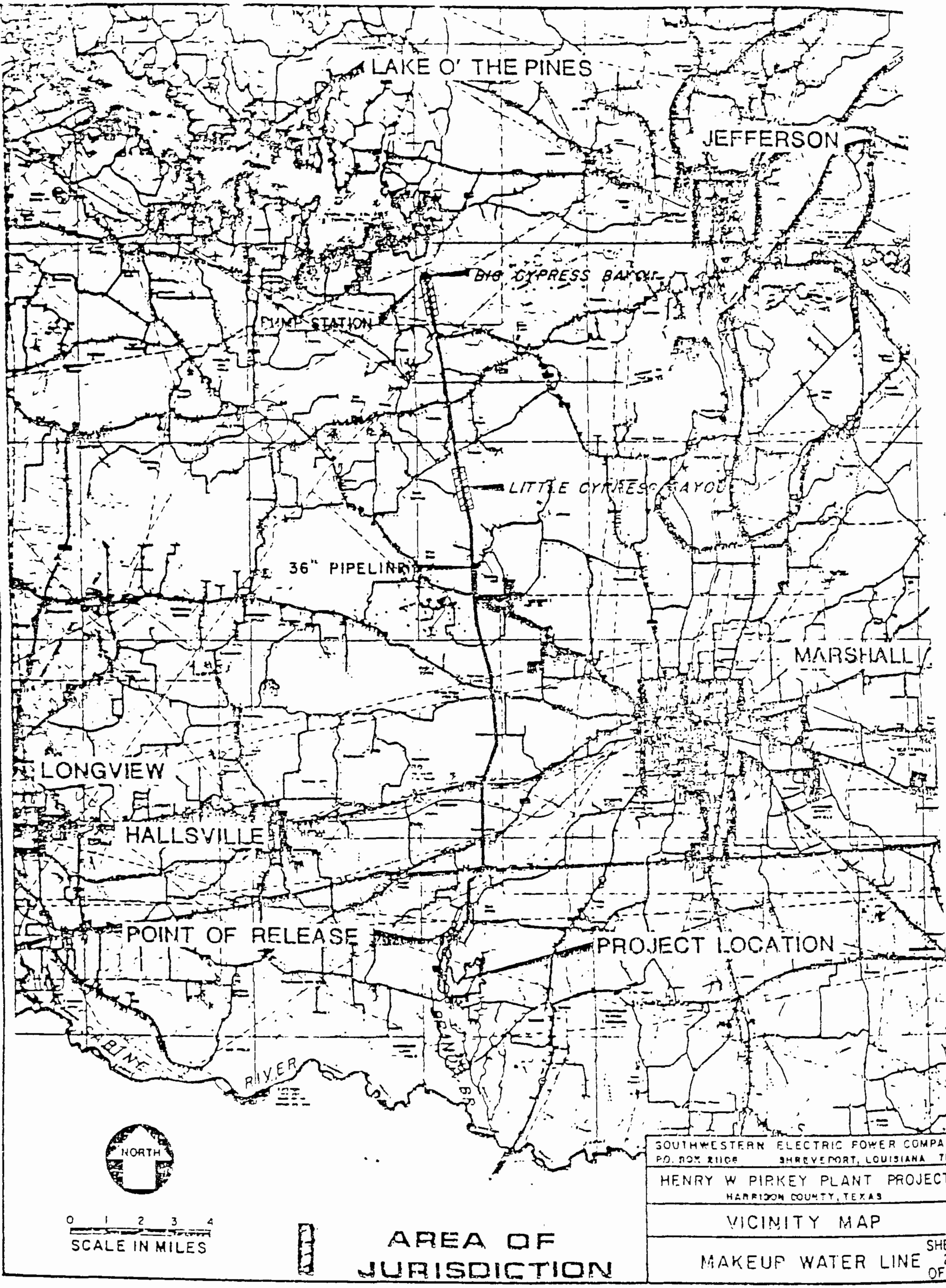
DATUM: N.G.V.D. OF 1929

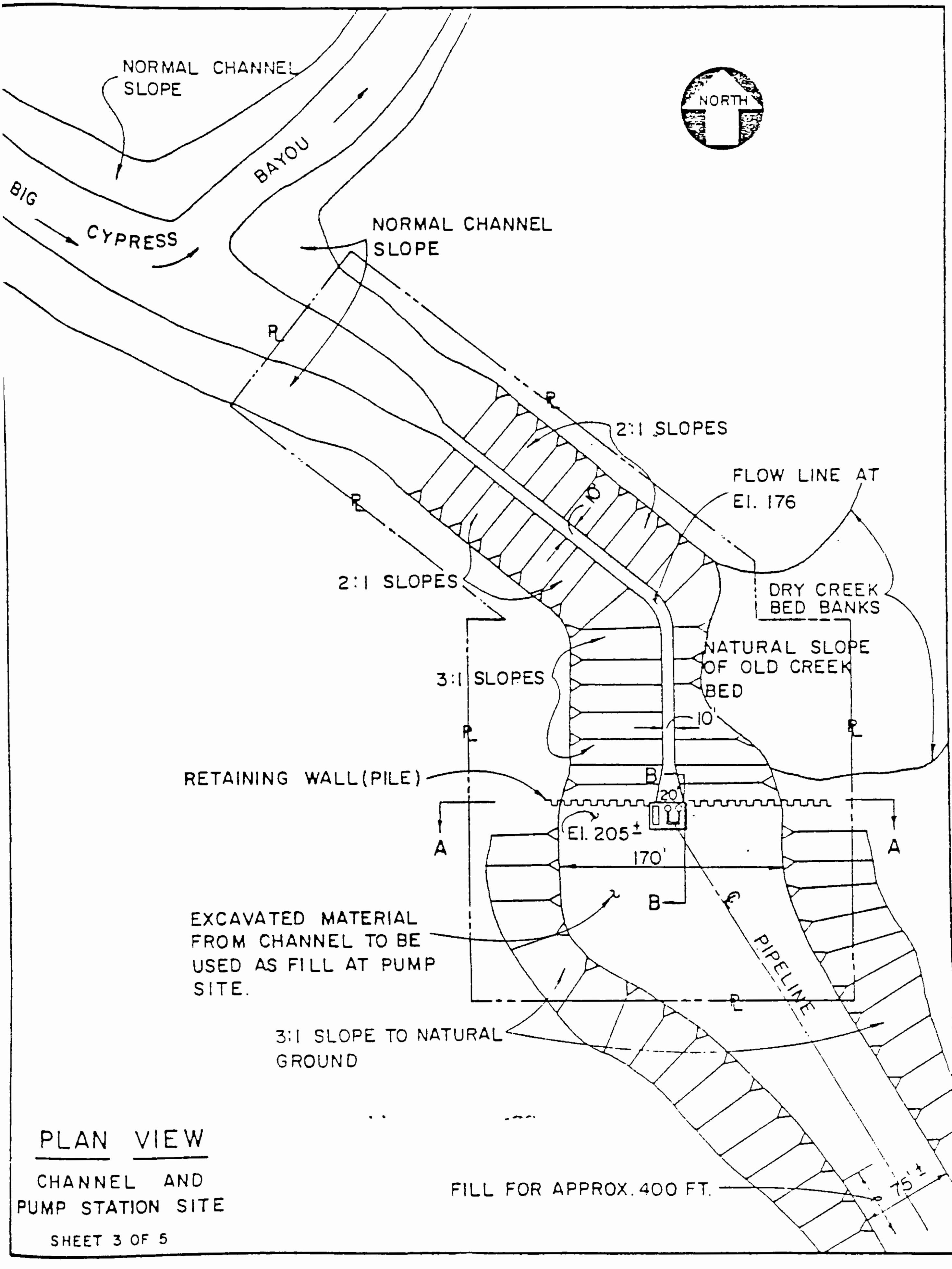
PROPOSED PUMP STATION
ON BIG CYPRESS BAYOU

MARION COUNTY, TEXAS

APPLICANT: SOUTHWESTERN ELECTRIC POWER CO.

SHEET 1 OF 5 | FREESE AND NICHOLS, INC. CONSULTING ENGINEERS | AUG. 1979

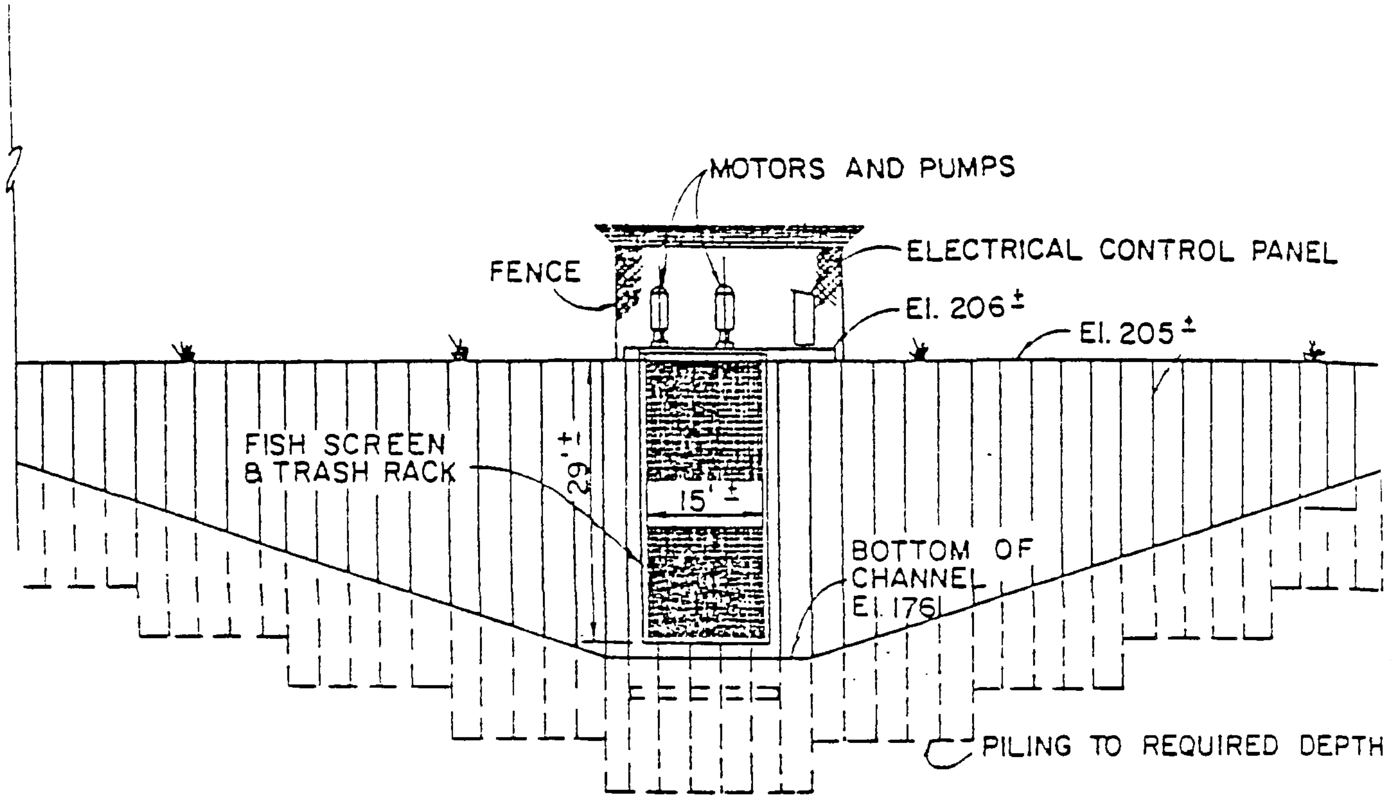

LAKE O' THE PINES
JEFFERSON
BIG CYPRESS BAYOU
PUMP STATION
LITTLE CYPRESS BAYOU
36" PIPELINE
MARSHALL
LONGVIEW
HALLSVILLE
POINT OF RELEASE
PROJECT LOCATION
RIVER
NORTH
0 1 2 3 4
SCALE IN MILES
AREA OF JURISDICTION
SOUTHWESTERN ELECTRIC POWER COMPA
P.O. BOX 21106 SHREVEPORT, LOUISIANA
HENRY W PIRKEY PLANT PROJECT
HARRISON COUNTY, TEXAS
VICINITY MAP
MAKEUP WATER LINE



PLAN VIEW

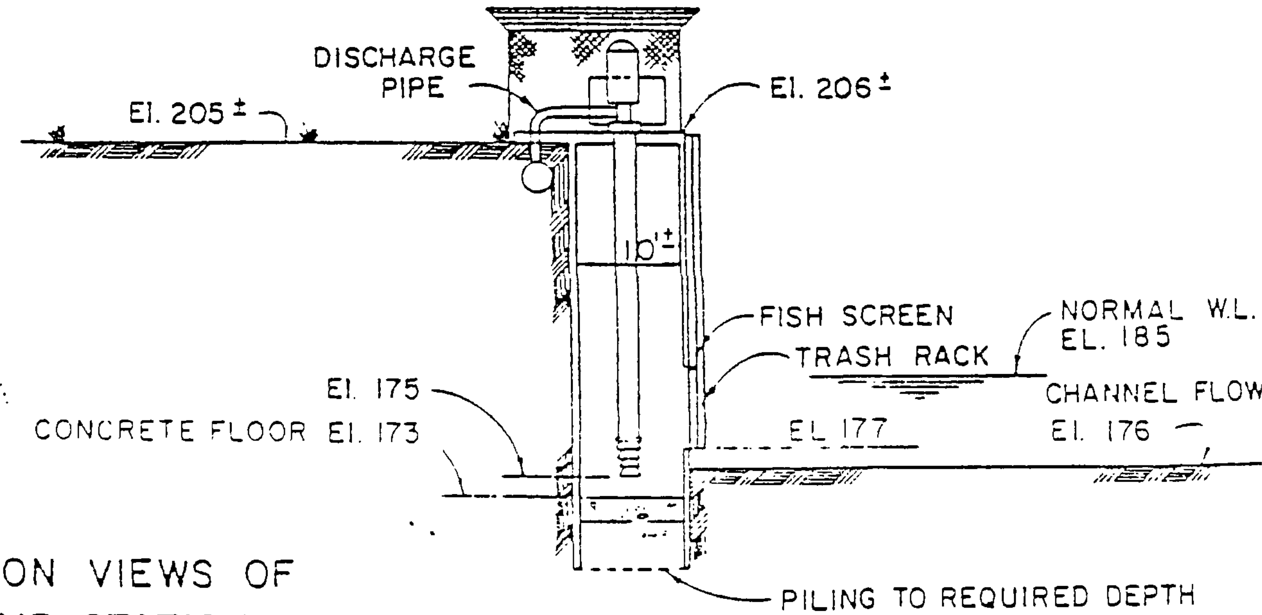
CHANNEL AND PUMP STATION SITE

SHEET 3 OF 5



SECTION A-A

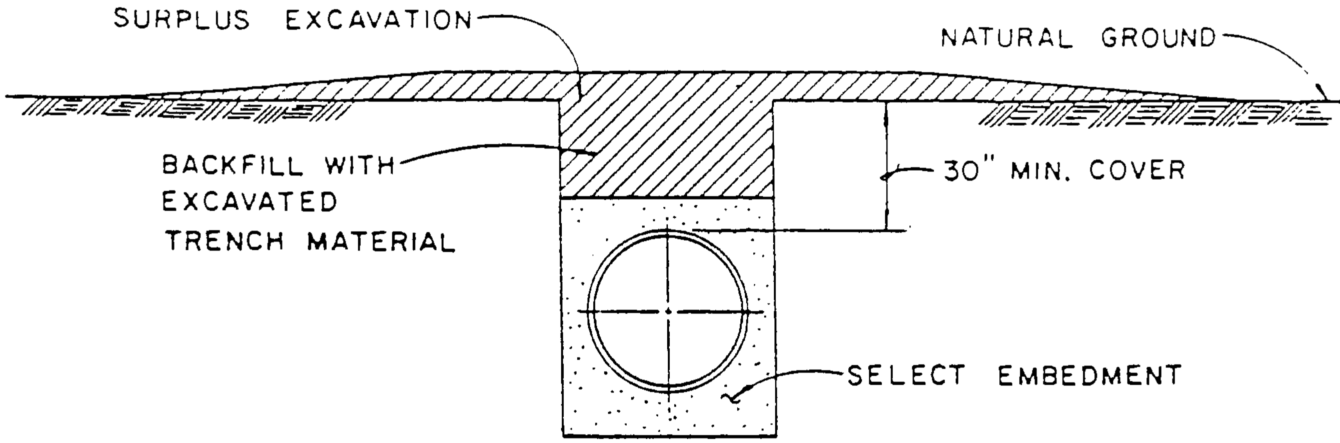
SCALE: 1" = 20'



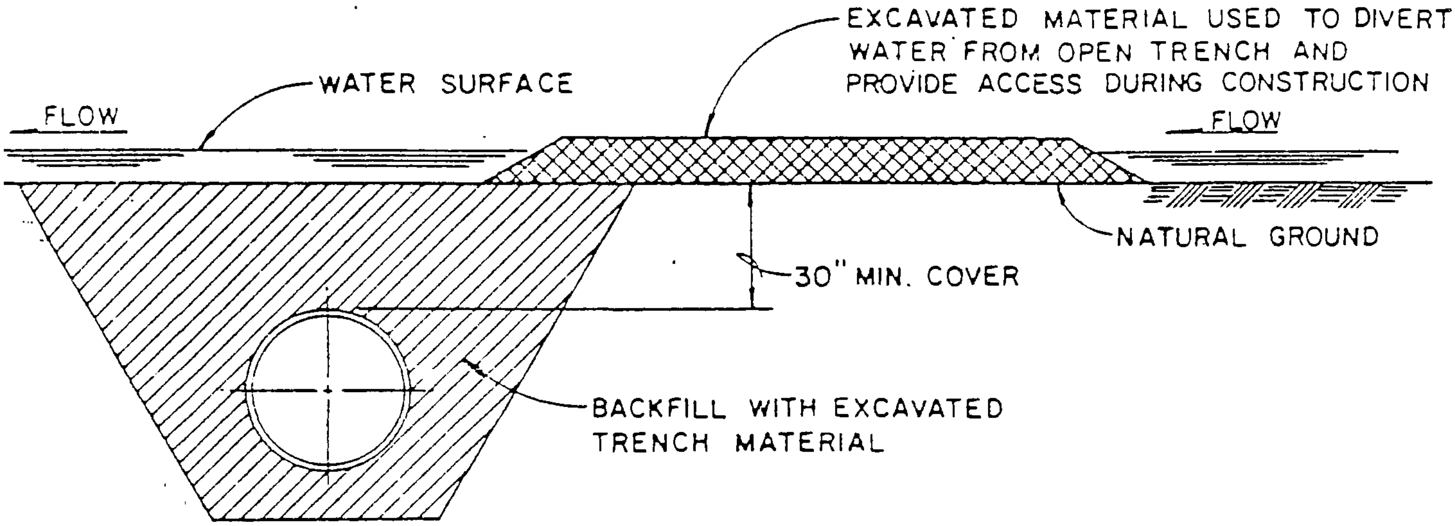
SECTION VIEWS OF PUMP STATION

SECTION B-B

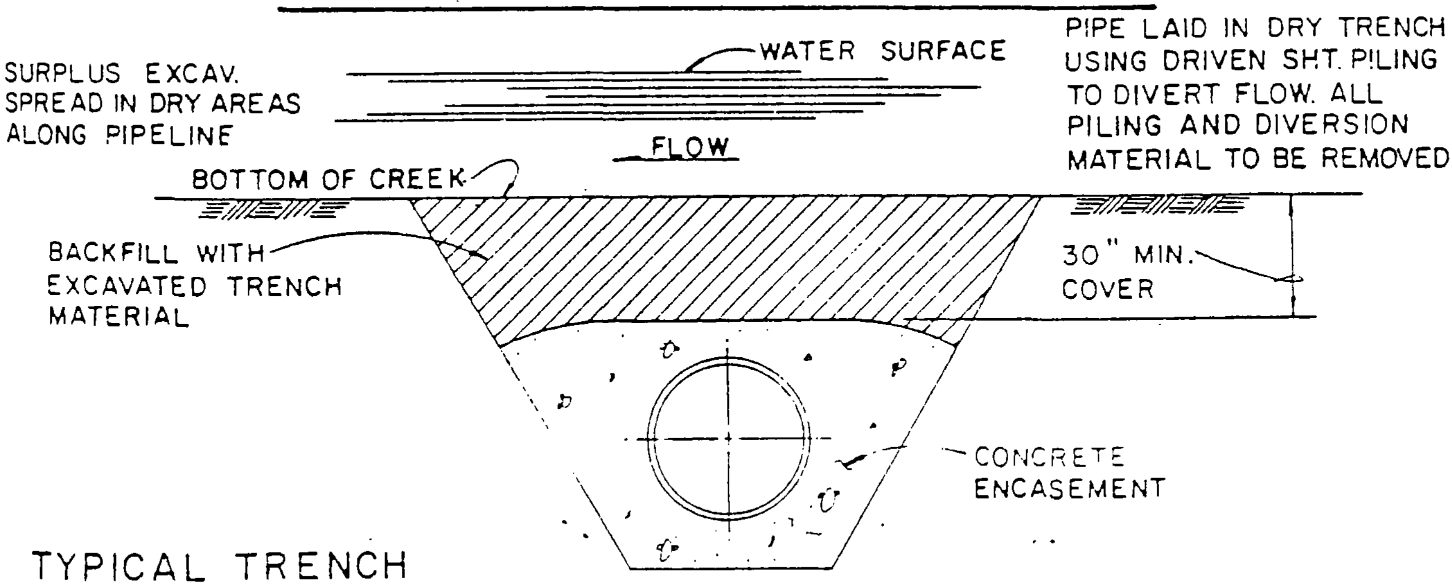
SCALE: 1" = 20'



TYPICAL PIPE TRENCH



TYPICAL TRENCH IN WET AREAS



TYPICAL TRENCH
SECTIONS

TYPICAL TRENCH AT CREEK CROSSING

STATEMENT OF FINDINGS

The following information is provided concerning issuance of Department of Army Permit No. SWF-80-MARION-280 under Section 404 of the Clean Water Act and Section 10 of the River and Harbor Act of 1899.

1. The applicant, Southwestern Electric Power Company (SWEPCO), proposes to construct a makeup water intake and pump station on the above named waterway. Diversion rate will be 33.4 cfs with an intake velocity through the screens not to exceed 0.5 feet per second with 0.5 inch screen openings. The proposed pipeline from the pump station to the point of discharge will be a 36-inch concrete cylinder pipe. The pipe will be covered with 2 1/2 feet of the native soil removed during ditching operations. Excess backfill will be placed on top of the line and spread smoothly over the right-of-way. The applicant further proposes to rehabilitate an old road right-of-way to be used as an access road. Crushed stone or road gravel will be used as needed and necessary culverts and drainage will be provided. The project will maintain preconstruction drainage patterns; all wetland areas and stream crossings will be restored to their original contours.

2. I have reviewed and evaluated, in light of the overall public interest the documents and factors concerning this permit application as well as the stated views of other Federal and non-Federal agencies, relative to the proposed work in waters of the United States.

3. The possible consequences of this proposed work have been studied in accordance with regulations published in 33 CFR 320, 322, 323, and 40 CFR 230. Factors considered in my review include: conservation, economics, aesthetics, general environmental concerns, historic values, fish and wildlife values, flood damage prevention, land use, navigation, recreation, water supply, water quality, energy needs, safety, food production, and in general, the needs and welfare of the people.

4. In evaluation of this work and in consideration of comments received from coordination of Public Notice 280 dated 14 July 1980, the following points are considered pertinent.

a. Federal Agencies:

(1) U.S. Fish and Wildlife Service (FWS): In a letter dated August 6, 1980, the FWS stated that significant impacts could occur to fish and wildlife resources as a result of the proposed project. These impacts would be lessened and the FWS would not object to the issuance of the permit provided the following three conditions were met:

The oxbow affected by the project should be left open.

Wetlands crossed by the pipeline should be restored to their original contours.

Construction should be accomplished during the driest season to reduce impacts on wetlands.

In addition, the following operational recommendations were made to lessen adverse impacts on aquatic organisms.

Make-up releases should be carried out during mid-day. Reduced activity of fish during this time period would lessen adverse impacts upon them.

Water to be released should be taken from that portion of the reservoir water column which represents the best water quality from a fishery standpoint.

A bubbler screen could be located at each end of the oxbow to prevent excessive migration into the intake bay prior to the start-up phase, thereby reducing impingement losses during this critical phase.

The intake pipe screens should be equipped with a cleaning mechanism. Fish and other detritus removed from the screens should be disposed of downstream of the oxbow or buried to reduce attraction of foraging fish.

Pumping should be scheduled for fewer, longer duration period. This would reduce the number of times the pumps are activated. This is an important factor in reducing fish mortality as impingement rates are higher during the start-up phase.

The need for make-up releases should be anticipated to allow the receiving reservoir to be at or near capacity during the spawning season (late April through July). This would reduce impingement and entrainment during the critical spawning period.

SWEPCO's proposed project will not cut off flow into the affected oxbow lake. Flow patterns will remain similar to preconstruction conditions.

During the public hearing, SWEPCO described the following protective measures to be implemented during construction and project operation.

Protective screens will be located in front of the intake structure to prevent fish and other aquatic vertebrates from entering the pump bay. The velocity of the water through the screens will be relatively low and will minimize impingement of fish and other organisms. There will be a dual set of screens. Any debris removed from the screens will be disposed of away from the site.

Construction will take place during drier months of the year and use standard sedimentation control procedures. Following construction, SWEPCO will restore the affected areas to their original contours and establish grasses on the right-of-way.

(2) U.S. Environmental Protection Agency (EPA): In a letter dated July 31, 1980, EPA stated that the environmental impacts of the project would be minor and therefore had no objection to the issuance of the permit.

(3) National Marine Fisheries Services (NMFS): In a letter dated July 24, 1980, NMFS anticipated that any adverse effects that might occur on the fishery resources for which it is responsible would be minimal and therefore it did not object to issuance of the permit.

b.. State and Local Agencies:

(1) Texas Department of Water Resources (TDWR): In a letter dated July 31, 1980, TDWR certified the proposed project with the following qualifications:

Work must be done with the minimum production of turbidity in the waters where the work is taking place.

The discharge of oil, gasoline, or other fuel or materials capable of causing pollution arising from the operations is prohibited.

Spoil must be placed in spoil areas approved by the United States Army Corps of Engineers and Texas Parks and Wildlife Department in such a manner as to minimize the runoff of spoil or highly turbid waters into adjacent waters.

During construction, adequate erosion control methods shall be used in order to minimize runoff and consequent elevations of turbidity in Big Cypress and Little Cypress Bayous.

Areas devegetated during construction shall be replanted to the maximum extent practicable after project completion, to avoid excessive erosion and the runoff of turbid waters to waters of the State.

Appropriate water control structures must be placed, in construction of the access road, to provide adequate drainage and circulation in wetlands.

Pipeline construction across creeks and wetlands must maintain minimum cover of 30 inches, and original contours and shoreline configurations must be restored.

(2) Texas Historical Commission-State Historic Preservation Officer (SHPO): In a letter dated October 7, 1980, the SHPO stated that there would be no impact on known properties either listed or eligible for listing in the National Register of Historic Places. The SHPO advised that numerous sites of cultural significance had been located in the general area and that there was a high likelihood that sites potentially eligible for inclusion in the National Register may be found during the construction phase of the project.

c. Organized Groups:

(1) The Greater Caddo Lake Association Inc. (GCLA): In a letter dated July 28, 1980, the GCLA requested a public hearing on the proposed project. The

GCLA expressed concern that the water withdrawn from the watershed as a result of the project would cause severe environmental and ecological damage to Caddo Lake and Big Cypress Bayou. The preparation of an Environmental Impact Statement (EIS) for the project was also requested.

In another letter dated September 12, 1980, GCLA reaffirmed its objection to the proposed project and requested that the cumulative impacts of the proposed project be addressed. A list of twenty-five (25) questions concerning the project was submitted for review by the District Engineer. The majority of these questions were directed to the impacts that the proposed project could have on water levels of Caddo Lake and state water rights.

The hydrologic impacts of the proposal on stage elevation at Caddo Lake were calculated considering historical flow records in the drainage basin, part of which covered the period during the construction and impoundment of Bob Sandlin, Cypress Springs, Monticello and Johnson Creek Reservoirs. Calculation of the impacts of all water withdrawals within the basin were not made due to the complex and expensive nature of the task. It was found that the proposed diversion would have resulted in only a 0.30 foot decrease in the elevation of Caddo Lake if applied to the lowest flows for the period of record. Increased water usage in the drainage basin of Caddo Lake may ultimately reduce flows to the lake. However, the proposed project in combination with present uses will not significantly or permanently lower the level of Caddo Lake during periods of low flows.

Section 101 of the Clean Water Act states that it is the policy of the Congress that the authority of each State to allocate quantities of water within its jurisdiction shall not be superceded, abrogated, or otherwise impaired by the Act.

GCLA requested the public hearing be postponed until answers to its questions were received. Lt. Colonel Lively denied this request because the Corps of Engineers function at the public hearing was not to answer questions, but to allow presentation of information concerning the project.

GCLA requested a response to two additional questions at the hearing. What minor modifications have been made in the project and to what degree must impacts be before they are considered environmentally substantial? SWEPCO responded to the initial concerns of GCLA in a letter dated July 31, 1980. Only water released from Lake O' The Pines under TDWR permit number CP-454 will be used for the proposed project. Therefore, the normal flows downstream to Caddo Lake would not be affected and no substantial environmental impact would result from the proposed project. In addition, SWEPCO addressed a portion of GCLA's 25 questions at the public hearing.

In a subsequent letter dated October 12, 1980, GCLA requested a 45 day extension to the comment period. GCLA's request for extension was denied by letter dated December 11, 1980.

d. Individuals:

During the public hearing, one individual questioned the legality of diverting 18,000 acre feet of water from the Red River basin into the Sabine River basin. He was concerned that such a transfer would violate the Red River Compact. TDWR permit number CP-454 was approved on November 6, 1978, authorizing diversion of this water. The conditions of this permit do not violate terms of the Red River Compact.

The Honorable Judge Richard J. Anderson, Jr., Harrison County Judge, asked that the net reductions of downstream flows to Caddo Lake on a monthly and annual basis be identified. He also requested the average normal flow from Caddo Lake without the pipeline and the average flow from Caddo Lake after the proposed pump station is fully operational. In addition, Judge Anderson wished to know the feasibility of withdrawing water at the proposed pump station on Big Cypress Bayou during periods of high flows so as to minimize the impacts upon Caddo Lake during low flows. His concerns dealt mostly with the impacts of water diversion on the stage levels of Caddo Lake. As previously discussed, hydrologic records from 1961 to 1977 indicate that even at times of low flow the proposed diversions would have resulted in a maximum 0.30 decrease in the elevation of Caddo Lake. The demand for water at the H.W. Pirkey Power Plant will be continuous and storage at the facility will not be adequate to meet demands between hydrologic cycles. Therefore, it would not be feasible to limit withdrawals at Big Cypress Bayou to periods of high flows.

In a letter dated October 10, 1980, Mr. H. C. Bradbury requested an extension of the comment period and the preparation of an EIS for the project. In a letter dated 4 December 1980 , Mr. Bradbury was advised that all significant issues concerning this permit application were a matter of record and further delay in the decision process was not in the public interest.

e. Other Considerations:

Preliminary considerations of environmental impacts were approved 8 July 1980. There have been no significant adverse environmental effects identified that would result from the proposed work; therefore, an Environmental Impact Statement is not required.

5. I find that the decision to issue this permit, as prescribed in regulations published in 33 CFR 320, 322, 323, and 40 CFR 230, is based on evaluation of the various factors enumerated in paragraph 3; that no significant adverse environmental effects relating to the work have been presented; that the issuance of the permit is consonant with National policies, statutes and administrative directives; and that on balance the total public interest should best be served by issuance of a Department of the Army permit. Further, it is my finding that to serve the total public interest, I must require that a special condition be imposed upon the applicant to protect water quality, fisheries resources, and in general serve the overall public interest.

STATEMENT OF FINDINGS, SWF-80-MARION-280

Construction in the wetland areas adjacent to Big Cypress and Little Cypress Bayous will be accomplished during the dryer portion of the year (June through October).

RECOMMENDED BY: ______________________ DATE ______________

ALLIE J. MAJORS
Chief, Operations Division

REVIEWED BY: Albert C. Proctor DATE 22 Dec 80

ALBERT C. PROCTOR
Chief, Office of Counsel

REVIEWED BY: Charles W. Lively DATE 23 DEC 80

CHARLES W. LIVELY
LTC, CE
Deputy District Engineer

APPROVED BY: Donald J. Palladino DATE 6 Jan 81

DONALD J. PALLADINO
Colonel, CE
District Engineer

ENVIRONMENTAL ASSESSMENT

APPLICANT: Southwestern Electric Power Company (SWEPCO)
P.O. Box 21106
Shreveport, Louisiana 71156

WATERWAY & LOCATION: Big Cypress Bayou near Jefferson, Marion and Harrison Counties, Texas

PERMIT NUMBER: SWF-80-MARION-280

1. Proposed Project: The applicant proposes to construct a makeup water intake an pump station on the above named waterway. Diversion rate will be 33.4 cfs with an intake velocity through the screens not to exceed 0.5 feet per second with a 0.5 in screen opening. The proposed pipeline from the pump station to the point of releas will be a 36-inch concrete cylinder pipe. The pipe will be covered with 2 1/2 feet of the native soil removed during the ditching operation. Excess backfill will be placed on top of the line and spread smoothly over the right-of-way. The applicant further proposes to rehabilitate an old road right-of-way to be used as an access road. Crushed stone or road gravel will be used as needed and necessary culverts a drainage will be provided.

2. Purpose of the Project: If authorized, the proposed project will transfer up t 18,000 acre feet of water per year located in Lake O' the Pines from Big Cypress Bayou to the applicant's H.W. Pirkey Power Plant currently under construction in Harrison County, Texas. Transferred water will be stored in a cooling reservoir until needed in the operation of the lignite-fired steam electric generating statio Use of the water will constitute an interbasin transfer from the Red River Drainage Basin to the Sabine River Drainage Basin.

3. Environmental Impact:

a. Socioeconomic Impact: Direct socioeconomic impacts of this project will inv the expenditure of funds for labor, equipment, and supplies to be used in constructi activities. Such funds will be recouped from the profits of the power plant. A temporary and slight benefit to the local economy may result from wages and other expenditures during construction of the pump station and pipeline.

The proposed project site was the most economically feasible of 12 alternatives exam It will enable SWEPCO to meet the increasing energy needs of its 320,000 customers. SWEPCO must maintain a 12 percent power reserve to meet its commitments to the Southwestern Power Pool. Without the H.W. Pirkey Power Plant these reserves would b only 4.3 percent by 1985.

b. Natural Resources: The project site is located within the Outer Coastal Pla Forest Ecoregion. Precipitation averages 40 to 60 inches per year. Mild winters an hot humid summers are the rule; average annual temperature is 60^{o} to 70^{o} F. Primary plant species in the river bottoms of Big Cypress and Little Cypress Bayous consist dogwood, sweetgum, bald cypress, river birch, deciduous holly, swamp privet, and American holly. Approximately 14 acres of these forested bottom lands would be cleared during construction of the pump station and the 75 foot wide pipeline right-of-way. This clearing will produce an edge effect in the midst of forested bottom lands which should prove beneficial to some wildlife species. Some disturbance of soil will result from this clearing and constrctuion. However, the affected areas wi[?] be revegetated with grasses and drainages will be restored to preconstruction conditi[?] Work in wetland areas will be limited to times of the year with the least precipitati[?] June through October. Such construction techniques will preserve the functional integrity and value of these wetlands.

Some fish and wildlife species may be temporarily displaced by the proposed project, but most will probably reestablish shortly after construction is completed. Some benthic organisms will be lost due to dredging and filling associated with the project The intake structure will be fitted with double screens to minimize impingement of fish and other aquatic vertebrates by the pumps. Localized elevations of turbidity during construction of the project should have minor impacts on the fisheries resource due to the temporary nature of these conditions.

c. Cultural Resources: The State Historic Preservation Officer (SHPO) advised that the project should not adversely affect known properties which are either listed or eligible for listing in the National Register of Historic Places. However, present unknown archeological, scientific, prehistoric or historic data may be lost or destroyed by the work if approved. The applicant will notify the construction contractor and crew of the high likelihood of buried sites in the area. If cultural resources are found during project construction, the applicant will notify the District Engineer immediately. In accordance with Part 325 of our regulatory program the District Engineer will notify the SHPO and the Heritage, Conservation, and Recreation Service of these findings.

d. Air, Noise, and Water Pollution: Some temporary air and noise pollution may occur as a result of equipment use during the construction phase of the project. Duri[?] operation of the pumps, increased noise levels will occur at the intake structure. Turbidity may increase both locally and downstream from construction activities in Big Cypress and Little Cypress Bayous. These effects will be temporary and water qual[?] should return to preconstruction conditions upon completion of the project.

e. Aesthetics: The natural appearance of the project area will be permanently modified by the construction of the pump station and pipeline. A small amount of erosion may be associated with the project until vegetation can be established.

f. Energy: The project is necessary to support a lignite coal fired electrical generation plant. Reserve power produced by this plant in 1985 would require 5,836,00[?] barrels of fuel oil to produce. This plant is scheduled to provide 19.4 percent of SWEPCO's total generation capacity once it becomes operational.

g. Cumulative Impacts: In evaluating the cumulative impacts of the proposed work we considered the affects of similar type discharges of fill associated with like structures in the Big Cypress Drainage Basin. Most intake structures would have impacts similar to those described for this project. Since these impacts are mostly temporary and localized the cummulative total would not be significant. Cummulative impacts of clearing pipeline right-of-ways associated with such work could be appreciable to the aesthetics of the area; however, such work might benefit wildlife by providing some openings in the dense forest canopy. It is probable that additional such projects may be constructed within the drainage basin, but sufficient environmental considerations should reduce the cummulative impacts to acceptable levels.

4. Conclusion: Based on the above considerations, I have determined that the propo work will not have any significant adverse impact on the natural environment nor is environmentally controversial and that the issuance of a permit for the proposed wo will not adversely affect the quality of the human environment. An Environmental Ir Statement will not be prepared.

RECOMMENDED BY: ______________________ DATE: ______

ALLIE J. MAJORS
Chief, Operations Division

REVIEWED BY: Albert C. Proctor DATE: 22 Dec

ALBERT C. PROCTOR
Chief, Office of Counsel

APPROVED BY: Charles W. Lively DATE: 23 DEC 8

CHARLES W. LIVELY
LTC, CE
Deputy District Engineer

APPENDIX C

USCE WETLANDS DETERMINATION

DEPARTMENT OF THE ARMY
FORT WORTH DISTRICT, CORPS OF ENGINEERS
P. O. BOX 17300
FORT WORTH, TEXAS 76102

REPLY TO
ATTENTION OF:

SWFOD-O

21 January 1982

Mr. Clinton B. Spotts
Regional EIS Coordinator
U.S. Environmental Protection Agency
1201 Elm Street
Dallas, Texas 75270

Dear Mr. Spotts:

Reference your letter of 21 August 1981 requesting a wetland determination on the Southwestern Electric Power Company's South Hallsville Surface Lignite Mine in Harrison County, Texas.

A determination of the U.S. Army Corps of Engineers jurisdiction under Section 404 of the Clean Water Act for the South Hallsville Mine area is inclosed.

If you have any questions concerning this report, you may contact Marje Schlangenstein at 817-334-2681.

Sincerely,

ALLIE J. MAJORS
Chief, Operations Division

1 Incl
As stated

Copies furnished:
Mr. George Vought
Espey, Huston, and Associates, Inc.
916 Loop 360 South
Austin, Texas 78701

Mr. Jay Pruett
SWEPCO
P.O. Box 21106
Shreveport, Louisiana 71156

SOUTHWESTERN ELECTRIC POWER COMPANY

SOUTH HALLSVILLE SITE

WETLAND DETERMINATION

U.S. ARMY CORPS OF ENGINEERS

INTRODUCTION

The U.S. Army Corps of Engineers (COE) regulates the discharge of dredged and fill material into waters of the United States including adjacent wetlands under Section 404 of the Clean Water Act (CWA). The Regional Administrator of the United States Environmental Protection Agency (EPA) has ultimate authority to determine the reach of waters of the United States as described in the CWA. In accordance with the Memorandum of Understanding (MOU) with EPA concerning geographical jurisdiction of the Section 404 program, the COE has been requested by EPA to establish the boundaries of waters of the United States which do not involve significant issues or technical difficulties where EPA has declared a special interest.

The South Hallsville Surface Lignite Mine Site along the Sabine River, Harrison County, Texas, proposed by Southwestern Electric Power Company (SWEPCO), does not involve any such special interests, therefore the Regional Administrator of EPA has requested that the COE, as a cooperating agency, determine the jurisdictional limit of Section 404 for the South Hallsville Surface Lignite Mine Project. This determination is being prepared in support of the COE permit program and its purpose is to detail the extent of the waters of United States including adjacent wetlands in the proposed project area.

METHODS

Field investigations of the project area were conducted 26-29 October 1981 by representatives of the COE, SWEPCO, and Espey, Huston, and Associates, Inc.

Transect lines were established at six sites and spot checks conducted at additional locations dispersed throughout the project area, primarily at the road crossings of major creeks within the project boundary. These sites were selected on the basis of accessibility, representativeness, drainage characteristics, and range of topographic changes. Their locations are shown on the accompanying photograph.

Transects were extended into nonwetland areas to discern differences in key characteristics and estimate a line of demarcation. Investigation along each transect included the identification of vegetative communities, examination of soils and observation of positive hydrologic indicators (i.e. flood debris, silt depositio on vegetation, standing water, etc.).

The limit of COE jurisdiction was established where the appearance of positive hydrologic indicators was found in conjunction with saturated soils supporting a predominance of water tolerant vegetation. Color infrared and black and white aerial photographs were used to aid in distinguishing wetland boundaries.

SUMMARY OF FIELD OBSERVATIONS

The wetlands within the project area which are part of the waters of the United States are shown on the accompanying aerial photograph. These wetlands primarily support water oak, willow oak, overcup oak, and black willow. Herbaceous species include lizard tail and broomsedge bluestem; woody vine species are peppervine and green briar. The soil is predominantly Mantachie clay loam, frequently flooded, however, some wetlands are supported by Marietta and Urbo clay loam, frequently flooded soils.

The southwestern portion of the project area is characterized by a series of ridges and sloughs. The slough areas are typically comprised of the wetland species referenced above on Mantachie or Marietta soils. The ridges primarily support loblolly pine, sweetgum, some post oak and blackjack oak, and wax myrtle. Soils are predominantly of the Thenas fine sandy loam, frequently flooded series. Sandier soils supporting species such as loblolly pine indicate drier conditions.

CONCLUSION

Wetlands are transition areas between the aquatic and terrestrial zone. For purposes of the regulatory program, wetlands are defined as those areas inundated or saturated by surface or ground water at a frequency and duration sufficient to support a prevalence of vegetation typically adapted to life in saturated soil conditions. The prevalent vegetation which occurs in wetlands designated in this report has been shown by various studies to be flood tolerant. In addition, most of these species maintain a competitive advantage in wet soils. It is significant that species known to have little tolerance to flooding do not occur within the wetlands. The wetlands in the South Hallsville site principally occur in association with Mantachie, Marietta, and Urbo clay loams. The Soil Conservation Service reports that these soils occupy the wetter, lower areas whereas Thenas soils occupy sandier ridges.

Of the approximate 25,000 acres of the project area, 3780 acres were delineated on the accompanying photograph as wetlands under the jurisdiction of the COE. It should be noted that the southwestern portion of the project area is a series of ridges and sloughs which could not be accurately delineated on the aerial photograph, and therefore, some upland areas are included in the 3780 acres.

In summary, areas within the project boundary which exhibit Mantachie, Marietta, and Urbo soils as previously described and support water tolerant vegetation (Appendix A), are considered to be within COE jurisdiction. Conversely, those areas in the project boundary which exhibit Thenas or Bibb soils supporting vegetation which is not generally suited for life in saturated soils are excluded from COE jurisdiction.

It is my determination that the areas designated on the attached map and further described in Appendix A are wetlands consistent with the above definition and comprise a portion of the waters of the United States under our regulatory jurisdiction. In the absence of adjacent wetlands, the lateral limit of COE jurisdiction is the plane of the ordinary high water mark.

Wetland Determination
South Hallsville Site

RECOMMENDED BY: ______________________ DATE: ______________
DAVID B. BARROWS
Chief, Permits Section

REVIEWED BY: ______________________ DATE: 21 Jan '82
L. M. HAWKINS, JR.
Chief, Office Operations Branch

APPROVED BY: ______________________ DATE: 21 January 1981
ALLIE J. MAJORS
Chief, Operations Division

APPENDIX A

The forest cover types used here are taken from the Society of American Foresters 1980 publication Forest Cover Types of the United States and Canada.

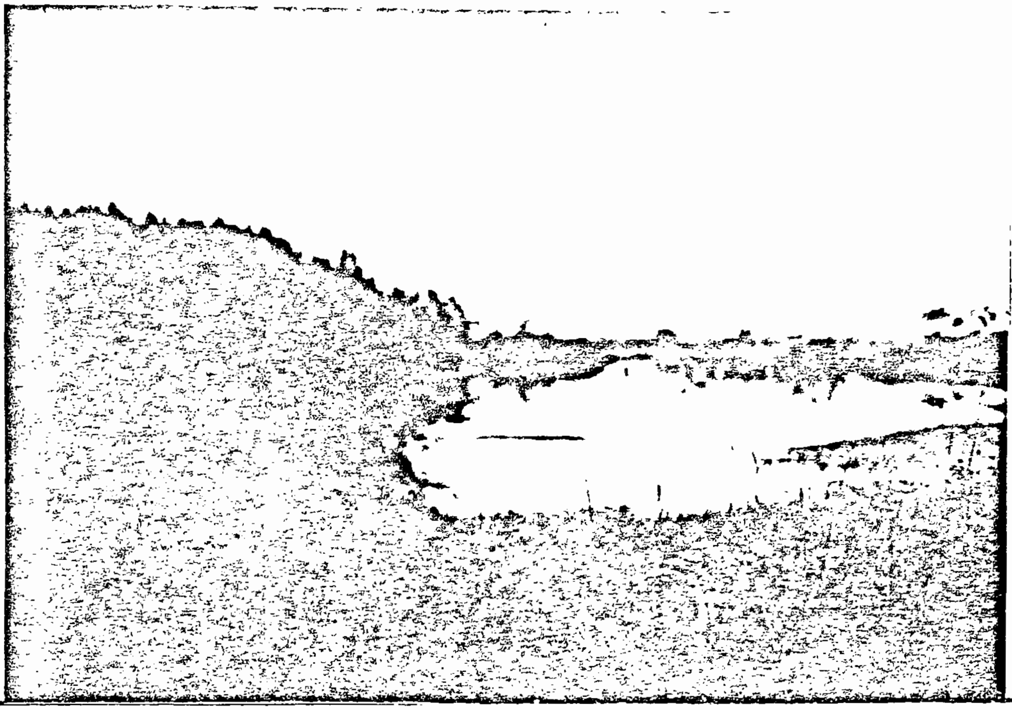
Site 1: This transect was conducted generally parallel to Mason's Creek for approximately 345 yards. This area is comprised of a series of ridges and sloughs. The forest cover type of the slough areas is Sweetgum-Willow Oak (92). Water oak, overcup oak, and water hickory are associates found along this site with dwarf palmetto and American hornbeam in the understory. Other species along this transect in smaller numbers include water elm, bitternut hickory, and river birch. The soils in the lower regions are Mantachie clay loam, frequently flooded with mottling in the upper 15 inches.

The ridge areas contain species associated with the forest cover type Loblolly Pine (81). The primary associate is sweetgum; the understory includes wax myrtle and American beautyberry. The soils along the ridge areas are Thenas fine sandy loam, and are dark brown and friable in the upper 24 inches.

Site 2: This transect began at the most southwestern corner of the project area and proceeded northeasterly from the AT and SF railroad. A large portion of the area was inundated due to recent heavy rainfalls. A slough approximately 30 feet in width bisects the transect line. The forest cover type in this area is not easily categorized. The dominant species within the slough is water elm. Soils are extremely saturated. The species which comprise the edge of the slough include sweetgum, water hickory, river birch, black willow, some willow oak, and water oak. Buttonbush is dominant in the understory. Herbaceous species present are lizard tail and goldenrod. A grassy area on the north side of the slough is the transition zone between the inundated area to the east and a loblolly pine plantation to the west. Soils are a saturated loam underlain by clay exhibiting mottling. The area to the east contains overcup oak that was, at the time, standing in 18-24 inches of water. Water willow is present in this area. This area is usually inundated for approximately 30 days of the year. Moving west, the topography rises gently into the grassy transition area with black willow in the overstory; buttonbush, dwarf palmetto, and scattered alder comprise the understory. A species of paspalum, and some smartweed are the dominant herbaceous components. A little further to the west, the forest cover type is Sweetgum-Willow oak (92) on the Mantachie soils (10YR 5/2) with very little mottling. Dwarf palmetto and black willow comprise the understory.

The western portion of the area is a loblolly pine plantation with sweetgum and wax murtle understory and a few other associated hardwood species including mockernut hickory, blackjack oak, and some palmetto. The soils are a sandy clay loam (Thenas series) to 40 inches down.

Site 3: Site 3 is located parallel to a dirt road approximately 1.5 miles east of Site 2. The transect line was inundated by 18-24 inches of water. This area is composed of overcup oak and water elm in the overstory. Some water locust and willow oak are also present in this area.

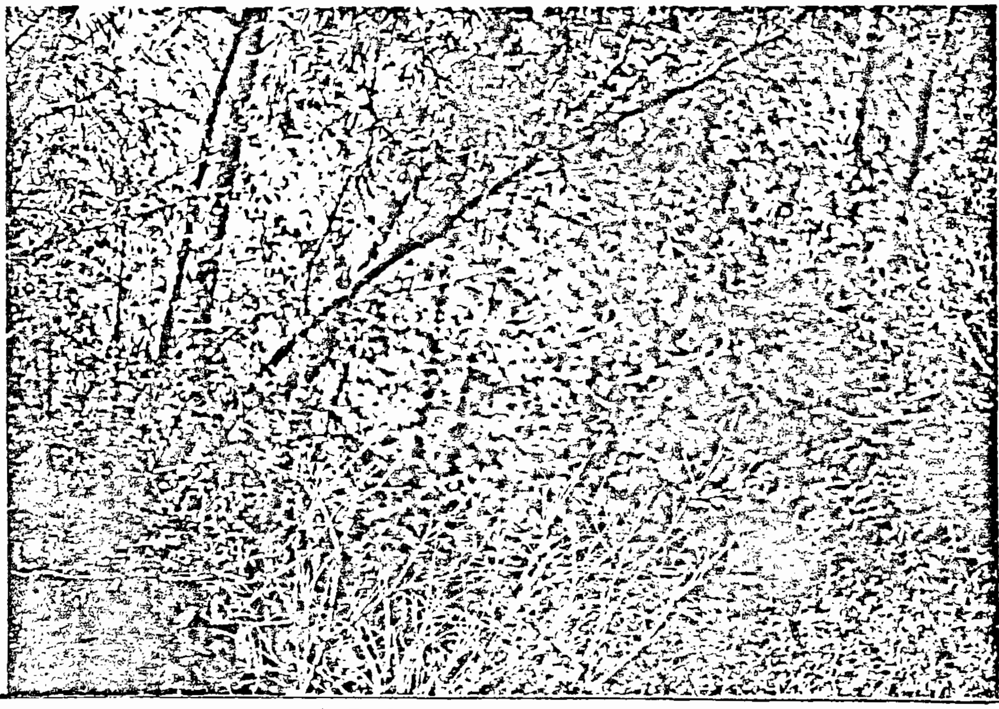


FORT WORTH DIST. CORPS OF ENGINEERS FORT WORTH, TEXAS

PHOTOGRAPHER:	DATE:	LOCATION:
Marje Schlangenstein	27 Oct 81	Site 2, SWEPCO South Hallsville Mine

Looking NE from road adjacent to AT and Sf railroad at large inundated area. Loblolly pine plantation is to the west.

Figure 1



FORT WORTH DIST. CORPS OF ENGINEERS FORT WORTH, TEXAS

PHOTOGRAPHER:	DATE:	LOCATION:
Marje Schlangenstein	27 Oct 81	Site 2, SWEPCO South Hallsville Mine

Swamp area to NE of transition zone. Note herbaceous growth and standing water. Black willow is in the understory.

Figure 2

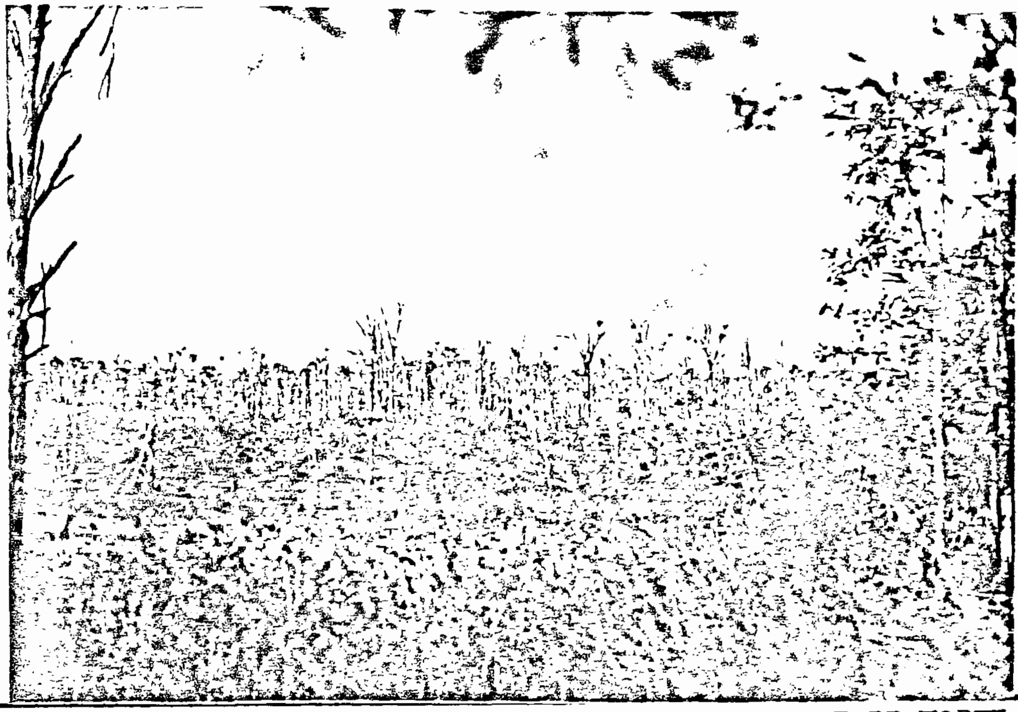
SWF FORM 43-J
12 Jan 55

Site 4: The transect line for this site is located approximately 2.7 miles east of Site 3. Clark's Creek runs west-east on the northern edge of the transect line. The majority of this area along the southwestern portion of the site is composed of an overcup oak forest inundated by approximately one to two feet of water. Most of the trees are dead; beaver activity in the area has raised the water level significantly enough to kill the trees. The soils in the area are extremely saturated and exhibit gleying with little evidence of oxidation in the upper 15 inches. A large pasture composed of broomsedge is directly north and east of the overcup oak forest. A swamp adjacent to the east side of the overcup oak forest includes species such as water elm and overcup oak. Dead trees which appeared to be sweetgum are also located within the swamp. The edge of the swamp is composed of water locust and buttonbush in Mantachie soils with some mottling above 15 inches. At the most eastern portion of the swamp, the forest cover type could be described as a variant of Overcup Oak-Water Hickory (96) where pure overcup oak stands are present with swamp privet in the understory. A slough runs along the northern edge of the swamp. On the upland bank of the slough, southern red oak comprises the overstory; overcup oak, willow oak, and deciduous holly are also found along the slough banks. Upland areas include post oak on sandier soils.

Site 5: Site 5 is located along Hatley Creek in the more southeastern portion of the project area. Creek banks are composed of southern sugar maple with overcup oak and deciduous holly in the understory. Loblolly pine and sweetgum are found as dominants in the overstory in an area adjacent to the creek banks. Also found in the area are eastern redcedar and eastern hop-hornbeam. This area is supported on Thenas, fine sandy loam soils with no mottling. Approximately 75 feet from the banks, a gently slope in topography results in a depression where the overstory is comprised of water oak; river birch, American hornbeam, and redbud are in the understory and herbaceous species include Japanese honeysuckle. This area reveals Mantachie soils, slightly mottled in the upper 12 inches.

Due to the prevalence of Thenas soils adjacent to the creek, the area along the bank and in the floodplain for a width of 75 feet could be classified as drier than the depressed areas away from the creek which exhibit Mantachie soils with some mottling.

Site 6: Site 6 along Brandy Branch in the most eastern portion of the project area was completely cleared of vegetation and work had begun in this area. Biologists from Espey, Huston, and Associates, Inc. stated that the area had included some bogs and bottomland hardwoods that could be classified as wetlands. The acreage of wetlands cleared in this area is not known.



FORT WORTH DIST.	CORPS OF ENGINEERS	FORT WORTH, TEXAS
PHOTOGRAPHER: Marje Schlangenstein	DATE: 28 Oct 81	LOCATION: Site 4, SWEPCO South Hallsville Mine

Overcup oak forest. Note dead trees due to inundation. An egret rookery is present in the forest but has been abandoned for this season.

Figure 3

FORT WORTH DIST.	CORPS OF ENGINEERS	FORT WORTH, TEXAS
PHOTOGRAPHER: Marje Schlangenstein	DATE: 28 Oct 81	LOCATION: Site 4, SWEPCO South Hallsville Mine

In foreground, note broomsedge bluestem. The background depicts the swamp to the east of the overcup oak forest. Dead trees may be sweetgum.

Figure 4

SWF FORM 43-J
12 Jan 55

FORT WORTH DIST.	CORPS OF ENGINEERS	FORT WORTH, TEXAS
PHOTOGRAPHER: Marje Schlangenstein	DATE: 28 Oct 81	LOCATION: Site 4, SWEPCO South Hallsville Mine

This picture was taken to illustrate flood debris in areas adjacent to the swamp.

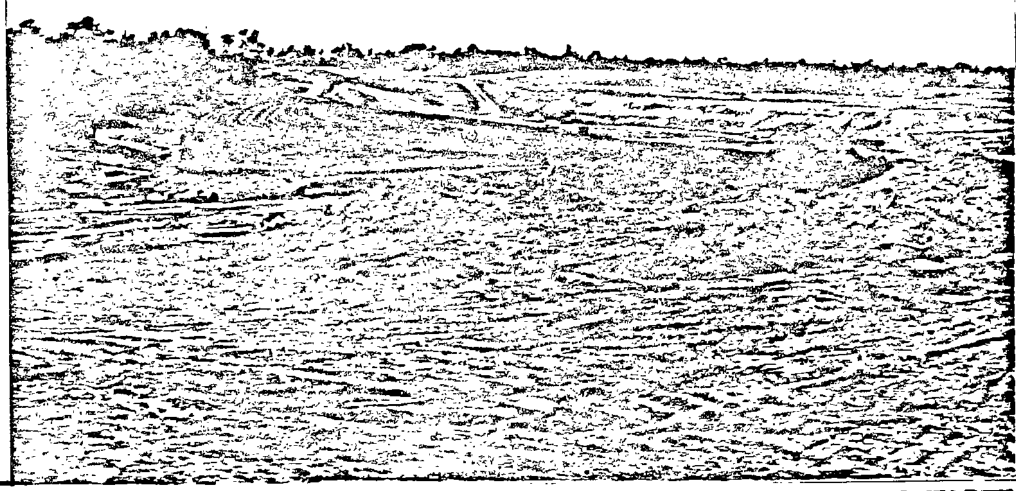
Figure 5

FORT WORTH DIST.	CORPS OF ENGINEERS	FORT WORTH, TEXAS
PHOTOGRAPHER: Marje Schlangenstein	DATE: 26 Oct 81	LOCATION: Site 6, SWEPCO South Hallsville Mine Site

Illustrates area which was cleared along Brandy Branch prior to field investigation.

Figure 6

SWF FORM 43-J
12 Jan 55



FORT WORTH DIST. CORPS OF ENGINEERS FORT WORTH, TEXAS

PHOTOGRAPHER:
Marje Schlangenstein

DATE:
26 Oct 81

LOCATION:
Site 6, SWEPCO South Hallsville Mine

Same as Figure 6

Figure 7

FORT WORTH DIST. CORPS OF ENGINEERS FORT WORTH, TEXAS

PHOTOGRAPHER:
Marje Schlangenstein

DATE:
26 Oct 81

LOCATION:
Site 6, SWEPCO South Hallsville Site

Brandy Branch off of the project area depicting vegetation similar to that cleared (see Figures 6 and 7)

Figure 8

SWF FORM 43-J
12 Jan 55

APPENDIX B

INDEX OF PLANTS CONTAINED IN THIS REPORT

alder	*Alnus* sp.
American beautyberry	*Callicarpa americana*
American hornbeam	*Carpinus caroliniana*
bitternut hickory	*Carya cordiformis*
blackjack oak	*Quercus marilandica*
black willow	*Salix nigra*
broomsedge bluestem	*Andropogon virginicus*
buttonbush	*Cephalanthus occidentalis*
deciduous holly	*Ilex decidua*
dwarf palmetto	*Sabal minor*
eastern hop-hornbeam	*Ostrya virginiana*
eastern redcedar	*Juniperus virginiana*
green briar	*Smilax rotundifolia*
Japanese honeysuckle	*Lonicera japonica*
lizard tail	*Saururus cernuus*
loblolly pine	*Pinus taeda*
mockernut hickory	*Carya tomentosa*
overcup oak	*Quercus lyrata*
paspalum	*Paspalum* sp.
peppervine	*Ampelopsis arborea*
post oak	*Quercus stellata*
redbud	*Cercis canadensis*
river birch	*Betula nigra*
smartweed	*Persicaria hydropiperoides*
southern red oak	*Quercus falcata*
southern sugar maple	*Acer barbatum*
swamp privet	*Forestiera acuminata*
sweetgum	*Liquidambar styraciflua*
water elm	*Planera aquatica*
water hickory	*Carya aquatica*
water locust	*Gleditsia aquatica*
water oak	*Quercus nigra*
water willow	*Decodon verticillatus*
wax myrtle	*Myrica* sp.
willow oak	*Quercus phellos*

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