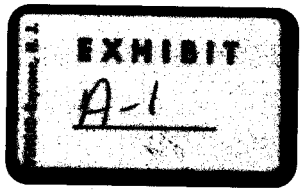
Transcript Exhibit(s)

Docket #(s): L-00000V-00-0106-00000

Exhibit # : A1, A2, A3, A4, A5,



GILA BEND POWER PARTNERS, L.L.C.

NEW APPLICATION

RECEIVED
2000 SEP -7 P 3:20
AZ CORP COMMISSION
DOCUMENT CONTROL

September 1, 2000

Ms. Deborah Scott
Director, Utilities Division
Arizona Corporation Commission
1200 West Washington Street
Phoenix, Arizona 85007

RE: Gila Bend Power Project

Dear Ms. Scott:

Gila Bend Power Partners L.L.C. is pleased to provide 25 copies of its Application for a Certificate of Environmental Compatibility (CEC). This CEC Application is for the Gila Bend Power Project proposed to be located in the Town of Gila Bend, in Maricopa County, Arizona.

Our check for $10,000, as required by A.R.S. § 40-360.09, is enclosed.

If we can be of assistance to the Power Plant and Transmission Line Siting Committee with respect to this Application please contact Karen Peters of Squire, Sanders & Dempsey at (602) 528-4041.

Very truly yours,

GILA BEND POWER PARTNERS, L.L.C.

By: Sammons Power Development, Inc., Managing Member

By: _____
John Washburn
Authorized Representative

Encl: 25 copies of the CEC Application
Check for $10,000
Docket Cover Sheet

5949 Sherry Lane, Suite 1880
Dallas, Texas 75225
(214) 210-5080 Fax (214) 210-5079

NEW APPLICATION

BEFORE THE POWER PLANT AND

TRANSMISSION LINE SITING COMMITTEE

RECEIVED
2000 SEP -7 P 3:20
AZ CORP COMMISSION
DOCUMENT CONTROL

In the matter of the Application of Gila Bend Power Partners, L.L.C., or their assignee(s), in conformance with the requirements of Arizona Revised Statutes 40-360.01 *et seq.*, for a Certificate of Environmental Compatibility authorizing construction of a natural gas-fired, combined cycle generating plant, switchyard, and related facilities in the Town of Gila Bend, Maricopa County, Arizona located in the southwest quarter of Section 19, Township 5 South, Range 5 West, Gila and Salt River Base and Meridian.	)	CASE NO. _____ DOCKET NO. L-00000V-00-0106

APPLICATION FOR A CERTIFICATE OF ENVIRONMENTAL COMPATIBILITY

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INTRODUCTION

Gila Bend Power Partners L.L.C. (the "Applicant") proposes to develop, own, and operate the Gila Bend Power Project, a nominal 845 megawatt (mW) natural gas-fired, combined cycle power plant (the "Project") to be located in a recently-annexed portion of the town of Gila Bend, in Maricopa County, Arizona. The Applicant requests a Certificate of Environmental Compatibility ("CEC") in order to proceed with the Project.

The Project will be operated as a "merchant" power plant. As such, it will sell power on the wholesale electricity market, and customers will purchase the power on a voluntary, wholesale basis. All economic costs of the Project will be borne by Gila Bend Power Partners L.L.C.

The Project will be fueled by natural gas transported to the plant site by an El Paso Natural Gas Company pipeline. The proposed facility will consist of the power plant and onsite supporting infrastructure, including a control/administration building, water treatment and handling facilities, cooling towers and a switchyard. The source of water for the proposed facility will be local groundwater. The groundwater wells are located on the Applicant's property.

Figures 1 and 2 show the site layout for the Project. Topographic maps showing the site location are provided in Exhibit A. An artist's rendering and a photosimulation of the Project are provided in Exhibit G.

This application includes evaluations of relevant environmental matters associated with the Project and outlines potential impacts and mitigation measures associated with the Project. Environmental studies are provided in Exhibits B through I. These studies include a Prevention of Significant Deterioration and Title V Air Permit Application and associated analyses, Groundwater Assessment, Wetlands and Waters Assessment, Biological Resource studies including a Pygmy Owl Survey, Noise Assessment, Cultural Resource Assessment, Scenic Area Assessment and Land Use Evaluation. These evaluations conclude that no significant environmental impacts will result from the Project.

Interconnection with the Western States Coordinating Council transmission grid will be completed by a regional utility company and is not requested by the Applicant in this filing.

The proposed Project will not cause any significant direct, indirect, or cumulative adverse effects on land use, cultural resources, visual resources, wilderness areas, biological resources including special interest wildlife or plant species, socioeconomics, air quality, groundwater or surface water quality, or noise levels.

In addition to providing a safe, reliable, and clean source of electricity, the Project will provide a short term economic benefit derived from the construction workforce. There will be a continuing benefit from the creation of approximately thirty full-time jobs. The Project also will provide significant increases in contributions to the tax base, a significant portion of which can be used for area education and school improvements.

APPLICATION FOR A CERTIFICATE OF ENVIRONMENTAL COMPATIBILITY

1. Name and Address of the Applicant:

Name: Gila Bend Power Partners L.L.C.
Address: 5949 Sherry Lane, Suite 1880 Dallas, TX *75225*

2. Name, Address, and Telephone Number of a Representative of the Applicant:

Name: Mr. Robert C. Walther, President
Industrial Power Technology
Address: 2227 Capricorn Way, Suite 101 Santa Rosa, CA 95407
Phone: (707) 528-8900
Fax: (707) 528-8901
E-mail: rcwalther@aol.com

3. State Each Date on which Applicant has Filed a Ten-Year Plan:

Legislation enacted in 1998 (Laws 1998, Ch. 209, § 27) eliminated the requirement of a 10-year plan for contemplated construction of generating facilities.

4. Description of the Proposed Facilities:

4.a.i. Type of Generating Facilities:

The Gila Bend Power Project (the "Project") is a natural gas-fired, combined-cycle electric generating plant. The Project will use three advanced-technology, high-efficiency combustion gas turbines (CGTs) in a combined cycle design producing a nominal 845 mW. The Project incorporates the CGT generator sets with three heat recovery steam generators (HRSGs) and a single steam turbine generator (STG) deriving from a single steam header manifold from the three HRSGs. The steam output will be augmented by duct burners. The Project design will include power islands, a switchyard, control and administrative buildings, water-cooled condensers with mechanical draft cooling towers, storage tanks, and other ancillary facilities.

A preliminary project configuration depicting the location of the Project site, access roads, and associated evaporation and storm water ponds is included as Figure 1. The supporting infrastructure includes vehicular access, water supply system, natural gas supply lines, intra-plant transmission, and a switchyard. Access to the Project site will be from the east utilizing an access road extending from Watermelon Road at the intersection of Citrus Valley Road, across the Applicant's property.

The combustion turbines use state-of-the-art technology to burn clean natural gas efficiently with reduced nitrogen oxide emissions relative to other generation options. Emissions control technologies will be used to ensure compliance with air quality regulations. The Project will meet and in most cases exceed EPA standards for emissions.

4.a.ii. Number and Size of Proposed Units:

The Project will be nominally rated at 845 mW, using three combustion turbines and one steam turbine. The Project's major components are shown on Figure 2 and include the following:

- site improvements, foundations, buildings, and structures
- three evaporative inlet air coolers
- three natural gas-fired combustion turbine electric generators (nominal 170 mW) with dry low nitrogen oxide combustors
- three heat recovery steam generators with duct burners
- three selective catalytic reduction units
- three approximately 165-foot-tall exhaust stacks
- one condensing steam turbine electric generator (nominal 335 mW)
- one water-cooled condenser
- two 12-cell mechanical draft-cooling towers
- water handling and wastewater treatment facilities
- natural gas handling system with compression
- switchyard and interconnection facilities
- automated instrumentation and control systems
- emergency diesel-fueled firewater pump engine
- emergency diesel-fueled electric generator

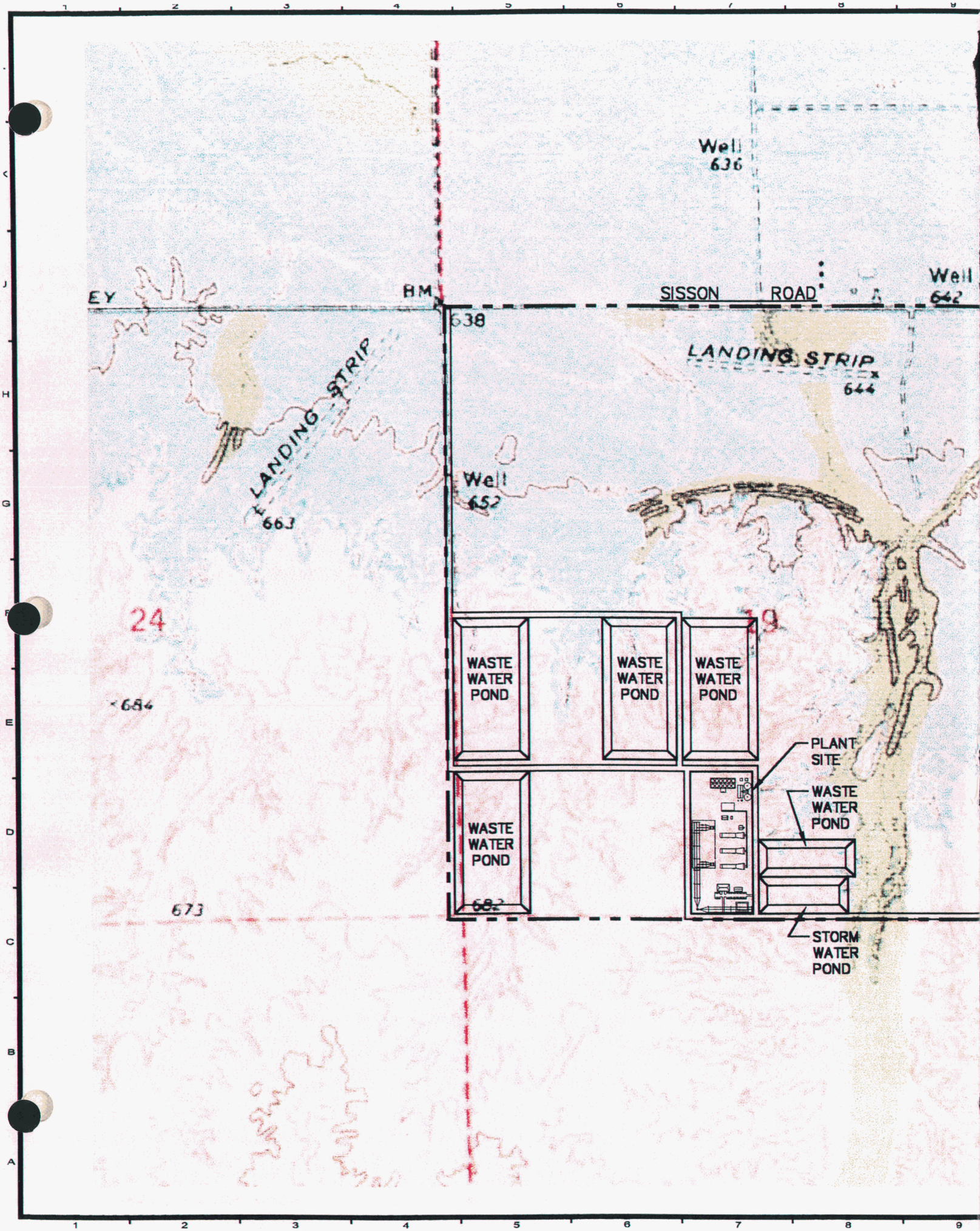
The following is a brief description of the Project's cycle and related systems. A process flow diagram is provided as Figure 3; a depiction of a combined cycle plant configuration is provided as Figure 4.

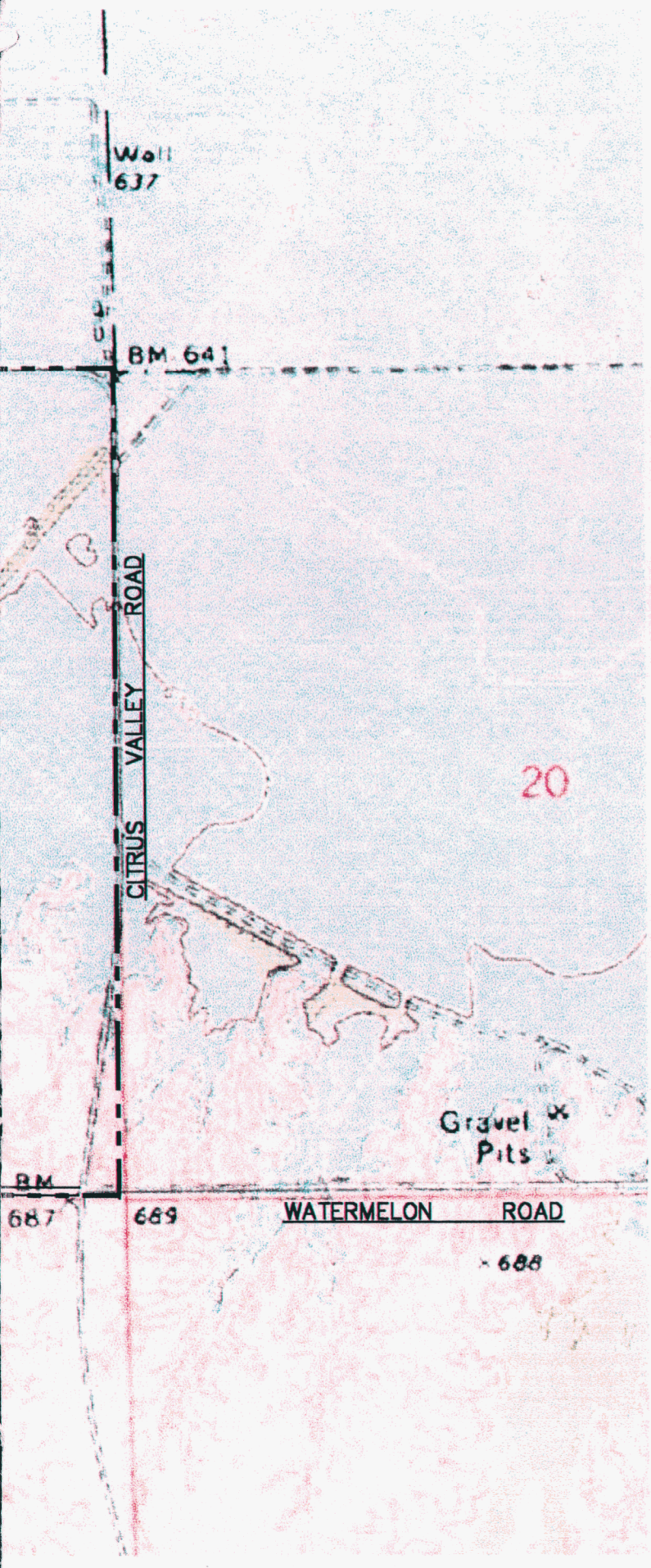
Combustion Turbine Generator (CTG)

The combustion turbine converts the thermal energy produced by the combustion of natural gas into mechanical energy which in turn drives the generator and combustion turbine compressor. Air is compressed in the combustion turbine and then combined with natural gas. This air-fuel mixture is then burned in the turbine combustors. The hot gases from the combustion process are expanded through a turbine, which in turn spins an electric generator to produce electricity. Exhaust gas from the combustion turbine generators is then routed through ducting to an HRSG, which is a boiler designed to recover the heat from the exhaust gas and use this heat to generate steam. The HRSG substantially removes the remaining heat in the gas and exhausts the residual through a stack. The HRSG will have duct burners installed to augment steam production. Each exhaust stack will contain

FIGURE 1

PRELIMINARY PROJECT CONFIGURATION


Well
636
EY
BM
SISSON ROAD
Well
642
638
LANDING STRIP
644
LANDING STRIP
663
Well
652
24
684
WASTE WATER POND
WASTE WATER POND
WASTE WATER POND
PLANT SITE
WASTE WATER POND
WASTE WATER POND
673
STORM WATER POND



INDUSTRIAL POWER TECHNOLOGY
2227 CAPRICORN WAY SUITE 101
SANTA ROSA, CALIFORNIA 95407
TEL: 707-528-8900/FAX: 707-528-8901

No.	Revisions	Date

GILA BEND POWER PROJECT

PRELIMINARY PROJECT CONFIGURATION

TS DESIGN	SS DRAWN	RW ENG.

Job Number: 147100
Date: 8/30/00

Sheet Number
Figure-1
1 of 1 sheets

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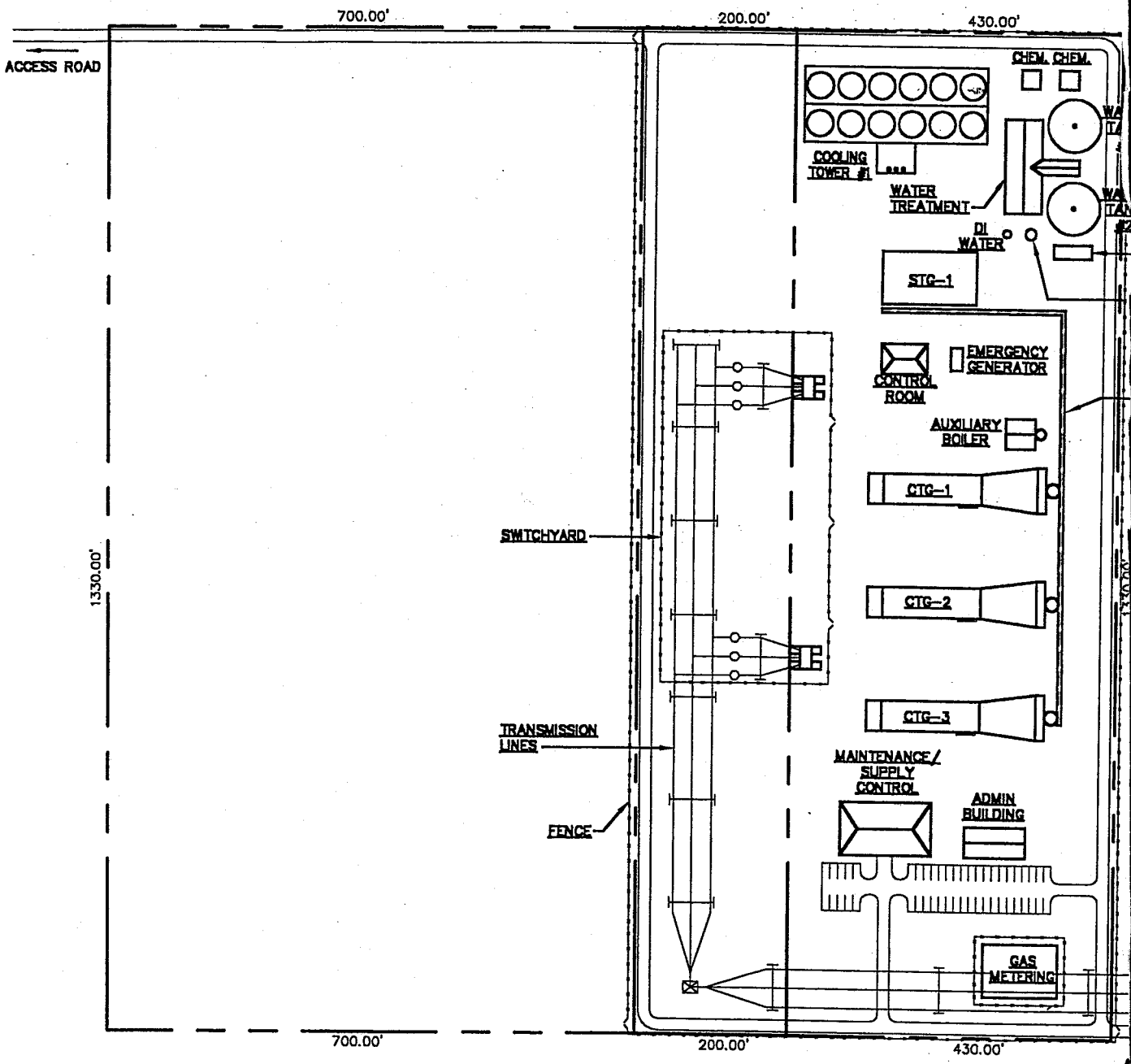
FIGURE 2

PRELIMINARY SITE LAYOUT


700.00'
200.00'
430.00'
ACCESS ROAD
CHEM. CHEM.
COOLING TOWER #1
WATER TREATMENT
DI WATER
STG-1
CONTROL ROOM
EMERGENCY GENERATOR
AUXILIARY BOILER
CTG-1
CTG-2
CTG-3
SWITCHYARD
TRANSMISSION LINES
FENCE
MAINTENANCE / SUPPLY CONTROL
ADMIN BUILDING
GAS METERING
1330.00'
700.00'
200.00'
430.00'

INDUSTRIAL POWER TECHNOLOGY
2227 CAPRICORN WAY SUITE 101
SANTA ROSA, CALIFORNIA 95407
TEL: 707-528-8900/FAX: 707-528-8901

COOLING TOWER:	240'x100'x50'
CTG 1-3:	250'x60'x55'
CTG STACK:	18' DIA.x165'
AUX. BOILER BLDG.:	40'x40'x20'
AUX. BOILER STACK:	45'x31"
WATER TANK:	70' DIA.x40'
WATER TREATMENT BLDG.:	125'x50'x20'
CONTROLS ROOM:	40'x60'x20'
STG 1:	125'x70'x30'
MAINT./SUPPLY CONTROL:	120'x60'x30'
ADMIN. BLDG.:	80'x40'x25'
COOLING WATER TANK:	15' DIA.x15'
DI WATER TANK:	10' DIA.x10'

- DIESEL FIRE PUMP
- COOLING WATER TANK
- PIPE RACK W/CATWALK ABOVE

TO PALO VERDE SATELLITE SWITCHYARD

ACCESS ROAD

WIND ROSE

NORTH

0 100 200 400

SCALE: 1"=200'-0"

No.	Revisions	Date

GILA BEND POWER PROJECT

PRELIMINARY SITE LAYOUT

DESIGN DRAWN ENG.

Job Number: 147100

Date: 8/30/00

Sheet Number

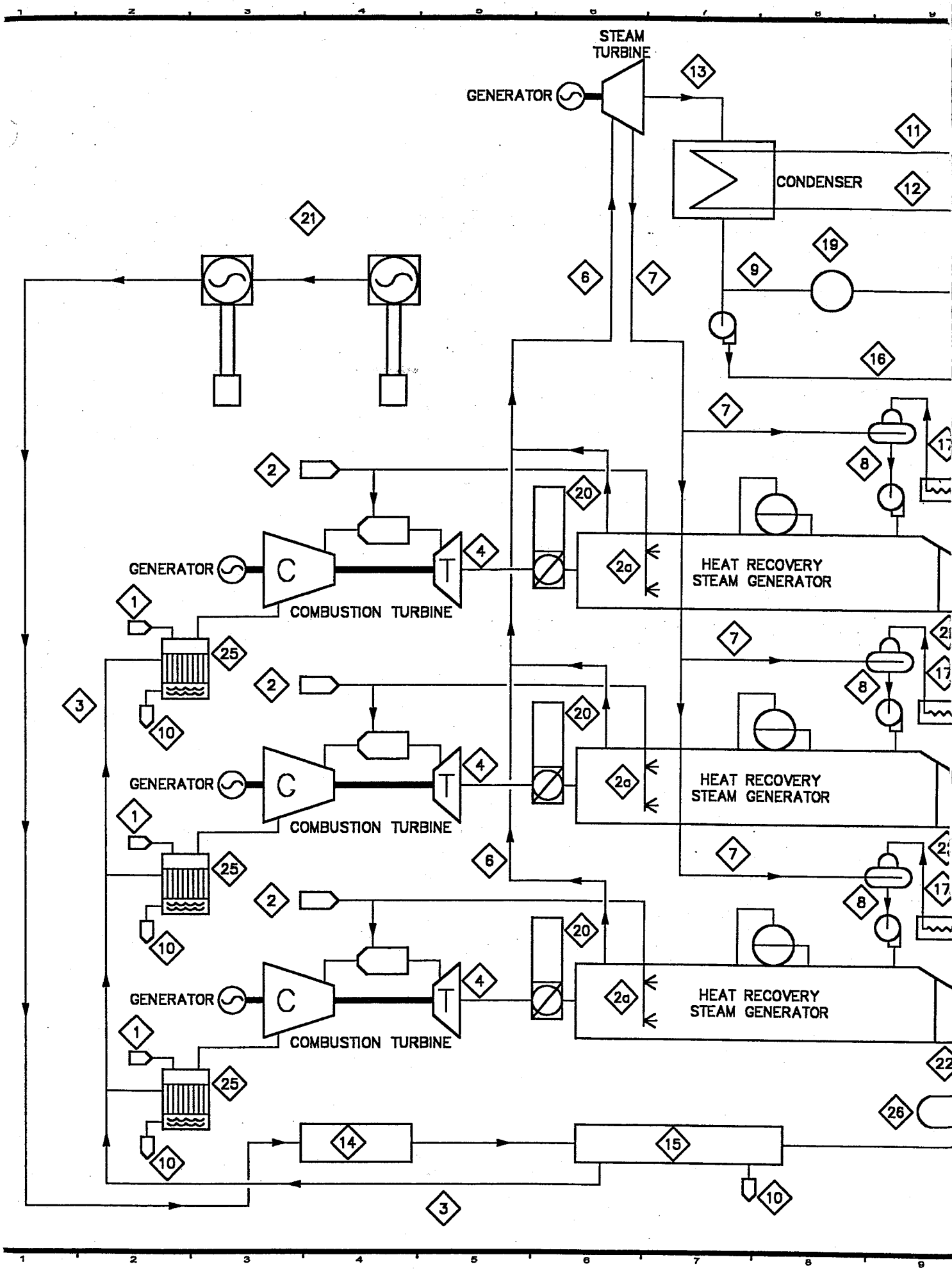
Figure-2

1 of 1 sheets

20000830.103008

FIGURE 3

PROCESS FLOW DIAGRAM


STEAM TURBINE
GENERATOR
CONDENSER
HEAT RECOVERY STEAM GENERATOR
HEAT RECOVERY STEAM GENERATOR
HEAT RECOVERY STEAM GENERATOR
GENERATOR
C
T
COMBUSTION TURBINE
GENERATOR
C
T
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1
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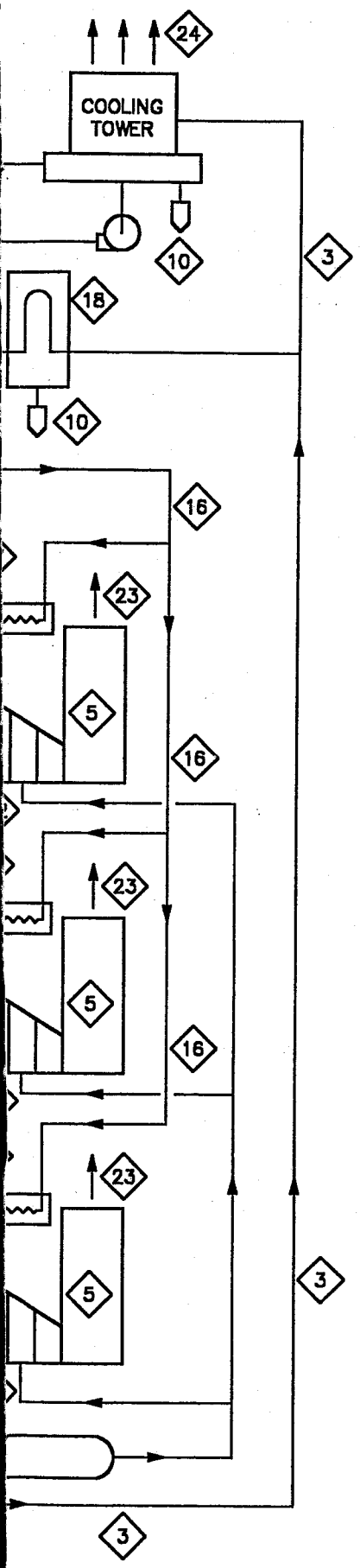

1. COMBUSTION TURBINE INLET AIR
2. COMBUSTION TURBINE FUEL
2a. DUCT BURNER
3. WATER PRIMARY TREATED
4. COMBUSTION TURBINE EXHAUST
5. HRSG STACK EXHAUST
6. HIGH PRESSURE STEAM FROM HSRG
7. DEAREATOR LOW PRESSURE STEAM
8. FEEDWATER AFTER DEAREARATOR
9. MAKE UP WATER
10. BLOWDOWN/WASTE WATER TO EVAPORATION PONDS
11. CONDENSER COOLING WATER IN
12. CONDENSER COOLING WATER OUT
13. STEAM TURBINE EXHAUST
14. RAW WATER TANKS
15. PRIMARY WATER TREATMENT
16. FEED WATER BEFORE FEED WATER HEATER
17. FEED WATER AFTER FEED WATER HEATER
18. RO SYSTEM
19. DI WATER STORAGE
20. EMERGENCY BY--PASS
21. DEEP WATER WELLS
22. SCR SECTION
23. FLUE GAS
24. COOLING TOWER EVAPORATION
25. INTAKE AIR EVAPORATIVE COOLER
26. AQUEOUS AMMONIA SYSTEM

INDUSTRIAL POWER TECHNOLOGY
2227 CAPRICORN WAY SUITE 101
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TEL: 707-528-8900/FAX: 707-528-8901

No.	Revisions	Date

GILA BEND POWER PROJECT

PROCESS FLOW DIAGRAM

TS	SS	RW
DESIGN	DRAWN	ENG.

Job Number: 147100
Date: 8/30/00

Sheet Number
Figure-3
1 of 1 sheets

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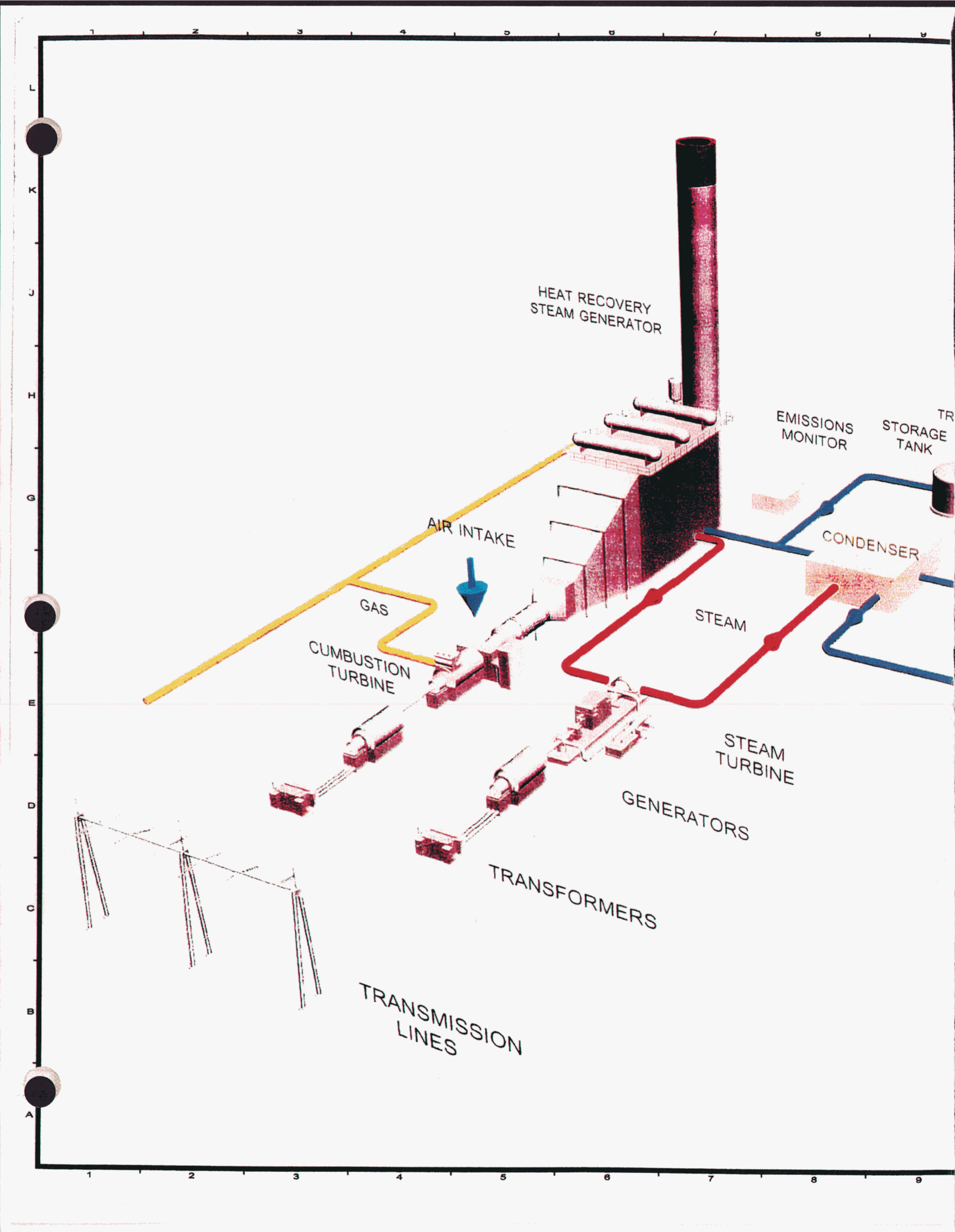
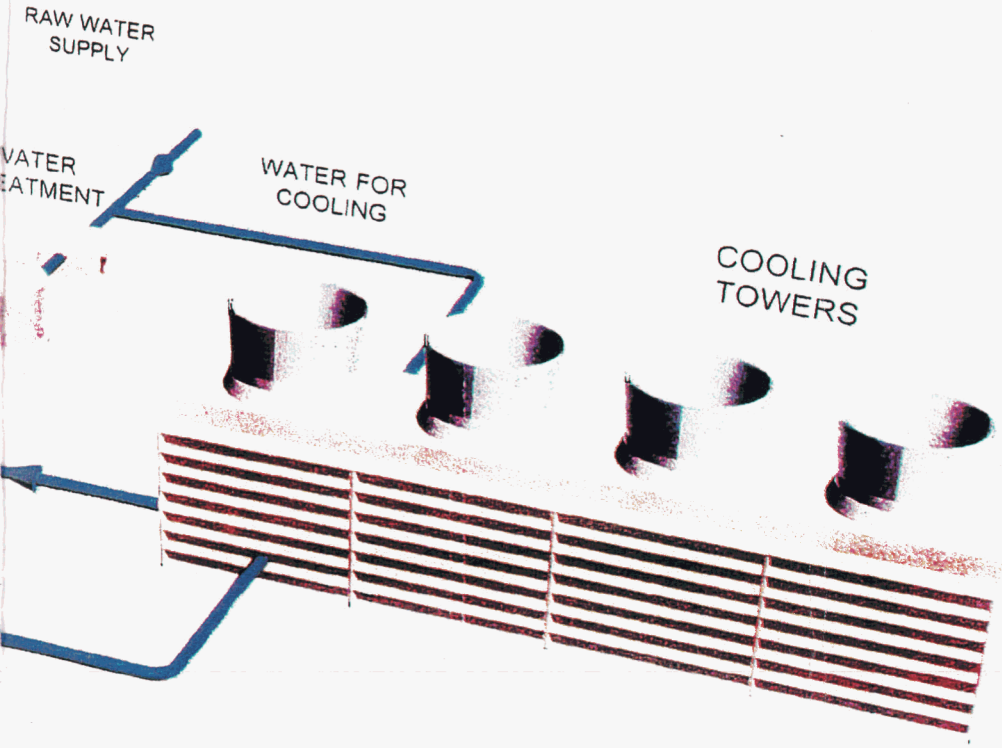
FIGURE 4

COMBINED CYCLE PLANT CONFIGURATION


HEAT RECOVERY
STEAM GENERATOR
EMISSIONS
MONITOR
STORAGE
TANK
AIR INTAKE
CONDENSER
GAS
STEAM
CUMBUSTION
TURBINE
STEAM
TURBINE
GENERATORS
TRANSFORMERS
TRANSMISSION
LINES



COMBINED CYCLE PLANT CONFIGURATION

INDUSTRIAL POWER TECHNOLOGY
2227 CAPRICORN WAY SUITE 101
SANTA ROSA, CALIFORNIA 95407
TEL: 707-528-8900/FAX: 707-528-8901

No.	Revisions	Date

GILA BEND
POWER PROJECT

COMBINED CYCLE
PLANT CONFIGURATION

TS	SS	RW
DESIGN	DRAWN	ENG.

Job Number: 147100
Date: 8/30/00

Sheet Number
Figure-4
1 of 1 sheets

20000831.160557

continuous emission monitors (CEM) to ensure that air emission standards are not exceeded.

Auxiliary systems required for combustion turbine operation include inlet air filters, inlet air evaporative coolers, oil lubrication and cooling systems, fuel gas delivery, pre-heat and ignition system, fire protection, sound reduction equipment, and instrumentation/control devices.

Heat Recovery Steam Generator (HRSG)

The HRSG transfers heat from combustion turbine exhaust gases to feedwater to produce steam for the steam turbine operation. The HRSG is designed and constructed to operate at the maximum exhaust gas flow and temperature ranges of the combustion turbine. The HRSG also is designed for outdoor installation.

The HRSG consists of a condensate pre-heater, a low-pressure section, an intermediate pressure section, and a high-pressure steam section. The HRSG utilizes the exhaust heat from the combustion turbines, which may be augmented by duct burners for additional capacity, to preheat the feedwater, which then passes through the pressure sections of the HRSG until the steam reaches the required temperature (i.e., 1,050°F) and pressure (i.e., 1,800 psig) for use in the steam turbine. The conditioned steam is then piped via a steam manifold and header to the STG to generate additional electricity.

Steam Turbine Generator (STG)

The final step in the combined cycle process uses a STG to produce electricity. High pressure steam from the three HRSGs is piped to the STG. The steam turns the turbine blades attached to a shaft. The shaft is attached to an electrical generator. The STG will generate approximately 335 mW.

The steam turbine package includes a lube oil system, gland condenser, automatic sealing system, and supervisory control panel. The turbine lube oil and generator are cooled via the plant's closed cooling water system.

Air Pollution Control System

The use of pipeline quality natural gas and good combustion practices will minimize nitrogen oxides (NOx), sulfur dioxide, particulate matter emissions, and volatile organic compound emissions. The emissions of NOx will be further reduced by the installation of a state-of-the-art Selective Catalytic Reduction (SCR) system, utilizing aqueous ammonia for catalytic reaction, in the exhaust stream. The project will meet or exceed all applicable air emissions requirements. A more detailed discussion of emission control equipment and emission rates is contained in Exhibit B-1.

Water Handling and Treatment Facilities

The major on-site water handling and treatment facilities include the steam system, feedwater and condensate systems, circulating water system, service water system, fire protection, make-up water treatment system, and wastewater treatment system.

The wastewater sources include the water pretreatment wastes, de-mineralized regeneration wastes, HRSG blowdown, and cooling tower blowdown. Storm water, consisting of roof and floor drains and rainfall runoff, will be sent to an on-site retention basin. Potential contaminant run-off streams will be routed to an oil/water separator before being sent to wastewater evaporation ponds. The water treatment system may include filtration, reverse osmosis (RO), and demineralization units, depending on the quality of available water. The reject stream from the RO and other treatment units will be forwarded to on-site wastewater evaporation ponds.

Fuel System

The purpose of the natural gas fuel system is to transfer, meter, filter, and regulate pressure of the natural gas main interconnection to the combustion turbine combustors. Natural gas (pipeline quality, low sulfur) will be obtained from a new natural gas main at the Project boundary. The gas will be piped underground from the Project boundary, where it will be metered, to the combustion turbine area and split to the individual combustion turbine fuel gas skids.

The natural gas system includes compression facilities and conditioning equipment to ensure that the gas delivered to the combustion turbines and the auxiliary boiler meets the CTG manufacturer's specifications concerning minimum pressures, temperatures, maximum particulate levels and entrained liquid content. Entrained particles must be kept to a minimum to prevent erosion and plugging of fuel system nozzles and sticking or jamming of control equipment.

Instrumentation and Control System

The Project will use a digital process control system suitable for use in power plants. The control interface will be located in a control/administration building on the site. The system will be a programmable control system designed to achieve maximum availability and reliability with the least staffing requirements.

Switchyard and Electrical Interconnection

The generator of each combustion turbine set is connected to the high-voltage switchyard via the generator leads and the generator step-up transformer. Unit breakers will be provided in the switchyard to connect each unit to the grid.

Auxiliary power for the generating units will be tapped from the generator leads of the combustion turbines. These taps supply power to the switchgear via the unit auxiliary transformer. A generator breaker will be provided between each generator and the tap to allow the grid to supply auxiliary power to the plant via the generator step-up transformers when the combustion turbines are not operating. The generator breaker will be used to synchronize the CTG to the grid. The plant auxiliary switchgear will be arranged so that all plant auxiliaries can be supplied from any CTG.

The STG also will be provided with a generator breaker, which will be used to synchronize the STG to the grid, but has no tap on the generator leads.

The switchyard is expected to be a conventional open-air, breaker and one-half bus design consisting of high-voltage power circuit breakers, disconnect switches, grounding switches, potential transformers, surge arresters, substation steel structures, and protective relaying equipment.

Site Improvements

Access to the Project's 120 contiguous acres will be west from Citrus Valley Road, across Applicant-owned property via a new access road. The necessary on-site roads and parking will be provided to permit normal operations, maintenance, equipment overhauls and delivery of bulk materials. The site area will be graded to route storm water to an on-site retention basin. Site security and lighting will be provided as necessary.

On-site bulk storage of critical materials will be provided to permit continued operation during certain component or system maintenance operations or material supply interruptions. Bulk storage of acid and caustic for cycle make-up, water system regeneration and waste neutralization will be provided in the Project design. Sufficient aqueous ammonia for SCR use will be stored onsite in pressurized bulk storage tanks.

4.a.iii. The Source and Type of Fuel to be Used:

The Project will use natural gas provided to the plant from an existing El Paso Natural Gas pipeline approximately 24 miles northeast of the site. A typical analysis of the natural gas that will be used is outlined on Table I.

Table I
NATURAL GAS ANALYSIS

COMPONENT	NORMALIZED PERCENT
Carbon Dioxide	0.78
Nitrogen	1.33
Methane	96.08
Ethane	1.49
Propane	0.21
Iso. Butane	0.03
Normal Butane	0.03
Iso. Pentane	0.01
Normal Pentane	0.01
Hexane & Heavier	0.03
Gallons Per Minute	0.776
BTU (standard cubic feet)	1,020
Specific Gravity	0.587

Source:
Casa Grande Compressor Station Gravitometer Analysis I.D. 05227;
El Paso Natural Gas, June 1998 to June 1999 (annual average).

4.a.iv. Amount of Fuel to be Utilized:

The Project would use the following maximum fuel quantities:

TIME PERIOD	FUEL CONSUMPTION
Daily	152 MM cu.ft.
Monthly	4,605 MM cu.ft.
Annually	55,250 MM cu.ft.

Fuel use varies with ambient air temperature, actual number of hours of combustion turbine operation, and start-up/shut-down conditions. The above is based on 73 degrees Fahrenheit, and 100% percent availability/capacity factor. The depicted fuel use would result from the ***maximum permitted operation*** of all CGT generating components and may not depict the actual operations of the plant.

4.a.v. Type of Cooling to be Utilized and the Source of any Water to be Utilized:

Type of Cooling

The Project will use evaporative or wet cooling for both the combustion turbine inlets and for circulating cooling water in the cooling towers.

Source of Water

Cooling water required for the Project would be obtained from a system of up to five groundwater supply wells. The Project would achieve a high degree of water conservation through a waste minimization matrix system. This process utilizes each water stream for its best possible use. This includes maximizing the number of cooling cycles and providing internal recycling that reduces discharge and water consumption. Supply water will be pretreated as necessary to maximize the cycles of concentration in the cooling tower.

The discharge from the process is primarily cooling tower blowdown, which is sent to wastewater evaporation ponds totaling approximately 87 acres.

4.a.vi. Proposed Height and Number of Stacks:

The Project would have three stacks each approximately 165 feet high, one for each 170 mW unit, and an approximately 95 foot high stack for the auxiliary boiler.

4.a.vii. Construction, Startup, and Operation Dates:

The anticipated schedule for the Project is to complete construction and commence commercial operation in the second quarter of 2003. In order to meet this schedule, construction would have to commence in the second quarter of 2001.

Project Construction

A primary contractor will be selected to perform the engineering, procurement, and construction for the Project. The actual construction in the field should be completed in 16 to 18 months. During this period, the construction work force will peak at approximately 300 to 400 personnel on-site. An area adjacent to the plant will be used temporarily for construction parking, work trailers, storage, and laydown areas. Water and electrical power facilities are available at the site for use during construction.

Project Operation

The proposed design of the plant allows for base load, part load, and peak load operations. The level of output of the Project will be determined by market

factors, such as the growth in energy demands and daily wholesale energy prices. The Project is designed for base load combined cycle operation. The combustion turbines can be fired in 10 to 15 minutes and reach full load output in four hours or less, depending on the ambient condition of the steam plant. The Project also can perform over a range of power output from approximately 150 to approximately 845 mW depending on the ambient temperature conditions and mode of operation. As ambient temperatures increase, evaporative coolers will be turned on to drop the air inlet temperatures close to the wet bulb temperature to maximize plant output.

The Project will include advanced control systems to monitor and control all of the plant operation systems. Approximately 35 full-time staff will perform routine operation and maintenance functions. In addition, the plant can be remotely monitored and dispatched. Some functions, including major turbine and generator maintenance, will be outsourced to other vendors.

4.a.viii. The Estimated Costs of the Proposed Facilities and Site:

The cost of the Project, including transmission interconnects, pipelines, and related facilities, is estimated to be in excess of $365 million.

4.a.ix. Legal Description of the Proposed Site:

The Project will occupy the southwest quarter of Section 19, Township 5 South, Range 5 West in the Town of Gila Bend, Maricopa County, Arizona, Gila and Salt River Base and Meridian.

4.b. Description of the proposed transmission line:

Interconnection into the Western States Coordinating Council transmission grid will be completed by a regional utility company and is not requested by the Applicant in this filing. The regional utility (or utilities) will apply for a separate Certificate of Environmental Compatibility to describe and permit the interconnecting transmission lines. This regional utility company will provide the new 500 kV transmission line to connect the Project's open-air switchyard to the grid of the new Hassayampa switchyard. The anticipated location for a new transmission line would be approximately 44 miles long, proceeding east along Watermelon Road to intersect the existing Bureau of Land Management ("BLM") designated utility corridor, then north to a point at the Kyrene Line where it will turn east paralleling the Kyrene Line to the Hassayampa Switchyard.

5. Areas of Jurisdiction

All components of the Project will be located within the Town of Gila Bend in Maricopa County. The site is located within a rural zoning district which may include farm and non-farm residential uses, public/quasi-public land uses, recreation, commercial, utilities

and educational facilities. The power generation facility will require a conditional use permit within this zoning district. The Applicant is currently working with the Town to obtain a Conditional Use Permit that will govern the Project (see Exhibit J-2). Based upon discussions with the Town, the Applicant anticipates that the Conditional Use Permit process will be initiated within the next 60 days.

6. Environmental Studies

The Applicant has engaged the services of a number of consultants to perform environmental studies for the Project. Results of the studies are presented in Exhibits B through I of this application and are summarized below. Environmental studies for the transmission line will be prepared by a regional utility that will file a separate Certificate of Environmental Compatibility application with the Power Plant and Transmission Line Siting Committee.

Air Quality Analyses

Malcolm Pirnie, Inc. ("MPI") has prepared a Clean Air Act Title V and Prevention of Significant Deterioration ("PSD") Air Permit Application on behalf of the Applicant that details the air quality analyses performed to demonstrate the Project's compliance with federal, state, and county air quality requirements. The Air Permit Application was submitted to Maricopa County on March 31, 2000 and is attached to this Application as Exhibit B-1.

The Project is classified as a new major source within the meaning of Maricopa County Air Pollution Control Regulations. The location of the Project in an attainment area requires that the Project demonstrate compliance with PSD rules. These rules require all PSD-regulated pollutants emitted by the proposed facility to be compared to the PSD significant emission levels in order to determine the applicability of PSD review. PSD requires Best Available Control Technology ("BACT") PSD for all conventional pollutants exceeding the significant emission levels. The Air Permit Application includes a BACT analysis and an ambient air quality analysis ("AAQA"). The AAQA calculates the maximum predicted impacts from emissions of nitrogen oxides (NO_x), carbon monoxide (CO), sulfur dioxide (SO_2) and particulate matter with a diameter less than or equal to ten microns (PM10) from the Project and demonstrates that the Project will comply with all applicable air quality standards. The BACT analysis identifies and evaluates available control technologies and demonstrates that the proposed pollution controls meet or exceed BACT criteria. Due to the distance of the Project from the nearest Class I area (Superstitions Wilderness Area), the Project is not expected to have any adverse impacts on Class I air quality values such as visibility.

Groundwater Assessment

Hargis + Associates, Inc. ("Hargis") conducted a Groundwater Assessment on behalf of the Applicant that calculates the impact of proposed groundwater withdrawal for the Project on the existing groundwater reservoir in the area surrounding the Project. The Groundwater Assessment is attached to this Application as Exhibit B-2. As stated above, the estimated water demand for the Project is 10,000 acre-feet per year ("AF/yr"). All of the Project's water demand will be met by groundwater pumped from wells at the site. The Groundwater Assessment considers regional geology and hydrogeology as well as water levels and groundwater quality. Existing wells also are inventoried. The Project is located in an area previously in agricultural production that also was reliant on groundwater pumping. Major flooding in 1993 curtailed agricultural use and associated groundwater pumping in much of the area. The Groundwater Assessment indicates that water levels in the area have risen since the 1970s, and that groundwater is of poor quality for domestic and most agricultural uses.

Hargis developed a conceptual hydrogeologic model for the region and simulated groundwater pumping for the Project under various scenarios. The Groundwater Assessment concludes that even under the most conservative, "worst-case" pumping scenario, groundwater withdrawals for the Project will not create excessive additional drawdown at or near the study area boundaries. The more likely scenarios modeled indicate a reasonably low level of drawdown over the 50-year useful life of the Project.

Wetlands and Waters Assessment

MPI conducted a wetlands and waters assessment to evaluate the extent and approximate boundaries of any wetlands and waters of the United States on the Project site. The assessment is attached to this Application as Exhibit B-3. Wetlands and waters were identified using the methods described in the U.S. Army Corps of Engineers Wetlands Delineation Manual (1987). The assessment identified no wetlands at the Project site, but did identify approximately 5.20 acres of jurisdictional ephemeral washes. The Applicant expects that a Clean Water Act Section 404 permit and Section 401 certification will be required prior to beginning construction activities in these arroyos on the site.

Storm Water and Industrial Wastewater Evaluation

MPI evaluated the location of the Project facilities with relation to the boundaries of the 100-year floodplain to determine the applicability of National Pollutant Discharge Elimination System ("NPDES") permit requirements. The evaluation is attached to this Application as Exhibit B-4. A NPDES multi-sector storm water permit will be required for construction of the Project, but not for the Project's operations. No NPDES permit will be required for the planned industrial wastewater evaporation ponds. The Applicant has sought written confirmation of NPDES nonapplicability for the industrial wastewater evaporation ponds from United States EPA Region IX.

Aquifer Protection Permit

The Applicant plans to utilize both stormwater and industrial wastewater evaporation ponds for the Project, as depicted on Figure 1. An Arizona Aquifer Protection Permit ("APP") from the Arizona Department of Environmental Quality ("ADEQ") will be required for this aspect of the Project. The Applicant has consulted with ADEQ regarding the necessary engineering work for the proposed evaporation ponds and plans to submit its APP application within the next 60 days.

Biological Wealth/Rare and Endangered Species

MPI prepared an assessment of the potential impacts of the Project on endangered and threatened species, based upon correspondence with state and federal wildlife agencies and on-site field surveys (See Exhibit C). Suitable habitat for endangered or threatened species is not present at the Project site, with the possible exception of the Cactus Ferruginous Pygmy Owl. No designated or critical habitat for endangered or threatened species occurs in the area. A survey for the Cactus Ferruginous Pygmy Owl was conducted which indicated that the owls do not utilize the site. Potential impacts on migration habitat for the Southwestern Willow Flycatcher will be minimized by relocation of a wash and associated riparian vegetation on the site.

Biological Resources

MPI prepared an inventory of plant and animal life at or near the Project Site by conducting on-site field surveys and consulting other references. A listing is set forth in Exhibit D to this Application. Impacts to wildlife populations in the Project area are expected to be minimal. In addition, construction will not impact unique vegetation and wildlife corridors will not be affected.

Scenic Areas

MPI prepared an assessment of the inherent aesthetics of the landscape, the public value of viewing the landscape, and sensitivity to visual effects of the Project, which is attached as Exhibit E-1 to this Application. The overall scenic quality of the Project area is characterized as nondistinctive. The closest population center is approximately five miles southeast of the Project area, at the town center of Gila Bend. Planned land use to the south of the Project site includes a solid waste landfill and no nearby residential or commercial development is expected in the foreseeable future. Therefore, visual impacts are expected to be minimal. An artist's rendering of the Project and photosimulation of the Project are provided as Exhibits G-1 and G-2, respectively.

Cultural Resources

An assessment of cultural resources in the Project area was prepared by Archaeological Consulting Services, Ltd. and is attached to this Application as Exhibit E-2. Prior research and maps for the area were reviewed, which indicate that there is little potential

that construction of the Project will disturb significant prehistoric archaeological sites. Some potential for discovery of historic resources exists. The assessment recommends a survey of the area to confirm and protect any significant remains. The Applicant intends to complete such a survey in conjunction with preconstruction activities.

Land Use Evaluation

A study of existing and planned land uses in the vicinity of the Project was prepared by Environmental Planning Group (EPG). The study is attached to this Application as Exhibit H. EPG reviewed maps, aerial photographs and plan documents and conducted field reconnaissance in preparation of the land use study. Generally, the Project site and vicinity is a combination of undeveloped desert and inactive farmland. The Project does not conflict with existing or future land uses.

Noise Impact Study

Industrial Power Technology ("IPT") analyzed potential noise emissions from operations at the Project, using data derived from existing combined-cycle generation plants using similar or identical equipment and layout. This report is attached to this Application as Exhibit I. IPT calculated the attenuation of sound between the Project and the closest residential receptor and concluded that during full load operation, no noise impacts could be discerned by the nearest receptor. In addition, no interference with communication signals will be caused by the Project.

Conclusion and Recommendation

The studies performed indicate that the Project will have minimal adverse impacts to land use, wildlife and plant life including endangered or threatened species, recreation, visual resources, water resources, cultural resources, air quality, water and groundwater quality, noise levels, and the total environment of the area. The Project will have a beneficial economic impact in the Town of Gila Bend in terms of increased tax base and employment. The Project also will contribute to an increased dependable supply of electric power in Arizona and southwestern region. The Applicant chose the Project site considering all of these factors and believes that the Project is environmentally compatible.

The Applicant therefore respectfully requests the Committee to issue its Certificate of Environmental Compatibility for the Project at the proposed site.

GILA BEND POWER PARTNERS, L.L.C.

By: Sammons Power Development, Inc., Managing Member

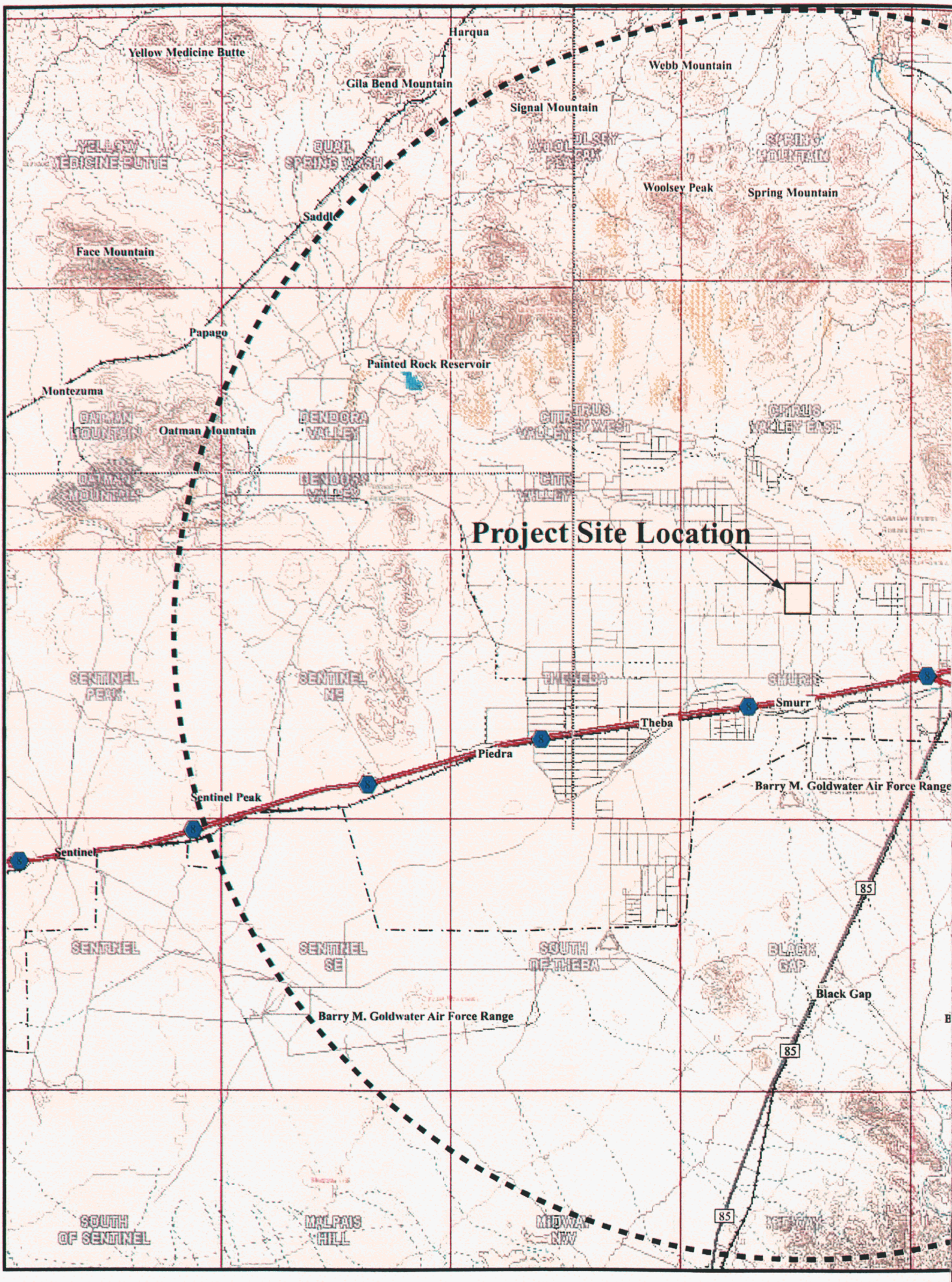
By: _____
John Washburn
Authorized Representative

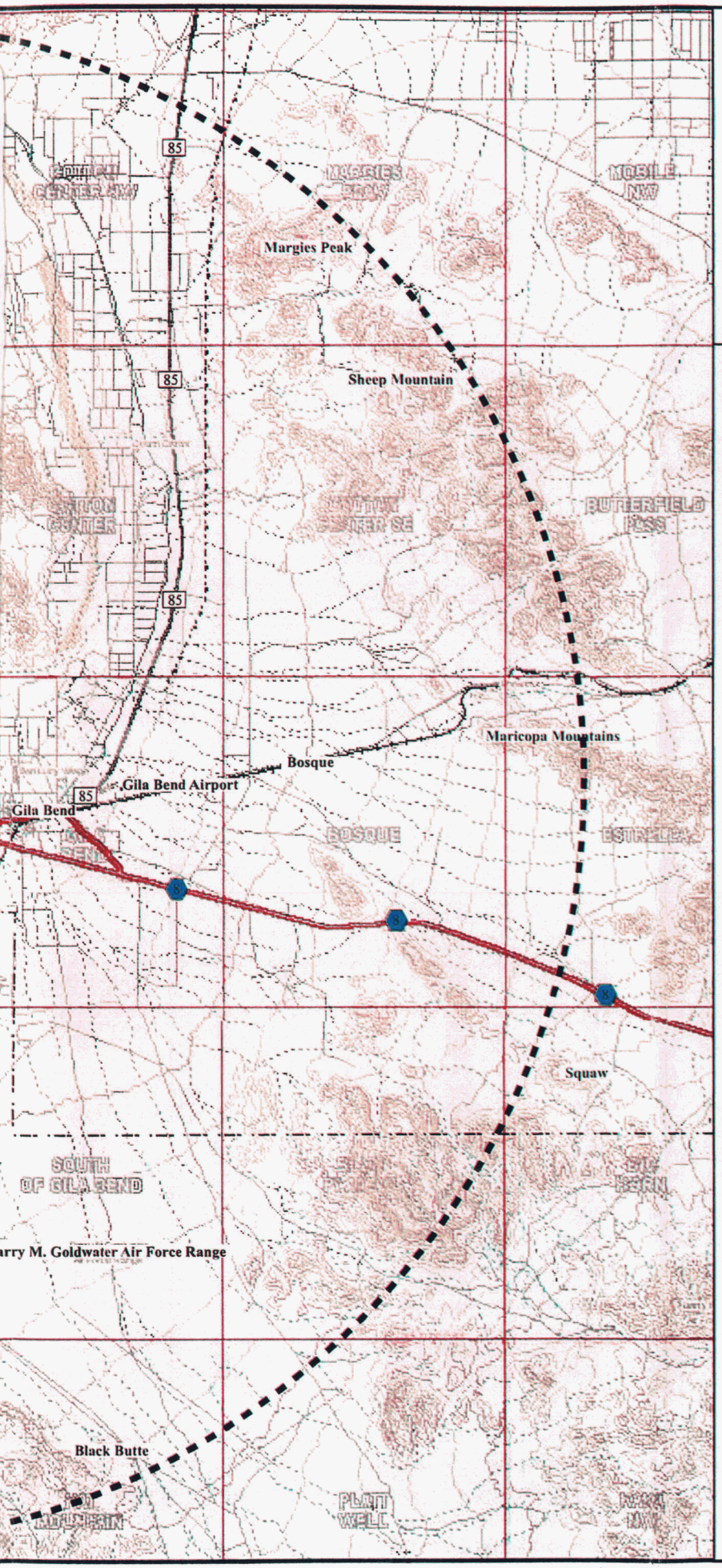
ORIGINAL and 25 copies of the foregoing hand delivered and filed with the Director of Utilities, Arizona Corporation Commission, this 7th day of September, 2000.

_____

EXHIBIT A-1

PLANT SITE AND ADJACENT AREA – 20 MILES


Harqua
Yellow Medicine Butte
Webb Mountain
Gila Bend Mountain
Signal Mountain
Woolsey Peak
Spring Mountain
Saddle
Face Mountain
Papago
Painted Rock Reservoir
Montezuma
Oatman Mountain
Project Site Location
Smurr
Theba
Piedra
Barry M. Goldwater Air Force Range
Sentinel Peak
Sentinel
Black Gap
85
Barry M. Goldwater Air Force Range
85
85



Gila Bend Power Generation Station 20-mile Radius Map Exhibit A-1

General Reference Features

- Major Arterials
- Minor Arterials
- Railroad
- Twenty Mile Radius
- Project Site Location
- Barry M. Goldwater AFB

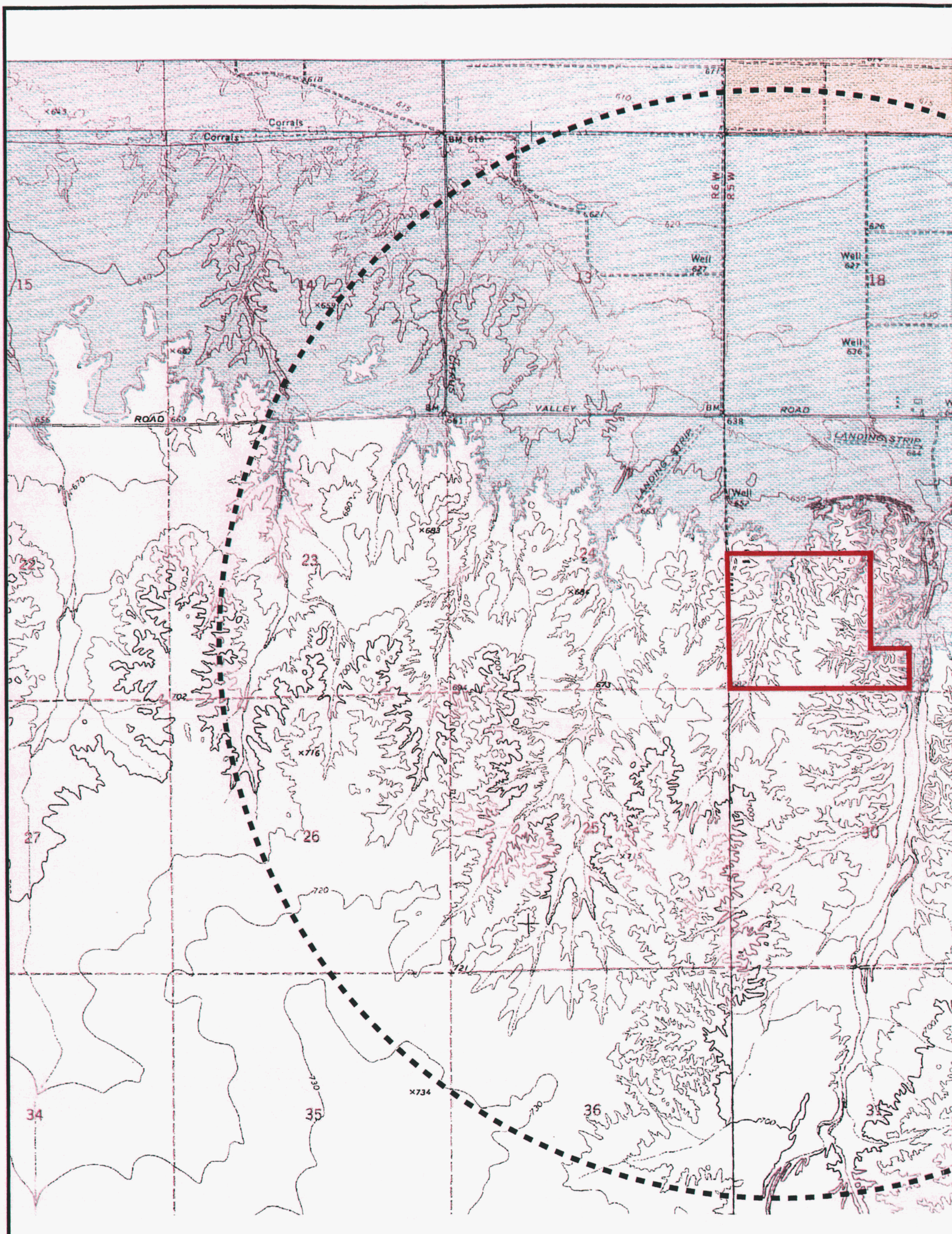
1:250000

0 4 8

Miles

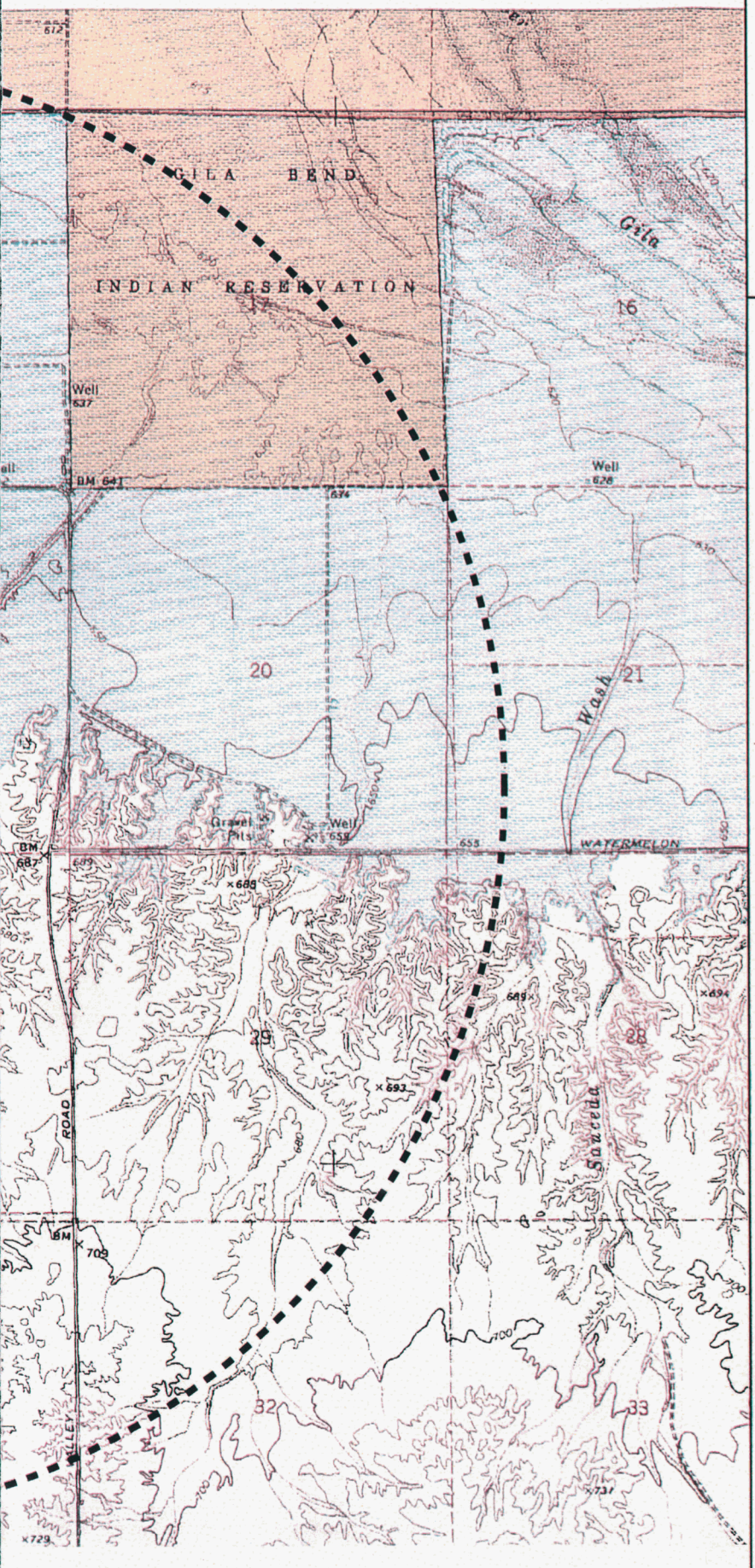
EXHIBIT A-2

PLANT SITE AND ADJACENT AREA – 2 MILES



Corrals
Corrals
BM 616
R6W
R5W
Well 627
Well 627
Well 636
15
14
13
18
ROAD
VALLEY
ROAD
LANDING STRIP
LANDING STRIP
Well
22
23
24
27
26
25
30
34
35
36
×734
×716
720
730

Gila Bend Power Generation Station 2-Mile Radius Map Exhibit A-2



General Reference Features

- Minor Arterials
- Railroad
- Two Mile Radius
- Project Site Location

0 0.5 1

Miles

EXHIBIT B-1

TITLE V AND PSD AIR QUALITY PERMIT APPLICATION

Air Quality
Permit Application

Gila Bend Power Generation Station

March, 2000

GILA BEND POWER GENERATION STATION
AIR QUALITY PERMIT APPLICATION

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GILA BEND POWER GENERATION STATION
AIR QUALITY PERMIT APPLICATION

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Reference	Description
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2	List of Insignificant Activities
3	Phase II Permit Application and Certificate of Representation
4	Emission Rate Calculations
5	BACT Analysis

LIST OF REFERENCES
(Continued)

Reference	Description
6	PSD Modeling Protocol
7	Ambient Air Quality Analysis
8	Completeness Determination Checklist

EXECUTIVE SUMMARY

This document comprises the Clean Air Act Title V and PSD Air Quality Permit Application ("Application"), as required by Maricopa County Air Pollution Control Regulations ("County Rules"), Rules 200, 210, and 240. This Application was prepared by Malcolm Pirnie, Inc. ("MPI") on behalf of Power Development Enterprises, Inc. ("PDEI") for the construction and operation of the Gila Bend Power Generation Station ("Facility").

PDEI is proposing to construct a nominal 750-megawatt combined-cycle electric power generation plant in Maricopa County. The Facility will be located approximately 70 miles southwest of Phoenix in the Town of Gila Bend, Arizona. The Facility's address is 35400 West Sisson Road, Gila Bend, Arizona 85337. The Facility will be located in an attainment area for all criteria pollutants and will be subject to the Title V and PSD regulations.

The Facility will consist of three combined-cycle combustion turbine generators ("CTGs"), three heat recovery steam generators ("HRSG"), one steam turbine, one natural gas-fired auxiliary boiler, one emergency diesel generator, one diesel fire pump, cooling towers, and ancillary equipment. The CTGs will be fired exclusively with natural gas.

This Application identifies, describes, and quantifies the regulated emission sources, including air pollution control devices. In addition, the Application references information used to determine regulatory applicability and the Facility's compliance status with the federal, state, and County requirements. The construction and operations at the Facility will comply with the applicable federal, state, and County regulations.

This Application is organized to correspond to the order in which the information requested in Appendix B (Standard Permit Application Form and Filing Instructions) of the County Rules is listed. A copy of the County's Appendix B is also included in Reference 1 of this Application.

MARICOPA COUNTY
ENVIRONMENTAL SERVICES DEPARTMENT
DIVISION OF AIR POLLUTION CONTROL

1001 N. Central Ave., Ste 201
Phoenix, AZ 85004
(602) 506-6010

STANDARD PERMIT APPLICATION FORM

(As required by A.R.S. § 49-480, and Chapter 3, Article 3, Arizona Administrative Code)

Internet Copy

1. Permit to be issued to: (Business license name of organization that is to receive permit)
   Power Development Enterprises, Inc.
2. Mailing Address: 5949 Sherry Lane, Suite 1880
   City: Dallas State: TX ZIP: 75225
3. Plant Name (if different from item #1 above): Gila Bend Power Generation Station
4. Name (or names) of Owner or Operator: Power Development Enterprises, Inc.
   Phone: (214) 210-5080
5. Name of Owner's Agent: Not Applicable
   Phone: _____
6. Plant/Site Manager or Contact Person: Robert C. Walther
   Phone: (707) 528-8900
7. Proposed Equipment/Plant Location Address: 35400 West Sisson Road
   City: Gila Bend County: MARICOPA ZIP: 85337
   Indian Reservation (if applicable): Not Applicable
   Section/Township/Range: Section 19 / Township 5S / Range 5W
   Latitude: 32 ° 58 ' 30 " Longitude: 112° 49 ' 15 " Elevation: 678 ft.
8. General Nature of Business: Electric Power Generation
   Standard Industrial Classification Code: _____
9. Type of Organization: ☑ Corporation ☐ Individual Owner ☐ Partnership
   ☐ Government Entity (Government Facility Code: _____)
   ☐ Other: _____
10. Permit Application Basis: ☑ New Source ☐ Revision ☐ Renewal of Existing Permit
    ☐ Portable Source ☐ General Permit (Check all that apply)
    For renewal or modification, include existing permit number: _____
    Date of Commencement of Construction or Modification: January, 2001
    Is any of the equipment to be leased to another individual or entity? ☐ Yes ☑ No
11. Signature of Responsible Official of Organization Robert A. [signature]
    Official Title of Signer: President
12. Typed or Printed Name of Signer: Robert A. Innamorati
    Date: 3-29-00 Phone Number: (214) 210-5080

COMPANY NAME & LOCATION Power Development Enterprises, Inc. - Gila Bend Power Generation Station, 35400 West Sisson Road, Gila Bend, AZ 85337

EMISSION SOURCES

Date 03/22/00

Estimated "Potential to Emit" as per Rule 100
Review of applications and Issuance of permits will be expedited by supplying all necessary information on this Table.

REGULATED AIR POLLUTANT DATA					EMISSION POINT DISCHARGE PARAMETERS										
EMISSION POINT (1)		CHEMICAL COMPOSITION OF TOTAL STREAM	R. AIR POLLUTANT EMISSION RATE		UTM COORDINATES OF EMISSION PT. (5)			STACK SOURCES (6)					NONPOINT SOURCES (7)	
NUMBER	NAME	REGULATED AIR POLLUTANT NAME (2)	#/ hr. (3)	TONS/ YEAR (4)	ZONE	EAST (Mtrs)	NORTH (Mtrs)	HEIGHT ABOVE GROUND (feet)	HEIGHT ABOVE STRUC. (feet)	EXIT DATA			LENGTH (ft.)	WIDTH (ft.)
										DIA. (ft.)	VEL. (fps.)	TEMP. (^{0}F)		
1	CTG1	Nox	20.000			329867.65	3650157.67	165	105	18	46.3	183		
2	CTG2 (same emission rate)	CO	50.700			329867.65	3650111.95	165	105	18	46.3	183		
3	CTG3 (same emission rate)	SO2	4.000			329867.65	3650066.23	165	105	18	46.3	183		
		VOC	2.900											
		PM10	28.000											
		PM	28.000											
		1-3 Butadiene		0.003										
		Acetaldehyde		0.574										
		Acrolein		0.056667										
		Benzene		1.004333										

GROUND ELEVATION OF FACILITY ABOVE MEAN SEA LEVEL 678 feet
ADEQ STANDARD CONDITIONS ARE 293K AND 101.3 KILOPASCALS (A.A.C. R18-2-101)

GENERAL INSTRUCTIONS:

1. Indentify each emission point with a unique number for this plant site, consistent with emission point identification used on plot plan, previous permits, and Emissions Inventory Questionnaire. Include fugitive emissions. Limit emission point number to eight (8) character spaces. For each emission point use as many lines as necessary to list regulated air pollutant data. Typical emission point names are: heater, vent, boiler, tank, reactor, separator, baghouse, fugitive, etc. Abbreviations are O.K.
2. Components to be listed include regulated air pollutants as defined in R18-2-101. Examples of typical component names are: Carbon Monoxide (CO), Nitrogen Oxides (NO_x), Sulfur Dioxide (SO_2), Volatile Organic Compounds (VOC), particulate matter (PM), particulate less than 10 microns (PM_{10}), etc. Abbreviations are O.K.
3. Pounds per hour (#/HR) is maximum potential emission rate expected by applicant.
4. Tons per year is annual maximum potential emission expected by applicant, which takes into account process operating schedule.
5. As a minimum applicant shall furnish a facility plot plan as described in the filing instructions. UTM coordinates are required only if the source is a major source or is required to perform refined modeling for the purposes of demonstrating compliance with ambient air quality guidelines.
6. Supply additional information as follows if appropriate:
   (a) Stack exit configuration other than a round vertical stack. Show lenght and width for a rectangular stack. Indicate if horizontal discharge with a note.
   (b) Stack's height above supporting or adjacent structures if structure is within 3 "stack height above the ground" of stack.
7. Dimensions of nonpoint sources as defined in R18-2-101.

COMPANY NAME & LOCATION Power Development Enterprises, Inc. - Gila Bend Power Generation Station, 35400 West Sisson Road, Gila Bend, AZ 85337

EMISSION SOURCES

Date 03/22/00

Estimated "Potential to Emit" as per Rule 100
Review of applications and issuance of permits will be expedited by supplying all necessary information on this Table.

REGULATED AIR POLLUTANT DATA					EMISSION POINT DISCHARGE PARAMETERS										
EMISSION POINT (1)		CHEMICAL COMPOSITION OF TOTAL STREAM	R. AIR POLLUTANT EMISSION RATE		UTM COORDINATES OF EMISSION PT. (5)			STACK SOURCES (6)					NONPOINT SOURCES (7)	
NUMBER	NAME	REGULATED AIR POLLUTANT NAME (2)	#/ hr. (3)	TONS/ YEAR (4)	ZONE	EAST (Mtrs)	NORTH (Mtrs)	HEIGHT ABOVE GROUND (feet)	HEIGHT ABOVE STRUC. (feet)	EXIT DATA DIA. (ft.)	EXIT DATA VEL. (fps.)	EXIT DATA TEMP. (°F)	LENGTH (ft.)	WIDTH (ft.)
1	CTG1	Ethylbenzene		0.172				165		18	46.3	183		
2	CTG2 (same emission rate)	Formaldehyde		5.195				165		18	46.3	183		
3	CTG3 (same emission rate)	Naphthalene		1.004333				165		18	46.3	183		
		NDMA		0.001667										
		NMOR		0.001667										
		PAHs		1.291333										
		Propylenen Oxide		0.208										
		Toluene		0.932667										
		TMA		0.001333										
		Xylenes		0.193667										

GROUND ELEVATION OF FACILITY ABOVE MEAN SEA LEVEL 678 feet
ADEQ STANDARD CONDITIONS ARE 293K AND 101.3 KILOPASCALS (A.A.C. R18-2-101)

GENERAL INSTRUCTIONS:

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4. Tons per year is annual maximum potential emission expected by applicant, which takes into account process operating schedule.
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6. Supply additional information as follows if appropriate:
   (a) Stack exit configuration other than a round vertical stack. Show lenght and width for a rectangular stack. Indicate if horizontal discharge with a note.
   (b) Stack's height above supporting or adjacent structures if structure is within 3 "stack height above the ground" of stack.
7. Dimensions of nonpoint sources as defined in R18-2-101.

COMPANY NAME & LOCATION Power Development Enterprises, Inc. - Gila Bend Power Generation Station, 35400 West Sisson Road, Gila Bend, AZ 85337

EMISSION SOURCES

Date 03/22/00

Estimated "Potential to Emit" as per Rule 100
Review of applications and Issuance of permits will be expedited by supplying all necessary information on this Table.

REGULATED AIR POLLUTANT DATA					EMISSION POINT DISCHARGE PARAMETERS										
EMISSION POINT (1)		CHEMICAL COMPOSITION OF TOTAL STREAM	R. AIR POLLUTANT EMISSION RATE		UTM COORDINATES OF EMISSION PT. (5)			STACK SOURCES (6)					NONPOINT SOURCES (7)	
NUMBER	NAME	REGULATED AIR POLLUTANT NAME (2)	#/ hr. (3)	TONS/ YEAR (4)	ZONE	EAST (Mtrs)	NORTH (Mtrs)	HEIGHT ABOVE GROUND (feet)	HEIGHT ABOVE STRUC. (feet)	EXIT DATA DIA. (ft.)	EXIT DATA VEL. (fps.)	EXIT DATA TEMP. (^{0}F)	LENGTH (ft.)	WIDTH (ft.)
4	Auxiliary Boiler	Nox	3.110			329873.09	3650043.5	95	75	2	35.0	450		
		CO	3.950											
		SO2	0.030											
		VOC	0.420											
		PM10	0.260											
		PM	0.260											
		Formaldehyde		0.008										
		Hexane		0.201										

GROUND ELEVATION OF FACILITY ABOVE MEAN SEA LEVEL 678 feet
ADEQ STANDARD CONDITIONS ARE 293K AND 101.3 KILOPASCALS (A.A.C. R18-2-101)

GENERAL INSTRUCTIONS:

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2. Components to be listed include regulated air pollutants as defined in R18-2-101. Examples of typical component names are: Carbon Monoxide (CO), Nitrogen Oxides (NO_x), Sulfur Dioxide (SO_2), Volatile Organic Compounds (VOC), particulate matter (PM), particulate less than 10 microns (PM_{10}), etc. Abbreviations are O.K.
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4. Tons per year is annual maximum potential emission expected by applicant, which takes into account process operating schedule.
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   (a) Stack exit configuration other than a round vertical stack. Show lenght and width for a rectangular stack. Indicate if horizontal discharge with a note.
   (b) Stack's height above supporting or adjacent structures if structure is within 3 "stack height above the ground" of stack.
7. Dimensions of nonpoint sources as defined in R18-2-101.

1.0 DESCRIPTION OF FACILITY AND PROCESSES

1.1 Site Location

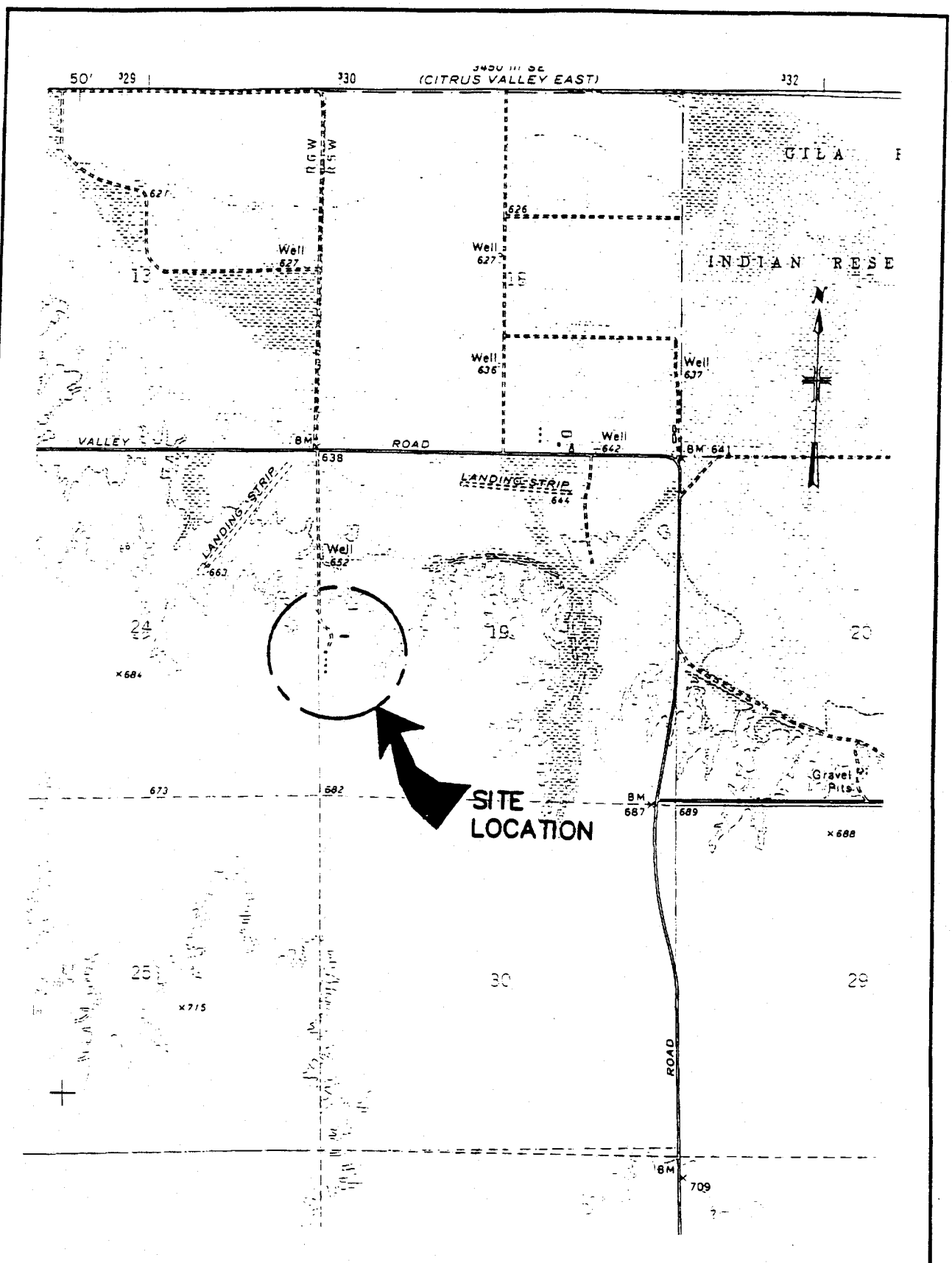
The Facility will be located approximately 70 miles southwest of Phoenix in the Town of Gila Bend, Arizona. The general coordinates of the site are 32° 58' 30" N latitude and 112° 49' 15" W longitude. The site is located north of Interstate 8 and just south of West Sisson Road. The Facility's address will be 35400 West Sisson Road, Gila Bend, Arizona 85337. A facility location map and site plan is shown in figure 1-1 and 1-2, respectively.

1.2 Physical Description

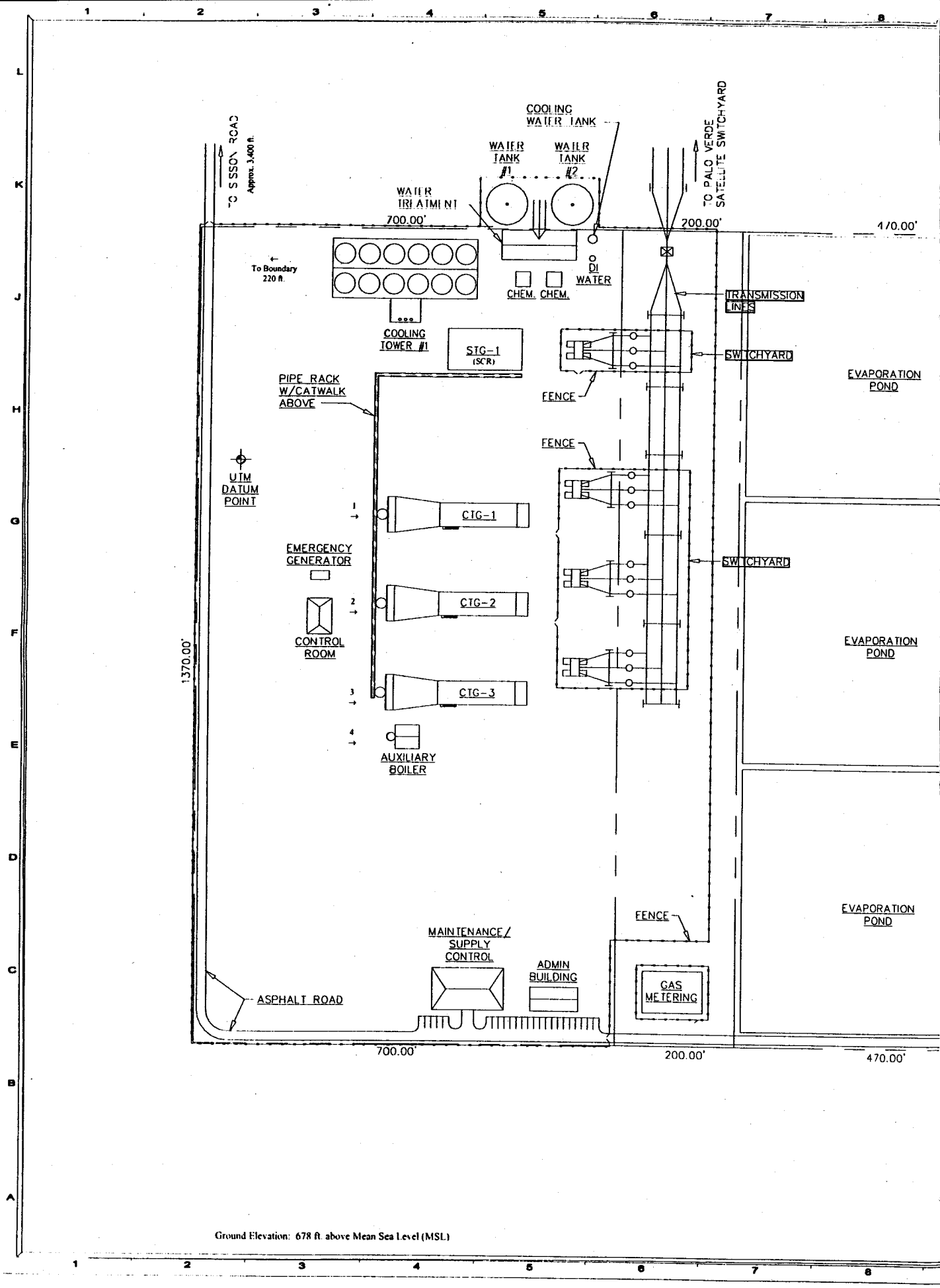
The Facility will be situated on a 40-acre portion of Section 19 in Township 5 South, Range 5 West of the Gila and Salt River Base and Meridian, Maricopa County, Arizona. The proposed site is located in a sparsely populated region in Gila Bend, Arizona. A dirt road borders the site property to the west. Native desert borders the property to the south and east. Fallow agricultural land, including a former cotton gin and landing strip, borders the property to the north. Entrance to the site is from the bordering dirt road. The property across the dirt road is native desert. The land to the north of the property consists of abandoned agricultural property. These former cotton fields are now overgrown with Salt Cedars. Native desert borders the subject property to the south and east.

1.3 Employment

Total employment at the Facility will vary during operations, but is estimated to range between approximately 25 to 35 employees. The Facility is expected to operate 24 hours per day and seven days per week. The facility entrance will be attended at all times.



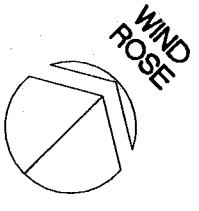
MALCOLM PIRNIE	GILA BEND, ARIZONA FACILITY LOCATION	MALCOLM PIRNIE, INC. FIGURE 1-1



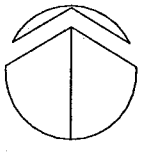
Ground Elevation: 678 ft. above Mean Sea Level (MSL)

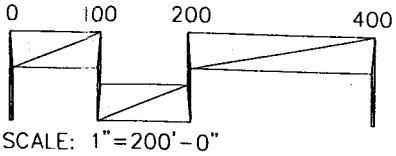
COOLING TOWER:		240'x100'x50'
CTG 1-3:		250'x60'x55'
CTG STACK:	(1-3)	18' DIA.x165'
AUX. BOILER BLDG.:		40'x40'x20'
AUX. BOILER STACK:	(4)	45'x31'
WATER TANK:		70' DIA.x40'
WATER TREATMENT BLDG.:		125'x50'x20'
CONTROLS ROOM:		40'x60'x20'
STG 1:		125'x70'
MAINT./SUPPLY CONTROL:		120'x60'x30'
ADMIN. BLDG.:		80'x40'x25'
COOLING WATER TANK:		15' DIA.x15'
DI WATER TANK:		10' DIA.x10'
EVAPORATION POND:		450'x440'

1370.00'



NORTH





SCALE: 1"=200'-0"

INDUSTRIAL POWER TECHNOLOGY
2227 CAPRICORN WAY SUITE 101
SANTA ROSA, CALIFORNIA 95407
TEL: 707-528-8900/FAX: 707-528-8901

No.	Revisions	Date

GILA BEND POWER PROJECT

FIG 1-2
Site Plan

DESIGN	DRAWN	ENG.

Job Number: 147100
Date: 2/25/00

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C1
1 of 1 sheets

20000228-114555

1.4 Product/Process Description

The following are the major processes and equipment associated with the operation of the Facility:

- Natural gas-fired combustion turbine generators (3)
- Heat recovery steam generators (3)
- Steam turbine (1)
- Natural gas-fired auxiliary boiler (1)
- Emergency diesel generator (1)
- Diesel fire pump (1)
- Cooling towers (3)

2.0 DESCRIPTION OF PRODUCTS

The Facility will not conduct any on-site manufacturing and/or production activities. The Facility will only generate electric power for sale to energy markets.

3.0 DESCRIPTION OF ALTERNATE OPERATING SCENARIOS

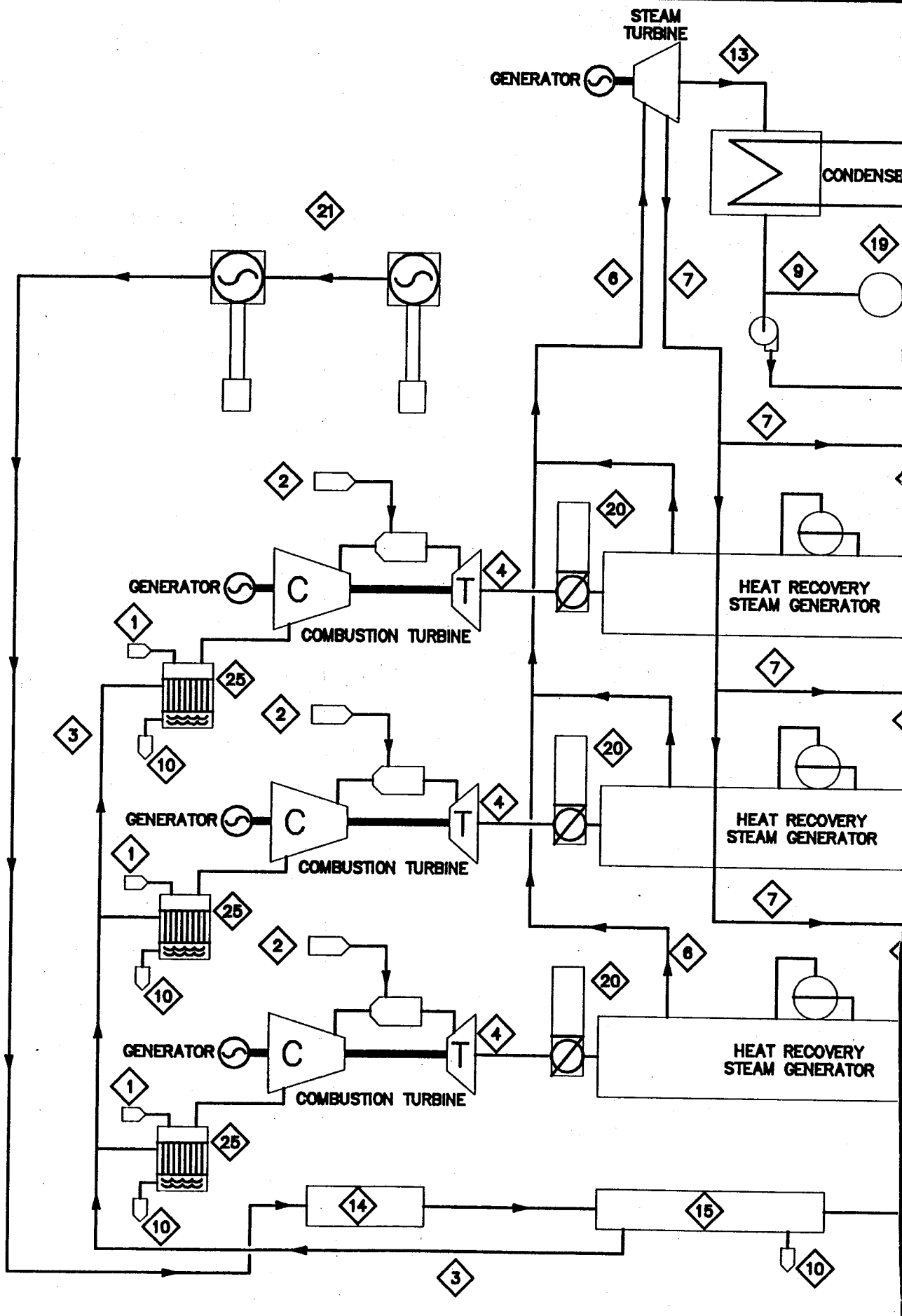
There are no alternative operating scenarios planned for the Facility. The Facility may operate the CTGs simultaneously or individually, as necessary, for a maximum of 8,760 hours per year for each CTG.

4.0 DESCRIPTION OF ALTERNATIVE OPERATING SCENARIO PRODUCTS

Because the Facility will not conduct any on-site manufacturing and/or production activities, there are no alternative operating scenario products.

5.0 PROCESS FLOW DIAGRAM

The Facility will consist of three natural gas-fired combined cycle combustion turbine generators (CTGs), three heat recovery steam generators (HRSG), one steam turbine, one natural gas-fired auxiliary boiler, one emergency diesel generator, one diesel fire pump, and cooling towers. In addition to the combustion turbines and engines, the Facility will include a balance of plant equipment and systems such as natural gas metering systems; natural gas handling systems; instrumentation and control systems; water treatment, storage and handling systems; transformers; and administration and warehouse/maintenance buildings. Water treatment equipment will be required to support the boiler feed water and coolant for the cooling tower. A preliminary process flow diagram for the Facility is presented in Figure 5-1.


STEAM TURBINE
GENERATOR
13
CONDENSE
21
19
9
6
7
2
20
GENERATOR
C
T
4
HEAT RECOVERY STEAM GENERATOR
COMBUSTION TURBINE
1
25
3
10
GENERATOR
C
T
4
HEAT RECOVERY STEAM GENERATOR
COMBUSTION TURBINE
1
25
10
GENERATOR
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T
4
HEAT RECOVERY STEAM GENERATOR
COMBUSTION TURBINE
1
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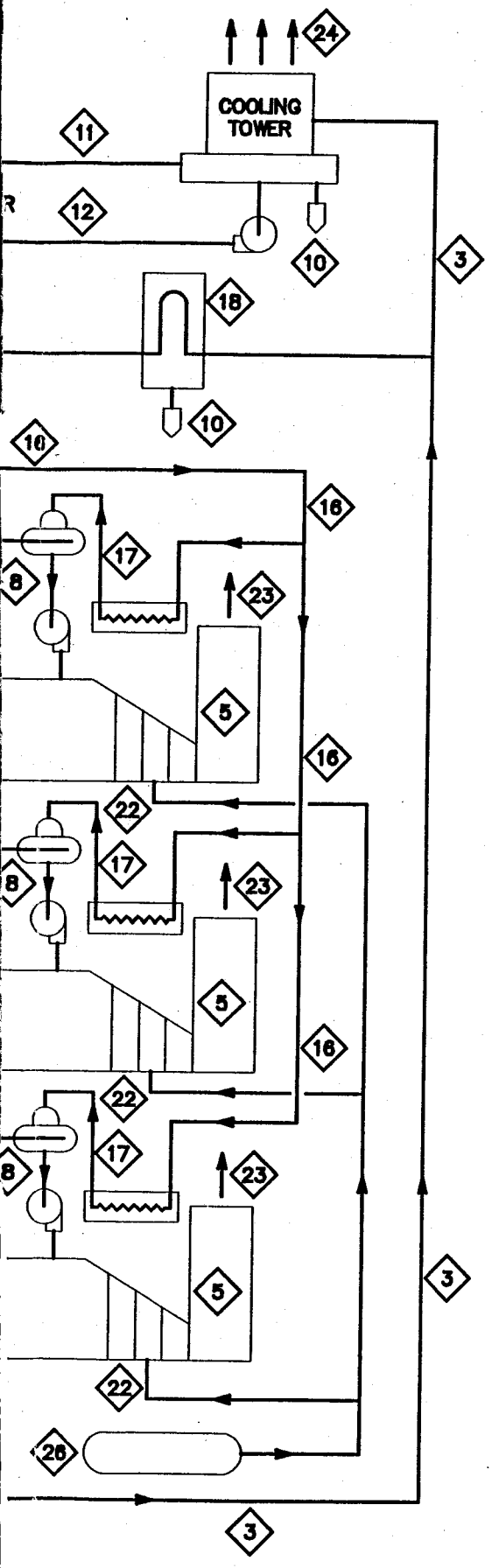
14
15
10
3



1. COMBUSTION TURBINE INLET AIR
2. COMBUSTION TURBINE FUEL
3. WATER PRIMARY TREATED
4. COMBUSTION TURBINE EXHAUST
5. HRSG STACK EXHAUST
6. HIGH PRESSURE STEAM FROM HSRG
7. DEAREATOR LOW PRESSURE STEAM
8. FEEDWATER AFTER DEAREARATOR
9. MAKE UP WATER
10. BLOWDOWN/WASTE WATER TO EVAPORATION PONDS
11. CONDENSER COOLING WATER IN
12. CONDENSER COOLING WATER OUT
13. STEAM TURBINE EXHAUST
14. RAW WATER TANKS
15. PRIMARY WATER TREATMENT
16. FEED WATER BEFORE FEED WATER HEATER
17. FEED WATER AFTER FEED WATER HEATER
18. RO SYSTEM
19. DI WATER STORAGE
20. EMERGENCY BY--PASS
21. DEEP WATER WELLS
22. SCR SECTION
23. FLUE GAS
24. COOLING TOWER EVAPORATION
25. INTAKE AIR EVAPORATIVE COOLER
26. AQUEOUS AMMONIA SYSTEM

INDUSTRIAL POWER TECHNOLOGY
2227 CAPRICORN WAY SUITE 101
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TEL: 707-528-8900/FAX: 707-528-8901

No.	Revisions	Date

GILA BEND POWER PROJECT

FIGURE 5-1
PROCESS FLOW DIAGRAM

IS DESIGN | SS DRAWN | RW CHK

Job Number: 147100 | Date: 3/25/00

Sheet Number
F5-1
1 of 1 sheets

6.0 MATERIAL BALANCES

No material balances are included in this Application because the Facility's air emissions were not based on material balances.

7.0 EMISSIONS-RELATED INFORMATION

7.1 Basis for Estimating Air Emissions

The Facility's air emission estimates were based on manufacturer's and supplier's emission factors as well as USEPA's AP-42 factors. Table 7-1 summarizes the hourly and annual air emissions from the significant emission sources.

7.2 Significant Emission Sources

The sources of regulated air emissions from the Facility that are required to be included in the Application include:

- 3 CTGs (includes 3 combustion turbines, 3 HRSGs, and 1 steam turbine)
- 1 auxiliary boiler (33 MMBtu/hr)
- 1 diesel generator (500kW)
- 1 diesel fire pump (400 BHP)
- 3 cooling towers (4 cells)

7.3 Insignificant Emission Sources

The Department has classified various activities associated with electric utility facilities as insignificant. Reference 2 includes a copy of the Department's list of insignificant activities for these operations. In addition, all relevant insignificant activities listed in County Rule 200, Section 3.3.3(c) are also incorporated herein by reference.

Table 7-1 Emission Source Summary [1]

Regulated Pollutants	Combustion Turbines		Auxiliary Boiler		Diesel [2] Generator		Diesel Fire [2] Pump		Cooling [3] Towers		Facility Total	
	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(tpy)
NOx	60	262.8	3.1	13.6	15.5	3.9	12.4	3.1	0	0	91.0	283.4
CO	152.1	666.3	4.0	17.3	3.3	0.8	2.7	0.7	0	0	162.1	685.1
SO2	12	52.2	0.0	0.14	1.0	0.3	0.8	0.2	0	0	13.8	52.8
VOC [4]	8.9	38.7	0.4	1.84	1.2	0.3	1.0	0.3	0	0	11.5	41.1
PM10	84	368.1	0.3	1.2	1.1	0.3	0.9	0.2	Neg.	Neg.	86.3	369.8
TSP	84	368.1	0.3	1.2	1.1	0.3	0.9	0.2	33.4	146.4	119.7	516.2
HAPs	(tpy)		(tpy)		(tpy)		(tpy)		(tpy)		(tpy)	
Acetaldehyde	1.72		--		0.001		Trace		0		1.72	
Benzene	3.01		Trace		0.001		Trace		0		3.01	
Ethylbenzene	0.52		--		--		--		0		0.52	
Formaldehyde	15.59		0.008		0.002		Trace		0		15.6	
Naphthalene	3.01		Trace		Trace		Trace		0		3.01	
PAH's	3.87		--		--		--		0		3.87	
Propylene Oxide	0.62		--		--		--		0		0.62	
Toluene	2.80		Trace		Trace		Trace		0		2.80	
Xylenes	0.58		--		Trace		Trace		0		0.58	
Total HAPs	31.92		0.21		0.01		0.00		0		32.14	

[1] Emission estimates are based on the calculations and assumptions included in Reference 4.
[2] Diesel generator and fire pump annual emissions are based 500 hours per year.
[3] According to the EPRI study and supporting documentation, PM10 emissions from cooling towers are negligible.
[4] VOC emissions from each source include the HAP emissions.

8.0 DESCRIPTION OF APPLICABLE REQUIREMENTS

Table 8-1 summarizes the federal, state, and County regulations evaluated for applicability relative to the Facility. Table 8-1 also identifies which regulations apply to the Facility. Only the substantive regulations that impose specific requirements on the Facility are identified as being applicable to the Facility.

TABLE 8-1

GILA BEND POWER GENERATION STATION
REGULATORY APPLICABILITY ANALYSIS
SUMMARY [1]

Regulatory Citation	Regulatory Title	Applicable	Non-Applicable
40 CFR[2] Part	***Federal***		
50	National Primary and Secondary Ambient Air Quality Standards		*
51	Requirements for Preparation, Adoption, Submittal of Implementation Plans		*
52	Approval and Promulgation of Implementation Plans		*
53	Ambient Air Monitoring Reference and Equivalent Methods		*
54	Prior notice of Citizen Suit		*
55	Outer Continental Shelf Air Regulations		*
56	Regional Consistency		*
57	Primary nonferrous Smelter Orders		*
58	Ambient Air Quality Surveillance		*
60	New Source Performance Standards (Subparts Dc and GG)	*[3]	
61	National Emission Standards for Hazardous Air Pollutants (Subparts A and M)		*[4]
61	National Emission Standards for Hazardous Air Pollutants (Subparts B-FF, except M)		*[4]
62	Approval and Promulgation of State Plans for Designated Facilities and Pollutants		*
63	National Emission Standards for Hazardous Air Pollutants for Source Categories		*
63	Compliance Assurance Monitoring	*	
65	Delayed Compliance Orders		*
66	Assessment and Collection of noncompliance Penalties by EPA		*
67	EPA Approval of State noncompliance Penalty Program		*
68	Chemical Accident Prevention Provisions (Subparts A, B, E, F,	*	

TABLE 8-1

GILA BEND POWER GENERATION STATION
REGULATORY APPLICABILITY ANALYSIS
SUMMARY [1]

Regulatory Citation	Regulatory Title	Applicable	Non-Applicable
	G, and H)		
69	Special Exemptions from Requirements of Clean Air Act		*
70	State Operating Permit Program		*[5]
71	Federal Operating Permit Programs		*
72	Acid Rain Program (Subparts A, B, C, D, E, H, and I)	*	
73	Sulfur Dioxide Allowance System	*	
74	Sulfur Dioxide Opt-ins		*
75	Continuous Emission Monitoring (Subparts A, B, C, D, F, G)	*	
76	Acid Rain Nitrogen Oxides Emission Reduction Program		*
77	Excess Emissions		*
78	Appeal Procedures for Acid Rain Program		*
79	Registration of Fuels and Fuel Additives		*
80	Regulation of Fuels and Fuel Additives		*
81	Designation of Areas for Air Quality Planning Purposes		*
82	Protection of Stratospheric Ozone (Subparts B, E, F, and G)		*
85	Control of Air Pollution from Motor Vehicles and Motor Vehicle Engines		*
86	Control of Air Pollution from New and In-use Motor Vehicles and New and In-use Motor Vehicle Engines		*
87	Control of Air Pollution from Aircraft and Aircraft Engines		*
88	Clean Fuel Vehicles		*
89	Control of Emissions from New and In-use Nonroad Engines		*
90	Control of Emissions from Nonroad Spark-Ignition Engines		*
93	Determining Conformity of Federal Actions to State or Federal Implementation Plans		*

TABLE 8-1

GILA BEND POWER GENERATION STATION
REGULATORY APPLICABILITY ANALYSIS
SUMMARY [1]

Regulatory Citation	Regulatory Title	Applicable	Non-Applicable
95	Mandatory Patent Licenses		*
Clean Air Act	***Federal***		
Title I	New Source Review		*[6]
Title II	Mobile Sources		*[6]
Title III	Hazardous Air Pollutants Program		*[6]
Title IV	Acid Deposition Control		*[6]
Title V	Operating Permit Program		*[6]
Title VI	Stratospheric Ozone Protection		*[6]
Article	***Arizona Administrative Code - Title 18, Chapter 2***		
1	General (R18-2-101 through R18-2-103)		*
2	Ambient Air Quality Standards, Area Designations, Classifications (R18-2-201 through R18-2-220)		*
3	Permits and Permit Revisions (R18-2-301 through R18-2-333)		*
4	Permit Requirements for New Major Sources and Major Modifications to Existing Sources (R18-2-401 through R18-2-411)		*
5	General Permits (R18-2-501 through R18-2-525)		*
6	Emissions from Existing and New Nonpoint Sources (R18-2-601 through R18-2-610)		*
7	Existing Stationary Source Performance Standards (R18-2-710)		*
8	Emissions from Mobile Sources (R18-2-801 through R18-2-805)		*
9	New Source Performance Standards (R18-2-901)		*
10	Motor Vehicles: Inspections and Maintenance (R18-2-1001 through R18-2-1031)		*
11	Federal Hazardous Air Pollutants (R18-2-1101 through R18-2-1102)		*
14	Conformity Determinations (R18-2-1401 through R18-2-1438)		*
Rule	***Arizona State Implementation Plan (SIP)*** [7]		

TABLE 8-1

GILA BEND POWER GENERATION STATION
REGULATORY APPLICABILITY ANALYSIS
SUMMARY [1]

Regulatory Citation	Regulatory Title	Applicable	Non-Applicable
1	Emission Required: Policy, Legal Authority		*[8]
2	Definitions		*[8]
3	Air Pollution Prohibited		*[8]
220	Permits to Operate		*[8]
20	Permits Required		*[8]
21	Permit Conditions		*[8]
23	Permit Classes		*[8]
24	Installation Permit Fees		*[8]
25	Emissions Test Methods/Annual Operating Permit Fees and Procedures		*[8]
26	Portable Equipment		*[8]
27	Performance Tests		*[8]
28	Permit Fees		*[8]
30	Visible Emissions		*[8]
31	Emissions of Particulate Matter		*[8]
32	Odors and Gaseous Emissions		*[8]
33	Storage and Handling of Petroleum Products		*[8]
34	Organic Solvents		*[8]
35	Incinerators		*[8]
Regulation IV	Production of Records: Monitoring, Testing, and Sampling Facilities		*[8]
Regulation V	Unlawful Open Burning		*[8]
Regulation VI	Violations		*[8]
Regulation VII	Ambient Air Quality Standards		*[8]
Regulation	Validity and Operation		*[8]

TABLE 8-1

GILA BEND POWER GENERATION STATION
REGULATORY APPLICABILITY ANALYSIS
SUMMARY [1]

Regulatory Citation	Regulatory Title	Applicable	Non-Applicable
VIII			
Rule	***Maricopa County***		
100	General Provisions and Definitions	*	
110	Violations		*[9]
120	Conditional Orders		*
200	Permit Requirements	*	
210	Title V Permit Provisions	*	
220	Non-Title V Permit Provisions		*
230	General Permits		*
240	Permits for New Major Sources and Major Modifications to Existing Major Sources	*	
241	Permits for New Sources and Modifications to Existing Sources	*	
245	Continuous Source Emission Monitoring		*
270	Performance Tests	*	
280	Fees	*	
300	Visible Emissions	*	
310	Open Fugitive Dust Sources	*	
311	Particulate Matter from Process Industries	*	
312	Abrasive Blasting	*	
313	Incinerators		*
314	Open Outdoor Fires		*
315	Spray Coating Operations	*	
316	Nonmetallic Mineral Mining and Processing		*
317	Medical Waste Incinerators		*
318	Approval of Residential Woodburning Devices		*

TABLE 8-1

GILA BEND POWER GENERATION STATION
REGULATORY APPLICABILITY ANALYSIS
SUMMARY [1]

Regulatory Citation	Regulatory Title	Applicable	Non-Applicable
320	Odors and Gaseous Air Contaminants	*	
321	Municipal Solid Waste Landfills		*
330	Volatile Organic Compounds	*	
331	Solvent Cleaning	*	
332	Perchloroethylene Dry Cleaning		*
333	Petroleum Solvent Dry Cleaning		*
334	Rubber Sports Ball Manufacturing		*
335	Architectural Coatings	*	
336	Surface Coating Operations		*
337	Graphic Arts		*
338	Semiconductor Manufacturing		*
339	Vegetable Oil Extraction Processes		*
340	Cutback and Emulsified Asphalt		*
341	Metal Casing		*
342	Coating Wood Furniture and Fixtures		*
343	Commercial Bread Bakeries		*
344	Automotive Windshield Washer Fluid		*
345	Vehicle Refinishing		*
346	Coating Wood Millwork		*
350	Storage of Organic Liquids at Bulk Plants and Terminals		*
351	Loading of Organic Liquids		*
352	Gasoline Delivery Vessels		*
353	Transfer of Gasoline into Stationary Storage Dispensing Tanks		*
360	New Source Performance Standards (Section 300 Subparts Dc	*	

TABLE 8-1

GILA BEND POWER GENERATION STATION
REGULATORY APPLICABILITY ANALYSIS
SUMMARY [1]

Regulatory Citation	Regulatory Title	Applicable	Non-Applicable
	and GG)		
370	Federal Hazardous Air Pollutant Program (Section 300 ɔɔ 301.1 and 301.8)		*
371	Acid Rain (Section 301)	*	
400	Procedure Before the Hearing Board		*[10]
500	Attainment Area Classification		*
510	Air Quality Standards		*
600	Emergency Episodes		*

Notes

1. Only the substantive regulations that impose specific requirements on the facility are identified as applicable.
2. CFR - Code of Federal Regulations, July 1996.
3. The New Source Performance Standards (NSPS) of 40 CFR Part 60 are incorporated by reference in Maricopa County Rule 360.
4. The National Emission Standards for Hazardous Air Pollutants (NESHAPs) in 40 CFR Part 61 are incorporated by reference in Maricopa County Rule 370.
5. This minimum requirements rule applies to states not to individual sources. Individual sources are subject to Maricopa County Rules 200 and 210.
6. These provisions are shown as non-applicable because they mainly provide the statutory authority for the state and county air quality programs and do not impose specific requirements on the facility. The facility's daily operation will be governed by the provisions in the Maricopa County air quality regulations.
7. Only the Maricopa County rules in the December 1996 SIP that are not codified in the current Maricopa County air quality rules are presented here.
8. This provision is shown as non-applicable because it is obsolete and has been superseded by the current Maricopa County air quality rules which are at least as stringent as this provision.
9. This provision is shown as non-applicable because it is administrative in nature and merely specifies the classification of violations of the County rules.
10. This provision is shown as non-applicable because it is administrative in nature and merely sets out the procedures before the hearing board.

9.0 VOLUNTARILY ACCEPTED LIMITS PURSUANT TO RULE 220

This section is not applicable to the Facility because the project is not subject to the provisions of County Rule 220.

10.0 ADDITIONAL INFORMATION PURSUANT TO RULE 220

This section is not applicable to the Facility because the project is not subject to the provisions of County Rule 220.

11.0 DESCRIPTION OF PROCESS AND CONTROL EQUIPMENT

As described in Section 1 of this Application, the Facility will consist of three natural gas-fired CTGs, three HRSGs, one steam turbine, one natural gas-fired auxiliary boiler, one emergency diesel generator, one diesel fire pump, and cooling towers. In addition to the combustion turbines and engines, the Facility will include a balance of plant equipment and systems such as natural gas metering systems; natural gas handling systems; instrumentation and control systems; water treatment, storage and handling systems; transformers; and administration and warehouse/maintenance buildings. Water treatment equipment will be required to support the boiler feed water and coolant for the cooling tower.

11.1 Combustion Turbines

The three combined-cycle combustion turbine generators are fired exclusively with natural gas. Each CTG package will incorporate a GE PG7241FA (or equivalent) combustion turbine. At full load operations, nitrogen oxide (NO_x) emissions at the CTG exhaust will be controlled to a level of 3 ppmvd corrected to 15 percent O_2 using a combination of selective catalytic reduction (SCR) and Dry Low NO_X (DLN) combustion.

The energy consumption and production of each CTG are summarized in Table 11-1. Hourly production rates are dependent on operating and ambient conditions such as loading, ambient temperature, and relative humidity. The production rates are based on full output of the Facility at the ambient conditions noted. The normal combined output of the Facility will be approximately 750 MW.

TABLE 11-1 SUMMARY OF ENERGY PRODUCTION DESIGN CRITERIA *GILA BEND POWER GENERATION STATION*	
Number of units	3
Natural gas operation ➢ Nominal Maximum Electrical Capacity ➢ Energy Input (HHV)	 181.2 MW each 1,546 MMBtu/hr each

The combustion turbines will be designed to operate continuously 24 hours per day, with each turbine potentially operating every day of the year. The turbines are not expected to operate less than 70 percent of base load for significant periods of time.

11.2 Heat Recovery Steam Generator

In addition to the CTGs, the Facility will operate three heat recovery steam generators (HRSGs). The HRSGs will take advantage of the hot exhaust gases from the combustion turbines to produce high pressure steam, which will then power the steam turbine to produce electricity.

11.3 Steam Turbine

The facility will operate one steam turbine; The steam turbine will be driven by the steam produced by the HRSGs. There are no emissions generated from the steam turbine because there is no fuel combustion.

11.4 Selective Catalytic Reduction System

The HRSGs will each be fitted with a SCR system, which will be used as an add-on

emission control system for NO_X emissions. Operating time will parallel turbine operations and will be based on average annual ambient conditions. This system will be discussed further in the BACT Analysis.

11.5 Auxiliary Boiler

The Facility will utilize an auxiliary boiler with a rated heat input of 26 MMBtu/hr to augment turbine start-up. The boiler will fire natural gas exclusively and will permitted to operate 8,760 hours per year.

11.6 Emergency Diesel Generator and Diesel Fire Pump

The emergency diesel generator and the diesel fire pump will be used as backup systems in the event that there is a power outage. The emergency diesel generator is rated at 500 kW and the diesel fire pump is rated at 400 BHP. These internal combustion engines will be limited to a maximum annual operation of 500 hours. These emission units are considered exempt according to County Rule 200.

11.7 Cooling Towers

The Facility will utilize three cooling towers, comprising 4 cells each. The cooling tower function will provide cool water to the condensing steam turbine. The tower will be a mechanical draft counter-flow design.

11.8 Construction Activities

It is estimated that construction of the Facility will take approximately 24 months. The construction activities during that period will include:

- Set up of temporary construction trailers and field management office.
- Set up of temporary utilities.
- Preparation of construction roads and parking.
- Use of site preparation and construction equipment such as diesel powered earth movers and auxiliary equipment.
- Building construction.
- Connection to existing utilities.
- Surface coating.
- Welding.
- Plant testing and cleaning.

TABLE 11-2

PROCESS AND CONTROL EQUIPMENT

Equipment Name	# of Units	Make	Model	Size or Production Capacity	Type
CT	3	GE	MS700IFA	170 MW	Combined-cycle
HRSG	3	Deltek		1,000 ton	Fluegas-driven
Steam Turbine	1	GE		300 MW	Steam-driven
Auxiliary Border	1	Cleaver Brooks		26 MMBtu/hr	Natural gas-fired
Emergency Generator	1	Caterpillar	3412	500 kw	Diesel-fired
Fire Pump	1	Caterpillar	3406	400 BHP	Diesel-fired
Cooling Towers	3	Marley		4 cells (ea.)	Counter-flow

12.0 STACK INFORMATION

All relevant information for the significant emission sources such as identification number, location, exit gas temperature, exit gas velocity, height, and inside dimension is provided in the Emission Sources tables of the Department's Standard Application Forms included in this Application.

TABLE 12-1
STACK INFORMATION

Source ID	Description	Bldg. Dimensions	Exhaust Gas Temp (°F)	Exhaust Gas Velocity (ft/sec)	Stack Height (ft)	Stack ID (ft)
1	CT-1	(1)	183	46.3	165	18
2	CT-2	(1)	183	46.3	165	18
3	CT-3	(1)	183	46.3	165	18
4	Aux. Boiler	(1)	450	35	95	2
5	Cooling Towers	(1)	70	30	50	30.3

Notes: (1) Refer to Figure 1-2 (site plan) for all building dimensions.

13.0 SITE DIAGRAM

A facility location plan (Figure 1-1) and site plan (Figure 1-2) for the Facility is provided in Section 1 of this Application. The plans include the following information:

- Property boundaries.
- Adjacent streets and roads.
- Directional arrow indicating "North".
- Ground elevation of 678 feet above mean sea level (msl).
- Closest distance between equipment (cooling towers) and property boundary (west) of approximately 220 feet at the northwest corner of the Facility.
- Equipment layout showing the major process areas.
- Relative location of emission sources.
- Location of emission points.
- Location of air pollution control equipment.

14.0 AIR POLLUTION CONTROL INFORMATION

14.1 Applicable Test Methods

Applicable emission standards and reference test methods for determining compliance are included in Table 16-1 of this Application.

14.2 Description of Equipment

Each of the Facility's CTGs will use a combination of dry low NO_x (DLN) combustion and selective catalytic reduction (SCR), which represents the most stringent commercially available NO_x control technology. The SCR will be added as a post combustion treatment for NO_x emissions by injecting ammonia (NH_3) into the turbine exhaust stream and upstream from the catalyst unit. The SCR unit houses a catalyst typically made from noble metals, base metal oxides such as vanadium and titanium, and zeolite-based material. The ammonia injected exhaust stream enters and reacts with the catalyst beds to form N_2 and H_2O. The SCR will be located within the HRSG where the temperature is typically stable, thus providing temperatures within the optimum range of the selected catalyst.

14.3 Rated Equipment Efficiency

During normal operations the NO_x emissions from the SCR-controlled CTGs will be approximately 3.0 ppmdv.

14.4 Control Efficiency Parameters

The continuous emissions monitors will be used to measure and record the NO_x

emissions from the CTGs.

14.5 Regulatory Compliance Demonstration

The analyses described in Section 18 of this Application provide the supporting documentation necessary to demonstrate no violations of air quality standards or maximum allowable increases will recur as a result of this project.

15.0 EQUIPMENT MANUFACTURER'S INFORMATION

Final selection of the Facility's equipment has not been completed as of this submittal date. Therefore, no manufacturer information is available at this time.

16.0 COMPLIANCE PLAN

The Facility will operate in full compliance with all the applicable requirements identified in Table 16-1. The Facility also expects to track and meet the requirements of all applicable regulations that become effective during the permit term. Because the Facility will be a new source, it is not out of compliance with any applicable requirements at this time. Therefore, a compliance plan and schedule is not required for this Application.

The Facility's combustion turbines will be subject to the USEPA's Acid Rain Program. Based on the requirements stipulated in 40 CFR 72.30 (b) (z) (ii) and County Rule 371, Reference 3 of the Application includes the Phase II Permit Application and the Certificate of Representation.

Table 16-1 Compliance Status Summary

Regulatory Citation	Regulatory Title	Applicable Requirements	Compliance Demonstration
FEDERAL U.S. ENVIRONMENTAL PROTECTION AGENCY			
40 CFR Part 60 Subpart Dc	New Source Performance Standards for Small Industrial-Commercial-Institutional Steam Generating Units	See Maricopa County Rule 360 which adopted 40 CFR Part 60 by reference.	The Facility will comply as set forth in the compliance demonstration for Maricopa County Rule 360.
40 CFR Part 60 Subpart GG	New Source Performance Standard for Stationary Gas Turbines	See Maricopa County Rule 360 which adopted 40 CFR Part 60 by reference.	The Facility will comply as set forth in the compliance demonstration for Maricopa County Rule 360.
40 CFR Part 64	Compliance Assurance Monitoring	• Design monitoring criteria to assure compliance. • Reporting and recordkeeping requirements for monitored data.	• Required CEM criteria will satisfy criteria. • CEM data will be recorded and reported as required.
40 CFR Part 68 Subpart A, B, E, F, G and H	Chemical Accident Prevention Provisions	• Prepare a worst case scenario Risk Management Plan. • Develop and implement an Emergency Response Program.	• The Facility will prepare and submit a RMP in accordance with 40 CFR Part 68, if necessary after examining the regulated substance thresholds.
40 CFR Part 72 Subpart A, B, C, D, E, H and I	Acid Rain Program	See Maricopa County Rule 371 which adopted 40 CFR Part 72 by reference.	The Facility will comply as set forth in the compliance demonstration for Maricopa County Rule 371.
40 CFR Part 73	Sulfur Dioxide Allowance System	SO2 allowance, tracking, and transfer standards.	The Facility will comply with allowance, tracking and transfer of SO2 standards.

Table 16-1 Compliance Status Summary (Continued)

Regulatory Citation	Regulatory Title	Applicable Requirements	Compliance Demonstration
40 CFR Part 75 Subpart A, B C, D, F and G	Continuous Emission Monitoring	• Continuous Emission Monitor is required. • Monitor opacity, SO2, NOx, and CO2.	• The Facility will install required CEM. • The Facility will certify CEM. • The Facility will comply with recordkeeping and reporting requirements.
MARICOPA COUNTY			
Rule 100	General Provisions and Definitions	• Prohibits the discharge of regulated air pollutants in excess of the quantities or concentrations specified in the applicable State or County rules. • Requires reports of excess emissions. • Requires recordkeeping of emissions testing, monitoring, and malfunctions. • Requires submittal of an annual emissions inventory questionnaire.	• The Facility will comply through monitoring of emissions as required by each applicable rule that contains an emission limit. • The Facility will comply by submitting any necessary excess emission reports. • The Facility will comply by maintaining all necessary records of emissions testing, monitoring, and malfunctions as required by each applicable rule. • The Facility will comply by submitting annual emissions inventory reports to Maricopa County.

Table 16-1 Compliance Status Summary (Continued)

Regulatory Citation	Regulatory Title	Applicable Requirements	Compliance Demonstration
Rule 200	Permit Requirements	• Requires an air quality permit prior to commencement and operation of a new source. • Requires an earth moving permit prior to any earth moving operation that disturbs a total surface area of 0.10 acre or more.	• The Facility will comply by obtaining a Title V/PSD permit. • The Facility will comply with obtaining an earthmoving permit.
Rule 210	Title V Permit Provisions	• Lists criteria for a complete application. • Explains permit processing procedures and permit contents.	The Facility will submit an application in accordance with the complete application criteria.
Rule 240	Permits for New Major Sources and Major Modifications to Existing Major Sources	Required application content for attainment area including GEP stack height, air impact analysis, BACT evaluation, etc. for a major source.	The Facility will submit an application that has an acceptable air impact analysis, BACT analysis, and GEP stack height information.
Rule 241	Permit for New Sources and Modifications to Existing Sources	Requires application of RACT for ancillary activities such as abrasive blasting.	The Facility will comply with RACT requirement by operating within applicable County 300 series rules.

Table 16-1 Compliance Status Summary (Continued)			
Regulatory Citation	Regulatory Title	Applicable Requirements	Compliance Demonstration
Rule 270	Performance Tests	Establishes the requirements for performance tests, testing criteria, testing conditions, notice of testing and testing facilities that must be followed to determine compliance with applicable emissions limits.	The Facility will comply by conducting performance tests to ensure compliance with the emission limits for the electric generation and opacity through the following: • The Facility will conduct performance tests on the turbines, and boiler within 60 days after it has achieved the capability to operate at its maximum capacity on a sustained basis. • The Facility will notify Maricopa County of the performance test at least two weeks prior to conducting the tests. • The Facility will furnish Maricopa County with a written test protocol and a report of the results of the performance tests.

Table 16-1 Compliance Status Summary (Continued)			
Regulatory Citation	Regulatory Title	Applicable Requirements	Compliance Demonstration
Rule 280	Fees	Establishes the fees for processing of Title V applications and permits and for annual emissions of regulated air pollutants.	The Facility will comply through the payment of all applicable fees.
Rule 300	Visible Emissions	Establishes an opacity limit of 20 percent with the exception of exceedences during startup, shutdown, and emergencies.	The Facility will retain copies of all opacity records for five years.
Rule 310	Open Fugitive Dust Sources	• Requires a dust control plan for any source commencing earth moving operations or dust generating operations. • Requires compliance with any applicable opacity standards. • Requires application of reasonable available control measures (RACM). • Requires an earth moving permit and operating permit in accordance with Maricopa County Rule 200.	• The Facility will comply by obtaining an approved Dust Control Plan and Earth Moving Permit from Maricopa County. • The Facility will comply through application of RACM as set forth in its approved Dust Control Plan and Earth Moving Permit issued by Maricopa County. The Facility will keep a daily written log recording the actual implementation of RACM and will make such information available for review on request by

Table 16-1 Compliance Status Summary (Continued)			
Regulatory Citation	Regulatory Title	Applicable Requirements	Compliance Demonstration
Rule 310 (Continued)			Maricopa County. Copies of all records will be retained for five years. • The Facility will comply by having obtained its approved Earth Moving Permit and obtaining the Title V/PSD permit from Maricopa County.
Rule 311	Particulate Matter from Process Industries	Sets PM emission limit for fuel burning operation.	The Facility will comply with PM emission limit.
Rule 312	Abrasive Blasting	Lists approved controls for abrasive blasting such as wet blasting.	The Facility or its subcontractor will use one of the approved controls.
Rule 315	Spray Coating Operations	Lists approved controls for spray coating such as a three-sided enclosure.	The Facility or its subcontractor will use one of the approved controls.
Rule 320	Odors and Gaseous Air Contaminants	• Requires material containment to limit gaseous or odorous air contaminants from equipment, operations or premises thereby preventing air pollution. • Limits NOx emission to be less than 0.2 lb/MM BTU for gaseous fossil fuel for	• The Facility will control gaseous or odorous air contaminants by handling material in a manner to reduce unnecessary air pollution. • The Facility will comply with NOx emission limitation.

Table 16-1 Compliance Status Summary (Continued)			
Regulatory Citation	Regulatory Title	Applicable Requirements	Compliance Demonstration
Rule 320 (Continued)		electric power plants after 1972.	
Rule 330	Volatile Organic Compounds	Lists VOC content limits for various solvents.	• The Facility will use only the approved solvents. • The Facility will keep a current list and usage for all solvents.
Rule 331	Solvent Cleaning	Lists acceptable material handling and equipment standards.	• The Facility will use only approved equipment and handling in safe manner to reduce unnecessary emissions. • The Facility will keep a current list and usage for all solvents.
Rule 335	Architectural Coatings	Lists VOC content limits for various architectural coatings.	The Facility will only use approved coatings.
Rule 360	New Source Performance Standards (Section 300 Subpart Dc)	• Sets opacity, SO2 and PM emission standards for various types of fuels combusted. • Lists testing, monitoring, and recordkeeping & reporting requirements.	• The Facility combusts natural gas which has no applicable opacity, SO2 and PM standards. • The Facility will comply with testing, monitoring, and recordkeeping & reporting requirements.
Rule 360	New Source Performance Standards	• Sets NOx and SO2 emission standards.	• The Facility will comply with the NOx and SO2

Table 16-1 Compliance Status Summary (Continued)			
Regulatory Citation	Regulatory Title	Applicable Requirements	Compliance Demonstration
Rule 360 (Continued)	(Section 300 Subpart GG)	• Lists monitoring and testing requirements.	emission standards. • The Facility will comply with monitoring and testing requirements.
Rule 371	Acid Rain (Section 301)	• Required to submit an application and certificate of representation. • Required to operate in accordance with acid rain permit application.	• The Facility will submit an application and certificate of representation. • The Facility will operate in accordance with permit application.

17.0 COMPLIANCE CERTIFICATION

I certify under penalty of law that the enclosed documents and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on information and belief formed after my reasonable inquiry, the statements and information in the documents submitted are true, accurate and complete.

I further certify under penalty of law that, to the best of my knowledge and belief, my facility is in continuous compliance with all applicable federal, state, and Maricopa County requirements. I also certify that I will ensure that my facility continues to comply with all requirements that apply.

Responsible Official: Mr. Robert A. Innamorati

Signature: Robert A. [signature]

Title: President

Date: 3-29-00

18.0 NEW MAJOR SOURCE INFORMATION (RULE 240)

18.1 Gila Bend Power Generation Project Source Classification

The proposed Facility, a nominal 750 megawatt combined-cycle electric power generation plant, will be located approximately 70 miles southwest of Phoenix in the Town of Gila Bend, Arizona. It will be located in an attainment area for all conventional pollutants.

The Facility is a Categorical Source, a fossil fuel-fired steam electric plant and combined cycle gas turbines of more than 250 MM BTU per hour rated heat input, as defined by the County Rule 240 Section 202. It also has a potential to emit more than 100 tons per year for NOx, CO and PM_{10}. Since the Facility is classified as a Categorical Source which has potential to emit more than 100 tons per year of conventional air pollutants, it is a new major source as defined in the County Rule 240 Section 210.

A new major source in an attainment area must demonstrate an ability to comply with provisions of Prevention of Significant Deterioration (PSD) in the County Rule 240. The following sections will discuss requirements for the Facility as listed in Item 18.b of the Maricopa County Permit Application Filing Instructions.

18.2 Rule 240 Requirements in an Attainment Area

The applicable requirements and compliance method are listed in Section 20 – Additional Requirements.

18.3 Best Available Control Technology Applicability and Analysis

The Facility will emit more than significant emission levels as defined in the County Rule 100 for NOx, CO, SO2, PM10, and VOC. Table 7-1 (Emission Source Summary) summarizes the projected emissions for the Facility. PSD requires Best Available Control Technology (BACT) for all conventional pollutants exceeding the significant emission levels. Reference 5 (BACT Analysis) includes the required BACT determinations.

18.4 Ambient Air Quality Analysis

Reference 6 (PSD Modeling Protocol) includes the protocol used in the ambient air impact modeling and Reference 7 (Ambient Air Quality Analysis) describes the analysis and summarizes the results.

18.5 Visibility Impact Analysis

The Facility is located more than 120 kilometers from the nearest Class I area (Superstitions Wilderness Area). Therefore, there are no anticipated impacts from the Facility on visibility in any Class I areas.

19.0 EMISSIONS CALCULATIONS

All supporting references, engineering calculations, and assumptions used to estimate the air emissions required for this Application are included in Reference 4.

20.0 ADDITIONAL REQUIREMENTS

20.1 Rule 210 - Title V Permit Provisions

In addition to required items from the "Standard Permit Application Form and Filing Instructions for Maricopa County", there are several items listed below that must be addressed.

- **Federal delayed compliance orders or consent decrees**: The Facility is a new source. There is no Federal delayed compliance orders or consent decrees.
- **The list of insignificant activities**: Reference 2 includes the list of insignificant activities.
- **Emission Trading Information**: The Facility is not requesting terms and conditions allowing for the trading of emissions increases and decreases.
- **A Copy of Application for EPA Region IX**: A copy of the application will be submitted to the US EPA Region IX.
- **Confidential Trade Information**: There is no confidential information.
- **Applicable MACT**: The Facility is not a listed NESHAP operation. No MACT is applicable.

20.2 Rule 240 - Permits For New Major Sources And Major Modification

In addition to the above requirements, the Rule 240 also requires the following items listed below.

- **Air Impact Analysis for Any Geographical Area**: The analysis is done in accordance with the Rule 240, Section 303.
- **More Stringent Rule Required**: Applicable sections from County Rule 360 and Regulation III of the County rules do not overlap any operation. Therefore, there is no conflict with more stringent rule requirement.

- **Visibility Impact Analysis:** The Facility is located more than 120 kilometers from the nearest Class I area (Superstition Wilderness Area). Therefore, there are no anticipated impacts from the Facility on visibility in any Class I areas.
- **GEP Stack Height**: Stack height in excess of GEP stack height and any other dispersion technique will not affect the degree of emission limitation required for control of any pollutant.
- **Fugitive Dust Emission**: The facility will comply with the Rule 310 – Fugitive Dust Sources and Rule 311 - Particulate Matter from Process Industry. The Rule 316 – Nonmetallic Mineral Mining and Processing is not applicable.
- **Lead emission**: Lead emissions are estimated to be less than five tons per year.

REFERENCE 1

MARICOPA COUNTY PERMIT APPLICATION FILING INSTRUCTIONS (APPENDIX B)

Adopted 11/15/93
Revised 02/15/95

APPENDIX B
STANDARD PERMIT APPLICATION FORM AND FILING INSTRUCTIONS
MARICOPA COUNTY

FILING INSTRUCTIONS

No application shall be considered complete until the Control Officer has determined that all information required by this application form and the applicable statutes and regulations has been submitted. The Control Officer may waive certain application requirements for specific source types pursuant to Rules 200, 210, and/or 220 of these rules. For permit revisions, the applicant need only supply information which directly pertains to the revision. The Control Officer shall develop special guidance documents and forms to assist certain sources requiring Non-Title V permits in completing the application form and filing instructions. Guidance documents can be requested by contacting the Maricopa County Environmental Services Department at the address and phone number given on the "Standard Permit Application Form".

In addition to the information required on the application form, the applicant shall supply the following:

1. Description of the process to be carried out in each unit (include Source Classification Code, if known).
2. Description of product(s).
3. Description of alternate operating scenario, if desired by applicant (include Source Classification Code, if known).
4. Description of alternate operating scenario product(s), if applicable.
5. A flow diagram for all processes.
6. A material balance for all processes (optional, only if emission calculations are based on a material balance).
7. Emissions related information:
   a. The source shall be required to submit the potential emissions of regulated air pollutants as defined in Rule 100 of these rules for all emission sources. Emissions shall be expressed in pounds per hour, tons per year, and such other terms as may be requested. Emissions shall be submitted using the standard "Emission Sources" portion of the "Standard Permit Application Form". Emissions information shall include fugitive emissions in the same manner as stack emissions, regardless of whether the source category in question is included in the list of sources contained in the definition of major source in Rule 100 of these rules.
   b. The source shall be required to identify and describe all points of emissions and to submit additional information related to the emissions of regulated air pollutants sufficient to verify which requirements are applicable to the source and sufficient to determine any fees pursuant to Rules 280 of these rules.
8. Citation and description of all applicable requirements as defined in Rule 100 of these rules including voluntarily accepted limits to Rule 220 of these rules.

9. An explanation of any voluntarily accepted limits established pursuant to Rule 220 of these rules and of any proposed exemptions from otherwise applicable requirements.
10. The following information to the extent it is needed to determine or regulate emissions or to comply with the requirements of Rule 220 of these rules:
    a. Maximum annual process rate for each piece of equipment which generates air emissions.
    b. Maximum annual process rate for the whole plant.
    c. Maximum rated hourly process rate for each piece of equipment which generates air emissions.
    d. Maximum rated hourly process rate for the whole plant.
    e. For all fuel burning equipment including generators, a description of fuel use, including the type used, the quantity used per year, the maximum and average quantity used per hour, the percent used for process heat (heat other than for HVAC or domestic hot water), and higher heating value of the fuel. For solid fuels and fuel oils, state the potential sulfur and ash content.
    f. A description of all raw materials used and the maximum annual and hourly, monthly, or quarterly quantities of each material used.
    g. Anticipated operating schedules:
        1. Percent of annual production by season.
        2. Days of the week normally in operation.
        3. Shifts or hours of the day normally in operation.
        4. Number of days per year in operation.
    h. Limitations on source operations and any work practice standards affecting emissions.
    i. A demonstration of how the source will meet any limitations accepted voluntarily pursuant to Rule 220 of these rules.
11. A description of all process and control equipment for which permits are required including:
    a. Name.
    b. Make (if available).
    c. Model (if available).
    d. Serial number (if available).
    e. Date of manufacture (if available).
    f. Size/production capacity.
    g. Type.
12. Stack Information:
    a. Identification.
    b. Description.
    c. Building dimensions.
    d. Exit gas temperature.
    e. Exit gas velocity.
    f. Height.
    g. Inside dimensions.

13. Site diagram which includes:
    a. Property boundaries.
    b. Adjacent streets or roads.
    c. Directional arrow.
    d. Elevation.
    e. Closest distance between equipment and property boundary.
    f. Equipment layout.
    g. Relative location of emission sources/points.
    h. Location of emission points and non-point emission areas.
    i. Location of air pollution control equipment.
14. Air pollution control information:
    a. Description of or reference to any applicable test method for determining compliance with each applicable requirement.
    b. Identification, description and location of air pollution control equipment, including spray nozzles and hoods, and compliance monitoring devices or activities.
    c. The rated and operating efficiency of air pollution control equipment.
    d. Data necessary to establish required efficiency for air pollution control equipment (e.g. air to cloth ratio for baghouses, pressure drop for scrubbers, and warranty information).
    e. Evidence that operation of the new or modified pollution control equipment will not violate any ambient air quality standards, or maximum allowable increases pursuant to Rule 500 of these rules.
15. Equipment manufacturer's bulletins and shop drawings may be acceptable where appropriate.
16. Compliance Plan:
    a. A description of the compliance status of the source with respect to all applicable requirements including, but not limited to:
        1. A demonstration that the source or modification will comply with the applicable requirements contained in Regulation III.
        2. A demonstration that the source or modification will comply with the applicable requirements contained in rules promulgated pursuant to A.R.S.§49-480.03.
        3. A demonstration that the source or modification will comply with the applicable requirements contained in rules promulgated pursuant to A.R.S.§49-480.04.
        4. A demonstration that the source or modification will comply with any voluntarily accepted limitations pursuant to Rule 220 of these rules.
    b. A compliance schedule as follows:
        1. For applicable requirements with which the source is in compliance, a statement that the source will continue to comply with such requirements.
        2. For applicable requirements that will become effective during the permit term, a statement that the source will meet such requirements on a timely

basis. A statement that the source will meet in a timely manner applicable requirements that become effective during the permit term shall satisfy this provision, unless a more detailed schedule is expressly required by the applicable requirement.

3. A schedule of compliance for sources that are not in compliance with all applicable requirements at the time of permit issuance. Such a schedule shall include a schedule of remedial measures, including an enforceable sequence of actions with milestones, leading to compliance with any applicable requirements for which the source will be in noncompliance at the time of permit issuance. This compliance schedule shall resemble and be at least as stringent as that contained in any judicial consent decree or administrative order to which the source is subject. Any such schedule of compliance shall be supplemental to, and shall not sanction noncompliance with, the applicable requirements on which it is based.

c. A schedule for submission of certified progress reports no less frequently than every 6 months for sources required to have a schedule of compliance to remedy a violation.

d. The compliance plan content requirements specified in this paragraph shall apply and be included in the acid rain portion of a compliance plan for an affected source, except as specifically superseded by regulations promulgated under Title IV of the Act with regard to the schedule and method(s) the source will use to achieve compliance with the acid rain emissions limitations.

17. Compliance certification:

a. A certification of compliance with all applicable requirements including voluntarily accepted limitations pursuant to Rule 220 of these rules by a responsible official consistent with Rule 210 or Rule 220 of these rules. The certification shall include:

1. Identification of the applicable requirements which are the basis of the certification.

2. A statement of methods used for determining compliance, including a description of monitoring, recordkeeping, and reporting requirements and test methods.

3. A schedule for submission of compliance certifications during the permit term to be submitted no less frequently than annually, or more frequently if specified by the underlying applicable requirement or by the permitting authority.

4. A statement indicating the source's compliance status with any applicable enhanced monitoring and compliance certification requirements.

5. A certification of truth, accuracy, and completeness pursuant to Rule 210 or Rule 220 of these rules.

b. Acid rain program compliance plan: Sources subject to the Federal acid rain regulations shall use nationally-standardized forms for acid rain portions of permit

applications and compliance plans, as required by regulations promulgated under Title IV of the Act.

18. A new major source as defined in Rule 240 of these rules or a major modification shall submit all information required in this Appendix and information necessary to show compliance with Rule 240 of these rules including, but not limited to:

a. For sources located in a nonattainment area:

1. In the case of a new major source as defined in Rule 240 of these rules or a major modification subject to an emission limitation which is LAER (Lowest Achievable Emission Rate) for that source or facility, the application shall contain a determination of LAER that is consistent with the requirements of the definition of LAER contained in Rule 240 of these rules. The demonstration shall contain the data and information relied upon by the applicant in determining the emission limitation that is LAER for the source or facility for which a permit is sought.
2. In the case of a new major source as defined in Rule 240 of these rules or a major modification subject to the demonstration requirement of Rule 240 of these rules, the applicant shall submit such demonstration in a form that lists and describes all existing major sources owned or operated by the applicant and a statement of compliance with all conditions contained in the permits or conditional orders of each of the sources.
3. In the case of a new major source as defined in Rule 240 of these rules or a major modification subject to the offset requirements described in Rule 240 of these rules, the applicant shall demonstrate the manner in which the new major source or major modification meets the requirements of Rule 240 of these rules.
4. An applicant for a new major source as defined in Rule 240 of these rules or a major modification for volatile organic compounds or carbon monoxide (or both) which will be located in a nonattainment area for ozone or carbon monoxide (or both) shall submit the analysis described in Rule 240 of these rules.

b. For sources located in an attainment area:

1. A demonstration of the manner in which a new major source or major modification which will be located in an attainment area for a pollutant for which the source is classified as a major source as defined in Rule 240 of these rules or the modification is classified as a major modification will meet the requirements of Rule 240 of these rules.
2. In the case of a new major source as defined in Rule 240 of these rules or major modification subject to an emission limitation which is BACT (Best Available Control Technology) for that source or facility, the application shall contain a determination of BACT that is consistent with the requirements of the definition of BACT contained in Rule 100 of these rules. The demonstration shall contain the data and information relied

upon by the applicant in determining the emission limitation that is BACT for the source or facility for which a permit is sought.

3. In the case of a new major source as defined in Rule 240 of these rules or major modification required to perform and submit an air impact analysis in the form prescribed in Rule 240 of these rules, such an analysis shall meet the requirements of Rule 240 of these rules. Unless otherwise exempted in writing by the Control Officer, the air impact analysis shall include all of the information and data specified in Rule 240 of these rules.

4. If an applicant seeks an exemption from any or all of the requirements of Rule 240 of these rules, the applicant shall provide sufficient information and data in the application to demonstrate compliance with the requirements of the subsection(s) under which an exemption is sought.

19. Calculations on which all information requested in this Appendix is based.

REFERENCE 2

INSIGNIFICANT ACTIVITIES LIST

FINAL LIST OF INSIGNIFICANT ELECTRIC UTILITY ACTIVITIES
for Maricopa County Title V and non-Title V Sources

ACTIVITIES

A. Size-Based Exemptions

1. Stationary reciprocating internal combustion engines of 250 or less aggregate horsepower, with no individual internal combustion engine exceeding 50 horsepower.

2. Stationary reciprocating internal combustion engines that are emergency or standby units and are operated less than 200 hours per year.

3. Any source with an aggregated input capacity of less than 2,000,000 Btu per hour calculated by adding only those pieces of equipment over 300,000 Btu per hour with respect to fuel burning equipment fired with natural gas or liquefied petroleum gas.

4. Gas turbines with a maximum heat input of less than 3,000,000 Btu per hour fired with natural gas or liquefied petroleum gas.

B. Laboratories and Pilot Plants

1. Noncommercial (in-house) experimental and analytical laboratory equipment which emit less than 3 pounds of VOCs per day and are bench scale in nature including quality control/quality assurance laboratories supporting an electric utility facility, and research and development laboratories.

2. Small pilot scale research and development projects (on a case-by-case basis).

C. Storage and Distribution

1. Chemical Storage and Process Holding Tanks
   a. Chemical storage tanks and storage areas (List individual tanks/storage areas and chemicals in application; provide threshold values for throughput or capacity for each tank)
   b. Process holding tanks (List individual tanks and chemicals in application; provide threshold values for throughput or capacity for each tank)

2. Storage of butane, propane, or liquefied petroleum gas (List individual storage vessels and contents in application; provide threshold values for throughput or capacity or both for each vessel).

3. Petroleum product storage tanks containing the following substances (List individual tanks and specify substance; provide threshold values for throughput or capacity or both for each tank):
   a. Diesel fuels and fuel oils
   b. Lubricating oil
   c. Transformer oil
   d. Used oil
   e. Fuel storage and dispensing equipment operated solely for company-owned vehicles where the individual storage tank capacity is 250 gallons or less

4. Piping and storage systems for natural gas, propane, and liquefied petroleum gas (Provide system description).

5. Piping of fuel oils, used oil and transformer oil (Provide system description).

6. Storage and handling of drums or other transportable containers where the containers are sealed during storage (includes containers of RCRA waste and used oil).

7. Storage tanks of any size containing exclusively soaps, detergents, waxes, greases, aqueous salt solutions, aqueous acid solutions, or aqueous caustic solutions at ambient temperatures (Specify contents of each storage tank).

D. Water and Wastewater Treatment

1. Water treatment or storage systems for boiler and feedwater.

2. Storage of chemicals (not exempted by C.7 above) associated with water and wastewater treatment where the water is treated for consumption and/or use within the permitted facility (Specify chemical).

3. The collection, transmission, liquid treatment, and solids treatment processes at domestic wastewater and sewage treatment works, or treatment facilities, including septic tank systems, which treat only domestic type wastewater and sewage (Specify size of facility in application).

E. Office/Administrative

1. Housekeeping activities and associated products used for cleaning purposes, including collecting spilled and accumulated materials at the source, including operation of fixed vacuum cleaning systems specifically for such purposes.

2. Air conditioning, cooling, heating or ventilating equipment of less than 500,000 Btu/hour not designed to remove air contaminants generated by or released from associated or other equipment.

3. General office activities, such as paper shredding, copying, photographic activities, and blueprinting, but not to include incineration.

4. Rest room facilities and associated cleanup operations, and stacks or vents used to prevent the escape of sewer gases through plumbing traps.

5. Smoking rooms and areas.

6. Use of consumer products, including hazardous substances as that term is defined in the Federal Hazardous Substances Act (15 U.S.C. 1261 et. seq.) where the product is used at a source in the same manner as normal consumer use.

7. Vacuum cleaning systems where the system is used exclusively for industrial or commercial purposes.

F. Groundskeeping

1. Landscaping and site housekeeping equipment.

2. Fugitive emissions from landscaping activities.

3. Use of pesticides, fumigants, and herbicides.

4. Groundskeeping activities and products.

G. Burning

1. Fire fighting activities and training conducted at the source in preparation for fighting fires (All reporting and permitting requirements that apply to such operations must be followed).
2. Open burning activities (All reporting and permitting requirements that apply to such operations must be followed).
3. Flares used to indicate danger.

H. Roadways (Sources must comply with Maricopa County Rule 310 for Open Fugitive Dust Sources)

1. Activities associated with the construction, repair or maintenance of roads or other paved or open areas, including operation of street sweepers, vacuum trucks, spray trucks and other vehicles related to the control of fugitive emissions of such roads or other areas.
2. Unpaved public and private roadways, except for haul roads located within a stationary source site boundary (pertains to regularly trafficked roadways; will vary according to facility).
3. Road and lot paving operations at commercial and industrial facilities.
4. Street and parking lot striping.
5. Fugitive dust emissions from the operation of a passenger automobile, station wagon, pickup truck, or van at a stationary source.

I. Miscellaneous

1. Cafeterias, kitchens, and other facilities used for preparing food or beverages primarily for consumption at the source.
2. Equipment using water, water and soap or detergent for purposes of cleaning or finishing.
3. Construction and disturbance of surface areas for purposes of land development (Specify dust suppression measures that would likely be used).
4. Activities at a source associated with the maintenance, repair or dismantlement of an emission unit or other equipment installed at the source, including preparation for maintenance, repair or dismantlement and preparation for subsequent startup, including preparation of a shutdown vessel for entry, replacement of insulation, welding and cutting, and steam purging of a vessel prior to startup; also includes maintenance, repair or dismantlement of buildings, utility lines, pipelines, wells, excavations, earthworks and other structures that do not constitute an emission unit (sources must comply with all applicable requirements).
5. Containers, reservoirs, or tanks used exclusively in dipping operations to coat objects with unheated oils, waxes, or greases.
6. Activities directly used in the diagnosis and treatment of disease, injury or other medical condition.
7. Manually operated equipment that is used for buffing, polishing, carving, cutting, drilling, machining, routing, sanding, sawing, surface grinding or turning and associated venting hoods.
8. Wood working equipment with an aggregate horsepower of 50 or less.

9. Individual points of emission or activities as follows:
   a. Individual sampling points, analyzers, and process instrumentation, whose operation may result in emissions.
   b. Individual features of an emission unit, such as each burner and sootblower in a boiler (Aggregate emissions from such individual emission units must be quantified on the Emission Source Form).
   c. Individual test equipment that is transportable or activities within a facility established for testing units prior to sale or for purposes of research.
   d. Properly maintained individual flanges, valves, pump seals, pressure relief valves and other individual components that have the potential for leaks.

10. Brazing, soldering, or welding operations.

11. Battery recharging areas.

12. Aerosol can usage.

13. Plastic pipe welding.

14. Acetylene, butane, and propane torches.

15. Architectural painting and associated surface coating using an aggregate of not more than one gallon per day for maintenance purposes at industrial or commercial facilities.

16. Steam vents, condenser vents and boiler blowdown.

17. Equipment used exclusively for portable steam cleaning with an aggregate heat input of less than 2,000,000 BTU per hour.

18. Blast-cleaning equipment with an aggregate heat input of less than 2,000,000 BTU per hour using a suspension of abrasive in water and any exhaust system or collector serving them exclusively.

19. Surface impoundments, such as ash ponds, cooling ponds, evaporation ponds, settling ponds, and storm water ponds (specify approx. size and contents).

20. Pump/motor oil reservoirs, such as gear box lubrication.

21. Transformer vents.

22. Lubricating system reservoirs.

23. Hydraulic system reservoirs .

24. Adhesive use which is not related to production.

25. Caulking operations which are not part of a production process.

26. Electric motors.

27. Cathodic protection systems.

28. Corona (the arc, halo, or light from high voltage lines, power poles, and insulators which emits ozone).

29. (Item 29 deleted)

30. Safety devices, such as fire extinguishers, if associated with a permitted emission source, but not including sources or continuous emissions (specify activity or device).

31. Freon recovery equipment.

32. Soil gas sampling.

33. Filter draining.

34. General vehicle maintenance and servicing activities at the source.

35. Station transformers.

36. Circuit breakers.

37. Generation unit gas vents (solenoid valves that vent uncombusted natural gas from generation units).

38. Storage cabinets for flammable products.

39. Fugitive emissions from landfill operations.

40. Unheated, non-conveyerized, cleaning or coating equipment that does not include control enclosures: with an open surface area of one square meter or less and an internal volume of 350 liters or less, having an organic solvent loss of three gallons per day or less, or; using only organic solvents with an initial boiling point of 302 degrees F or greater and having an organic solvent loss of three gallons per day or less, or; using materials with a VOC content of two percent or less by volume.

REFERENCE 3

ACID RAIN PROGRAM – PHASE II PERMIT APPLICATION AND CERTIFICATE OF REPRESENTATION

United States
Environmental Protection Agency
Acid Rain Program

OMB No. 2060-0258

Phase II Permit Application

For more information, see instructions and refer to 40 CFR 72.30 and 72.31

This submission is: [X] New [ ] Revised

STEP 1
Identify the source by plant name, State, and ORIS code from NADB

Gila Bend Power Generation Station	AZ	*

STEP 2
Enter the boiler ID# from NADB for each affected unit, and indicate whether a repowering plan is being submitted for the unit by entering "yes" or "no" at column c. For new units, enter the requested information in columns d and e

a	b	c	d	e
Boiler ID#	Compliance Plan: Unit Will Hold Allowances in Accordance with 40 CFR 72.9(c)(1)	Compliance Plan: Repowering Plan	New Units: Commence Operation Date	New Units: Monitor Certification Deadline
*	Yes		03/01/03	06/01/03
*	Yes		03/01/03	06/01/03
*	Yes		03/01/03	06/01/03
	Yes			
	Yes			
	Yes			
	Yes			
	Yes			
	Yes			
	Yes			
	Yes			
	Yes			

* Will provide ORIS Code and Unit IDs when recieved from EIA.

STEP 3
Check the box if the response in column c of Step 2 is "Yes" for any unit

[ ] For each unit that will be repowered, the Repowering Extension Plan form is included and the Repowering Technology Petition form has been submitted or will be submitted by June 1, 1997.

Gila Bend Power Generation Station
Plant Name (from Step 1)

STEP 4
Read the standard requirements and certification, enter the name of the designated representative, and sign and date

Standard Requirements

Permit Requirements.

(1) The designated representative of each affected source and each affected unit at the source shall:
(i) Submit a complete Acid Rain permit application (including a compliance plan) under 40 CFR part 72 in accordance with the deadlines specified in 40 CFR 72.30; and
(ii) Submit in a timely manner any supplemental information that the permitting authority determines is necessary in order to review an Acid Rain permit application and issue or deny an Acid Rain permit;
(2) The owners and operators of each affected source and each affected unit at the source shall:
(i) Operate the unit in compliance with a complete Acid Rain permit application or a superseding Acid Rain permit issued by the permitting authority; and
(ii) Have an Acid Rain Permit.

Monitoring Requirements.

(1) The owners and operators and, to the extent applicable, designated representative of each affected source and each affected unit at the source shall comply with the monitoring requirements as provided in 40 CFR parts 74, 75, and 76.
(2) The emissions measurements recorded and reported in accordance with 40 CFR part 75 shall be used to determine compliance by the unit with the Acid Rain emissions limitations and emissions reduction requirements for sulfur dioxide and nitrogen oxides under the Acid Rain Program.
(3) The requirements of 40 CFR parts 74 and 75 shall not affect the responsibility of the owners and operators to monitor emissions of other pollutants or other emissions characteristics at the unit under other applicable requirements of the Act and other provisions of the operating permit for the source.

Sulfur Dioxide Requirements.

(1) The owners and operators of each source and each affected unit at the source shall:
(i) Hold allowances, as of the allowance transfer deadline, in the unit's compliance subaccount (after deductions under 40 CFR 73.34(c)) not less than the total annual emissions of sulfur dioxide for the previous calendar year from the unit; and
(ii) Comply with the applicable Acid Rain emissions limitations for sulfur dioxide.
(2) Each ton of sulfur dioxide emitted in excess of the Acid Rain emissions limitations for sulfur dioxide shall constitute a separate violation of the Act.
(3) An affected unit shall be subject to the requirements under paragraph (1) of the sulfur dioxide requirements as follows:
(i) Starting January 1, 2000, an affected unit under 40 CFR 72.6(a)(2); or
(ii) Starting on the later of January 1, 2000 or the deadline for monitor certification under 40 CFR part 75, an affected unit under 40 CFR 72.6(a)(3).
(4) Allowances shall be held in, deducted from, or transferred among Allowance Tracking System accounts in accordance with the Acid Rain Program.
(5) An allowance shall not be deducted in order to comply with the requirements under paragraph (1)(i) of the sulfur dioxide requirements prior to the calendar year for which the allowance was allocated.
(6) An allowance allocated by the Administrator under the Acid Rain Program is a limited authorization to emit sulfur dioxide in accordance with the Acid Rain Program. No provision of the Acid Rain Program, the Acid Rain permit application, the Acid Rain permit, or the written exemption under 40 CFR 72.7 and 72.8 and no provision of law shall be construed to limit the authority of the United States to terminate or limit such authorization.
(7) An allowance allocated by the Administrator under the Acid Rain Program does not constitute a property right.

Nitrogen Oxides Requirements. The owners and operators of the source and each affected unit at the source shall comply with the applicable Acid Rain emissions limitation for nitrogen oxides.

Excess Emissions Requirements.

(1) The designated representative of an affected unit that has excess emissions in any calendar year shall submit a proposed offset plan, as required under 40 CFR part 77.
(2) The owners and operators of an affected unit that has excess emissions in any calendar year shall:
(i) Pay without demand the penalty required, and pay upon demand the interest on that penalty, as required by 40 CFR part 77; and
(ii) Comply with the terms of an approved offset plan, as required by 40 CFR part 77.

Recordkeeping and Reporting Requirements.

(1) Unless otherwise provided, the owners and operators of the source and each affected unit at the source shall keep on site at the source each of the following documents for a period of 5 years from the date the document is created. This period may be extended for cause, at any time prior to the end of 5 years, in writing by the Administrator or permitting authority:
(i) The certificate of representation for the designated representative for the source and each affected unit at the source and all documents that demonstrate the truth of the statements in the certificate of representation, in accordance with 40 CFR 72.24; provided that the certificate and documents shall be retained on site at the source beyond such 5-year period until such documents are superseded because of the submission of a new certificate of representation changing the designated representative;
(ii) All emissions monitoring information, in accordance with 40 CFR part 75;
(iii) Copies of all reports, compliance certifications, and other submissions and all records made or required under the Acid Rain Program; and,
(iv) Copies of all documents used to complete an Acid Rain permit application and any other submission under the Acid Rain Program or to demonstrate compliance with the requirements of the Acid Rain Program.

(2) The designated representative of an affected source and each affected unit at the source shall submit the reports and compliance certifications required under the Acid Rain Program, including those under 40 CFR part 72 subpart I and 40 CFR part 75.

Gila Bend Power Generation Station
Plant Name (from Step 1)

Liability.

(1) Any person who knowingly violates any requirement or prohibition of the Acid Rain Program, a complete Acid Rain permit application, an Acid Rain permit, or a written exemption under 40 CFR 72.7 or 72.8, including any requirement for the payment of any penalty owed to the United States, shall be subject to enforcement pursuant to section 113(c) of the Act.
(2) Any person who knowingly makes a false, material statement in any record, submission, or report under the Acid Rain Program shall be subject to criminal enforcement pursuant to section 113(c) of the Act and 18 U.S.C. 1001
(3) No permit revision shall excuse any violation of the requirements of the Acid Rain Program that occurs prior to the date that the revision takes effect.
(4) Each affected source and each affected unit shall meet the requirements of the Acid Rain Program.
(5) Any provision of the Acid Rain Program that applies to an affected source (including a provision applicable to the designated representative of an affected source) shall also apply to the owners and operators of such source and of the affected units at the source.
(6) Any provision of the Acid Rain Program that applies to an affected unit (including a provision applicable to the designated representative of an affected unit) shall also apply to the owners and operators of such unit. Except as provided under 40 CFR 72.44 (Phase II repowering extension plans) and 40 CFR 76.11 (NO_x averaging plans), and except with regard to the requirements applicable to units with a common stack under 40 CFR part 75 (including 40 CFR 75.16, 75.17, and 75.18), the owners and operators and the designated representative of one affected unit shall not be liable for any violation by any other affected unit of which they are not owners or operators or the designated representative and that is located at a source of which they are not owners or operators or the designated representative.
(7) Each violation of a provision of 40 CFR parts 72, 73, 74, 75, 76, 77, and 78 by an affected source or affected unit, or by an owner or operator or designated representative of such source or unit, shall be a separate violation of the Act.

Effect on Other Authorities. No provision of the Acid Rain Program, an Acid Rain permit application, an Acid Rain permit, or a written exemption under 40 CFR 72.7 or 72.8 shall be construed as:

(1) Except as expressly provided in title IV of the Act, exempting or excluding the owners and operators and, to the extent applicable, the designated representative of an affected source or affected unit from compliance with any other provision of the Act, including the provisions of title I of the Act relating to applicable National Ambient Air Quality Standards or State Implementation Plans;
(2) Limiting the number of allowances a unit can hold; *provided*, that the number of allowances held by the unit shall not affect the source's obligation to comply with any other provisions of the Act;
(3) Requiring a change of any kind in any State law regulating electric utility rates and charges, affecting any State law regarding such State regulation, or limiting such State regulation, including any prudence review requirements under such State law;
(4) Modifying the Federal Power Act or affecting the authority of the Federal Energy Regulatory Commission under the Federal Power Act; or,
(5) Interfering with or impairing any program for competitive bidding for power supply in a State in which such program is established.

Certification

I am authorized to make this submission on behalf of the owners and operators of the affected source or affected units for which the submission is made. I certify under penalty of law that I have personally examined, and am familiar with, the statements and information submitted in this document and all its attachments. Based on my inquiry of those individuals with primary responsibility for obtaining the information, I certify that the statements and information are to the best of my knowledge and belief true, accurate, and complete. I am aware that there are significant penalties for submitting false statements and information or omitting required statements and information, including the possibility of fine or imprisonment.

Name Robert A. Innamorati	
Signature Robert A. Innamorati	Date 3-29-00

STEP 5 (optional)
Enter the source AIRS and FINDS identification numbers, if known

AIRS
FINDS

United States
Environmental Protection Agency
Acid Rain Program

OMB No. 2060-0258

Certificate of Representation

For more information, see instructions and refer to 40 CFR 72.24

This submission is: [X] New [ ] Revised (revised submissions must be completed in full; see instructions)

This submission includes combustion or process sources under 40 CFR part 74 [ ]

STEP 1
Identify the source by plant name, State, and ORIS code.

Plant Name	State	ORIS Code
Gila Bend Power Generation Station	AZ	*

* Will provide ORIS Code ans Unit IDs when received from EIA.

STEP 2
Enter requested information for the designated representative.

Name: Robert A. Innamorati	
Address: Power Development Enterprises, Inc. 5949 Sherry Lane, Suite 1880 Dallas, TX 75225	
Phone Number: (214) 210-5080	Fax Number: (214) 210-5079
E-mail address (if available)	

STEP 3
Enter requested information for the alternate designated representative, if applicable.

Name: Not Available	
Phone Number	Fax Number
E-mail address (if available)	

STEP 4
Complete Step 5, read the certifications, and sign and date. For a designated representative of a combustion or process source under 40 CFR part 74, the references in the certifications to "affected unit" or "affected units" also apply to the combustion or process source under 40 CFR part 74 and the references to "affected source" also apply to the source at which the combustion or process source is located.

I certify that I was selected as the designated representative or alternate designated representative, as applicable, by an agreement binding on the owners and operators of the affected source and each affected unit at the source.

I certify that I have given notice of the agreement, selecting me as the 'designated representative' for the affected source and each affected unit at the source identified in this certificate of representation, in a newspaper of general circulation in the area where the source is located or in a State publication designed to give general public notice.

I certify that I have all necessary authority to carry out my duties and responsibilities under the Acid Rain Program on behalf of the owners and operators of the affected source and of each affected unit at the source and that each such owner and operator shall be fully bound by my actions, inactions, or submissions.

I certify that I shall abide by any fiduciary responsibilities imposed by the agreement by which I was selected as designated representative or alternate designated representative, as applicable.

I certify that the owners and operators of the affected source and of each affected unit at the source shall be bound by any order issued to me by the Administrator, the permitting authority, or a court regarding the source or unit.

Where there are multiple holders of a legal or equitable title to, or a leasehold interest in, an affected unit, or where a utility or industrial customer purchases power from an affected unit under life-of-the-unit, firm power contractual arrangements, I certify that:

I have given a written notice of my selection as the designated representative or alternate designated representative, as applicable, and of the agreement by which I was selected to each owner and operator of the affected source and of each affected unit at the source; and

Allowances and the proceeds of transactions involving allowances will be deemed to be held or distributed in proportion to each holder's legal, equitable, leasehold, or contractual reservation or entitlement or, if such multiple holders have expressly provided for a different distribution of allowances by contract, that allowances and the proceeds of transactions involving allowances will be deemed to be held or distributed in accordance with the contract.

The agreement by which I was selected as the alternate designated representative, if applicable, includes a procedure for the owners and operators of the source and affected units at the source to authorize the alternate designated representative to act in lieu of the designated representative.

Gila Bend Power Generation Station	Certificate - Page 2
Plant Name (from Step 1)	Page 2 of 2

I am authorized to make this submission on behalf of the owners and operators of the affected source or affected units for which the submission is made. I certify under penalty of law that I have personally examined, and am familiar with, the statements and information submitted in this document and all its attachments. Based on my inquiry of those individuals with primary responsibility for obtaining the information, I certify that the statements and information are to the best of my knowledge and belief true, accurate, and complete. I am aware that there are significant penalties for submitting false statements and information or omitting required statements and information, including the possibility of fine or imprisonment.

Signature (designated representative)	Date
	3-29-00
Signature (alternate designated representative)	Date

STEP 5
Provide the name of every owner and operator of the source and identify each affected unit (or combustion or process source) they own and/or operate.

Power Development Enterprises, Inc. Name					☒ Owner	☐ Operator
ID#	ID#	ID#	ID#	ID#	ID#	ID#
ID#	ID#	ID#	ID#	ID#	ID#	ID#

Name					☐ Owner	☐ Operator
ID#	ID#	ID#	ID#	ID#	ID#	ID#
ID#	ID#	ID#	ID#	ID#	ID#	ID#

Name					☐ Owner	☐ Operator
ID#	ID#	ID#	ID#	ID#	ID#	ID#
ID#	ID#	ID#	ID#	ID#	ID#	ID#

Name					☐ Owner	☐ Operator
ID#	ID#	ID#	ID#	ID#	ID#	ID#
ID#	ID#	ID#	ID#	ID#	ID#	ID#

REFERENCE 4

EMISSION RATE CALCULATIONS

APPENDIX TABLE A-1
EMISSIONS SUMMARY TABLE

GILA BEND POWER GENERATION PROJECT
GILA BEND, ARIZONA

(All emissions based on data obtained by Industrial Power Technology, unless otherwise noted)

Parameters	Single Combustion Turbine					Auxiliary Boiler	Diesel Generator	Diesel Fire Pump	Cooling Tower [2]
Load Condition	Base - 100%			75%		105%	100%	100%	
Ambient Temperature, F	13	66.3	121	13	66.3		--	--	
Fuel Type	Natural Gas[6]						Diesel Fuel		--
Power Output, kW	181,200	170,600	166,506	135,900	121,200	--	500 kW	400 BHP	
Heat Input, (LHV) MMBtu/hr	1,546	1,579	1,671	1,346	1,234	26.0	5.6	3.0	
Operating Time, hrs/yr	8,760					8,760	500		8,760
Emissions:									
NO_X, ppm [1]	3.0	3.0	3.0	3.0	3.0	--			
NO_X, lb/MMBtu	0.0129	0.0120	0.0111	0.0123	0.0122	0.120	--	--	
Total NO_X as NO_2, lb/hr	20.0	19.0	18.5	16.5	15.0	3.11	15.5	12.40	
Total NO_X as NO_2, TPY	87.6	83.2	81.0	72.3	65.7	13.62	3.88	3.10	
CO, ppm	17.0	15.1	13.6	16.9	15.1	--			
CO, lb/MMBtu	0.0328	0.0301	0.0278	0.0301	0.0304	0.152	--	--	
Total CO, lbs/hr	50.7	47.6	46.5	40.5	37.6	3.95	3.34	2.67	
Total CO, TPY	222.1	208.3	203.5	177.2	164.5	17.30	0.83	0.67	
SO_2, lbs/MMBtu	0.0026	0.0023	0.0022	0.0023	0.0024	0.001	--	--	--
Total SO_2, lbs/hr	4.0	3.70	3.65	3.15	2.90	0.03	1.03	0.82	
Total SO_2, TPY	17.3	16.2	16.0	13.8	12.7	0.13	0.26	0.21	
VOC, ppm (as methane)	1.40	1.40	1.40	1.40	1.40	--			
VOC, lb/MMBtu	0.0019	0.0018	0.0016	0.0017	0.0018	0.016	--	--	
Total VOC, lbs/hr	2.9	2.8	2.7	2.3	2.2	0.42	1.24	0.99	
Total VOC, TPY	12.8	12.1	11.9	10.2	9.5	1.84	0.31	0.248	
TSP, lb/MMBtu [4,5]	0.018	0.018	0.017	0.021	0.023	0.0102	--	--	
TSP, lb/hr [3]	28.00	28.00	28.00	28.00	28.00	0.26	1.10	0.88	11.14
% that is PM_{10} [3]	100%					100%	100%	100%	0%
Total PM_{10} Portion, lb/hr	28.00	28.00	28.00	28.00	28.00	0.26	1.10	0.88	0.00
TSP, TPY	122.6	122.6	122.6	122.6	122.6	1.16	0.28	0.220	48.80
PM_{10} Portion, TPY	122.6	122.6	122.6	122.6	122.6	1.16	0.28	0.220	0.0
Stack Parameters:									
Base Elevation, ft	678								
Site Pressure, psia	14.46								
Height, ft	165					95			50
Diameter, ft	18					2.0			30.3 (Fan)
Flow @ Base Load, lb/hr	3,718,000	3,506,000	3,437,000	2,967,000	2,766,000	--	--	--	--
Flow @ Base Load, acfm	996,043	926,936	932,656	776,039	706,870	6,597			1,297,919
Exhaust Temp., F	216	205	221	200	183	450			70
Velocity, fps	65.2	60.7	61.1	50.8	46.3	35.0			30.0 /cell

Note:

(1) Concentration reflects NOx emissions from SCR technology for the CT.

(2) Emissions were calculated using drift to circulating water ratio of 0.003% and a TDS of 12,000 ppm. Also Calculations are based on a single cooling tower per turbine with 4 cells per cooling tower.

(3) According to AP-42, Chapter 3, all PM emissions for uncontrolled natural gas combustion and diesel industrial engines are considered less than 1 micrometer, and therefore 100% is considered PM10.

(4) Cooling tower PM emissions are considered 100% TSP according to the EPRI Report titled, "User's Manual: Cooling-Tower-Plume Prediction Code", Section 4, pg. 4-1

(5) Combustion turbine particulate emissions take into account the backend emissions as referred to in the EPA Method 5 testing protocol for combustion turbines.

(6) Emissions are based on firing pipeline quality natural gas.

APPENDIX TABLE A-2
MAXIMUM HAZARDOUS AIR POLLUTANT (HAP) CALCULATIONS

GILA BEND POWER GENERATION PROJECT
GILA BEND, ARIZONA

				CT Generators (Total)	Auxiliary Boiler	Diesel Emergency Generator	Diesel Fire Pump	Facility Total HAPs Emissions
Annual Operation				8,760 hrs/yr	8,760 hrs/yr	500 hrs/yr	500 hrs/yr	
Fuel Type				Natural Gas		Diesel Fuel		
Heat Input (HHV)				1,671 MMBtu/hr	26 MMBtu/hr	5.6 MMBtu/hr	3.0 MMBtu/hr	--
Number of Units				3	1	1	1	
HAPs Pollutant Emitted	Emission Factors from Natural Gas-Fired Turbines (lb/MMBtu)	Emission Factors from Natural Gas Combustion (lb/MMBtu)	Diesel Engines Uncontrolled Emission Factors (lb/MMBtu)	Annual Emissions (TPY)	Annual Emissions (TPY)	Annual Emissions (TPY)	Annual Emissions (TPY)	Annual Emissions (TPY)
1,3-Butadiene	4.31E-07	--	3.91E-05	0.009	--	trace	trace	0.009
2-Methynaphthalene	--	2.35E-08	--	--	trace	--	--	0.000
Acetaldehyde	7.84E-05	--	7.67E-04	1.722	--	0.001	trace	1.723
Acrolein	7.75E-06	--	9.25E-05	0.170	--	trace	trace	0.170
Benzene	1.37E-04	2.06E-06	9.33E-04	3.013	trace	0.001	trace	3.014
Dichlorobenzene	--	1.18E-06	--	--	trace	--	--	0.000
Ethylbenzene	2.35E-05	--	--	0.516	--	--	--	0.516
Flouranthene	--	2.94E-09	--	--	--	--	--	--
Flouene	--	1.18E-06	--	--	--	--	--	--
Formaldehyde[4]	7.10E-04	7.35E-05	1.18E-03	15.585	0.008	0.002	trace	15.595
Hexane	--	1.76E-03	--	--	0.201	--	--	0.201
Naphthalene	1.37E-04	5.98E-07	8.48E-05	3.013	trace	trace	trace	3.013
NDMA	2.25E-07	--	--	0.005	--	--	--	0.005
NMOR	2.25E-07	--	--	0.005	--	--	--	0.005
PAHs	1.76E-04	--	--	3.874	--	--	--	3.874
Phenanathrene	--	1.67E-08	--	--	trace	--	--	0.000
Propylene	--	--	2.58E-03	--	--	0.004	0.002	0.006
Propylene Oxide	2.84E-05	--	--	0.624	--	--	--	0.624
Pyrene	--	4.90E-09	--	--	trace	--	--	0.000
Toluene	1.27E-04	3.33E-06	4.09E-04	2.798	trace	trace	trace	2.798
TMA	1.67E-07	--	--	0.004	--	--	--	0.004
Xylenes	2.65E-05	--	2.85E-04	0.581	--	trace	trace	0.581
Total				31.918	0.209	0.008	0.002	32.137

Note:
(1) Emission factors obtained from the 3/98 AP-42 Supplemental D. Fifth Edition for Natural Gas Combustion
(2) Only the significant emission factors were taken from the list of Speciated Organic Compounds
(3) Emission factor is based on AP-42 Table 3.1-3, Emission Factors for Hazardous Air Pollutants from Natural Gas-Fired Turbines, 5/1998
(4) Emission factor is based on AP-42 Table 3.1-3, revised per discussion with EPA on 3/17/2000

0.001911765

Calculation Equation:

Annual Emissions (tpy) :

(Fuel Usage)(Heating Value)(Emission Factor/10^6)(Hours of Operation)(tons/2000lbs)(No. of units)

APPENDIX TABLE A-3
CTG Sample Air Flow

GILA BEND POWER GENERATION PROJECT
GILA BEND, ARIZONA

Sample of a Single Turbine Mass Flow Rate to Volumetric Flow Rate Conversion

Paramters:

Load Condition = *Base*
Ambient Temp., F = *13*
Exhaust Temp., F = *216*
Exhaust Temp., R = 676
Pressure, psia = *14.46*

Constant R = 0.73 atm-cf/lbmol-R
Exhaust Mass Flow Rate, lb/hr = *3,718,000*
Pressure, atm. = 0.984

Component	MW	% in Exhaust	lb/lbmoles	lbmoles/hr	Q (acfm)
$Ar+N_2$	31.72	*75.97%*	24.10		
O_2	32.00	*12.72%*	4.07		
CO_2	44.01	*3.80%*	1.67		
H_2O	18.02	*7.51%*	1.35		
Total			31.20	119,167	**996,043**

* *Italisized* indicates information provided by Industrial Power Technology, Inc.

APPENDIX TABLE A-4
COOLING TOWER EMISSION CALCULATIONS

GILA BEND POWER GENERATION PROJECT
GILA BEND, ARIZONA

Potential Cooling Tower Emission Calculations [2]

Circulating Water Flow (gpm) [3]	Water Density (lbs/gal)	Percent Drift from Coolant (%)	Assumed TDS [1] (PPM)	Estimated TSP Emissions (lbs/ hr)
181.800/ tower	8.345	0.003	4.080	**11.14**

Note:

(1) TDS based on 12.000 PPM from AP-42, Chapter 13 and then subsequently reduced by 34% to account for actual particulate in the TSP range of 10 to 100 microns. This size distribution was reported in an EPRI document called that all particle User's Manual: Cooling-Tower-Plume Prediction Code, Table 4-1, pg. 4-4. The EPRI document also states emissions are above 10 microns.

(2) Emissions are per cooling tower per turbine.

(3) Per cooling tower with 4 cells.

APPENDIX TABLE A-5
Controlled Estimated
Maximum Emission Data Set

GILA BEND POWER GENERATION PROJECT
GILA BEND, ARIZONA

obtained by Industrial Power Technology, unless otherwise noted)

Parameters	CTG (Per Unit)	Auxiliary Boiler	Diesel Generator	Diesel Fire Pump	Cooling[1] Tower	Total Facility[2] Annual Emissions
Load Condition	Base - 100%	--	--	--	--	--
Ambient Temperature, F	13					
Fuel Type	Natural Gas	Nat. Gas	No. 2 Fuel Oil			
Power Output, kW	181,200	--	500 kW	400 BHP		
Heat Input, (HHV) MMBtu/hr	1546.0	26.0	5.60	3.02	--	
Operating Time, hrs/yr	8,760	8,760	500	500	8,760	
Emissions:						
NO_x, ppmvd @ 15% O_2	3.0	0.12 lb/MMBtu	--	--		
NO_x as NO_2, lbs/hr	20.0	3.11	15.50	12.40		--
NO_x as NO_2, TPY	87.6	13.63	3.88	3.10		283.4
CO, ppmvd @ 15% O_2	17.0	0.152 lb/MMBtu	--	--		
CO, lbs/hr[3]	50.7	3.95	3.34	2.67		--
CO, TPY	222.1	17.31	0.84	0.67		685.1
SO_2, lbs/MMBtu[3]	0.003	0.001	--	--	--	
SO_2, lbs/hr	4.0	0.03	1.03	0.82		--
SO_2, TPY[3]	17.4	0.14	0.26	0.210		52.8
VOC or UHC, ppmvw @ 15% O_2	1.40	0.016 lb/MMBtu	--	--		
VOC or UHC, lbs/hr	2.93	0.42	1.24	0.99		--
VOC or UHC, TPY	12.9	1.84	0.31	0.25		41.1
PM_{10}, lb/hr	28.00	0.26	1.10	0.88		
PM_{10}, TPY	122.70	1.16	0.28	0.22	--	369.8
TSP, lb/hr	28.00	0.26	1.10	0.88	11.14	
TSP, TPY	122.70	1.16	0.28	0.22	48.81	516.2
Stack Parameters:						
Base Elevation, ft	678					
Height, ft	165	95	--	--	50	
Diameter, ft	18	2			30 (Fan)	
Flow @ Base Load, lb/hr	3,718,000	--			--	
Flow @ Base Load, acfm	996,043	6,597			1,297,919 /cell	
Exhaust Temp., F	173	450			70	

Note:

(1) Emissions were calculated using drift to circulating water ratio of 0.003% and a TDS of 12,000 ppm. Also Calculations are based on a single cooling tower per turbine with 4 cells per cooling tower

(2) Total Emissions includes the total emissions for three turbines, three duct burners, three cooling towers, one auxiliary boiler, one diesel generator, and one diesel fire pump.

(3) Sulfuric acid mist according to the AP-42 5/98 draft for Stationary Gas Turbines, states that "trace to low amounts of SO_2 are emitted from gas turbines. Other oxides of sulfur will only appear in a significant quantity if heavy oils are fired in the turbine." Therefore the formation of sulfuric acid mist is deemed to be in insignificant with natural gas combustion

LAWRENCE COUNTY POWER PROJECT
LAWRENCE COUNTY, INDIANA

Sample Calculations

I. Air Flow Determination: Convert the mass flow rate of the CTG with ductburners on to acfm at 10F and at base load.
Solution:
Using ideal gas law;

$$Q_{acfm} = \left(\frac{(N_{CTG+DB}) \times (0.73 \text{ atm-cf/lbmol-R}) \times (173+460 \text{ R})}{(P_{site} \text{ atm}) \times (60 \text{ min/hr})} \right)$$

where,

P_{site} = (14.36 psia) x (1 atm/ 14.7 psia)
= 0.977 atm

$N_{CTG+DB} = Q_{mass} / M.W._{exhaust}$ = (3,788,000 lb/hr) / (28.46 lb/lbmole *(M.W. calculated from vendor supplied performance sheets)*
= 133,099.1 lbmole/hr

where,

$Q_{mass} = Q_{CTG} + Q_{ductburner}$ = 3,763,000 lb/hr + 25,000 lb/hr *(Vendor supplied data)*
= 3,788,000 lb/hr

Therefore,
$Q_{exhaust}$ = **1,049,194 ft^3/ min**

II. CO Concentration: CO concentration is calculated similar to statement II, except $M.W._{CO}$ = 28 lb/lbmol

III. SO_2 Concentration: Calculate SO_2 mass emissions at 10 F (ambient) and at base load for a CTG with ductburners on.
Solution:
Given;
Emission factor = 0.006 lb/MMBtu {emission factor taken from AP-42, Supplemental D with a factor of safety of 10 added}

$Q_{SO2, mass}$ = (emission factor) x (combined heat input of CTG and DB)
= (0.006 lb/MMBtu) x (1,698 + 300 MMBtu/hr)
= **11.99 lb/hr**

IV. VOC Concentration: VOC concentration is calculated similar to statement II, except $M.W._{(as\ methane)\ CH4}$ = 16 lb/lbmol

V. Ammonia Emissions: NH_3 is based on a conservative maximum emission of 10 PPM and the following EPA equation from AP-42 Appendix A.

$$TPY = \frac{C_{PPM} \left[NH_3 \text{ M.W.} \right] \times (\text{Air Flow, acfm}) \times \left(\frac{520 \text{ R}}{(460 +} \right) \times \left(\frac{14.36}{14.7 \text{ psia}} \right) \times (60 \text{ min/hr}) \times (8{,}760 \text{ hrs/ year})}{\left[385.1 \times 10^6 \right] \times (2{,}000 \text{ lbs/ ton})}$$

REFERENCE 5

BACT ANALYSIS

This section presents the Best Available Control Technology (BACT) analysis for each pollutant emitted at the Gila Bend Power Generation Project (GBPGP) which is subject to the PSD Regulations. The PSD regulations require new major stationary sources to apply BACT to each emission unit which is subject to regulation under the Clean Air Act and which has the potential to emit air pollutants in significant amounts as defined by 40CFR52.21. The PSD regulations are applicable to sources located in attainment areas only. The GBPGP will be located in an attainment area for all criteria pollutants.

BACT is essentially an emission limitation based on the maximum degree of reduction for each pollutant, on a case-by-case basis, taking into account technical feasibility, energy, environmental, and economic impacts. In no event can the application of BACT result in the emission of any pollutant that would exceed the emissions allowed by an applicable NSPS or NESHAP. BACT is defined in the Clean Air Act as a numerical emission limit. This numerical limit can be based on the application of air pollution control equipment, specific production processes, methods, systems or techniques, or fuel cleaning or combustion techniques.

5.1 POLLUTANT APPLICABILITY

The proposed GBPGP is a major PSD source as described in Section 18. The pollutants subject to review under the PSD regulations, and for which a BACT analysis is required include nitrogen oxides (NO_X), sulfur dioxide (SO_2), carbon monoxide (CO), total suspended particulates (TSP), particulates less than or equal to 10 microns in diameter (PM_{10}), and volatile organic compounds (VOC).

Hazardous air pollutants (HAPs) are emitted from this facility but are not subject to review under the PSD regulations. HAPs previously regulated by Section 112 of the National Emissions Standards for Hazardous Air Pollutants

(NESHAPS) and Section 111 of the New Source Performance Standards (NSPS) program, are exempt from Federal PSD applicability because these HAPs are now regulated under Title III of the 1990 Clean Air Act Amendments.[1]

Though a BACT analysis is not required for each of these Section 111 or 112 pollutants, the effectiveness of a particular control technology on each HAP emitted must be evaluated. For the GBPGP, these HAPs primarily include formaldehyde and hexane, as well as trace amounts of other HAPs listed on the Combustion Air Toxic Emissions Table in Appendix A.

5.2 EMISSION UNITS APPLICABILITY

The emission units and the pollutants for which a BACT analysis is required include:

- Combustion turbines, auxiliary boiler, emergency diesel generators, diesel fire pump, and fuel preheaters - NO_X, SO_2, CO, TSP/PM_{10}, VOC
- Cooling Towers – TSP/PM_{10}

5.3 BACT ANALYSIS APPROACH

Under the PSD program, newly constructed and modified major sources in areas with satisfactory air quality, i.e., attainment areas, must implement BACT. In contrast, new and modified sources in areas with poor air quality, i.e., non-attainment areas, must implement the lowest achievable emission rate (LAER) (existing sources in poor air quality areas must implement reasonably available control technology [RACT]). The area surrounding the GBPGP is an attainment area; therefore the BACT process is followed as outlined in the EPA draft

[1] Memorandum, Seitz, John/Environmental Protection Agency to Smith, Winston/Environmental Protection Agency concerning Davidson Exterior Trim/Textron, February 3, 1989

document "New Source Review Workshop Manual" (EPA, February, 1996). The five steps involved in a BACT analysis are:

- & Identification of all available control options with practical potential for application to the specific emission unit for the regulated pollutant under evaluation.
- & Elimination of technically infeasible or unavailable technology options.
- & Ranking remaining control technologies based on control effectiveness.
- & Evaluation of most effective control technologies and documentation of results.
- & Selection of BACT

Best Available Control Technology (BACT) is defined in 42 U.S.C. & 7479, provision within the Clean Air Act as follows:

"[BACT] means an emission limitation based on the maximum degree of reduction of each pollutant subject to regulation under this chapter emitted from or which results from any major emitting facility, which the permitting authority, on a case-by-case basis, taking into account energy, environmental, and economic impacts and the other costs, determines is achievable for such facility through application of production processes and available methods, systems and techniques..."

Economic as well as energy and environmental impacts are considered in a top down BACT analysis, the top down BACT approach must not only look at the most stringent emission limits previously approved, but it also must evaluate all demonstrated and potentially applicable technologies, including innovative controls, lower polluting processes, etc. These technologies and emission limits are identified through a review of EPA's RACT/BACT/LAER Clearinghouse (RLBC). A discussion of this approach is provided in Appendix B. If the proposed BACT is equivalent to the most stringent emission limit, no further analysis is necessary. However, if the most stringent emission limit is not selected, additional analyses are required.

Once the most stringent emission limit has been identified, its technical feasibility must be determined. In general, a control option is considered applicable if it has been, or is soon to be, developed on the same or similar source type. A control technique is considered available if it has reached the licensing and commercial sales stage of development. A technology that is available and is applicable to the source under review is considered technically feasible. If a control technique is not applicable or is technically or economically infeasible for the source in question, the next most stringent technology is evaluated. The process continues until an emission control technology cannot be eliminated. If a control technology is technically and economically feasible and provides the most stringent emission level, that control is considered BACT unless energy or environmental impacts preclude its use.

The determination of what ultimately constitutes BACT is left to the State Regulatory Agency in which the emissions unit will operate. This allows State regulatory agencies to consider the weight or emphasis to be placed on the energy, environmental and economic impacts of control. The State regulatory agency may consider the size of the plant, the increment of air quality which will be absorbed by any particular major emitting facility, and such other considerations as anticipated and desired economic growth for the area. For the GBPGP, the Air Quality Division of Maricopa County Environmental Services Department will determine BACT for the project.

5.3.1 Impact Analysis of Control Alternatives

If the most stringent technically feasible emission limitation is not selected as BACT, justification must be provided in terms of adverse environmental, energy, or economic impacts. The net environmental impact is the first analysis performed for each alternative. Both beneficial impacts and adverse

impacts should be discussed and qualified/quantified where possible. All air pollutants should be included in the analysis, including air pollutants not currently regulated under the Clean Air Act. Therefore, an analysis of unregulated air pollutants and their potential impact is required as part of the BACT analysis.

The second analysis involves energy impacts. The direct energy impacts of the control alternatives are estimated in terms of energy consumption (BTUs, kWh, etc.). In addition, the impacts of relying on scarce fuels must be considered because of the possibility of a change in availability in subsequent years.

The third analysis involves evaluating the economic impacts of control alternatives with primary consideration to the cost effectiveness (dollars per ton of pollutant removed) for each option. The analysis generally includes an estimate of the capital and annualized costs for each alternative based on vendor quotes and established USEPA cost-estimating procedures. The analysis addresses both average and incremental cost effectiveness for each alternative. Details of the costing methodology are provided in Appendix C.

5.3.2 Enforceability

An emission limit must be proposed for each emission unit subject to BACT and the emission limit must be federally enforceable. The emission limit must be short-term and specific such that regulatory agency personnel can determine compliance at any time.

5.3.3 Selection of Alternative Control Systems

The following alternative control systems were considered in the BACT

analysis for the three combustion turbine generators (CTGs), the auxiliary boiler, the emergency diesel generators, and the diesel fire pump:

- **NO_X**

  Combination of Dry Low NO_X (DLN) Combustion and $SCONO_x$™ technology.

  Dry Low NO_X (DLN) Combustion and Selective Catalytic Reduction (SCR)

  Xonon™ Technology

- **SO_2**

  Very low sulfur fuels

- **TSP/PM_{10}**

  Good combustion practices/design

- **CO**

  Oxidation catalyst
  Good combustion practices/design

- **VOC**

  Oxidation catalyst
  Good combustion practices/design

The following alternative control systems were considered in the BACT analysis for the cooling towers:

TSP/PM_{10}

Drift eliminators/ good design.

Control devices similar in efficiency and function are not considered and only those technologies which have been commercially demonstrated and for which manufacturer guarantees are available have been analyzed.

5.4 SUMMARY

Table 5-1 summarizes the proposed BACT for the CTGs, auxiliary boiler, emergency diesel generators, diesel fire pump, and cooling towers at the GBPGP. This analysis reaches a conclusion on BACT for each of the criteria pollutants as defined in 40 CFR 52.21.

The alternatives evaluated were based on the USEPA guidelines for the top-down approach for BACT analysis. Technically feasible alternatives were evaluated in the order of decreasing stringency.

5.5 COMBINED CYCLE COMBUSTION TURBINES

5.5.1 Background

The GBPGP is proposing to install three combined-cycle combustion turbines that will provide base load electricity to meet a growing demand in the surrounding communities. The combustion turbines will exclusively combust natural gas with a proposed annual operation of up to 8,760 hours.

5.5.2 Nitrogen Oxides (NO_X)

5.5.2.1 Background

Nitrogen Oxides (NO_X) are formed during the fuel combustion process. There are three types of NO_X formations: thermal NO_X, fuel bound NO_X, and prompt NO_X. Thermal NO_X is created by the high temperature reaction in the combustion chamber between atmospheric nitrogen and oxygen. The amount that is formed is a function of time, turbulence, temperature, and fuel-to-air ratios within the combustion flame zone. The majority of NO_X emissions result from thermal NO_X generation.

TABLE 5-1
SUMMARY OF PROPOSED BACT

GILA BEND POWER GENERATION PROJECT
GILA BEND, ARIZONA

Emission Unit	Emissions Limit and Basis				
	TSP/PM_{10}	SO_2	NO_X	CO	VOC
Natural Gas-Fired Combustion Turbines:					
Emission Rate	0.023 lbs/MMBtu	0.003 lbs/MMBtu	3.0 ppmvd @ 15% O_2	17.0 ppmvd @ 15% O_2	1.4 ppmvw @ 15% O_2
Proposed BACT	Use of natural gas, and good combustion practices/design	Use of Natural Gas	DLN Combustion and SCR	Good combustion practices/design	Good combustion practices/design
Natural Gas-Fired Auxiliary Boiler:					
Emission Rate	0.0102 lbs/MMBtu	0.001 lbs/MMBtu	0.12 lbs/MMBtu	0.152 lbs/MMBtu	0.016 lbs/MMBtu
Proposed BACT	Good Combustion Practice/Design	Use of Natural Gas	Low NO_X Burner	Good Combustion Practice/Design	Good Combustion Practice/Design
Emergency Diesel Generator:					
Emission Rate	1.1 lb/hr	1.1 lb/hr	15.5 lb/hr	3.34 lb/hr	1.24 lb/hr
Proposed BACT	Good Engine Design	Very Low Sulfur Fuel	Good Engine Design	Good Engine Design	Good Engine Design
Diesel Fire Pump:					
Emission Rate	0.9 lb/hr	0.82 lb/hr	12.4 lb/hr	2.7 lb/hr	1.0 lb/hr
Proposed BACT	Good Engine Design	Very Low Sulfur Fuel	Good Engine Design	Good Engine Design	Good Engine Design
Cooling Tower:					
Emission Rate	11.2 lb/hr	N/A	N/A	N/A	N/A
Proposed BACT	Drift Eliminators				

Fuel-bound NO_X is created by the gas-phase oxidation of the elemental nitrogen contained within the fuel. Its formation is a function of the fuel nitrogen content and the amount of oxygen in the combustion chamber. Fuel-bound NO_X formation is a function of the fuel nitrogen content and the amount of oxygen in the combustion chamber. Generally, natural gas fuel has negligible chemically bound nitrogen with very little elemental nitrogen present. Therefore, little or no fuel-bound NO_X forms in turbine combustion with natural gas as the fuel source.

The last mechanism for NO_X formation, known as prompt NO_X, occurs primarily in other combustion sources that use fuel-rich combustion techniques. The formation of prompt NO_X occurs through several early reactions of nitrogen molecules in the combustion air and hydrocarbon radicals in the fuel. The reactions primarily take place within fuel rich flame zones and are usually negligible when compared to the formation of NO_X by the thermal NO_X process. Combustion turbines generally have high mixing efficiencies with excess air, so rich combustion zones rarely exist. Therefore, the formation of prompt NO_X is not deemed a significant contributing factor towards NO_X formation.

Since the formation of NO_X is largely dependent on thermal NO_X, several control technologies employ techniques to reduce the precursors of NO_X formation or use catalysts to treat the post combustion emissions.

5.5.2.2 Discussion

Since the formation of NO_X is largely dependent on thermal NO_X, several control technologies employ techniques to reduce the precursors of NO_X formation or use catalysts to treat the post combustion emissions. There are three types of emission controls for natural gas-fired turbines. The least effective is wet controls, which uses steam or water injected into the combustion zone to reduce the ambient flame temperature thus controlling NO_X formation. Dry controls use

advanced combustor design to suppress NO_X formation. Dry controls include the standard dry low NOx. Post-combustion catalytic controls that selectively or non-selectively reduce NO_x include selective catalytic reduction (SCR) and the $SCONO_X$™ technology developed by Goal Line Environmental Technologies LLC. The following subsections present the discussions of the technologies, which were evaluated for NO_x control for the GBPGP.

5.5.2.3 $SCONO_x$™ Technology

A combination of DLN combustion and $SCONO_x$™ technology was evaluated for the NO_x control for the combustion turbine generators. ABB Alstom Power Environmental Systems (AAP) has licensed the $SCONO_x$™ technology from Goal Line Environmental Technologies for NO_x abatement on combined cycle gas turbines.

The $SCONO_x$™ system is a pollution control technology that utilizes a catalyst for the reduction of CO and NO_X. The system uses no ammonia, and can operate effectively at temperatures ranging from 300°F to 700°F, making it suited for both new and retrofit applications. Because the inputs that are needed to run $SCONO_x$™ (natural gas, water, steam, and electricity) are already present at most power plants, the logistics of plant operation do not change when the system is installed.

The $SCONO_x$™ catalyst works by simultaneously oxidizing CO to CO_2, NO to NO_2, and then absorbing NO_2 onto its surface through the use of a potassium carbonate absorber coating. These reactions are shown below, and are referred to as the "Oxidation/Absorption Cycle."

$$CO + \tfrac{1}{2}O_2 \rightarrow CO_2$$

$$NO + \tfrac{1}{2}O_2 \rightarrow NO_2$$

$$2NO_2 + K_2CO_3 \rightarrow CO_2 + KNO_2 + KNO_3$$

The CO_2 in the above reactions exhausts through the stack. Note that during this cycle, the potassium carbonate coating reacts to form potassium nitrites and nitrates, which are then present on the surface of the catalyst. The $SCONO_x$™ catalyst must be regenerated to maintain maximum NO_X absorption. The carbonate absorber coating on the surface of the catalyst absorbs nitrogen compounds, and the catalyst must enter the regeneration cycle.

The regeneration of the $SCONO_x$™ catalystis accomplished by passing a controlled mixture of regeneration gases across the surface of the catalyst in the absence of oxygen. The regeneration gases react with nitrites and nitrates to form water and elemental nitrogen. Carbon dioxide in the regeneration gas reacts with potassium nitrites and nitrates to form potassium carbonate, which restores the absorber coating on the surface of the catalyst. The reaction that occurs during the regeneration cycle is shown below.

$$KNO_2 + KNO_3 + 4H_2 + CO_2 \rightarrow K_2CO_3 + 4H_2O + N_2$$

Water (as steam) and elemental nitrogen are exhausted through the stack instead of NO_X, and potassium carbonate is once again present on the surface of the catalyst, allowing the oxidation/absorption cycle to begin again. There is no net gain or loss of potassium carbonate after both the oxidation/absorption cycle and the regeneration cycle have been completed. The process operates as a true catalyst. A regeneration cycle typically is set to last for three to seven minutes, so

each section is in the oxidation/absorption cycle for twelve to twenty eight minutes

The technology for producing a regeneration gas containing a dilute concentration of hydrogen from natural gas is well developed, and there are numerous reactions by which this can be accomplished. For installations below 450°F the SCONO$_x$™ system uses an inert gas generator for the production of hydrogen and carbon dioxide. The regeneration gas is diluted to under 4% hydrogen using steam as a carrier gas; the typical system is designed for 2% hydrogen. The appropriate reaction for producing regeneration gas is listed below.

$$CH_4 + \frac{1}{2}O_2 + H_2O \rightarrow CO_2 + 3H_2$$

For installations with operating temperatures greater than 450°F, the catalyst can be regenerated by introducing a small quantity of natural gas with a carrier gas, such as steam, over a steam reforming catalyst and then to the SCONO$_x$™ catalyst. The reforming catalyst initiates the conversion of methane to hydrogen, and the conversion is completed over the SCONO$_x$™ catalyst. As per manufacturers information, the application of SCONO$_x$™ in conjunction with DLN combustion can reduce the NO_x emissions to 2.0 ppmvd @ 15% O_2. SCONO$_x$™ technology is commercially available. However, cost effectiveness and feasibility of the NO_x control for long-term operations has not yet been demonstrated.

A listing of permitted facilities from the RBLC is provided in Appendix B. A review of a RBLC indicates that no permits have been issued for combined cycle combustion turbines firing natural gas using SCONO$_x$™ technology.

Economic Impacts

The calculated average cost effectiveness of SCONO$_x$™ technology with DLN combustion is $148,288/ton NOx removed (refer to Table 5-2). However,

TABLE 5-2
SUMMARY OF TOP-DOWN BACT ANALYSIS RESULTS FOR NOx EMISSIONS FROM COMBINED CYCLE TURBINE OPERATIONS

GILA BEND POWER GENERATION PROJECT
GILA BEND, ARIZONA

Control Alternatives [1]	Stack Emissions	Economic Impacts				Energy Impact[2]	
		Total Capital Cost	Annual Cost	Cost Effectiveness	Incremental Cost Effectiveness	Electric Usage (Increase over Baseline)	Fuel Usage - Energy Penalty (Increase over Baseline)
Natural Gas [3]	(tons/yr)	($)	($/yr)	($/ton NOx)	($/ton NOx)	($/yr)	($/yr)
1.) DLN & SCONO$_x$ (2.0 ppmvd)	58.4	$14,574,450	$4,329,999	$148,288	--	--	$560,000
2.) DLN & Selective Catalytic Reduction (3.0 ppmvd)	87.6	--	--	--	--	--	--

(1) Control Alternative is based on 8,760 operational hours per year.
(2) The fuel/ electricity annual cost reflect 8,760 hours of operation.
(3) Emissions are based on the turbine operating at 100% base load.

this does not include other operating and maintenance costs expected due to malfunctioning of catalyst regeneration process nor the economic impacts of forced outages to handle those events. The application of SCONO$_x$™ for the GBPGP will not be feasible because of the economic impact

5.5.2.5 SCR

The GBPGP proposes the use of combination of dry low NO_X (DLN) combustion and selective catalytic reduction (SCR), which represents the most stringent commercially available NO_X control technology. Therefore the other least effective controls will not be analyzed.

The SCR will be added as a post combustion treatment for NO_X emissions by injecting ammonia (NH_3) into the turbine exhaust stream and upstream from the catalyst unit. The SCR unit houses a catalyst typically made from noble metals, base metal oxides such as vanadium and titanium, and zeolite based material. The ammonia injected exhaust stream enters and reacts with the catalyst beds to form N_2 and H_2O. The following equations describe the reactions, which govern the overall process:

$$4NO + 4NH_3 + O_2 \rightarrow 4N_2 + 6H_2O$$

$$6NO_2 + 8NH_3 \rightarrow 7N_2 + 12H_2O$$

$$NH_3 + O_2 \rightarrow NO_X + H_2O$$

The first and second equation reflects the NO_X reduction reaction. The third equation reflects injection of ammonia into high temperature flue gas above the optimum reaction temperature. At these high temperatures, NO_X emissions increase and the reaction is counter-productive. Therefore, the reaction mechanisms involved in the process are very temperature-sensitive and can be used to reduce NO_X only over a narrow temperature window.

Efficient operating temperature ranges vary for each type of catalyst material. The noble metal catalysts optimum temperature range is 400 to 700°F, but this range can be lower than what is required to reduce NO_X with minimum ammonia slip. The vanadium-titanium catalyst operates at a slightly higher range of temperature, 450 to 800°F, which makes it most suitable for a combined cycle base load facility. The zeolite-based catalysts have even a higher operating temperature range of 800 to 1,100°F. Ideally the SCR would be located within the HRSG where the temperature is typically stable, thus providing temperatures within the optimum range of the vanadium-titanium catalyst. The application of an SCR unit will successfully attain a NO_X emission of 3.0 ppmvd at 15 percent oxygen. This will result in a maximum NO_X emission rate of 20.0 pounds per hour at full load from each combustion turbine generator.

One possible adverse environmental impact of this NO_X control system is ammonia slip. One possible cause of ammonia slip occurs when the exhaust temperature falls outside the optimum catalyst reaction range. A second cause occurs when the catalyst itself becomes prematurely fouled or exceeds its life expectancy. Some ammonia slip will occur regardless of the efficiency of the unit due to the SCR manufacturer's recommendation to inject NH_3 above what is stoichiometrically required. This associated ammonia slip will be designed to not exceed 10 ppm to insure that the proposed NO_X emission level is met.

A review of a RBLC for combined cycle combustion turbines firing natural gas indicates BACT emission limits ranging from 4 to 10 ppm, based on the application of SCR technology. A listing of permitted facilities from the RBLC is provided in Appendix B.

There are potential environmental impacts associated with the SCR system, although they are not significant. One, as mentioned before, is the ammonia slip, which will be designed to not exceed 10 ppm. Proper control of the

ammonia injection will minimize the ammonia slip well below the designed maximum and will maximize NO_X reduction. The second potential environmental impact is a negligible amount of ammonia salt precipitation, which can be emitted to the atmosphere. The ammonia salt formation is the function of the fuel-bound sulfur content and the amount of excess ammonia in the catalyst bed. The catalyst forms sulfur trioxide, which then mixes with water vapor to form sulfuric acid, which oxidizes the sulfur dioxide in the exhaust stream. This acid then reacts with the free or unreacted ammonia to form ammonia salts that can agglomerate in the exhaust stream as it cools. The potential for formation of ammonia salts is minimal due to the low sulfur content of natural gas. The third environmental impact is associated with the transportation, handling and storage of aqueous ammonia, which can result in potential spills and evaporation of ammonia into the atmosphere. The overall risk of this occurrence is considered low. There are no anticipated environmental impacts associated with the spent catalyst material, because the metal is shipped back to the manufacturer for recycling.

5.3.2.6. *Xonon™*

Xonon™ is an emerging emission control technology that has been introduced commercially by Catalytica, Inc. This technology uses catalytic combustion to reduce NO_X emissions from gas turbines to 3-5 ppm. According to Catalytica, Xonon™ has successfully reduced NO_X emissions to 3 ppm in laboratory and pilot tests on small turbines.

Xonon™ uses flameless combustion to burn natural gas and requires no down-stream cleanup device to reduce NO_X emissions. This technique prevents the formation of thermal NO_X during the combustion of fuel and avoids the need for ammonia injection, as with SCR. Xonon™ may be retrofitted to existing turbines because it replaces the diffusion or lean pre-mix combustion cans.

In the Xonon™ technology, a fuel and air mixture is oxidized across several small catalyst beds, which combusts the fuel at a temperature lower than that at which thermal NO_X is formed. A partial flame is used downstream to complete the combustion process where unavoidable small amounts of NO_X are formed. The Xonon™ catalyst will age with time, as with other catalyst. However, the Xonon™ catalyst can be easily replaced with a combustor replacement.

Currently, Xonon™ is not available for large industrial gas turbines such as the GE Frame 7FA. According to a press release from Catalytica, GE and Catalytica are collaborating on the Pastoria Energy Facility project in Bakersfield, California to adapt the Xonon™ technology to fit the GE Frame 7FA turbines. The project is expected to begin construction in 2001 and enter commercial operations by the summer of 2003. However, presently GE does not offer a Xonon™ combustor on any large industrial turbines. Xonon™ is not considered to be a commercially available control technology for the GBPGP. Furthermore, GE nor Catalytica could provide cost data for the Xonon™ technology and therefore was not considered a viable control alternative for this project.

5.5.2.3 Conclusion and BACT Determination

The GBPGP proposes a NO_X emission limit of 3.0 ppmvd at 15% oxygen for combustion turbine generators. The emissions will be controlled by utilizing a combination of DLN combustion and SCR. There are no anticipated adverse environmental impacts associated with this control technology. This combination of DLN combustion and SCR represents the most stringent technically feasible control technology and thus is proposed as BACT.

5.5.3 Carbon Monoxide (CO)

5.5.3.1 Introduction

Combustion turbines are designed to combust fuel as completely as possible by incorporating good combustion practices including proper air-to-fuel ratio and a design that adequately accounts for time, temperature, and turbulence conditions within the combustion zone. Three applicable CO control techniques have been identified for combustion turbines. SCONO$_x$™; catalytic oxidation; and efficient combustion/ design technology are viable possibilities for CO emissions controls. The application of SCONO$_x$™ technology is not feasible for NO$_x$ control, therefore not considered for CO control.

5.5.3.2 Catalytic Oxidation Technology

Catalytic oxidation of CO is a technically proven control alternative for combustion turbines; however, it has primarily been used to meet specialized requirements such as Lowest Achievable Emission Rate (LAER), typically in areas that are designated as non-attainment for CO.

5.5.3.3 Catalytic Oxidation Economic, Environmental, and Energy Impacts

The installed capital cost associated with catalytic oxidation is $2,112,668 and the annualized cost is $856,086 per turbine when firing natural gas. The cost-effectiveness is $9,638 per ton CO removed. These cost impacts are considered to be excessive.

The energy impact is the result of pressure loss through the catalyst, which reduces the turbine power output. The estimated annual energy impact is $36,059.

A summary of the capital cost, annual cost, cost-effectiveness, environmental and energy impacts of catalytic oxidation to control CO emissions are presented in Table 5-3.

5.5.3.4 BACT Conclusion

The CO emission rate under maximum load conditions will be limited to 17 ppmvd when firing natural gas. A review of EPA's RBLC database (Appendix C) indicates that other combustion turbines that utilize natural gas have been issued permits with BACT-based CO emissions in the range of 3 to 60 PPM (based on full load operation). Given the regional air quality conditions and the fact that the predicted maximum impact of CO emissions on the surrounding environment will not be significant, the proposed emission limits are believed to be representative of a top level of emission control. There are no expected adverse economic, environmental or energy impacts associated with the proposed control alternative. Thus good combustion practices/design are proposed as BACT for CO emissions from the combustion turbines.

5.5.4 Sulfur Dioxide (SO_2)

Control techniques available to reduce SO_2 emissions include flue gas desulfurization (FGD) systems and the use of low sulfur fuels. A review of the RLBC indicates that while FGD systems are common on boiler applications, there are no known FGD systems on combustion turbines Thus, the use of an FGD is rejected as a BACT control alternative.

The GBPGP will utilize natural gas in the turbines. The maximum estimated SO_2 emissions would be 0.003 lb/MMBtu for the turbines. The use of very low sulfur fuel has an established record of compliance with applicable regulations. NSPS, subpart establishes maximum allowable SO_2 emissions associated with combustion turbines and requires either an SO_2 emission

TABLE 5-3
SUMMARY OF TOP-DOWN BACT ANALYSIS RESULTS FOR CO EMISSIONS FROM COMBINED CYCLE TURBINE OPERATIONS

Gila Bend Power Generation Project
Gila Bend, Arizona

Control Alternatives [1]	Stack Emissions	Economic Impacts				Energy Impact[2]	
		Total Capital Cost	Annual Cost	Cost Effectiveness	Incremental Cost Effectiveness	Electric Usage (Increase over Baseline)	Fuel Usage - Energy Penalty (Increase over Baseline)
Natural Gas [3]	(tons/yr)	($)	($/yr)	($/ton CO)	($/ton CO)	($/yr)	($/yr)
1.) Catalytic Oxidation	133.2	$2,112,668	$856,086	$9,638	--	--	$36,059
2.) Good Combustion Practices / Design	222.1	--	--	--	--	--	--

(1) Control Alternatives are based on 8,760 operational hours per year.
(2) The fuel/ electricity annual cost reflect 8,760 hours of operation.
(3) Emissions are based on the turbine operating at 100% base load.

limitation of 150 PPM or a maximum fuel content of 0.8 percent by weight (40 CFR Part 60, Subpart GG). The estimated emissions for these units are summarized in Table 7-1 and show that the emissions will be significantly less than the NSPS limit. Therefore, the very low SO_2 emission rate that results from the use of natural gas is proposed as BACT for the turbines. There are no expected adverse environmental or energy impacts associated with the proposed control alternative.

5.5.5 Volatile Organic Compounds (VOC)

Catalytic oxidation of VOC is a technically proven control alternative for combustion turbines; however, it has primarily been used to meet specialized requirements such as LAER, typically in areas that are designated as non-attainment for ozone. Catalytic oxidation can achieve a VOC reduction efficiency of 50 percent with VOC compounds larger than ethane. Since natural gas is comprised of over 92 percent methane, a significantly smaller compound than ethane, the reduction efficiency by this technology when firing natural gas is exaggerated. However, the cost analysis is conservatively based on the 50 percent reduction efficiency. Good combustion practices include proper air-to-fuel ratio and design that adequately accounts for time, temperature, and turbulence conditions within the combustion zone.

The cost effectiveness of catalytic oxidation is $142,238 per ton VOC removed and is considered to be excessive. The energy impact is the result of pressure loss through the catalyst, which reduces the turbine power output. The annual energy impact is assessed at $53,286. These cost impacts are considered to be prohibitive.

A summary of the capital cost, annual operating cost, cost-effectiveness, environmental and energy impacts of catalytic oxidation to control VOC

emissions is presented in Table 5-4. The capital and operating costs elements for the catalytic oxidation system will be the same as for the CO catalyst and are contained in Appendix D. Because of the adverse economic and energy impacts, catalytic oxidation is rejected as a BACT control alternative.

Almost all of the recent permits listed in the RLBC database (Appendix B) indicate that good combustion practices/design is the preferred method of VOC control on combined cycle combustion turbines. The maximum estimated unburned hydrocarbons emissions concentration is 1.4 ppmvw at 15 percent oxygen from the CTG. The VOC emission concentration will be less than the unburned hydrocarbon concentrations. The slight difference in concentration is due to the differences inherent in the combustion sources. There are no expected adverse economic, environmental, or energy impacts associated with good combustion practices/design. Thus, good combustion practices/design is proposed as BACT for control of VOC emissions for the combustion turbines.

5.5.6 Total Suspended Particulates/PM_{10}

Total suspended particulates (TSP) and particulate matter less than 10 micrometers (PM_{10}) will occur from the combustion of natural gas. The EPA's AP-42, Fifth Edition, Supplement B, Section 3, considers particulate matter from natural gas combustion to be less than 1 micron, so all emissions are considered as PM_{10}. The PM_{10} emissions from the combustion of natural gas will result primarily from inert solids contained in the unburned fuel hydrocarbons, which agglomerate to form particles. PM_{10} emission rates from natural gas combustion are inherently low because of very high combustion efficiencies and the clean burning nature of natural gas. Therefore, use of natural gas is in and of itself a highly efficient method of minimizing emissions. The maximum estimated PM_{10} emission rate is 0.023 lbs/MMBtu. Based on the EPA's RACT/BACT/LAER

TABLE 5-4
SUMMARY OF TOP-DOWN BACT ANALYSIS RESULTS FOR VOC EMISSIONS FROM COMBINED CYCLE TURBINE OPERATIONS

Gila Bend Power Generation Project
Gila Bend, Arizona

Control Alternatives [1]	Stack Emissions	Economic Impacts[4]				Energy Impact[2]	
		Total Capital Cost	Annual Cost	Cost Effectiveness	Incremental Cost Effectiveness	Electric Usage (Increase over Baseline)	Fuel Usage - Energy Penalty (Increase over Baseline)
Natural Gas [3]	(tons/yr)	($)	($/yr)	($/ton VOC)	($/ton VOC)	($/yr)	($/yr)
1.) Catalytic Oxidation	6.45	$2,112,668	$918,393	$142,387	--	--	$53,286
2.) Good Combustion Practices/ Design	12.9	--	--	--	--	--	--

(1) Control Alternatives are based on 8,760 operational hours per year.
(2) The fuel/ electricity annual cost reflect 8,760 hours of operation.
(3) Emissions are based on the turbine operating at 100% base load.
(4) Costs are based on a per turbine basis.

Clearinghouse (RBLC) database, there are no BACT precedents that have included an add-on TSP/PM_{10} control requirement for natural gas-fired combustion turbines. Therefore, BACT for PM_{10} emissions from the combustion turbines is proposed to be the use of a low ash fuel and efficient combustion. This BACT choice will meet any reasonable opacity standard. Typically, plume opacity is not an issue for this type of facility as the exhaust plumes are nearly invisible except for the condensation of moisture during periods of low ambient temperature. There are no expected adverse environmental or energy impacts associated with the proposed control alternative.

5.6 AUXILIARY BOILER

5.6.1 Background

One natural gas-fired boiler will be installed to provide an alternate source of steam for facility heating and soft starting the combustion turbine systems. The auxiliary boiler has a rated heat input of 33 million BTUs per hour. The auxiliary boiler will fire a maximum of 8,760 hours per year and will vent through a separate stack.

5.6.2 Nitrogen Oxides (NO_X)

The boiler design will incorporate Low NO_X burners for NO_X control, which is common for auxiliary boilers. Due to the intermittent use of this boiler, the use of Low NO_X burners is proposed as BACT for NO_X control of the auxiliary boiler. The estimated NO_X emissions rate is 0.12 lb/MMBTU. No expected adverse environmental or economic impacts are associated with this NO_X control technology.

5.6.3 Carbon Monoxide (CO)

The control technologies evaluated for use on the natural gas-fired auxiliary boiler include catalytic oxidation and proper boiler design/good operating practices. The cost of add-on controls on intermittently operated facilities is prohibitive.

However, controlling boiler-operating conditions can minimize carbon monoxide emissions. This includes proper burner settings, maintenance of burner parts, and sufficient air, residence time, and mixing, for complete combustion. The maximum estimated CO emission rate is 0.152 lb/MMBtu. Thus, boiler design and good operating practices are proposed as BACT for controlling the CO emissions from the auxiliary boiler. The proposed BACT will not have any expected adverse environmental or energy impacts.

5.6.4 Sulfur Dioxide (SO_2)

Control techniques available to reduce SO_2 emissions include flue gas desulfurization (FGD) systems and the use of low sulfur fuels. A review of the RLBC indicates that while FGD systems are common on boiler applications, they are not common with boilers firing very low sulfur fuels, such as natural gas. FGD systems are not cost effective because the SO_2 emissions are already minimal. The estimated SO_2 emission rate is 0.03 pounds per hour. Thus, the use of an FGD system is rejected as a BACT control alternative.

Therefore, the use of natural gas is proposed as BACT for the auxiliary boiler. There are no expected adverse environmental or energy impacts associated with the proposed control alternative.

5.6.5 Volatile Organic Compounds (VOC)

The control technologies evaluated for use on the natural gas-fired auxiliary boiler include catalytic oxidation and proper boiler design and good

combustion practices. The cost of add-on controls on intermittently operated facilities is prohibitive. However, optimizing boiler-operating conditions will minimize VOC emissions. The maximum estimated VOC emission rate is 0.016 lbs./MMBtu. Thus, boiler design and good operating practices are proposed as BACT for controlling VOC emissions from the auxiliary boiler. The proposed BACT will not have any expected adverse environmental or energy impacts.

5.6.6 Total Suspended Particulates/PM_{10}

Since the auxiliary boiler will fire natural gas, the same properties that applied to the combustion turbines will also apply to this application. The maximum estimated TSP/PM_{10} emission rate is 0.0102 lbs/MMBtu. The EPA's RACT/BACT/LAER Clearinghouse (RBLC) database indicates that there are no BACT precedents for natural gas-fired boilers requiring add-on controls for TSP/PM_{10} emissions.

Therefore, BACT for TSP/PM_{10} is proposed to be the use of a low ash fuel and efficient combustion. Opacity is also not an issue with this type on of application, except for the condensation of moisture during periods of low ambient temperature. There are no expected adverse environmental or energy impacts associated with the proposed control alternative.

5.7 EMERGENCY DIESEL GENERATOR

5.7.1 Background

One emergency diesel generator will supply power to the turbine's auxiliaries in the event that an emergency shut down of the unit is required or there is a power outage The heat input for the emergency diesel generator is estimated to be 5.6 MMBtu per hour. The annual operating time is estimated to be less than 500 hours, and typically only 30 minutes of test firing per week.

5.7.2 Total Suspended Particulates/PM_{10}

These units, like the turbines and auxiliary boiler, emit particulates consisting of ash in the fuel and residual carbon and hydrocarbons caused from incomplete combustion. A review of EPA's RBLC, Appendix C, shows that good combustion control was the most stringent precedent set for this application. The TSP/PM_{10} emissions are estimated not to exceed 1.1 lbs/hr.

Therefore due to the very low operating hours of these units, good combustion control and engine design are proposed as BACT. The proposed BACT will not have any expected adverse environmental or energy impacts.

5.7.3 Nitrogen Oxides (NO_X)

A review of the RACT/BACT/LAER Clearinghouse indicates that emergency diesel generators have not been required to install additional NO_X controls because of intermittent operation.

An uncontrolled NO_X emission of 15.5 lbs/hr for the emergency diesel generator is based on engine design and is proposed as BACT. The proposed BACT will not have any expected adverse environmental or energy impacts.

5.7.4 Carbon Monoxide (CO)

The control technologies for CO emissions evaluated for use on the emergency diesel generators are catalytic oxidation and proper design to minimize emissions. Because of the intermittent operation and low emissions, add-on controls would be prohibitively expensive. Thus, engine design is proposed as BACT for controlling the CO emissions from the emergency diesel generators. An estimated CO emission of 3.34 lbs/hr is proposed as BACT. The proposed BACT will not have any expected adverse environmental or energy impacts.

5.7.5 Sulfur Dioxide (SO_2)

The only known SO_2 control technique for use on the emergency diesel generators is the use of low sulfur fuel. An SO_2 emission limit of 1.1 lbs/hr based on low sulfur fuel is proposed. Therefore the use of low sulfur fuel is proposed as BACT for SO_2 emissions. There are no expected adverse environmental or energy impacts associated with this proposed BACT.

5.7.6 Volatile Organic Compounds (VOC)

The control technologies for VOCs are catalytic oxidation and proper design to minimize emissions. Because of the intermittent operation and low emissions, add-on controls would be prohibitively expensive. An emission of 1.24 lbs/hr is estimated. Thus, engine design is proposed as BACT. The proposed BACT will not have any expected adverse environmental or energy impacts.

5.8 DIESEL FIRE PUMP

5.8.1 Background

The diesel fire pump will supply water to the fire protection system in the event the electrical pumps fail. The fire protection system provides fire suppression and elimination to the entire facility. The heat input for the diesel powered fire pump is estimated to be 3.0 MMBtu per hour and the estimated annual operation will be less than 500 hours and typically only 30 minutes of test firing per week. The BACT determinations for all affected pollutants are discussed below.

5.8.2 Nitrogen Oxides (NO_X)

A review of the RACT/BACT/LAER Clearinghouse indicates that emergency/backup diesel-powered fire pumps generally have not been required to

employ any additional NO_X controls because of the intermittent operation and low emissions. An uncontrolled NOX emission limit of 12.4 lbs/hr is proposed as BACT. The proposed BACT will not have any expected adverse environmental or energy impacts.

5.8.3 Carbon Monoxide (CO)

The control technologies for CO evaluated for use on the diesel-powered fire pump are catalytic oxidation and proper design. However, the cost of add-on controls on intermittently operated facilities is prohibitive. Thus, engine design is proposed as BACT for controlling the CO emissions from the diesel-powered fire pump. An uncontrolled CO emission limit of 2.7 lbs/hr is proposed as BACT. The proposed BACT will not have any expected adverse environmental or energy impacts.

5.8.4 Sulfur Dioxide (SO_2)

The only known SO_2 control technique for use on a diesel fire pump is the use of low-sulfur diesel fuel. An SO_2 emission limit of 0.82 lbs/hr is proposed. Therefore, the use of low sulfur diesel fuel is the proposed BACT. The proposed BACT will not have any expected adverse environmental or energy impacts.

5.8.5 Volatile Organic Compounds (VOC)

The control technologies for VOCs are catalytic oxidation and proper design to minimize emissions. Because of the intermittent operation and low emissions, add-on controls would be prohibitively expensive. Thus, engine design is proposed as BACT. A VOC emission limit of 1.0 lbs/hr is proposed. The proposed BACT will not have any expected adverse environmental or energy impacts.

5.8.6 Total Suspended Particulates/PM_{10}

Control technologies available for TSP and PM_{10} include filters such as particulate traps, proper engine design, and fuel additives and/or modifications. Because the uncontrolled emission rates of TSP and PM_{10} are estimated to be only 0.9 lbs/hr, any particulate controls will be prohibitively expensive. Therefore, proper engine design is proposed as BACT for particulate emissions from the diesel fire pump. The proposed BACT will not have any expected adverse environmental or energy impacts.

5.9 COOLING TOWERS

5.9.1 Background

The cooling towers will be multi-celled, mechanical draft, counterflow type with an associated liquid drift. This drift is a source of particulate emission, caused by dissolved and suspended solids inherently contained within the liquid droplets. The water droplets then will evaporate allowing the particulates to agglomerate. The particle sizes are mostly in the 20 to 30 micron range, according to a 1984 EPRI report titled "User's Manual: Cooling-Tower-Plume Prediction Code", Section 4, Pg. 4-1.

The annual operating time is expected to be 8,760 hours. The BACT determination for particulates is discussed below.

5.9.2 Total Suspended Particulates/ PM_{10}

There are no technically feasible alternatives that can be installed on the cooling towers, which specifically reduce particulate emissions; however, cooling towers are typically designed with drift elimination features. The drift eliminators are specially designed baffles that collect and remove condensed water droplets in the air stream. These drift eliminators, according to a review of the EPA's RBLC,

can reduce drift to 0.0015 percent to 0.004 percent of cooling water flow, which reduces particulate emissions.

Therefore the use of drift eliminators to attain an emission rate of 11.2 lbs/hr is proposed as BACT for cooling tower particulate emissions. The proposed BACT will not have any expected adverse environmental or energy impacts.

5.10 PROPOSED COMPLIANCE DEMONSTRATION METHODS

The proposed compliance demonstration methods, including the averaging period, compliance method, and frequency, are shown in Table 5-5. The compliance methods include the initial performance testing and continuous emissions monitoring.

TABLE 5-5
SUMMARY OF PROPOSED COMPLIANCE DEMONSTRATION METHODS

GILA BEND POWER GENERATION FACILITY
GILA BEND, ARIZONA

Compliance Parameter	Pollutant/ Parameter					
	TSP/PM_{10}	SO_2	NO_X	CO	VOC	Opacity
Combustion Turbines XAveraging Period XCompliance Method XFrequency	XNA XEPA Method 5/201A/202 or equivalent XInitial Performance Test	X3 hours XEPA Method 6C or equivalent XCEM or fuel sampling and fuel flow monitoring XInitial Performance Test and Quarterly CEM Reports	XRolling 30-Day Average XEPA Method 20 or equivalent and CEM XInitial Performance Test and Quarterly CEM Reports	XNA XEPA Method 10B or equivalent XInitial Performance Test	XNA XEPA Method 25A or equivalent XInitial Performance Test	X6 min XEPA Method 9 or equivalent XInitial Performance Test
Auxiliary Boiler XAveraging Period XCompliance Method XFrequency	NA	NA	X24 hours XEPA Method 7 and CEM XInitial Performance Test and Quarterly CEM Reports	NA	NA	X6 min XEPA Method 9 or equivalent XInitial Performance Test

APPENDIX TABLE A-1
EMISSIONS SUMMARY TABLE

GILA BEND POWER GENERATION PROJECT
GILA BEND, ARIZONA

(All emissions based on data obtained by Industrial Power Technology, unless otherwise noted)

Parameters	Single Combustion Turbine					Auxiliary Boiler	Diesel Generator	Diesel Fire Pump	Cooling Tower [2]
Load Condition	Base - 100%			75%		105%	100%	100%	
Ambient Temperature, F	13	66.3	121	13	66.3		--	--	
Fuel Type	Natural Gas [6]						Diesel Fuel		--
Power Output, kW	181,200	170,600	166,506	135,900	121,200	--	500 kW	400 BHP	
Heat Input, (LHV) MMBtu/hr	1,546	1,579	1,671	1,346	1,234	26.0	5.6	3.0	
Operating Time, hrs/yr	8,760					8,760	500		8,760
Emissions:									
NO_X, ppm [1]	3.0	3.0	3.0	3.0	3.0	--	--	--	
NO_X, lb/MMBtu	0.0129	0.0120	0.0111	0.0123	0.0122	0.120			
Total NO_X as NO_2, lb/hr	20.0	19.0	18.5	16.5	15.0	3.11	15.5	12.40	
Total NO_X as NO_2, TPY	87.6	83.2	81.0	72.3	65.7	13.62	3.88	3.10	
CO, ppm	17.0	15.1	13.6	16.9	15.1	--	--	--	
CO, lb/MMBtu	0.0328	0.0301	0.0278	0.0301	0.0304	0.152			
Total CO, lbs/hr	50.7	47.6	46.5	40.5	37.6	3.95	3.34	2.67	
Total CO, TPY	222.1	208.3	203.5	177.2	164.5	17.30	0.83	0.67	
SO_2, lbs/MMBtu	0.0026	0.0023	0.0022	0.0023	0.0024	0.001	--	--	--
Total SO_2, lbs/hr	4.0	3.70	3.65	3.15	2.90	0.03	1.03	0.82	
Total SO_2, TPY	17.3	16.2	16.0	13.8	12.7	0.13	0.26	0.21	
VOC, ppm (as methane)	1.40	1.40	1.40	1.40	1.40	--	--	--	
VOC, lb/MMBtu	0.0019	0.0018	0.0016	0.0017	0.0018	0.016			
Total VOC, lbs/hr	2.9	2.8	2.7	2.3	2.2	0.42	1.24	0.99	
Total VOC, TPY	12.8	12.1	11.9	10.2	9.5	1.84	0.31	0.248	
TSP, lb/MMBtu [4,5]	0.018	0.018	0.017	0.021	0.023	0.0102	--	--	
TSP, lb/hr [3]	28.00	28.00	28.00	28.00	28.00	0.26	1.10	0.88	11.14
% that is PM_{10} [3]	100%					100%	100%	100%	0%
Total PM_{10} Portion, lb/hr	28.00	28.00	28.00	28.00	28.00	0.26	1.10	0.88	0.00
TSP, TPY	122.6	122.6	122.6	122.6	122.6	1.16	0.28	0.220	48.80
PM_{10} Portion, TPY	122.6	122.6	122.6	122.6	122.6	1.16	0.28	0.220	0.0
Stack Parameters:									
Base Elevation, ft	678								
Site Pressure, psia	14.46								
Height, ft	165					95	--	--	50
Diameter, ft	18					2.0			30.3 (Fan)
Flow @ Base Load, lb/hr	3,718,000	3,506,000	3,437,000	2,967,000	2,766,000	--			--
Flow @ Base Load, acfm	996,043	926,936	932,656	776,039	706,870	6,597			1,297,919
Exhaust Temp., F	216	205	221	200	183	450			70
Velocity, fps	65.2	60.7	61.1	50.8	46.3	35.0			30.0 /cell

Note:
(1) Concentration reflects NOx emissions from SCR technology for the CT.
(2) Emissions were calculated using drift to circulating water ratio of 0.003% and a TDS of 12,000 ppm. Also Calculations are based on a single cooling tower per turbine with 4 cells per cooling tower.
(3) According to AP-42, Chapter 3, all PM emissions for uncontrolled natural gas combustion and diesel industrial engines are considered less than 1 micrometer, and therefore 100% is considered PM10.
(4) Cooling tower PM emissions are considered 100% TSP according to the EPRI Report titled, "User's Manual: Cooling-Tower-Plume Prediction Code", Section 4, pg. 4-1.
(5) Combustion turbine particulate emissions take into account the backend emissions as referred to in the EPA Method 5 testing protocol for combustion turbines.
(6) Emissions are based on firing pipeline quality natural gas.

APPENDIX TABLE A-2
MAXIMUM HAZARDOUS AIR POLLUTANT (HAP) CALCULATIONS

GILA BEND POWER GENERATION PROJECT
GILA BEND, ARIZONA

				CT Generators (Total)	Auxiliary Boiler	Diesel Emergency Generator	Diesel Fire Pump	Facility Total HAPs Emissions
Annual Operation				8,760 hrs/yr	8,760 hrs/yr	500 hrs/yr	500 hrs/yr	
Fuel Type				Natural Gas		Diesel Fuel		--
Heat Input (HHV)				1,671 MMBtu/hr	26 MMBtu/hr	5.6 MMBtu/hr	3.0 MMBtu/hr	
Number of Units				3	1	1	1	
HAPs Pollutant Emitted	Emission Factors from Natural Gas-Fired Turbines (lb/MMBtu)	Emission Factors from Natural Gas Combustion (lb/MMBtu)	Diesel Engines Uncontrolled Emission Factors (lb/MMBtu)	Annual Emissions (TPY)	Annual Emissions (TPY)	Annual Emissions (TPY)	Annual Emissions (TPY)	Annual Emissions (TPY)
1,3-Butadiene	4.31E-07	--	3.91E-05	0.009	--	trace	trace	0.009
2-Methynaphthalene	--	2.35E-08	--	--	trace	--	--	0.000
Acetaldehyde	7.84E-05	--	7.67E-04	1.722	--	0.001	trace	1.723
Acrolein	7.75E-06	--	9.25E-05	0.170	--	trace	trace	0.170
Benzene	1.37E-04	2.06E-06	9.33E-04	3.013	trace	0.001	trace	3.014
Dichlorobenzene	--	1.18E-06	--	--	trace	--	--	0.000
Ethylbenzene	2.35E-05	--	--	0.516	--	--	--	0.516
Flouranthene	--	2.94E-09	--	--	--	--	--	--
Flouene		1.18E-06	--	--	--	--	--	--
Formaldehyde[4]	7.10E-04	7.35E-05	1.18E-03	15.585	0.008	0.002	trace	15.595
Hexane	--	1.76E-03	--	--	0.201	--	--	0.201
Naphthalene	1.37E-04	5.98E-07	8.48E-05	3.013	trace	trace	trace	3.013
NDMA	2.25E-07	--	--	0.005	--	--	--	0.005
NMOR	2.25E-07	--	--	0.005	--	--	--	0.005
PAHs	1.76E-04	--	--	3.874	--	--	--	3.874
Phenanathrene	--	1.67E-08	--	--	trace	--	--	0.000
Propylene	--	--	2.58E-03	--	--	0.004	0.002	0.006
Propylene Oxide	2.84E-05	--	--	0.624	--	--	--	0.624
Pyrene	--	4.90E-09	--	--	trace	--	--	0.000
Toluene	1.27E-04	3.33E-06	4.09E-04	2.798	trace	trace	trace	2.798
TMA	1.67E-07	--	--	0.004	--	--	--	0.004
Xylenes	2.65E-05	--	2.85E-04	0.581	--	trace	trace	0.581
Total				31.918	0.209	0.008	0.002	32.137

Note:
(1) Emission factors obtained from the 3/98 AP-42 Supplemental D, Fifth Edition for Natural Gas Combustion.
(2) Only the significant emission factors were taken from the list of Speciated Organic Compounds.
(3) Emission factor is based on AP-42 Table 3.1-3, Emission Factors for Hazardous Air Pollutants from Natural Gas-Fired Turbines, 5/1998.
(4) Emission factor is based on AP-42 Table 3.1-3, revised per discussion with EPA on 3/17/2000.

0.001911765

Calculation Equation:

Annual Emissions (tpy) :

(Fuel Usage)(Heating Value)(Emission Facto/10^6)(Hours of Operation)(tons/2000lbs)(No of units)

APPENDIX TABLE A-3
CTG Sample Air Flow

GILA BEND POWER GENERATION PROJECT
GILA BEND, ARIZONA

Sample of a Single Turbine Mass Flow Rate to Volumetric Flow Rate Conversion

Paramters:

Load Condition = *Base*
Ambient Temp., F = *13*
Exhaust Temp., F = *216*
Exhaust Temp., R = *676*
Pressure, psia = *14.46*

Constant R = 0.73 atm-cf/lbmol-R
Exhaust Mass Flow Rate, lb/hr = *3,718,000*
Pressure, atm. = 0.984

Component	MW	% in Exhaust	lb/lbmoles	lbmoles/hr	Q (acfm)
$Ar+N_2$	31.72	*75.97%*	24.10		
O_2	32.00	*12.72%*	4.07		
CO_2	44.01	*3.80%*	1.67		
H_2O	18.02	*7.51%*	1.35		
Total			31.20	119,167	**996,043**

* *Italisized* indicates information provided by Industrial Power Technology, Inc.

APPENDIX TABLE A-4
COOLING TOWER EMISSION CALCULATIONS

GILA BEND POWER GENERATION PROJECT
GILA BEND, ARIZONA

Potential Cooling Tower Emission Calculations [2]

Circulating Water Flow (gpm) [3]	Water Density (lbs/gal)	Percent Drift from Coolant (%)	Assumed TDS [1] (PPM)	Estimated TSP Emissions (lbs/ hr)
181,800/ tower	8.345	0.003	4,080	**11.14**

Note:

(1) TDS based on 12,000 PPM from AP-42, Chapter 13 and then subsequently reduced by 34% to account for actual particulate in the TSP range of 10 to 100 microns. This size distribution was reported in an EPRI document called that all particle User's Manual: Cooling-Tower-Plume Prediction Code, Table 4-1, pg. 4-4. The EPRI document also states emissions are above 10 microns.

(2) Emissions are per cooling tower per turbine.

(3) Per cooling tower with 4 cells.

APPENDIX TABLE A-5
Controlled Estimated
Maximum Emission Data Set

GILA BEND POWER GENERATION PROJECT
GILA BEND, ARIZONA

obtained by Industrial Power Technology, unless otherwise noted)

Parameters	CTG (Per Unit)	Auxiliary Boiler	Diesel Generator	Diesel Fire Pump	Cooling[1] Tower	Total Facility[2] Annual Emissions
Load Condition	Base - 100%	--	--	--	--	--
Ambient Temperature, F	13					
Fuel Type	Natural Gas	Nat. Gas	No. 2 Fuel Oil			
Power Output, kW	181,200	--	500 kW	400 BHP		
Heat Input, (HHV) MMBtu/hr	1546.0	26.0	5.60	3.02		
Operating Time, hrs/yr	8,760	8,760	500	500	8,760	
Emissions:						
NO_X, ppmvd @ 15% O_2	3.0	0.12 lb/MMBtu	--	--	--	--
NO_X as NO_2, lbs/hr	20.0	3.11	15.50	12.40		
NO_X as NO_2, TPY	87.6	13.63	3.88	3.10		283.4
CO, ppmvd @ 15% O_2	17.0	0.152 lb/MMBtu	--	--	--	--
CO, lbs/hr[2]	50.7	3.95	3.34	2.67		
CO, TPY	222.1	17.31	0.84	0.67		685.1
SO_2, lbs/MMBtu[3]	0.003	0.001	--	--	--	--
SO_2, lbs/hr	4.0	0.03	1.03	0.82		
SO_2, TPY[7]	17.4	0.14	0.26	0.210		52.8
VOC or UHC, ppmvw @ 15% O_2	1.40	0.016 lb/MMBtu	--	--	--	--
VOC or UHC, lbs/hr	2.93	0.42	1.24	0.99		
VOC or UHC, TPY	12.9	1.84	0.31	0.25		41.1
PM_{10}, lh/hr	28.00	0.26	1.10	0.88	--	--
PM_{10}, TPY	122.70	1.16	0.28	0.22		369.8
TSP, lb/hr	28.00	0.26	1.10	0.88	11.14	
TSP, TPY	122.70	1.16	0.28	0.22	48.81	516.2
Stack Parameters:						
Base Elevation, ft	678					
Height, ft	165	95	--	--	50	--
Diameter, ft	18	2			30 (Fan)	
Flow @ Base Load, lb/hr	3,718,000	--			--	
Flow @ Base Load, acfm	996,043	6,597			1,297,919 /cell	
Exhaust Temp., F	173	450			70	

Note:

(1) Emissions were calculated using drift to circulating water ratio of 0.003% and a TDS of 12,000 ppm. Also Calculations are based on a single cooling tower per turbine with 4 cells per cooling tower.

(2) Total Emissions includes the total emissions for three turbines, three duct burners, three cooling towers, one auxiliary boiler, one diesel generator, and one diesel fire pump.

(3) Sulfuric acid mist according to the AP-42 5/98 draft for Stationary Gas Turbines, states that "trace to low amounts of SO_2 are emitted from gas turbines. Other oxides of sulfur will only appear in a significant quantity if heavy oils are fired in the turbine." Therefore the formation of sulfuric acid mist is deemed to be in insignificant with natural gas combustion.

LAWRENCE COUNTY POWER PROJECT
LAWRENCE COUNTY, INDIANA

Sample Calculations

I. Air Flow Determination: Convert the mass flow rate of the CTG with ductburners on to acfm at 10F and at base load.
Solution:
Using ideal gas law;

$$Q_{acfm} = \left(\frac{(N_{CTG+DB}) \times (0.73 \text{ atm-cf/lbmol-R}) \times (173+460 \text{ R})}{(P_{site} \text{ atm}) \times (60 \text{ min/hr})} \right)$$

where,

P_{site} = (14.36 psia) x (1 atm/ 14.7 psia)
= 0.977 atm

$N_{CTG+DB} = Q_{mass} / M.W._{exhaust}$ = (3,788,000 lb/hr) / (28.46 lb/lbmole *{M.W. calculated from vendor supplied performance sheets}*
= 133,099.1 lbmole/hr

where,

$Q_{mass} = Q_{CTG} + Q_{ductburner}$ = 3,763,000 lb/hr + 25,000 lb/hr *{Vendor supplied data}*
= 3,788,000 lb/hr

Therefore,
$Q_{exhaust}$ = 1,049,194 ft^3/ min

II. CO Concentration: CO concentration is calculated similar to statement II, except $M.W._{CO}$ = 28 lb/lbmol

III. SO_2 Concentration: Calculate SO_2 mass emissions at 10 F (ambient) and at base load for a CTG with ductburners on.
Solution:
Given;
Emission factor = 0.006 lb/MMBtu {emission factor taken from AP-42, Supplemental D with a factor of safety of 10 added}

$Q_{SO2, mass}$ = (emission factor) x (combined heat input of CTG and DB)
= (0.006 lb/MMBtu) x (1,698 + 300 MMBtu/hr)
= **11.99 lb/hr**

IV. VOC Concentration: VOC concentration is calculated similar to statement II, except $M.W._{(as\ methane)\ CH4}$ = 16 lb/lbmol

V. Ammonia Emissions: NH_3 is based on a conservative maximum emission of 10 PPM and the following EPA equation from AP-42 Appendix A.

$$TPY = \frac{C_{PPM} \left[NH_3 \text{ M.W.}\right] \times (\text{Air Flow, acfm}) \times \left(\frac{520 \text{ R}}{(460 +}\right) \times \left(\frac{14.36}{14.7 \text{ psia}}\right) \times (60 \text{ min/hr}) \times (8{,}760 \text{ hrs/ year})}{\left[385.1 \times 10^6\right] \times (2{,}000 \text{ lbs/ ton})}$$

BACT SURVEY RESULTS

The BACT survey is the first key step in performing a BACT analysis in accordance with the "top down" approach suggested by the Environmental Protection Agency (EPA). That approach requires a source to identify the most stringent emission limit previously approved by the appropriate regulatory agency for similar or identical units and determine its technical feasibility. The most stringent emission limits is the Lowest Achievable Emission Rate (LAER) and is the most stringent limit or standard of performance that is achievable by a class or category of emission sources. LAER analyses do not typically consider the economic impacts in the analysis; LAER analyses consider cost if the associated level of control is so great that the new major source could not be built.

If a source elects to install equipment to meet LAER, no further analyses are necessary. Thus, the results of this BACT survey provide a basis for the BACT analysis and the preliminary design.

The approach followed in performing the BACT survey for the GBPGP is described below:

- The RACT/BACT/LAER (RLBC) Clearinghouse on EPA's Bulletin Board System was searched for all simple cycle combustion turbines. The Clearinghouse is a compilation of RACT/BACT/LAER emission limit determinations voluntarily submitted by air pollution control agencies throughout the United States.

- Combined cycle combustion turbines were further categorized into the subset of natural gas-fired and oil-fired turbines, which were then sorted by pollutant.

- A summary of the natural gas-fired combined cycle combustion turbines contained in the database as provided.

- In addition to the EPA Clearinghouse search, EPA and State agency personnel were contacted to obtain additional information on project status, compliance demonstrations, etc.

Summary of BACT De. ..ation - Carbon Monoxide

Process Type 15.004

Gila Bend Power Generation Project

Gila Bend, Arizona

RBLCID	FACILITY	STATE	PROCESS	THRUPUT	UNIT	LIMIT	UNIT	CONTROLS
RI-0012	ALGONQUIN GAS TRANSMISSION CO.	RI	TURBINE, GAS, 2	49	MMBTU/H	0.114	LB/MMBTU	GOOD COMBUSTION PRACTICES
FL-0080	AUBURNDALE POWER PARTNERS, LP	FL	TURBINE,GAS	1214	MMBTU/H	15	PPMVD	GOOD COMBUSTION PRACTICES
MD-0019	BALTIMORE GAS & ELECTRIC - PERRYMAN PLANT	MD	TURBINE, 140 MW NATURAL GAS FIRED ELECTRIC	140	MW	20	PPM @ 15% O2	GOOD COMBUSTION PRACTICES
PA-0148	BLUE MOUNTAIN POWER, LP	PA	COMBUSTION TURBINE WITH HEAT RECOVERY BOILER	153	MW	3.1	PPM @ 15% O2	OXIDATION CATALYST 16 PPM @ 15% O2 WHEN FIRING NO. 2 OIL. AT 75% NG LIMIT SET TO 22.1 PPM
NY-0044	BROOKLYN NAVY YARD COGENERATION PARTNERS L.P.	NY	TURBINE, NATURAL GAS FIRED	240	MW	4	PPM @ 15% O2	
PA-0149	BUCKNELL UNIVERSITY	PA	NG FIRED TURBINE, SOLAR TAURUS T 7300S	5	MW	50	PPMV@15%O2	GOOD COMBUSTION
FL-0045	CHARLES LARSEN POWER PLANT	FL	TURBINE, GAS, 1 EACH	80	MW	25	PPM @ 15% O2	COMBUSTION CONTROL
CO-0020	CIMARRON CHEMICAL	CO	TURBINE #2, GE FRAME 6	33	MW	250	T/YR, LESS THAN	CO CATALYST
OH-0218	CNG TRANSMISSION	OH	TURBINE (NATURAL GAS) (3)	5500	HP (EACH)	0.015	G/HP-HR	FUEL SPEC: USE OF NATURAL GAS
CO-0019	COLORADO POWER PARTNERSHIP	CO	TURBINES, 2 NAT GAS & 2 DUCT BURNERS	385	MMBTU/H EAC	22.4	PPM @ 15% O2	
VA-0238	COMMONWEALTH CHESAPEAKE CORPORATION	VA	3 COMBUSTION TURBINES (OIL-FIRED)	6000	HRS/YR	96	TPY	GOOD COMBUSTION OPERATING PRACTICES
NC-0055	DUKE POWER CO. LINCOLN COMBUSTION TURBINE STATION	NC	TURBINE, COMBUSTION	1313	MM BTU/HR	59	LB/HR	COMBUSTION CONTROL
AZ-0010	EL PASO NATURAL GAS	AZ	TURBINE, GAS, SOLAR CENTAUR H	5500	HP	10.5	PPM @ 15% O2	FUEL SPEC:. LEAN FUEL MIX
AZ-0011	EL PASO NATURAL GAS	AZ	TURBINE, GAS, SOLAR CENTAUR H	5500	HP	10.5	PPM @ 15% O2	FUEL SPEC: LEAN FUEL MIX
AZ-0012	EL PASO NATURAL GAS	AZ	TURBINE, NAT. GAS TRANSM., GE FRAME 3	12000	HP	60	PPM @ 15% O2	LEAN BURN
LA-0079	ENRON LOUISIANA ENERGY COMPANY	LA	TURBINE, GAS, 2	39.1	MMBTU/H	60	PPM @ 15% O2	BASE CASE, NO ADDITIONAL CONTROLS
AL-0074	FLORIDA GAS TRANSMISSION COMPANY	AL	TURBINE, NATURAL GAS	12600	BHP	0.42	GM/HP HR	AIR-TO-FUEL RATIO CONTROL, DRY COMBUSTION CONTROLS
FL-0052	FLORIDA POWER AND LIGHT	FL	TURBINE, CG, 4 EACH	400	MW	33	PPM @ 15% O2	COMBUSTION CONTROL
FL-0052	FLORIDA POWER AND LIGHT	FL	TURBINE, GAS, 4 EACH	400	MW	30	PPM @ 15% O2	COMBUSTION CONTROL
FL-0053	FLORIDA POWER AND LIGHT	FL	TURBINE, GAS, 4 EACH	240	MW	30	PPM @ 15% O2	COMBUSTION CONTROL
FL-0082	FLORIDA POWER CORPORATION POLK COUNTY SITE	FL	TURBINE, NATURAL GAS (2)	1510	MMBTU/H	25	PPMVD	GOOD COMBUSTION PRACTICES
LA-0093	FORMOSA PLASTICS CORPORATION, BATON ROUGE PLANT	LA	TURBINE/HSRG, GAS COGENERATION	450	MM BTU/HR	70	LB/HR	COMBUSTION DESIGN AND CONSTRUCTION.
LA-0089	FORMOSA PLASTICS CORPORATION, LOUISIANA	LA	TURBINE/HRSG, GAS COGENERATION	450	MM BTU/HR	25.8	LB/HR	PROPER OPERATION
LA-0091	GEORGIA GULF CORPORATION	LA	GENERATOR, NATURAL GAS FIRED TURBINE	1123	MM BTU/HR	972.4	TPY CAP FOR 3 TURB.	GOOD COMBUSTION PRACTICE AND PROPER OPERATION
GA-0053	HARTWELL ENERGY LIMITED PARTNERSHIP	GA	TURBINE, GAS FIRED (2 EACH)	1817	M BTU/HR	25	PPMVD @ FULL LOAD	FUEL SPEC: CLEAN BURNING FUELS
OR-0011	HERMISTON GENERATING CO.	OR	TURBINES, NATURAL GAS (2)	1696	MMBTU	15	PPM @ 15% O2	GOOD COMBUSTION PRACTICES
LA-0086	INTERNATIONAL PAPER	LA	TURBINE/HRSG, GAS COGEN	338	MM BTU/HR TU	165.9	LB/HR	COMBUSTION CONTROL
MI-0206	KALAMAZOO POWER LIMITED	MI	TURBINE, GAS-FIRED, 2, W/ WASTE HEAT BOILERS	1805.9	MMBTU/H	20	PPMV	DRY LOW NOX TURBINES
FL-0109	KEY WEST CITY ELECTRIC SYSTEM	FL	TURBINE, EXISTING CT RELOCATION TO A NEW PLANT	23	MW	20	PPM @ 15% O2 FULL LD	GOOD COMBUSTION
FL-0078	KISSIMMEE UTILITY AUTHORITY	FL	TURBINE, NATURAL GAS	869	MMBTU/H	54	LB/H	GOOD COMBUSTION PRACTICES
FL-0078	KISSIMMEE UTILITY AUTHORITY	FL	TURBINE, NATURAL GAS	367	MMBTU/H	40	LB/H	GOOD COMBUSTION PRACTICES

Summary of BACT D .ation - Carbon Monoxide

Proc.. .ype 15.004

Gila Bend Power Generation Project

Gila Bend, Arizona

RBLCID	FACILITY	STATE	PROCESS	THRUPUT	UNIT	LIMIT	UNIT	CONTROLS
FL-0054	LAKE COGEN LIMITED	FL	TURBINE, GAS, 2 EACH	42	MW	42	PPM @ 15% O2	COMBUSTION CONTROL
NJ-0013	LAKEWOOD COGENERATION, L.P.	NJ	TURBINES (NATURAL GAS) (2)	1190	MMBTU/HR (E	0.026	LB/MMBTU	TURBINE DESIGN
NM-0031	LORDSBURG L.P.	NM	TURBINE, NATURAL GAS-FIRED, ELEC. GEN.	100	MW	27	LBS/HR	DRY LOW-NOX TECHNOLOGY BY MAINTAINING PROPER AIR-FUEL RATIO.
NM-0022	MARATHON OIL CO. - INDIAN BASIN N.G. PLAN	NM	TURBINES, NATURAL GAS (2)	5500	HP	13.2	LBS/HR	LEAN-PREMIXED COMBUSTION TECHNOLOGY.
AL-0096	MEAD COATED BOARD, INC.	AL	COMBINED CYCLE TURBINE (25 MW)	568	MMBTU/HR	28	PPMVD@15% O2 (GAS)	PROPER DESIGN AND GOOD COMBUSTION PRACTICES
GA-0063	MID-GEORGIA COGEN.	GA	COMBUSTION TURBINE (2), NATURAL GAS	116	MW	10	PPMVD	COMPLETE COMBUSTION
NM-0024	MILAGRO, WILLIAMS FIELD SERVICE	NM	TURBINE/COGEN, NATURAL GAS (2)	900	MMCF/DAY	27.6	PPM @ 15% O2	
RI-0010	NARRAGANSETT ELECTRIC/NEW ENGLAND POWER CO.	RI	TURBINE, GAS AND DUCT BURNER	1360	MMBTU/H EAC	11	PPM @ 15% O2, GAS	
NV-0020	NEVADA COGENERATION ASSOCIATES #1	NV	COMBINED-CYCLE POWER GENERATION	85	MW TOTAL OU	39.98	LBS/HR	CATALYTIC CONVERTER
NV-0018	NEVADA COGENERATION ASSOCIATES #2	NV	COMBINED-CYCLE POWER GENERATION	85	MW POWER OU	39.98	LBS/HR	CATALYTIC CONVERTER
NV-0017	NEVADA POWER COMPANY, HARRY ALLEN PEAKING PLANT	NV	COMBUSTION TURBINE ELECTRIC POWER GENERATION	600	MW (8 UNITS 7	152.5	TPY (EACH TURBINE)	PRECISION CONTROL FOR THE LOW NOX COMBUSTOR
NJ-0009	NEWARK BAY COGENERATION PARTNERSHIP	NJ	TURBINE, NATURAL GAS FIRED	585	MMBTU/HR	0.0055	LB/MMBTU	CATALYTIC OXIDATION
NJ-0017	NEWARK BAY COGENERATION PARTNERSHIP, L.P.	NJ	TURBINES, COMBUSTION, NATURAL GAS-FIRED (2)	617	MMBTU/HR (E	1.8	PPMDV	OXIDATION CATALYST
PA-0083	NORTHERN CONSOLIDATED POWER	PA	TURBINES, GAS, 2	34.6	KW EACH	110	T/YR	OXIDATION CATALYST
FL-0068	ORANGE COGENERATION LP	FL	TURBINE, NATURAL GAS, 2	368.3	MMBTU/H	30	PPMVD	GOOD COMBUSTION
FL-0056	ORLANDO UTILITIES COMMISSION	FL	TURBINE, GAS, 4 EACH	35	MW	10	PPM @ 15% O2	COMBUSTION CONTROL
FL-0102	PANDA-KATHLEEN, L.P.	FL	COMBINED CYCLE COMBUSTION TURBINE (TOTAL 115MW)	75	MW	25	PPM @ 15% O2	COMBUSTION CONTROLS STANDARD ONLY APPLIES IF GE CT IS SELECTED, THE ABB CT WAS LESS THAN SIGNIFICANT EMIS. INCR FOR CO
MA-0015	PEABODY MUNICIPAL LIGHT PLANT	MA	TURBINE, 38 MW NATURAL FAS FIRED	412	MMBTU/HR	40	PPM @ 15% O2	GOOD COMBUSTION PRACTICES
OR-0010	PORTLAND GENERAL ELECTRIC CO.	OR	TURBINES, NATURAL GAS (2)	1720	MMBTU	15	PPM @ 15% O2	GOOD COMBUSTION PRACTICES
NY-0080	PROJECT ORANGE ASSOCIATES	NY	GE LM-5000 GAS TURBINE	550	MMBTU/HR	92	LB/HR TEMP > 20F	NO CONTROLS
NY-0046	SARANAC ENERGY COMPANY	NY	TURBINES, COMBUSTION (2) (NATURAL GAS)	1123	MMBTU/HR (E	3	PPM	OXIDATION CATALYST
GA-0052	SAVANNAH ELECTRIC AND POWER CO.	GA	TURBINES, 8	1032	MMBTU/H, NA	9	PPM @ 15% O2	FUEL SPEC: LOW SULFUR FUEL OIL
SC-0029	SC ELECTRIC AND GAS COMPANY - HAGOOD STATION	SC	INTERNAL COMBUSTION TURBINE	110	MEGAWATTS	23	LBS/HR	GOOD COMBUSTION PRACTICES
NY-0045	SELKIRK COGENERATION PARTNERS, L.P.	NY	COMBUSTION TURBINE (79 MW)	1173	MMBTU/HR	25	PPM	COMBUSTION CONTROL
NY-0045	SELKIRK COGENERATION PARTNERS, L.P.	NY	COMBUSTION TURBINES (2) (252 MW)	1173	MMBTU/HR (E	10	PPM	COMBUSTION CONTROLS
NY-0050	SITHE/INDEPENDENCE POWER PARTNERS	NY	TURBINES, COMBUSTION (4) (NATURAL GAS) (1012 MW)	2133	MMBTU/HR (E	13	PPM	COMBUSTION CONTROLS
CA-0418	SOUTHERN CALIFORNIA GAS	CA	TURBINE, GAS-FIRED	47.64	MMBTU/H	7.74	PPM @ 15% O2	HIGH TEMPERATURE OXIDATION CATALYST

Summary of BACT D[illegible]ation - Carbon Monoxide

Process Type 15.004

Gila Bend Power Generation Project

Gila Bend, Arizona

RBLCID	FACILITY	STATE	PROCESS	THRUPUT	UNIT	LIMIT	UNIT	CONTROLS
CA-0463	SOUTHERN CALIFORNIA GAS	CA	TURBINE, GAS FIRED, SOLAR MODEL H	5500	HP	7.74	PPM @ 15% O2	HIGH TEMP OXIDATION CATALYST
NM-0029	SOUTHWESTERN PUBLIC SERVICE COMPANY/CUNNINGHAM STA	NM	COMBUSTION TURBINE, NATURAL GAS	100	MW		SEE FACILITY NOTES	GOOD COMBUSTION PRACTICES
WA-0027	SUMAS ENERGY INC.	WA	TURBINE, NATURAL GAS	88	MW	6	PPM @ 15% O2	CO CATALYST
CO-0017	THERMO INDUSTRIES, LTD.	CO	TURBINE, GAS FIRED, 5 EACH	246	MMBTU/H	25	PPM @ 15% O2	COMBUSTION CONTROL
FL-0072	TIGER BAY LP	FL	TURBINE, GAS	1614.8	MMBTU/H	49	LB/H	GOOD COMBUSTION PRACTICES
CA-0613	UNOCAL	CA	TURBINE, GAS (SEE NOTES)			10	PPM @ 15% O2	OXIDATION CATALYST
TX-0231	WEST CAMPUS COGENERATION COMPANY	TX	GAS TURBINES	75.3	MW (TOTAL PO	300	TPY	INTERNAL COMBUSTION CONTROLS
NM-0021	WILLIAMS FIELD SERVICES CO. - EL CEDRO COMPRESSOR	NM	ENGINE, GAS-FIRED, RECIPROCATING	1000	HP	2.5	G/B-HP-H	CLEAN/LEAN BURN TECHNOLOGY
NM-0021	WILLIAMS FIELD SERVICES CO. - EL CEDRO COMPRESSOR	NM	TURBINE, GAS-FIRED	11257	HP	50	PPM @ 15% O2	COMBUSTION CONTROL
PR-0004	ECOELECTRICA, L.P.	PR	TURBINES, COMBINED-CYCLE COGENERATION	461	MW	33	PPMDV	COMBUSTION CONTROLS.
IN-0071	PORTSIDE ENERGY CORP.	IN	TURBINE, NATURAL GAS-FIRED	63	MEGAWATT	12	LBS/HR	GOOD COMBUSTION AND EMISSIONS NOT TO EXCEED 10 PPMVD AT 15% OXYGEN.
PR-0004	ECOELECTRICA, L.P.	PR	TURBINES, COMBINED-CYCLE COGENERATION	461	MW	100	PPMDV AT MIN. LOAD	COMBUSTION CONTROLS.
IN-0071	PORTSIDE ENERGY CORP.	IN	TURBINE, NATURAL GAS-FIRED	63	MEGAWATT	40	LBS/HR	GOOD COMBUSTION AND EMISSIONS NOT TO EXCEED 40 PPMVD AT 15% OXYGEN.

Cost Estimation Methodology for BACT Analysis

The cost estimating approach used in this report is consistent with that presented in the EPA documents, EAB Control Cost Manual, Control Technologies for Hazardous Air Pollutants, and OAQPS Control Cost Manual[1, 2, 3]. That is, the capital cost estimation procedure is a "factored" or "study" estimate. For this type estimate a reliable estimate of the total purchased cost is calculated or a quote is obtained from a vendor and predetermined factors are applied to determine all other capital cost elements.

The total capital investment is the sum of the total purchased equipment cost, the total direct installation cost and the total indirect cost. Purchased equipment costs represent the estimated delivered cost of the control device, auxiliary equipment, instrumentation, structural support, freight, and taxes. Control device costs were obtained from vendors and the open literature. Auxiliary equipment consists of all structural, mechanical and electrical components required for efficient operation of the device. These include interconnecting ductwork, fans, stacks, tanks, pumps, piping, and motors. Auxiliary equipment costs are not always included in the basic equipment quotes from the vendors. The costs of instrumentation, structural support, and freight, are then calculated as a fraction of the basic equipment and auxiliaries cost. Each direct and indirect installation cost may then be calculated as a fraction of the total purchased equipment cost.

Installation costs consist of the direct expenditures for materials and labor for foundations and supports, erection and handling, piping, electrical, painting, insulation, and site preparation, and the indirect costs for contractor's engineering and supervision, construction and field expenses, construction fees, contingencies, start-up, and performance tests. These installation costs are expressed as a function

[1] EPA - EAB Control Cost Manual (Third Edition), EPA - 450/5-87-001A, February 1987.
[2] EPA - Control Technologies for Hazardous Air Pollutants, EPA - 625/6-86-014, September 1986.
[3] EPA - OAQPS Control Cost Manual (Fourth Edition), EPA - 450/3/90/006, January 1990.

of the total purchased equipment cost. The factors were based on the assumption that the installation is performed by an outside contractor and not by plant personnel.

Annualized Costs

Annualized costs are developed using vendor's estimates and operating data in the literature. Annualized costs are comprised of the direct operating costs of materials and labor for maintenance, operation, supervision and utilities and waste disposal, and the indirect operating charges including plant overhead, general administration, and capital charges.

Labor and material costs for operation, supervision and maintenance will vary depending on the system type, degrees of system automation, and operating time. Operating labor is generally reduced with increased system automation. The maintenance costs of well-designed and maintained control equipment are low.

Utility costs for the control device and auxiliary equipment are based on the total annual consumption, unit costs and vendor estimates.

Indirect operating costs include the cost of plant overhead, general administration (G&A), and capital charges. G&A is a direct function of the total capital cost. Overhead is a function of labor. The capital recovery cost, or capital charge, is based on the operational life of the system interest and capital depreciation rates, and total capital cost. These charges are based on the capital recovery factor (CRF) defined as:

$$CRF = \frac{I\,(1+I)^n}{(1+I)^n - 1}$$

where: I = the annual interest rate

n = the equipment life (years)

Based on these costs estimating procedures, capital and annualized costs have been estimated for each flue gas control alternative reviewed. It is important

to recognize that the costs presented are budgetary estimates, provided for comparative purposes only, and are not final costs.

REFERENCE 6

PSD MODELING PROTOCOL

MALCOLM PIRNIE

PREVENTION OF SIGNIFICANT DETERIORATION (PSD) MODELING PROTOCOL

GILA BEND POWER GENERATION STATION

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3962-001

March 7, 2000

MALCOLM PIRNIE

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MALCOLM PIRNIE

EXECUTIVE SUMMARY

Power Development Enterprises, Inc. is proposing to construct a nominal 750-megawatt combined cycle, natural gas fired electric power generation facility in Maricopa County, Arizona. The facility, the Gila Bend Power Generation Station, will be located approximately 60 miles southwest of Phoenix in the town of Gila Bend, Arizona. The proposed power generation facility will be a new major source and will be subject to the Prevention of Significant Deterioration (PSD) regulations contained in 40 CFR Part 52.21. As part of the permit application process, the PSD regulations require modeling of air pollutant emissions from the proposed facility to evaluate ambient air quality impacts. This modeling protocol contains information on the proposed modeling approach including a description of the site, model input data, meteorological data, and other assumptions and information that will be used to complete the modeling analysis.

1.1 PROJECT DESCRIPTION

Power Development Enterprises, Inc. is proposing to construct a nominal 750-megawatt combined cycle electric power generation facility in Maricopa County, Arizona. This facility, the Gila Bend Power Generation Station, will be located approximately 60 miles southwest of Phoenix in the town of Gila Bend, Arizona.

Upon completion, the power generation facility will consist of three combined cycle combustion turbine generators (CTG), three heat recovery steam generators (HRSG), one natural gas-fired auxiliary boiler, one emergency diesel generator, one diesel fire pump, cooling towers and ancillary equipment. The CTG's will be fired exclusively with natural gas.

1.2 REGULATORY EVALUATION

The proposed facility will be a new major source of air pollutant emissions located within an area that is in attainment with all established national ambient air quality standards (NAAQS) for criteria pollutants. As such, the facility is subject to the Prevention of Significant Deterioration (PSD) regulations prescribed under 40 CFR Part 52.21. The PSD regulations impose permitting requirements and specific standards regarding air emissions from the proposed facility. Estimated annual emission rates for the proposed facility and PSD significant emission rates are shown in Table 1-1. As shown in Table 1-1, estimated emissions of carbon monoxide (CO), nitrogen oxides (NO_x), sulfur dioxide (SO_2), particulate matter less than 10 microns in diameter (PM_{10}), and volatile organic compounds (VOC) from the proposed facility exceed the PSD significant emission rates. To satisfy PSD requirements, an air quality modeling analysis will be performed for

TABLE 1-1

SUMMARY OF ESTIMATED CONTROLLED EMISSIONS COMPARED TO PSD SIGNIFICANT EMISSION RATES

Pollutant	Estimated Controlled Emissions* (Tons/yr)	PSD Significant Emission Rates (Tons/yr)	PSD Review Required
Carbon Monoxide	692	100	Yes
Nitrogen Oxide	289	40	Yes
Sulfur Dioxide	53	40	Yes
PM_{10}	370	15	Yes
Ozone (VOC)	42	40	Yes
Lead	0.4	0.6	No
Sulfuric Acid Mist	Negligible	7	No

* Based on an annual operating schedule of 8,760 hr/yr for three combined cycle combustion turbines. The pollutant emission rates shown are preliminary estimates. Final emission estimates will be provided in the PSD permit application.

emissions of CO, NO_x, SO_2, and PM_{10} from the proposed facility.

1.3 EMISSION RATES AND SOURCE PARAMETERS

A summary of the preliminary emission estimates for the pollutants for which modeling will be performed is presented in Table 1-2. These estimates are subject to change depending on final facility designs and equipment vendor specifications. Final emission estimates will be presented as part of the PSD permit application. The source parameters for the various emission sources will also be established when the final design is completed and will be included in the final modeling report as part of the PSD permit application. The final modeling report will include stack parameters such as stack height, stack diameter, exhaust velocity, and exhaust temperature. The modeling analysis will be based on a single condition using conservative, "worst-case" emissions and "worst-case" stack parameters.

The modeling analysis will include an assessment of emissions from the three combustion turbines with heat recovery steam generators and the auxiliary boiler. Other facility emission units including the emergency diesel generator, diesel fire pump, and cooling towers will not be included in the modeling analysis for reasons discussed below.

The diesel emergency generator and diesel fire pump will be used on a limited basis in emergency situations. Limited testing of this equipment will also occur periodically. Because these units will be operated less than 500 hours per year, these emergency units are considered negligible and will not be included in the modeling analysis. The facility will also operate a series of cooling towers. Based on results from an Electric Power Research

TABLE 1-2

MAXIMUM HOURLY ESTIMATED EMISSION RATES FOR DISPERSION MODELING ANALYSIS

EMISSION SOURCE	CARBON MONOXIDE EMISSION RATE (LB/HR)	SULFUR DIOXIDE EMISSION RATE (LB/HR)	PM_{10} EMISSION RATE (LB/HR)	NITROGEN OXIDES EMISSION RATE (LB/HR)
Combustion Turbine Generator No. 1	50.7	4.0	28	20
Combustion Turbine Generator No. 2	50.7	4.0	28	20
Combustion Turbine Generator No. 3	50.7	4.0	28	20
Auxiliary Boiler	5.7	0.05	0.38	4.4

Note: Emission rates are based on worst-case scenarios from preliminary estimates. The final emission rates used in the modeling analyses will be presented in the PSD permit application.

Institute (EPRI) study[1] on mechanical-draft cooling towers, particulate matter less than 10 microns in diameter (PM_{10}) is not emitted in measurable amounts from these units. Therefore, emissions of PM_{10} from the cooling tower are considered negligible and are proposed for exclusion from the modeling analysis.

[1] Electric Power Research Institute (EPRI) report titled, "User's Manual: Cooling Tower-Plume Prediction Code," Section 4, Table 4-1.

2.1 SITE LOCATION

The proposed location of the Gila Bend Power Generation Station is in southwestern Arizona approximately 60 miles southwest of Phoenix in Maricopa County. The site is located in Gila Bend north of Interstate 8 and just south of the Citrus Valley. The general coordinates of the site are 32° 58' 30" N latitude and 112° 49' 15" W longitude. A map showing the proposed site location is provided as Figure 2-1.

2.2 TOPOGRAPHY

The proposed facility is located in southwestern Arizona. The site elevation is approximately 670 feet (204 meters) above mean sea level (msl). A review of the United States Geological Survey (USGS) quadrangle map for the area indicates that terrain elevations vary from approximately 610 feet to 720 feet within a 3 kilometer radius of the site. The surrounding terrain at distances greater than 10 kilometers from the site consists of various mountain ranges including the Gila Bend Mountains to the north, the Maricopa Mountains to the northeast, the Sauceda and Sand Tank Mountains to the south, and the Painted Rock Mountains to the west.

2.3 LAND USE CLASSIFICATION

The proposed plant site is located in a sparsely populated region in Gila Bend, Arizona. A dirt road borders the site property to the west. Native desert borders the property to the south and east. Fallow agricultural land, including a former cotton gin and landing strip, borders the property to the north. Entrance to the site is from the bordering dirt road. The property across the dirt road is native desert. The land to the north of the property

consists of abandoned agricultural property. These former cotton fields are now overgrown with Salt Cedars. Native desert borders the subject property to the south and east.

The criteria for establishing whether the site should be considered urban or rural for modeling purposes (suggested by Irwin[1]) is outlined below:

- Classify the land use within a 3-km radius from the proposed facility using the meteorological land-use typing scheme proposed by Auer[2].
- If the land use Types I1, I2, C1, R2, and R3 account for 50 percent or more of the area located within 3 km of the source, the area should be considered urban for modeling purposes. Otherwise, the area should be considered rural.

The proposed plant site area is considered to be rural based upon a review of the USGS map for the site.

2.4 EXISTING AIR QUALITY

The area surrounding the proposed facility is currently classified as in attainment of all National Ambient Air Quality Standards (NAAQS).

---

[1] J.S. Irwin, *Proposed criteria for Selection of Urban Versus Rural Dispersion Coefficients (Draft Staff Report).* Meteorology and Assessment Division, U.S. Environmental Protection Agency, Research Triangle Park, North Carolina. Docket Number A-80-46, II-B-8 1978.

[2] August H. Auer, Jr. "*Correlation of Land Use and Cover with Meteoroligical Anomalies*," Journal of Applied Meteorology. 17(5): 636-643 1978.

3.1 OBJECTIVE

Dispersion models are used to estimate the ambient concentrations resulting from a proposed source of emissions to determine compliance with NAAQS, PSD increments, and other applicable standards and criteria. Dispersion modeling will be performed in accordance with the Guideline on Air Quality Models (40 CFR Part 51, Appendix W). The analyses will include dispersion estimates for emissions of SO_2, NO_2, CO, and PM_{10} from the proposed facility.

3.2 CLASS II AREA IMPACT ANALYSIS

The dispersion modeling effort addressing Class II Area impacts will be divided into two analyses: a preliminary modeling analysis and, if necessary, a full modeling analysis. The preliminary modeling analysis will assess only the emission stacks associated with the proposed Gila Bend Power Generation Station. The results will be compared to the PSD significance levels, shown in Table 3-1. If the impacts are below the significance levels, then no further analysis is required. In the event that the maximum predicted impacts from the preliminary modeling analysis exceed the significance levels, then a full modeling analysis will be required.

If required, a full modeling analysis will consider emissions from the proposed source, existing sources in the impact area, and the growth (industrial, residential, and commercial) that accompanies the new source. The results from the full modeling analysis will be compared to the appropriate NAAQS and PSD increments as discussed in Section 3.2.2.

TABLE 3-1 PSD SIGNIFICANCE LEVELS FOR CRITERIA POLLUTANTS		
Pollutant	**Averaging Period**	**Significance Level (ug/m3)**
SO_2	Annual	1
	24-hour	5
	3-hour	25
PM_{10}	Annual	1
	24-hour	5
NO_2	Annual	1
CO	8-hour	500
	1-hour	2000

3.2.1 Preliminary Modeling Analysis

The USEPA Guideline on Air Quality Models describes appropriate models and techniques for use in regulatory applications. These models vary depending upon source types, receptor terrain elevations, and averaging times. Model selection is based upon consideration of each of these characteristics for a given project.

For this analysis, the modeling must determine impacts from multiple point sources in simple and complex terrain and for short-term and annual averaging periods. Therefore, the preferred model based on EPA guidance is the most recent version of the Industrial Source Complex model in the Short-Term mode, known as ISCST3 (version 99155).

The ISCST3 model requires four basic types of input data:

- Source Data
- Meteorological Data

- Receptor Data
- Model Control Options

The selection of each of these model input items is described below.

Source Data

The proposed facility will have the potential to emit SO_2, NO_x, CO, and PM_{10} from three combustion turbines powered by natural gas. Emissions will be released to the atmosphere through three separate exhaust stacks. Also, the facility will operate an auxiliary boiler that will emit SO_2, NO_x, CO, and PM_{10} through a single exhaust stack. Source data (stack parameters) required by the ISCST3 model include stack height and stack diameter, exhaust temperature and velocity, and emission rates of each pollutant to be modeled. The stack parameters for the emission sources will be established when the facility design is completed and will be included in the final modeling report as part of the PSD permit application.

For conservatism, "worst-case" stack parameters from a modeling perspective will be used to conduct the modeling analysis. A review of the proposed operating load conditions and equipment vendor data will be completed to establish the "worst-case" emission rates and stack parameters. Maximum emission rates and most conservative stack parameters (lowest stack exhaust temperatures and exhaust exit velocities) considering all proposed operating load conditions will be used in the modeling analysis. A more refined analysis of the operating load conditions will be performed requiring additional modeling analyses only if these conservative assumptions fail to result in acceptable model predicted ambient impacts.

Meteorological Data

The ISCST3 model requires the use of hourly surface measurements of wind speed and direction, temperature, mixing heights, and stability in the RAMMET format. In accordance with USEPA guidelines, the modeling analysis will be performed using 5 consecutive years of meteorological data from a nearby, representative meteorological station. For the Gila Bend Power Generation Station site, surface data from a meteorological station located in Paloma, Arizona and upper air (mixing height) data from Tucson, Arizona for the years 1994-1998 is proposed. The Paloma Ranch station is located approximately 6 miles from the Gila Bend Power Generation Station site and its coordinates are 32° 55'36" N and 112° 53'44" W. Meteorological data collected by this station is available from the Arizona Meteorological Network's (AZMET) Internet site (www.ag.arizona.edu/azmet/).

Receptor Data

The modeling analysis will be performed with a coarse Cartesian receptor grid extending from the center of the site, with 1-kilometer spacing. The extent of the grid will be based upon the distance to maximum impacts. The locations of maximum impacts will be further refined with smaller Cartesian receptor grids centered on the coarse grid maximum impact receptor location. The refined receptor grids will extend a minimum of 1 kilometer out from the course grid receptor points, at 100-meter spacing. Terrain heights for the course and refined grid receptors will be obtained from 1-minute USGS digital elevation maps (DEMs).

In addition to the grids, discrete receptors will be placed along the facility fenceline (although maximum impacts are expected to occur beyond

the fenceline). The fenceline receptors will be set-up using approximately 100-meter spacing.

Model Control Options

The ISCST3 model contains a number of user-specified options. Following USEPA guidance, the "regulatory default" switch will be selected, which includes buoyancy-induced dispersion, final plume rise, the effects of stack-dip downwash, and calm wind processing. In addition, ISCST3 will employ different dispersion coefficients into the model depending on the land-use classification of the surrounding area. As described in Section 2.3, an analysis was performed which determined that the area around the site was rural; therefore, the rural dispersion coefficients will be selected in the model.

The ISCST3 model also has the ability to include the effects of building wakes on the dispersion of plumes released from facility stacks. A software package using USEPA Building Profile Input Program (BPIP), will be used to determine the potential effects of on-site and nearby structures. The program requires the input of the horizontal, lateral, and vertical extent of each building, as well as, the source-specific parameters of facility stacks. These data will be used to calculate the predominant building dimensions associated with each emission source at wind directions of every 10 degrees. This output will be used by ISCST3 in determining downwash effects on the dispersion of plumes.

Cavity Analysis

The cavity effect analysis will be performed for the turbine stacks. Malcolm Pirnie will use the latest version of SCREEN3 (version 96043) for

the cavity impacts analysis, which is the USEPA recommended model for screening procedures. Buildings or structures causing wake and downwash effects for any wind direction will be determined. The dimensions of these buildings will be used in the SCREEN3 model to determine the maximum cavity effect concentration. Cavity effect concentration values will be calculated only if effects are seen off-site. The cavity effect analysis methodology is described below.

- The SCREEN3 model will be run for each structure at the site within influence of the exhaust stacks.
- The cavity length for each structure will be compared to the distance from the leeward side of the building to the property line in the direction in which the source is impacted by the building. If the cavity length does not extend off-site, then no cavity concentration will be calculated.
- The structure causing the maximum cavity concentration for the source in the direction toward the nearest property line will be used to calculate the cavity concentration.

Results

The maximum impact results from the preliminary modeling analysis described above will be compared to PSD significance levels (shown in Table 3-1). If impacts are less than the significance levels, then no further analysis is required. However, if the impacts exceed significance levels, than a full modeling analysis will be conducted.

3.2.2 Full Impact Analysis

If the maximum predicted ambient ground-level concentration for a

pollutant (either from the ISCST3 or cavity analysis) exceeds its PSD significance level (shown in Table 3-1), a full impact analysis will be performed for that pollutant. For each pollutant subject to the full impact analysis, the significant impact area (SIA) will be determined. The SIA is a circular geographical region with the radius extending from the proposed facility to the furthest point of significant impact or a radius of 50 kilometers, whichever is less. An impact area will be determined for every averaging time. The final impact area for a pollutant is the largest impact of the individual averaging times. Quantifiable fugitive emissions will be included in the determination of the impact area.

NAAQS Inventory

The EPA requires that all nearby sources be modeled as a part of the NAAQS analysis. Nearby is generally defined as within 50-kilometers of the SIA. Once the impact area(s) is determined, Malcolm Pirnie will work with Maricopa County to determine which emissions inventories from stationary sources within the area will be used.

PSD Increment Inventory

The PSD increment inventory will include all PSD sources and any increment-affecting sources within a 50-kilometer annular distance post the SIA. Malcolm Pirnie will work with Maricopa County to determine which stationary sources to include in the increment inventory for the multi-source analysis.

Preconstruction Monitoring Exemption

Based on the significance modeling, the maximum ground-level

concentrations will be compared to the PSD *de minimis* monitoring concentrations (preconstruction monitoring exemption levels) listed in Table 3-2. If the significance modeling indicates that the resulting concentrations from the proposed emission increase are below the PSD *de minimis* monitoring level, then a waiver from preconstruction ambient air monitoring will be requested.

TABLE 3-2
PSD *DE MINIMIS* MONITORING LEVELS

Pollutant	Averaging Period	De Minimis Monitoring Concentration (ug/m^3)
SO_2	24-hour	13
PM_{10}	24-hour	10
TSP	24-hour	10
NO2	Annual	14
CO	8-hour	575

Compliance Demonstration

Once the maximum total concentrations (including facility impacts, impacts due to other sources, and the appropriate background) for each applicable averaging time have been established, these concentrations will be compared to the NAAQS and PSD increment values shown in the Tables 3-3 and 3-4. Compliance will be demonstrated if the total concentrations are below the NAAQS and the modeled pollutant increase is less than the applicable PSD increment.

3.3 CLASS I AREA IMPACT ANALYSIS

The PSD program provides for extra protection for pristine areas of

TABLE 3-3

NATIONAL AMBIENT AIR QUALITY STANDARDS

STANDARDS	PRIMARY (ug/m^3)					SECONDARY (ug/m^3)			
Pollutant	Annual	24-hour	8-hour	1-hour	4-month	Annual	24-hour	3-hour	1-hour
PM_{10}	50 [a]	150 [b]				50 [a]	150 [b]		
SO_2	80 [c]	365 [d]						1300 [d]	
NO_2	100 [c]					100 [c]			
O_3				235 [b]					235 [b]
CO			10,000 [d]	40,000 [d]					
Lead					1.5 [c]				

Information reported in *New Source Review Workshop Manual,* (Draft October 1990).

[a] Standard is attained when the expected annual arithmetic mean is less than or equal to 50 ug/m^3.

[b] Standard is attained when the expected number of exceedances is less than or equal to 1.

[c] Never to be exceeded.

[d] Not to be exceeded more than once per year.

TABLE 3-4

PSD INCREMENTS

CLASSES	I			II			III		
Pollutant	**Annual ug/m³**	**24-hour ug/m³**	**3-hour ug/m³**	**Annual ug/m³**	**24-hour ug/m³**	**3-hour ug/m³**	**Annual ug/m³**	**24-hour ug/m³**	**3-hour ug/m³**
SO_2	2 [a]	5 [b]	25 [b]	20 [a]	91 [b]	512 [a]	40 [a]	182 [b]	700 [b]
PM_{10}	4 [a]	8 [b]		17 [a]	30 [b]				
NO_2	2.5 [a]			25 [a]			50 [a]		

Information reported in *New Source Review Workshop Manual,* (Draft October 1990) except for PM_{10} increments.

[a] Standard never to be exceeded.

[b] Standard not to be exceeded more than 1 time per year.

the United States, such as national parks, forests, and wildlife refuges. These areas (Class I areas) have lower ambient air quality thresholds with respect to significance levels and allowable impacts. A Class I Area impact analysis is conducted to predict ambient impacts at Class I Areas located near a proposed facility. Since there are no Class I Areas within 100 kilometers of the proposed Gila Bend Power Generation Station site location, a Class I Area impact analysis will not be completed. However, the Federal Land Manager (FLM) may require that additional analyses be completed to address impacts at nearby Class II Wilderness Areas located within 50 kilometers of the site. If necessary, these analyses will be completed based on future discussions and negotiations with the FLM.

3.4 HAZARDOUS AIR POLLUTANT ASSESSMENT

Since the combustion turbines will operate using natural gas, emissions of hazardous air pollutants (HAP) from the proposed facility are expected to be minimal. A breakdown of individual and total HAP emissions from the proposed facility will be provided in the PSD permit application submittal to Maricopa County. If emissions of any single HAP are above the major source threshold of 10 tons per year, then a HAP assessment will be conducted. As appropriate, modeling results will be compared with Arizona Ambient Air Quality Guidelines to evaluate compliance.

MALCOLM PIRNIE

SECTION 4.0

OUTPUT PRODUCTS AVAILABLE TO MARICOPA COUNTY

In addition to documentation of the methodology and results of the dispersion modeling analysis, Malcolm Pirnie will provide Maricopa County with electronic copies of computer model input and output. This will include input/output ISCST3 modeling files, BPIP input/output files, meteorological data files, and DEM (terrain elevation) files.

REFERENCE 7

AMBIENT AIR QUALITY ANALYSIS

7.1 INTRODUCTION

As a proposed new major source of air pollution to be located in an attainment area, the proposed Gila Bend Power Generation Station (GBPGS) is subject to the Prevention of Significant Deterioration (PSD) regulations prescribed under 40 CFR Part 52.21. As part of the permitting process, the PSD regulations require an assessment of the ambient air quality impacts resulting from the proposed facility's operations. To address these requirements, an air quality analysis considering Class I and Class II Areas has been completed and is described in the sections below.

The proposed GBPGS will be located approximately 60 miles southwest of Phoenix in the town of Gila Bend, Arizona. This area is currently in attainment with all established National Ambient Air Quality Standards (NAAQS). The pollutants emitted by the facility subject to review under the PSD regulations, and for which NAAQS have been established, are nitrogen dioxide (NO_2), carbon monoxide (CO), sulfur dioxide (SO_2), and particulate matter (PM_{10}). Therefore, an air quality analysis was performed for each of these pollutants. Additionally, an analysis was performed for emissions of formaldehyde (HCHO) from the proposed facility to evaluate compliance with Arizona Ambient Air Quality Guidelines (AAAQGs).

A modeling protocol was submitted to the Maricopa County Environmental Services Department, Air Quality Division in March 2000. The modeling protocol, as presented in Reference 6 of this application, was developed to outline dispersion modeling procedures in accordance with the Guideline on Air Quality Models (40 CFR 51, Appendix W) and the New Source Review Workshop Manual (USEPA, 1990).

The New Source Review Workshop Manual (USEPA, 1990) describes two levels of modeling analyses required for NSR/PSD applicants: preliminary and

refined. The preliminary analysis (or significance analysis) is conducted to estimate impacts on ambient air quality from the proposed source alone. Results from the preliminary analysis are used to determine if a refined (full impact) analysis is necessary and to then define the significant impact region for the full impact analysis. A full impact analysis is performed for each pollutant that exceeds its PSD significant impact level. The full impact analysis is more complex than the preliminary analysis because it considers the combined impact due to emissions from the proposed source, existing sources in the impact area, and growth (industrial, residential, and commercial) that accompanies the new source.

7.2 CLASS II AREA ANALYSIS

The sections presented below describe the methodology used and summarize the results obtained from the Class II area modeling analysis completed for the proposed GBPGS.

7.2.1 Model Selection

The EPA Guideline on Air Quality Models describes appropriate models and techniques for use in regulatory applications depending upon source types, receptor elevations, and building downwash potential and averaging times. Model selection should be based upon consideration of each of these characteristics for a given project. For the GBPGS, the modeling addresses impacts from point sources in simple and complex terrain and for short-term and annual averaging periods. Therefore, the Industrial Source Complex model in the short-term mode, known as ISCST3 (version 99155) was used as recommended by EPA.

The ISCST3 model requires four basis types of input data including source data, meteorological data, receptor data, and model options. Each type of input data used in the modeling effort is described in the sections below.

7.2.2 Source Data

The GBPGS will consist of three-combined cycle combustion turbine generators. The combustion turbine generators will be fired exclusively with natural gas. Other emission sources planned for use at the facility include one auxiliary boiler, one emergency diesel generator, and one diesel fire pump. The auxiliary boiler will be fired exclusively with natural gas. The emergency diesel generator and diesel fire pump were not included in the modeling analysis since they will be used on a limited basis in emergency situations. A site plan showing the layout of the proposed equipment at the site is presented in Section 1.0 of this document in Figure 1-2.

The proposed GBPGS will have the potential to emit various criteria air pollutants including NO_x, CO, SO_2, PM_{10}, and also smaller quantities of hazardous air pollutants (HAPs). For purposes of comparison to the PSD significance level and for conservatism, NO_x emissions from the turbines are assumed to convert entirely to NO_2 in the atmosphere. Modeling was performed for each of the four criteria pollutants to identify the maximum predicted concentrations for comparison with established significant impact levels. Also, since potential emissions of formaldehyde from the proposed facility will exceed major HAP source levels (10 tons per year), a modeling analysis was completed to evaluate facility compliance with established AAAQGs for formaldehyde.

Table 7-1 summarizes the source data used for the modeling analysis including stack parameters and emission rates. The stack parameters and emission rates used represent conservative, "worst-case" values from a modeling

TABLE 7-1

MODELING INPUT DATA

GILA BEND POWER GENERATION STATION
GILA BEND, ARIZONA

Stack Parameters & Emission Rates	Combustion Turbine (3 units)	Auxiliary Boiler (1 unit)
Stack Height, ft	165	95
Stack Diameter, ft	18	2
Temperature (deg. F)	183	450
Exit Velocity (ft/s)	46.3	35
Emission Rates (lb/hr)		
CO	50.7	3.95
NO_x	20	3.11
SO_2	4.0	0.03
PM_{10}	28	0.26
HCHO	3.56	0.002

Note: Emissions rates presented above are on a per unit basis for each combustion turbine.

perspective considering all proposed operating load conditions. To define the stack parameters and emission rates for the "worst-case" load condition modeled, each proposed load condition was reviewed and the highest emission rates and most conservative stack parameters (lowest exhaust temperatures and exhaust velocities) were selected.

7.2.3 Meteorological Data

In accordance with USEPA guidelines, the modeling analysis was completed using five consecutive years of meteorological data from representative weather station(s) located nearby the proposed site. Also, discussions were held with Maricopa County to determine the most appropriate meteorological data sets to use for the modeling. The modeling analysis was performed using five consecutive years of meteorological data (1994-1998) with hourly surface data from Paloma, Arizona (anemometer height of 3 meters) and upper air data from Tucson, Arizona.

7.2.4 Receptor Data

Coarse and fine Cartesian receptor grids were used to complete the Class II area impact analysis. To define the receptor grid size, an initial analysis was completed using a coarse grid extending out 10-kilometers in each direction from the proposed site location. Receptor spacing of 1-kilometer was used and terrain elevations were derived from 7.5-minute United States Geological Survey (USGS) digital elevation models (DEMs) for Gila Bend, Smurr, Theba, Cotton Center, Citrus Valley East, and Citrus Valley West, Arizona. Five years of meteorological data from the Paloma and Tucson meteorological stations were used in this analysis (as discussed above in Section 7.2.3). The results obtained

from the initial analysis indicate that maximum impacts occur either at the facility's fenceline or within 1.0 kilometer from the site.

Based on results from the initial coarse grid analysis and to ensure that the locations of maximum impacts were identified, two fine grids were added to the model setup. The first fine grid extends out 4-kilometers from the site in all directions. The second fine grid is a 5-kilometer by 5 kilometer area located approximately 9-kilometers diagonally northeast from the site. Receptor spacing of 100-meters was used for the fine grid receptors. Similar to the coarse grid set-up, terrain elevations for the fine grid receptors were derived from 7.5-minute USGS DEMs for Gila Bend, Smurr, Theba, Cotton Center, Citrus Valley East, and Citrus Valley West, Arizona. In addition to the grids discussed above, discrete receptors were placed along the proposed facility's fenceline using 50-meter spacing. The terrain elevations for the fenceline receptors were based on the expected final site elevation.

The results from the coarse and fine grid analysis indicate that all maximum predicted impacts occur within 1.0-kilometer of the proposed site location with the exception of annual impacts for SO_2, PM_{10}, and formaldehyde. Maximum annual impacts for SO_2, PM_{10}, and formaldehyde are predicted to occur at receptors located within 10 kilometers of the site (at receptors located within the second fine grid area).

7.2.5 Model Control Options/BPIP Analysis

The ISCST3 model contains certain user-specified options. Following USEPA guidance, the "regulatory-default" switch was selected. This default option includes buoyancy-induced dispersion, final plume rise, the effects of stack-dip downwash, and calm wind processing.

The proposed plant site (as shown in Section 1.0, Figure 1-1) is located in Gila Bend, Arizona. This area in southwestern Arizona (60 miles southwest of Phoenix) is a sparsely populated rural area with fallow agricultural land covering the majority of the area in the vicinity of the site. Since the area around the proposed site is predominantly rural, the rural option was selected for the modeling.

The ISCST3 model also has the ability to include effects of building wakes on the dispersion of plumes released from exhaust stacks using the Building Profile Input Program (BPIP) (USEPA, 1993). BPIP incorporates building downwash guidance into a computer program that calculates building heights (BH) and projected building widths (PWB). When an emission source height is less than the Good Engineering Practice (GEP) stack height and the source is located within a region of building influence, direction-specific building dimensions are included in the modeling analysis for calculating wake and downwash concentrations. Since the proposed stacks heights are below GEP stack heights, an analysis of building downwash and wake effects was conducted.

To determine whether potential building downwash effects might occur, the combustion turbines and other structures to be located at the site were evaluated. All structures of sufficient size (heights greater than or equal to 40 percent of the stack heights) were incorporated into the model. BPIP was utilized to determine the direction-specific downwash data, which were then included as part of the ISCST3 modeling.

7.2.6 Cavity Analysis

A cavity effect analysis was performed for the GBPGS using the EPA-approved SCREEN3 model. Dimensions of the on-site structures were input into the SCREEN3 model to obtain cavity heights and cavity distances. Then,

emission stacks with heights below the predicted cavity heights and located within the cavity zones were identified and SCREEN3 was used to determine cavity effects for these stacks. Results from the cavity analysis indicate that cavity effects will not occur beyond the fenceline. Therefore, cavity effect concentration values were not considered in determining maximum impacts for the proposed facility.

7.2.7 Class II Area Analysis Results

A Class II area preliminary modeling analysis was completed to determine maximum facility impacts on ambient air quality for comparison with the established PSD significance levels. Coarse and fine grid model runs were executed to identify the maximum impacts for all pollutants and averaging periods considering five years of meteorological data.

Table 7-2 presents a summary of the maximum impacts for the GBPGS along with the PSD significance level for each pollutant of concern. Detailed results tables for each pollutant, averaging period, and years examined are included in Appendix F. As shown in Table 7-2, the maximum predicted impacts are below the PSD significance levels for all pollutants and averaging periods of concern. Therefore, a full impact modeling analysis is not required in accordance with PSD modeling guidance.

An analysis was also completed to evaluate compliance with AAAQGs established for formaldehyde based on three averaging periods. As shown in Table 7-3, maximum predicted impacts are below the AAAQGs for each averaging period.

TABLE 7-2

CLASS II AREA MODELING ANALYSIS RESULTS

GILA BEND POWER GENERATION STATION
GILA BEND, ARIZONA

POLLUTANT	AVERAGING PERIOD	MAXIMUM PREDICTED IMPACT ($\mu g/m^3$)	PSD CLASS II AREA SIGNIFICANCE LEVEL ($\mu g/m^3$)
NO_2	Annual	0.86	1
CO	8-hr	15.7	500
	1-hr	36.4	2000
SO_2	Annual	0.07	1
	24-hr	0.47	5
	3-hr	1.80	25
PM_{10}	Annual	0.48	1
	24-hr	3.30	5

TABLE 7-3

FORMALDEHYDE MODELING ANALYSIS RESULTS

GILA BEND POWER GENERATION STATION
GILA BEND, ARIZONA

POLLUTANT	AVERAGING PERIOD	MAXIMUM PREDICTED IMPACT ($\mu g/m^3$)	ARIZONA AAQ GUIDELINE ($\mu g/m^3$)
Formaldehyde (HCHO)	Annual	0.061	0.08
	24-hr	0.41	12
	1-hr	2.50	20

7.3 CLASS I AREA IMPACT ANALYSIS

The PSD program provides for extra protection for pristine areas of the United States, such as national parks, forests, and wildlife refuges. These areas are designated as Class I areas, and have lower ambient air thresholds with respect to significance and allowable impacts. Criteria have been proposed for SO_2, PM_{10}, and NO_x within Class I areas. Since there are no Class I Areas within 100 kilometers of the proposed site location, a Class I Area impact analysis was not performed.

7.4 AIR QUALITY ANALYSIS SUMMARY

An air quality analysis was performed for the proposed GBPGS in accordance with the modeling protocol submitted to Maricopa County. The analysis involved determining maximum impacts on ambient air quality from emissions of NO_x, CO, SO_2, PM_{10}, and formaldehyde based on the operation of three combined cycle combustion turbines and an auxiliary boiler at the proposed facility. Maximum predicted impacts were determined using the ISCST3 model. The maximum predicted impacts were compared with applicable PSD significance levels for criteria pollutants and established AAAQGs for formaldehyde. For all pollutants of concern, the maximum predicted impacts are below the applicable significance levels and standards. Therefore, the analyses demonstrate that the GBPGS will comply with all applicable air quality standards.

APPENDIX F

AIR QUALITY ANALYSIS - ADDITIONAL INFORMATION

Included in this appendix to Reference 7 (Air Quality Analysis) are the following:

1) Summary of Emission Rates, Stack Parameters & Building Dimensions

2) Summary of Modeled Concentrations

3) Modeling Analysis Disk Contents

SUMMARY OF EMISSION RATES, STACK PARAMETERS, & BUILDING DIMENSIONS

ISC Dispersion Modeling Analysis for Gila Bend Power Generation Project

Emission Source	Pollutant Emission Rate Per Unit (lb/hr)					
	Nitrogen Oxides	Carbon Monoxide	Sulfur Dioxide	Formaldehyde (HCHO)	Particulate (PM10)	Total Particulate (TSP)
Combined Cycle CT Generator (3 units)	20.0	50.7	4.0	3.56	28.0	28.0
Auxiliary Boiler (1 units)	3.11	3.95	0.03	0.002	0.264	0.264

Emission Source	Base Elevation (feet)	Stack Height (feet)	Stack Temperature (deg. F)	Stack Exit Velocity (feet/sec)	Stack Diameter (feet)
Combined Cycle CT Generator (3)	678	165	183	46.3	18
Auxiliary Boiler (1)	678	95	450	35	2.0

Structure	Base Elevation (feet)	Maximum Height (feet)	Maximum Length (m)	Maximum Width (m)	Radius (feet)
Combined Cycle CT Generator (3)	678	60	72	18.3	--
Boiler Bldg.	678	20	12.2	12.2	--
Control Bldg.	678	20	18.29	12.2	--
Generator Structure	678	20	9.15	4.57	--
Cooling Tower	678	50	73.2	30.48	--
Steam Turbine	678	30	38.1	21.34	--
Water Treatment Bldg.	678	20	38.1	15.24	--
Water Storage Tank #1	678	40	--	--	35
Water Storage Tank #2	678	40	--	--	35
DI Water Storage Tank	678	10	--	--	5

SUMMARY OF MODELED CONCENTRATIONS

ISC3 Dispersion Modeling Analysis for Gila Bend Power Generation Project

Met Data Year	1994	1995	1996	1997	1998	Significance Level
NOx						
Annual	0.67	0.60	**0.86**	0.60	0.64	*1*
CO						
8-hr	12.9	14.4	13.5	14.5	**15.7**	*500*
1-hr	32.7	**36.4**	31.2	34.6	31.2	*2000*
SO_2						
Annual	0.064	0.064	0.070	**0.069**	0.066	*1*
24-hr	0.36	0.39	0.37	0.38	**0.47**	*5*
3-hr	1.71	**1.80**	1.69	1.62	1.67	*25*
PM_{10}						
Annual	0.45	0.45	0.47	**0.49**	0.46	*1*
24-hr	2.55	2.74	2.62	2.65	**3.30**	*5*
HCHO*						
Annual	0.056	0.057	0.059	**0.061**	0.059	*0.08*
24-hr	0.32	0.34	0.33	0.34	**0.41**	*12*
1-hr	2.04	**2.48**	2.10	2.21	2.14	*20*

Note:

* All concentrations are in ug/m^3.

** Bold concentrations represent the maximum concentration for that averaging period.

03/29/2000

MODELING ANALYSIS DISK CONTENTS

PSD PERMIT APPLICATION - AIR QUALITY ANALYSIS
GILA BEND POWER GENERATION STATION

The enclosed modeling analysis compact disk contains the following folders and files:

1. Bpip folder

Files (5): bpi, bpo, dat, epa, & wak

2. DEMs folder

- 7.5-minute degree subfolder
  Files (6): 32112h6.dem, 32112h7.dem, 32112h8.dem, 33112a6.dem, 33112a7.dem, & 33112a8.dem

3. Metdata folder

Files (5): Paltus94.asc - Paltus98.asc

4. Psdsig folder (class II area modeling analysis)

Folders (5): CO, HCHO, NOx, PM, & SO2

Subfolders (5): GB_1994, GB_1995, GB_1996, GB_1997, GB_1998

Files (5 per subfolder)
(Example): *<pollutant name>*_*<metdata year>*.lst & .dat

ATTACHMENT 8

COMPLETENESS DETERMINATION CHECKLIST

COMPLETENESS CHECKLIST FOR TITLE V AIR QUALITY PERMIT APPLICATIONS

PERMITTEE: Power Development Enterprises, Inc.
FACILITY: Gila Bend Power Generation Station

APP. RCVD. DATE:
INCOMP. LTR. DATE:

APPLICATION #:
REVIEW ENGINEER:

COMPL. DATE:

App. B Item No.	Requirements	Yes	No	N/A	comments
R.280	Have the appropriate application fees been submitted?	X			
Form	Has the standard application form been completed?	X			
Form	Has the responsible official signed the application?	X			
1	Has a description been included for each process?	X			
2	Has the product description and raw materials been included?	X			Electricity
3	Has a complete description of the Alternate Operating Scenarios been included?	X			None
4	Has a description been provided for the alternate operating scenario products, if applicable?	X			None
5	Has a flow diagram for all processes been included?	X			
6	Has a Material Balance been included (if applicable)			X	
7.a	Has the emission sources form been completed and does it include potential emissions of regulated air pollutants (including fugitives)?	X			
7.b	Has the facility identified and described all points of emissions of regulated air pollutants?	X			
8	Has the facility identified all applicable SIP requirements?	X			
8	Has the facility identified all applicable NSPS requirements?	X			
8	Has the facility identified all applicable NESHAP requirements?	X			
8	Have all applicable Installation Permit requirements been identified?			X	New facility
9	Has the applicant provided an explanation of any voluntarily accepted limits established pursuant to Rule 220?			X	
10.a,c	Have the maximum annual and hourly process rates for each piece of equipment, which generate air emissions been included?			X	
10.b,d	Have the maximum annual and hourly process rates for the whole plant been included?			X	
10.e	Has the applicant included information about all fuel burning equipment including generators, a description of fuel used, including the type used, the quantity used per year, the maximum and the average quantity used per hour, the percent used for process heat and the higher heating value of the fuel. If solid fuels and fuel oils are used, has the sulfur and ash content been provided?			X	
10.f	Has the raw material maximum hourly, monthly or quarterly and annual usage information been included?			X	
10.g	Have the operating schedules (hour/day, days/year, days/week, % annual production by season) been included?			X	
10.h	Have any limitations on operations and work practice standards affecting emissions been included (if applicable)?			X	

App. B Item No.	Requirements	Yes	No	N/A	comments
10.i	Has the applicant provided a demonstration of how the source will meet any limitation accepted voluntarily in pursuant of Rule 220 (if applicable)?			X	
11.a-g	Does the application include a control equipment list with the type, name, make, model, serial number, size/capacity and date of manufacture (if applicable)?	X			
12.a-g	Does the application include necessary stack information including stack identification, description, exit height, inside dimensions, exit gas temperature and velocity, and building dimensions?	X			
13.a-i	Does the application include the site diagram, which includes emission areas and air pollution control equipment?	X			
14.a	Have the applicable test methods for determining compliance been included?	X			
14.b	Does the application include an identification, location and description of pollution controls and monitoring equipment (if applicable)?	X			
14.c	Has the rated and operating efficiency of pollution controls been included?	X			
14.d	Has the data used to establish control efficiency been provided?	X			
14.e	Has evidence that the new or modified source will not violate any Ambient Air Quality Standards or PSD increments been provided?	X			
15	Has the applicant provided equipment manufacturer's bulletins and shop drawings (if applicable)			X	None
16.a-d	Has a Compliance Plan been included? (The compliance plan must address acid rain provisions, if applicable)	X			
16.a	Does the application include a description of the Compliance Status of the source with respect to all applicable requirements (for constructed/operating sources)?			X	New facility
16.a,b	Has a description of how the new source or alteration will comply with applicable requirements been included (for new sources or modifications to existing sources)?	X			
16.b.1	Does the application include a statement that the source will continue to comply with the applicable requirements with which they currently comply? (for constructed/operating sources)	X			Section 17
16.b.2	Has a statement that the source will meet the requirements, which become effective after permit issuance, been included?	X			
16.b.3	Has a compliance schedule with remedial measures, and an enforceable sequence of actions with milestones leading to compliance been included for applicable requirements with which the source does not currently comply?			X	New facility
16.c	Has a schedule of Submission of Progress Reports (at least every 6 months) been included? (for sources required to have a compliance schedule)			X	

App. B Item No.	Requirements	Yes	No	N/A	comments
16.d	If an acid rain compliance plan is required, does it meet the requirement of 16 a through c? (if applicable)			X	
17	Does the application contain a compliance certification covering all applicable requirement, including voluntarily accepted limits and a statement whether the compliance is continuous or intermittent?	X			
17.a.1	Does the compliance certification identify the applicable requirements, which are the basis of the certification?	X			
17.a.2	Does the compliance certification include a Statement of Methods Used to Determine Compliance including monitoring, record keeping and reporting requirements and test methods?	X			
17.a.3	Has a Schedule for Submission of Compliance Certifications (at least annually) been included?			X	
17.a.4	Does the compliance certification include a statement indicating the compliance status with respect to any applicable enhanced monitoring and compliance certification requirements? (if applicable)			X	
17.a.5	**Certification of truth, accuracy and completeness:** Does the application contain certification signed by a responsible official stating that " based on information and belief formed after reasonable inquiry, the statements and information in the application are true, accurate and complete"	X			
17.b	Does the application include an acid rain compliance plan (if applicable) and if so, is it on nationally standardized forms?			X	
19	Have all the calculations on which all information is based been included in the application?	X			
R210	Is any applicable Federal delayed compliance orders or consent decrees included?			X	New facility
R210. 301.4.h	Does the application contain list of insignificant activities according to County Rule 210 Section 301.4?	X			
R210. 301.4.i	If a permit applicant requests terms and conditions allowing for the trading of emission increases and decreases in the permitted source solely for the purpose of complying with a federally enforceable emission cap that is established in the permit independent of otherwise applicable requirements, does the application include proposed replicable procedures and permit terms that ensure the emissions trades are quantifiable and enforceable?			X	
R210	Was the copy of the application send to EPA Region IX? The copies of all correspondence regarding Title V application have to be send to EPA Region IX.	X			
R210	Does the notification precisely identify information in the application which is to be considered confidential?			X	
R210	Does the notification contain sufficient supporting information to allow to evaluate whether the information satisfies the requirements related to trade secrets or, if applicable, how the information, if disclosed, is likely to cause substantial harm to the person's competitive position?			X	
R210	Any additional information submitted pursuant to Rule 210 Maricopa County Air Pollution Control Regulations shall contain certification by a responsible official stating that "based on information and belief formed after reasonable inquiry, the statements and information in the document are true, accurate and complete".	X			

SUPPLEMENTAL COMPLETENESS REVIEW OF APPLICATION FOR AIR QUALITY PERMIT FOR NEW MAJOR SOURCES OR MAJOR MODIFICATIONS TO SOURCES

App. B Item No.	Requirements	Yes	No	N/A	comments
	All New Major Sources or Major Modifications to Sources				
R 240. 302.1	Does the application meet the requirements of Rule 240 Section 303?	X			
R 240. 302.2	Does the application demonstrate that the more stringent of the applicable new source performance standards in Rule 360 of County rules or the existing source performance standards in Regulation III of County rules are applied to the proposed new major source or major modification of a major source?			X	
R 240. 302.3	Did the application demonstrate that the new major source or major modification will not have an adverse impact on visibility as determined by Section 511 of County Rule 240 and will satisfy all the visibility requirements contained in Section 511 of County Rule 240? Was a demonstration of the impact on visibility made according to Section 508 of County Rule 240?	X			
R 240. 302.4	Does the application include all applicable provisions of County Rules 200, 210, 240, 245, and 270?	X			
R 240. 302.5	Does the application comply with all applicable requirements specified in County Rule 240 Section 302.5?				
R 240. 302.6	Does the application contain demonstration that the new major source or major modification will not exceed the applicable standards for hazardous air pollutants contained in County Rule 370?	X			
R 240. 302.7	Does the application contain demonstration that the new major source or major modification will not exceed the limitations, if applicable, on emission from fugitive sources contained in County Rules 310, 311, and 316?	X			
R210. 301.4.d	Does the application for any major source of hazardous air pollutants contain a determination according to County Rule 210 Section 301.4.d that maximum achievable control technology (MACT) for new sources under Section 112 of the Act will be met?			X	

R 240. 302.8	Does the application contain demonstration that a stationary source that will emit five or more tons of lead per year will not violate the ambient air quality standards for lead contained in County Rule 510?	X			

	New Major Sources or Major Modifications to Sources in Non-Attainment Areas:				
18.a.1	In the case of a new major source as defined in Rule 240 of these rules or a major modification subject to an emission limitation which is LAER (Lowest Achievable Emission Rate) for that source or facility, does the application contain a determination of LAER that is consistent with the requirements of the definition of LAER contained in Rule 240 of these rules? Does the demonstration contain the data and information relied upon by the applicant in determining the emission limitation that is LAER for the source or facility for which a permit is sought?			X	
18.a.2	In the case of a new major source as defined in Rule 240 of these rules or a major modification subject to the demonstration requirement of Rule 240 of these rules, did the applicant submit such demonstration in a form that lists and describes all existing major sources owned or operated by the applicant and a statement of compliance with all conditions contained in the permits or conditional orders of each of the sources.			X	
18.a.3	In the case of a new major source as defined in Rule 240 of these rules or a major modification subject to the offset requirements described in Rule 240 of these rules, did the applicant demonstrate the manner in which the new major source or major modification meets the requirements of Rule 240 of these rules?			X	
18.a.4	Did an applicant for a new major source as defined in Rule 240 of these rules or a major modification for volatile organic compounds or carbon monoxide (or both) which will be located in a nonattainment area for ozone or carbon monoxide (or both) submit the analysis described in Rule 240 of these rules?			X	
	New Major Sources or Major Modifications to Sources in Attainment Areas:				
18.b.1	Does the application include demonstration of the manner in which a new major source or major modification which will be located in an attainment area for a pollutant for which the source is classified as a major source as defined in Rule 240 of these rules or the modification is classified as a major modification will meet the requirements of Rule 240 of these rules?	X			

18.b.2	In the case of a new major source as defined in Rule 240 of these rules or major modification subject to an emission limitation which is BACT (Best Available Control Technology) for that source or facility, does the application contain a determination of BACT that is consistent with the requirements of the definition of BACT contained in Rule 100 of these rules? Does the demonstration contain the data and information relied upon by the applicant in determining the emission limitation that is BACT for the source or facility for which a permit is sought?	X			
18.b.3	In the case of a new major source as defined in Rule 240 of these rules or major modification required to perform and submit an air impact analysis in the form prescribed in Rule 240 of these rules, does such an analysis meet the requirements of Rule 240 of these rules? Unless otherwise exempted in writing by the Control Officer, the air impact analysis shall include all of the information and data specified in Rule 240 of these rules.	X			
18.b.4	If an applicant seeks an exemption from any or all of the requirements of Rule 240 of these rules, did the applicant provide sufficient information and data in the application to demonstrate compliance with the requirements of the subsection(s) under which an exemption is sought?			X	

	Remarks	Received by
1		
2		
3		
4		
5		

EXHIBIT B-2

GROUNDWATER ASSESSMENT

April 26, 2000

GILA BEND POWER PROJECT
GROUNDWATER ASSESSMENT

HARGIS+ASSOCIATES, INC.

GILA BEND POWER PROJECT
GROUNDWATER ASSESSMENT

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GILA BEND POWER PROJECT
GROUNDWATER ASSESSMENT

1.0 INTRODUCTION

This report summarizes the results of a groundwater assessment conducted for Power Development Enterprises, Inc. (PDEI) for a power plant (the Project) located in the Gila Bend Basin (GBB), southwestern Maricopa County, Arizona (Figure 1). The Project will be located on property that comprises all of Sections 18 and 19 of Township 5 South (T5S), Range 5 West (R5W) (the Project Area) (Figure 1). The Project Area is located approximately 6 miles west of the Town of Gila Bend in the central portion of the GBB.

The Project will consist of a 750-megawatt electric generating station. Construction of the generating station is anticipated to begin in the first quarter of 2001. The generating station is anticipated to be operational in the third quarter of 2002. The estimated life of the Project is approximately 50 years.

The maximum estimated water demand for the Project upon completion is approximately 10,000 acre-feet per year (af/y). It is anticipated that 100 percent of the water demand for the Project will be met by groundwater pumped from wells on the property.

1.1 PURPOSE AND SCOPE

The purpose of this report is to summarize the results of a groundwater assessment conducted on behalf of PDEI to assess the impact of the groundwater withdrawals by Project Area wells that will serve as the source of water for the Project. The scope of this report includes: 1) collection and analysis of geologic and hydrogeologic data for the Project area and surrounding areas (Project Study Area); 2) descriptions of regional and Project Study Area geologic and hydrogeologic conditions; and 3) an evaluation of the potential impacts to the existing groundwater reservoir in the Project Study Area created by groundwater withdrawals to

meet the water demands of the Project. For the purposes of this groundwater assessment the Project Study Area will include all of Sections 7, 8, 17, 18, 19, 20, 30, and 31 of Township 5 South Range 5 West, and all of sections 2, 3, 4, 9, 10, 11, 12, 13, 24, and 25 of Township 5 South Range 6 West (Figure 1).

2.0 REGIONAL SETTING

The Project Area is located in the GBB Area approximately 50 miles southwest of metropolitan Phoenix, Arizona. The GBB is located in western Maricopa County in the Sonoran Desert section of the Basin and Range physiographic province. The GBB encompasses approximately 1,284 square miles and is comprised of portions of two northwest trending structural troughs separated by the Gila Bend and Sand Tank Mountains. The GBB area is a generally flat lying, northwest trending trough filled with a heterogeneous mixture of basin-fill deposits underlain and bounded by bedrock. The GBB area is bounded by mountain areas including: the Buckeye Hills and the Gila Bend Mountains on the north; the Maricopa Mountains on the east; the Sand Tank Mountains on the southeast; the Sauceda Mountains on the south; the White Tank Hills on the southwest; and the Painted Rock Mountains on the west. (Sebenik, 1981: Rascona, 1996). Rocks underlying the basin-fill deposits and comprising the surrounding mountain areas include igneous, metamorphic, and sedimentary rocks ranging in age from Precambrian to Quaternary (Oxford and Bender, 1973; Johnson and Cahill, 1955).

Groundwater is the primary source of water supply for the region. Surface water from the Gila River and Painted Rock Reservoir is used to supplement the groundwater supply when it is available. Nearly all groundwater withdrawn within the region is used for agricultural purposes. Agricultural development began in the early 1950's and continues to the present day.

The major natural surface-water feature in the Gila Bend basin is the Gila River. Associated manmade features include Gillespie Dam, the Gila Bend Canal, the Enterprise Canal, Painted Rock Dam, and Painted Rock Reservoir. The Gila River enters the basin from the north at the site of Gillespie Dam, flows south toward Gila Bend and then, as the name implies bends around the Gila Bend Mountains to the west and exits at Painted Rock Dam in the Painted Rock Mountains. The flow of Gila River at Gillespie Dam is perennial; predominately due to a combination of effluent discharged upstream, return flow of agricultural irrigation water and groundwater pumped into the river for drainage purposes by the Buckeye Irrigation District. Gillespie Dam was constructed in 1921 to divert all non-flood flows of the Gila River entering the basin to the Gila Bend and Enterprise Canals. These canals supply water to most of the

farmland in the Gila Rend basin (U.S. Army Corps of Engineers, 1994). Along its 35-mile length, wells pump groundwater into the Gila Bend Canal for irrigation use.

Painted Rock Dam was completed in 1960 to control all upstream floods up to approximately 300,000 cubic feet per second (ft^3/sec) peak flow, and has a maximum controllable discharge of 22,500 ft^3/sec (U.S. Army Corps of Engineers, 1962). Painted Rock Reservoir, created by the dam, inundates approximately 53,200 acres and has a capacity of approximately 2,476,300 acre-feet at the dam spillway crest, which is 661 feet above mean sea level (msl) (U.S. Army Corps of Engineers, 1994). The operational maximum flood release was exceeded for the first time in February 1993 at a peak outflow of 25,600 ft^3/sec (U.S Army Corps of Engineers, 1994).

2.1 REGIONAL GEOLOGY

The regional geology of the Gila Bend Basin area has been described by several researchers including studies by the US Bureau of Reclamation, US Geological Survey, and various state agencies (Oxford and Bender, 1973; Johnson and Cahill, 1955; Wilson et al., 1957). For the purposes of this report, rocks present within the region are broadly divided into bedrock and basin-fill deposits. Bedrock outcrops in the mountain areas along the margins of the Gila Bend basin.

Bedrock

The Gila Bend basin is enclosed by bedrock outcrops except for an area on the southwest between the Painted Rock and Sauceda Mountains (U.S. Bureau of Reclamation [BOR], 1976). Volcanic outcrops between the Sauceda and Painted Rock Mountains are probably remnants of the Sentinel lava flow. The Sentinel lava flow consists of Quaternary basalt and occupies about 225 square miles of southwestern Maricopa County to the west of the Gila Bend basin (Oxford and Bender, 1973). Basalt, probably from this flow, also occurs along the western edge of the basin at shallow depths between 80 and 150 feet below land surface (bls).

Other igneous rocks are found in the mountains surrounding the basin. These include Precambrian granites of varying ages found in all the mountains except the Sauceda and Painted Rock Mountains. Younger granites formed during the Laramide Orogeny crop out in the Buckeye Hills and the Painted Rock Mountains. Quaternary basalt and Cretaceous andesite occur in the Gila Bend, Sand Tank, Sauceda and Painted Rock Mountains. Metamorphic rocks include older Precambrian granite gneiss found in the southeastern tip of the Gila Bend Mountains and older Precambrian schist in the Sand Tank Mountains, Maricopa Mountains, and the White Hills. Sedimentary rocks composed of Tertiary sand, gravel and conglomerates are found mainly in the Sand Tank Mountains. A 200-foot cliff of steeply tilted sandstone beds occurs in the extreme southwestern part of the Gila Bend Mountains (Johnson and Cahill, 1955).

Alluvium

The BOR divided the alluvium of the Gila Bend basin into three units identified as the upper alluvial unit, the middle fine-grained unit, and the lower conglomerate. The composition of the upper alluvial unit is not defined by the BOR, but is reported to range in thickness from 0 to 1,000 feet (BOR, 1976). Approximately 300 to 500 feet of coarse- to fine-grained deposits overlie the locally named Sil Murk Formation in the upper alluvial unit south of the Gila Bend Mountains (Heindl and Armstrong, 1963). These deposits were laid down from the late Tertiary to the early Quaternary Period when the main surface-water drainage from the basin was probably around the south end of the Painted Rock Mountains (Heindl and Armstrong, 1963). The middle fine-grained unit includes the Sil Murk Formation. The middle fine-grained unit ranges in thickness from 0 to 700 feet and is found primarily in that part of basin west of Gila Bend but may extend further east (BOR, 1976). The Sil Murk Formation is comprised mainly of pebble- to boulder-sized conglomerates with thin interbedded volcanics near the top (BOR, 1976), and is probably late middle Tertiary in age (Heindl and Armstrong, 1963). The top of Sil Murk Formation marks an old erosional surface upon which the upper alluvial unit is deposited. This surface dips gently to the west and south and more steeply to the east away from the Gila Bend Mountains (Heindl and Armstrong, 1963). The surface of the lower conglomerate unit ranges from about 600 feet above sea level in the northern part of the basin to over 600 feet

below sea level near Paloma Ranch. The age of the lower conglomerate is unknown. Locally, it may exceed 1,000 feet in thickness (BOR, 1976).

For this groundwater assessment, terms proposed by Anderson et al (1990) to describe the basin fill of alluvial basins in south central Arizona are used for convenience in defining the hydrogeology of the GBB area. Stream alluvium refers to the unconsolidated deposits along the Gila River and its tributaries. It ranges in age from late Pliocene to Holocene. Upper basin fill refers to those alluvial deposits that are unconsolidated to moderately consolidated and include most of the upper alluvial unit identified by the BOR. Lower basin fill refers primarily to weakly to highly consolidated gravel, sand, silt and clay which includes most of the middle fine-grained unit, the Sil Murk Formation and lower conglomerate unit identified by the BOR. In general, lower basin fill represents deposition in topographically closed basins with interior drainage and upper basin fill represents deposition during a transition period from a closed- to integrated-drainage basin.

The basin fill north of Gila Bend is relatively thin due to the presence of pediments, and locally contains interbedded volcanics (Wolcott, 1953). Driller's logs show extensive pediments on the eastern part of the basin north of Gila Bend but virtually none on the west where the basin fill is up to 1,480 feet thick. East of the Gila River, the basin fill is generally not much thicker than 1,000 feet and decreases in thickness to the east as the pediments are encountered. Driller's logs show the upper basin fill near Gila Bend is at least 1,622 feet thick. The lower basin fill is at least 160 feet thick near Gila Bend. East of Gila Bend the upper basin fill is at least 2,158 feet thick. The thickness of the lower basin fill in this area is unknown.

2.2 REGIONAL HYDROGEOLOGY

The regional hydrogeology of the GBB has also been described by several researchers including studies by the BOR, U.S. Geological Survey (USGS), and various state agencies (Oxford and Bender, 1973; Johnson and Cahill, 1955; Sebenik, 1981, Rascona, 1993). Additional hydrologic data were obtained from the Arizona Department of Water Resources (ADWR) and the USGS (ADWR, 2000a, 2000b, and 2000c).

2.2.1 Hydrogeologic Units

A review of the literature and available data indicate that basin-fill deposits are the main waterbearing units within the region. The basin-fill deposits can be further subdivided into three distinct units based on lithology: 1) stream alluvium; 2) the upper basin- fill unit; and 3) the lower basin-fill unit (BOR, 1976; Rascona, 1993). This nomenclature will be adopted for this report.

2.2.2 Groundwater Occurrence and Movement

The upper and lower basin-fill units comprise the principal aquifer of the Gila Bend basin. Groundwater in the upper basin fill is generally unconfined to semi-confined. Perched, semi-perched, or confined conditions occur locally (BOR, 1976). Groundwater in the Gila Bend basin is primarily recharged by infiltration of surface flows of the Gila River and its tributaries. Other sources of recharge include infiltration of surface water applied to agricultural land and underflow from the Hassayampa sub-basin of the Phoenix Active Management Area north of Gillespie Dam. Changes in water levels throughout the Gila Bend basin are governed by complex interactions of groundwater and surface water. Water-level decline occurs during periods of low flow in the Gila River, primarily in response to groundwater pumping. During periods of high flows, water levels may rise despite large withdrawals of groundwater from wells.

Occurrence

West of Gila Bend, on Paloma Ranch, groundwater in the lower basin fill is primarily unconfined except possibly where fine-grained deposits are present causing the groundwater to be locally semi-confined to confined (BOR, 1976). Water-level elevations in four wells measured in 1993 on the Paloma Ranch range from 40 to more than 100 feet higher than water level elevations in surrounding wells. The depth to water in these four wells range from 65 to 109 feet bls. The vertical head differences observed In these wells are probably the result of the heterogeneous nature of the regional aquifer in this area combined with specific well depth and perforated interval of the individual wells rather than the existence of an areally extensive separate aquifer.

All four driller's logs of these wells show significant clay layers ranging from 150 to 500 feet thick at various depths. West of Gila Bend, under unconfined conditions, depth to water increases southward and ranges from 125 to 323 feet bls.

North of Gila Bend, unconfined groundwater occurs primarily in the sands and gravels of the basin fill and may occur in the interbedded volcanics (White, 1963). Groundwater levels north of Gila Bend are shallowest west of the Gila River and generally increase in depth toward the east side of the basin. Depths to groundwater increase from 12 feet bls west of the river to 351 feet bls about 5 miles east of the river. Depth to water ranges from 31 to over 400 feet bls near Gila Bend. Depth to water generally increases with increasing distance from the river due primarily to rising land-surface altitude.

According to Heindl and Armstrong (1963), the Sil Murk Formation is one of the principal waterbearing formations of the area north of Gila Bend. This formation is part of the lower basin fill and is interconnected with the upper basin fill. It does not constitute a separate aquifer. Heindl and Armstrong believed the Sil Murk Formation extends under the upper basin fill from the northwest toward Gila Bend and possibly beyond. Driller's logs from wells in Section 33, T5S, R5W., and Section 2, T6S, R3W show the volcanic member of the Sil Murk Formation occurring at depths below land surface of 1,622 to 1,782 feet and 2,158 to 2,209 feet, respectively.

Well Yields

Historical records show agricultural well yields in the Gila Bend basin range from 1,000 to 5,000 gallons per minute (gal/min). Well yields north of Gila Bend average 2,200 gal/min. West of Gila Bend, well yields average more than 2,400 gal/min.

Recharge and Movement

The major source of recharge to the groundwater system in the Gila Bend Basin is surface water from the Gila River and its tributaries. Stream flow in the Gila River and its tributaries varies greatly from year to year. Johnson and Cahill (1955) estimated that at least half of the

total flow of the Gila River through the Gila Bend basin is recharged to the groundwater reservoir. Turner (1956) suggested that approximately 28,000 acre-feet of surface water is recharged annually to the groundwater reservoir of the basin during average or dry years. The potential recharge during years with greater than normal flow could greatly exceed this amount. Since 1976, net surface-water flow into the basin (inflow minus outflow) has been greater than total groundwater pumpage. Net surface water into the Gila Bend basin from 1976 to 1993 was 4,603,000 acre-feet. Groundwater pumpage from the basin was 3,917,000 acre-feet over this time period. Therefore, there was a maximum gain to the aquifer of approximately 700,000 acre-feet from recharge (Rascona, 1993).

Maximum potential recharge from agricultural irrigation for the Gila Bend basin for 1993 is calculated at 57,400 acre-feet.

Seepage from the Gila Bend Canal is not believed to be significant because the canal is lined with concrete.

The direction of groundwater flow in the GBB area is controlled by the location of sources of recharge and the location of major areas of agricultural pumping. Groundwater recharged in the northern part of the basin by surface flows of the Gila River generally moves in an easterly direction as a result of heavy pumping east of the river. Contributing to this flow pattern, bedrock outcrops west of the river act as a barrier to groundwater flow. As the river bends to the west around the southern tip of the Gila Bend Mountains, groundwater flow continues in an east-southeasterly direction before turning sharply to the southwest. The overall flow direction of groundwater south of Gila Bend is to the southwest.

Cahill and Wolcott (1955) were the first to suggest groundwater principally flowed out of the Gila Bend basin south of the Painted Rock Mountains. There is also evidence that the Gila River once flowed out of the basin through this area after a lava flow dammed its path through the Painted Rock Narrows (Turner, 1956). Contours of groundwater elevations suggest that most of the groundwater in the western part of the Gila Bend basin presently moves south away from the Painted Rock Reservoir area and exits the basin south of the Painted Rock Mountains.

Lava flows associated with the Sentinel Plain lava flow in this area overlie alluvium, are too thin and occur at depths too shallow to act as barriers to groundwater flow.

2.2.3 Groundwater Quality

Groundwater sampling conducted in the Gila Bend by the USGS in 1946 showed the quality of groundwater throughout the basin was poor and would be classified as unsatisfactory for most agricultural uses. Groundwater throughout the basin was found to have a high dissolved-solids concentration consisting mostly of large amounts of sodium and chloride. Groundwater north of Gila Bend had even higher concentrations of dissolved solids. There were higher amounts of calcium and magnesium and lower amounts of fluoride than in groundwater to the south and west (Hem, in Babcock and Kendall, 1948). Groundwater samples collected by the ADWR from 1991 to 1993 indicate that water quality conditions have not changed since 1946.

Fluoride concentrations in groundwater from wells sampled by the ADWR range from 0.2 to 5.9 mg/L. Fluoride from wells to the north of Gila Bend average 2.1 mg/L. Samples from wells to the south and west average 4.9 mg/L of fluoride. The dividing line between the north, and south and west parts of the basin is arbitrarily drawn diagonally from the northwest corner of T5N, R4W to the center of T6S, R3W. Although Gila Bend is located south of this line, Gila Bend is used synonymously with the line. The maximum contaminant level (MCL) for fluoride is either 4.0 or 6.0 mg/L. The MCL is an enforceable standard set by the U.S. Environmental Protection Agency (EPA) for drinking water. The fluoride level allowed is dependent on the number of year-round residents a water system serves (Arizona Department of Environmental Quality. 1991). Private domestic wells and wells used for agriculture are exempt from state and federal regulations of water quality. Analyses of samples collected between 1991 and 1993 show sulfate, alkalinity and specific-conductance values are higher north of Gila Bend than elsewhere in the basin.

Groundwater samples from four wells sampled by the ADWR exceed the MCL for nitrates ($NO_2 + NO_3$, dissolved) of 10 mg/L as N. Samples from two of these wells also exceed the MCL of 10 µg/L for selenium. The concentration of nitrates in the surface flows of the Gila River

above diversions at Gillespie Dam averaged 8.8 mg/L from October 1990 to September 1991 and the concentration of selenium averaged 3.4 µg/L (Boner and others, 1992).

Boron in groundwater throughout the Gila Bend basin was previously reported to be higher than limits suggested by the U.S. Department of Agriculture for boron-sensitive crops such as citrus (Johnson and Cahill, 1955). Boron is also present in high concentrations in surface flows of the Gila River. Boron ranged from 1,300 to 2,500 µg/L from October 1990 to September 1991 in samples collected from the Gila River above diversions at Gillespie Dam (Boner et al, 1992). Maximum boron concentration from groundwater samples was 6,600 µg/L. Although water containing 2,000 µg/L may be used without injury, an upper limit of 750 µg/L is thought to protect most sensitive crops from boron toxicity (EPA, 1986). Of 32 wells sampled for boron, 20 exceed 750 µg/L. Wells sampled north of Gila Bend average 1,120 µg/L of boron. Wells sampled in the south and west average 1,430 µg/l.

Surface flows of the Gila River throughout the basin are usually highly mineralized with calcium and sodium (Hem, in Babcock and Kendall, 1948). As groundwater was withdrawn by the pumping of wells it was expected that groundwater would be replaced with the more highly mineralized water of the Gila River resulting in a continual increase of the dissolved-solids content of the groundwater (Hem, in Babcock and Kendall, 1948). However, Johnson and Cahill (1955) reported that high flows during floods were considerably less mineralized and recharge from this water tended to reduce the concentration of dissolved solids in the groundwater reservoir. Dissolved-solids content decreased in 19 of 23 wells sampled in 1953-55 and 1964-66. From 1953 to 1966 water levels declined throughout the basin and flows of the Gila River were low. The low flows of the Gila River were highly mineralized from 1953 to 1966, but they were apparently insufficient in volume to replenish the groundwater reservoir.

From 1966 to 1976, specific conductance of the Gila River remained relatively unchanged while pumpage throughout the basin increased substantially. Recharge from minor floods in 1966 and 1973 caused water levels to rise in the northern part of the basin despite the increased pumpage. The average specific conductance of groundwater in the northern part of the basin increased over this time. Specific conductance also increased in groundwater in the western part of the basin even though most static water levels declined from 1966 to 1976. A possible

explanation for this situation is that although recharge occurred throughout the basin, it was not enough to replenish groundwater withdrawn in the central and western parts of the basin. However, the volume and dissolved-solids concentration of the recharge water was insufficient to cause the increase in specific conductance.

The average specific conductance of groundwater throughout the basin has not changed significantly since the late 1970's. The average annual specific conductance of the Gila River measured at Gillespie Dam above diversions declined sharply in the late 1970's but has since remained relatively unchanged. Specific conductance is an indirect measure of the dissolved-solids content of a groundwater or surface water sample. The specific-conductance measurement of a groundwater sample can be used to estimate the concentration of dissolved solids in the groundwater sample. The dissolved solids concentration may be estimated by multiplying the specific-conductance of the groundwater sample by a factor of 0.6.

Review of dissolved solids concentrations in groundwater samples collected in the GBB indicate that changes in dissolved solids concentrations vary over time and areally. Of 16 wells sampled in 1976-79 and again in 1991-93 by the USGS and ADWR, six show slight-to-moderate increases in concentrations of dissolved solids, nine remain relatively unchanged, and one exhibited a significant decrease in concentrations of dissolved solids. Of the six wells that exhibited increases in concentrations of dissolved solids, all but one are north of Gila Bend. The single well that exhibited a decrease in concentration of total dissolved solids is also north of Gila Bend.

The average specific conductance of groundwater south and west of Gila Bend has consistently been lower than that of groundwater to the north. Specific-conductance values in groundwater samples collected from wells sampled throughout the Gila Bend Basin range from 1,250 to over 10,000 micromhos per centimeter (uS/cm) at 25 degrees C. Specific conductance values in groundwater samples collected from wells north of Gila Bend average 3,500 uS/cm while those to the south and west average 2,300 uS/cm. Wells throughout the basin that are perforated exclusively below 1,000 feet bls consistently exhibit lower specific-conductance values than those with perforations above 1,000 feet. Most wells west of Gila Bend are over 1,000 feet deep, while few to the north exceed 1,000 feet in depth.

The dissolved-solids content of the groundwater is not expected to rise unless significant recharge of highly mineralized surface water flows occur. This situation is not likely since most recharge occurs during periods of high flow. Historically, the dissolved-solids content in surface flow is low during periods of high flow. A decrease in concentrations of dissolved-solids in groundwater has been observed during periods of high pumpage and low flows in the Gila River. One possible explanation for decreasing concentrations of dissolved solids with depth is that stratification in the basin-fill sediments causes highly mineralized water to remain in the upper portion of the groundwater reservoir.

As the upper zone is dewatered and water levels drop, less water of poor quality is yielded to wells. As long as water levels remain high or continue to rise, water quality is not expected to improve. Only when water levels were at their lowest did a marked improvement in water quality occur (Rascona, 1993).

3.0 PROJECT AREA SETTING

Basin-fill deposits are present at land surface throughout the Project Area. The thickness of the basin-fill deposits beneath the Project Area is estimated to be more than 1,800 feet based on drillers logs in the area. There are records that indicate that 42 wells have been drilled and constructed in the vicinity of the Project Area. There are 25 registered wells located in the Project Study Area (Table 1). There are also historical records for 17 wells that are not registered in the Project Study area (Table 1). The reported total depths of Project Study area wells range from less than 50 to more than 1,800 feet bls. Lithologic logs are available for 17 of the 42 registered and unregistered wells. Based on the reported total depths in the driller logs and the descriptions of materials in the drillers logs, most of the wells are completed in the upper basin-fill unit.

3.1 WATER LEVEL CONDITIONS

Water level conditions in the Project Area have been evaluated based on the data collected by the ADWR. Depths to groundwater measured in wells in, and near, the Project Area by the ADWR during 1993 range from 2 to 72 feet bls. These depth to water measurements are in good general agreement with previous depths to water measurements collected from regional wells. Historic water level data are available for the Project Area (Table 2).

In general, depths to water in the Project Area have ranged from approximately 2.2 to 153 feet bls during the period 1953 to 1993. Groundwater elevations have ranged from approximately 502 to 626 feet above msl during the same period. Review of historical data and hydrographs of wells in the area published by Rascona (1993) indicates that water levels have gradually risen since the late 1970s. This rise in groundwater level is probably due to the cessation of pumping at and near the Project Area.

3.2 GROUNDWATER QUALITY

Groundwater quality conditions in the Project Area have been defined based on historic groundwater quality samples. Groundwater samples were collected by ADWR from selected wells located in the Project Area in 1979, 1991, and 1993. The groundwater samples collected by ADWR were analyzed for selected common ions and trace metals. In addition, S-P Farms collected groundwater samples in 1979, prior to decommissioning the wells before the Painted Rock Reservoir flooded in the early 1980s. The groundwater samples collected by S-P Farms were analyzed for Total Dissolved Solids, pH, standard inorganic cations and anions. Groundwater quality data for the Project Area are provided (Table 3).

In general, groundwater in the Project Area is of poor quality for domestic and most agricultural uses. Examination of the groundwater quality data indicates good general agreement with water quality in other portions of the region. The dissolved solids concentrations for wells in the Project area ranged from 807 to 5,887 parts per million (ppm). The dominant constituents in the water are sodium and chloride. And, in general, dissolved solids concentrations were highest in shallow wells and lowest in the deeper wells. Fluoride was detected at concentrations greater than the federal MCL (Table 3).

4.0 GROUNDWATER ASSESSMENT

Maximum water demand for the Project is expected to be approximately 10,000 af/y. This groundwater assessment was conducted to evaluate the impacts of withdrawing 10,000 af/y of groundwater from the Project Area to meet water demand. In addition, a worst case scenario that included withdrawing 15,000 af/y of groundwater from the Project Area was evaluated.

4.1 METHODOLOGY

Hydrogeologic data were collected to define regional and Project Area conditions (Sections 2.0 and 3.0). Examination of these data allowed the development of a conceptual hydrogeologic model for the region. The impact created by groundwater withdrawals at the Project Area was determined by simulating various pumpage scenarios within the conceptual model using the groundwater model Winflow. Winflow utilizes the Theis non-equilibrium equation to determine drawdowns created by pumping wells with selected aquifer hydraulic properties for selected periods of time.

Winflow input parameters include aquifer thickness, saturated thickness, hydraulic conductivity (K), specific yield (SY), and anticipated water demand. Review of the basic data indicates that alluvial materials are at least 1,100 feet thick in the Project Area. Wells located in the Project Area range from approximately 200 to 1,100 feet in total depth. Static depth to water in the Project Area is approximately 50 to 60 feet bls. Based on these data, a conservatively low saturated thickness of approximately 1,000 feet was assumed.

No aquifer test data are available to determine K or SY for aquifer materials underlying the Project Area; however, K and SY values were estimated using drillers logs and elements from the ADWR Drillers Log Program developed by ADWR (Long and Erb, 1980). One of the components of the ADWR Drillers Log Program is a standardized method of analyzing lithologic logs written by drillers so that specific yield, hydraulic conductivity and transmissivity could be estimated in wells where no aquifer test data exists.

The drillers reports received at ADWR contain lithologic logs prepared by drillers during the drilling of wells. Descriptions used by drillers in the preparation of these logs were standardized and values were assigned for the description of each type of aquifer material for specific yield and hydraulic conductivity. Estimates for specific yield and hydraulic conductivity were calculated by multiplying the values assigned to each aquifer material type by the thickness of that material in the well. Then, the sum of the values for each type of aquifer material, from the water table to the total depth of the well, was divided by the total depth of the well to arrive at a weighted average for specific yield and hydraulic conductivity for each well.

Ranges of K and SY for the basin fill units were estimated based on well logs for the Project Area. The estimated K values based on analysis of the driller logs for wells in the area range from approximately 17.4 to 1,267 feet per day (f/d). The average estimated K for the area based on the driller log analysis is about 640 f/d. The estimated SY based on the driller logs and using the method developed by the ADWR ranges from approximately .05 to 0.22 and averaged 0.14 (dimensionless). Based on these parameters; four pumping scenarios were simulated using conservative estimates of K and SY. The four scenarios are:

1. Pumping 10,000 af/y for 50 years using High K (100 f/d) and SY (0.12)
2. Pumping 10,000 af/y for 50 years using Low K (50 f/d) and SY (0.08)
3. Pumping 10,000 af/y for 50 years using moderate K (75f/d) and SY (0.10)
4. Pumping 15000 af/yr for 50 years using moderate K (75f/d) and SY (0.10)

Groundwater pumping was simulated from eight existing wells in the Project Area. For scenarios 1 through 4, these wells were pumped for 50 years at the rates listed below:

Scenario	Pumping Rate (gpm)
1	775
2	775
3	775
4	1,162

4.2 RESULTS

The results of the simulations for the four scenarios indicate that the impacts created by groundwater withdrawals in the Project Area will not create excessive additional drawdown at or near Project Area boundaries. Figures depicting the amount of drawdown based on the four above-referenced scenarios have been prepared (Figures 2 through 5).

As expected, the maximum amount of drawdown was created for the pumping scenario using the moderate range of aquifer parameters and pumping 15,000 ac/yr for 50 years (Scenario 4). Even under this very conservative condition, drawdown at the eight existing Project Area wells after 50 years of pumping is less than 25 feet. The projected drawdown at the Project Area boundary for Scenario 4 ranges from approximately 12 to 15 feet (Figure 5). The minimum amount of drawdown was projected using the high range of aquifer parameters and total pumping of 10,000 af/y (Scenario 1). The projected drawdown for Scenario 1 at the Project Area wells is less than 15 feet after 50 years and ranges from approximately 10 to 13 feet at the Project Area boundary. Scenario 1, which includes using the highest values of K and Sy for this analysis, is still conservative compared to the range of aquifer hydraulic parameters estimated using the ADWR drillers log methodology.

5.0 CONCLUSIONS

A review of the data collected for this investigation and the results of the impact analysis indicates that pumping groundwater to serve as a source of water supply to the Project will not produce significant drawdown in the area. Assuming these conservative conditions, i.e. using conservative (low) estimates of aquifer hydraulic parameters, additional drawdown at the site will likely range from approximately 0.3 to 0.5 feet per year, or a total drawdown of 15 to 25 feet over the 50 year estimated life of the Project.

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TABLE 1

WELL INVENTORY

LEGAL	REGISTRATION NUMBER	OWNER	TOTAL DEPTH (feet)	DIAMETER	WATER LEVEL (feet)	GALLONS PER MINUTE
C(5-5)18ACC	Not Registered	S&P Farms	657	20		
C(5-5)18ACC	Not Registered	Sisson	396	20		
C(5-5)18ADA	55-603692	S&P Farms	347	20	50	2,600
C(5-5)18B	Not Registered	Sisson	865	20		
C(5-5)18BBC	Not Registered	Sisson	945	20		130
C(5-5)18CAA	55-603694	S&P Farms	679	18	50	3,000
C(5-5)18CCC	55-559643	Southwest Gas Corporation	235	0	0	0
C(5-5)18CDD	55-603682	S&P Farms	500	6	0	0
C(5-5)18DCB	55-603693	S&P Farms	890	18	50	2,800
C(5-5)18DCC	Not Registered	Sisson	1,031	20		40
C(5-5)18DCD	55-603697	Gila Gin Co	400	6	50	35
C(5-5)18DDC	Not Registered	Sisson	770	20		100
C(5-5)18DDC	55-603690	S&P Farms	400	20	50	3,000
C(5-5)18DDD	55-603691	S&P Farms	669	20	50	1,800
C(5-5)19AAB	Not Registered	Pierce	1,135	30		2,449
C(5-5)19ABA	55-603689	S&P Farms	1,130	18	50	2,800
C(5-5)19BBB	55-603683	S&P Farms	188	8	73	33
C(5-5)20CBB	55-622334	Paloma Ranch Investments, LLC	1,114	16	0	1,900
C(5-5)20DCA	Not Registered	NW Mutual Life	1,811	18		203
C(5-5)20DCC	55-622372	Paloma Ranch Investments, LLC	1,811	18	0	3,600
C(5-5)20DCD	Not Registered	NW Mutual Life	767	24		255
C(5-5)31DBC	55-626709	Union Pacific Railroad	1,365	10	770	240
C(5-6)3ACC	Not Registered	Narramore	534	20		40
C(5-6)3CDD	Not Registered	Sisson	700	20		2,300
C(5-6)4DDD	55-603684	S&P Farms	702	20	50	2,400
C(5-6)11BBB	Not Registered	Sisson	1,085	20		4,000
C(5-6)11BCC	Not Registered	S&P Farms	1,160	18		2,449
C(5-6)11DBB	Not Registered	Sisson	920	20		3,366
C(5-6)12DAA	Not Registered	Narramore	979	20		3,300
C(5-6)13ADD	Not Registered	Narramore	1,000	18		3,383
C(5-5)18CCD	Not Registered	S&P Farms	936	18		2,019
C(5-6)25AAA	55-555281	Continental Waste	0	0	0	0
C(5-6)25AAA	55-555387	Continental Waste	50	4	25	0
C(5-6)25ABA	55-551348	Continental Waste	75	4	38	0
C(5-6)25BBB	55-551346	Continental Waste	65	4	45	0
C(5-6)25BBB	55-555277	Continental Waste	0	0	0	0
C(5-6)25CBB	55-551345	Continental Waste	0	0	0	0
C(5-6)25CCC	55-551343	Continental Waste	0	0	0	0
C(5-6)25CCC	55-555279	Continental Waste	0	0	0	0
C(5-6)25DBA	55-551347	Continental Waste	39	4	24	0
C(5-6)25DCD	55-551344	Continental Waste	0	0	0	0
C(5-6)25DDD	55-555280	Continental Waste	0	0	0	0

TABLE 2

WATER LEVEL DATA

WELL IDENTIFIER	DATE MEASURED	DEPTH TO WATER (feet bls)	WATER LEVEL ELEVATION
C(5-5)18acb	12/77	67.5	560
C(5-5)18dbd	08/79	32.8	599
C(5-5)18dcb	01/66	56.5	579
C(5-5)18dcd1	12/58	96.7	548
C(5-5)18dda	02/66	48.3	592
C(5-5)18ddc1	12/53	57.2	585
C(5-5)18ddc2	11/93	21.6	623
C(5-5)18ddd	08/79	53.6	588
C(5-5)19aab	01/91	58.6	585
C(5-5)19bcb	11/93	26.5	626
C(5-5)20cbb	03/80	55.6	596
C(5-5)20dcb	08/77	120	538
C(5-5)20dcd	11/99	84.3	571
C(5-6)02add1	07/53	3.4	592
C(5-6)02add2	06/54	3.4	592
C(5-6)02bbc	01/66	33.6	564
C(5-6)11cda	12/95	10.8	606
C(5-6)12daa	12/77	51.5	558
C(5-6)13adc1	01/65	572	579
C(5-6)13adc2	11/93	10.6	616

bls = Below land surface

HARGIS + ASSOCIATES, INC.

TABLE 3

GROUNDWATER QUALITY DATA

WELL IDENTIFIER	C(5-5) 18caa	C(5-5) 18dcd2	C(5-5) 18dda	C(5-5) 18ddc3	C(5-5) 18ddd	C(5-5) 19aab	C(5-5) 20dca	C(5-6) 02bbc	C(5-6) 02dbb	C(5-6) 03acc	C(5-6) 11caa	C(5-6) 11cda	C(5-6) 12daa
DATE SAMPLED	11/79	08/79	11/79	04/74	04/74	04/76	08/79	06/77	06/77	07/91	04/76	06/77	06/77
Temperature (°C)	--	25.5	--	24.5	27.0	--	30.0	24.0	25.0	25.5	--	26.0	24.0
Electrical conductivity	--	8,500	--	6,730	2,370	2,500	1,900	2,400	1,800	2,350	2,500	2,300	4,900
Dissolved Oxygen	--	--	--	--	--	--	--	--	--	0.3	--	--	--
pH (field)	--	7.8	--	7.5	8.0	--	--	--	--	8.0	--	--	--
pH (lab)	7.20	--	7.31	--	--	--	--	--	--	7.9	--	--	--
Alkalinity as $CaCO_3$	--	198	--	238	76	--	--	--	--	136	--	--	--
Nitrogen, dis. $NO_2 + NO_3$	--	--	--	6.5	1.5	--	--	--	--	1.10	--	--	--
Phosphorus, dissolved	--	--	--	0.070	0.030	--	--	--	--	<0.010	--	--	--
Hardness, tot. mg/L. as $CaCO_3$	--	1,600	--	970	180	--	--	--	--	210	--	--	--
Calcium, dissolved	440	540	560	240	60	--	--	59	16	400	--	--	--
Magnesium, dissolved	71	70	137	90	7.0	--	--	--	--	16	--	--	--
Sodium, dissolved	1250	1,300	1440	1,100	410	--	--	--	--	400	--	--	--
Potassium, dissolved	--	--	--	13	6.6	--	--	--	--	5.6	--	--	--
Chloride, dissolved	2260	2,300	2800	1,800	590	--	--	--	--	580	--	--	--
Sulfate, dissolved	427	900	648	610	150	--	--	--	--	150	--	--	--
Fluoride, dissolved	--	1.0	--	2.1	3.6	5.7	4.1	1.9	1.8	3.4	4.1	3.1	1.7
Silica, dissolved	--	--	--	41	30	--	--	--	--	33	--	--	--
Arsenic, dissolved	--	--	--	--	--	--	--	--	--	6	--	--	--
Barium, dissolved	--	--	--	--	--	--	--	--	--	<100	--	--	--
Boron, dissolved	--	--	--	1,600	840	--	--	--	--	630	--	--	--
Cadmium, dissolved	--	--	--	--	--	--	--	--	--	<1.0	--	--	--
Chromium (hex), dissolved	--	--	--	--	--	--	--	--	--	<1	--	--	--
Copper, dissolved	--	--	--	--	--	--	--	--	--	<1	--	--	--
Iron, dissolved	--	--	--	70	30	--	--	--	--	10	--	--	--
Lead, dissolved	--	--	--	--	--	--	--	--	--	<1	--	--	--
Manganese, dissolved	--	--	--	<10	<10	--	--	--	--	10	--	--	--
Molybdenum, dissolved	--	--	--	--	--	--	--	--	--	11	--	--	--
Strontium, dissolved	--	--	--	--	--	--	--	--	--	870	--	--	--
Vanadium, dissolved	--	--	--	--	--	--	--	--	--	18	--	--	--
Zinc, dissolved	--	--	--	--	--	--	--	--	--	<10	--	--	--
Lithium, dissolved	--	--	--	--	--	--	--	--	--	270	--	--	--

Please refer to Page 2 for footnotes

HARGIS + ASSOCIATES, INC.

TABLE 3
WATER QUALITY

FOOTNOTES:

Note: Concentrations are in parts per million unless otherwise noted

°C = Degrees Celsius
(--) = Not analyzed
$CaCO_3$ = Calcium carbonate
(<) = Less than; value is less than the Limit of Detection for that compound
mg/L = Milligrams per liter

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Hargis & Associates, Inc. - Tempe
1400 E. Southern Ave., Ste. 620
Tempe, AZ 85282
Attention: Michael Long

Client Project ID: GBPP 886
Report Number: PJF0386

Sampled: 06/21/00
Received: 06/21/00
Issued: 06/30/00

CASE NARRATIVE

LABORATORY NUMBER	SAMPLE DESCRIPTION	SAMPLE MATRIX
PJF0386-01	C(5-5) 20DCC	Water
PJF0386-02	C(5-5) 20DCC	Water
PJF0386-03	C(5-5) 20CBB	Water
PJF0386-04	C(5-5) 20CBB	Water

SAMPLE RECEIPT: Samples were received intact, on ice, and with chain of custody documentation.

HOLDING TIMES: Holding times were met.

PRESERVATION: Samples requiring preservation were verified prior to sample analysis.

QA/QC CRITERIA: All analyses met method criteria.

OBSERVATIONS: No significant observations were made.

SUBCONTRACTED: No analyses were subcontracted to an outside laboratory.

DEL MAR ANALYTICAL, PHOENIX (AZ0426)

Beth Price
Project Manager

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Hargis & Associates, Inc. - Tempe
1400 E. Southern Ave., Ste. 620
Tempe, AZ 85282
Attention: Michael Long

Client Project ID: GBPP 886
Report Number: PJF0386

Sampled: 06/21/00
Received: 06/21/00

TOTAL RECOVERABLE METALS

Analyte	Method	Batch	Reporting Limit	Sample Result	Dilution Factor	Date Extracted	Date Analyzed	Data Qualifiers
			mg/l	mg/l				
Sample ID: PJF0386-01 (C(5-5) 20DCC - Water)								
Antimony	EPA 200.7	P0F2206	0.050	ND	1	6/22/00	6/23/00	
Arsenic	EPA 200.7	P0F2206	0.050	ND	1	6/22/00	6/23/00	
Barium	EPA 200.7	P0F2206	0.010	ND	1	6/22/00	6/23/00	
Beryllium	EPA 200.7	P0F2206	0.0040	ND	1	6/22/00	6/23/00	
Cadmium	EPA 200.7	P0F2206	0.0050	ND	1	6/22/00	6/23/00	
Calcium	EPA 200.7	P0F2206	2.0	**41**	1	6/22/00	6/23/00	
Chromium	EPA 200.7	P0F2206	0.010	ND	1	6/22/00	6/23/00	
Copper	EPA 200.7	P0F2206	0.020	ND	1	6/22/00	6/23/00	
Lead	EPA 200.7	P0F2206	0.050	ND	1	6/22/00	6/23/00	
Magnesium	EPA 200.7	P0F2206	0.50	**2.5**	1	6/22/00	6/23/00	
Mercury	EPA 245.1	P0F2203	0.00020	ND	1	6/22/00	6/22/00	
Nickel	EPA 200.7	P0F2206	0.050	ND	1	6/22/00	6/23/00	
Potassium	EPA 258.1	P0F2206	1.0	**6.6**	1	6/22/00	6/23/00	
[illegible]um	EPA 200.7	P0F2206	0.050	ND	1	6/22/00	6/23/00	
Silica	EPA 200.7	P0F2206	2.5	**31**	1	6/22/00	6/23/00	
Silver	EPA 200.7	P0F2206	0.0050	ND	1	6/22/00	6/23/00	
Sodium	EPA 273.1	P0F2206	5.0	**360**	1	6/22/00	6/23/00	
Thallium	EPA 200.7	P0F2206	0.050	ND	1	6/22/00	6/23/00	
Zinc	EPA 200.7	P0F2206	0.050	ND	1	6/22/00	6/23/00	
Sample ID: PJF0386-03 (C(5-5) 20CBB - Water)								
Antimony	EPA 200.7	P0F2206	0.050	ND	1	6/22/00	6/23/00	
Arsenic	EPA 200.7	P0F2206	0.050	ND	1	6/22/00	6/23/00	
Barium	EPA 200.7	P0F2206	0.010	**0.022**	1	6/22/00	6/23/00	
Beryllium	EPA 200.7	P0F2206	0.0040	ND	1	6/22/00	6/23/00	
Cadmium	EPA 200.7	P0F2206	0.0050	ND	1	6/22/00	6/23/00	
Calcium	EPA 200.7	P0F2206	2.0	**57**	1	6/22/00	6/23/00	
Chromium	EPA 200.7	P0F2206	0.010	ND	1	6/22/00	6/23/00	
Copper	EPA 200.7	P0F2206	0.020	ND	1	6/22/00	6/23/00	
Lead	EPA 200.7	P0F2206	0.050	ND	1	6/22/00	6/23/00	
Magnesium	EPA 200.7	P0F2206	0.50	**3.8**	1	6/22/00	6/23/00	
Mercury	EPA 245.1	P0F2808	0.00020	ND	1	6/28/00	6/28/00	
Nickel	EPA 200.7	P0F2206	0.050	ND	1	6/22/00	6/23/00	
Potassium	EPA 258.1	P0F2206	1.0	**7.9**	1	6/22/00	6/23/00	
Selenium	EPA 200.7	P0F2206	0.050	ND	1	6/22/00	6/23/00	
Silica	EPA 200.7	P0F2206	2.5	**32**	1	6/22/00	6/23/00	
Silver	EPA 200.7	P0F2206	0.0050	ND	1	6/22/00	6/23/00	
Sodium	EPA 273.1	P0F2206	5.0	**410**	1	6/22/00	6/23/00	
Thallium	EPA 200.7	P0F2206	0.050	ND	1	6/22/00	6/23/00	
Zinc	EPA 200.7	P0F2206	0.050	ND	1	6/22/00	6/23/00	

DEL MAR ANALYTICAL, PHOENIX (AZ0426)

Beth Price
Project Manager

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Hargis & Associates, Inc. - Tempe
1400 E. Southern Ave., Ste. 620
Tempe, AZ 85282
Attention: Michael Long

Client Project ID: GBPP 886
Report Number: PJF0386

Sampled: 06/21/00
Received: 06/21/00

DISSOLVED METALS

Analyte	Method	Batch	Reporting Limit	Sample Result	Dilution Factor	Date Extracted	Date Analyzed	Data Qualifiers
			mg/l	mg/l				
Sample ID: PJF0386-02 (C(5-5) 20DCC - Water)								
Antimony, Dissolved	EPA 200.7	P0F2206	0.050	ND	1	6/22/00	6/23/00	
Arsenic, Dissolved	EPA 200.7	P0F2206	0.050	ND	1	6/22/00	6/23/00	
Barium, Dissolved	EPA 200.7	P0F2206	0.010	**0.70**	1	6/22/00	6/23/00	
Beryllium, Dissolved	EPA 200.7	P0F2206	0.0040	ND	1	6/22/00	6/23/00	
Cadmium, Dissolved	EPA 200.7	P0F2206	0.0050	ND	1	6/22/00	6/23/00	
Calcium, Dissolved	EPA 200.7	P0F2206	2.0	**43**	1	6/22/00	6/23/00	
Chromium, Dissolved	EPA 200.7	P0F2206	0.010	ND	1	6/22/00	6/23/00	
Copper, Dissolved	EPA 200.7	P0F2206	0.020	ND	1	6/22/00	6/23/00	
Lead, Dissolved	EPA 200.7	P0F2206	0.050	ND	1	6/22/00	6/23/00	
Magnesium, Dissolved	EPA 200.7	P0F2206	0.50	**2.7**	1	6/22/00	6/23/00	
Mercury, Dissolved	EPA 245.1	P0F2808	0.00020	ND	1	6/28/00	6/28/00	
Nickel, Dissolved	EPA 200.7	P0F2206	0.050	ND	1	6/22/00	6/23/00	
Potassium, Dissolved	EPA 258.1	P0F2206	1.0	**7.2**	1	6/22/00	6/23/00	
S um, Dissolved	EPA 200.7	P0F2206	0.050	ND	1	6/22/00	6/23/00	
Si..a, Dissolved	EPA 200.7	P0F2206	2.5	**32**	1	6/22/00	6/23/00	
Silver, Dissolved	EPA 200.7	P0F2206	0.0050	ND	1	6/22/00	6/23/00	
Sodium, Dissolved	EPA 273.1	P0F2206	5.0	**370**	1	6/22/00	6/23/00	
Thallium, Dissolved	EPA 200.7	P0F2206	0.050	ND	1	6/22/00	6/23/00	
Zinc, Dissolved	EPA 200.7	P0F2206	0.050	ND	1	6/22/00	6/23/00	
Sample ID: PJF0386-04 (C(5-5) 20CBB - Water)								
Antimony, Dissolved	EPA 200.7	P0F2206	0.050	ND	1	6/22/00	6/23/00	
Arsenic, Dissolved	EPA 200.7	P0F2206	0.050	ND	1	6/22/00	6/23/00	
Barium, Dissolved	EPA 200.7	P0F2206	0.010	**0.035**	1	6/22/00	6/23/00	
Beryllium, Dissolved	EPA 200.7	P0F2206	0.0040	ND	1	6/22/00	6/23/00	
Cadmium, Dissolved	EPA 200.7	P0F2206	0.0050	ND	1	6/22/00	6/23/00	
Calcium, Dissolved	EPA 200.7	P0F2206	2.0	**57**	1	6/22/00	6/23/00	
Chromium, Dissolved	EPA 200.7	P0F2206	0.010	ND	1	6/22/00	6/23/00	
Copper, Dissolved	EPA 200.7	P0F2206	0.020	ND	1	6/22/00	6/23/00	
Lead, Dissolved	EPA 200.7	P0F2206	0.050	ND	1	6/22/00	6/23/00	
Magnesium, Dissolved	EPA 200.7	P0F2206	0.50	**4.0**	1	6/22/00	6/23/00	
Mercury, Dissolved	EPA 245.1	P0F2808	0.00020	ND	1	6/28/00	6/28/00	
Nickel, Dissolved	EPA 200.7	P0F2206	0.050	ND	1	6/22/00	6/23/00	
Potassium, Dissolved	EPA 258.1	P0F2206	1.0	**7.9**	1	6/22/00	6/23/00	
Selenium, Dissolved	EPA 200.7	P0F2206	0.050	ND	1	6/22/00	6/23/00	
Silica, Dissolved	EPA 200.7	P0F2206	2.5	**34**	1	6/22/00	6/23/00	
Silver, Dissolved	EPA 200.7	P0F2206	0.0050	ND	1	6/22/00	6/23/00	
Sodium, Dissolved	EPA 273.1	P0F2206	5.0	**410**	1	6/22/00	6/23/00	
Thallium, Dissolved	EPA 200.7	P0F2206	0.050	ND	1	6/22/00	6/23/00	
Zinc, Dissolved	EPA 200.7	P0F2206	0.050	ND	1	6/22/00	6/23/00	

DEL MAR ANALYTICAL, PHOENIX (AZ0426)

Jeth Price
Project Manager

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Hargis & Associates, Inc. - Tempe
1400 E. Southern Ave., Ste. 620
Tempe, AZ 85282
Attention: Michael Long

Client Project ID: GBPP 886
Report Number: PJF0386

Sampled: 06/21/00
Received: 06/21/00

INORGANICS

Analyte	Method	Batch	Reporting Limit	Sample Result	Dilution Factor	Date Extracted	Date Analyzed	Data Qualifiers
			mg/l	mg/l				
Sample ID: PJF0386-01 (C(5-5) 20DCC - Water)								
Alkalinity as CaCO3	SM2320B	P0F2727	5.0	59	1	6/27/00	6/28/00	
Chloride	EPA 300.0	P0F2314	50	510	100	6/22/00	6/22/00	
Fluoride	EPA 300.0	P0F2314	1.0	4.1	10	6/22/00	6/22/00	
Nitrate-N	EPA 300.0	P0F2314	0.10	2.0	1	6/22/00	6/22/00	
Nitrite-N	EPA 300.0	P0F2314	0.10	ND	1	6/22/00	6/22/00	
			pH Units	pH Units				
Sample ID: PJF0386-01 (C(5-5) 20DCC - Water)								
pH	EPA 150.1	P0F2128	NA	8.02	1	6/21/00	6/21/00	HT-I
			umhos/cm	umhos/cm				
Sample ID: PJF0386-01 (C(5-5) 20DCC - Water)								
Specific Conductance	SM2510B	P0F2307	2.0	2100	1	6/23/00	6/23/00	
			mg/l	mg/l				
Sample ID: PJF0386-01 (C(5-5) 20DCC - Water)								
Sulfate	EPA 300.0	P0F2314	5.0	130	10	6/22/00	6/22/00	
			°C	°C				
Sample ID: PJF0386-01 (C(5-5) 20DCC - Water)								
Temperature	EPA 170.1	P0F2129	NA	18	1	6/21/00	6/21/00	HT-I
			mg/l	mg/l				
Sample ID: PJF0386-01 (C(5-5) 20DCC - Water)								
Total Dissolved Solids	SM2540C	P0F2329	20	1100	1	6/23/00	6/23/00	
Sample ID: PJF0386-03 (C(5-5) 20CBB - Water)								
Alkalinity as CaCO3	SM2320B	P0F2727	5.0	53	1	6/27/00	6/28/00	
Chloride	EPA 300.0	P0F2314	50	610	100	6/22/00	6/22/00	
Fluoride	EPA 300.0	P0F2314	1.0	4.3	10	6/22/00	6/22/00	
Nitrate-N	EPA 300.0	P0F2314	0.10	2.1	1	6/22/00	6/22/00	
Nitrite-N	EPA 300.0	P0F2314	0.10	ND	1	6/22/00	6/22/00	

Beth Price
Project Manager

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Hargis & Associates, Inc. - Tempe
1400 E. Southern Ave., Ste. 620
Tempe, AZ 85282
Attention: Michael Long

Client Project ID: GBPP 886
Report Number: PJF0386

Sampled: 06/21/00
Received: 06/21/00

INORGANICS

Analyte	Method	Batch	Reporting Limit	Sample Result	Dilution Factor	Date Extracted	Date Analyzed	Data Qualifiers
			pH Units	pH Units				
Sample ID: PJF0386-03 (C(5-5) 20CBB - Water)								
pH	EPA 150.1	P0F2128	NA	7.99	1	6/21/00	6/21/00	HT-I
			umhos/cm	umhos/cm				
Sample ID: PJF0386-03 (C(5-5) 20CBB - Water)								
Specific Conductance	SM2510B	P0F2307	2.0	2400	1	6/23/00	6/23/00	
			mg/l	mg/l				
Sample ID: PJF0386-03 (C(5-5) 20CBB - Water)								
Sulfate	EPA 300.0	P0F2314	5.0	160	10	6/22/00	6/22/00	
			°C	°C				
Sample ID: PJF0386-03 (C(5-5) 20CBB - Water)								
Temperature	EPA 170.1	P0F2129	NA	18	1	6/21/00	6/21/00	HT-I
			mg/l	mg/l				
Sample ID: PJF0386-03 (C(5-5) 20CBB - Water)								
Total Dissolved Solids	SM2540C	P0F2329	20	1300	1	6/23/00	6/23/00	

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Client Project ID: GBPP 886
Report Number: PJF0386

Sampled: 06/21/00
Received: 06/21/00

METHOD BLANK/QC DATA

TOTAL RECOVERABLE METALS

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Data Qualifiers
Batch: P0F2203 Extracted: 06/22/00										
Blank Analyzed: 06/22/00 (P0F2203-BLK1)										
Mercury	ND	0.00020	mg/l							
LCS Analyzed: 06/22/00 (P0F2203-BS1)										
Mercury	0.00541	0.00020	mg/l	0.00500		108	85-115			
Matrix Spike Analyzed: 06/22/00 (P0F2203-MS1)					Source: PJF0330-02					
Mercury	0.00292	0.00020	mg/l	0.00500	ND	58.4	85-115			M
Matrix Spike Dup Analyzed: 06/22/00 (P0F2203-MSD1)					Source: PJF0330-02					
Mercury	0.00294	0.00020	mg/l	0.00500	ND	58.8	85-115	0.683	20	M
Batch: P0F2206 Extracted: 06/22/00										
Blank Analyzed: 06/23/00 (P0F2206-BLK1)										
Antimony	ND	0.050	mg/l							
Arsenic	ND	0.050	mg/l							
Barium	ND	0.010	mg/l							
Beryllium	ND	0.0040	mg/l							
Cadmium	ND	0.0050	mg/l							
Calcium	ND	2.0	mg/l							
Chromium	ND	0.010	mg/l							
Copper	ND	0.020	mg/l							
Lead	ND	0.050	mg/l							
Magnesium	ND	0.50	mg/l							
Nickel	ND	0.050	mg/l							
Potassium	ND	1.0	mg/l							
Selenium	ND	0.050	mg/l							
Silica	ND	2.5	mg/l							
Silver	ND	0.0050	mg/l							
Sodium	ND	5.0	mg/l							
Thallium	ND	0.050	mg/l							
Zinc	ND	0.050	mg/l							

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Hargis & Associates, Inc. - Tempe
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Tempe, AZ 85282
Attention: Michael Long

Client Project ID: GBPP 886
Report Number: PJF0386

Sampled: 06/21/00
Received: 06/21/00

METHOD BLANK/QC DATA

TOTAL RECOVERABLE METALS

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Data Qualifiers
Batch: P0F2206 Extracted: 06/22/00										
LCS Analyzed: 06/23/00 (P0F2206-BS1)										
Antimony	1.10	0.050	mg/l	1.00		110	85-115			
Arsenic	1.15	0.050	mg/l	1.00		115	85-115			
Barium	1.06	0.010	mg/l	1.00		106	85-115			
Beryllium	1.11	0.0040	mg/l	1.00		111	85-115			
Cadmium	1.12	0.0050	mg/l	1.00		112	85-115			
Calcium	11.1	2.0	mg/l	10.0		111	85-115			
Ch· ·um	1.06	0.010	mg/l	1.00		106	85-115			
)P·	1.02	0.020	mg/l	1.00		102	85-115			
Lead	1.09	0.050	mg/l	1.00		109	85-115			
Magnesium	10.8	0.50	mg/l	10.0		108	85-115			
Nickel	1.06	0.050	mg/l	1.00		106	85-115			
Potassium	11.5	1.0	mg/l	10.0		115	85-115			
Selenium	1.14	0.050	mg/l	1.00		114	85-115			
Silica	22.0	2.5	mg/l	21.4		103	85-115			
Silver	0.0540	0.0050	mg/l	0.0500		108	85-115			
Sodium	54.4	5.0	mg/l	50.0		109	85-115			
Thallium	1.07	0.050	mg/l	1.00		107	85-115			
Zinc	1.08	0.050	mg/l	1.00		108	85-115			
Matrix Spike Analyzed: 06/23/00 (P0F2206-MS1)					**Source: PJF0330-02**					
Antimony	1.23	0.050	mg/l	1.00	ND	120	70-130			
Arsenic	1.35	0.050	mg/l	1.00	0.070	128	70-130			
Barium	1.10	0.010	mg/l	1.00	0.041	106	70-130			
Beryllium	1.19	0.0040	mg/l	1.00	ND	119	70-130			
Cadmium	1.15	0.0050	mg/l	1.00	ND	115	70-130			
Calcium	136	2.0	mg/l	10.0	130	60.0	70-130			M-HA
Chromium	1.07	0.010	mg/l	1.00	0.011	106	70-130			
Copper	1.15	0.020	mg/l	1.00	ND	114	70-130			
Lead	1.11	0.050	mg/l	1.00	ND	111	70-130			
Magnesium	67.5	0.50	mg/l	10.0	60	75.0	70-130			
Nick·l	1.18	0.050	mg/l	1.00	0.10	108	70-130			
Po· m	13.7	1.0	mg/l	10.0	ND	130	85-115			M

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Hargis & Associates, Inc. - Tempe
1400 E. Southern Ave., Ste. 620
Tempe, AZ 85282
Attention: Michael Long

Client Project ID: GBPP 886
Report Number: PJF0386

Sampled: 06/21/00
Received: 06/21/00

METHOD BLANK/QC DATA

TOTAL RECOVERABLE METALS

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Data Qualifiers
Batch: P0F2206 Extracted: 06/22/00										
Matrix Spike Analyzed: 06/23/00 (P0F2206-MS1)					**Source: PJF0330-02**					
Selenium	1.26	0.050	mg/l	1.00	ND	126	70-130			
Silica	89.7	2.5	mg/l	21.4	66	111	70-130			
Silver	0.0586	0.0050	mg/l	0.0500	ND	117	70-130			
Sodium	2630	50	mg/l	50.0	2600	60.0	85-115			M
Thallium	1.03	0.050	mg/l	1.00	ND	103	70-130			
Zinc	1.17	0.050	mg/l	1.00	ND	117	70-130			
M: Spike Dup Analyzed: 06/23/00 (P0F2206-MSD1)					**Source: PJF0330-02**					
..ay	1.21	0.050	mg/l	1.00	ND	118	70-130	1.64	20	
..rsenic	1.28	0.050	mg/l	1.00	0.070	121	70-130	5.32	20	
Barium	1.10	0.010	mg/l	1.00	0.041	106	70-130	0	20	
Beryllium	1.18	0.0040	mg/l	1.00	ND	118	70-130	0.844	20	
Cadmium	1.14	0.0050	mg/l	1.00	ND	114	70-130	0.873	20	
Calcium	135	2.0	mg/l	10.0	130	50.0	70-130	0.738	20	M-HA
Chromium	1.04	0.010	mg/l	1.00	0.011	103	70-130	2.84	20	
Copper	1.18	0.020	mg/l	1.00	ND	117	70-130	2.58	20	
Lead	1.07	0.050	mg/l	1.00	ND	107	70-130	3.67	20	
Magnesium	66.9	0.50	mg/l	10.0	60	69.0	70-130	0.893	20	M
Nickel	1.17	0.050	mg/l	1.00	0.10	107	70-130	0.851	20	
Potassium	13.7	1.0	mg/l	10.0	ND	130	85-115	0	20	M
Selenium	1.22	0.050	mg/l	1.00	ND	122	70-130	3.23	20	
Silica	88.8	2.5	mg/l	21.4	66	107	70-130	1.01	20	
Silver	0.0586	0.0050	mg/l	0.0500	ND	117	70-130	0	20	
Sodium	2630	50	mg/l	50.0	2600	60.0	85-115	0	20	M
Thallium	1.05	0.050	mg/l	1.00	ND	105	70-130	1.92	20	
Zinc	1.18	0.050	mg/l	1.00	ND	118	70-130	0.851	20	

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Hargis & Associates, Inc. - Tempe
1400 E. Southern Ave., Ste. 620
Tempe, AZ 85282
Attention: Michael Long

Client Project ID: GBPP 886
Report Number: PJF0386

Sampled: 06/21/00
Received: 06/21/00

METHOD BLANK/QC DATA

TOTAL RECOVERABLE METALS

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Data Qualifiers
Batch: P0F2808 Extracted: 06/28/00										
Blank Analyzed: 06/28/00 (P0F2808-BLK1)										
Mercury	ND	0.00020	mg/l							
LCS Analyzed: 06/28/00 (P0F2808-BS1)										
Mercury	**0.00549**	0.00020	mg/l	0.00500		110	85-115			
Matrix Spike Analyzed: 06/28/00 (P0F2808-MS1)					**Source: PJF0194-01**					
Mercury	**0.00554**	0.00020	mg/l	0.00500	ND	111	85-115			
Matrix Spike Dup Analyzed: 06/28/00 (P0F2808-MSD1)					**Source: PJF0194-01**					
Mercury	**0.00547**	0.00020	mg/l	0.00500	ND	109	85-115	1.27	20	

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Attention: Michael Long

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METHOD BLANK/QC DATA

DISSOLVED METALS

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Data Qualifiers
Batch: P0F2206 Extracted: 06/22/00										
Blank Analyzed: 06/23/00 (P0F2206-BLK1)										
Antimony, Dissolved	ND	0.050	mg/l							
Arsenic, Dissolved	ND	0.050	mg/l							
Barium, Dissolved	ND	0.010	mg/l							
Beryllium, Dissolved	ND	0.0040	mg/l							
Cadmium, Dissolved	ND	0.0050	mg/l							
Calcium, Dissolved	ND	2.0	mg/l							
Chr n, Dissolved	ND	0.010	mg/l							
pp., Dissolved	ND	0.020	mg/l							
Lead, Dissolved	ND	0.050	mg/l							
Magnesium, Dissolved	ND	0.50	mg/l							
Nickel, Dissolved	ND	0.050	mg/l							
Potassium, Dissolved	ND	1.0	mg/l							
Selenium, Dissolved	ND	0.050	mg/l							
Silica, Dissolved	ND	2.5	mg/l							
Silver, Dissolved	ND	0.0050	mg/l							
Sodium, Dissolved	ND	5.0	mg/l							
Thallium, Dissolved	ND	0.050	mg/l							
Zinc, Dissolved	ND	0.050	mg/l							
LCS Analyzed: 06/23/00 (P0F2206-BS1)										
Antimony, Dissolved	**1.10**	0.050	mg/l	1.00		110	85-115			
Arsenic, Dissolved	**1.15**	0.050	mg/l	1.00		115	85-115			
Barium, Dissolved	**1.06**	0.010	mg/l	1.00		106	85-115			
Beryllium, Dissolved	**1.11**	0.0040	mg/l	1.00		111	85-115			
Cadmium, Dissolved	**1.12**	0.0050	mg/l	1.00		112	85-115			
Calcium, Dissolved	**11.1**	2.0	mg/l	10.0		111	85-115			
Chromium, Dissolved	**1.06**	0.010	mg/l	1.00		106	85-115			
Copper, Dissolved	**1.02**	0.020	mg/l	1.00		102	85-115			
Lead, Dissolved	**1.09**	0.050	mg/l	1.00		109	85-115			
Magnesium, Dissolved	**10.8**	0.50	mg/l	10.0		108	85-115			
Nic' issolved	**1.06**	0.050	mg/l	1.00		106	85-115			

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METHOD BLANK/QC DATA

DISSOLVED METALS

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Data Qualifiers
Batch: P0F2206 Extracted: 06/22/00										
LCS Analyzed: 06/23/00 (P0F2206-BS1)										
Potassium, Dissolved	11.5	1.0	mg/l	10.0		115	85-115			
Selenium, Dissolved	1.14	0.050	mg/l	1.00		114	85-115			
Silica, Dissolved	22.0	2.5	mg/l	21.4		103	85-115			
Silver, Dissolved	0.0540	0.0050	mg/l	0.0500		108	85-115			
Sodium, Dissolved	54.4	5.0	mg/l	50.0		109	85-115			
Thallium, Dissolved	1.07	0.050	mg/l	1.00		107	85-115			
Zinc, Dissolved	1.08	0.050	mg/l	1.00		108	85-115			
Batch: P0F2206 Spike Analyzed: 06/23/00 (P0F2206-MS1)					Source: PJF0330-02					
Antimony, Dissolved	1.23	0.050	mg/l	1.00	ND	120	70-130			
Arsenic, Dissolved	1.35	0.050	mg/l	1.00	0.070	128	70-130			
Barium, Dissolved	1.10	0.010	mg/l	1.00	0.041	106	70-130			
Beryllium, Dissolved	1.19	0.0040	mg/l	1.00	ND	119	70-130			
Cadmium, Dissolved	1.15	0.0050	mg/l	1.00	ND	115	70-130			
Calcium, Dissolved	136	2.0	mg/l	10.0	130	60.0	70-130			M-HA
Chromium, Dissolved	1.07	0.010	mg/l	1.00	0.011	106	70-130			
Copper, Dissolved	1.15	0.020	mg/l	1.00	ND	114	70-130			
Lead, Dissolved	1.11	0.050	mg/l	1.00	ND	111	70-130			
Magnesium, Dissolved	67.5	0.50	mg/l	10.0	60	75.0	70-130			
Nickel, Dissolved	1.18	0.050	mg/l	1.00	0.10	108	70-130			
Potassium, Dissolved	13.7	1.0	mg/l	10.0	ND	130	85-115			M
Selenium, Dissolved	1.26	0.050	mg/l	1.00	ND	126	70-130			
Silica, Dissolved	89.7	2.5	mg/l	21.4	66	111	70-130			
Silver, Dissolved	0.0586	0.0050	mg/l	0.0500	ND	117	70-130			
Sodium, Dissolved	2630	50	mg/l	50.0	2600	60.0	85-115			M
Thallium, Dissolved	1.03	0.050	mg/l	1.00	ND	103	70-130			
Zinc, Dissolved	1.17	0.050	mg/l	1.00	ND	117	70-130			

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METHOD BLANK/QC DATA

DISSOLVED METALS

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Data Qualifiers
Batch: P0F2206 Extracted: 06/22/00										
Matrix Spike Dup Analyzed: 06/23/00 (P0F2206-MSD1)					Source: PJF0330-02					
Antimony, Dissolved	1.21	0.050	mg/l	1.00	ND	118	70-130	1.64	20	
Arsenic, Dissolved	1.28	0.050	mg/l	1.00	0.070	121	70-130	5.32	20	
Barium, Dissolved	1.10	0.010	mg/l	1.00	0.041	106	70-130	0	20	
Beryllium, Dissolved	1.18	0.0040	mg/l	1.00	ND	118	70-130	0.844	20	
Cadmium, Dissolved	1.14	0.0050	mg/l	1.00	ND	114	70-130	0.873	20	
Calcium, Dissolved	135	2.0	mg/l	10.0	130	50.0	70-130	0.738	20	M-HA
Ch ium, Dissolved	1.04	0.010	mg/l	1.00	0.011	103	70-130	2.84	20	
o , Dissolved	1.18	0.020	mg/l	1.00	ND	117	70-130	2.58	20	
Lead, Dissolved	1.07	0.050	mg/l	1.00	ND	107	70-130	3.67	20	
Magnesium, Dissolved	66.9	0.50	mg/l	10.0	60	69.0	70-130	0.893	20	M
Nickel, Dissolved	1.17	0.050	mg/l	1.00	0.10	107	70-130	0.851	20	
Potassium, Dissolved	13.7	1.0	mg/l	10.0	ND	130	85-115	0	20	M
Selenium, Dissolved	1.22	0.050	mg/l	1.00	ND	122	70-130	3.23	20	
Silica, Dissolved	88.8	2.5	mg/l	21.4	66	107	70-130	1.01	20	
Silver, Dissolved	0.0586	0.0050	mg/l	0.0500	ND	117	70-130	0	20	
Sodium, Dissolved	2630	50	mg/l	50.0	2600	60.0	85-115	0	20	M
Thallium, Dissolved	1.05	0.050	mg/l	1.00	ND	105	70-130	1.92	20	
Zinc, Dissolved	1.18	0.050	mg/l	1.00	ND	118	70-130	0.851	20	
Batch: P0F2808 Extracted: 06/28/00										
Blank Analyzed: 06/28/00 (P0F2808-BLK1)										
Mercury, Dissolved	ND	0.00020	mg/l							
LCS Analyzed: 06/28/00 (P0F2808-BS1)										
Mercury, Dissolved	0.00549	0.00020	mg/l	0.00500		110	85-115			

Beth Price
Project Manager

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Hargis & Associates, Inc. - Tempe
1400 E. Southern Ave., Ste. 620
Tempe, AZ 85282
Attention: Michael Long

Client Project ID: GBPP 886
Report Number: PJF0386

Sampled: 06/21/00
Received: 06/21/00

METHOD BLANK/QC DATA

DISSOLVED METALS

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Data Qualifiers
Batch: P0F2808 Extracted: 06/28/00										
Matrix Spike Analyzed: 06/28/00 (P0F2808-MS1)					Source: PJF0194-01					
Mercury, Dissolved	0.00554	0.00020	mg/l	0.00500	ND	111	85-115			
Matrix Spike Dup Analyzed: 06/28/00 (P0F2808-MSD1)					Source: PJF0194-01					
Mercury, Dissolved	0.00547	0.00020	mg/l	0.00500	ND	109	85-115	1.27	20	

eth Price
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INORGANICS

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Data Qualifiers
Batch: P0F2128 Extracted: 06/21/00										
Duplicate Analyzed: 06/21/00 (P0F2128-DUP1)					**Source: PJF0383-01**					
pH	7.68	NA	pH Units		7.58			1.31	10	
Duplicate Analyzed: 06/21/00 (P0F2128-DUP2)					**Source: PJF0393-01**					
pH	7.67	NA	pH Units		7.66			0.130	10	
Duplicate Analyzed: 06/21/00 (P0F2128-DUP3)					**Source: PJF0402-01**					
pH	7.21	NA	pH Units		7.21			0	10	
Reference Analyzed: 06/21/00 (P0F2128-SRM1)										
pH	6.95	NA	pH Units	7.00		99.3	95-105			
Reference Analyzed: 06/21/00 (P0F2128-SRM2)										
pH	7.00	NA	pH Units	7.00		100	95-105			
Reference Analyzed: 06/21/00 (P0F2128-SRM3)										
pH	6.97	NA	pH Units	7.00		99.6	95-105			
Batch: P0F2307 Extracted: 06/23/00										
Duplicate Analyzed: 06/23/00 (P0F2307-DUP1)					**Source: PJF0386-01**					
Specific Conductance	2120	2.0	umhos/cm		2100			0.948	10	
Duplicate Analyzed: 06/23/00 (P0F2307-DUP2)					**Source: PJF0395-01**					
Specific Conductance	1030	2.0	umhos/cm		1000			2.96	10	
Reference Analyzed: 06/23/00 (P0F2307-SRM1)										
Specific Conductance	1430	2.0	umhos/cm	1410		101	90-110			

Beth Price
Project Manager

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INORGANICS

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Data Qualifiers
Batch: P0F2307 Extracted: 06/23/00										
Reference Analyzed: 06/23/00 (P0F2307-SRM2)										
Specific Conductance	1480	2.0	umhos/cm	1410		105	90-110			
Batch: P0F2314 Extracted: 06/22/00										
Blank Analyzed: 06/22/00 (P0F2314-BLK1)										
Chloride	ND	0.50	mg/l							
Fluoride	ND	0.10	mg/l							
Nitrate-N	ND	0.10	mg/l							
Nitrite-N	ND	0.10	mg/l							
Sulfate	ND	0.50	mg/l							
LCS Analyzed: 06/22/00 (P0F2314-BS1)										
Chloride	1.91	0.50	mg/l	2.00		95.5	90-110			
Fluoride	1.02	0.10	mg/l	1.00		102	90-110			
Nitrate-N	0.924	0.10	mg/l	0.903		102	90-110			
Nitrite-N	0.295	0.10	mg/l	0.304		97.0	90-110			
Sulfate	3.79	0.50	mg/l	4.00		94.7	90-110			
Matrix Spike Analyzed: 06/22/00 (P0F2314-MS1)					**Source: PJF0330-02**					
Chloride	1880	500	mg/l	2000	2300	-21.0	80-120			M-HA
Fluoride	974	100	mg/l	1000	ND	96.5	80-120			
Nitrate-N	911	100	mg/l	903	ND	89.9	80-120			
Nitrite-N	311	100	mg/l	304	ND	102	80-120			
Sulfate	3630	500	mg/l	4000	2100	38.3	80-120			M-HA
Matrix Spike Dup Analyzed: 06/22/00 (P0F2314-MSD1)					**Source: PJF0330-02**					
Chloride	1810	500	mg/l	2000	2300	-24.5	80-120	3.79	20	M-HA
Fluoride	962	100	mg/l	1000	ND	95.3	80-120	1.24	20	
Nitrate-N	885	100	mg/l	903	ND	87.0	80-120	2.90	20	
Nitrite-N	288	100	mg/l	304	ND	94.7	80-120	7.68	20	
Sulfate	3610	500	mg/l	4000	2100	37.8	80-120	0.552	20	M-HA

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INORGANICS

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Data Qualifiers
Batch: P0F2329 Extracted: 06/23/00										
Blank Analyzed: 06/23/00 (P0F2329-BLK1)										
Total Dissolved Solids	ND	20	mg/l							
LCS Analyzed: 06/23/00 (P0F2329-BS1)										
Total Dissolved Solids	402	20	mg/l	405		99.3	80-115			
Duplicate Analyzed: 06/23/00 (P0F2329-DUP1)					Source: PJF0418-01					
Total Dissolved Solids	1310	20	mg/l		1300			0.766	10	
Duplicate Analyzed: 06/23/00 (P0F2329-DUP2)					Source: PJF0389-01					
Total Dissolved Solids	1140	20	mg/l		1200			5.13	10	
Batch: P0F2727 Extracted: 06/27/00										
Duplicate Analyzed: 06/28/00 (P0F2727-DUP1)					Source: PJF0418-01					
Alkalinity as CaCO3	300	5.0	mg/l		300			0	20	
Duplicate Analyzed: 06/28/00 (P0F2727-DUP2)					Source: PJF0390-01					
Alkalinity as CaCO3	89.0	5.0	mg/l		90			1.12	20	
Duplicate Analyzed: 06/28/00 (P0F2727-DUP3)					Source: PJF0447-04					
Alkalinity as CaCO3	113	5.0	mg/l		110			2.69	20	
Reference Analyzed: 06/28/00 (P0F2727-SRM1)										
Alkalinity as CaCO3	204	5.0	mg/l	203		100	89.162-111			

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METHOD BLANK/QC DATA

DATA QUALIFIERS AND DEFINITIONS

HT-I The holding time for this test is immediate. The laboratory measurement, therefore, cannot be used for compliance.

M The MS and/or MSD were outside of the acceptance limits due to sample matrix interference. See LCS.

M-HA Due to high levels of analyte in the sample, the MS/MSD calculation does not provide useful spike recovery information See LCS.

ND Analyte NOT DETECTED at or above the reporting limit

NR Not reported.

RPD Relative Percent Difference

Beth Price
Project Manager

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HARGIS & ASSOCIATES, INC.

CHAIN-OF-CUSTODY RECORD AND ANALYSIS REQUEST FORM

DATE 06/20/00 PAGE 1 OF 1

PROJECT NAME: GBPP	PROJECT No./TASK No.: 886
PROJECT MANAGER	Phone No.: (480) 345-0888
QA MANAGER: M.R. Long	FAX No.: (480) 730-0508
SAMPLER (SIGNATURE)	SAMPLER (PRINTED): MICHAEL F. WIESE

LAB ID	SAMPLE ID	SAMPLE COLLECTION Date	SAMPLE COLLECTION Time	MATRIX: Soil	MATRIX: Ground-water	MATRIX: Surface water	PRESERVATION: HCl	PRESERVATION: HNO3	PRESERVATION: NaOH	PRESERVATION: H2SO4	PRESERVATION: Ice	SAMPLE CONTAINERS: 1 L Poly	SAMPLE CONTAINERS: 500 ml Poly	ANALYSES REQUESTED: Common Ions & Nitrate	ANALYSES REQUESTED: Dissolved Metals	ANALYSES REQUESTED: Total Metals	ESTIMATED CONCENTRATION RANGE (ppb) FOR VOA S	SPECIAL HANDLING: Field Filtered
NSF0386-01	C(5-5)20CBB	6/20/00	1339	X							X	1		X				
-02				X				X			X		1		X			X
-01				X				X			X		1			X		
-03	C(5-5)20CBB		1410	X							X	1		X				
-04				X				X			X		1		X			X
-03				X				X			X		1			X		
												2	4					

LABORATORY INFORMATION: DataMAR PHX

Normal TAT

REMARKS: W77-11 → W70-9

See Attached Analyte List

Total number of Containers per analysis: 6

Total No. of Containers: 6

Relinquished by	Date	Received by	Date
Company: H+A	6/20/00	Company: 6-21-0	
	Time: 1616		Time
Relinquished by: 6-21-0	Date	Received by: Jaime Wood, DMAP	Date: 6/21/00
Company: 6-21-0	Time	Laboratory	Time: 1616

INSTRUCTIONS

1. Fill out form completely except for shaded areas (lab use only); sign only after verified for completeness.
2. Complete in ballpoint pen. Draw one line through errors, initial and date correction.
3. Indicate number of sample containers in analysis request space; indicate choice with ✓ or x.
4. Note applicable preservatives, special instructions, and deviations from typical environmental samples.
5. Consult project QA documents for specific instructions.

Sample Receipt:

- ☒ No. of containers correct
- ☒ received good condition/cold
- ☐ custody seals secure
- ☒ conforms to COC document

Shipment Method: H+NP Delivered

Send Results to: M.R. Long

- ☐ 2223 AVENIDA DE LA PLAYA, SUITE 300, LA JOLLA, CA 92037 (858) 454-0165
- ☒ 1400 EAST SOUTHERN AVENUE, SUITE 620, TEMPE, AZ 85282 (480) 345-0888
- ☐ 1820 EAST RIVER ROAD, SUITE 100, TUCSON, AZ 85718 (520) 881-7300

Send invoice to La Jolla, CA
Attn: Accounts Payable

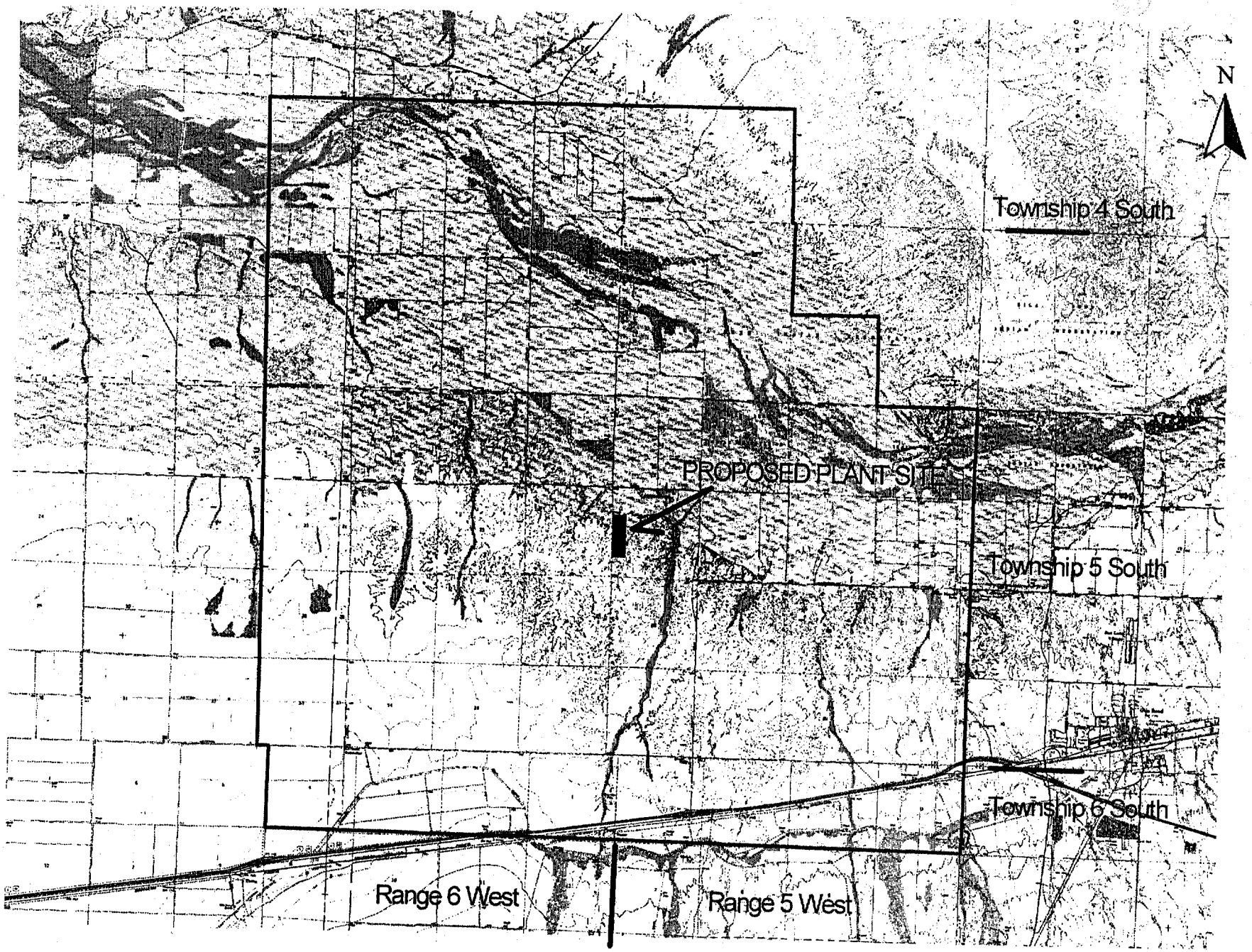


Figure 1. Study Area

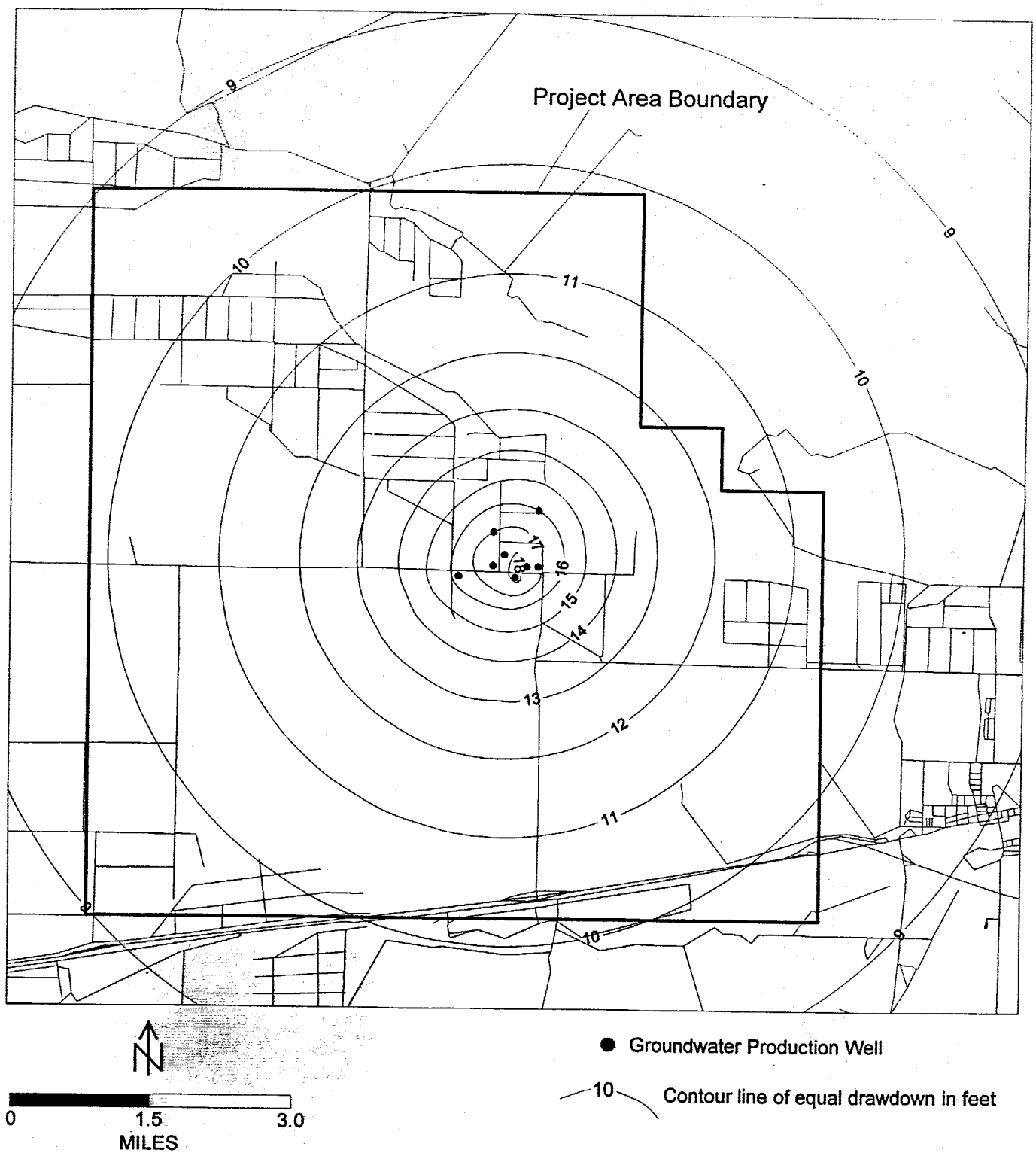


FIGURE 2. PROJECTED DRAWDOWN FOR SCENARIO 1

HARGIS + ASSOCIATES, INC.
Hydrogeology/Engineering

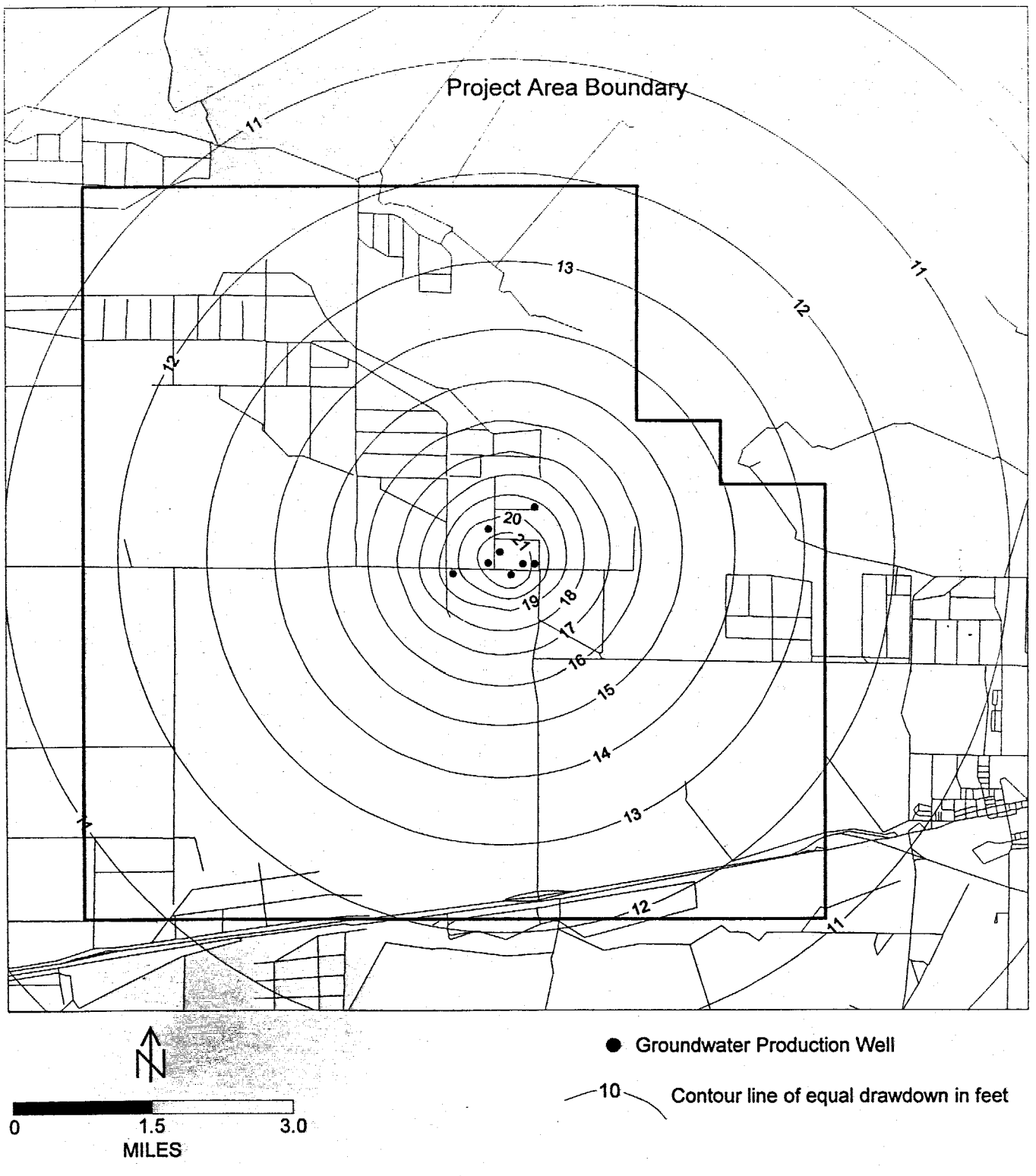


FIGURE 3. PROJECTED DRAWDOWN FOR SCENARIO 2

HARGIS + ASSOCIATES, INC.
Hydrogeology/Engineering

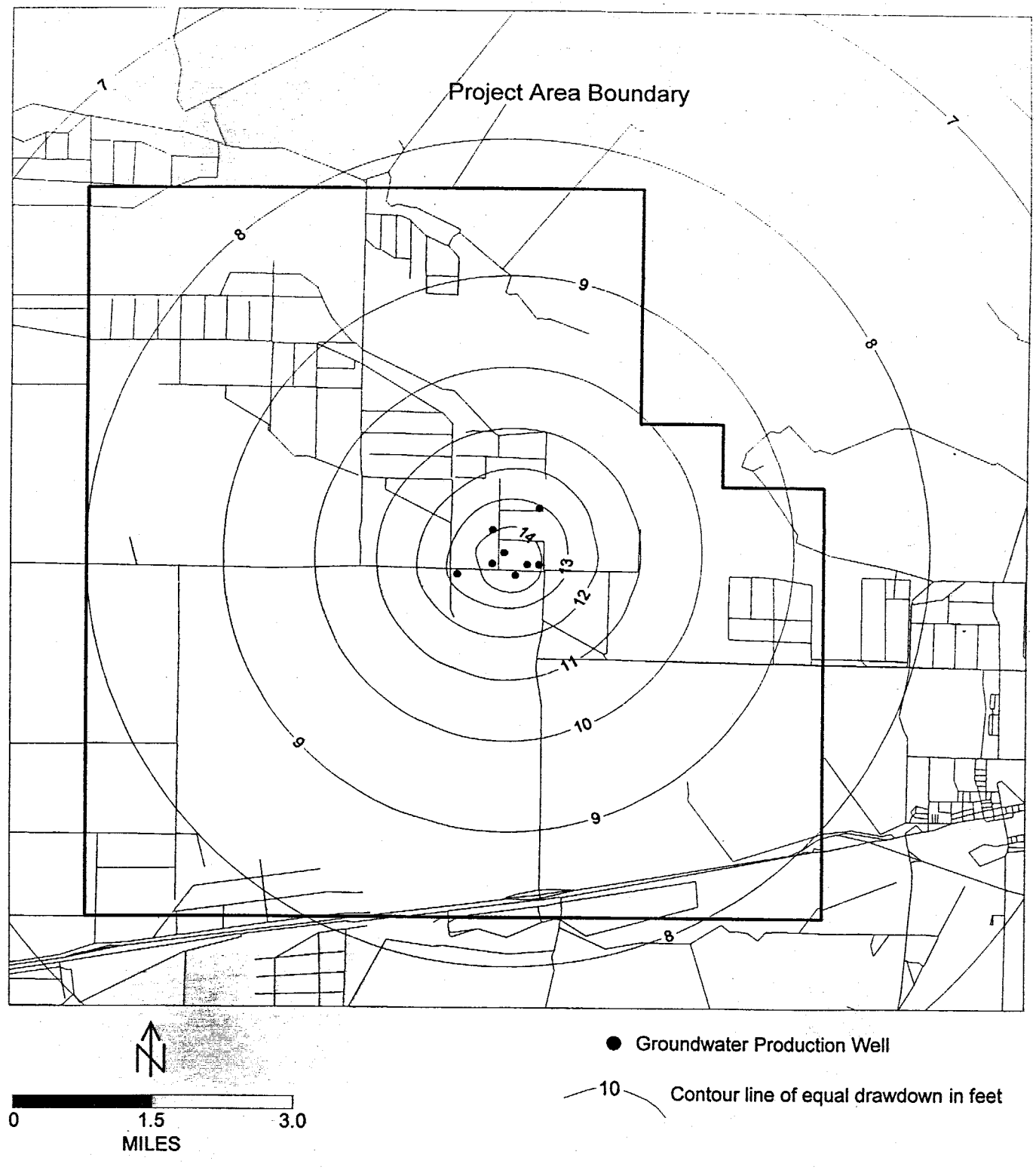


FIGURE 4. PROJECTED DRAWDOWN FOR SCENARIO 3

HARGIS + ASSOCIATES, INC.
Hydrogeology/Engineering

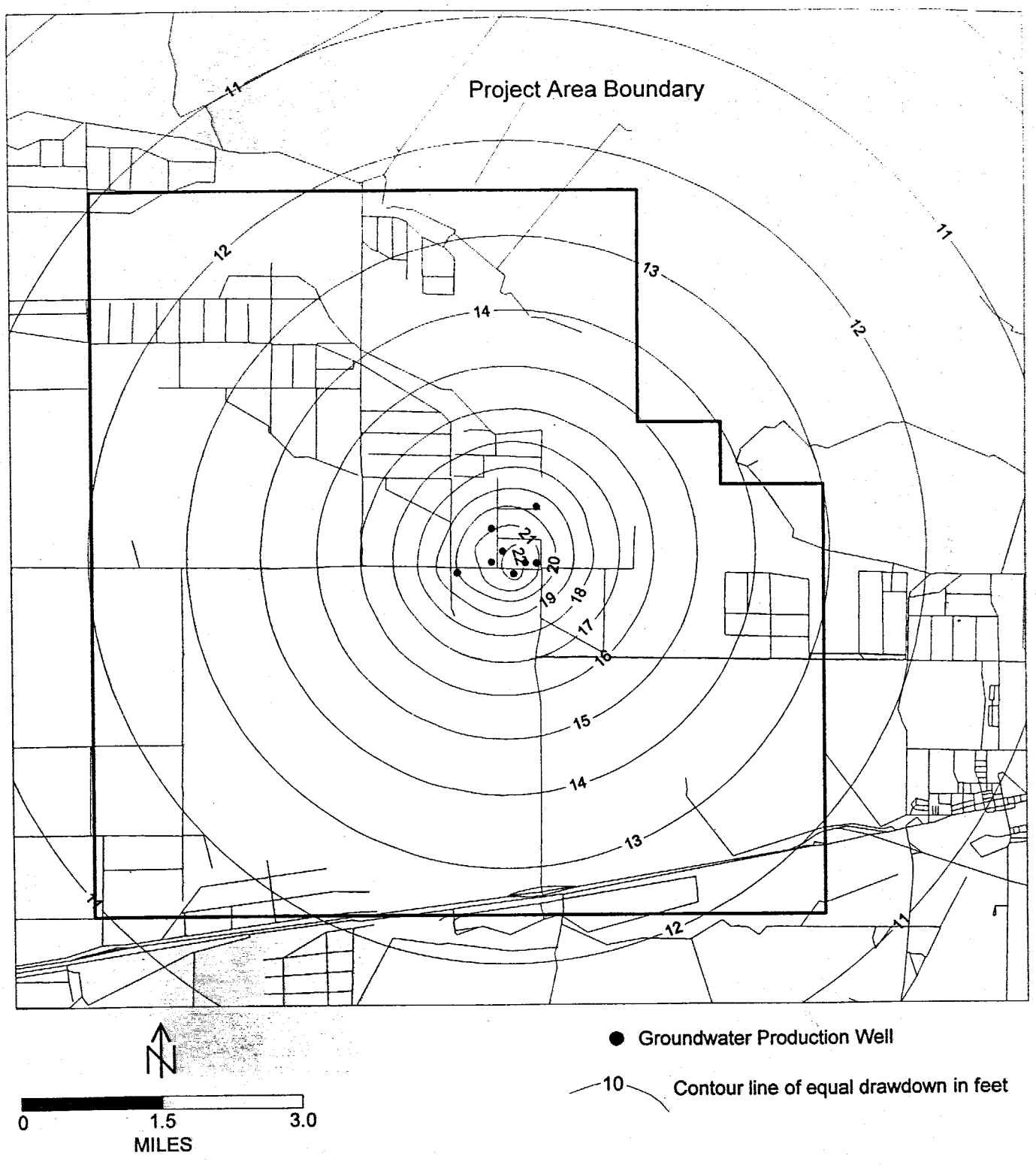


FIGURE 5. PROJECTED DRAWDOWN FOR SCENARIO 4

HARGIS + ASSOCIATES, INC
Hydrogeology/Engineering

EXHIBIT B-3

WETLANDS AND WATERS ASSESSMENT

WETLANDS AND WATERS ASSESSMENT FOR THE PROPOSED GILA BEND POWER GENERATION STATION MARICOPA COUNTY, ARIZONA

I. INTRODUCTION

On March 7-8, and May 23, 2000, a professional wetlands scientist (R. Thomas Sankey of Malcolm Pirnie) completed a wetlands and waters assessment for the proposed Gila Bend Power Generation Station facility to be located on a 160-acre parcel situated northwest of Gila Bend, Maricopa County, Arizona (Section 19, T5S, R5W, Gila and Salt River Meridian, Maricopa County, State of Arizona). The purpose of the assessment was to evaluate the extent and approximate boundaries of wetlands and waters, if any, on the site. In addition, this study provides sufficient information to allow the planning of the facility and to avoid and minimize impacts to wetlands and waters, if they are present on the site.

This report contains a site description, a narrative describing the extent and nature of wetlands and/or waters on the site, and a map depicting the approximate location of waters on the site. The report describes the wetland and water assessment methodology; describes the soils, hydrology, and vegetation found on the site; and presents the results of the wetlands assessment.

Site Description

The 160-acre site is located approximately 2 miles south of the Gila River and 4 miles northwest of Gila Bend, Arizona (see Figure 1 and Photos 1-3). The square-shaped parcels are located about 2400 feet south of Sisson Road and approximately 4000 feet west of Citrus Valley Road (T5S, R6W, Sec. 19). Site access is gained from Citrus Valley Road via an east-west oriented gravel road located at the extreme southern edge of Section 19.

The site is dominated by rolling topography. Elevations range from 687 feet above mean sea level (msl) in the southeastern portion adjacent to Citrus Valley Road to approximately 650 feet msl at the northern site perimeter.

The surficial geology of the site consists of deposits of the Upper Basin Fill. These deposits generally consist of sands with varying amounts of silts; surficial sands are generally siltier than sands at depth. In some areas a thin layer of silt or clay overlies the sands. Much of the area is covered with typical "desert pavement," a surface veneer of pebbles and cobbles spread over the low hills on the site. Several ephemeral washes cut through this desert pavement and drain the site.

Much of the site has been disturbed by past land use. For example, based on an examination of historic aerial photography, it appears that a large part of the site has been graded. The parking area located on top of the highest knoll in lot 3 has been worked and leveled to enable the parking of vehicles. In addition, the north-central portion of the site has been graded.

The entire site is drained by several small, ephemeral washes that eventually drain to a large south-to-north trending wash. This watercourse conveys water to the north then northeast, eventually crossing Citrus Farm Road and entering the Gila River. The site contains a mixture of desert scrub and riparian communities. Upland hillsides are dominated by typical desert scrub vegetation. The ephemeral washes are dominated by riparian scrub-shrub.

II. WETLAND ASSESSMENT METHODOLOGY

The following section describes the methodology used to conduct the wetland assessment completed on the site. Wetlands and waters were identified using the methods described in the 1987 ***Corps of Engineers Wetlands Delineation Manual.*** These methods require the presence of three criteria to define an area as a wetland: hydric soils, wetland hydrology, and hydrophytic vegetation.

Hydric soils are defined as soils that are saturated, flooded, or ponded long enough during the growing season to develop anaerobic conditions that favor the growth and regeneration of hydrophytic vegetation. Wetland hydrology is the sum total of wetness characteristics in areas that are inundated or have saturated soils for a sufficient duration to support hydrophytic vegetation. Hydrophytic vegetation is defined as the sum total of rooted vascular plants and mosses growing in water or on a substrate that is at least periodically deficient of oxygen as a result of excessive water content.

The first step in performing the wetland assessment was to complete a site walkover to identify plant communities. Particular attention was paid to topographic changes and shifts in vegetative cover types. During the initial site walkover, it was determined that "natural" environmental conditions exist at the site. There was no detectable evidence of vegetative stress due to fluctuations in precipitation, surface water, or ground water levels, other than the site being dominated by xeric, desert vegetation, indicative of persistent extremely dry conditions.

During the site inspection, Malcolm Pirnie scientists noticed that the site could be divided into two vegetative communities: 1) the slopes and relatively flat terraces were dominated by upland desert scrub species; and, 2) the washes (arroyos) and flat northern portion of the site were dominated by typical riparian species. At various washes around the site, soil coloration and conditions were examined to a depth of 12 inches below the ground surface and compared with Munsell Soil Color Charts following accepted U.S. Army Corps of Engineers (USCOE) procedures. Soils with a matrix chroma (color brightness) of two or less with mottling, or soils with a matrix chroma of one or less, if present, would be considered hydric.

Dominant vegetation at each sampling location was identified and keyed using accepted plant identification manuals. Dominant species were defined as those species in each stratum that, when ranked in decreasing order of abundance and cumulatively totaled, exceeded 50 percent total areal coverage for that stratum, plus any additional species

comprising 20 percent or more of the areal coverage for that stratum. The indicator status for each dominant species was then obtained from the U.S. Fish and Wildlife Service (USFWS) ***National List of Plant Species That Occur in Wetlands: 1996 Southwestern U.S.*** (USFWS, 1996). Areas where more than 50 percent of the dominants had an indicator status of obligate, facultative wet and/or facultative, if present, were considered to have wetland vegetation.

Indicators of wetland hydrology, if present, were identified within a major portion of the root zone of vegetation (usually within 12 inches of the ground surface). Data were recorded on standard data sheets to provide representative characteristics of the vegetative communities present. Data forms are included in Appendix A. Site photographs are included in Appendix B.

III. SOILS, HYDROLOGY, AND VEGETATION

Based on the field inspection performed on March 7-8, and May 23, 2000, no wetlands were found on the site. A total of 5.20 acres of waters of the U.S. were located in the areas associated with the numerous ephemeral arroyos on the site. Characteristics of the site soils, hydrology, and vegetation are presented in the following sections.

Soils

USDA Soil Conservation Service (SCS) or Natural Resources Conservation Service (NRCS) Soil Survey mapping has not been completed for this portion of Maricopa County, Arizona. Based on visual observations, the site is dominated by two soil types: 1) "desert pavement" dominated by varnished alluvial pebbles and cobbles on the hillsides and slopes; and, 2) sandy loams and pebbles found in the bottoms of the ephemeral washes.

In the ephemeral washes on the site, samples taken from several locations consisted of well-drained sandy loam. Soil samples taken from the washes were typically a strong brown (Munsell Color of 7.5 YR 4/6) sandy loam with no mottling.

Hydrology

The hydrology of the site has been altered by past land use. The extreme northeastern portion of the proposed facility site is adjacent to, but not located in, the 100-year floodplain of the Gila River. In addition, these areas are located within the Painted Rock Reservoir Dam inundation area that corresponds to the spillway elevation of the dam, approximately 661 feet msl. Based upon an examination of USGS topographic mapping and based upon a review of earlier documentation regarding the project area, it appears that the USCOE has a floodway easement that allows it to back up water at the Painted Rock Reservoir Dam to elevation 661 msl. According to Mr. Connie Covey, a permanent resident on the site, the area was last flooded in 1993. Evidence of this flood was seen throughout the site at an elevation of about 661 feet msl (Photo 4).

The entire site is drained by the major south-to-north trending ephemeral wash that eventually empties into the Gila River, approximately 2 miles to the northeast of the site. The ephemeral washes on the site did not contain water at the time of the site inspection. However, based on the sediment drift lines and high water marks found in the watercourses, it is evident that they do contain flowing water during periods of heavy precipitation (photos 5, 9, and 10).

Vegetation

In the undisturbed portions of the site, the natural vegetation is characterized as Sonoran Desert Scrub of the Lower Colorado River Valley Subdivision (Brown, 1982). The Creosotebush-White Bursage Community was the dominant cover type found on the site (Photo 6). Dominant vegetative species found in this cover type were Creosotebush (*Larria divaricata*), White Bursage (*Ambrosia dumosa*), Brittle Bush (*Encelia farinosa*), and Triangle-leaf Bursage (*Ambrosia deltoidea*). Common grasses found on the site include Big Galleta (*Hilaria rigida*) and three-awn (*Aristida* spp.). Cacti of the site include Diamond Cholla (*Opuntia ramosissima*), Pencil Cholla (*Opuntia arbuscula*) and widely scattered Giant Saguaro (*Carnegiea gigantea*) (Photos 7 and 8).

In the washes, desert riparian scrub is found (Photos 9 and 10). Common riparian species dominating the washes include Blue Paloverde (*Cercidium floridum*), Tamarisk (*Tamarix chinensis*), Catclaw (*Acacia greggii*) and Desert Ironwood (*Olneya tesota*).

IV. RESULTS

The vegetation of the site has been affected by past land use and is controlled by topography, soils, and hydrology. The Painted Rock Reservoir inundation area has affected drainage patterns over the site, resulting in changes in the vegetative composition of the area. For example, young Tamarisk shrubs have colonized the site below the elevation of 661 msl. According to Mr. Covey, the amount of Tamarisk in the low-lying areas on the site has dramatically increased since the 1993 flood. This is supported by the fact that most of the Tamarisk on the site is estimated to be less than 10 years of age.

No wetlands were identified on the site based on the 1987 USCOE methodology. As stated previously, there are approximately 5.20 acres of jurisdictional ephemeral washes located on the entire site. These south-to-north trending watercourses are identified on Figure 2.

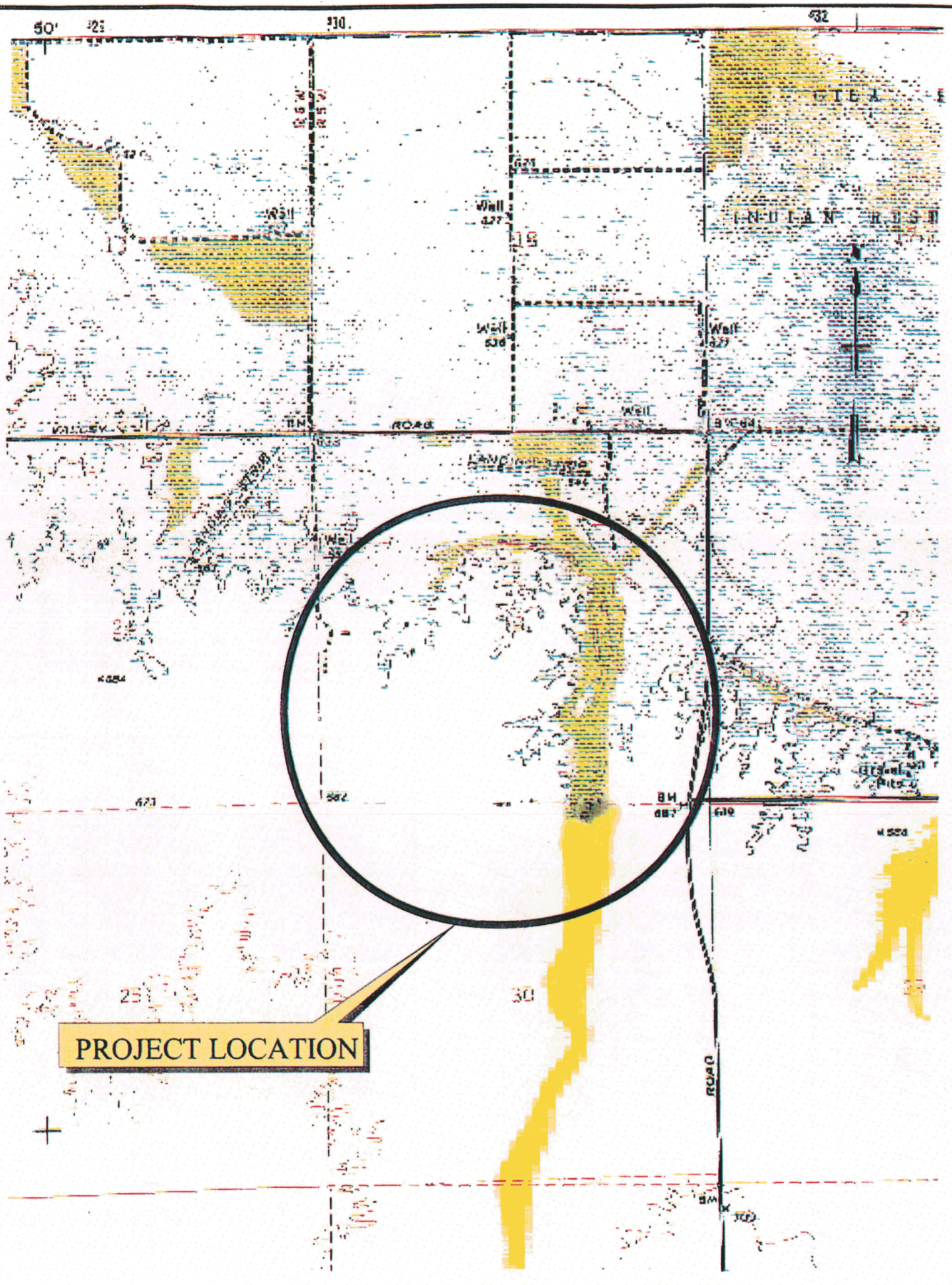
The arroyos on site are supported by precipitation. Since it was not possible to trace the actual alignment of the large southwest-to-northeast trending arroyo channels over their entire length on the site, and there was evidence that the watercourses intermittently overflow, the investigators determined that a large part of this area is jurisdictional. During the site inspection, there was evidence of recent flows extending outside the channel. The smaller washes on site occupy only the narrow channels and were mapped as linear streams.

Based upon the facility layout, it is expected that a Section 404 permit (dredge and fill) will need to be obtained from the USCOE prior to beginning construction activities in the

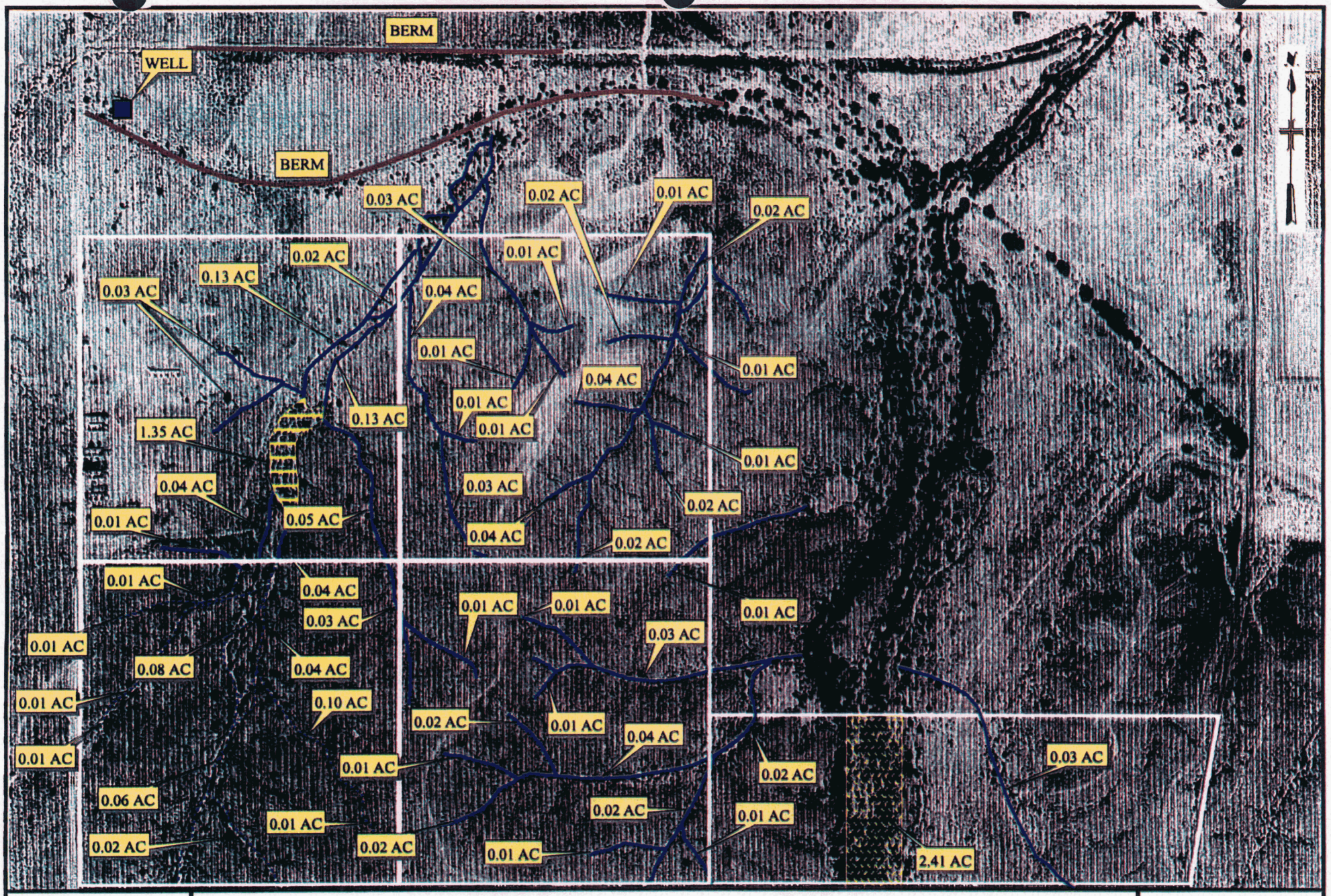
arroyos on the site. Additionally, a 401 certification will need to be obtained from the Arizona Department of Environmental Quality (ADEQ) in support of the diversion of the identified ephemeral washes and the dredge / fill activities necessary to construct the facility.

As of May 23, 2000, the discharge of dredged or fill material into intermittent watercourses such as those found on the proposed power plant site was covered under the USCOE's Nationwide Permit (NWP) Program. For example, the placement of fill in intermittent streams and wetlands for the construction of road crossings was generally covered by NWP 14. The placement of fill in "isolated and above-headwater wetlands and waters" was covered by NWP 26. However, with the recent revocation of the NWPs, these and other activities will be covered by a new regulatory program to be finalized by June 6, 2000. Under the new regulatory program no issues are anticipated that will impede successful permitting of this project.

This report presents the opinion of Malcolm Pirnie wetland scientists regarding the presence or absence of regulated waters and wetlands, and their boundaries, found on the subject site. Final determination of regulatory jurisdiction and verification of report findings is under the authority of the USCOE. These findings are not official until written concurrence has been received from the USCOE.



MALCOLM PIRNIE	Wetlands and Waters Assessment Report Gila Bend Power Generation Station **SITE LOCATION MAP**	Figure 1 June 2000



MALCOLM PIRNIE

Wetlands and Waters Assessment Report
Gila Bend Power Generation Station
WATERS OF THE U.S.

Figure 2

June 2000

APPENDIX A

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: GILA BEND POWER GEN. STATION Applicant/Owner: PDEI Investigator/s: R.T. SANKEY		Date: 3/7/00 County: MARICOPA State: AZ.
Do Normal Circumstances exist on the site? YES Is the site significantly disturbed (Atypical Situation)? NO Is the area a potential Problem Area? If yes, explain:	☒ Yes ☐ No ☐ Yes ☒ No ☐ Yes ☒ No	Community ID: RIPARIAN ~~Transect ID: -~~ SCRUB Plot ID: MAIN ARROYO

Vegetation

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. BLUE PALOVERDE *Cercidium floridum*	SHRUB	UPL	9.		
2. TAMARISK *Tamarix chinensis*	SHRUB	FACW	10.		
3. DESERT IRONWOOD *Olneya tesota*	TREE	UPL	11.		
4. CREOSOTEBUSH *Larria divaricata*	SHRUB	UPL	12.		
5. SAGE *Ambrosia sp.*	SHRUB	UPL	13.		
6.			14.		
7.			15.		
8.			16.		

Percentage of species that are OBL, FACW or FAC (excluding FAC-): 20 % FAC-Neut. %

Remarks: < 50% FAC OR WETTER. HYDROPHYTIC VEGETATION CRITERION IS NOT MET.

Hydrology

Recorded Data (Describe in Remarks) ☐ Stream, Lake, or Tide Gauge ☐ Aerial Photographs ☐ Other ☒ No Recorded Data Available	Wetland Hydrology Indicators: Primary Indicators: ☐ Inundated ☐ Saturated in Upper 12" ☒ Water Marks ☒ Drift Lines ☐ Sediment Deposits ☐ Drainage Patterns in Wetlands
Field Observations: ☐ Depth of Surface Water: <24 inches ☐ Depth to Free Water in Pit: inches ☐ Depth to Saturated Soil: inches	Secondary Indicators (2 or more required) ☐ Oxidized Root Channels in Upper 12" ☐ Water Stained Leaves ☐ Local Soil Survey Data ☐ FAC Neutral Test ☐ Other (Explain in Remarks)

Remarks: NO SURFACE WATER PRESENT. EVIDENCE OF RECENT FLOWS, HOWEVER WATER IS ABSENT THE MAJORITY OF GROWING SEASON

Plot ID: MAIN ARROYO

Soils

Soil Unit Name (Series and Phase): UNKNOWN - SANDY LOAM TEXTURE	Drainage Class:
Taxonomy (Subgroup):	Field observations Confirm Mapped Type? ☐ Yes ☐ No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle abundance/contrast	Texture, Concretions, Structure, Etc.
0-12		7.5YR 4/6			

Hydric Soil Indicators:

- ☐ Histosol
- ☐ Histic Epipedon
- ☐ Sulfidic Odor
- ☐ Aquic Moisture Regime
- ☐ Reducing Conditions
- ☐ Gleyed or Low-Chroma Colors
- ☐ Concretions
- ☐ High Organic Content in Surface Layer in Sandy soils
- ☐ Organic Streaking in Sandy Soils
- ☐ Listed on Local Hydric Soils List
- ☐ Listed on National Hydric Soils List
- ☐ Other (Explain in Remarks)

Remarks: NO MOTTLING OR OTHER EVIDENCE OF REDUCED CONDITIONS.

Wetland Determination

			Is This Sample Point Within a Wetland?
Hydrophytic Vegetation Present?	☐ Yes	☒ No	☐ Yes ☒ No
Wetland Hydrology Present? Hydric Soils Present?	☐ Yes	☒ No	
	☐ Yes	☒ No	

Remarks: ☐ All three wetland criteria have been meet.
☒ One or more of the wetland criteria have not been met.

AREA IS WATERS OF U.S., NOT WETLAND.

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: GILA BEND POWER GEN. STATION Applicant/Owner: PDEI Investigator/s: R.T. SANKEY		Date: 3/7/00 County: MARICOPA State: AZ
Do Normal Circumstances exist on the site? Is the site significantly disturbed (Atypical Situation)? Is the area a potential Problem Area? If yes, explain:	☒ Yes ☐ No ☐ Yes ☒ No ☐ Yes ☒ No	Community ID: RIPARIAN SCRUB ~~Transect ID:~~ Plot ID: SMALL ARROYO

Vegetation

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. BLUE PALOVERDE Cercidium floridum	SHRUB	UPL	9.		
2. TAMARISK Tamarix chinensis	SHRUB	FACW	10.		
3. CREOSOTE BUSH Larria divaricata	SHRUB	UPL	11.		
4.			12.		
5.			13.		
6.			14.		
7.			15.		
8.			16.		

Percentage of species that are OBL, FACW or FAC (excluding FAC-): 33% FAC-Neut. %

Remarks: <50% FAC OR WETTER. HYDROPHYTIC VEGETATION CRITERION IS NOT MET.

Hydrology

Recorded Data (Describe in Remarks) ☐ Stream, Lake, or Tide Gauge ☐ Aerial Photographs ☐ Other ☒ No Recorded Data Available	Wetland Hydrology Indicators: Primary Indicators: ☐ Inundated ☐ Saturated in Upper 12" ☒ Water Marks ☒ Drift Lines ☐ Sediment Deposits ☐ Drainage Patterns in Wetlands
Field Observations: ☐ Depth of Surface Water: <24 inches ☐ Depth to Free Water in Pit: inches ☐ Depth to Saturated Soil: inches	Secondary Indicators (2 or more required) ☐ Oxidized Root Channels in Upper 12" ☐ Water Stained Leaves ☐ Local Soil Survey Data ☐ FAC Neutral Test ☐ Other (Explain in Remarks)

Remarks: NO SURFACE WATER PRESENT. EVIDENCE OF RECENT FLOWS, HOWEVER WATER IS ABSENT THE MAJORITY OF GROWING SEASON.

Plot ID:

Soils

Soil Unit Name (Series and Phase): UNKNOWN - SANDY LOAM TEXTURE	Drainage Class:
Taxonomy (Subgroup):	Field observations Confirm Mapped Type? ☐ Yes ☐ No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle abundance/contrast	Texture, Concretions, Structure, Etc.
0-12		7.5YR 4/6			

Hydric Soil Indicators:

- ☐ Histosol
- ☐ Histic Epipedon
- ☐ Sulfidic Odor
- ☐ Aquic Moisture Regime
- ☐ Reducing Conditions
- ☐ Gleyed or Low-Chroma Colors
- ☐ Concretions
- ☐ High Organic Content in Surface Layer in Sandy soils
- ☐ Organic Streaking in Sandy Soils
- ☐ Listed on Local Hydric Soils List
- ☐ Listed on National Hydric Soils List
- ☐ Other (Explain in Remarks)

Remarks: NO MOTTLING OR OTHER EVIDENCE OF REDUCED CONDITIONS

Wetland Determination

			Is This Sample Point Within a Wetland?
Hydrophytic Vegetation Present?	☐ Yes	☒ No	☐ Yes ☒ No
Wetland Hydrology Present? Hydric Soils Present?	☐ Yes	☒ No	
	☐ Yes	☒ No	

Remarks: ☐ All three wetland criteria have been meet.
☒ One or more of the wetland criteria have not been met.

AREA IS WATERS OF U.S., NOT WETLAND.

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: GILA BEND POWER GEN. STATION Applicant/Owner: PDEI Investigator/s: R.T. SANKEY		Date: 3/7/00 County: MARICOPA State: AZ
Do Normal Circumstances exist on the site? Is the site significantly disturbed (Atypical Situation)? Is the area a potential Problem Area? If yes, explain:	☒ Yes ☐ No ☐ Yes ☒ No ☐ Yes ☒ No	Community ID: DESERT SCRUB<br~~Transect ID:~~ Plot ID: UPLAND SLOPES

Vegetation

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. CREOSOTE BUSH *Larrea divaricata*	SHRUB	UPL	9.		
2. CHOLLA CACTUS *Opuntia sp.*	HERB	UPL	10.		
3.			11.		
4.			12.		
5.			13.		
6.			14.		
7.			15.		
8.			16.		

Percentage of species that are OBL, FACW or FAC (excluding FAC-): 0 % FAC-Neut. %

Remarks: HYDROPHYTIC VEGETATION CRITERION IS NOT MET.

Hydrology

Recorded Data (Describe in Remarks) ☐ Stream, Lake, or Tide Gauge ☐ Aerial Photographs ☐ Other ☒ No Recorded Data Available	Wetland Hydrology Indicators: Primary Indicators: ☐ Inundated ☐ Saturated in Upper 12" ☐ Water Marks ☐ Drift Lines ☐ Sediment Deposits ☐ Drainage Patterns in Wetlands
Field Observations: ☐ Depth of Surface Water: <24 inches ☐ Depth to Free Water in Pit: inches ☐ Depth to Saturated Soil: inches	Secondary Indicators (2 or more required) ☐ Oxidized Root Channels in Upper 12" ☐ Water Stained Leaves ☐ Local Soil Survey Data ☐ FAC Neutral Test ☐ Other (Explain in Remarks)

Remarks: NO EVIDENCE OF WETLAND HYDROLOGY

Plot ID:

Soils

Soil Unit Name (Series and Phase): UNKNOWN - "DESERT PAVEMENT"	Drainage Class:
Taxonomy (Subgroup):	Field observations Confirm Mapped Type? ☐ Yes ☐ No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle abundance/contrast	Texture, Concretions, Structure, Etc.
SOILS NOT EVALUATED - PEBBLES AND COBBLES PRESENT					

Hydric Soil Indicators:

- ☐ Histosol
- ☐ Histic Epipedon
- ☐ Sulfidic Odor
- ☐ Aquic Moisture Regime
- ☐ Reducing Conditions
- ☐ Gleyed or Low-Chroma Colors
- ☐ Concretions
- ☐ High Organic Content in Surface Layer in Sandy soils
- ☐ Organic Streaking in Sandy Soils
- ☐ Listed on Local Hydric Soils List
- ☐ Listed on National Hydric Soils List
- ☐ Other (Explain in Remarks)

Remarks: NON-HYDRIC SOILS PRESENT

Wetland Determination

			Is This Sample Point Within a Wetland?
Hydrophytic Vegetation Present?	☐ Yes	☒ No	☐ Yes ☒ No
Wetland Hydrology Present? Hydric Soils Present?	☐ Yes	☒ No	
	☐ Yes	☒ No	

Remarks:
- ☐ All three wetland criteria have been meet.
- ☒ One or more of the wetland criteria have not been met.

APPENDIX B

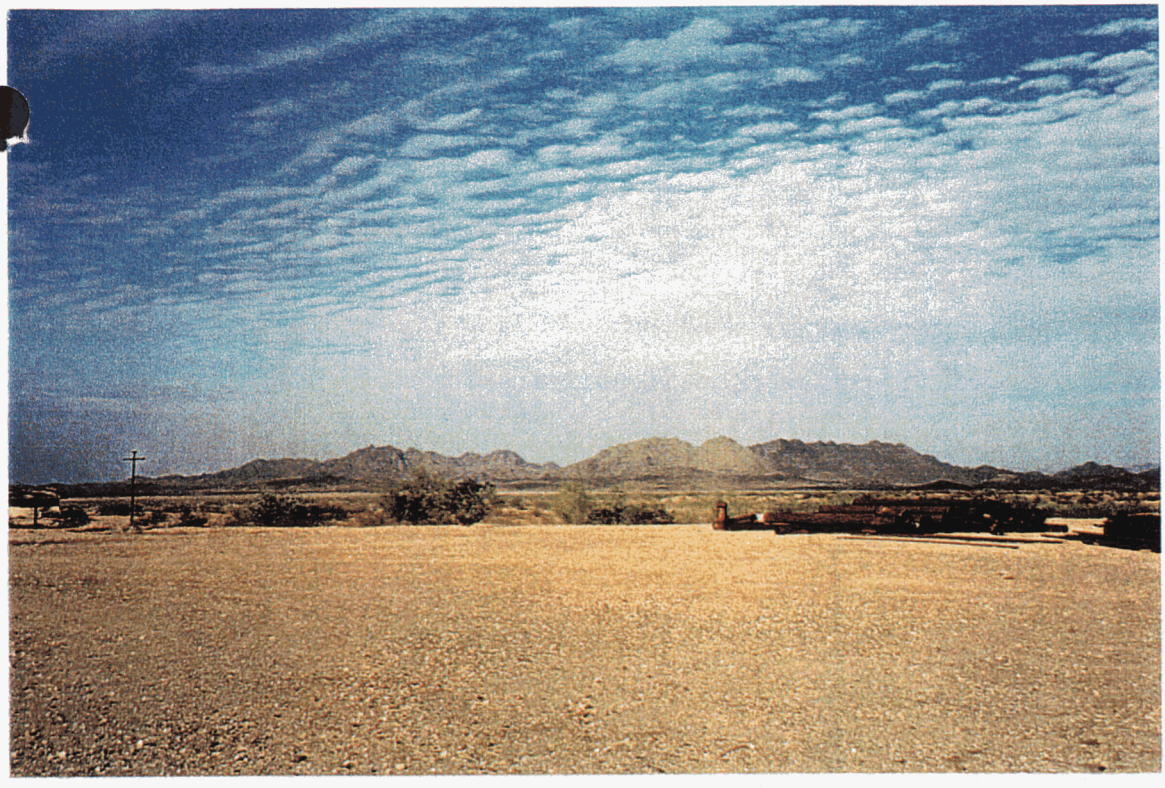


PHOTO #1

PROJECT Gila Bend Power Generation Station, Maricopa County, AZ

DATE March 8, 2000

DESCRIPTION Central portion of the site, facing north.

COMMENTS Note the graded parking area in the foreground.

PHOTO BY RTS

PHOTO #2

PROJECT Gila Bend Power Generation Station, Maricopa County, AZ

DATE March 8, 2000

DESCRIPTION South end of site facing south. Large Desert Ironwood (*Olneya tesota*) is seen in the center of the photo.

COMMENTS

PHOTO BY RTS

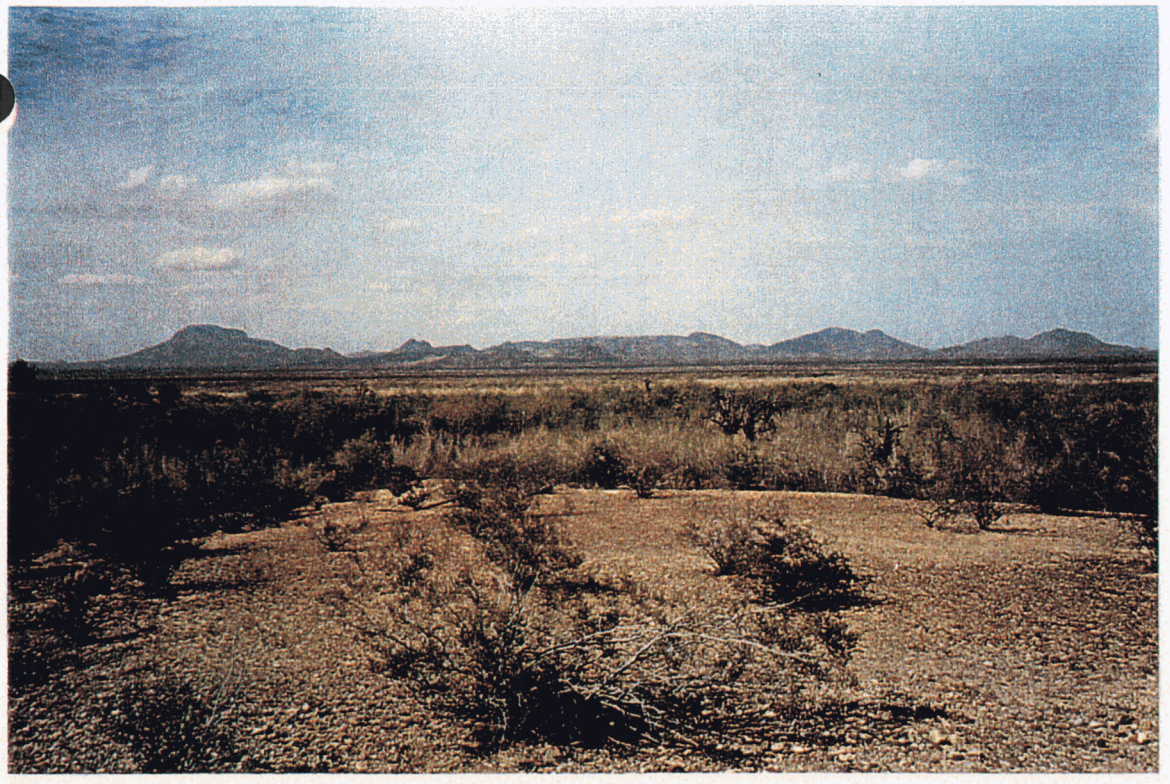


PHOTO #3

PROJECT Gila Bend Power Generation Station, Maricopa County, AZ

DATE March 8, 2000

DESCRIPTION View of north end of site facing north. Creosotebush (*Larria divaricata*) is seen on the slopes in the foreground Tamarisk (*Tamarix chinensis*) dominates the flat area beyond.

COMMENTS

PHOTO BY RTS

PHOTO #4

PROJECT Gila Bend Power Generation Station, Maricopa County, AZ

DATE March 8, 2000

DESCRIPTION View of slopes near eastern boundary of the site. Creosotebush dominates the hillside.

COMMENTS Note the debris in the upper end of the small wash, corresponding to elevation 661 msl

PHOTO BY RTS

PHOTO #5

PROJECT Gila Bend Power Generation Station, Maricopa County, AZ

DATE March 8, 2000

DESCRIPTION Southwest-to-northeast trending ephemeral wash (arroyo), facing north (downstream)

COMMENTS

PHOTO BY RTS

PHOTO #6

PROJECT Gila Bend Power Generation Station, Maricopa County, AZ

DATE March 8, 2000

DESCRIPTION View of large southwest-to-northeast trending arroyo, facing northwest. Photo shows Creosotebush in the foreground with Tamarisk dominating the wash in the background.

COMMENTS

PHOTO BY RTS

PHOTO #7

PROJECT Gila Bend Power Generation Station, Maricopa County, AZ

DATE March 8, 2000

DESCRIPTION Photograph of various Cholla (*Opuntia spp*) and typical "desert pavement" found or upland slopes of the site..

COMMENTS

PHOTO BY RTS

PHOTO #8

PROJECT Gila Bend Power Generation Station, Maricopa County, AZ

DATE March 8, 2000

DESCRIPTION View of Giant Saguaro (*Carnegiea gigantea*) found south of the site near the southern site perimeter.

COMMENTS Note that the Saguaro is being overgrown by woody vegetation.

PHOTO BY RTS

PHOTO #9

PROJECT Gila Bend Power Generation Station, Maricopa County, AZ

DATE March 8, 2000

DESCRIPTION Photograph of typical ephemeral wash. Riparian scrub community dominated by Creosotebush, Sage (*Ambrosia sp.*) and Blue Paloverde (*Cercidium floridum*).

COMMENTS

PHOTO BY RTS

PHOTO #10

PROJECT Gila Bend Power Generation Station, Maricopa County, AZ

DATE March 8, 2000

DESCRIPTION Photograph of typical ephemeral wash. Riparian scrub community dominated by Creosotebush, Sage and Blue Paloverde.

COMMENTS

PHOTO BY RTS

R. Thomas Sankey, CSE, PWS, Associate - Malcolm Pirnie, Inc. (*BS, University of South Carolina, 1981. MA, University of Kansas, 1985*). Mr. Sankey leads Malcolm Pirnie's environmental sciences and planning practice and has 15 years of experience in wetland management and permitting, ecological risk assessment, wildlife, vegetation and land use analysis, and environmental impact assessment. He has worked on all aspects of ecological risk assessment including fish, wildlife and vegetation inventories, ecological modeling, and risk quantification. His wetlands management experience includes wetland delineation and cover type mapping, impact assessment, functional evaluation, mitigation design, mitigation project construction and monitoring, wetland treatment design and construction, endangered species surveys, and state and federal permitting. His experience includes investigations under various programs including Sections 404 and 401 of the Clean Water Act, the Comprehensive Environmental Response Compensation and Liability Act / Superfund Amendment and Reauthorization Act (CERCLA/SARA), the National Environmental Policy Act (NEPA), Section 7 of the Endangered Species Act, Section 106 of the National Historic Preservation Act, and various state and federal regulatory programs. Mr. Sankey is recognized by the Ecological Society of America as a Certified Senior Ecologist and by the Society of Wetland Scientists as a Professional Wetland Scientist.

Detailed Experience:

Wetlands Management

Project Technical Leader for the completion of a wetland delineation and Section 404 Permit Application for the proposed Metro Light Rail System, Houston, Texas.

Project Leader for the Woodside High School Project, Newport News, Virginia. Completed a wetland delineation, evaluation, Individual permit application, endangered species surveys, and cultural resources coordination, for the project located in the environmentally sensitive Grafton Ponds Sinkhole Complex. Worked with local environmental groups, state natural heritage organizations, local landowners, and federal regulatory agencies to develop a unique collaborative conservation easement land set-aside as mitigation for the project.

Deputy Project Manager for the Air Liquide America Corporation Cogeneration Facility, Geismar, Louisiana. Part of an interdisciplinary team which completed federal and state wetlands permitting, air quality modeling, environmental justice analysis, noise monitoring, storm water management, and wetlands mitigation analysis.

Senior Environmental Scientist and Quality Assurance Manager for a subsurface wetland treatment study completed for the ABX Airport in Wilmington, OH. Evaluated several glycol treatment options, directed bench-scale wetland studies to evaluate the feasibility of using wetlands to treat glycol runoff, and directed construction of a 35,000 square foot pilot scale subsurface treatment wetland adjacent to receiving streams draining the airport's runways, taxiways, and cargo loading areas.

Project Manager for a Wetland Treatment Feasibility Study completed for the City of Philadelphia Water Department, Philadelphia, Pennsylvania. Directed an interdisciplinary team of scientists and engineers in evaluating several treatment options for improving water quality of Sandyford Run, an urbanized stream heavily impacted by untreated sewage discharges from several sources. Final report included an evaluation of treatment alternatives, conceptual design of the wetland treatment system, feasibility analysis, cost-benefit analysis, funding analysis, and a regulatory analysis.

Completed wetland delineations, wetland functional assessments, permitting, fisheries studies and evaluation of natural systems treatment options for the Oak Hollow storm water wetland treatment facility, High Point, NC. Tasks included an evaluation of wetland and biofilter treatment options for the removal of suspended sediments, TOC, and BOD, selection of appropriate sites for the construction of the stormwater treatment facilities, and development of plans and planting specifications for constructing the facilities.

Completed wetland delineation, permitting, mitigation planning, constructed wetland design, and environmental monitoring of a stormwater management/treatment wetland area for the Lake Liberty redevelopment project, Norfolk, VA. Delineated both tidal and non-tidal wetland systems, evaluated existing wetland functions, directed the construction of various islands, emergent fringes, and aquatic benches, and completed a 5-year monitoring program. The aquatic benches, islands, and emergent fringe wetlands have developed into successful, well-vegetated stormwater treatment areas over the monitoring period.

Project Scientist for the Jacksonville Land Treatment System Section 404/NC CAMA permitting and wetlands mitigation project, Onslow County, NC. Completed sections of NC SEPA environmental assessment, completed wetlands delineation, classification, evaluation, and mitigation plan, completed detailed plans and specs, and directed the construction of 20-acre and 15-acre wetland systems. The pine flatwood and bottomland hardwood systems were constructed in 1996 and monitoring results show that both will be successful.

Project Manager for the Swedesboro North Wetland Mitigation Design-Build Project, Gloucester County, NJ. Directed the site selection and detailed soils, hydrology, vegetation, and cultural resources studies to evaluate the feasibility of restoring wetlands on a prior-converted cropland site. Completed the detailed mitigation plan, construction plans and specs, and directed the construction of the site which was completed in 1996.

Project Manager for the Denbigh Middle School wetlands permitting project, Newport News, Virginia. Directed a team of scientists in completing a ground water monitoring study, a wetland delineation, a wetland evaluation, an Individual Permit Application, an alternatives evaluation, and a wetland mitigation plan for the project.

Energy

Project Manager for a proposed gas-fired power plant for a confidential client on a 40-acre site in Loudoun County, Virginia. Responsible for directing air quality, community input, cultural resources, fish and wildlife, wetlands, and endangered species programs, as well as obtaining State Corporation Commission approval for the project.

Technical advisor for a gas fired power plant project for a confidential client in Indiana. Responsible for directing cultural resources, wetlands, and endangered species studies.

Technical advisor for a gas fired power plant project for a confidential client in Ohio. Responsible for directing cultural resources, wetlands, and endangered species studies.

Project Manager for a gas-fired power plant project for a confidential client in Mississippi. Responsible for completing wetlands, endangered species, and cultural resources studies.

Technical advisor for a gas-fired power plant project for a confidential client in Mississippi. Responsible for directing cultural resources, wetlands, and endangered species studies

Project Manager for the Red Hills Generating Facility wetlands permitting project, Choctaw County, Mississippi. Directed a team of scientists in completing a wetland delineation and functional evaluation, a joint permit application, an alternatives evaluation, and a conceptual wetland mitigation plan for the 350-acre site.

Municipal Planning

Project Manager for the Town of Kinderhook Revised Master Plan, Columbia County, New York. Completed an inventory and analysis of land use, demographics, market conditions, infrastructure, environmental constraints, and historic resources; implemented a community input plan which included the development and distribution of questionnaires and the conducting of controversial public informational meetings; developed recommendations for land use controls including performance zoning and transferable development rights, and recommended changes to the land use plan. Also completed a generic environmental impact statement for the revised master plan.

Project Manager for the Town of Rensselaerville Comprehensive Land Use Plan, Albany County, New York. Implemented a public input plan which consisted of developing and distributing a public opinion survey, conducting public informational meetings, and developing a statement of goals; completed an inventory and analysis of the township's demographics, market conditions, municipal budget, infrastructure, environmental constraints, natural resources, and historic resources; developed recommendations for

land use controls and changes to the land use plan. Also completed a generic environmental impact statement for the revised master plan.

Water Quality Studies

Senior Environmental Scientist and Technical Leader for the completion of the Knells Ridge Water Quality Study, Chesapeake, Virginia. The study consisted of designing a water quality sampling program, analyzing water quality data provided by the City of Chesapeake, determining the eutrophication status of the five storm water ponds, and developing recommendations for potential BMPs that could be used to control nutrient loadings to the lakes.

Technical Leader for the completion of a water quality sampling program for the Hamptons Golf Course storm water lakes, Hampton, Virginia. Lake temperature, dissolved oxygen (DO), and nutrients were determined, water budgets were calculated, temperature/DO profiles were developed, and trophic status was determined for the golf course lakes. Developed recommendations for controlling nutrient loading to the lakes.

Technical leader for evaluating a 16,000-acre watershed owned by the Birmingham Waterworks and Sewer Board, Blount, Jefferson, and Shelby Counties, Alabama. Evaluated existing water quality, land use, geology, topography, soils, buffer zones, wetlands, potential endangered species habitat, and existing and potential sources of contamination within the watershed, and developed a ranking methodology to determine which properties were critical to the long-term protection of reservoir water quality.

Stream Investigations

Lead environmental scientist for the Sandy Hill Landfill Stream Investigation, Prince George's County, MD. Study consisted of stream habitat, benthic macroinvertebrate, and water quality surveys. Conducted public informational meetings with adjacent landowners. Developed recommendations for re-establishing benthic habitat through the use of in-stream and watershed best management practices.

Quality Assurance Manager for the City of Akron CSO Study, Akron, OH. Evaluated fisheries and benthic habitat for the Cayuhoga River and its tributaries in a basin-wide study of degraded urban streams. Developed recommendations for improving fisheries and benthic habitat in these streams and rivers.

Senior Environmental Scientist for the Regional Raw Water Supply Study, King William County, VA. Evaluated various stream restoration projects as components of overall comprehensive mitigation plan to compensate for reservoir impacts to stream and riparian habitat. Examined intermittent, first order streams degraded by agricultural runoff. Developed restoration concepts including the establishment of weir structures, in-stream bank stabilization, riparian re-vegetation, and forested buffer zones.

Senior Environmental Scientist for the Rocky Pen Run Reservoir Stream Investigation, Stafford County, VA. Completed benthic, fisheries, and freshwater mussel surveys on Rocky Pen Run, a tributary of the Potomac River, and evaluated several mitigation options for improving in-stream habitat in England Run, located in an adjacent habitat. Also developed concepts for improving best management techniques and establishing water quality basins within the England Run basin, as mitigation for stream impacts associated with the proposed reservoir.

Ivy Landfill Stream Investigation, Albemarle County, VA. Completed a stream survey, which included habitat, fisheries, and benthic invertebrate components, and developed stream restoration concepts. Various proposed techniques included re-establishing stream bank vegetation, establishing check-dams, rock revetments, rock vortex weirs, rock deflectors, K-logs, gabions and fascines, as well as other bio-engineering techniques.

Lakeside Refinery Davis Creek Restoration, Kalamazoo, MI. As part of an interdisciplinary remediation team, completed a stream restoration project for a 600-foot stretch of creek. Completed a stream assessment, evaluated various bio-engineering components, and developed a stream restoration design. Various components included in the design were rock vortex weir structures, rock deflectors, boulder fields, plunge pools, low level pools, and vegetative stream bank stabilization.

Ecological Risk Assessment

Completed vegetation, mammal, bird, benthic macroinvertebrate, fisheries, and stream surveys, as well as an ecological risk assessment for an RI/FS completed for the U.S. Naval Surface Warfare Center, White Oak, Maryland. Seven terrestrial and aquatic sites contaminated with PCBs and metals were investigated under the U.S. Navy's Installation Restoration Program (IRP). Developed terrestrial and stream remedial options and recommendations based upon the results of the ecological risk assessment.

For the 45-acre Eustis Lake Site at Fort Eustis, Virginia, completed vegetation and wildlife surveys, fish electro-shocking surveys and flesh analysis, and ecological risk assessment. Evaluated and recommended remedial actions for clean-up of PCB/pesticide/PAH contaminated sediments in the lake.

Completed vegetation and wildlife surveys and an ecological risk assessment for the Fire Training Area, Fort Story, Virginia. Recommended remedial actions for clean up of TPH/SVOC/VOC contaminated sediments, soils, and groundwater based on the results of the eco-risk assessment.

Completed vegetation and wildlife surveys and an ecological risk assessment for the LARC 60 Maintenance Area Site, Fort Story, Virginia. Recommended remedial actions for clean-up of TPH/VOC contaminated surface water, sediments, soils, and groundwater based on the results of the eco-risk assessment.

Completed vegetation and wildlife surveys and an ecological risk assessment for the Auto Craft Building Area Site, Fort Story, Virginia. Recommended remedial measures for clean-up of TPH/VOC contaminated soils and groundwater based on the result of the eco-risk assessment.

For the DOL Storage Yard Site at Fort Eustis, Virginia, completed vegetation and wildlife surveys, wetland surveys, and ecological risk assessment. Recommended measures to clean up pesticide/PAH/metal contaminated sediments and groundwater in down gradient forested wetland.

Completed vegetation and wildlife surveys, ecological risk assessment, and wetland restoration plan for the Bailey's Creek Site, Fort Eustis, Virginia. Recommended wetland restoration measures for the clean up of PCB contaminated sediments in palustrine forested and estuarine emergent areas.

Technical Director Delegate and Senior Scientist for screening level ecological risk assessments completed for the McGregor Ponds Range Camp, Dona Ana Range Camp, Meyer Range Camp, and Orogrande Range Camp Sewage Lagoons, Fort Bliss, New Mexico. Sewage lagoons at these four sites are contaminated with various COCs including pesticides, metals, and PCBs. Evaluated the technical approach and completeness of eco-risk assessments, applied accepted USEPA screening level standards for data collected for these sites, and selected sites for further quantitative ecological risk assessments.

Endangered Species Studies

Completed a habitat evaluation and endangered species survey for the Cactus Ferruginous Pygmy-owl (*Glaucidium brasilianum cactorum*) , for a proposed 160-acre power generating facility, Maricopa County, Arizona. Used USFWS survey protocol to determine the presence or absence of this species.

Completed a habitat evaluation and endangered species survey for the Bog Turtle (*Clemmys muhlenbergii*) on a 250-acre proposed dredge disposal landfill site in Washington County, New York. The special study was completed in support of the Hudson River PCB Reclamation Project EIS. All appropriate sedge meadows, low gradient streams, and herbaceous wetlands were identified and mapped as appropriate habitat on the site. Several early spring and summer surveys were conducted to determine the presence or absence of the species. No Bog Turtle specimens were detected or identified.

Completed habitat evaluations and field surveys for the Bog Turtle for the MCI fiber optics cable project in Seneca, Cayuga, and Onondaga Counties, New York. Aerial photography and New York State DEC freshwater wetlands mapping were examined to identify potential habitat for several proposed fiber optics cable crossings. Winter field surveys were completed to field verify the presence of bogs, sedge meadows, herbaceous

wetlands and other potential habitat. Developed avoidance and mitigation measures to reduce the potential impacts to the species.

Assisted in the completion of an endangered species survey for the Blanding's Turtle (*Emydoidea blandingi*) on a proposed 40-acre residential development site located adjacent to the Crum Elbow Creek, Town of Hyde Park, Dutchess County, New York. Suitable aquatic habitat in and adjacent to the creek was identified based on late winter site inspections. Hoop trapping and visual surveys were completed during the spring breeding season to determine that the species was not present in the area.

Completed herpetological surveys for a proposed 2,200-acre raw water reservoir in King William County, Virginia. Aerial photography and large-scale topographic mapping were utilized to identify a wide variety of upland and wetland communities and to identify search areas. Three-day field surveys were completed during early spring, late spring, early summer and mid-summer to detect breeding herpetofauna. A total of 74 species of reptiles and amphibians were detected.

Performed a site inspection, wetland delineation and endangered species survey for proposed 16-inch water reuse and 24-inch sewage force mains in Orlando, Florida. A habitat evaluation was completed for the Gopher Tortoise (*Gopherus polyphemus*), Red-cockaded Woodpecker (*Picoides borealis*), Florida Scrub Jay (*Aphelocoma coerulescens*), and American Kestrel (*Falco sparverius*). Several active Gopher Tortoise burrows were located along the corridor. Active burrows were flagged in the field and a salvage/transplantation plan was developed and implemented during project construction.

Completed a habitat evaluation and endangered species survey for the Barking Treefrog (*Hyla gratiosa*), Mabee's Salamander (*Ambystoma mabeei*), and Harper's Fimbristylis (*Fimbristylis perpusilla*) for the Virginia Natural Gas pipeline project in the Grafton Ponds Sinkhole Complex, York County and Newport News, Virginia. Evaluated aerial photography and large-scale topographic mapping to identify potential sinkhole pond and forested wetland habitat. Spring and summer surveys were completed and avoidance and mitigation measures were developed to reduce the potential effects on these species.

Completed a habitat evaluation and endangered species survey for the Harper's Fimbristylis for the proposed Turnberry Boulevard Extension corridor, Newport News, Virginia.

Completed a habitat evaluation and endangered species survey for the Barking Treefrog and Mabee's Salamander on a 45-acre site for the proposed Woodside High School project, Newport News, Virginia in support of a USCOE and Virginia DEQ Joint Permit Application. Completed an on-site habitat evaluation to determine appropriate habitat and reference sites, as well as completed late winter, spring and summer surveys for the rare amphibians. No rare species were detected.

Lead project scientist for a habitat evaluation and endangered species survey for the 6,500-acre Jacksonville Land Treatment System project, Onslow County, North Carolina.

Color infrared aerial photography, topographic mapping, and hydric soils mapping were examined to identify sinkholes, bottomland hardwoods, remnant pocosin, remnant savannah, and other potential habitat for rare plant and animal species. Late winter field inspections to refine potential search areas, as well as spring and summer surveys were completed to detect the presence or absence of federally listed and state listed threatened or endangered species.

Completed an endangered species survey for the state-listed Red-shouldered Hawk (*Buteo lineatus*) on a 300-acre proposed large-lot development in Ulster County, New York. Habitat evaluations were completed to identify appropriate upland hardwood and forested wetland habitat. Early spring transect surveys were completed for the proposed 300-acre residential site.

Completed endangered species survey for the Rough-leaved Loosestrife (*Lysimachia asperulifolia*) and Red-cockaded Woodpecker for a proposed 10-acre solid waste transfer station in the Croatan National Forest, Carteret County, North Carolina. No individual plants or active nest sites were found.

Completed Small-whorled Pogonia (*Isotria medeoloides*) (SWP) surveys for several projects as described below:

1. Newport News Waterworks Northern Zone Water Pipeline Survey, James City County, Va., July 1991. No individuals found.
2. College Woods, Williamsburg, Va., June 1993. Status of individual SWP plant discovered by Virginia Crouch. One individual plant examined.
3. King William Reservoir Site Survey, King William County, Va., June 1993 One individual seen.
4. Black Creek Reservoir Site Survey, New Kent County, Va., July 1993. No individuals seen.
5. Chisel Run Colony, James City County, Va., May 1994. Checked on the status of the colony being monitored by Dr. Donna Ware.
6. Ware Creek Reservoir Site Survey, James City and New Kent Counties, Va., May 1994. Two individuals discovered.
7. King William Reservoir Site Survey, King William County, Va., June 1994. New colony of 5 plants discovered. Individual discovered in 1993 was examined.
8. Virginia Natural Gas 20-Inch Northern Trunk Line, James City County, Va., June 1994. Habitat assessment and SWP survey. No individuals found.
9. Black Creek Reservoir Site Survey, New Kent County, Va., August 1994. No individuals found.
10. Rocky Pen Run Reservoir Site Survey, Stafford County, Va., May-June 1996. Principal Investigator and Field Crew Leader. No individuals found.
11. Fredericksburg Outer Connector, Stafford and Spotsylvania Counties, Va., June-July 1998. Crew leader. Three individuals discovered.
12. Fredericksburg Outer Connector, Stafford and Spotsylvania Counties, Va., June 1999. Project Manager. No individuals discovered.

13. Chisel Run Colony, James City County, Va., August 1999. Checked on the status of the colony being monitored by Dr. Donna Ware. 40 individuals examined. No new individuals discovered.

Environmental Impact Assessment

Mr. Sankey has been a principal author in the preparation of the following documents:

Lower Virginia Peninsula Regional Raw Water Supply NEPA EIS
Rocky Pen Run Reservoir NEPA EA, Stafford County, VA
King Street Bridge NEPA EA, Hampton, Virginia
Radford Army Ammunition Plant WWTP Extension NEPA EA, Radford, Virginia
CRSWA Solid Waste Transfer Station NEPA EA, Carteret County, NC
Jordan Lake Pipeline Crossing NEPA EA, Piedmont, NC
Boswell Loop Alternatives Environmental Assessment
Dahlgren WWTP Expansion NEPA EA, Dahlgren, VA
Crooked Creek Reservoir NEPA EA, Jefferson County, AL

Additional Professional Training:

Wetland Identification and Delineation, University of Massachusetts, 1990; Habitat Evaluation Procedures (HEP), Colorado State University, 1991; Winter Botany, Environmental Concern, 1994; Evaluation for Planned Wetlands, Environmental Concern, 1995; Aquatic Ecological Risk Assessment, WERF, 1996; Constructed Wetlands for Wastewater Treatment, Henricopolis Soil & Water Conservation District, 1997; Watershed Planning, Center for Watershed Planning, 1999.

Publications and Research:

Sankey, R. T. 2000. "Created Wetlands: Innovative Storm Water Management and Reuse." Workshop presented at the AWWA 2000 Water Reuse Conference, January 30, 2000, San Antonio, TX.

Sankey, R. T. 1999. "Innovative Mitigation Plan Preserves Unique Grafton Ponds." Presented at the 20th Annual Meeting of the Society of Wetlands Scientists, Norfolk, VA.

Sankey, R. T. 1996. "Pocosin and Bottomland Hardwood Restoration in the North Carolina Coastal Plain: A Case Study." Presented at the 17th Annual Meeting of the Society of Wetland Scientists, Kansas City, MO.

Powers, P. H., L. O'Neil, W. Fuscoe, and R. T. Sankey. 1995. "Innovative Storm Water Treatment at the Oak Hollow Reservoir." Presented at the 75th Annual Conference of the North Carolina American Water Works Association / Water Environment Association, Greensboro, NC.

Johnson, R. L., Sankey, R. T., Dembinsky, R. P., and Thurrott, J. C. 1995. "City of Daytona Beach Wellfield Wetland Monitoring Program." Presented at the American Water Works Association Annual Meeting, Anaheim, CA.

Sankey, R. T. 1995. "Vernal Ponds in Virginia." Published in the Virginia Association of Wetland Professionals Newsletter, Volume II, Issue 2, July 1995.

Sankey, R. T. and Schwenneker, B. W. 1992. "Ecology of the Grafton Ponds Sinkhole Complex in Eastern Virginia." Presented at the Thirteenth Annual Meeting of the Society of Wetland Scientists, New Orleans, LA.

Sankey, R. T. and B. W. Schwenneker. 1992 "Creation of an Open Water/Emergent Marsh in the Albany Pine Bush." Presented at the Nineteenth Annual Conference on Wetlands Restoration and Creation, Tampa, FL.

Sankey, R. T. 1985. "Islands on the Prairie: The Flora and Avifauna of Shelterbelts in Stafford County, Kansas." Master's Thesis. The University of Kansas, Lawrence, KS.

EXHIBIT B-4

STORMWATER AND INDUSTRIAL WASTEWATER EVALUATION

Storm Water and Industrial Wastewater Evaluation / Permitting

Summary of Findings
A National Pollutant Discharge Elimination System (NPDES) multi-sector storm water permit will be required for the construction phase of the Gila Bend Power Generation Station project, but will not be necessary for the facility's operation.

An NPDES permit will not be required for the facility's industrial wastewater discharge evaporation ponds that will be located adjacent to the power plant. A determination letter, confirming non-applicability of NPDES permitting for the industrial wastewater evaporation ponds is pending with USEPA Region 9 and the Arizona Department of Environmental Quality (ADEQ).

Storm Water Discharge
A multi-sector general NPDES storm water permit will be required for storm water discharges associated with the construction phase of the Gila Bend Power Generation Station. Under the storm water permitting program, a general permit requires filing of a NPDES Notice-of-Intent (NOI) prior to construction activities. A NOI will be submitted and the conditions of the general permit (i.e., development of a Storm Water Pollution Prevention Plan) must be met before commencing construction activities at the proposed facility.

The facility design includes a dedicated storm water runoff evaporation pond. This pond is intended to prevent storm water runoff beyond the facility's property line. Therefore, a multi-sector general NPDES storm water permit will not be required for the operating facility. PDEI's environmental engineering consultant has estimated the necessary pond volume required to contain runoff from a 25-year storm event while maintaining a freeboard of two feet. Based on this evaluation, a pond approximately 430 feet long by 450 feet wide by 5 feet deep will be constructed.

Proposed Facility Industrial Wastewater NPDES Permitting Determination
ADEQ states that industrial wastewater discharge facilities meeting the following criteria are <u>not subject</u> to NPDES permitting:

- The industrial wastewater treatment system is not constructed in waters of the United States;
- There is no hydrologic connection with surface waters or subsurface aquifers; and,
- Runoff and surface water from a 100-year storm event is adequately contained.

The planned industrial wastewater evaporation ponds will be designed to meet the three criteria necessary to ensure non-applicability of NPDES permitting:

- The industrial wastewater treatment system will not be constructed in waters of the United States.

  No wetlands were identified during the wetlands delineation performed at the proposed site. Based on proposed facility layout, a Section 404 permit and Section 401 certification will be obtained in order to address diversion of miscellaneous ephemeral washes and to fulfill the dredge/fill requirements necessary to site the evaporation ponds;

- There will be no hydrologic connection with subsurface aquifers. Evaporation ponds will be designed with a liner system that prevents wastewater flow into the groundwater. An ADEQ Aquifer Protection Program (APP) permit will be obtained for the proposed evaporation ponds.

- Runoff and surface water from a 100-year storm event will be adequately contained.

MALCOLM PIRNIE

MALCOLM PIRNIE, INC.
INDEPENDENT ENVIRONMENTAL ENGINEERS, SCIENTISTS & CONSULTANTS

August 17, 2000

Mr. Jack Landy
U.S. Environmental Protection Agency (WTR-5)
Region IX
75 Hawthorne Street
San Francisco, CA 94105

Re: Proposed Gila Bend Power Generation Station
Request for a Determination of NPDES Non-Applicability

Dear Mr. Landy:

On behalf of the Gila Bend Power Partners, LLC, Malcolm Pirnie, Inc. has completed an assessment of the possible industrial wastewater permitting requirements for the proposed Gila Bend Power Generation Station. We believe that a National Pollutant Discharge Elimination System (NPDES) permit is not required for the facility's industrial wastewater evaporation ponds.

As part of the on-going project review process with the Arizona Corporation Commission (requiring submission of a Certificate of Environmental Compatibility Application), we request the U.S. EPA provide us with a determination letter confirming the non-applicability of NPDES permitting for the industrial wastewater and storm water evaporation ponds. Malcolm Pirnie believes the following information and attached maps will help your staff with the NPDES assessment.

Industrial Wastewater Discharge

Based on previous telephone discussions between you and Mr. Peter Carroll (Malcolm Pirnie), I understand that you have a general knowledge of the proposed project and facility location. The facility will be an 845-MW combined-cycle, natural gas-fired electric power generation facility in Gila Bend, Arizona. It will be sited on an approximately 180-acre portion of Section 19 (Township 5 South, Range 5 West, Gila and Salt River Meridian). Designed to be a "zero discharge" facility, the plant's industrial wastewater as well as storm water will be collected in dedicated evaporation ponds located on site (see enclosed site map).

No wetlands were identified on the proposed facility site during a recent wetlands delineation study conducted by Malcolm Pirnie. In addition, the proposed facility footprint is located outside the 100-year flood plain (see enclosed FEMA flood plain maps). However, portions of the proposed site are located within a U.S. Army Corps of Engineers flowage easement.

432 N. 44th STREET SUITE 400 PHOENIX, AZ 85008-7603 602-241-1770 fax 602-231-0131 http://www.pirnie.com

RECYCLED PAPER

Approximately 5.2 acres of ephemeral arroyos were also identified on the site. The Gila Bend Power Partners intend to obtain a Section 404 permit from the U.S. Army Corps of Engineers and a Section 401 certification from the Arizona Department of Environmental Quality (ADEQ). These permits and approvals will be required for the anticipated surface water diversion and dredge/fill activities.

Facility-specific Information

The industrial wastewater evaporation ponds will be designed to ensure that (1) there are no hydrologic connections with surface waters or subsurface aquifers, and (2) runoff and surface waters from a 100-year storm event are contained. To achieve this, the evaporation ponds will be designed with liner and berm systems that prevent wastewater flow into surface waters or groundwater. The evaporation ponds will also be designed to prevent the possibility of contamination caused by the potential inundation of the flowage easement. In order to satisfy these design criteria and regulatory requirements, the Gila Bend Power Partners intend to obtain an Aquifer Protection Permit from ADEQ for the construction and operation of the evaporation ponds.

We look forward to receiving a NPDES permit non-applicability determination letter for this proposed project and site within the next several weeks. Please call me at (602) 231-5591 if you have any questions or require additional information.

Very truly yours,

MALCOLM PIRNIE, INC.

Gary H. Bacon

Gary H. Bacon, P.E.
Associate

Enclosures

RECYCLED PAPER

c: Linda Taunt, ADEQ
Pete Wright, Gila Bend Power Partners
Robert Walther, IPT
Thom Shelton, IPT
Karen Peters, SSD
Gary Rogers, MPI
Jim Laughlin, MPI
Tom Sankey, MPI

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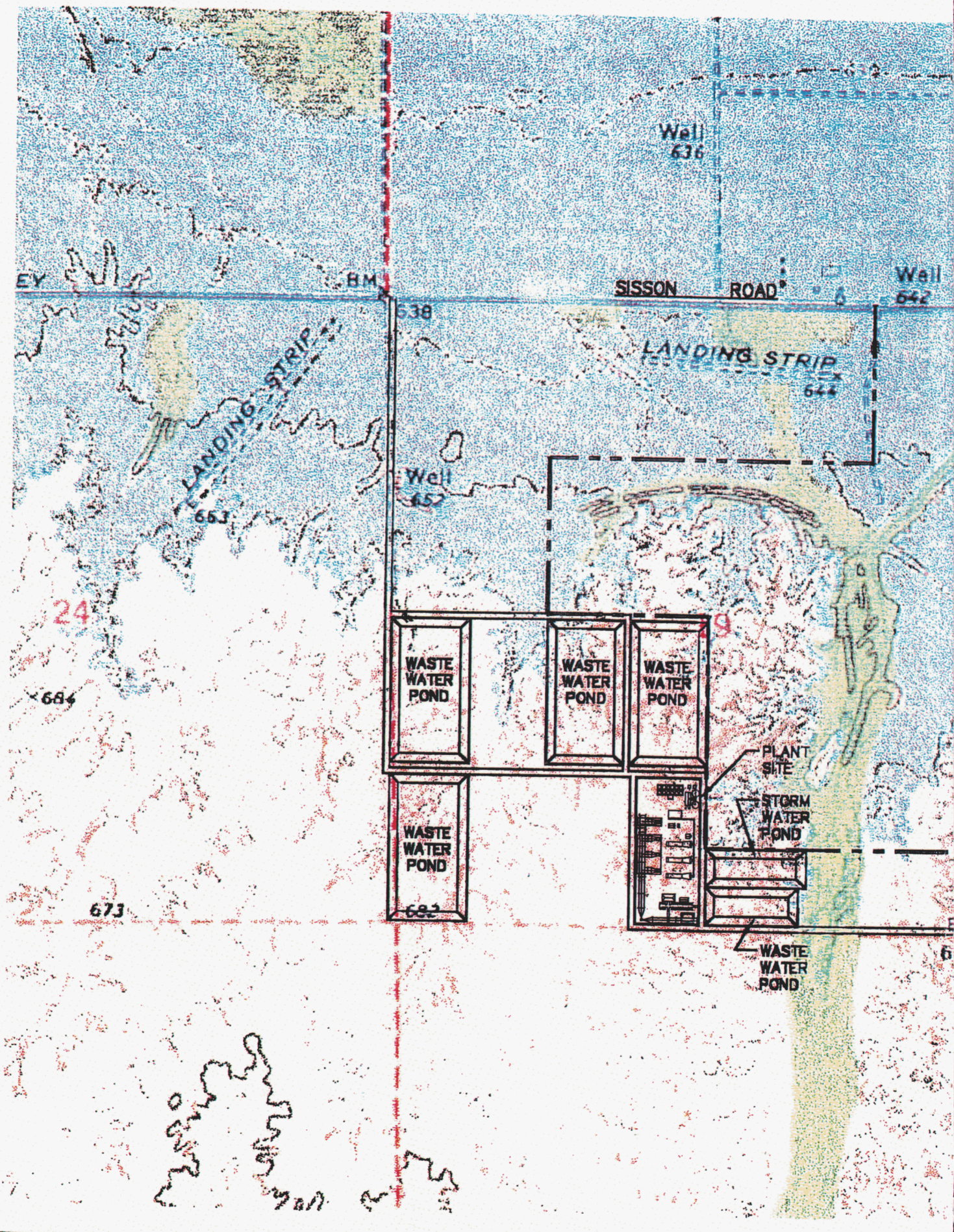
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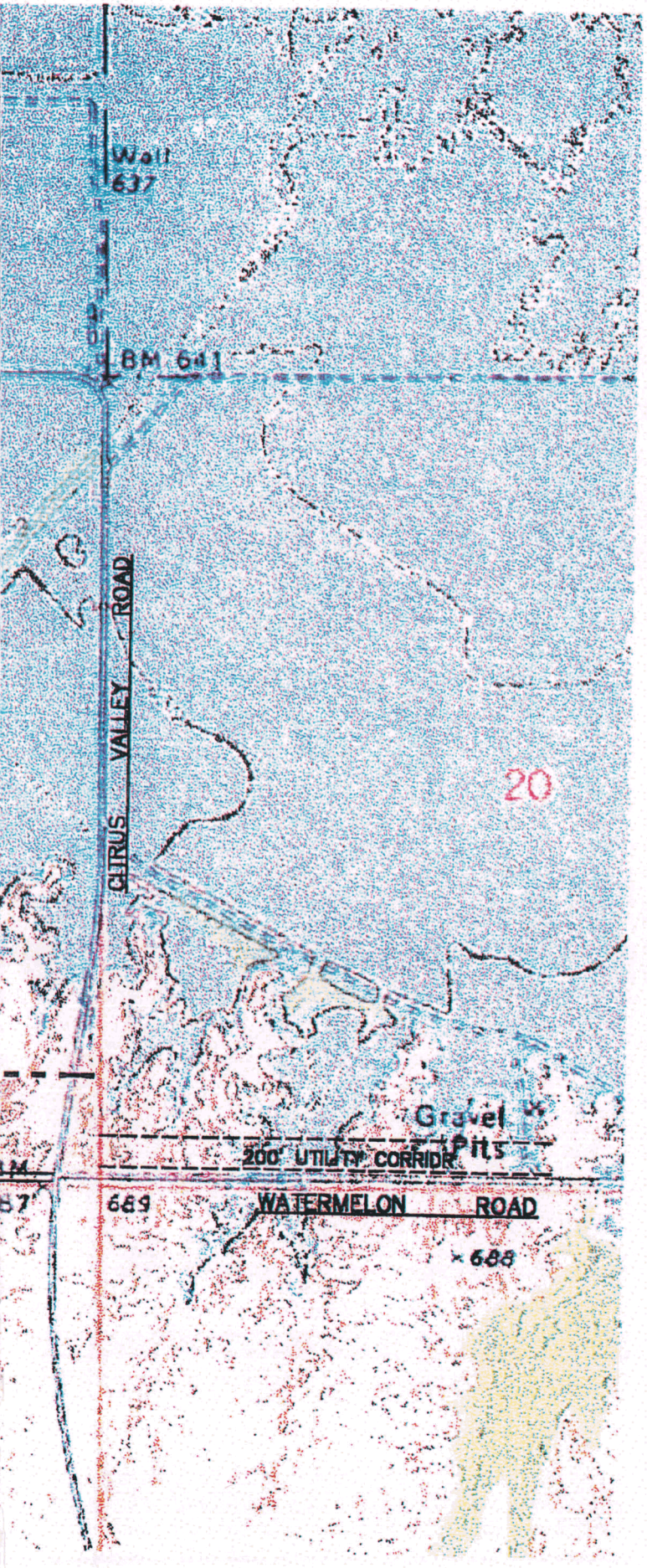
WASTE WATER POND



INDUSTRIAL POWER TECHNOLOGY
2227 CAPRICORN WAY SUITE 101
SANTA ROSA, CALIFORNIA 95407
TEL: 707-528-8900/FAX: 707-528-8901

No.	Revisions	Date

GILA BEND POWER PROJECT

EVAPORATION PONDS

TS DESIGN	SS DRAWN	RW ENG.

Job Number: 147100

Date: 4/7/00

Sheet Number

EP1

1 of 1 sheets

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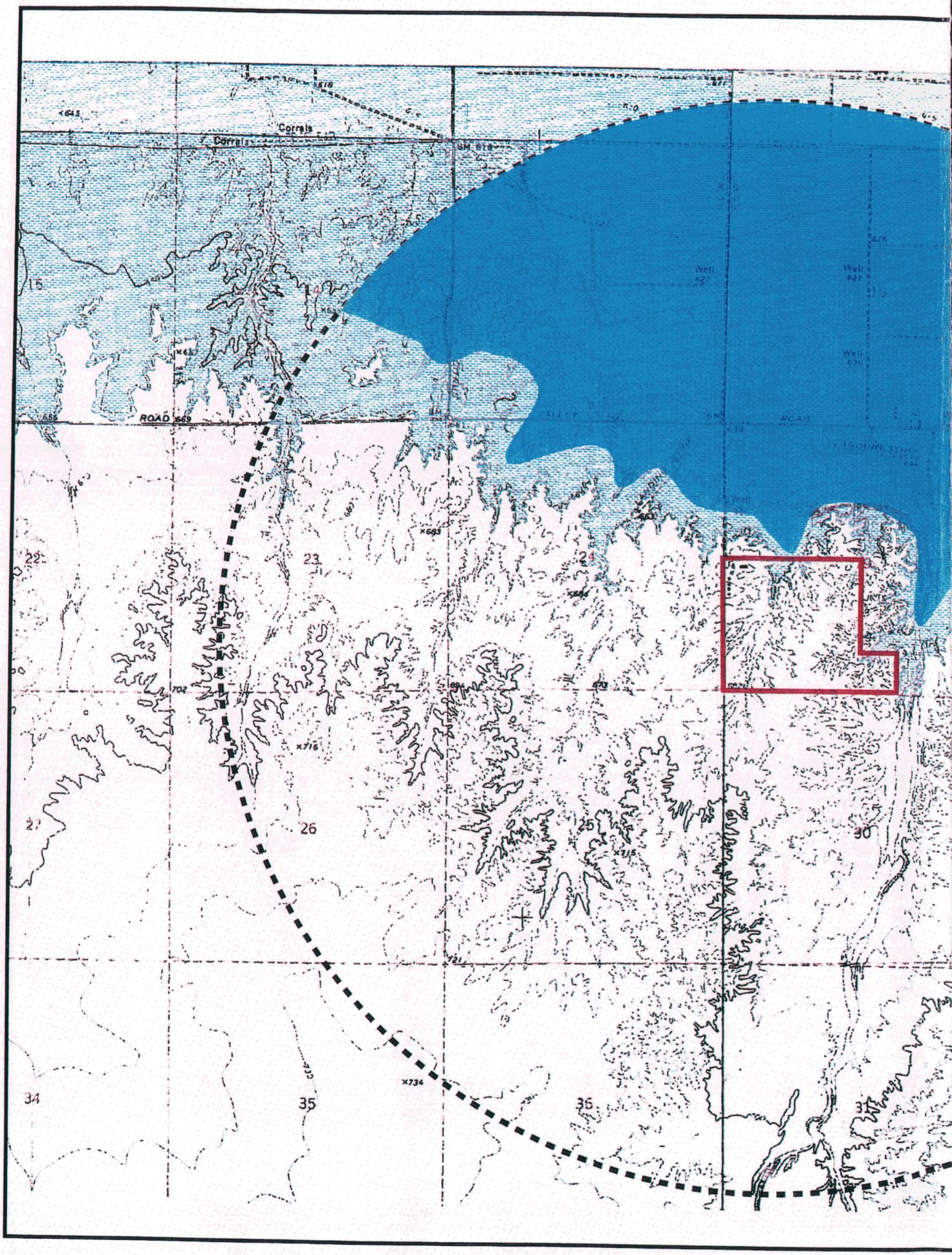
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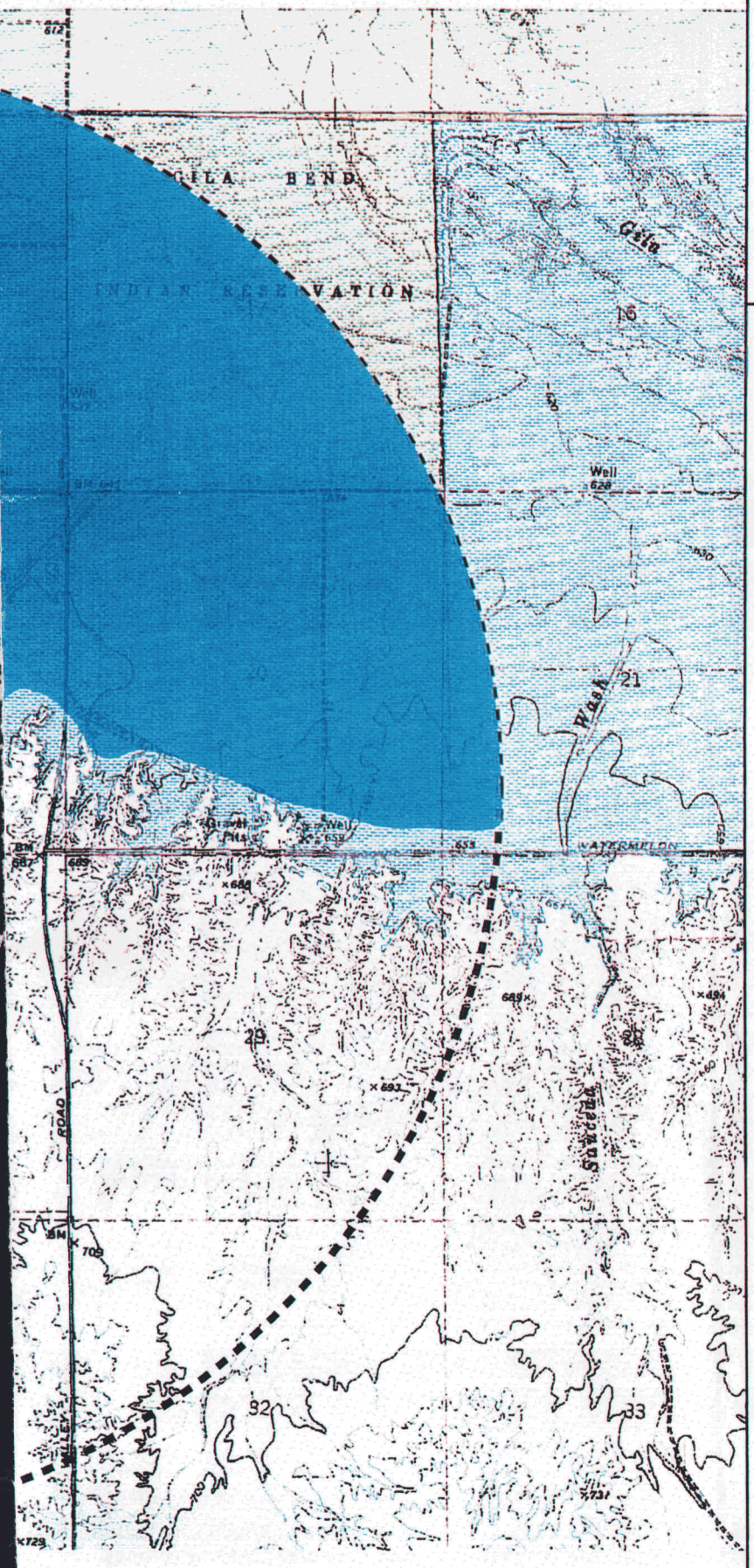

Gila Bend
100 Year Flood Plain
Figure 1

General Reference Features

- Minor Arterials
- Railroad
- Two Mile Radius
- Project Site Location
- 100 Year Flood Plain

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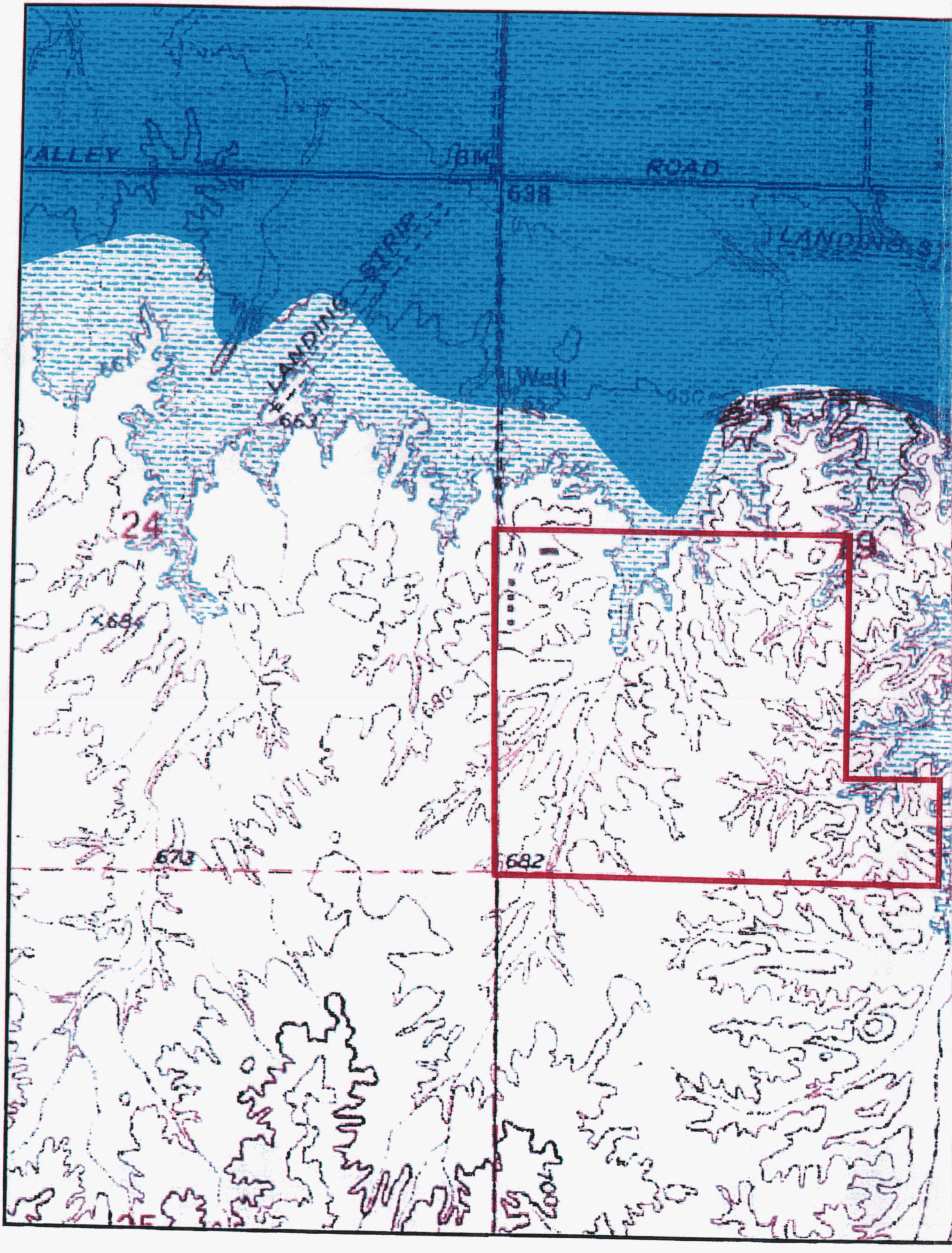
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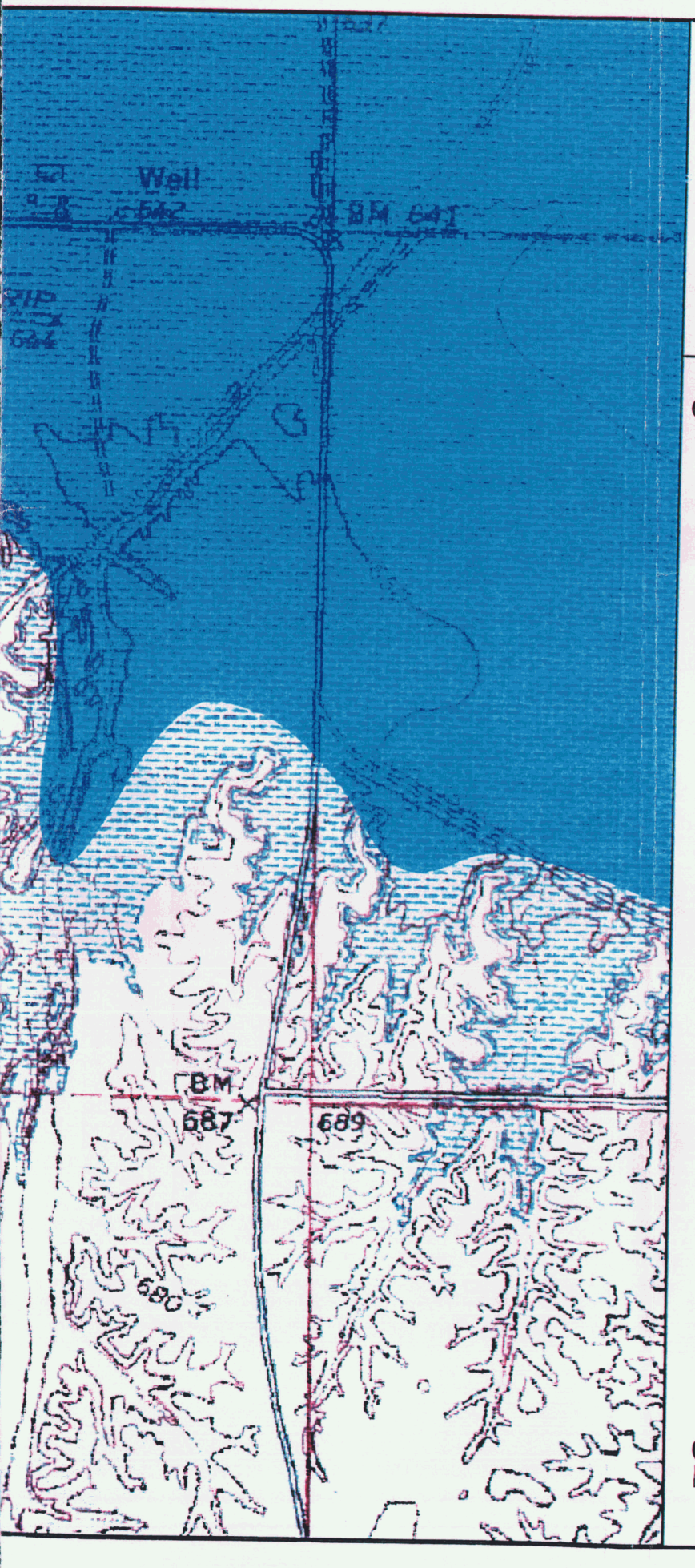

Gila Bend
100 Year Flood Plain
Figure 2

General Reference Features

- Minor Arterials
- Railroad
- Two Mile Radius
- Project Site Location
- 100 Year Flood Plain

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Exhibit C
Areas of Biological Wealth and Rare / Endangered Species Habitats

INTRODUCTION

Power Development Enterprises, Inc. (PDEI) is preparing to construct a power generation station located near Gila Bend, Maricopa Co., Arizona. The construction process will involve disturbance of some washes, which may constitute "dredge and fill activities" involving waters of the United States, and may require a permit through the U.S. Army Corps of Engineers under authority of Section 404 of the Clean Water Act. This biological assessment was prepared to comply with Section 404 permit conditions, which require that the project applicant address impacts to any species listed or proposed as endangered or threatened and designated critical habitat, under Section 7 of the Endangered Species Act of 1973.

PROPOSED PROJECT AND STUDY AREA

The proposed project located on a 160-acre site (three 40 acre and two 20 acre lots) will include, an access road on the southern perimeter, cooling water evaporation ponds, a dedicated storm water evaporation pond, CTG turbines, cooling tower, switch yard, transmission lines and an administrative facility site. The proposed project is located approximately 8 miles northwest of the community of Gila Bend and approximately 2 miles south of the Gila River at Watermelon and Citrus Valley Roads (T5S, R5W, Sec. 19). Elevations on site range from 650 ft. msl to 687 ft msl. The geology is characterized by alluvial gravels forming desert pavement on low hills throughout the area with several small ephemeral washes and three major washes in Section 19 that drains water from the south into Painted Rock Reservoir.

In the undisturbed portions of the site, the natural vegetation is characterized as Sonoran Desert Scrub of the Lower Colorado River Valley Subdivision (Brown, 1982). The Creosotebush-White Bursage Community was the dominant cover type found on the site (See Photos 1-14 in Exhibit B-5 "Wetlands Delineation / Permitting"). Dominant vegetative species found in this cover type were Creosotebush (*Larria divaricata*), White Bursage (*Ambrosia dumosa*), Brittle Bush (*Encelia farinosa*), and Triangle-leaf Bursage (*Ambrosia deltoidea*). Common grasses found on the site include Big Galleta (*Hilaria rigida*) and three-awn (*Aristida spp.*). Cacti of the site include Diamond Cholla (*Opuntia ramosissima*), Pencil Cholla (*Opuntia arbuscula*) and very widely scattered Giant Saguaro (*Carnegiea gigantea*).

In the washes, desert riparian scrub is found (See Photos 1-14 in Exhibit B-5 "Wetlands Delineation / Permitting"). Common riparian species dominating the washes include Blue Paloverde (*Cercidium floridum*), Tamarisk (*Tamarix chinensis*), Catclaw (*Acacia greggii*) and Desert Ironwood (*Olneya tesota*).

TARGETED SPECIES

A letter to Southwestern Field Biologist from the Ecological Services Field Office of the U.S. Fish and Wildlife Service (FWS) included a list of federally threatened, endangered, or proposed species that are likely to occur in or near the site of the proposed developments (Attachment 1). In addition, Malcolm Pirnie requested and received a printout of special status species and plant community occurrences in or near the project area from the Arizona Game and Fish Department (Attachment 2). Summarized habitat requirements of federal threatened and endangered species can be found in **Appendix A.** Summarized habit requirements of state-listed species can be found in **Appendix B.**

FIELD SURVEYS

A Malcolm Pirnie biologist conducted an on-site field survey, March 7-8 and May 23, 2000 to assess the potential impacts of the proposed project on endangered and threatened species. A survey for the Cactus Ferruginous (*Glaucidium brasilianum cactorum*) Pygmy-owl survey was performed at the proposed site to determine if pygmy-owls are present on the proposed project site and to determine the current distribution of pygymy-owls. Due to the lack of suitable habitat for endangered and threatened species on the site, no other surveys were performed for any other species, or group of species. Tom Sankey and Gerald Crawford of Malcolm Pirnie conducted the survey. Tom Sankey is a biologist with extensive experience conducting endangered species surveys and habitat evaluations. Survey procedures utilized were taken from the revised survey protocol developed for the pygmy-owl by the Arizona Game and Fish Department (AGFD). The survey was conducted during the spring survey period (January 1 through June 30) on May 23, 2000, by broadcasting recordings of pygmy-owl calls. The surveys were conducted from 1 hour before sunrise to 2 hours after sunrise, and from 1 hour before sunset to 1 hour after sunset. In addition, our biologist made a qualitative assessment of overall habitat conditions and quality, took photographs, and listed the common plant and wildlife species observed. A species inventory is found in Exhibit D – "Biological Resources."

RESULTS

Potential habitat for federally listed endangered or threatened species was not present on the site, except for the Lesser Long-nosed Bat (*Leptonycteris curasoae yerbabuenae*), Southwestern Willow Flycatcher (*Empidonax traillii extimus*), and the Cactus Ferruginous Pygmy-owl. No designated or proposed critical habitat for these species occurs in the area, and as a result of the survey, no pygmy-owls were detected at the site. Appendix A shows all of the federally-listed species and the potential effects of the proposed project. Appendix B contains the results of the early morning and late evening surveys completed on May 23, 2000.

Lesser Long-nosed Bat (*Leptonycteris curasoae yerbabuenae*)

The Lesser Long-nosed Bat occurs from El Salvador north through southern, western, and northwestern Mexico to extreme southwestern New Mexico and south-central Arizona. The bat species was listed by the FWS as endangered on 30 September 1998 (53 FR 38456).

The Lesser Long-nosed Bat inhabits Sonoran Desert scrub and Semidesert Grassland to above 5,000 ft. elevation in the U.S. portion of its range (U.S. Fish and Wildlife Service 1993). In the United States, it feeds on fruit, nectar, pollen, and occasionally insects. The Lesser Long-nosed Bat is migratory in Arizona, New Mexico, and northwestern Mexico, in response to the availability of its food resources (U.S. Fish and Wildlife Service 1993). Female bats arrive gravid in late April and early May and feed on the nectar and pollen of columnar cacti, especially the saguaro. Adult males arrive in late July and early August to join females and young bats dispersing from maternity roosts to feed on paniculate agaves (in southern Arizona: *Agave chrysantha, A. deserti, A. murpheyi, A. palmeri, A. parryi*), which mostly occur above the 4,500 ft. elevational contour, except *A. deserti* which mostly occurs under 4,500 ft. By mid to late September the majority of these bats have left Arizona and New Mexico. Preferred roost sites include caves, cliff crevices, and disused mine tunnels (U.S. Fish and Wildlife Service 1993).

Lesser Long-nosed Bat surveys were not conducted in the proposed project area. While a detailed survey was not completed, the site would not attract a significant number of foraging bats due to the lack of dense stands of agaves or columnar cacti and the lack of caves or abandoned mine tunnels on or near the site.

Southwestern Willow Flycatcher (*Empidonax traillii extimus*)

The Southwestern Willow Flycatcher breeds in dense riparian habitats. It can be distinguished from the two other subspecies of willow flycatchers only when territorial males are singing on breeding grounds. In southern Arizona, the bird occurs along perennial streams with well-developed willow, cottonwood, or salt cedar thickets. In the montane portions of the state, the bird is found in willow thickets. The bird is generally associated with saturated soil conditions (McCarthey et al., 1998). Such conditions do not occur at the proposed power generation station site; therefore, the bird would not be expected to breed on the site.

Willow flycatchers could occur on the site during spring and fall since they utilize a wide variety of riparian corridors during migration. Impacts to the Southwestern Willow Flycatcher will be minimal, as migration habitat for the species will only be temporarily affected as a result of project construction. The wash and associated riparian vegetation will be re-located at the eastern edge of the site, re-establishing willow flycatcher migration habitat.

Cactus Ferruginous Pygmy-owl (*Glaucidium brasilianum cactorum*)

The Cactus Ferruginous Pygmy-owl has been documented historically along the Gila River in Maricopa and Pinal Counties from the Phoenix area west to Agua Caliente.

These records date from the late 1800s and early 1900s. The species is now extirpated from this portion of its range and suitable habitat no longer appears to exist along this reach of the Gila River. Suitable habitat that once existed along the Gila River but has since been altered by water reclamation projects includes deciduous riparian forest.

Pygmy-owls have also been documented in well-developed desert riparian scrub habitat along normally dry washes in Arizona. Important desert tree species that can be found along these washes include paloverde, mesquite, ironwood, with a number of saguaro present. The Pygmy-owl nests in cavities excavated by woodpeckers in the saguaro and trees large enough to support such cavities.

Due to the diminished habitat and to the relatively young age of the trees found there, it is not expected that the Pygmy-owl would utilize the site. Surveys were conducted to determine whether the species is present on the site. The survey results indicate that pygmy-owls do not utilize the site. Therefore, the project would have no effect on this species.

State-listed Species

Only a few state-listed species have at least some potential for occurring on site. These species include Ferruginous Hawk (*Buteo regalis*), American Peregrine Falcon (*Falco peregrinus anatum*), California Leaf-nosed Bat (*Macrotus californicus*), and Southern Yellow Bat (*Lasiurus ega*).

The Ferruginous Hawk and American Peregrine Falcon are not expected to occur on the site. Peregrines require cliffs for nesting and these areas do not occur on the site. Ferruginous Hawks breed in open grasslands, scrub land, or woodlands in northern Arizona. (Glinski, 1998). These hawks are primarily adapted to semiarid grasslands of the Great Basin, where grasses are abundant and large populations of rodents and rabbits can be supported (Johnsgard, 1990). Neither of these species is expected to breed at the proposed site; however, they may occur during spring and fall migration or during winter.

California Leaf-nosed Bats and Southern Yellow Bats could potentially forage over or near the plant site. These species of bats are threatened by disturbances and changes at roost sites, not foraging areas. California Leaf-nosed Bats roost in caves and mine tunnels, while Southern Yellow Bats roost in California Fan Palms (*Washingtonia filifera*) and thick riparian areas (AGFD 1996). Roost environments required by these bats do not exist at the proposed power generation facility site. Impacts associated with the facility construction are expected to be negligible because foraging habitat for these species is extensive in southern Arizona and disturbance to habitat at the power generating station site is expected to be minimal.

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Appendix A. Federally-listed species potentially occurring near the proposed Power Generation Station near Gila Bend, Maricopa County, Arizona

Common Name	Scientific Name	Federal	State	Habitat	Project Effects
Arizona Agave	*Agave arizonica*	LE	HS	Found in transitional zones between pine-oak woodlands and higher zones 3000-6000 ft. on steep, rocky slopes.	No effect: no habitat present at project site.
Arizona Cliffrose	*Purshia subintegra*	LE	HS	Found in tertiary limestone lakebed deposits usually below 4000 ft.	No effect; no habitat present at project site.
Arizona Hedgehog Cactus	*Echinocereus triglochidiatus arizonicus*	LE	HS	Found in transitional zones between interior chaparral and pine-oak woodland from 3700-5200 ft.	No effect; no habitat present at project site.
Lesser Long-nosed Bat	*Leptonycteris curasoae yerbabuenae*	LE	E	Found in desert scrub habitats with agaves and columnar cacti present as food sources.	No effect: not enough habitat present at project site.
Sonoran Pronghorn	*Antilocapra americana sonorensis*	LE	E	Found in desert scrub from 2000-4000 ft. Known from the Painted Rock Reservoir area Maricopa Co. (Hoffmeister 1986).	No effect; no habitat present at project site.
Bald Eagle	*Haliaeetus leucocephalus*	LT	E	Found near large trees or cliffs near water that support abundant prey.	No effect: no habitat present at project site.
Mexican Spotted Owl	*Strix occidentalis lucida*	LT	T	Found in conifer forests.	No effect; no habitat present at project site.
Southwestern Willow Flycatcher	*Empidonax traillii extimus*	LE	E	Found along perennial streams with thick, well developed willow thickets. Migrates along riparian corridors	No effect; no breeding habitat present at project site.
Yuma Clapper Rail	*Rallus longirostris yumanensis*	LE	T	Found in dense riparian habitats with wet substrates.	No effect; no habitat present at project site.
Desert Pupfish	*Cyprinodon macularius*	LE	E	Perennial water courses.	No effect; no habitat present at project site.
Gila Topminnow	*Poeciliopsis o. occidentalis*	LE	T	Perennial water courses.	No effect; no habitat present at project site.
Razorback Sucker	*Xyrauchen texanus*	LE	E	Perennial water courses and lakes.	No effect; no habitat present at project site.
Cactus Ferruginous Pygmy-owl	*Glaucidium brasilianum cactorum*	LE	E	Mature cottonwood/willow; mesquite bosques and Sonoran desert scrub	No effect; species not present at project site.

Status Codes:

Federal: U.S. Fish and Wildlife Service

LE = Listed Endangered
T = Threatened
CI = Taxa on which exist sufficient data to warrant listing as threatened or endangered
P = Officially proposed for listing

State: Arizona Game and Fish Department

E = State Endangered
T = State Threatened
C = State Candidate. Taxa for which threats are known or suspected but for which population declines from historical levels have not been documented
HS = Highly safeguarded protected native plants (AZ Dept. of Agriculture)

Appendix B. State-listed Species Potentially Occurring Near the Proposed Power Generation, Maricopa County, Arizona

Common Name	Scientific Name	State Status	Habitat[1]	Project Effects[2]
American Bittern	*Botaurus lentiginosus*	SC	Marshes	No effect; habitat not present on site
Least Bittern	*Ixobrychus exilis*	SC	Fresh and brackish marshes	No effect; habitat not present on site
Great Egret	*Ardea alba*	SC	Marshes, rivers and lake shores	No effect; habitat not present on site
Snowy Egret	*Egretta thula*	SC	Marshes and ponds	No effect; habitat not present on site
Black-bellied Whistling Duck	*Dendrocygna autumnalis*	SC	Fresh and brackish marshes; Pond and stream borders with floating veg, open woodland	No effect; habitat not present on site
Osprey	*Pandion haliaetus*	SC	Rivers and lakes	No effect; habitat not present on site
Mississippi Kite	*Ictinia mississippiensis*	SC	In trees near waterways, in forest, open woodland, semiarid rangeland	No effect; habitat not present on site
Northern Goshawk	*Accipiter gentilis*	SC	Chiefly mountain forests	No effect; habitat not present on site
Gray Hawk	*Asturina nitida*	SC	Riparian and open woodland and pasture land	No effect; habitat not present on site
Common Black-hawk	*Buteogallus anthracinus*	SC	Wooded streamsides and wet canyons	No effect; habitat not present on site
Ferruginous Hawk	*Buteo regalis*	SC	Open country, usually prairies, plains and badlands	No effect; winter habitat only
American Peregrine Falcon	*Falco peregrinus anatum*	SC	Nests on cliffs, canyons; also in cities	No effect; winter habitat only
Snowy Plover	*Charadrius alexandrinus*	SC	Edges of shallow alkaline lakes	No effect; habitat not present on site
Western Yellow-billed Cuckoo	*Coccyzus americanus*	SC	Open woodland, parks, riparian woodland	No effect; habitat not present on site
Belted Kingfisher	*Ceryle alcyon*	SC	Usually along permanent watercources, both fresh and brackish	No effect; habitat not present on site
Tropical Kingbird	*Tyrannus melancholicus*	SC	Open woodland, parks, suburbs	No effect; habitat not present on site
FISHES				
Colorado Squawfish	*Prychocheilus lucius*	SC	Permanent water	No effect; habitat not present on site
Spikedace	*Meda fulgida*	SC	Permanent water	No effect; habitat not present on site
MAMMALS				
California Leaf-nosed Bat	*Macrotus californicus*	SC	Desert with caves and mines; Forages widely	No effect; breeding habitat not present on site
Western Red Bat	*Lasiurus blossevillii*	SC	Wooded areas	No effect; habitat not present on site
Southern Yellow Bat	*Lasiurus ega*	SC	Wooded areas; Forages widely	No effect; breeding habitat not present on site
Spotted Bat	*Euderma maculatum*	SC	Unknown[3]	No effect; habitat does not appear to be present on site
Jaguar	*Panthera onca*	SC	Low mountains; chaparral, open forests	No effect; habitat not present on site
Chihuahuan Pronghorn	*Antilocapra americana mexicana*	SC	Open prairies and high sagebrush plains	No effect; habitat not present on site
REPTILES AND AMPHIBIANS				
Chiricahua Leopard Frog	*Rana chiricahuensis*	SC	Rocky streams in oak and mixed forests	No effect; habitat not present on site

Lowland Leopard Frog	*Rana yavapaiensis*	SC	Permanent water	No effect; habitat not present on site
Desert Tortoise	*Gopherus agassizii*	SC	Desert oases, riverbanks, washes, dunes, and rocky slopes	No effect; site is too far from water
Arizona Skink	*Eumeces gilberti arizonensis*	SC	Chaparral, couifers, pinon-pine, mequite-willow bottomlands	No effect; habitat not present on site
Narrow-headed Garter Snake	*Thamnophis rufipunctatus*	SC	Highly aquatic	No effect; habitat not present on site
PLANTS				
Hohokam Agave	*Agave murpheyi*	HS		No effect; plant not seen on site
Crested or Fan-top Saguaro	*Carnegiea gigantea*	HS	Desert scrub	Very few plants seen on site
Acuna Cactus	*Echinomastus erectocentrus acunensis*	HS		No effect; plant not seen on site
Lemon Fleabane	*Erigeron lemmoni*	HS		No effect; plant not seen on site

Key:

State Status: SC = Special Concern HS = Highly Safeguarded

Sources:

[1]AGFD 1996 and ADA 1999

[2]Potential presence of species based on the following sources: Hoffmeister 1986, Kearney and Peebles 1960, Monson and Phillips 1981, Stebbins1985.

[3]Habitat requirements for the Spotted Bat are not known, but appear to include cliffs and rocks (Hoffmeister 1986)

Cactus Ferruginous Pygmy-Owl Survey Form

☑ Project clearance survey
☐ Large area search (research) survey

USFWS Permit no. _____
Date (mm/dd/yyyy): 5/23/00 am

Surveyor(s): Tom Sankey / Gerald Crawford Affiliation/Company name: Malcolm Pirnie

Survey route name/description: Approximately 2 miles South of Gila river and 4 miles northwest of Gila Bend Arizona. The Survey began just west of Citrus Valley Road - Watermelon Road intersection, where the survey continued west across Sec. 19 and then the major & minor washes. Site access via 4WD vehicle

Land ownership: PBET Quad. name (Attach map): Smurr Quadrangle

Township/Range: T5S/R6W Section(s): 19 Elevation (ft.): min. 650 msl max. 687 msl

Route previously surveyed? Y N Date (mm/dd/yyyy): unknown CFPO detected (previous survey): Y N

Official Sunrise/Sunset time: 0522/1937 Habitat type (Brown 1994): Sonoran Desert Scrub-LCRS

UTM (start): E _____ N _____ UTM (end): E _____ N _____

START: Time (military): 0450 Temp (°C): 65°F Wind (mph): CALM Cloud (%): 0%

END : Time (military): 7:05 Temp (°C): 70°F Wind (mph): CALM Cloud (%): 0%

Moon visible during survey: Y (N) Moon phase: new ¼ (½) ¾ full

Number of call points completed: 8 Length of survey route (m): _____

Type of player used (brand and model): Olympus (Pearlcorder 5701)

CFPO detected? Y (N) (If Y, fill out detection form) Time detected: _____ Call point detected at: _____

Responses: (Describe behavior of other bird species responding to CFPO tape or detected pygmy-owl) Night hawks made close flyby when call was made. Gray Kingbird Desert Sparrow and Gila Woodpecker responded to call; However, no pygmy-owls detected near mobbing birds.

Habitat: (Note the habitat conditions with regard to tree/shrub/cacti density, canopy cover, dominant plant species, and topographic information)
Main wash - dominated by extreamely dense stand of Tamarisk
Second major north-south wash dominated by catclaw, Tamarisk, Dessert Ironwood & Blue Paloverde (some ≥ 6 inches)
occassional columar cacti
Minor washes - similar habitat as above

Additional comments: (Note disturbances, observed water sources, other birds observations, etc.)
See additional descriptions and photographs in Exhibit C "Areas of Biological Wealth and Rare/Endangered species Habitats," Exhibit B-5 - "Wetlands Delineation/Permitting", and Exhibit D - "Biological Resources."

Version 01/2000

Cactus Ferruginous Pygmy-owl Survey Form (field note sheet)

Survey route name: DIAMONDBACK 5/23 AM

Surveyor(s): Tom Sankey / Gerald Crawford. Date (mm/dd/yyyy): 5/23/00 AM

Call Point	Time (military)			Moon visible?	Weather			Avian response			UTM (if change in direction)	
	Start	End	Total (min.)		Wind	Cloud	Temp.	A/V	Spp. Code(s)	Behavior	E	N
1	0450	0505	15	N	CALM	CLEAR	68°F	—	—	—	UNAVAILABLE	UNAVAILABLE
2	0510	0523	13	↓	↓	↓	↓	—	—	—	↓	↓
3	0525	0540	15					—	—	—		
4	0550	0605	15					A/V	SEE PREV. PG.	MOBBING		
5	0606	0620	14					A/V	SEE PREV. PG.	MOBBING		
6	0621	0636	15					—		—		
7	0638	0650	12				↓	A/V	SEE PREV. PG.	MOBBING		
8	0651	0705	14	↓	↓	↓	70°F	A/V	SEE PREV. PG.	MOBBING	↓	↓

Version 01/2000

Cactus Ferruginous Pygmy-Owl Survey Form

☑ Project clearance survey
☐ Large area search (research) survey

USFWS Permit no. _____
Date (mm/dd/yyyy): 5/23/00 pm

Surveyor(s): Tom Sankey / Gerald Crawford Affiliation/Company name: Malcolm Pirnie
Survey route name/description: Approximately 2 miles South of Gila river and 4 miles northwest of Gila Bend Arizona. The survey began just west of Citrus Valley Road - Watermelon Road intersection, where the survey continued west across Sec. 19 and thru the major & minor washes. Site access via 4WD vehicl.
Land ownership: PBEI Quad. name (Attach map): Smurr Quadrangle
Township/Range: T5S/R6W Section(s): 19 Elevation (ft.): min. 650 msl max. 687 msl

Route previously surveyed? Y N Date (mm/dd/yyyy): unknown CFPO detected (previous survey): Y N
Official Sunrise/Sunset time: 0522/1937 Habitat type (Brown 1994): Sonoran Desert Scrub-LCRS
UTM (start): E _____ N _____ UTM (end): E _____ N _____
START: Time (military): ~~0450~~ 1515 Temp (°C): 108°F Wind (mph): CALM Cloud (%): 0%
END : Time (military): 2105 Temp (°C): 98 oF Wind (mph): CALM Cloud (%): 0%
Moon visible during survey: Y (N) Moon phase: new ¼ (½) ¾ full
Number of call points completed: 8 Length of survey route (m): _____
Type of player used (brand and model): Olympus (Pearlcorder 5701)

CFPO detected? Y (N) (If Y, fill out detection form) Time detected: _____ Call point detected at: _____
Responses: (Describe behavior of other bird species responding to CFPO tape or detected pygmy-owl) Night hawks made close flyby when call was made. Gray Kingbird Desert Sparrow and Gila Woodpecker responded to call; However, no pygmy-owls detected near mobbing birds.
Habitat: (Note the habitat conditions with regard to tree/shrub/cacti density, canopy cover, dominant plant species, and topographic information)
Main wash - dominated by extreamely dense stand of Tamarisk
Second major north-south wash dominated by catclaw, Tamarisk, Dessert Ironwood & Blue Paloverde (some ≥ 6inches)
occassional columar cacti
Minor washes - similar habitat as above
Additional comments: (Note disturbances, observed water sources, other birds observations, etc..)
See additional descriptions and photographs in Exhibit C "Areas of Biological Wealth and Rare/Endangered species Habitats" Exhibit B-5 - "Wetlands Delineation/Permitting", and Exhibit D - "Biological Resources."

Version 01/2000

Cactus Ferruginous Pygmy-owl Survey Form (field note sheet)

Survey route name: Diamond Back 5/23 pm

Surveyor(s): Tom Senkey / Gerald Crawford Date (mm/dd/yyyy): _____

Call Point	Time (military)			Moon visible?	Weather			Avian response			UTM (if change in direction)	
	Start	End	Total (min.)		Wind	Cloud	Temp.	A/V	Spp. Code(s)	Behavior	E	N
1	1845	1900	15	Y	Caln	Clear	108°F	–	–	–	unavailable	unavailable
2	1905	1920	15	↓	↓	↓	↓	–	–	–	↓	↓
3	1925	1940	15					–	–	Mobbing		
4	1945	2000	15					–	See prev. pg	–		
5	2005	2018	13					–	see prev. pg	Mobbing		
6	2028	2038	15				↓	A/V	–	Mobbing		
7	2043	2058	15	↓	↓	↓		A/V	–	Mobbing		
8	2103	2118	15				98°F	–	–	–	↓	↓

Version 01/2000

THE STATE OF ARIZONA

GAME & FISH DEPARTMENT

2221 West Greenway Road, Phoenix, Arizona 85023-4399 (602) 942-3000
www.gf.state.az.us

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Deputy Director
Steve K. Ferrell

May 2, 2000

Mr. Peter J. Carroll
Malcom Pirnie, Inc.
180 Grand Avenue, Suite 100
Oakland, California 94612-3754

Re: Special Status Species; Natural Gas-Fired Electrical Power Generating Facility Northwest of Gila Bend

Dear Mr. Carroll:

The Arizona Game and Fish Department (Department) has received your letter, dated March 27, 2000, regarding special status species for the above-referenced project and the following information is provided.

The Department's Heritage Data Management System (HDMS) has been accessed and current records do not indicate the presence of any special status species as occurring in the project vicinity.

At this time, the Department's comments are limited to the special status species information provided above. This correspondence does not represent the Department's evaluation of impacts to wildlife or wildlife habitat associated with activities occurring in the subject area. If you have any questions regarding the HDMS information provided in this letter, please contact me at (602) 789-3605.

Sincerely,

Bob Broscheid
Project Evaluation Program Coordinator
Habitat Branch

cc: Russ Engel, Habitat Program Manager, Region IV, Yuma

AGFD# 3-28-00(03)

An Equal Opportunity Reasonable Accommodations Agency

MALCOLM PIRNIE

TELEPHONE CONVERSATION RECORD

Name:	Bob Broscheid	**Date:**	08/01/2000
Company:	State of Arizona Game and Fish Depart.	**Time:**	5:30 pm (central)
From:	Gerald W. Crawford	**Telephone No.:**	602-789-3605
Project:	Proposed Gila Bend Power Station	**Project No.:**	3962001
Re:	Special Status Species; Natural Gas-Fired Electrical Power Generating Facility Northwest of Gila Bend		

Dear Mr. Broscheid:

This letter is to confirm our conversation via telephone concerning the submittal of documentation for the additional property acquired by Power Development Enterprises, Inc. (PDEI) at the subject site in Gila Bend, AZ. As you indicated, the Heritage Data Management System assessment performed for the 40-acre subject site included a five-mile radius buffer around the site. The additional 120 acres acquired by PDEI is within the five-mile radius of the original subject site; therefore no further submittal of documentation to your department is necessary.

If you have any questions or comments concerning this matter please feel free to contact Gary Bacon (602-231-5591), Tom Sankey (713-960-7419) or myself (713-960-7447).

Very truly yours,

MALCOLM PIRNIE, INC.

Gerald W. Crawford
Project Scientist

c: Gary Bacon
Tom Sankey

GWC
Enclosures
3962001

M:/3962001/letters/Storm.Ind.WW.NPDES/ Broscheid.doc

United States Department of the Interior

U.S. Fish and Wildlife Service
2321 West Royal Palm Road, Suite 103
Phoenix, Arizona 85021-4951
Telephone: (602) 640-2720 FAX: (602) 640-2730

In Reply Refer To:

AESO/SE
2-21-00-I-204

March 27, 2000

Mr. Peter J. Carroll
Senior Environmental Risk Manager
Malcolm Pirnie, Inc.
180 Grand Avenue, Suite 1000
Oakland, California 94612-3754

RE: Electrical Power Generation Facility in Maricopa County, Arizona

Dear Mr. Carroll:

This letter responds to your March 23, 2000, request for an inventory of threatened or endangered species, or those that are proposed to be listed as such under the Endangered Species Act of 1973, as amended (Act), which may potentially occur in your project area (Maricopa County). The enclosed list may include candidate species as well. We hope the enclosed county list of species will be helpful. In future communications regarding this project, please refer to consultation number 2-21-00-I-204.

The enclosed list of the endangered, threatened, proposed, and candidate species includes all those potentially occurring anywhere in the county, or counties, where your project occurs. Please note that your project area may not necessarily include all or any of these species. The information provided includes general descriptions, habitat requirements, and other information for each species on the list. Also on the enclosed list is the Code of Federal Regulations (CFR) citation for each list and is available at most public libraries. This information should assist you in determining which species may or may not occur within your project area. Site-specific surveys could also be helpful and may be needed to verify the presence or absence of a species or its habitat as required for the evaluation of proposed project-related impacts.

Endangered and threatened species are protected by Federal law and must be considered prior to project development. If the action agency determines that listed species or critical habitat may be adversely affected by a federally funded, permitted, or authorized activity, the action agency must request formal consultation with the Service. If the action agency determines that the planned action may jeopardize a proposed species or destroy or adversely modify proposed critical habitat, the action agency must enter into a section 7 conference with the Service. Candidate species are those which are being considered for addition to the list of threatened or endangered species. Candidate species are those for which there is sufficient information to support a proposal for listing. Although candidate

species have no legal protection under the Act, we recommend that they be considered in the planning process in the event that they become listed or proposed for listing prior to project completion.

If any proposed action occurs in or near areas with trees and shrubs growing along watercourses, known as riparian habitat, the Service recommends the protection of these areas. Riparian areas are critical to biological community diversity and provide linear corridors important to migratory species. In addition, if the project will result in the deposition of dredged or fill materials into waterways or excavation in waterways, we recommend you contact the Army Corps of Engineers which regulates these activities under Section 404 of the Clean Water Act.

The State of Arizona protects some plant and animal species not protected by Federal law. We recommend you contact the Arizona Game and Fish Department and the Arizona Department of Agriculture for State-listed or sensitive species in your project area.

The Service appreciates your efforts to identify and avoid impacts to listed and sensitive species in your project area. If we may be of further assistance, please feel free to contact Tom Gatz.

Sincerely,

Jacqueline Harson

for David L. Harlow
Field Supervisor

Enclosure

cc: John Kennedy, Habitat Branch, Arizona Game and Fish Department, Phoenix, AZ

LISTED, PROPOSED, AND CANDIDATE SPECIES FOR THE FOLLOWING COUNTY: MARICOPA

08/26/1999

1) LISTED

TOTAL= 13

NAME: **ARIZONA AGAVE** *AGAVE ARIZONICA*

STATUS: ENDANGERED CRITICAL HAB No RECOVERY PLAN: No CFR: 49 FR 21055, 05-18-1984

DESCRIPTION: HAS ATTRACTIVE ROSETTES OF BRIGHT GREEN LEAVES WITH DARK MAHOGANY MARGINS. FLOWER: BORNE ON SUB-UMBELLATE INFLORESCENCES.

ELEVATION RANGE: 3000-6000 FT.

COUNTIES: GILA, YAVAPAI, MARICOPA

HABITAT: TRANSITION ZONE BETWEEN OAK-JUNIPER WOODLAND & MOUNTAIN MAHOGANY-OAK SCRUB

SCATTERED CLONES IN NEW RIVER MOUNTAINS AND SIERRA ANCHA. USUALLY FOUND ON STEEP, ROCKY SLOPES. POSSIBLY MAZATAL MOUNTAINS. SHOULD BE LOOKED FOR WHEREVER THE RANGES OF Agave toumeyana var. bella AND Agave chrystantha OVERLAP.

NAME: **ARIZONA CLIFFROSE** *PURSHIA SUBINTEGRA*

STATUS: ENDANGERED CRITICAL HAB No RECOVERY PLAN: Yes CFR: 49 FR 22326 5-29-84

DESCRIPTION: EVERGREEN SHRUB OF THE ROSE FAMILY (ROSEACEAE). BARK PALE SHREDDY. YOUNG TWIGS WITH DENSE HAIRS. LEAVES 1-5 LOBES AND EDGES CURL DOWNWARD (REVOLUTE). FLOWERS: 5 WHITE OR YELLOW PETALS <0.5 INCH LONG.

ELEVATION RANGE: <4000 FT.

COUNTIES: GRAHAM YAVAPAI MARICOPA MOHAVE

HABITAT: CHARACTERISTIC WHITE SOILS OF TERTIARY LIMESTONE LAKEBED DEPOSITS.

WHITE SOILS OF TERITIARY LIMESTONE LAKEBED DEPOSITS CAN BE SEEN FROM A DISTANCE.

NAME: **ARIZONA HEDGEHOG CACTUS** *ECHINOCEREUS TRIGLOCHIDIATUS ARIZONICUS*

STATUS: ENDANGERED CRITICAL HAB No RECOVERY PLAN: No CFR: 44 FR 61556,10-15-1979

DESCRIPTION: DARK GREEN CYLINDROID 2.5-12 INCHES TALL, 2-10 INCHES IN DIAMETER, SINGLE OR IN CLUSTERS. 1-3 GRAY OR PINKISH CENTRAL SPINES LARGEST DEFLEXED AND 5-11 SHORTER RADIAL SPINES. FLOWER: BRILLIANT RED, SIDE OF STEM IN APRIL- MAY

ELEVATION RANGE: 3700-5200 FT.

COUNTIES: MARICOPA, GILA, PINAL

HABITAT: ECOTONE BETWEEN INTERIOR CHAPPARAL AND MADREAN EVERGREEN WOODLAND

OPEN SLOPES, IN NARROW CRACKS BETWEEN BOULDERS, AND IN UNDERSTORY OF SHRUBS. THIS VARIETY IS BELIEVED TO INTERGRADE AT THE EDGES OF ITS DISTRIBUTION WITH VARIETIES MELANCANTHUS AND NEOMEXICANUS CAUSING SOME CONFUSION IN IDENTIFICATION.

LISTED, PROPOSED, AND CANDIDATE SPECIES FOR THE FOLLOWING COUNTY: MARICOPA

08/26/1999

NAME: **LESSER LONG-NOSED BAT** *LEPTONYCTERIS CURASOAE YERBABUENAE*

STATUS: ENDANGERED CRITICAL HAB No RECOVERY PLAN: Yes CFR: 53 FR 38456, 09-30-88

DESCRIPTION: ELONGATED MUZZLE, SMALL LEAF NOSE, AND LONG TONGUE. YELLOWISH BROWN OR GRAY ABOVE AND CINNAMON BROWN BELOW. TAIL MINUTE AND APPEARS TO BE LACKING. EASILY DISTURBED.

ELEVATION RANGE: <6000 FT.

COUNTIES: COCHISE, PIMA, SANTA CRUZ, GRAHAM, PINAL, MARICOPA

HABITAT: DESERT SCRUB HABITAT WITH AGAVE AND COLUNMNAR CACTI PRESENT AS FOOD PLANTS

DAY ROOSTS IN CAVES AND ABANDONED TUNNELS. FORAGES AT NIGHT ON NECTAR, POLLEN, AND FRUIT OF PANICULATE AGAVES AND COLUMNAR CACTI. THIS SPECIES IS MIGRATORY AND IS PRESENT IN ARIZONA USUALLY FROM APRIL TO SEPTMBER AND SOUTH OF THE BORDER THE REMAINDER OF THE YEAR.

NAME: **SONORAN PRONGHORN** *ANTILOCAPRA AMERICANA SONORIENSIS*

STATUS: ENDANGERED CRITICAL HAB No RECOVERY PLAN: Yes CFR: 32 FR 4001, 03-11-67

DESCRIPTION: BUFF ON BACK AND WHITE BELOW, HOOFED WITH SLIGHTLY CURVED BLACK HORNS HAVING A SINGLE PRONG. SMALLEST AND PALEST OF THE PRONGHORN SUBSPECIES.

ELEVATION RANGE: 2000-4000 FT.

COUNTIES: PIMA, YUMA, MARICOPA

HABITAT: BROAD, INTERMOUNTAIN ALLUVIAL VALLEYS WITH CREOSOTE-BURSAGE & PALO VERDE-MIXED CACTI ASSOCIATIONS

TYPICALLY, BAJADAS ARE USED AS FAWNING AREAS AND SANDY DUNE AREAS PROVIDE FOOD SEASONALLY. HISTORIC RANGE WAS PROBABLY LARGER THAN EXISTS TODAY. THIS SUBSPECIES ALSO OCCURS IN MEXICO.

NAME: **DESERT PUPFISH** *CYPRINODON MACULARIUS*

STATUS: ENDANGERED CRITICAL HAB Yes RECOVERY PLAN: Yes CFR: 51 FR 10842, 03-31-1986

DESCRIPTION: SMALL (2 INCHES) SMOOTHLY ROUNDED BODY SHAPE WITH NARROW VERTICAL BARS ON THE SIDES. BREEDING MALES BLUE ON HEAD AND SIDES WITH YELLOW ON TAIL. FEMALES & JUVENILES TAN TO OLIVE COLORED BACK AND SILVERY SIDES.

ELEVATION RANGE: <5000 FT.

COUNTIES: LA PAZ, PIMA, GRAHAM, MARICOPA, PINAL, YAVAPAI, SANTA CRUZ

HABITAT: SHALLOW SPRINGS, SMALL STREAMS, AND MARSHES. TOLERATES SALINE & WARM WATER

CRITICAL HABITAT INCLUDES QUITOBAQUITO SPRING, PIMA COUNTY, PORTIONS OF SAN FELIPE CREEK, CARRIZO WASH, AND FISH CREEK WASH, IMPERIAL COUNTY, CALIFORNIA. TWO SUBSPECIES ARE RECOGNIZED: DESERT PUPFISH (C. m. macularis) AND QUITOBAQUITO PUPFISH (C. m. eremus).

NAME: **GILA TOPMINNOW** *POECILIOPSIS OCCIDENTALIS OCCIDENTALIS*

STATUS: ENDANGERED CRITICAL HAB No RECOVERY PLAN: Yes CFR: 32 FR 4001, 03-11-1967
DESCRIPTION: SMALL (2 INCHES), GUPPY-LIKE, LIVE BEARING, LACKS DARK SPOTS ON ITS FINS. BREEDING MALES ARE JET BLACK WITH YELLOW FINS.

ELEVATION RANGE: <4500 FT.

COUNTIES: GILA, PINAL, GRAHAM, YAVAPAI, SANTA CRUZ, PIMA, MARICOPA, LA PAZ

HABITAT: SMALL STREAMS, SPRINGS, AND CIENEGAS VEGETATED SHALLOWS

SPECIES HISTORICALLY OCCURRED IN BACKWATERS OF LARGE RIVERS BUT IS CURRENTLY ISOLATED TO SMALL STREAMS AND SPRINGS

NAME: **RAZORBACK SUCKER** *XYRAUCHEN TEXANUS*

STATUS: ENDANGERED CRITICAL HAB Yes RECOVERY PLAN: Yes CFR: 55 FR 21154, 05-22-1990; 59 FR 13374, 03-21-1994
DESCRIPTION: LARGE (UP TO 3 FEET AND UP TO 16 POUNDS) LONG, HIGH SHARP-EDGED KEEL-LIKE HUMP BEHIND THE HEAD. HEAD FLATTENED ON TOP. OLIVE-BROWN ABOVE TO YELLOWISH BELOW.

ELEVATION RANGE: <6000 FT.

COUNTIES: GREENLEE, MOHAVE, PINAL, YAVAPAI, YUMA, LA PAZ, MARICOPA (REFUGIA), GILA, COCONINO, GRAHAM

HABITAT: RIVERINE & LACUSTRINE AREAS, GENERALLY NOT IN FAST MOVING WATER AND MAY USE BACKWATERS

SPECIES IS ALSO FOUND IN HORSESHOE RESERVOIR (MARICOPA COUNTY).CRITICAL HABITAT INCLUDES THE 100-YEAR FLOODPLAIN OF THE RIVER THROUGH GRAND CANYON FROM CONFLUENCE WITH PARIA RIVER TO HOOVER DAM; HOOVER DAM TO DAVIS DAM; PARKER DAM TO IMPERIAL DAM. ALSO GILA RIVER FROM AZ/NM BORDER TO COOLIDGE DAM; AND SALT RIVER FROM HWY 60/SR 77 BRIDGE TO ROOSEVELT DAM; VERDE RIVER FROM FS BOUNDARY TO HORSESHOE LAKE.

NAME: **BALD EAGLE** *HALIAEETUS LEUCOCEPHALUS*

STATUS: THREATENED CRITICAL HAB No RECOVERY PLAN: Yes CFR: 60 FR 35999, 07-12-95
DESCRIPTION: LARGE, ADULTS HAVE WHITE HEAD AND TAIL. HEIGHT 28 - 38"; WINGSPAN 66 - 96". 1-4 YRS DARK WITH VARYING DEGREES OF MOTTLED BROWN PLUMAGE. FEET BARE OF FEATHERS.

ELEVATION RANGE: VARIES FT.

COUNTIES: YUMA, LA PAZ, MOHAVE, YAVAPAI, MARICOPA, PINAL, COCONINO, NAVAJO, APACHE, SANTA CRUZ, PIMA, GILA, GRAHAM, COCHISE
HABITAT: LARGE TREES OR CLIFFS NEAR WATER (RESERVOIRS, RIVERS AND STREAMS) WITH ABUNDANT PREY

SOME BIRDS ARE NESTING RESIDENTS WHILE A LARGER NUMBER WINTERS ALONG RIVERS AND RESERVOIRS. AN ESTIMATED 200 TO 300 BIRDS WINTER IN ARIZONA. ONCE ENDANGERED (32 FR 4001, 03-11-1967; 43 FR 6233, 02-14-78) BECAUSE OF REPRODUCTIVE FAILURES FROM PESTICIDE POISONING AND LOSS OF HABITAT, THIS SPECIES WAS DOWN LISTED TO THREATENED ON AUGUST 11, 1995. ILLEGAL SHOOTING, DISTURBANCE, LOSS OF HABITAT CONTINUES TO BE A PROBLEM. SPECIES HAS BEEN PROPOSED FOR DELISTING (64 FR 36454) BUT STILL RECEIVES FULL PROTECTION UNDER ESA.

LISTED, PROPOSED, AND CANDIDATE SPECIES FOR THE FOLLOWING COUNTY: MARICOPA

08/26/1999

NAME: **CACTUS FERRUGINOUS PYGMY-OWL** *GLAUCIDIUM BRASILIANUM CACTORUM*

STATUS: ENDANGERED CRITICAL HAB Yes RECOVERY PLAN: No CFR: 62 FR 10730, 3-10-97

DESCRIPTION: SMALL (APPROX. 7"), DIURNAL OWL REDDISH BROWN OVERALL WITH CREAM-COLORED BELLY STREAKED WITH REDDISH BROWN. SOME INDIVIDUALS ARE GRAYISH BROWN

ELEVATION RANGE: <4000 FT.

COUNTIES: MARICOPA, YUMA, SANTA CRUZ, GRAHAM, GREENLEE, PIMA, PINAL, GILA, COCHISE

HABITAT: MATURE COTTONWOOD/WILLOW, MESQUITE BOSQUES, AND SONORAN DESERTSCRUB

RANGE LIMIT IN ARIZONA IS FROM NEW RIVER (NORTH) TO GILA BOX (EAST) TO CABEZA PRIETA MOUNTAINS , (WEST). ONLY A FEW DOCUMENTED SITES WHERE THIS SPECIES PERSISTS ARE KNOWN, ADDITIONAL SURVEYS ARE NEEDED. CRITICAL HABITAT IN PIMA, COCHISE, PINAL, AND MARICOPA COUNTIES (64 FR 37419).

NAME: **MEXICAN SPOTTED OWL** *STRIX OCCIDENTALIS LUCIDA*

STATUS: THREATENED CRITICAL HAB No RECOVERY PLAN: Yes CFR: 56 FR 14678, 04-11-91

DESCRIPTION: MEDIUM SIZED WITH DARK EYES AND NO EAR TUFTS. BROWNISH AND HEAVILY SPOTTED WITH WHITE OR BEIGE.

ELEVATION RANGE: 4100-9000 FT.

COUNTIES: MOHAVE, COCONINO, NAVAJO, APACHE, YAVAPAI, GRAHAM, GREENLEE, COCHISE, SANTA CRUZ, PIMA, PINAL, GILA, MARICOPA

HABITAT: NESTS IN CANYONS AND DENSE FORESTS WITH MULTI-LAYERED FOLIAGE STRUCTURE

GENERALLY NESTS IN OLDER FORESTS OF MIXED CONIFER OR PONDERSA PINE/GAMBEL OAK TYPE, IN CANYONS, AND USE VARIETY OF HABITATS FOR FORAGING. SITES WITH COOL MICROCLIMATES APPEAR TO BE OF IMPORTANCE OR ARE PREFERED.

NAME: **SOUTHWESTERN WILLOW FLYCATCHER** *EMPIDONAX TRAILLII EXTIMUS*

STATUS: ENDANGERED CRITICAL HAB Yes RECOVERY PLAN: No CFR: 60 FR 10694, 02-27-95

DESCRIPTION: SMALL PASSERINE (ABOUT 6") GRAYISH-GREEN BACK AND WINGS, WHITISH THROAT, LIGHT OLIVE-GRAY BREAST AND PALE YELLOWISH BELLY. TWO WINGBARS VISIBLE. EYE-RING FAINT OR ABSENT.

ELEVATION RANGE: <8500 FT.

COUNTIES: YAVAPAI, GILA, MARICOPA, MOHAVE, COCONINO, NAVAJO, APACHE, PINAL, LA PAZ, GREENLEE, GRAHAM, YUMA, PIMA, COCHISE, SANTA CRUZ

HABITAT: COTTONWOOD/WILLOW & TAMARISK VEGETATION COMMUNITIES ALONG RIVERS & STREAMS

MIGRATORY RIPARIAN OBLIGATE SPECIES THAT OCCUPIES BREEDING HABITAT FROM LATE APRIL TO SEPTEMBER. DISTRIBUTION WITHIN ITS RANGE IS RESTRICTED TO RIPARIAN CORRIDORS. DIFFICULT TO DISTINGUISH FROM OTHER MEMBERS OF THE EMPIDONAX COMPLEX BY SIGHT ALONE. TRAINING SEMINAR REQUIRED FOR THOSE CONDUCTING FLYCATCHER SURVEYS. CRITICAL HABITAT ON PORTIONS OF THE 100-YEAR FLOODPLAIN ON SAN PEDRO AND VERDE RIVERS; WET BEAVER AND WEST CLEAR CREEKS, INCLUDING TAVASCI MARSH AND ISTER FLAT; THE COLORADO RIVER, THE LITTLE COLORADO RIVER, AND THE WEST, EAST, AND SOUTH FORKS OF THE LITTLE COLORADO RIVER, REFERENCE 60 CFR:62 FR 39129, 7/22/97.

LISTED, PROPOSED, AND CANDIDATE SPECIES FOR THE FOLLOWING COUNTY: MARICOPA

08/26/1999

NAME: **YUMA CLAPPER RAIL** *RALLUS LONGIROSTRIS YUMANENSIS*

STATUS: ENDANGERED CRITICAL HAB No RECOVERY PLAN: Yes CFR: 32 FR 4001, 03-11-67; 48 FR 34182, 07-27-83

DESCRIPTION: WATER BIRD WITH LONG LEGS AND SHORT TAIL. LONG SLENDER DECURVED BILL. MOTTLED BROWN ON GRAY ON ITS RUMP. FLANKS AND UNDERSIDES ARE DARK GRAY WITH NARROW VERTICAL STRIPES PRODUCING A BARRING EFFECT.

ELEVATION RANGE: <4500 FT.

COUNTIES: YUMA, LA PAZ, MARICOPA, PINAL, MOHAVE

HABITAT: FRESH WATER AND BRACKISH MARSHES

SPECIES IS ASSOCIATED WITH DENSE EMERGENT RIPARIAN VEGETATION. REQUIRES WET SUBSTRATE (MUDFLAT, SANDBAR) WITH DENSE HERBACEOUS OR WOODY VEGETATION FOR NESTING AND FORAGING. CHANNELIZATION AND MARSH DEVELOPMENT ARE PRIMARY SOURCES OF HABITAT LOSS.

Exhibit D
Biological Resources

PROPOSED PROJECT AND STUDY AREA

Power Development Enterprises, Inc. (PDEI) is preparing to construct a power generation station located near Gila Bend, Maricopa Co., Arizona. The proposed project located on a 160-acre site (three 40 acre and two 20 acre lots) will include, an access road on the southern perimeter, cooling water evaporation ponds, a dedicated storm water evaporation pond, CTG turbines, cooling tower, switch yard, transmission lines and an administrative facility site. The proposed project is located approximately 8 miles northwest of the community of Gila Bend and approximately 2 miles south of the Gila River at Watermelon and Citrus Valley Roads (T5S, R5W, Sec. 19). Elevations on site range from 650 ft. msl to 687 ft msl. The geology is characterized by alluvial gravels forming desert pavement on low hills throughout the area with several ephemeral washes and two major washes in Section 19 that drain water from the south into Painted Rock Reservoir.

BIOLOGICAL RESOURCES

Much of the site has been disturbed by land grading activities. In the undisturbed portions of the site, the natural vegetation is characterized as Sonoran Desert Scrub of the Lower Colorado River Valley Subdivision (Brown, 1982). The Creosotebush-White Bursage Community was the dominant cover type found on the site (See Photos 1-14 in Exhibit B-5 "Wetlands Delineation / Permitting"). Dominant vegetative species found in this cover type were Creosotebush *(Larria divaricata),* White Bursage *(Ambrosia dumosa),* Brittle Bush *(Encelia farinosa),* and Triangle-leaf Bursage *(Ambrosia deltoidea*). Common grasses found on the site include Big Galleta *(Hilaria rigida)* and three-awn *(Aristida spp.).* Cacti of the site include Diamond Cholla *(Opuntia ramosissima),* Pencil Cholla *(Opuntia arbuscula)* and very widely scattered Giant Saguaro *(Carnegiea gigantea).*

In the washes, desert riparian scrub is found (See Photos 1-14 in Exhibit B - Wetlands Delineation / Permitting"). Common riparian species dominating the washes include Blue Paloverde *(Cercidium floridum*), Tamarisk *(Tamarix chinensis),* Catclaw *(Acacia greggii)* and Desert Ironwood *(Olneya tesota).*

Tables D-1, D-2, D-3, and D-4 list many of the plants, mammals, birds, reptiles, and amphibians, which potentially occur on the proposed facility site. A Malcolm Pirnie biologist conducted an on-site field survey on March 7-8 and May 23, 2000 to assess the biological resources which occur on the site. Species identified on or immediately adjacent to the site include Pyrrhuloxia (*Cardinalis sinuatus*), Sage Sparrow (*Amphispiza belli*), Golden Eagle (*Aquila chrysaetos*), Red-tailed Hawk (*Buteo jamaicensis*), Gila Woodpecker (*Melanerpes uropygialis*), Gilded Flicker (*Colaptes chrysoides),* Desert Cottontail (*Sylvilagus audoboni*), Greater Roadrunner (*Geococcyx californianus),* American Kestrel (*Falco sparverius*), Great Horned Owl (*Bubo virginianus*), Harris

Hawk (*Parabuteo unicinctus*), House Sparrow (*Passer domesticus*), Coyote (*Canis latrans*), Mojave Rattlesnake (*Crotalus scutulatus*), Black-tailed Jackrabbit (*Lepus californicus*), Mourning Dove (*Zenaida marcroura*), White-winged Dove (*Zenaida asiatica*), and Lesser Nighthawk (*Chordeiles acutipennis*).

Potential Effects

Construction of the facility is not expected to have appreciable impacts to native vegetation or wildlife in the vicinity of the project site. Vegetation of the Lower Colorado River subdivision of the Sonoran Desert Scrub biome (Turner and Brown 1994) will be removed to facilitate project construction. This type vegetation is extensive within southern Arizona and the removal of a relatively small amount of vegetation for the project will not impact the vegetation community as a whole.

Wildlife currently using undisturbed portions of the project site will be directly and indirectly impacted by construction. Natural vegetation, similar to what currently exists on the project site, surrounds the area, so wildlife movement around the site will not be affected. Individuals that are fossorial, nocturnal, or not mobile will be directly impacted during construction. Following construction, wildlife will no longer be able to utilize the site for shelter, foraging, or raising young.

Impacts to wildlife populations in the vicinity of the project site are expected to be minimal. In addition, construction will not impact unique vegetation and wildlife corridors will not be affected.

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TABLE D-1

PLANT SPECIES THAT POTENTIALLY OCCUR IN THE PROJECT AREA

TABLE D-1
PLANT SPECIES THAT POTENTIALLY OCCUR IN THE PROJECT AREA

Common Name	Scientific Name[1]	Habitat Type[2]
Red Brome[3]	*Bromus rubens*	Roadside and waste places
Arabian Grass[3]	*Schismus arabicus*	Sandy soil
Mediterranean Grass[3]	*Schismus barbatus*	Open desert
Wingscale	*Atriplex canescens*	Sandy, sometimes saline soil
Quail Brush	*Atriplex lentiformes*	Moist or dry saline soil
All Scale	*Atriplex polycarpa*	Moderately saline to nonsaline soil
Russian Thistle[3]	*Salsola iberica*	Roadsides, overgrazed ranges
Yellow Tansy Mustard	*Descurainia pinnata*	Open ground
Catclaw Acacia	*Acacia greggii*	Along streams and washes
Velvet Mesquite	*Prosopis velutina*	Along watercourses, on grasslands and lower mountain slopes
Blue Paloverde	*Cerdidium floridum*	Along washes, on floodplains
Greasewood, Creosote Bush	*Larrea tridentata*	Dry plains and mesas
Corona de Cristo	*Castela emoryi*	Desert plains
Graythorn	*Ziziphus obtusifolia*	Dry mesas, plains, slopes
Alkali Pink, Globe Mallow	*Sphaeralcea spp.*	Roadsides, fields, edges of sandy washes, well-drained slopes
Tamarisk	*Tamarix chinensis*	Along streams
Wolf berry	*Lycium spp.*	Washes and dry slopes in desert or semidesert areas
Desert Willow	*Chilopsis linearis*	Along washes in deserts and foothills
Triangle-leaf Bursage	*Ambrosia deltoidea*	Plains and mesas
White Bursage	*Ambrosia dumosa*	Dry plains and mesas
Desert Broom	*Baccharis sarothroides*	Hillsides and bottomlands, sometimes in saline soil
Alkali Goldenbush	*Isocoma acradenius*	Various habitats, often in saline soil
Jimmy Weed	*Isocoma heterophyllus*	Mesas and plains, often in saline soil and on overgrazed rangeland
Prickly Lettuce[3]	*Lactuca serriola*	Waste land and roadsides

Sources:
[1]Lehr 1978
[2]Kearney and Peebles 1960
[3]Not native to Arizona

TABLE D-2

MAMMALS LIKELY TO BE PRESENT AT THE PROJECT SITE

TABLE D-2
MAMMALS LIKELY TO BE PRESENT AT THE PROJECT SITE

Common Name[1]	Scientific Name	Habitat Type[1]
Desert Shrew	*Notiosorex crawfordi*	Desert with adequate hiding/nest cover
California Leaf-nosed Bat	*Macrotus californicus*	Desert with caves or mineshafts
Lesser Long-nosed Bat	*Leptonycteris curasoae*	Desert with agave or saguaro; summer only
Western Pipistrelle	*Pipstrellus hesperus*	Desert with nearby cliffs or rock outcrops; summer only
Big Brown Bat	*Eptesicus fuscus*	Pine forests to desert with caves, mine shafts, or saguaro cavities for roosting; summer only
Pallid Bat	*Antrozous pallidus*	Desert with buildings, bridges, mine shafts, or cliffs for roosting
Brazilian Free-tailed Bat	*Tadarida brasiliensis*	Desert with caves or mine shafts
Desert Cottontail	*Sylvilagus audubonii*	Desert to juniper woodlands in areas with dense shrub cover
Black-tailed Jackrabbit	*Lepus californicus*	Desert to juniper woodlands
Harris' Antelope Squirrel	*Ammospermophilus harrisii*	Saltbush-creosote bush-bursage desert
Round-tailed Ground Squirrel	*Spermophilus tereticaudus*	Creosote bush-saltbush desert
Botta's Pocket Gopher	*Thomomys bottae*	All environments with adequate palnt cover
Arizona Pocket Mouse	*Perognathus amplus*	Sonoran, and Mojave deserts
Little Pocket Mouse	*Perognathus longimembris*	Sandy creosote bush desert
Desert Pocket Mouse	*Perognathus penicillatus*	Sonoran desert
Rock Pocket Mouse	*Chaetodipus intermedius*	Rocky areas of Sonoran desert
Desert Kangaroo Rat	*Dipodomys deserti*	Sandy areas of Sonoran desert
Merriam's Kangaroo Rat	*Dipodomys merriami*	Creosote bush-mesquite desert
Western Harvest Mouse	*Reithrodontomys megalotis*	Wide variety of environments with grassy or weedy areas
Cactus Mouse	*Peromyscus eremicus*	Variety of desert environments
Southern Grasshopper Mouse	*Onychomys torridus*	Desert with mesquite and cacti
Arizona Cotton Rat	*Sigmodon arizonae*	Desert with mesquite
White-throated Wood Rat	*Neotoma albigula*	Wide variety of desert environments
Desert Wood Rat	*Neotoma lepida*	Variety of environments from creosote bush to pine
Coyote	*Canis latrans*	All environments
Kit Fox	*Vulpes macrotis*	Desert with sandy or diggable clay soils
Gray Fox	*Utrocyon cinereoargenteus*	Wide variety of environments including open desert
Collared Peccary	*Tayassu tajacu*	Sonoran desert with shrub and tree thickets and cactus patches
Mule Deer	*Odocoileus hemionus*	Variety of environments from desert to pine forests

Source:
[1]Hoffmeister 1986

TABLE D-3

BIRD SPECIES THAT POTENTIALLY OCCUR IN THE PROJECT AREA

TABLE D-3
BIRD SPECIES THAT POTENTIALLY OCCUR IN THE PROJECT AREA[1]

Common Name	Scientific Name[2]	Habitat Type[3]
Red-tailed Hawk	*Buteo jamaicensis*	Habitat variable
American Kestrel	*Falco sparverius*	Open country
Gambel's Quail	*Callipepla gambelii*	Desert scrublands and thickets
White-winged Dove	*Zenaida asiatica*	Dense mesquite, mature citrus groves, riparian woodlands, saguaro-paloverde desert
Mourning Dove	*Zenaida macroura*	Wide variety of habitats
Greater Roadrunner	*Geococcyx californianus*	Scrub desert, mesquite groves
Great-horned Owl	*Bubo virginianus*	Habitat variable
Burrowing Owl	*Athene cunicularia*	Open country
Lesser Nighthawk	*Chordeiles acutipennis*	Dry open country, scrubland, desert
Common Poorwill	*Phalaenoptilus nuttali*	Sagebrush and chaparral slopes
Costa's Hummingbird	*Calypte costae*	Desert washes, dry chaparral
Gila Woodpecker	*Melanerpes uropygialis*	Scrub desert, cactus country, streamside woods
Gilded Flicker	*Colaptes chrysoides*	Low desert woodland, saguaros
Ash-throated Flycatcher	*Myiarchus cinerascens*	Wide variety of habitats
Western Kingbird	*Tyrannus verticalis*	Dry open country
Loggerhead Shrike	*Lanius ludovicianus*	Open or brushy areas
Common Raven	*Corvus corax*	Variety of habitats
Verdin	*Auriparus flaviceps*	Mesquite and other dense thorny shrubs of southwestern desert
Cactus Wren	*Campylorhynchus brunneicappilus*	Cactus country and arid hillsides and valleys
Black-tailed Gnatcatcher	*Polioptila melanura*	Desert resident, partial to washes
Northern Mockingbird	*Mimus polyglottos*	Variety of habitats
European Starling	*Sturnis vulgaris*	Wide variety of habitats
Curve-billed Thrasher	*Toxostoma curvirostre*	Canyons, semiarid brushland
Phainopepla	*Phainopepla nitens*	Mesquite brushland
Lucy's Warbler	*Vermivora luciae*	Mesquite and cottonwoods along watercourses
Black-throated Sparrow	*Amphispiza bilineata*	Desert, especially rocky slopes
Northern Cardinal	*Cardinalis cardinalis*	Taller and denser Lower Sonoran brush[4]
House Finch	*Carpodacus mexicanus*	Semiarid lowlands

Sources:
[1]Potential for occurrence based on Monson and Phillips 1981 and Witzeman et al. 1997
[2]American Ornithologists' Union 1998
[3]National Geographic Society 1999
[4]Monson and Phillips 1981

TABLE D-4

REPTILE AND AMPHIBIAN SPECIES THAT POTENTIALLY OCCUR IN THE PROJECT AREA

TABLE D-4
REPTILE AND AMPHIBIAN SPECIES THAT POTENTIALLY OCCUR IN THE PROJECT AREA[1]

Common Name	Scientific Name	Habitat Type[2]
TOADS		
Couch Spadefoot	*Scaphiopus couchi*	Shortgrass plains, mesquite savannah, creosote bush desert, and other areas of low rainfall
Western Spadefoot	*Schismus hammondii*	Washes, floodplains, alluvial fans, playas, alkali flats
Sonoran Desert Toad	*Bufo alvarius*	Mesquite-creosote bush lowlands, arid grasslands, mountain canyons
Red-spotted Toad	*Bufo punctatus*	Desert streams, open grassland and scrubland, oak woodland, rocky canyons
Great Plains Toad	*Budo cognatus*	Grasslands, creosote bush desert, mesquite woodland, sagebrush plains
TORTOISES		
Desert Tortoise	*Gopherus agassizii*	Desert oases, riverbanks, washes, dunes, rocky slopes
LIZARDS		
Western Banded Gecko	*Coleonyx variegatus*	Variety of habitats, from creosote bush flats to piñon-juniper belt
Desert Iguana	*Disposaurus dorsalis*	Creosote bush desert
Zebratail Lizard	*Callisaurus draconoides*	Washes, desert pavement, hardpan
Desert Spiny Lizard	*Sceloporus magister*	Arid/semiarid plains and lower mountain slopes
Side-blotched Lizard	*Uta stanburiana*	Sand, rock, hardpan or loam with grass, shrubs, and scattered trees
Desert Horned Lizard	*Phrynosoma platyrhinos*	Sandy flats, alluvial fans, washes, dune edges
Western Whiptail	*Cnemidophorus tigris*	Desert and semiarid areas with sparse vegetation
Gila Monster	*Heloderma suspectum*	Shrubby, grassy, and succulent desert
SNAKES		
Spotted Leaf-nosed Snake	*Salvadora hexalepis*	Open desert plains
Coachwhip	*Masticophis flagellum*	Variety of habitats
Western Patch-nosed Snake	*Salvadora hexalepis*	Grasslands, chaparral, sagebrush plains, piñon-juniper woodland, desert scrub
Banded Sand Snake	*Chilomeniscus cinctus*	Mesquite-creosote bush and paloverde-saguaro associations
Night Snake	*Hypsiglena torquata*	Variety of habitats
Arizona Coral Snake	*Micruroides euryxanthus*	Arid and semiarid thornscrub, brushland, woodland, grassland, farmland
Western Diamondback Rattlesnake	*Crotalus atrox*	Variety of habitats in arid and semiarid regions
Sidewinder	*Crotalus cerastes*	Sand hummocks topped with creosote bushes, mesquite, or other desert plants; also windswept flats, barren dunes, hardpan, rocky hillsides

TABLE D-4
REPTILE AND AMPHIBIAN SPECIES THAT POTENTIALLY OCCUR IN THE PROJECT AREA[1]

Common Name	Scientific Name	Habitat Type[2]
Mojave Rattlesnake	*Crotalus scutulatus*	Barren desert, grassland, open juniper woodland, scrub, esp. scattered creosote bush and mesquite

Sources:
[1]Potential for occurrence based on Stebbins 1985
[2]Stebbins 1985

EXHIBIT E-1

SCENIC AREA ASSESSMENT

SCENIC AREAS ASSESSMENT

An assessment of the inherent aesthetics of the landscape, public value of viewing the landscape, and sensitivity to visual effects from the proposed Gila Bend Power Generation Station siting was conducted by Malcolm Pirnie, Inc.

Existing visual conditions, scenic quality and visual sensitivity were evaluated during several site visits conducted in March 2000. The project area, Lot 3, Section 19, Township 5 South, Range 5 West, Gila and Salt River Meridian, Maricopa County, Arizona is located within the Gila Bend basin. The subject property is located within the Basin and Range Physiographic Province of the state of Arizona and is characterized by broad, deep alluvial-filled basins bounded by block-faulted mountains. Topography within and surrounding the project area is characterized as rolling with an elevation across the area ranging from 650 to 680 feet above mean sea level. The 40-acre project area is located approximately 2 miles south of the Gila River and 8 miles northwest of Gila Bend, Arizona. The section directly south of the project area is part of the Gila Bend Solid Waste Landfill.

In the undisturbed portions of the site, the natural vegetation is characterized as Sonoran Desert Scrub of the Lower Colorado River Valley Subdivision. The Creosotebush-White Bursage Community was the dominant cover type found on the site. In the several small washes, and larger southwest-to-northeast trending wash, desert riparian scrub is found.

Permanent cultural modifications visible in and around the project area include residential dwellings (all abandoned except one), paved and unpaved road surfaces, agricultural machinery, abandoned cars / appliances and a water tank. These have significantly altered the natural setting.

Scenic Quality

The overall scenic quality of the project area can be described as non-distinctive based upon a lack of significantly varied topography, rock outcroppings, surface water bodies, or floral diversity. **Exhibits G-1 and G-2** demonstrate how the constructed power generation facility will blend with the existing natural environment.

Sensitive Viewpoints

The sensitivity of a viewpoint reflects the degree of public concern for change in the scenic quality of the landscape visible from that location. Sensitivity is measured by evaluating the type of viewpoint and viewer concern for change in the landscape, volume of use, viewing duration and the influence of adjacent land use. No significant sensitive viewpoints associated with the project area have been identified.

Residences: The closest population center to the proposed site is the Town of Gila Bend (population approximately 1,700), about 5 miles to the southeast of the project area. A dirt road borders the property to the west. Native desert borders the property to the south and east. Fallow agricultural land borders the project area to the north.

The project area will be annexed into the City of Gila Bend. However, based on the project site, adjacent to the solid waste landfill, no large-scale residential or commercial development is expected to occur in the foreseeable future in the proximity of the project area. Based on the lack of population density in the vicinity of the project area, visual impacts to the population are expected to be minimal.

Travel routes: Interstate 8 is located approximately 3 miles south of the proposed site. The project area is not expected to create a significant visual impact to travelers on Interstate 8.

Mitigation

A factor in selection of architectural coatings for the project structures will be considered of how the facility can best blend in the natural landscape.

EXHIBIT E-2

CULTURAL RESOURCE ASSESSMENT

CULTURAL RESOURCE ASSESSMENT FOR THE GILA BEND POWER GENERATING PLANT, MARICOPA COUNTY

Prepared by Barbara S. Macnider
Archaeological Consulting Services, Ltd.
ACS Project 00-14
May 3, 2000

The following report documents the cultural resources in the area of the proposed Gila Bend Power Plant. The goal of the study was to determine the nature of cultural resources that would be impacted by the construction of the power plant. This study was based on the review of prior research and documentation of cultural resources in the area and a visual inspection of the project area, which is located in Sections 19 (NW4NE4, N2NW4, SW4NW4, and E2SW4) and 30 (N4) of Township 5 South, Range 5 West.

The literature review and file check was performed for all cultural resources within a 2-mile radius of the project area. Information was gathered from the State Historic Preservation Office (SHPO), and the Arizona State Museum (ASM).

Cultural History Background

Prehistoric peoples occupied southwestern Arizona and the Gila Bend area for thousands of years. Some of the oldest human artifacts in the New World, perhaps from before 30,000 B.C. to 10,000 B.C., are claimed to be in the region (Hayden 1976; McGuire and Schiffer 1982:160). This ancient culture, often referred to as Malpais, is identified by stone tools, such as choppers and scrapers, that show heavy patination known as desert varnish, tools made of marine shell, cleared areas (sleeping circles), trails, shrines, and intaglios (Hayden 1976, 1982). Sites of this period are found on old landforms near old water sources.

The Malpais period was followed by the Paleoindian period. Remains of this big-game hunting culture were present in the lowest cultural deposits at Ventana Cave and radiocarbon dated to 9,350 B.C. (± 1200). The various phases of these early lithic industries are often identified by diagnostic projectile points, such as the lanceolate Clovis and Folsom points (Hayden 1976). Several isolated Paleoindian points have been found near Gila Bend (Dart 1989; Olszewski 1996:18). Another ancient culture, known as San Dieguito, was present in southwestern Arizona. The earliest San Dieguito phase—the only one found near Gila Bend—lacked projectile points; later phases included stemmed and shouldered points such as Lake Mohave and Silver Lake types (McGuire and Schiffer 1982:167–169; Rogers 1939, 1966).

Archaic period populations (ca. 7,500 B.C.–A.D. 1) were also mobile hunter-gatherers. They gathered seasonally available native plants and hunted the same species of animals that exist in the environment today. Southwestern Arizona may have been a zone of overlap among Archaic groups, known as Amargosa in the west and Cochise in the east, who ranged from southeastern California to southern Arizona. Some late Archaic groups in southern Arizona began to focus on agriculture or horticulture as part of their subsistence, but no evidence for this shift was found in the Gila Bend area. Some groups living in nonriverine areas appear to have maintained an "Archaic" way of life long after other groups had adopted more sedentary agriculture-based lifestyles (Hayden 1967).

Following the Archaic, the Formative period (ca. A.D. 1 –1450) emerged as populations adopted agriculture and developed pottery. Regional cultures continued to diverge, with the Patayan in the west and the Hohokam in the east.

By A.D. 900, agriculture was well established among the Patayan. Riverine villages were supported by floodwater farming, fishing, gathering, and hunting. Trade with upland nonagricultural groups may have contributed to the economic security of riverine and upland groups (Stone 1991:61–66). Similar economic patterns apparently lasted into the Historic period. The Patayan culture (also known as Yuman and

Hakataya) has been divided into Patayan phases based primarily on associated Hohokam decorated pottery types. Patayan groups produced plain and decorated Lower Colorado Buff Ware pottery (Waters 1982a, 1982b), and their sites are found in both riverine and nonriverine locations. Patayan groups are thought to have occupied the Lower Gila River east to Gila Bend by A.D. 900–1000 (Schroeder 1961; Wasley and Johnson 1965). The Patayan pattern has not been well studied, certainly not to the extent of the dominant cultural pattern in the Gila Bend area—the Hohokam.

In the Early Formative period (A.D. 1–800), the Hohokam developed pottery and increased their use of agriculture. Innovations dating to the Late Formative period (A.D. 800–1100) had lasting effects on land use and village patterns. Development of agriculture resulted in population growth, large permanent villages, and ritual elaboration, culminating in an increased social complexity. A network of actively trading villages developed containing ceremonial ball courts and mounds (Doyel 1981, 1991a; Wilcox and Sternberg 1983).

On the southwestern frontier of the Hohokam region, several important villages were near Gila Bend (Wasley and Johnson 1965). Sizeable settlements associated with irrigation agriculture were present by A.D. 900. Through time, large Hohokam settlements took on distinctive characteristics such as; large trash mounds, platform mounds, plazas, ball courts, cemeteries, and distinctive residential patterns (Gregory 1991). Though not entirely understood, platform mounds are a type of public architecture consisting of large earthen features that played important roles in Hohokam community organization. The function of these features continues to be a subject of debate.

The Classic period (A.D. 1100–1500) was a time of change. Village organization and settlement patterns underwent radical restructuring, suggesting the development of new social relationships and alliances. The presence of Tanque Verde Red-on-brown at many Gila Bend sites suggests new alliances or increased trade with groups to the south and east. In the Phoenix area, increased reliance on intensive canal irrigation agriculture had a profound influence on Hohokam culture. Subsistence diversification and reliance on nonirrigation agriculture was emphasized in other areas, such as Papagueria. The pattern for the Gila Bend area remains unclear, but subsistence and settlement may have varied according to local conditions.

The abandonment of some villages and the construction of elevated settlements such as the Forteleza (Greenleaf 1975) indicate hostilities, or the threat thereof, were associated with this period. Other villages and special-function sites dating to the Classic period were located along the Gila River (Wasley and Johnson 1965).

The Classic period ended by A.D. 1500. Sites postdating A.D. 1450 are rare. Small sites lacking Classic period traits (massive adobe architecture, compounds, polychrome pottery, etc.) have been discovered in the Phoenix area and may represent a transition between the late Classic period and the less complex cultural patterns of the Protohistoric period (A.D. 1500–1700) (Doyel 1991b). Due to a lack of excavated sites, the picture for this period at Gila Bend remains unclear.

When first visited by non-Indians, the Lower Gila River and Gila Bend areas were home to several distinct native groups. Yuman-speaking peoples, including the Opa, Kaveltcadom, Halchedoma, Maricopa, Mohave, Yavapai, and other groups, occupied the Lower Colorado and Lower Gila areas (Russell 1975; Spicer 1962; Spier 1970), while speakers of the Piman (O'odham) language occupied the Salt-Gila river confluence and the arid Papagueria to the south. The Hia Ced O'odham—also known as the Sand Papago—occupied the arid area to the southwest of Gila Bend, where they traded for pottery and commingled with Yuman speakers. The Yuman were seasonal agriculturalists and hunter-gatherers. The O'odham had settled villages and a complex social organization based on a diversity of land use strategies and agricultural traditions. The people of the San Lucy District of the Tohono O'odham Nation are descendants of this tradition. Warfare among the O'odham, Yuman, and Apache was endemic until 1860 (Doyel 1989; Kroeber and Fontana 1986; Spier 1970; Winter 1973). Between 1830 and 1880, the Apache used a route through Gila Bend to raid into Mexico and Papagueria (McClellan and Vogler 1977:43).

Oatman Flat, the scene of a massacre of a white family by marauding Apache in 1851, is 20 km west of the Gila Bend Power Plant project area.

Consistent with its role in prehistory, Gila Bend was important in the Historic period as a link in cross-country travel. The Spanish missionary-explorers, the Forty-niners and other immigrants, the overland stage companies, and the railroad passed through Gila Bend. Father Eusebio Kino visited the area in 1699 looking for an overland route to California. A nearby rancheria named Santos Apostales San Simon y Judas was established by Father Francisco Garces in 1774. The Gila Bend Stage Station, in the original town of Gila Bend, was destroyed by Indians in the 1850s and was then rebuilt on the site of Tezotal, a Maricopa Indian village (Berge 1968:236).

The railroad was completed through the area in 1880, and the Town of Gila Bend was forced to move from near the river to its present site. O'odham workers helped build the railroad through the area, and the Gila Bend Indian Reservation (San Lucy District) was established in 1884 for them. Yuman-speaking Indians were located on reservations to the east and west of Gila Bend. Non-Indian sites were associated with homesteading, mining, and ranching. Other significant historic Indian and non-Indian sites include irrigation canals, road segments, the railroad, and other assorted structures (Berge 1968; Teague and Baldwin 1978:48).

Previous Research

Many archaeological surveys have been conducted near the Gila Bend Power Plant (Table 1). The surveys recorded archaeological sites of various ages and cultural affiliations from prehistoric to recent historic. The following studies are representative of the findings in the area and a summary of relevant sites can be found in Table 2.

Table 1. Prior Cultural Resource Surveys.

Project Name	Acreage	Sites*	Reference
Painted Rocks Reservoir: Salvage Archaeology	200 +	Z:1:11–13	Wasley and Johnson 1965
Painted Rock Reservoir Project: Preliminary Survey	~ 4,100	T:13:42–44, 48	Teague and Baldwin. 1978
Painted Rock Reservoir	~ 6,000	T: 13:22, 30, 31, 35–51; T:14:8, 10 and 32; Z:1:8, 11, 12, 15–19; Z:2:2, 3, 12–15	Bergin and Bruder 1988
Painted Rock Reservoir Project Survey and Management Plan	4,140	T:13:71–118	Bernard-Shaw 1990; Dart et al. 1989
Proposed Materials Source Pit	50	Z:1:25–28	Wright 1993
Gila Bend Landfill Survey and Data Recovery	550	Z:1:39–42	Doyel et al. 1995, 1996

*All site numbers begin with AZ and end with (ASM).

Between 1925 and 1960 Malcolm Rogers surveyed extensively over southwestern Arizona, northern Mexico, and southern California and recorded 6,000 sites, many of which he attributed to the Preceramic period (McGuire and Schiffer 1982:439–440). By walking old trails, he was able to connect sites. He determined that cleared areas (or sleeping circles), trails, and hearths were associated with the early lithic industries (Rogers 1939, 1966). Ancient stone tools were present in the 11,000-year deposits at Ventana Cave, 100 km south of the project area (Haury 1975; McGuire and Schiffer 1982:164–171).

Gila Pueblo surveyed the southern Southwest in search of the "Red-on-buff" culture, named after the distinctive Hohokam pottery (Gladwin and Gladwin 1929, 1930). This extensive survey recorded 247 sites. The western range of the Red-on-buff culture was set at Bouse, 150 km northwest of Gila Bend (McGuire and Schiffer 1982:439).

Table 2. Nearby Previously Recorded Cultural Resources.			
ASM Site No.	**Description**	**Status**	**Reference**
T:13:48	Patayan? lithic and ceramic scatter	Site has been inundated	Bergin and Bruder 1988; Teague and Baldwin 1978
T:13:43	Metate fragments and chipped flakes	Site not relocated in 1986	Bergin and Bruder 1988; Teague and Baldwin 1978
T:13:42	Cobble tools and primary flakes, some heavily patinated	Site not relocated in 1986	Bergin and Bruder 1988; Teague and Baldwin 1978
T:13:44	Lower Colorado Buffware, Gila Polychrome, primary flakes	Site flooded and reclaimed for cultivation, small portion of original left in 1986	Bergin and Bruder 1988; Teague and Baldwin 1978
Z:1:7	Hohokam sherd scatter with assorted stone tool and hearths	Site lost to erosion by 1960	N/A
Z:1:11	Hohokam sherds eroding from surface	Excavated	Wasley and Johnson 1965
Z:1:12	Lower Colorado River Buff	Excavated	Wasley and Johnson 1965
Z:1:13	Historic Papago redware and plainware ceramics	Eight structures excavated	Wasley and Johnson 1965
Z:1:15	Lithic scatter	Excavated	Bergin and Bruder 1988
Z:1:16	Lithic scatter	Excavated	Bergin and Bruder 1988
Z:1:17	Lithic scatter and quarry	Site destroyed by recent/modern quarrying activities	Bergin and Bruder 1988; Teague and Baldwin 1978
Z:1:18	Historic mine shaft	Site inundated and covered with overgrown tamarisk	Bergin and Bruder 1988; Teague and Baldwin 1978
Z:1:25	Prehistoric artifact scatter	Recommended as eligible	Wright 1993
Z:1:26	Prehistoric lithic scatter	Recommended as eligible	Wright 1993
Z:1:27	Prehistoric artifact scatter	Recommended as eligible	Wright 1993
Z:1:28	Prehistoric trail segment	Recommended as eligible	Wright 1993
Z:1:39	Extensive lithic procurement and processing	Recommended as eligible; data recovery completed	Doyel et al 1996
Z:1:41	Extensive lithic procurement and processing	Recommended as eligible; data recovery completed	Doyel et al 1996
Z:1:42	Extensive lithic procurement and processing	Recommended as eligible; data recovery completed	Doyel et al 1996
Z:1:40	Trash dump	Recommended as not eligible	Doyel et al 1996

Development of Painted Rock Reservoir provided impetus for archaeological research. The reservoir management area covers 85,000 acres with 60,000 acres for inundation (Dart et al. 1989:1). The central portion of the reservoir is 5 km north of the Gila Bend Power Plant. Surveys for the Interagency Salvage Program (Breternitz 1957; Schroeder 1961; Vivian 1965; Wasley and Johnson 1965) yielded numerous prehistoric and historic sites. Between 1958 and 1961 Arizona State Museum staff conducted excavations at 18 sites in and around the proposed reservoir, including the Preclassic period Gatlin, Rock Ball Court, and Citrus sites (Wasley 1960; Wasley and Johnson 1965) and the Classic period Fortified Hill site (Greenleaf 1975). These sites contained ball courts, trash mounds, plazas, houses, cemeteries, masonry structures, petroglyphs, and a variety of domestic and ceremonial artifacts. Two seasons were spent excavating a ceremonial platform mound at the Gatlin site, 11 km upriver from the Gila Bend Power Plant site.

Since 1970, surveys and test excavations have been undertaken as part of cultural resources management programs for the reservoir (Bergin and Bruder 1988; Bernard-Shaw 1990; Bruder and Spain 1986; Teague 1981; Teague and Baldwin 1978; Wallace 1989). An overview (Vogler 1976) and a historic properties

management plan (Dart et al. 1989) have been completed. In total, 184 prehistoric and historic sites are known in the reservoir area.

A stratified 10 percent sample survey of 41,000 acres yielded 30 sites (Teague and Baldwin 1978). Habitations, rock circles, lithic scatters, and one probable Archaic site were located. No sites were present in the survey samples near the Gila Bend Power Plant site, but a hamlet or village site dating to the Late Formative period (A.D. 700–1100) was located approximately 3 mi to the northwest (Teague 1981). Systematic, intensive survey of 4,140 acres surrounding the Rock Ball Court site inventoried 47 sites. Most were Hohokam-affiliated and included habitation, geoglyph, petroglyph, trail, and limited activity sites- others included rockpiles and rock cairns (Bernard-Shaw 1990).

In 1996, Archaeological Consulting Services, Ltd. surveyed and performed data recovery prior to construction of the Gila Bend Landfill, located directly south of the Gila Bend Power Plant (Doyel et al. 1995, 1996). Three prehistoric sites and one possibly historic site were identified. The prehistoric sites were low-density lithic scatters. The sites were used by the prehistoric people for several thousand years to obtain raw materials for stone tools and other flaked-stone items. Horticulture or harvesting and processing of native plants also occurred in the vicinity. The lithic scatters probably continued north to the terrace edge, including across the Gila Bend Power Plant Project area. The possibly historic site was a small, multiple episode trash dump; data recovery investigations determined the site was modern.

Potential for Significant Cultural Resources

The review of prior research in the area provided a basis for gauging the potential for the presence of significant prehistoric and historic archaeological sites in the Gila Bend Power Plant area. The Gila Bend Landfill data recovery results were the most relevant for determining the potential for prehistoric cultural resources in the project area (Doyle et al. 1996). Historic maps provided pertinent data about the historic resources.

The Gila Bend Landfill study area overlaps with the southern end of the Gila Bend Power Plant area. Specifically, the power plant area includes the north quarter of Section 30 in Townships 5 South, Range 5 West, which was investigated as part of the landfill study. Two lithic scatters with chipping stations, AZ Z:1:39 and Z:1:41(ASM), were located in Section 30. The northern border of the sites is an artificial distinction based on the limits of the landfill study, not the exhaustion of the presence of chipping stations. Therefore, we predicted that the lithic scatters continue north into Section 19. A quick field inspection of two undisturbed zones in Lot 3 of Section 19 found chipping stations resembling those in AZ Z:1:41(ASM). However, they were fewer in number and density. It is likely that any portion of Sections 19 and 30 where undisturbed desert pavement is present will have archaeological remains associated with the two sites.

Between 1948 and 1980, the area was the S&P Farms, owned by Edward Sisson. He operated the farm and a cotton gin. The 1950 USGS 15′ Theba topographic quadrangle indicates there were multiple structures along Sisson Road (in the south quarter of Section 18 and north quarter of Section 19), including two schools. Foundations associated with the cotton gin and residences are still present north of Citrus Valley Road (in Section 18); however, the remains of the schools south of the road (in Section 19) are obscured by vegetation. Connie Covey, a resident on the property and former employee of the local cotton gin, remembers one school that burnt down many years ago. He reported it was a one-room, five-grade school attended by the local children, including the daughters of the storeowner who had a structure next door.

The 1950 map shows an abandoned section of the Gila Bend Canal crossing the northern half of Section 19 from east to west. A small portion of the abandoned canal was part of an active canal headed northwest and directly south. The 1973 USGS 7.5′ Smurr topographic quadrangle only shows the contours of these various canals. The 1973 map also includes an east-west-oriented landing strip south of Citrus Valley Road (in Section 19). The landing strip was associated with Mr. Sisson.

Finally, there are several residential buildings on the Gila Bend Power Plant site. These are too recent to be eligible for historic preservation.

Conclusion

Substantial information regarding the project area was gathered from prior research and maps. Data recovery conducted south for the construction of the Gila Bend Landfill (Doyle et al. 1996) provided valuable data relevant to the Gila Bend Power Plant project area. Historic maps were useful for reconstruction more recent activities in the area.

The prehistoric cultural resources have been disturbed in the much of the project area by historic and recent construction. In undisturbed zones, there is a continuation of chipping stations similar to those recorded in the 1996 data recovery (Doyle et al. 1996). The 1996 data recovery has provided ample information on the lithic resources and land use in this area. Further excavation or collection of chipping stations would not be expected to provide new information. However, the full extent of these resources needs to be documented.

Mr. Sisson's farm and cotton gin represent the bulk of the project area's non-aboriginal cultural resources. The buildings standing in the project area were built after 1950 and are, therefore, ineligible for historic preservation. However, nearby historic foundations and irrigations features need to be evaluated for their integrity and their potential to provide important information about the agricultural development of the area.

In conclusion, there is little potential that the construction of the Gila Bend Power Plant will disturb significant prehistoric archaeological sites. There is a greater potential for finding significant historic resources. A cultural resource survey of the entire project area will be needed to confirm this and to ensure that significant remains will not be disturbed.

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1990 *Linear Oasis: Managing Cultural Resources Along the Lower Colorado River.* Cultural Resources Series No. 6. Bureau of Land Management, Phoenix.

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1981 *Test Excavations at Painted Rock Reservoir.* Archaeological Series No. 143. Arizona State Museum, Tucson.

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1978 *Painted Rock Reservoir Project Phase I: Preliminary Survey and Recommendations.* Archaeological Series No. 126. Arizona State Museum, Tucson.

Vivian, R. Gwinn
1965 An Archaeological Survey of the Lower Gila River, Arizona. *The Kiva* 30:95-146.

Vogler, Lawrence E.
1976 *Cultural Resources of Painted Rocks Dam and Reservoir: Preliminary Evaluation and Management Plan Recommendations.* Archaeological Series No. 99. Arizona State Museum, Tucson.

Wallace, Henry D.
1989 *Archaeological Investigations at Petroglyph Sites in the Painted Rock Reservoir Area, Southwestern Arizona.* Technical Report No. 89-5. Institute for American Research, Tucson.

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1960 A Hohokam Platform Mound at the Gatlin Site, Gila Bend, Arizona. *American Antiquity* 26:244-262

Wasley, William W., and Alfred E. Johnson
1965 *Salvage Archaeology in Painted Rocks Reservoir, Western Arizona.* Anthropological Papers of the University of Arizona 9. Tucson.

Waters, Michael R.
1982a The Lowland Patayan Ceramic Tradition. In *Hohokam and Patayan: Prehistory of Southwestern Arizona,* edited by Randall McGuire and M. Schiffer, pp. 275-297. Academic Press, New York.
1982b The Lowland Patayan Ceramic Typology. In *Hohokam and Patayan: Prehistory of Southwestern Arizona,* edited by Randal McGuire and M. Schiffer, pp. 537-570. Academic Press, New York.

Wilcox, David, and Charles Sternberg
1983 *Hohokam Ballcourts and Their Interpretation.* Archaeological Series 160. Arizona State Museum, Tucson.

Winter, Joseph C.
1973 Cultural Modifications of the Gila Pima: A.D. 1697-1846. *Ethnohistory* 20:67-77

Wright, Thomas
1993 A Cultural Resources Survey of Approximately 50 Acres for a Proposed Materials Source Northwest of Gila Bend, Maricopa County, Arizona. ARS Project Report #93:83. Archaeological Research Services, Inc., Tempe.

BARBARA S. MACNIDER
Principal Investigator II

Archaeological Consulting Services, Ltd.
424 W. Broadway Road
Tempe, Arizona 85282-1339

EDUCATION

1979-82 Graduate studies in archaeology (all work completed toward a master's degree except the thesis), Arizona State University
1978 Graduate studies in archaeology, Florida State University
1977 B. A. anthropology (archaeology) and minoring in history, University of Illinois
1973-75 Undergraduate studies majoring in biology, Denison University, Ohio

PROFESSIONAL EXPERIENCE

ARCHAEOLOGICAL CONSULTING SERVICES, LTD., Tempe, AZ

- Vice president (August 1997-present)
- Principal investigator II (August 1998-present)
- Senior project manager (May 1992-August 1998)
- Project manager (Oct. 1989-May 1992)
- Crew chief/assistant project manager (Jan. 1985; Dec. 1986-Oct. 1989)
- Field archaeologist/lab assistant (Oct. 1983; Dec. 1984; Aug.-Dec. 1986)

Current duties include overseeing (and sometimes performing) archaeological surveys and small- to medium-sized excavations, writing and editing project reports, interacting with agency personnel and clients, and developing proposals and budgets. Since becoming a project manager in 1989, I have supervised over 600 projects conducted throughout Arizona, from Bullhead City to Yuma and from near Douglas to Rock Point on the Navajo Reservation. These projects took place on private land as well as on land managed by various agencies, including the Apache-Sitgreaves, Coconino, Kaibab, Prescott, and Tonto National Forests; the Phoenix and Yuma Districts of the Bureau of Land Management; the Bureau of Reclamation; the US Fish and Wildlife Service; the Arizona State Land Department; the Bureau of Indian Affairs; the US Postal Service; the Arizona Department of Transportation; Maricopa and Pinal Counties; Ak-Chin, Cocopah, Gila River, Salt River Pima-Maricopa, Fort McDowell, Fort Mojave, and Navajo Indian Communities; and the Towns/Cities of Buckeye, Goodyear, Gilbert, Mesa, Tempe, Page, Kingman, and Florence. Sample of the larger projects follow.

1997-98 **Cave Creek Agriculture Sites**–Wheeler Construction. Supervised archaeological and geomorphological study of prehistoric agricultural sites along Cave Creek. Conducted a damage assessment of two prehistoric sites, prepared budgets for different phases, and edited and produced all project reports.

1996-99 **Red Mountain Freeway EIS**-Entranco and ADOT. Supervised archaeological and architectural study along the alternative alignments for the freeway between Country Club Road and US 60. Participated in monthly team meetings and two public hearings. Prepared responses to public comments about the cultural resources in the DEIS. Developed plan and supervised mitigation for Lehi District.

1995-98 **Bank One Ballpark, Maricopa County Stadium District**–SCS Engineers. Assisted in the management of the testing and data recovery excavations for the ca. 25 acre ballpark. Provide communication between archaeological investigations and construction management to ensure smooth sailing through a sea of scheduling nightmares.

1995-97 **US 93 Realignment**–ADOT. Supervised surveys and excavations within new US 93 right-of-way north of Kingman. Prepared budgets for different phases, prepared data recovery plans, surveyed one of the realigned areas, and edited and produced all project reports.

1994-95 **SR 98 Realignment**–ADOT. Supervised survey of new right-of-way for SR 98 near Page, AZ. Prepared testing/data recovery budget, assisted in preparation of data recovery plan, and edited and produced the data recovery report.

1993-94 **Bonneybrook Substation**–APS. Directed survey and data recovery investigations of a prehistoric agricultural field located east of Florence, AZ. Worked closely with the Arizona State Land Department to coordinate the work.

1993 **Bullhead Parkway, East Branch Sewerline, and Rio Rancho/Rancho del Rio Projects.** Series of projects in Bullhead City, AZ, that involved managing survey and data recovery tasks. Prepared data recovery plans for the projects. Worked closely with the Bureau of Land Management to insure rapid completion of the fieldwork to meet the needs of the clients.

1992-93 **Price Expressway Testing and Data Recovery**–ADOT. Prepared testing plan and served as project director overseeing the fieldwork and managing the project.

Rillito and Toltec Loops (Casa Grande to Tucson)–ADOT. Managed survey, testing, monitoring, and data recovery efforts along two 20-mile pipeline rights-of-way located between Tucson and Phoenix. Edited reports, prepared testing and data recovery plans, and coordinated field and laboratory efforts.

1991 **Grand Canyon Airport Data Recovery.** Prepared data recovery plan, coordinated field, laboratory, and report writing efforts.

Mohave Line Survey and Monitoring. Coordinated with Woodward-Clyde Consultants, Transwestern Pipeline, and State Historic Preservation Office to monitor pipeline construction activities between Topock and Bullhead City. Also provided additional survey of proposed realignment.

Knuck Land Exchange–Prescott National Forest. Conducted field survey and prepared report on land exchange project.

Reno-Cannon Airport Survey. Coordinated with Nevada state personnel to perform archaeological survey. Edited report and interfaced with client.

1990 **State Route 69 Widening Project**–ADOT. Surveyed Cordes Junction to Mayer, AZ, right-of-way and prepared report.

Cocopah Land Use Study. Prepared cultural resource overview of Cocopah Indian Community lands in Yuma County.

Nevada Lateral to Topock Station–El Paso Natural Gas Company. Conducted an assessment of previously recorded sites along the El Paso Natural Gas Company's proposed right-of-way.

Christopher Creek Testing Project–Tonto National Forest. Conducted field testing and prepared report of a site located in the Christopher Creek Campground, Tonto National Forest.

Dude Timber Salvage Project. Conducted field survey east of Payson and wrote the historic portion of a culture history for the sub-Rim area on the Tonto National Forest.

1989 **Pima Freeway Project.** Conducted archaeological survey and wrote report for the proposed Pima Freeway right-of-way located on the Salt River Pima-Maricopa Indian Community.

Siphon Draw Project–TRW. Conducted field survey for proposed state land sale in Apache Junction, AZ.

1987-89 **Prescott and Tonto National Forests Overviews.** Wrote data synthesis and culture history chapters for both cultural resource overviews.

Childs and Irving Hydroelectric Plants National Register Nomination–APS. Conducted archaeological survey and archival research for the National Register nomination of Arizona Public Service Company's Childs and Irving hydroelectric plants near Strawberry, AZ.

1986-89 Crew chief. Conducted survey projects throughout Arizona, primarily in Yavapai, Gila, and Maricopa counties.

1986 **Waddell Data Recovery Project**–Bureau of Reclamation. Crew member, laboratory technician, and data entry personnel.

1985 **Agua Fria Borrow Area and Waddell Canal.** Crew chief.

1984 **Castle Hot Springs Road Relocation.** Field archaeologist. Participated in survey near Peoria, AZ.

1983 **Aztec Timber Sale,** Heber, AZ. Field archaeologist. Apache-Sitgreaves National Forest timber sales survey. Duties occasionally included supervising a survey crew.

SOIL SYSTEMS, INC. (SSI), Phoenix, AZ

1986 **East Papago Testing Project 3.3.** Field archaeologist. Participated in testing tasks in Phoenix. .

American Telephone and Telegraph Fiber Optics Mitigation Project, along the Pinal Pioneer Parkway, Oracle, AZ. Joint SSI/ACS project. Field director overseeing excavation of prehistoric village site.

1985-86 **Pinnacle Peak Urban Planning Project test excavations,** Scottsdale, AZ. Crew chief, duties included planning testing strategies, running field testing, and preparing testing report including suggestions for a mitigation program.

Ak-Chin Indian Community Data Recovery Project. Crew chief, duties included site report writing as well as directing field excavations at two prehistoric sites (one site also had a protohistoric component).

1985 **American Telephone and Telegraph Testing Project.** Joint SSI/ACS project. Field archaeologist. Participated in testing tasks along the Pinal Pioneer Parkway, Oracle, AZ.

Papago Park Planning Area Project. Archaeologist. Duties included researching known sites within Tempe Papago Park and writing an overview for the area.

1983 **Phoenix Redevelopment Project, Block 24 Mitigation.** Field archaeologist. Participated in prehistoric excavations.

1982-83 **New River Authorized Dam Project.** Assistant crew chief. Project involved prehistoric and historic data recovery excavations near Peoria, AZ.

1982 **Phoenix Redevelopment Project, Murphy Addition Data Recovery.** Field archaeologist. Project involved excavating historic features.

1981 **Phoenix Redevelopment Project, Calmark (Murphy Addition) Testing,** AZ. Field archaeologist and historic artifact analyst.

BUREAU OF LAND MANAGEMENT, PHOENIX DISTRICT, Phoenix, AZ

1984 **Hopi-Navajo Relocation Program and the Ron Cohn Range Land.** Field archaeologist. Surveys were in Rainbow Valley, Tortolita Mountains, and Avra Valley, AZ.

WESTERN ARCHAEOLOGICAL AND CONSERVATION CENTER, NPS, Tucson, AZ

1984 **Saguaro National Monument, Rincon Mountain Unit Survey.** Field archaeologist.

ARIZONA ARCHAEOLOGICAL SOCIETY, Phoenix, AZ

1983 **Black Mesa Pueblo Field School.** Assistant field director. Duties included giving daily lectures on archaeological methods and excavation techniques and assisting in supervising site excavations near Show Low, AZ. Also directed survey crews to cover nearby BLM Asset Management acreage.

ARIZONA STATE UNIVERSITY, Tempe, AZ

1982 **AZ AA:6:1(ASU) Project**, near Arizona City, AZ. Computer data management and manipulation of lithic artifacts.

1980-81 **Noble Science Library Salvage Excavations,** ASU campus. Assistant director.

1979 **Veracruz (Mexico) Project.** Research assistant for Dr. Barbara Stark. Coding ceramic data for computer analysis. (National Science Foundation funded project)

NORTHLAND RESEARCH, INC., Flagstaff, AZ

1982 **Central Arizona Project, Indian Distribution Division,** AZ. Field archaeologist on Gila River Indian Reservation survey.

1980-81 **Central Arizona Project, Indian Distribution Division,** AZ. Field archaeologist on Ak-Chin Reservation survey. Also did preliminary analysis of ceramics.

UNIVERSITY OF GEORGIA, Athens, GA

1980 **Valley of Oaxaca Settlement Pattern Project,** Oaxaca, Mexico. Crew chief supervising field survey. Contributed to the chapter on preceramic sites in published report for the project. (National Science Foundation funded project)

IROQUOIS RESEARCH INSTITUTE, Fairfax, VA

1979 **St. Francis River Basin Survey,** MI and AR, and **Harry Truman Reservoir Survey,** MI. Crew member on several survey projects.

SOUTH EAST CONSERVATION AND ARCHAEOLOGICAL CENTER, NPS, Tallahassee, FL

1979 **Tyndall Air Force Base,** Panama City, Florida. Field archaeologist on survey of coast areas.

Mackeys Creek and Parr sites, northeast MS. Lithic analysis of chert artifacts.

NPS Natchez Trace (Mackeys Creek site), MS. Field archaeologist on salvage excavations.

1978 Volunteer work for National Park Service doing faunal analysis for a site in the Everglades.

ARCHAEOLOGICAL RESOURCE ASSESSMENT, Argenta, IL

1978 **Lincoln Log Cabin and Moore Home,** Illinois. Field archaeologist on outbuilding excavations.

UNIVERSITY OF ILLINOIS, Champaign-Urbana, IL

1978 **Chicap Petroleum Pipeline,** Chicago to Mount Vernon, IL. Field archaeologist on survey.

1977-78 **University of Illinois Field School and Earthwatch Expedition,** Middle Caicos, Turks Islands, West Indies. Co-supervisor of a field school and Earthwatch groups in both the field excavations and survey and the lab. Dissertation research.

1977 Crew member for various contract projects, including excavation and laboratory work, and for dissertation research involving survey of uplands in central Illinois,

1976, 78 Laboratory assistant and co-supervisor, ceramic analysis of Ecuadorian ceramics. Dissertation research.

1976 Collins Site, Middlefork River Valley, IL. Field archaeologist on excavations of Woodland and Mississippian village site.

PUBLICATIONS/MANUSCRIPTS/PAPERS

1998 Archaeological Survey of the Preacher Canyon Substation Access Road (Forest Road 436), Payson Ranger District, Tonto National Forest, Gila County, Arizona, by Jerryll L. Moreno and **Barbara S. Macnider**. Ms. on file, ACS, Tempe.

1997 Cultural Resource Literature Review and Site Assessment for the Santan Freeway, Chandler, Mesa, and Gilbert, Maricopa County, Arizona, by **Barbara S. Macnider** and Kim Adams. Draft on file, ACS, Tempe.

Geoarchaeological Investigations at AR-03-12-04-366, East of Star Valley, Gila County, Payson Ranger District, Tonto National Forest, by Bruce G. Phillips and **Barbara S. Macnider**. Ms. on file, ACS, Tempe.

Plan of Work for Geoarchaeological Investigations at AR-03-12-04-366, East of Star Valley, Gila County, Payson Ranger District, Tonto National Forest, by Bruce G. Phillips and **Barbara S. Macnider**. Ms. on file, ACS, Tempe.

Archaeological Survey of Red Mountain Freeway (State Route 202) from State Route 87 to Us Highway 60, Mesa, Maricopa County, Arizona, by **Barbara S. Macnider**, Holly DeMaagd, David E. Doyel, Shereen Lerner, and Jerryll Moreno. Cultural Resources Report No. 102. ACS, Tempe.

Cultural Assessment of Historic Properties in the Lehi Area, Mesa, Maricopa County, Arizona, by Karolyn Jackman Jensen, **Barbara S. Macnider** (both of ACS), and Gerald A. Doyle (of Gerald A. Doyle and Associates). Cultural Resources Report No. 103. ACS, Tempe.

Archaeological Data Recovery at AZ L:11:15 and AZ L:11:17(ASM), Windsor State Beach Park, Lake Havasu City, Mohave County, Arizona, by C. Scott Crownover, Bruce G. Phillips, **Barbara S. Macnider**, and Teresa L. Hoffman. Ms. on file, ACS, Tempe.

1996 *Lithic Resources and Land Use in the Gila Bend Landfill, Town of Gila Bend, Maricopa County, Arizona*, by David E. Doyel, John Rapp, Bruce Phillips, C. Scott Crownover, and **Barbara S. Macnider**. Cultural Resources Report No. 96. ACS, Tempe

Archaeological Survey of Realignment for US 93 Between Stations 101+660 and 102+380, North of Kingman, Mohave County, Arizona, by **Barbara S. Macnider**. Ms. on file, ACS, Tempe.

1995 *Archaeological Excavations at Pueblo Blanco: The MCDOT Alma School Road Project*, edited by David E. Doyel, Andrew T. Black, and **Barbara S. Macnider**. Cultural Resources Report No. 90. ACS, Tempe.

Archaeological Testing, Data Recovery, Monitoring, and Discovery Plan for the Bank One Ballpark, Phoenix, Maricopa County, Arizona, by Shereen Lerner, Karolyn Jackman Jensen, and **Barbara S. Macnider**. Ms. on file, ACS, Tempe.

1994 A Cultural Resources Assessment for the Proposed Citizens Utilities Lake Havasu to Gem Acres Fiber Optic Cable Right-of-way, Mohave County, Arizona, by C. Scott Crownover and **Barbara S. Macnider**. Ms. on file, ACS, Tempe.

Archaeological Investigations of AZ U:5:143(ASM), the McDowell Mountains Ground Stone Manufacturing Quarry, Scottsdale, Maricopa County, Arizona, by C. Scott, Crownover, John Rapp, and **Barbara S. Macnider**. Cultural Resources Report No. 93. ACS, Tempe.

Site and Project File Search for the Hohokam Irrigation and Drainage District and Florence-Coolidge Natural Resource Conservation District, South and West of Coolidge, Pinal County, Arizona, by **Barbara S. Macnider** and Gina Gage. Ms. on file, ACS, Tempe.

1993 An Archaeological Assessment of the Bullhead Parkway, Bullhead City, Mohave County, Arizona, by Joseph Crary and **Barbara S. Macnider**. Ms. on file, ACS, Tempe.

An Archaeological Assessment of the East Branch Sewerline, Bullhead City, Mohave County, Arizona, by **Barbara S. Macnider**, Walter Punzmann, and Joseph Crary. Ms. on file, ACS, Tempe.

Results of Archaeological Data Recovery of Sites Located Along Bullhead Parkway, Bullhead City, Mohave County, by Shereen Lerner, Walter Punzmann, Joseph Crary, **Barbara S. Macnider**, John Rapp, and Aline LaForge. Cultural Resources Report No. 81. ACS, Tempe.

Results of Testing in Eight Parcels and of Documentary Research of the Thude House, South Price Expressway, Tempe and Chandler, Maricopa County, by Walter R. Punzmann, Karolyn Jackman Jensen, and **Barbara S. Macnider**. Cultural Resources Report No. 77. ACS, Tempe.

1992 *Research Design for Cultural Resource Class III Survey and Testing Contract*, by Margerie Green, **Barbara S. Macnider**, JoAnn E. Kisselburg, Robert B. Neily, and Karolyn Jackman Jensen. Cultural Resources Report No. 67. ACS, Tempe.

Results of Testing in Two Portions of the South Price Expressway, Chandler, Maricopa County, Arizona, by Wilma Allen, Joseph Crary, and **Barbara S. Macnider**. Cultural Resources Report No. 74. ACS, Tempe.

1991 *An Overview of the Cultural Heritage of the Tonto National Forest*, by Richard Effland Jr. and **Barbara Macnider**. Cultural Resources Report No. 49. ACS, Tempe.

Cultural Resource Investigations at Two Sites Along the Nevada Lateral System Expansion Route, El Paso Natural Gas Line, Mohave County, Arizona, by Kim Adams, JoAnn Kisselburg, **Barbara S. Macnider**, and Walter Punzmann. Ms. on file, ACS, Tempe.

Data Recovery at AZ V:13:99(ASM) in the U.S. West Communications Right-of-Way West of Hayden in Pinal County, Arizona, by JoAnn Kisselburg, **Barbara S. Macnider**, and Walter Punzmann. Cultural Resources Report No. 63. ACS, Tempe.

Monitoring Report and Data Recovery Plan for the U.S. West Communications Dudleyville to Hayden Fiber Optic Right-of-Way, by **Barbara S. Macnider**, Kim Adams, and JoAnn Kisselburg. Ms. on file, ACS.

Under the Mogollon Rim: Cultural Resource Overview for the Mogollon Rim Escarpment, by David E. Doyel and **Barbara S. Macnider**. Cultural Resources Report No. 42. ACS, Tempe.

What Your Archaeologist Needs From You. Paper presented with Margerie Green at the Saguaro Chapter 73 International Right-of-Way Association Conference on Archaeological Regulation and Mitigation, Tucson.

Under the Mogollon Rim: Historic Settlement and Subsistence. Paper presented at the Arizona Archaeological Society State Meeting, Payson.

1990 An Archaeological Assessment of the U.S. West Communications Hayden-Kearny Fiber Optic Cable Right-of-Way, Pinal and Gila Counties, Arizona. Ms. on file, ACS, Tempe.

Cocopah Land Use Study: Cultural Resources. Ms. on file, ACS, Tempe.

Literature Review for the Hohokam Northern Periphery: New River and Skunk Creek Drainages, by **Barbara S. Macnider** and Margerie Green. Ms. on file, ACS, Tempe.

Testing and Data Recovery Measures Performed at Five Prehistoric Sites along Siphon Draw, Pinal County, Arizona, by JoAnn Kisselburg, **Barbara S. Macnider**, Kim Adams, and Donald Irwin. Cultural Resources Report No. 58. ACS, Tempe.

1989 *An Archaeological Assessment of a Portion of the Santan Mountains, Pinal County, Arizona*, by Kim Adams, Garry Cantley, **Barbara S. Macnider**, and Richard W. Effland. Cultural Resources Report No. 60. ACS, Tempe.

Cultural Resources Overview: The Prescott National Forest, by **Barbara S. Macnider**, Richard W. Effland, and George Ford. Cultural Resources Report No. 50. ACS, Tempe.

Cultural Resources Overview: The Tonto National Forest, by **Barbara S. Macnider** and Richard W. Effland. Cultural Resources Report No. 51. ACS, Tempe.

An Archaeological Assessment of Arizona Public Service Company's Childs and Irving Hydroelectric Facilities, Coconino National Forest, Beaver Creek Ranger District, by **Barbara S. Macnider**, Richard W. Effland and Ann Howard. Cultural Resources Report No. 55. ACS, Tempe.

An Archaeological Assessment of the Pima Road Portion of the Outer Loop Freeway Alignment, Salt River Pima-Maricopa Indian Community. Ms. on file, ACS, Tempe.

Preceramic Sites and Cave Occupations by Laura Finsten, Kent V. Flannery, and **Barbara Macnider**. In *Monte Alban's Hinterland, Part II*, by Stephen A. Kowalewski, Gary M. Feinman, Laura Finsten, Richard E. Blanton, and Linda M. Nicholas, pp. 39-53. Memoirs of the Museum of Anthropology No. 23. University of Michigan, Ann Arbor.

1988 An Archaeological Survey of the Woofidd Timber Sale, Payson Ranger District, Tonto National Forest, Gila County, Arizona, by **Barbara Macnider** and Richard Effland. Ms. on file, ACS, Tempe.

An Archaeological Survey of the Salt River Project Lower Buckeye Road Canal Relocation Project, Maricopa County, Arizona. Ms. on file, ACS, Tempe.

Numerous small clearance reports for utility company rights-of-way also were written in 1988; most projects were located in central and southern Arizona. Mss. on file, ACS, Tempe.

1987 An Archaeological Survey of the Iron Mine Timber Sale and Roads, Long Valley Ranger District, Coconino National Forest, Arizona. Ms. on file, ACS, Tempe.

An Archaeological Survey of the Proposed Mountain Bell Underground Telephone Cable Route between Bumble Bee and Mayer, Yavapai County, Arizona. Ms. on file, ACS, Tempe.

An Archaeological Survey of the Proposed Mountain Bell Underground Telephone Cable Route between Dewey and Cottonwood, Yavapai County, Arizona. Ms. on file, ACS, Tempe.

Numerous small clearance reports for utility company rights-of-way also were written in 1987; most projects were located in central and southern Arizona. Mss. on file, ACS, Tempe.

1986 A Cultural Resource Survey of the Proposed APS 12 kV Distribution Line to Serve the Gillespie All-American Pipeline Valve. Ms. on file, ACS, Tempe.

Test Excavations at Three Archaeological Sites in the Pinnacle Peak Urban Lands Project, Maricopa County, Arizona. Ms. on file, SSI, Phoenix.

1985 Cultural Resources Overview for the Papago Park Planning Area. Ms. on file, SSI, Phoenix.

1984 An Archaeological Survey of T12S, R11E, E 1/2 of Section 25. Ms. on file, BLM, Phoenix District.

1981 The Preceramic Occupation of the Valley of Oaxaca. Paper given at the 46th Annual Meeting of the Society for American Archaeology, San Diego.

PROFESSIONAL AFFILIATIONS

American Association for State and Local History
Arizona Archaeological Council
Arizona Archaeological and Historical Society
Arizona Historical Society
Museum Association of Arizona
Registrars Committee-Western Region

CITIZENSHIP COMMITTEES

Buckeye Airport Advisory Commission
Buckeye Valley Historical and Archaeological Museum (President of the Board of Directors)

RECREATIONAL PURPOSES AND ASPECTS

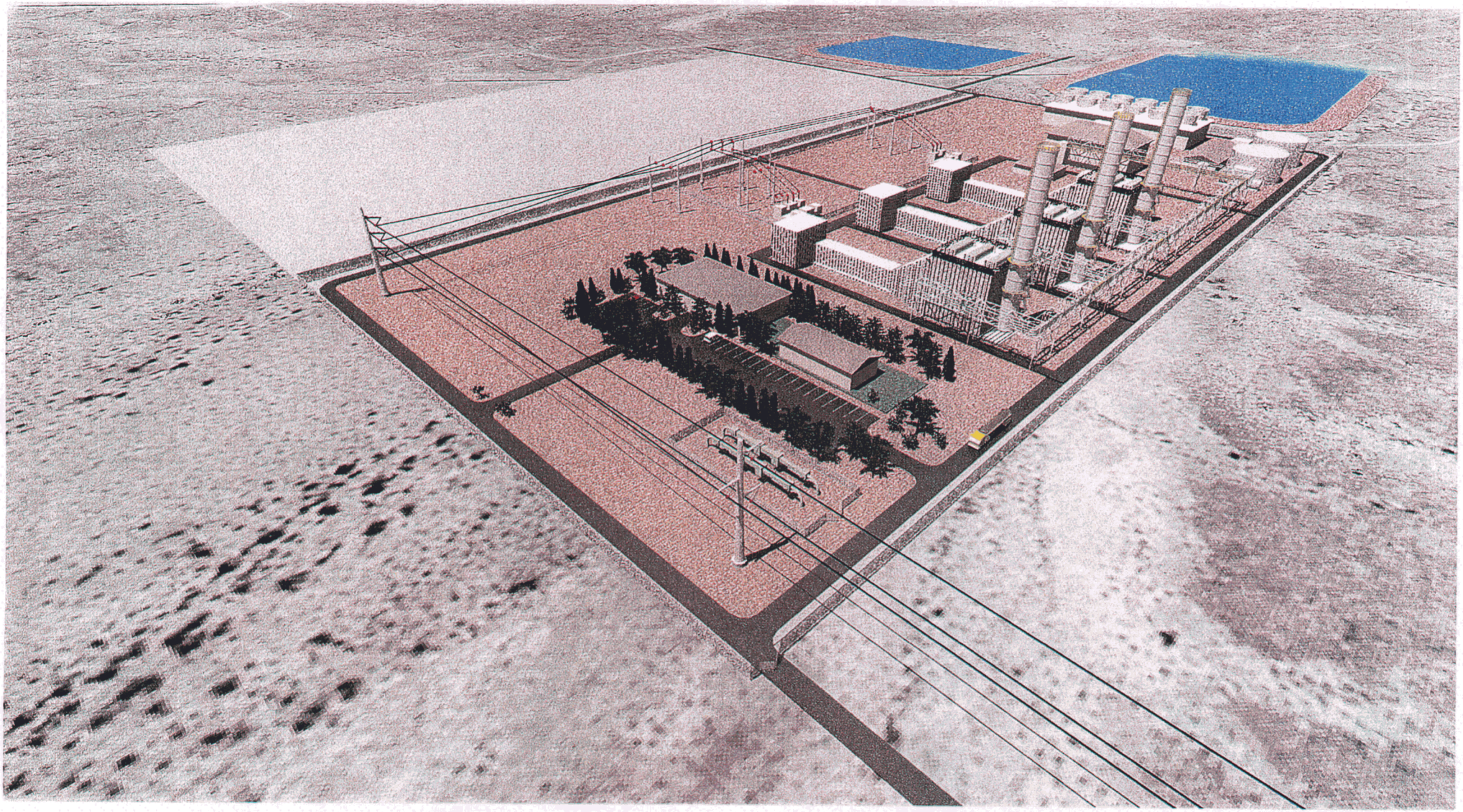
The Applicant is unaware of any official approved plans for the development of additional recreational facilities within the vicinity of the Project. The construction, operation, and maintenance of the project will be consistent with safety considerations, and will not be open to public access.

EXHIBIT G-1

ARTIST'S RENDERING

EXHIBIT G-1

ARTIST'S RENDERING



Gila Bend Power Generation Station

Gila Bend, Arizona

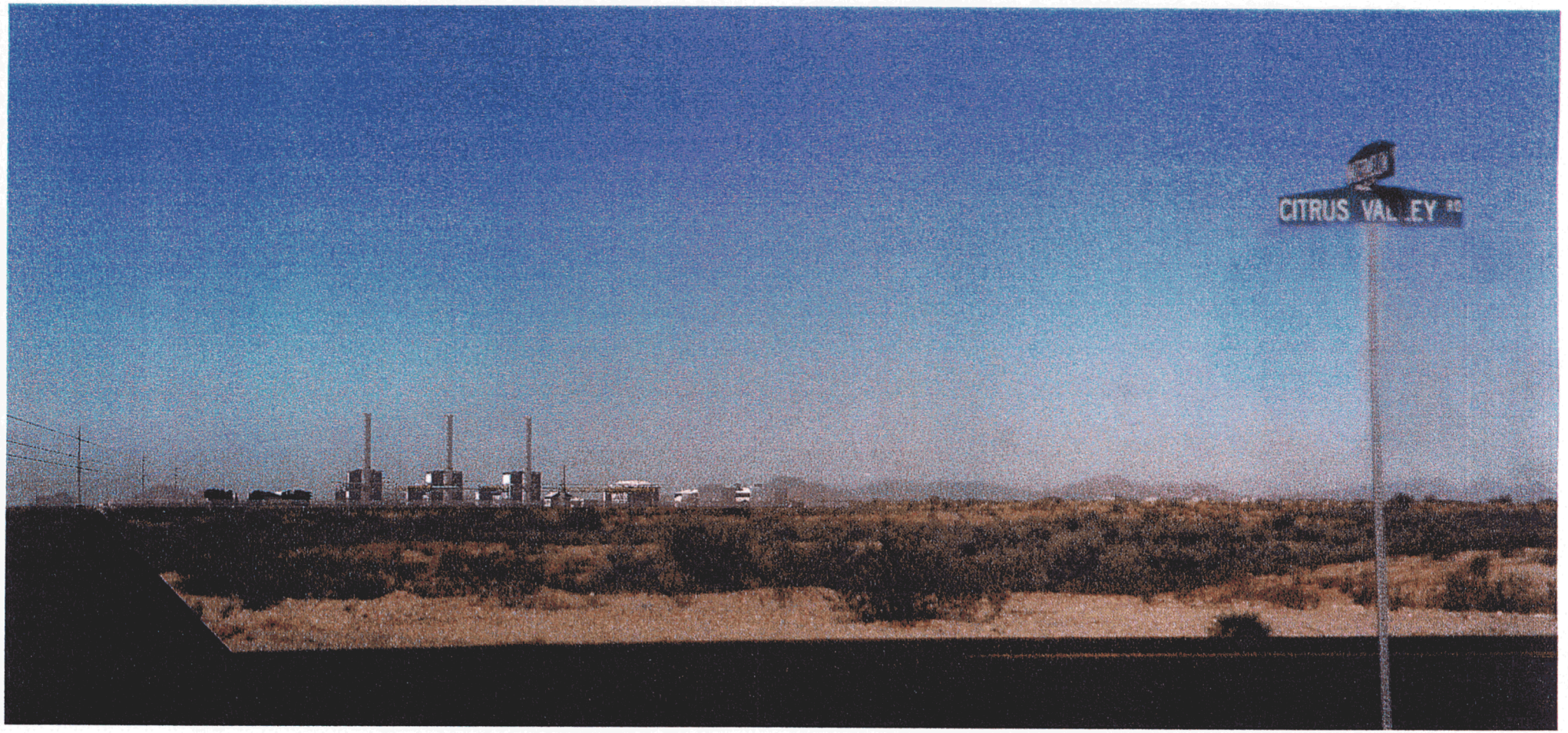
INDUSTRIAL POWER TECHNOLOGY
2227 CAPRICORN WAY SUITE 101
SANTA ROSA, CALIFORNIA 95407
TEL: 707-528-8900/FAX: 707-528-8901

EXHIBIT G-2

PHOTOSIMULATION

EXHIBIT G-2

PHOTOSIMULATION



Gila Bend Power Generation Station

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LAND USE EVALUATION

INTRODUCTION

This land use report identifies existing land uses, land ownership, and land use plans within a 2-mile radius of the proposed facility (the study area). Descriptions of land uses outside of the study area are provided where appropriate to indicate the context of study area uses. This report also includes an assessment of potential impacts that may occur as a result of the construction and operation of the proposed project. The methods that were used for the preparation of this report include review and interpretation of maps, aerial photographs, and plan documents and a field reconnaissance.

The proposed site occupies the southwest quarter of Section 19 of Township 5 South, Range 5 West, which was annexed by the Town of Gila Bend in January 2000 (Exhibit A-1). Most of the land within the 2-mile radius study area is undeveloped, with the exception of limited agriculture and one residence. Interstate 8 (I-8) via Citrus Valley Road to an extension of Watermelon Road, which runs west to the south property line, provides access to the site. The closest population center to the proposed site is the center of the Town of Gila Bend, which is located approximately 5 miles to the east of the site.

LAND OWNERSHIP AND JURISDICTION

Exhibit A-2 illustrates land ownership and jurisdiction within the study area. The site on which the facility will be located is privately owned and located within the jurisdictional boundary of the Town of Gila Bend. Outside of the Town's jurisdictional boundary, the land is unincorporated and under the jurisdiction of Maricopa County. Bureau of Land Management (BLM) lands are to the east and north of the site on Township 5 South, Range 5 West, Sections 7 through 10, 15, and 17.

EXISTING LAND USES

Currently, the site is a combination of undeveloped desert and inactive farmland. One inhabited residence, several uninhabited residences, and an abandoned airstrip also exist on the site. Land within the study area is largely undeveloped desert or agricultural fields that are either under cultivation or have been abandoned. Exhibit A-3 depicts existing land uses within the study area. Specific types of land uses and their general locations within the study area, or outside the study area as appropriate to provide context, are described below.

Residential – One occupied residence occurs within the study area, which is located on the site. This resident will be relocating as agreed to with GBPP. Approximately 2½ miles to the south, adjacent to I-8, is an abandoned cattle feed lot with a single residence. Four miles to the southwest are residences for employees of Paloma Ranch, a privately owned agricultural entity.

Other residential land uses in the vicinity are primarily located 5 miles to the east in the Town of Gila Bend town center.
Commercial – No commercial land uses within the study area.

Industrial – A small sand and gravel mining operation is the only identified industrial land use in the study area. Existing industrial land uses generally occur in the vicinity of Gila Bend's town center, with the exception of the waste sterilization ponds located nearly 4 miles west of the project site.

Public/Quasi-Public – No public land uses are located within the study area. Within the town center of Gila Bend, public land uses include local government buildings, churches, and the Gila Bend Municipal Airport.

Agriculture – Active farming occurs in Paloma Ranch on land located to the south, east, and west of the project site. Current crop production includes alfalfa, cotton, and grains. All crops are ground-irrigated row crops.

Utilities – APS power lines, a Southwest Gas natural gas pipeline, and a US WEST telephone line occur within the study area and serve the single dwelling located on site. Each service is low capacity in nature.

Transportation – Paved arterial roads within the study area include Citrus Valley Road, Watermelon Road, and Sisson Road. I-8, south of the site approximately 2½ miles, is the major transportation corridor in the vicinity of the study area.

Vacant Land/Undeveloped – The proposed power plant will be located on vacant, private land. The vacant land in the study area is characterized by a lack of development or abandonment.

FUTURE LAND USES

Bureau of Land Management

The management of BLM land located within the study area occurs in accordance with the Lower Gila South Resource Management Plan (BLM 2000). The Resource Management Plan (RMP) does not identify wilderness areas or any other potentially conflicting future uses within the study area.

Maricopa County

The future use of unincorporated lands is planned under the jurisdiction of Maricopa County. The Maricopa County Plan (Maricopa County 1997) designates the lands within the study area as a Rural Development Area, permitting agricultural and very low-density rural residential uses.

Other uses would be suitable if adjusted to rural principles and may include "agriculture support services, churches, home-based businesses, and small-scale cottage industries" (Maricopa County 1997, p.16).

The county zoning designation for the land within the study area is Rural-43. This classification allows very low-density residential uses (i.e., not more than one residential dwelling unit per five acres). Additionally, the main goal of this classification is "to conserve and protect farms and other open land uses; foster orderly growth in rural and agricultural areas, and prevent urban and agriculture land conflicts" (Maricopa County 1969 (revised in 2000), p.VI-1).

Town of Gila Bend

The Town of Gila Bend Master Plan Update (1996) addresses planned land uses in Sections 25, 30, 29, and 31 within the study area, which were incorporated by the Town in July 1998. In addition, Sections 18 and 19 were shown as annexed in a Master Plan Amendment adopted in July 2000. However, these sections were not included in the planning effort and retain agricultural zoning as described below.

Lands within the study area addressed in the 1996 plan update are designated as residential, light industrial, heavy industrial, commercial, and parks/open space as illustrated in Exhibit A-4. Further descriptions of the land use designations are provided below.

Residential – Within the study area the Plan Amendment includes low (1 to 5 dwelling units per acre), medium (5 to 10 dwelling units per acre), and high (8 to 16 dwelling units per acre) density residential areas. The Plan Amendment also designates mobile home (4 to 10 dwelling units per acre) and Recreational Vehicle (9 to 11 dwelling units per acre) uses within the study area (see Exhibit A-4).

Light Industrial – Light industrial land uses are designated on portions of Township 5 South, Range 5 West, Sections 20, 29, and 31.

Heavy Industrial – Heavy industrial land uses are designated on Township 5 South, Range 5 West, Section 30 and Township 5 South, Range 6 West, Section 25.

Commercial – The Plan Amendment designates a commercial area on a portion of Township 5 South, Range 5 West, Sections 31 and 32. The planned commercial center will provide services and goods to the surrounding neighborhoods.

Parks/Open Space – The Plan Amendment identifies areas for regional, community, and neighborhood parks and open space. Within the study area, a park/open space corridor is planned along the wash in Sections 30 and 31 (see Exhibit A-4).

Sections 18 and 19, which include the project site, consist of undeveloped or agricultural land that is currently included in a rural zoning district (AG). This zoning district allows low- and medium-density residential farms; public/quasi-public land uses (e.g., libraries, museums, and churches); recreation (e.g., golf courses); commercial; utilities (e.g., electricity, water, and gas); and educational facilities (Town of Gila Bend 2000). Generating stations and associated facilities require a conditional use permit in this zoning category. The project proponent is currently pursuing a conditional use permit for the project site with the Town of Gila Bend.

IMPACT ASSESSMENT

Overall, the proposed project is not anticipated to have an adverse impact on adjacent existing or planned land uses. The site is privately owned, and surrounding properties are either rural/undeveloped or in agricultural use. The project site is located adjacent to planned heavy industrial land uses, and generating facilities are allowed and require a conditional use permit to be located on the proposed site. As part of the application process for the conditional use permit, the Town of Gila Bend Planning Commission will consider the effect of the proposed project on the General Plan.

MITIGATION

No significant impacts to existing or future land uses are expected as a result of constructing and operating the proposed facility. The industrial zoning on adjacent sections is considered compatible; therefore, land use conflicts are anticipated to be minimal. Considerations to minimize potential visual and noise impacts to future land uses have been incorporated into the design of the facility and are discussed in Exhibits F and H.

The current resident on the project site has agreed to relocate closer to the town center. Gila Bend Power Partners, LLC will work with both the former owner of the site and the resident in this effort.

REFERENCES

Arizona State Land Department. 2000. Land Ownership Maps.

Bureau of Land Management. 2000. Amendment and Environmental Assessment to the Lower Gila North Management Framework Plan and the Lower Gila South Resource Management Plan – Final. February.

_____. 2000. Lower Gila South Resource Management Plan Environmental Impact Statement Phoenix District, Arizona – Final. August.

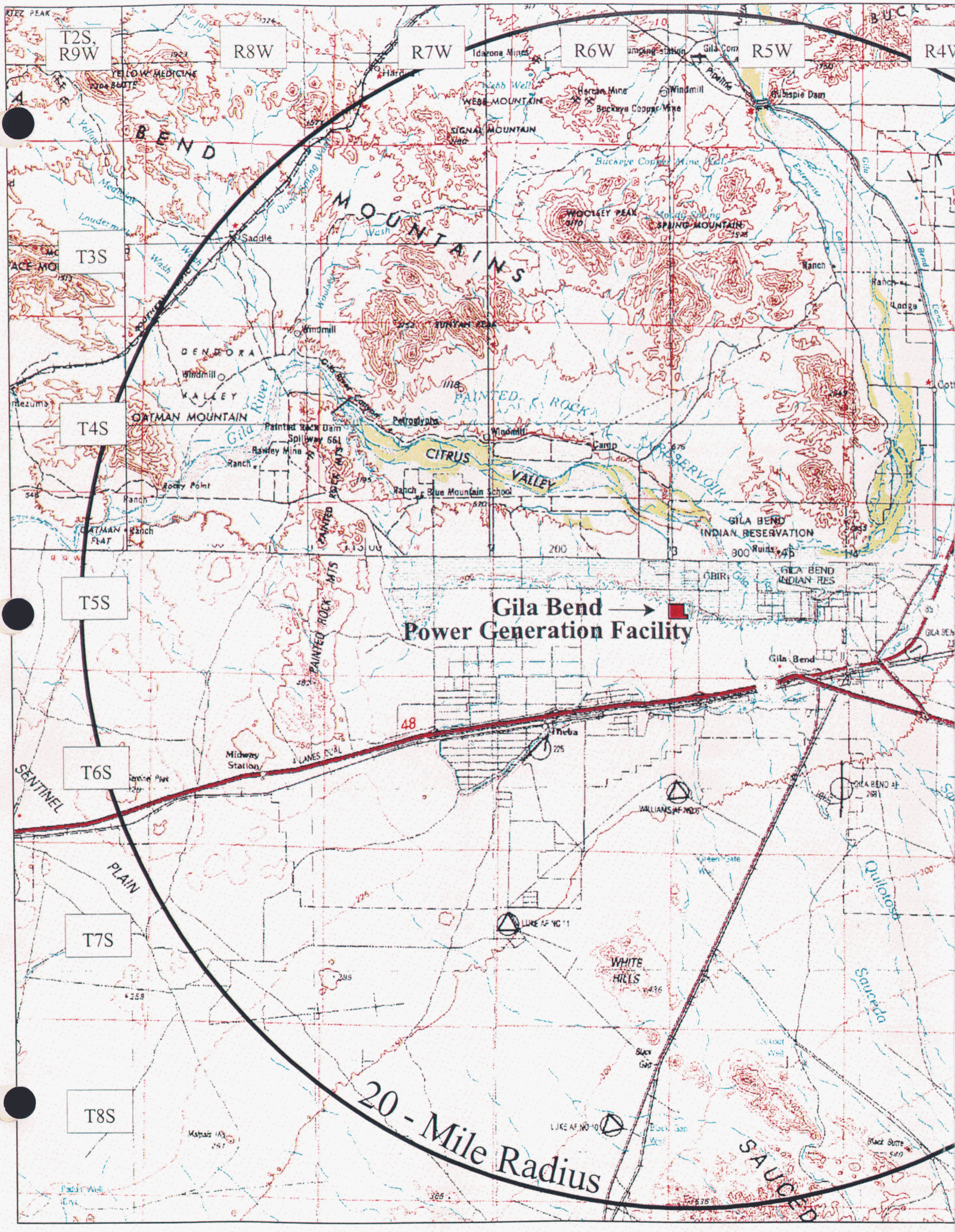
Maricopa County. 1997. Maricopa County Plan.

_____. 1969. Zoning Ordinance (revised in February 2000).

Town of Gila Bend. 2000. Zoning Ordinance.

Town of Gila Bend Master Plan Amendment. 2000. Prepared by Partners for Strategic Action, EPG, and David Evans & Associates.

Town of Gila Bend Master Plan Update. 1996. Prepared by BRW, Inc. and Sun Region Associates, Inc.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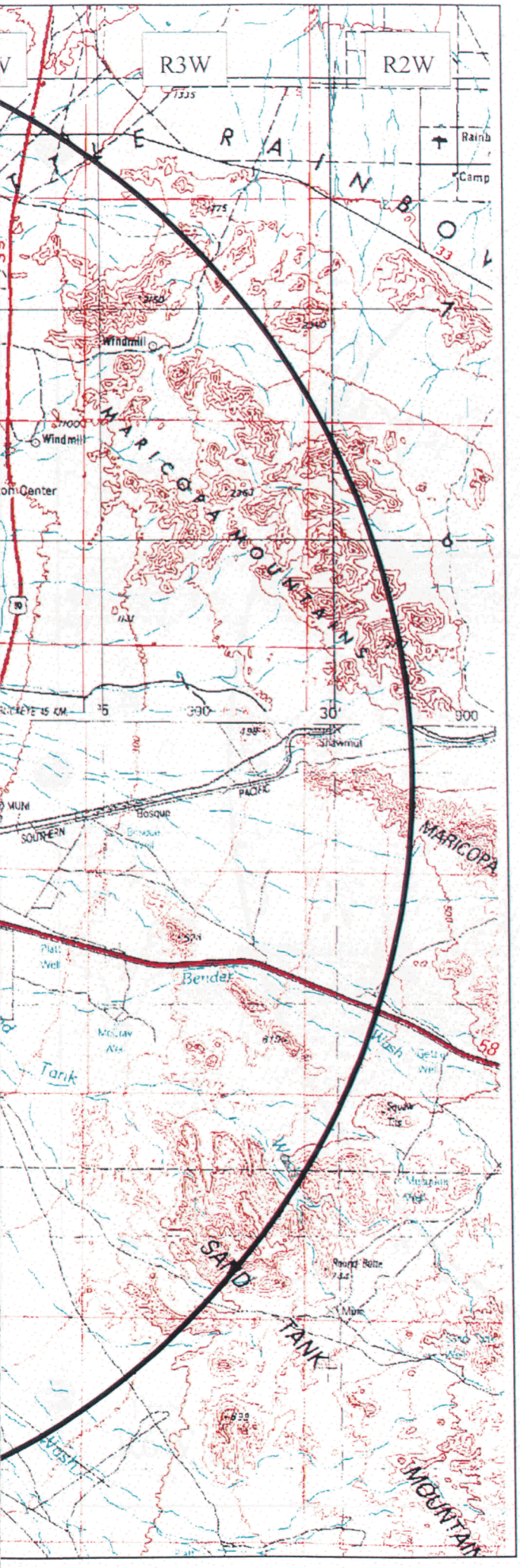
BEND MOUNTAINS
PAINTED ROCK RESERVOIR
CITRUS VALLEY
GILA BEND INDIAN RESERVATION
Gila Bend
Power Generation Facility
20 - Mile Radius
SENTINEL PLAIN
WHITE HILLS
SAUCEDA
Gila River
Painted Rock Dam
Spillway 661
Gillespie Dam
Windmill
Saddle
Ranch
Lodge
Camp
Petroglyphs
Blue Mountain School
Rocky Point
Oatman Flat
Oatman Mountain
Dendora Valley
Woolsey Peak
Signal Mountain
Webb Mountain
Harcuvar Mine
Buckeye Copper Mine
Idazona Mines
Yellow Medicine
Quartzsite
Tacna
Theba
Midway Station
Williams AF
Luke AF No 1
Luke AF No 10
Gila Bend AF
48



Gila Bend Power Project Project Location

Exhibit A-1

Project Site Location

N

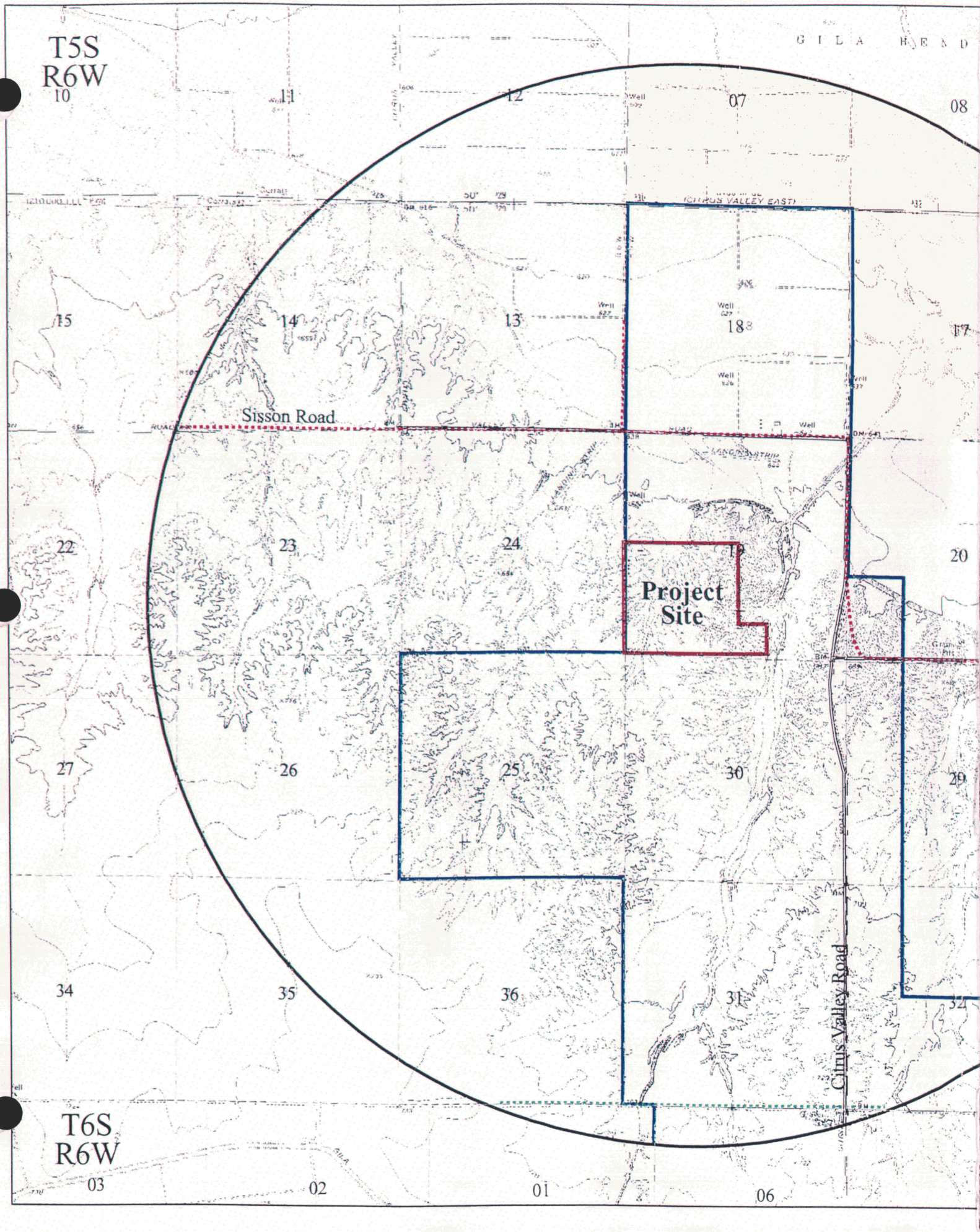
1:250,000

2 0 2 4 6 8 10 Miles

Sources:
USGS 1:250,00 Scale
Digital Raster Graphics
Phoenix, AZ 1969
Ajo, AZ 1982

GILA BEND Power Partners, L.L.C.

September 6, 2000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Citrus Valley Road
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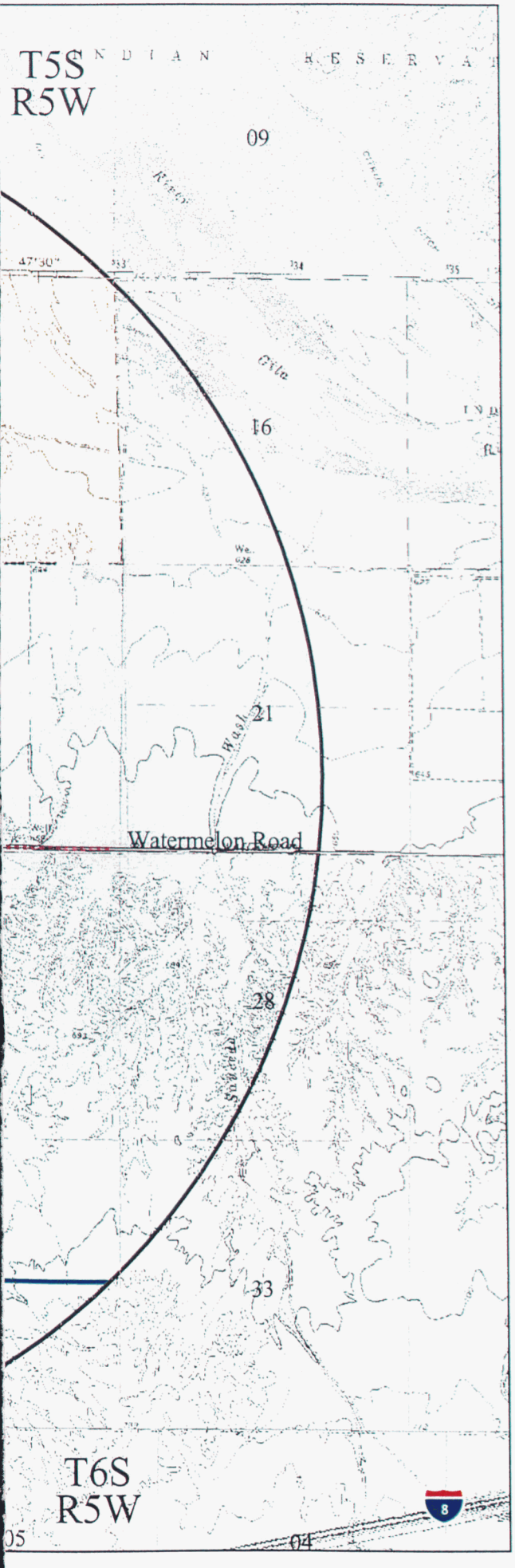


Gila Bend Power Project Land Ownership and Jurisdiction

Exhibit A-2

Land Ownership

- Private
- BLM
- Town of Gila Bend Boundary

General Reference Features

- Minor Arterials
- Two-Mile Study Area
- 12kV Power Line
- 69kV Power Line
- Project Site Location

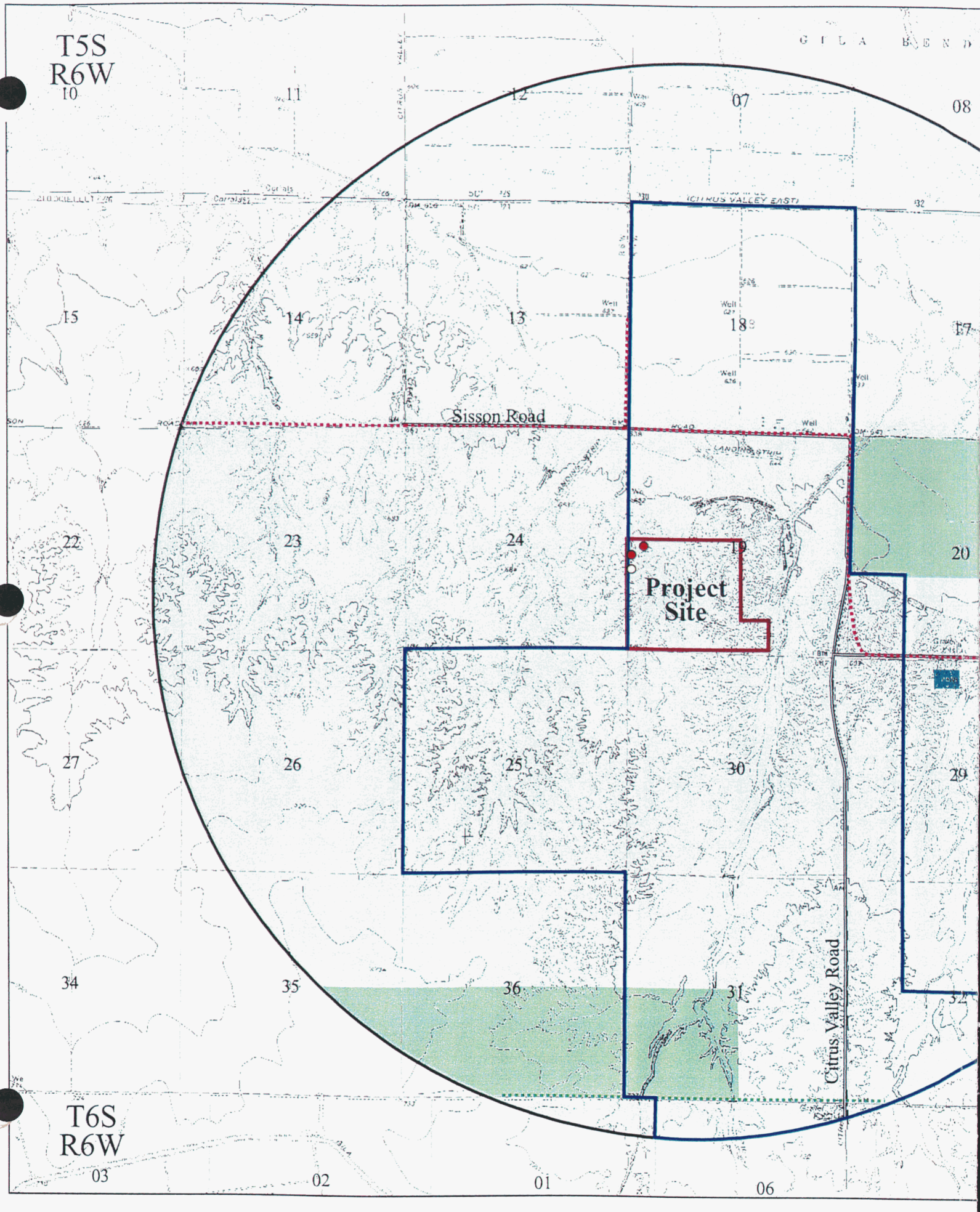
N

0.25 0 0.25 0.5 0.75 1 Miles

Sources:
USGS 1:24,000 Scale
Digital Raster Graphics
Smurr, Ariz 1973
Arizona State Land Department

GILA BEND
Power Partners, L.L.C.

September 6, 2000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Citrus Valley Road
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R6W
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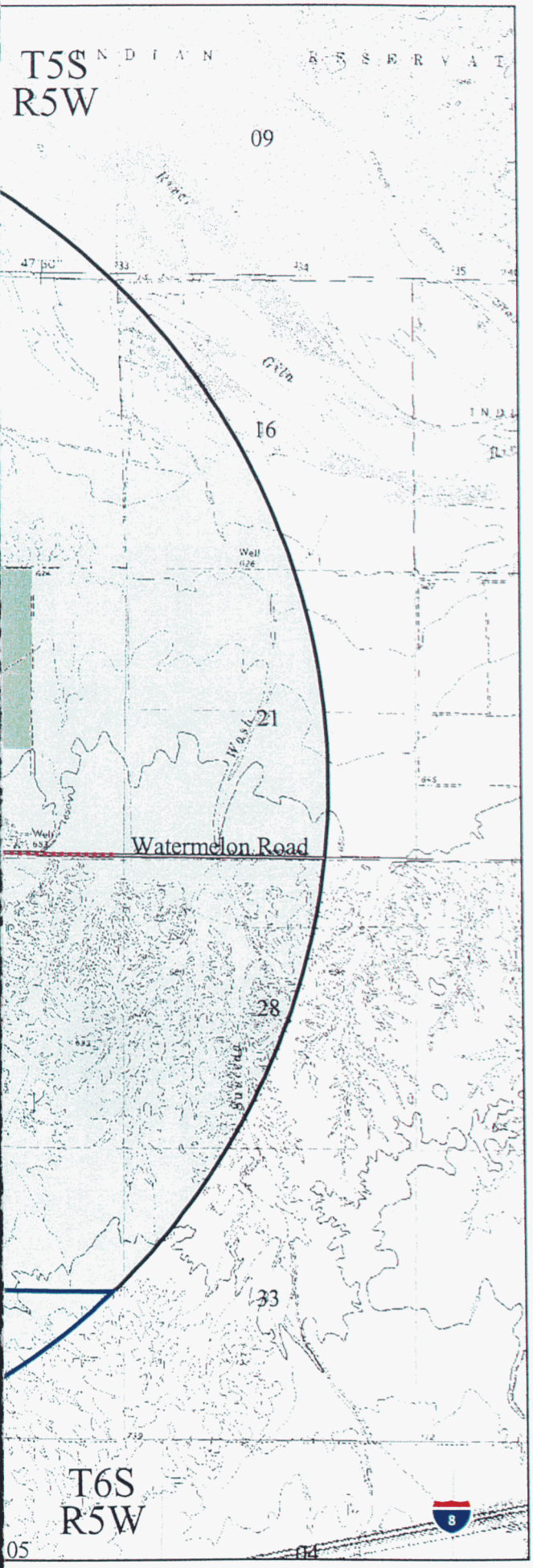


Gila Bend Power Project Existing Land Use

Exhibit A-3

Existing Land Use

- Agriculture
- Vacant/Undeveloped
- Residence
- Abandoned Residences
- Gravel Mining
- Town of Gila Bend

General Reference Features

- Minor Arterials
- Two-Mile Study Area
- 12kV Power Line
- 69kV Power Line
- Project Site Location

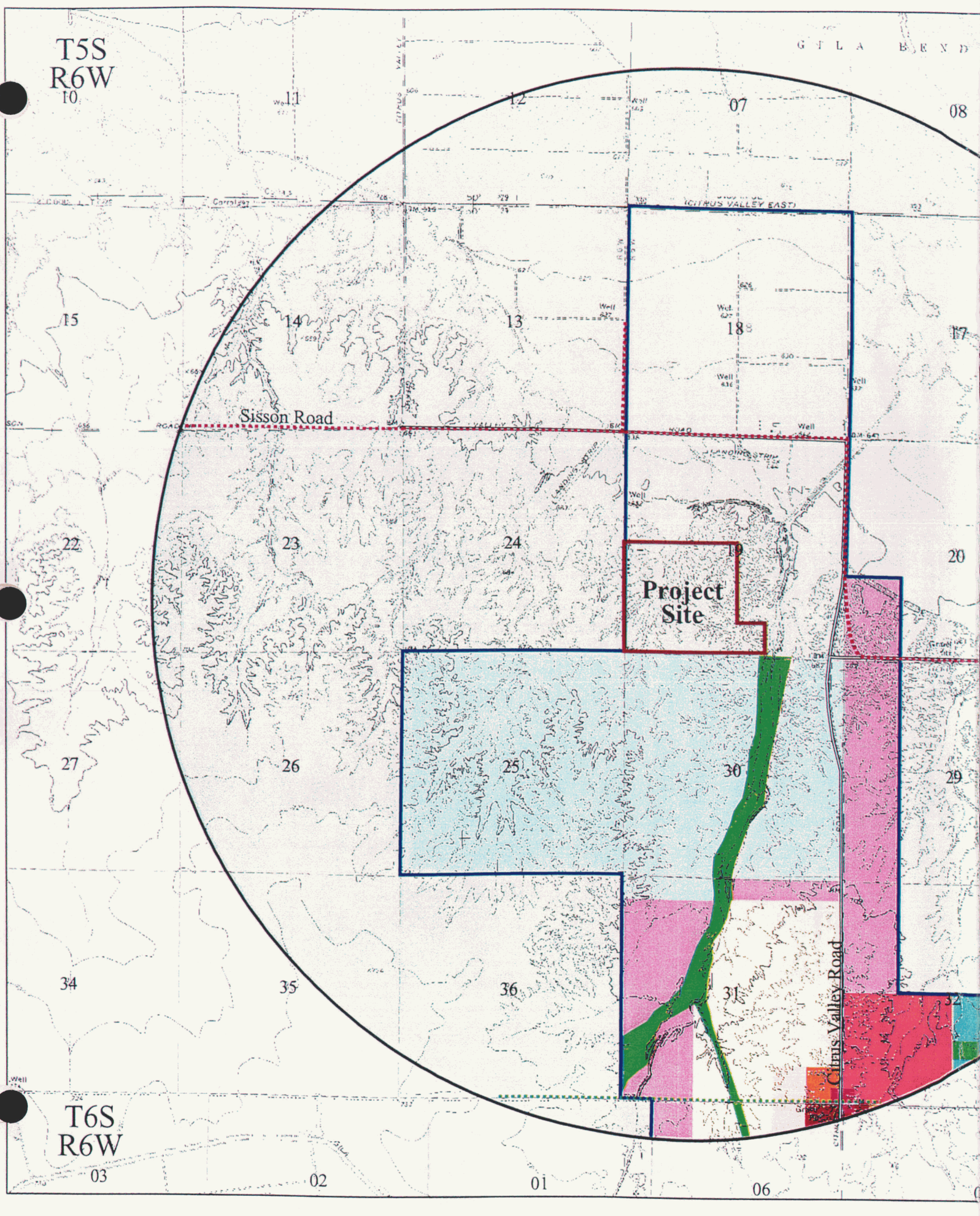
N

0.25 0 0.25 0.5 0.75 1 Miles

Sources:
USGS 1:24,000 Scale
Digital Raster Graphics
Smurr, Ariz 1973

GILA BEND
Power Partners, L.L.C.

September 6, 2000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Citrus Valley Road
T6S
R6W
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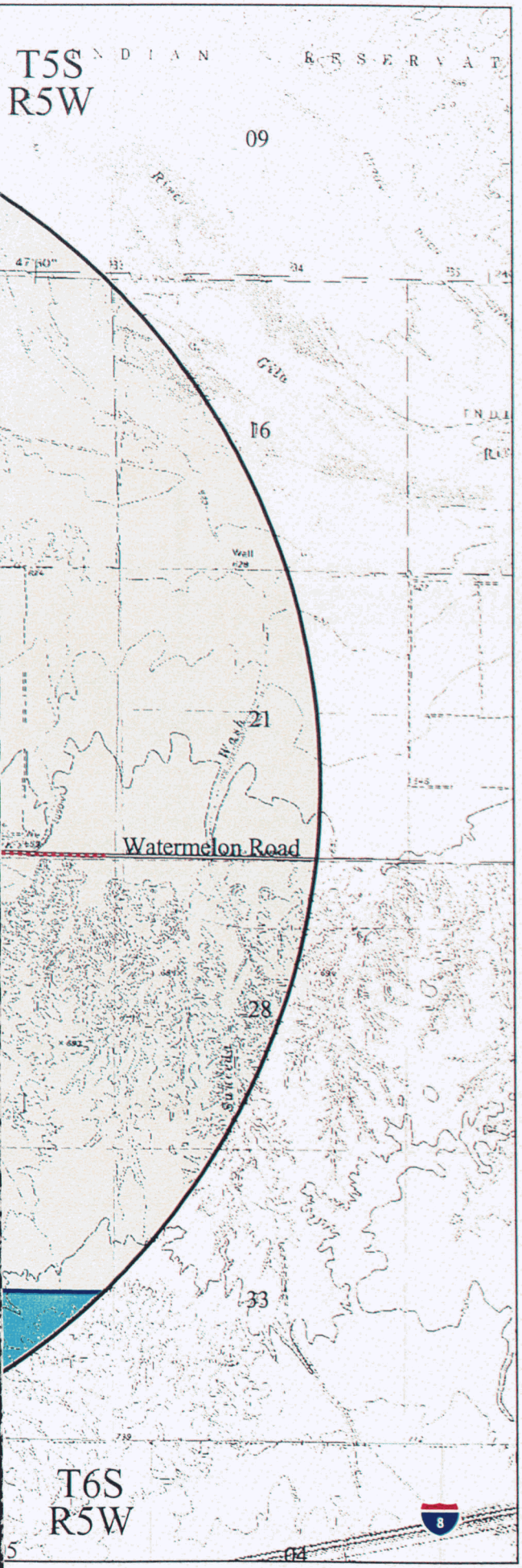


Gila Bend Power Project Planned Land Use

Exhibit A-4

Planned Land Use

- Rural Residential/Agriculture
- Low Density Residential
- Medium Density Residential
- High Density Residential
- Mobile Home
- Recreational Vehicle
- General Business
- Neighborhood Business
- Light Industrial
- Heavy Industrial
- Parks/Open Space
- Town of Gila Bend Boundary

General Reference Features

- Minor Arterials
- 12kV Power Line
- 69kV Power Line
- Two-Mile Study Area
- Project Site Location

N

0.25 0 0.25 0.5 0.75 1 Miles

Sources:
USGS 1:24,000 Scale
Digital Raster Graphics
Smurr, Ariz 1973

GILA BEND
Power Partners, L.L.C.

September 6, 2000

APPLICATION FOR A CERTIFICATE OF ENVIRONMENTAL COMPATIBILITY

EXHIBIT I
ANTICIPATED NOISE/INTERFERENCE WITH COMMUNICATION SIGNALS

"Describe the anticipated noise emission levels and any interference with communication signals which will emanate from the proposed facilities."

ANTICIPATED NOISE

The closest occupied private residence or business, other than agricultural operations, is a single mobile home (R-1) in excess of three-miles south of the plant site, located on the south side of the I-8 freeway and the Southern Pacific railroad tracks. The next closest private residence or business is a group of residential dwellings (R-2) in the western edge of the Town of Gila Bend, some five-miles distant (see Figure I-1). The anticipated noise levels generated during full load operation of the proposed project will have little or no audible impact on either of these locations. Calculations indicate that plant noise will be insignificant (< 25 dBA) at a location at or beyond a three-mile radius of the project.

Ambient noise levels in the potentially affected areas are typical of background noise conditions including, automobile, truck and train traffic, general aviation, dogs and residential activities. These activities result in ambient noise levels from a low of 29dBA during the night, to a high of 69 dBA at peak activity periods during the day (In the case of R-1, this higher level may be reached or exceeded whenever there is I-8 highway truck traffic or trains passing on the Southern Pacific tracks).

CONSTRUCTION NOISE

During construction transient noise levels will reach a maximum of 85 to 89 dBA at fifty feet from the point of generation, but in general will be a nominal 55 to 65 dBA at the project fence line during peak periods of activity including grading and building construction. Nighttime construction activities will be limited to minimize noise during the hours of 9:00 PM to 5:00 AM.

TYPICAL CONSTRUCTION NOISE LEVELS

Construction Stage	Noise Level (dBA) at 50 Feet	
	Minimum Required Equipment in Use	All Applicable Equipment in use
Ground Clearing	**83**	**84**
Grading & Excavation	**79**	**89**
Foundation Construction	**78**	**78**
Building Construction	**75**	**85**
Finishing & Site Cleanup	**75**	**89**

Source: Bolt, Beranek & Newman, "Noise from Construction Equipment & Operations, Building Equipment and Home Appliances," prepared for the U.S. EPA, December 31, 1971

EXHIBIT I
ANTICIPATED NOISE/INTERFERENCE WITH COMMUNICATION SIGNALS

OPERATIONS NOISE

In order to predict these noise emissions with a degree of accuracy, nominal plant noise emissions were established using data derived from similar operating combined-cycle plants utilizing similar or identical equipment and layout. Although, during start-up, shutdown and part-power operations noise levels are generally reduced, the plant was assumed to operate at full load, 24 hours a day, producing a constant level and output of noise in the range of 72 to 76 dBA at the project fence line

In May 2000, Industrial Power Technology undertook the analysis of noise emission at the GBPGF site and its environs. Using the projected total noise level produced by the facility, the analysis calculates the propagation losses that occur with respect to each source over the line of sight between it and the receptor in accordance with ISO 9613, *"Attenuation of Sound During Propagation Outdoors"* and other studies in the professional literature on acoustics.

ANTICIPATED GBPGF NOISE EMISSIONS AT THE NEAREST RESIDENCES

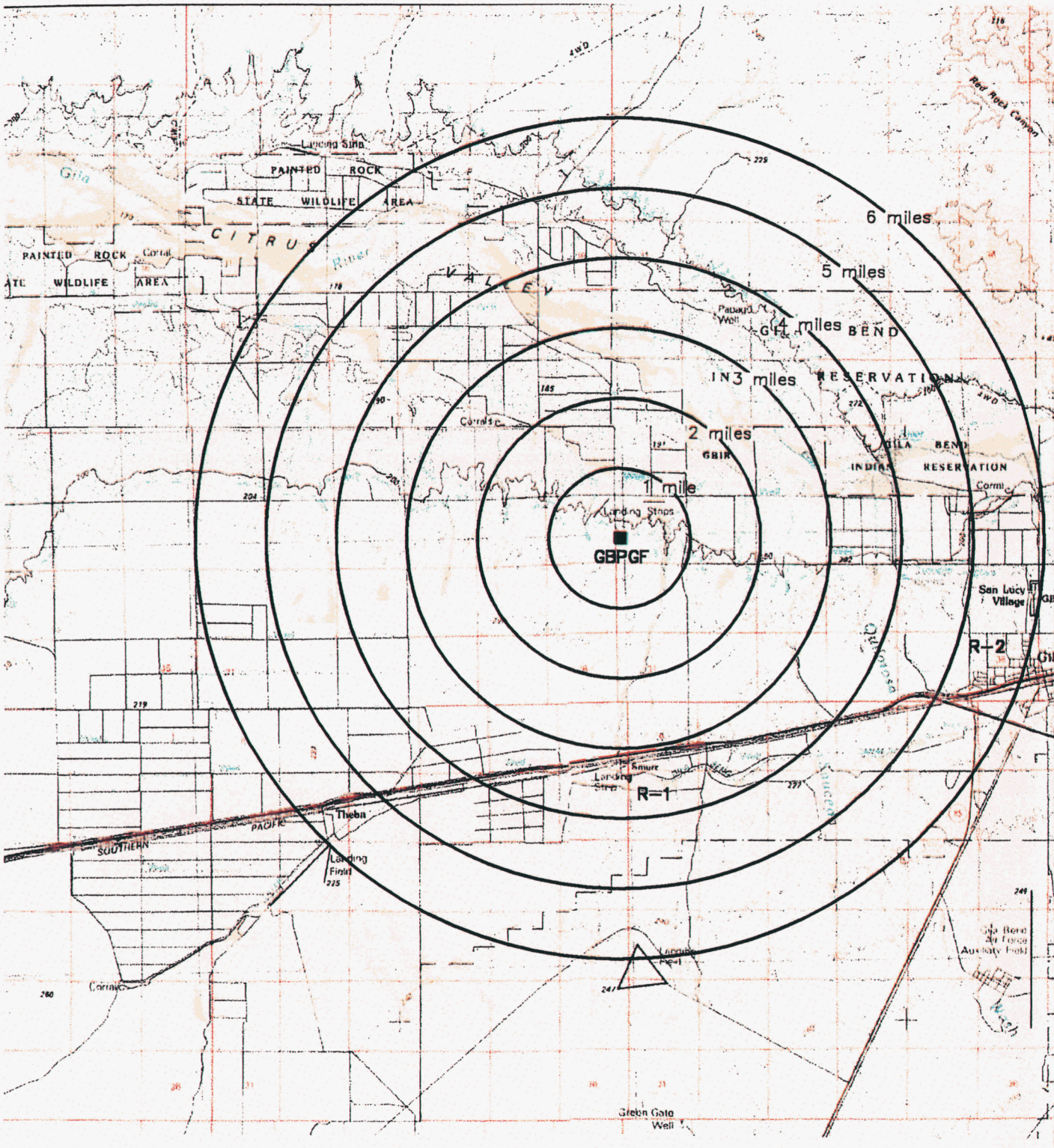
	Potential sensitive noise receptor location	**Calculated plant noise level @ receptor during full load operation in decibels**
R-1	Single residence approximately 18,000 feet south of GBPGF & south of the Southern Pacific R.R. tracks	< 25 dBA *
R-2	Group of residences approximately 25,000 feet east of GBPGF in the Town of Gila Bend.	< 25 dBA *

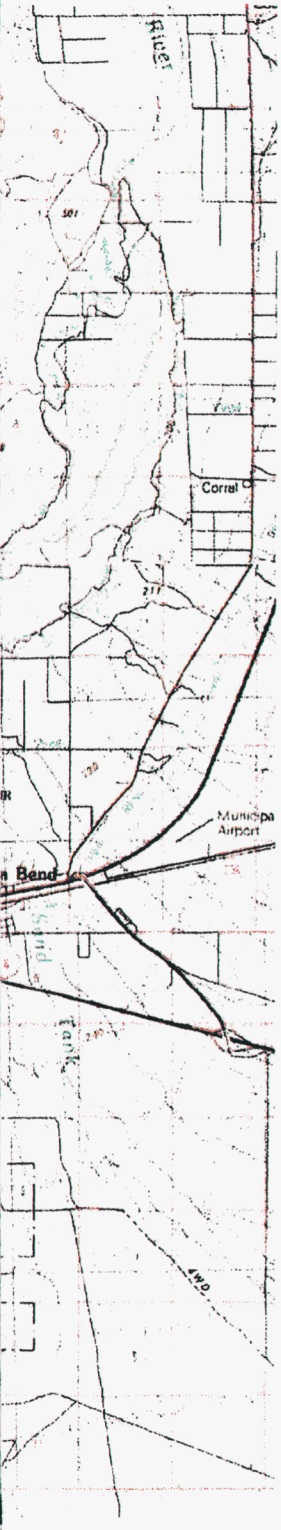
In general, the validity of these data has been verified on a number of projects, utilizing similar installed machinery and equipment location, by comparing the actual noise emissions of similar power plants at a particular far field location to the predicted levels at the same distance from the noise source. Consequently, the results yielded through these calculations are considered realistic. It should be noted, however, that the accuracy of any noise prediction decreases at very large receptor distances due to the fact that atmospheric conditions, particularly wind and not perfectly uniform over the entire propagation path. The significance of this potential error in the above results is considered to be minor as the nominal predicted levels are far below the likely threshold of disturbance for this environment whose ambient level is probably greater than 40 dBA.

* *On an absolute scale, sound levels in the vicinity of 25dBA are virtually inaudible and beyond the detection capabilities of the human ear.*

INTERFERENCE WITH COMMUNICATION SIGNALS

No interference with communication signals will be caused by the project.


6 miles
5 miles
4 miles
3 miles
2 miles
1 mile
GBPGF
R-1
R-2
PAINTED ROCK STATE WILDLIFE AREA
CITRUS VALLEY
GILA BEND INDIAN RESERVATION
Landing Strip
Theba
Landing Field
Gila Bend Air Force Auxiliary Field
San Lucy Village
Green Gate Well
Padgett Well
Corrals
Gila River
SOUTHERN PACIFIC



NORTH

0 2 4 6 8

SCALE: 1"=2 Miles

INDUSTRIAL POWER TECHNOLOGY

2227 CAPRICORN WAY SUITE 101
SANTA ROSA, CALIFORNIA 95407
TEL: 707-528-8900/FAX: 707-528-8901

No.	Revisions	Date

GILA BEND POWER PROJECT

Figure I-1

TS	SS	RW
DESIGN	DRAWN	ENG.

Job Number:	Date:
147100	5/3/00

Sheet Number

FI-1

1 of 1 sheets

20000503.144555

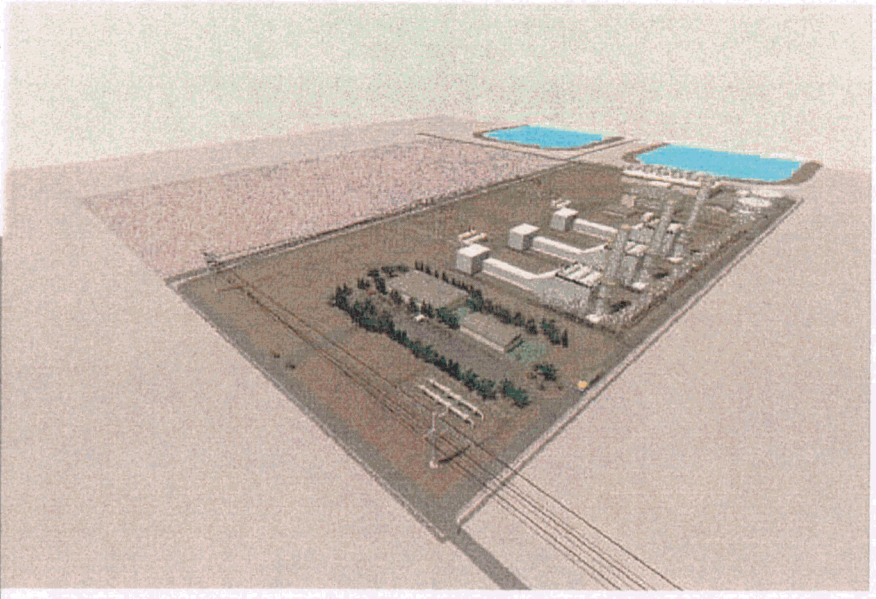
EXHIBIT J-1

COMMUNITY OUTREACH

GILA BEND
Power Partners, L.L.C.

GILA BEND POWER PROJECT

845 MegaWatts of Clean, Reliable Energy



Commercial Operation Planned for 2003
in
Gila Bend, Arizona

A development of Gila Bend Power Partners, L.L.C.

Gila Bend Home Page

Facts Page

News

Comments & Questions

Town of Gila Bend Page

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Updated: 09/05/00

POWERDEVELOPMENT ENTERPRISES, INC.
INDEPENDENT POWER DEVELOPERS

October 5, 1999

Members of the City Council
Town of Gila Bend
C/o Mr. Chuck Turner
Mayor
P.O. Box A
Gila Bend, AZ 85337

Dear Mr. Mayor:

As you are aware, over the last two years we have been actively pursuing a new power project (the "Project") to be located west and north of the Town of Gila Bend. For reasons outlined in this letter, and those that we are prepared to discuss with you in your next City Council meeting of October 12, 1999, we believe our Project and its site location will have tremendous positive community and economic benefit for Gila Bend. The site has also been carefully selected as a result of over two years of intensive screening designed to mitigate any potential negative environmental effects to the Town and its citizens. You will see from the information below and in our presentation at your next City Council meeting that the Project will be a good fit with the Town of Gila Bend both economically and environmentally. We appreciate your preliminary and ongoing efforts regarding our requests to have our Project site annexed into the Town so that the economic benefits of the Project may be more fully enjoyed by the Town.

The Project is initially comprised of a joint merchant power plant development effort between two firms, *POWERDEVELOPMENT ENTERPRISES, INC. ("PDEI")* and Industrial Power Technology ("IPT"). The name of the Project company (the "Company") is Diamondback Power Partners, L.P. and the site is on property adjacent to that of the Continental Waste Landfill site that has been procured from James Warkomski. The current summary of Project activity is as follows:

- Development Entity: The Company current ownership is comprised of *POWERDEVELOPMENT ENTERPRISES, INC.* (*"PDEI"*) and Industrial Power Technology ("IPT"). *PDEI* is a wholly-owned subsidiary of *ROBERT A. INNAMORATI & CO., INC.*, the exclusive financial advisor to Sammons Enterprises, Inc. ("Sammons") Sammons is a Dallas-based, diversified, privately-held company with total assets of approximately $7 billion and net worth of over $1.6 billion and operates in a variety of businesses including life insurance, industrial and oil-field supply and distribution, industrial equipment sales and leasing, travel and tourism, and bottled water. Industrial Power Technology, based in Santa Rosa, California, is a prominent engineering and technical services firm with extensive background in building projects of all types all over the world, with particular expertise in electric power. The principals (the "Principals") of PDEI and IPT have been directly responsible for approximately $1 billion in power project-related financings and development of

5949 Sherry Lane, Suite 1880
Dallas, Texas 75225
(214) 210-5080 Fax (214) 210-5079

approximately 1,900 megawatts of power related assets in the United States, China, Nepal, Turkey and the United Kingdom.

- Site Location and Interconnections: The Company has secured a site that is just north and west of Gila Bend, Arizona, at a location approximately 27 miles from the Palo Verde Nuclear Station and 23 miles from the El Paso Natural Gas Pipeline. In our preliminary discussion with Salt River Project ("SRP"), the operator of the existing Palo Verde Nuclear Station switchyard, we have ascertained that SRP will be constructing a new switchyard (the "Yard") to avoid Nuclear Regulatory Commission oversight of the existing switchyard. The Company has agreed to sit on a merchant plant interconnect engineering and operations committee that has been formed to allow for Project specific input into the formative issues and preliminary proposed interconnect protocol and configuration regarding the new satellite, 500 kilovolt Yard.

- Local Economic Impact: Upon anticipated annexation of the Project site by the end of this calendar year, the Project will become part of the property tax base of the Town. It is anticipated that the Project will eventually entail a total capital cost of approximately $350 million to $400 million. Initially a significant component of the local labor force will be needed to help build the Project. The entire construction period will require approximately two years, after the environmental permitting process is completed, which is estimated to take twelve to eighteen months. After construction of the Project it is our intention that a locally based and trained labor crew will operate the Project, comprising a permanent local labor requirement of 35 to 40 operations specialists on an ongoing basis.

- Equipment Configuration: The Project will be a gas-fired, combined cycle configuration with gross capacity from approximately 550 megawatts to 770 megawatts.

- Fuel: Transmission of fuel will be provided on the nearby El Paso line and will come from one of several supply sources with which the Company is currently negotiating. There is adequate transmission capacity to handle the volumes of gas that the Project will consume on a long term, baseload basis, approximately 40 billion cubic feet per year.

- Water Resources: The Company has secured several ground water wells in the Gila Bend area, near the site, with adequate water volumes and all located in a non-actively managed area as defined by the Arizona Department of Water Resources. The site is within the Citrus Valley aquifer, which has an available subterranean aquifer of 83,000 acre-feet. Since 1992 there has not been any draw down on the Citrus Valley aquifer. According to the Company's hydrogeologist, the annual draw down of 15,000 to 21,500 acre feet, which is needed for the Project, will be available on an on-going basis.

- Transmission Line (500 kilovolt) and Gas Line Rights of Way: Discussions have commenced with property owners involved that include the United States Bureau of Land Management and a limited number of private land owners.

- Environmental and Permitting: According to the Arizona Department of Environmental Quality, the Project will be in "an attainment area for all identified pollutants". Such a designation allows for the construction of the Project with existing technology designed to reduce air and water emissions. The building of a clean burning, natural gas-fueled generating facility will not have a negative impact on the local air-quality.

- Financing: Depending on the equipment configuration, total capital cost of the Project will be approximately $300 to over $400 million. Mortgage financing in an approximate amount of $250 million to $350 million is being handled by major Wall Street investment banks with experience in financing merchant power plants similar to the Project. Equity in an amount of approximately $50 million to $60 million will be sourced from one or more entities that the Company is currently in discussions with regarding permanent equity, including Sammons.

- Engineering, Procurement and Construction and Plant Operations: The Project will be built, under supervision of IPT as owner's engineer and, in turn, by a construction firm that will require approximately 200 new construction related jobs on site. The Project will be operated and maintained by a firm hired by the Company to manage the ongoing delivery of power with locally trained and hired professionals from the surrounding area.

- Community Relations: In addition to our request to be annexed by the Town of Gila Bend, thereby making the Project a part of the local property tax base, we are contemplating a number of related items that could enhance the quality of life for Gila Bend residents such as a water related recreational park. We are also contemplating the initiation of a training program to assist local residents to qualify for operator jobs at the Project.

The above is a brief summary of our current activities regarding the Project's ongoing development. We look forward to further working with you and the Town of Gila Bend regarding mutually beneficial ways of working together on the Project.

Sincerely,
POWERDEVELOPMENT ENTERPRISES, INC.

Copy - original sent 10/5/99

Robert A. Innamorati
President

NOTICE OF A PUBLIC MEETING

GILA BEND TOWN COUNCIL
October 12,1999; 6:00 p.m.
Council Chambers, 644 West Pima Street
AMENDED AGENDA

I. CALL TO ORDER

II. ROLL CALL

A. Mayor Chuck Turner
B. Vice-Mayor Fred Hull
C. Council Member Bill Henry
D. Council Member Steve Holt
E. Council Member Christopher Riggs
F. Council Member Richard Stuart
G. Council Member James "Bud" Turner

III. WORK SESSION - Airport Improvements:

A. Airport Runway Extension Project and Change Orders #2 and #3 relating to taxiway lighting and the preparation of an airfield pavement preservation program, Ron Schreier, Gannet/Fleming (BLUE)
B. Airport Fuel Tank Project, Ed Turski, EnecoTech (YELLOW)
C. Industrial Power generating plant proposal (PINK)
D. Steve Bernard proposal for Well #4 (GREEN)
E. Petition from residents and owners of property on Porter Avenue to change the name back to Porter Drive (BUFF)
F. Council Retreat (PEACH)

RECESS UNTIL 7 PM

IV. CONSENT AGENDA (all items subject to approval by a single motion; any Council member may require any of these items to be voted on separately)

A. Approval of the September 23, 1999, meeting minutes (WHITE)
B. Approval of the Ambulance Operational/Staffing Agreement with Rural Metro (BLUE)
C. Appointments to fill the expired terms of Steve Drinkuth, Dale Birchfield, and John Laird on the Gila Bend Historical Preservation Commission (PINK)
D. Resolution 99-15, amending the Town F/Y 2000 Fee Schedule (GREEN)

V. BUSINESS

A. PUBLIC HEARING: Consideration and possible action to approve the Five Year Community Development Consolidated Plan (YELLOW)
   1. PUBLIC HEARING
   2. Action to approve 5 year consolidated plan
B. Consideration and possible action on Ordinance 99-14, amending Ordinance 99-12 Section 6, effective date of tax increase and declaring an emergency (PEACH)

VI. ACCOUNTS PAYABLE - Ratify accounts payable for the amount of $131,125.54

3/9/98-4:28 PM

VII. YEAR-TO-DATE BUDGET REPORT (for information only - no action required)

VIII. CALL TO THE PUBLIC (At this point any citizen may speak about any subject not listed on the agenda when recognized; Council members, however, may not discuss these subjects because they are not specifically listed on the agenda).

IX. REPORTS BY OFFICERS
- A. Council Member reports
- B. Staff reports

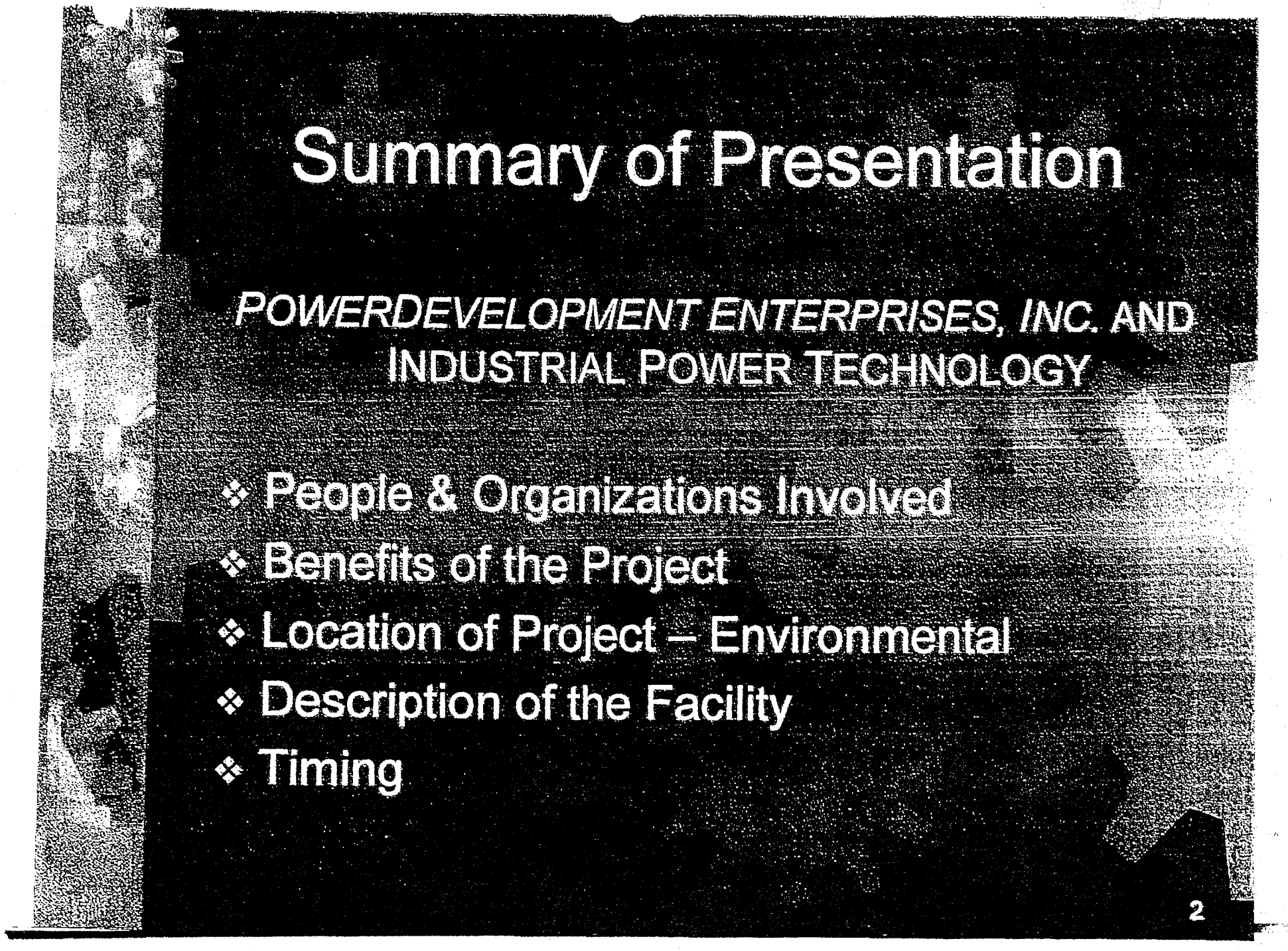
X. EXECUTIVE SESSION: Consideration and possible action to move into Executive Session pursuant to ARS 38-431.03 (A) legal advice regarding annexations

XI. ADJOURNMENT

Carl Stephani, Deputy Town Clerk
10/7/99

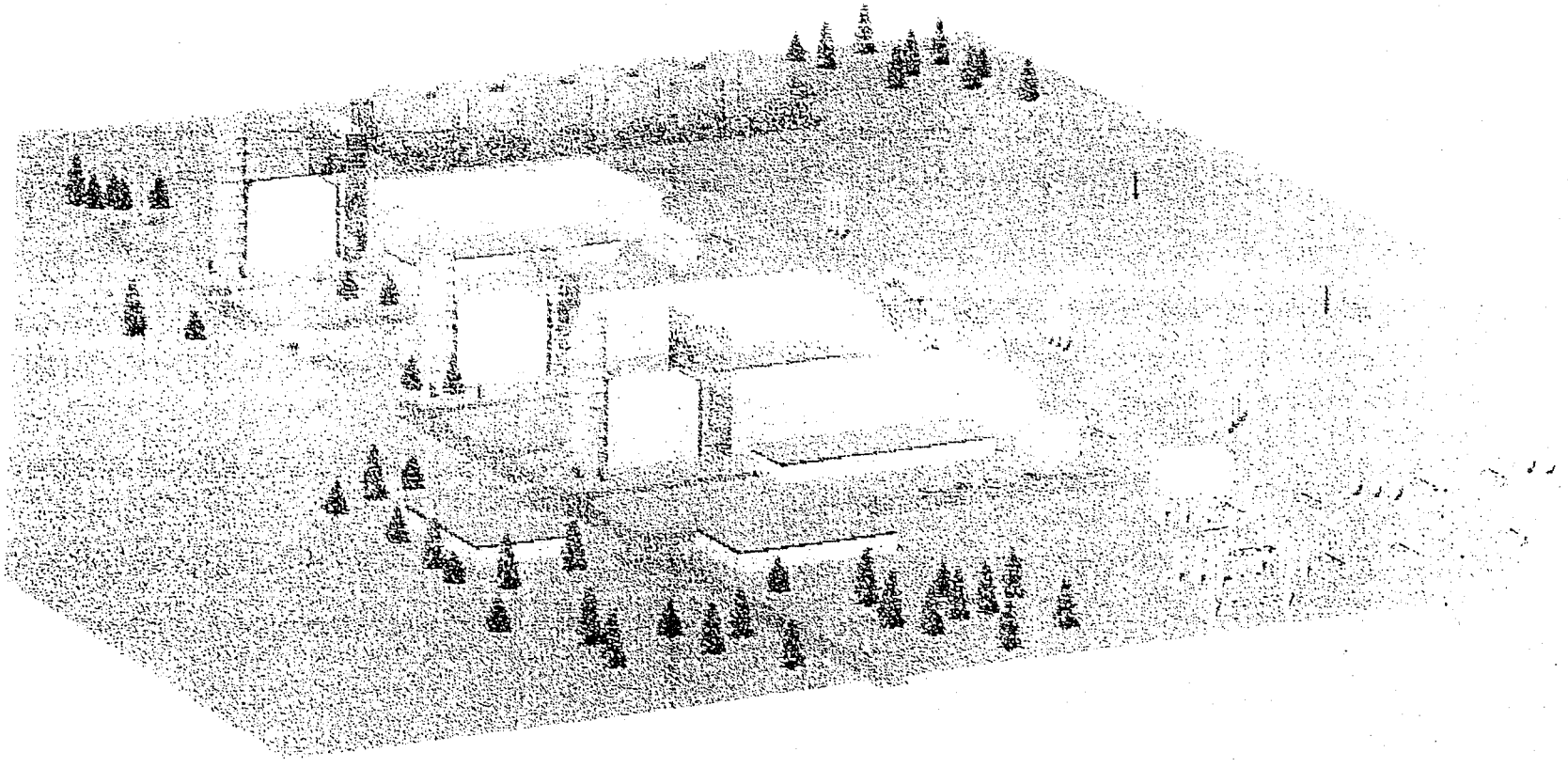
Date posted: 10/7/99

ACCESSIBILITY FOR ALL PERSONS WITH DISABILITIES WILL BE PROVIDED UPON REQUEST. PLEASE TELEPHONE YOUR ACCOMMODATION REQUEST (683-2255 OR 1-800-367-8939 ADD ARIZONA RELAY SERVICE) 72 HOURS IN ADVANCE IF YOU NEED A SIGN LANGUAGE INTERPRETER OR ALTERNATE MATERIALS FOR A VISUAL OR HEARING IMPAIRMENT.



PRESENTATION MADE AT CLIO BOND TOWN COUNCIL MEETING

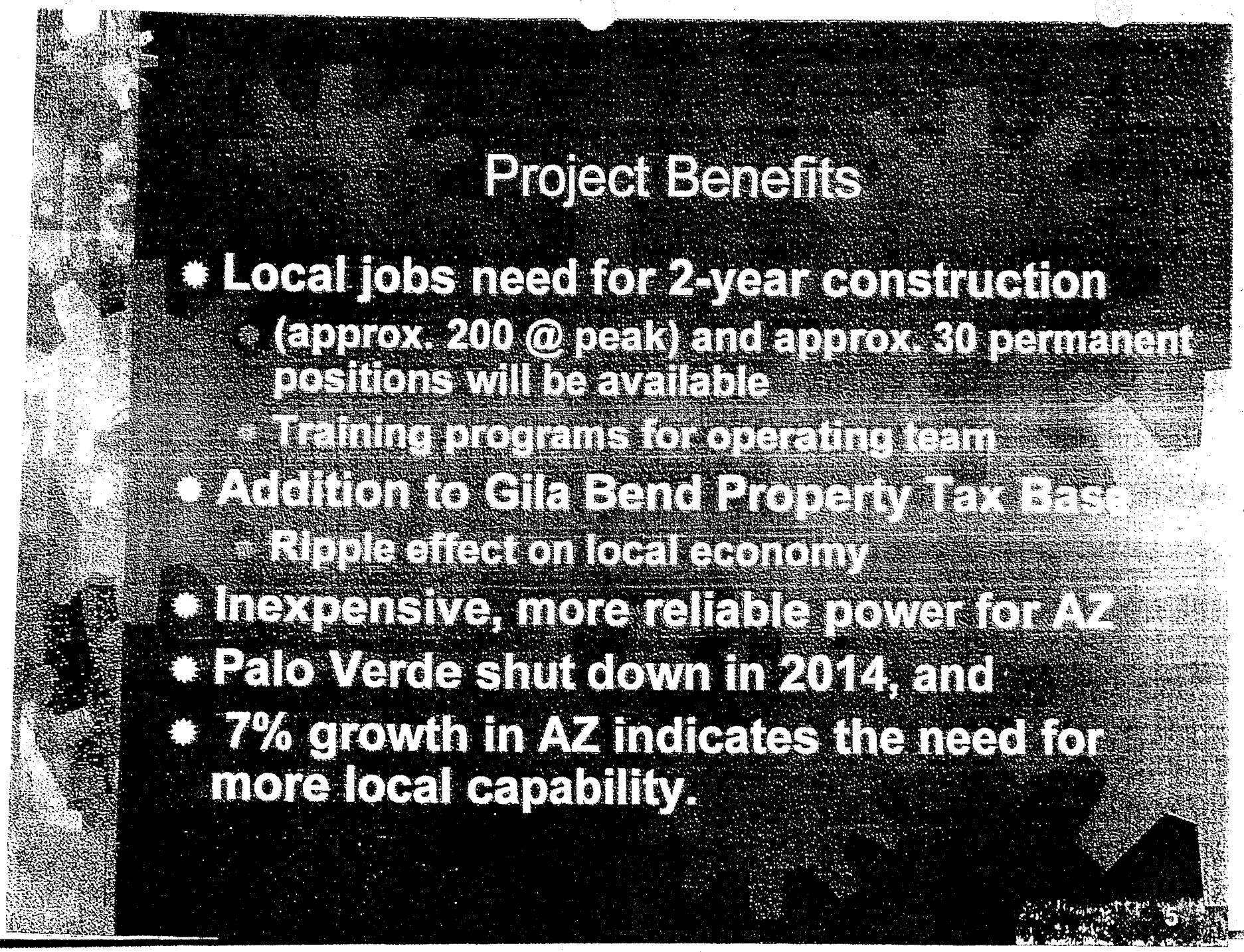
Gila Bend Power Project

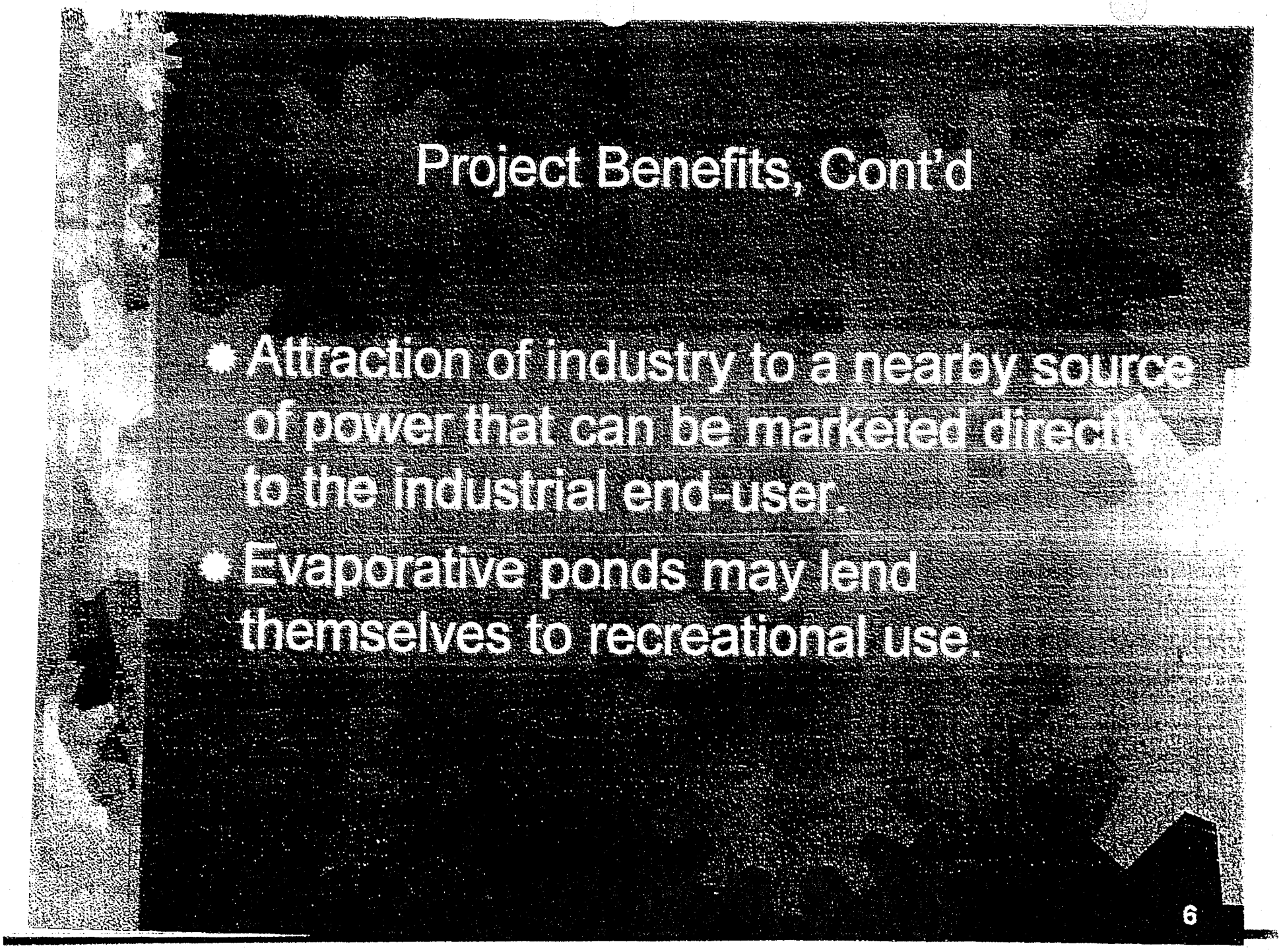


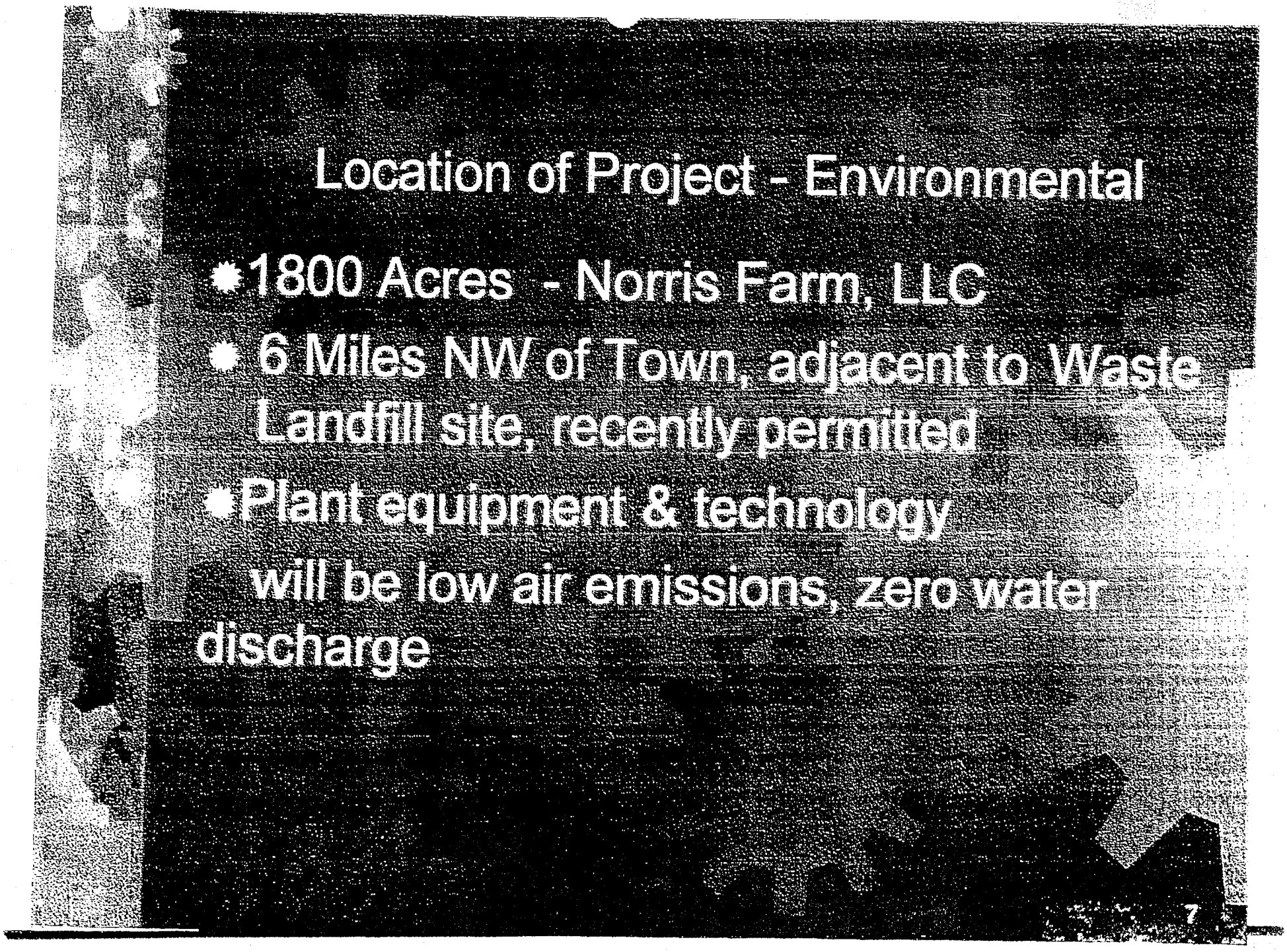
POWER DEVELOPMENT ENTERPRISES, INC.

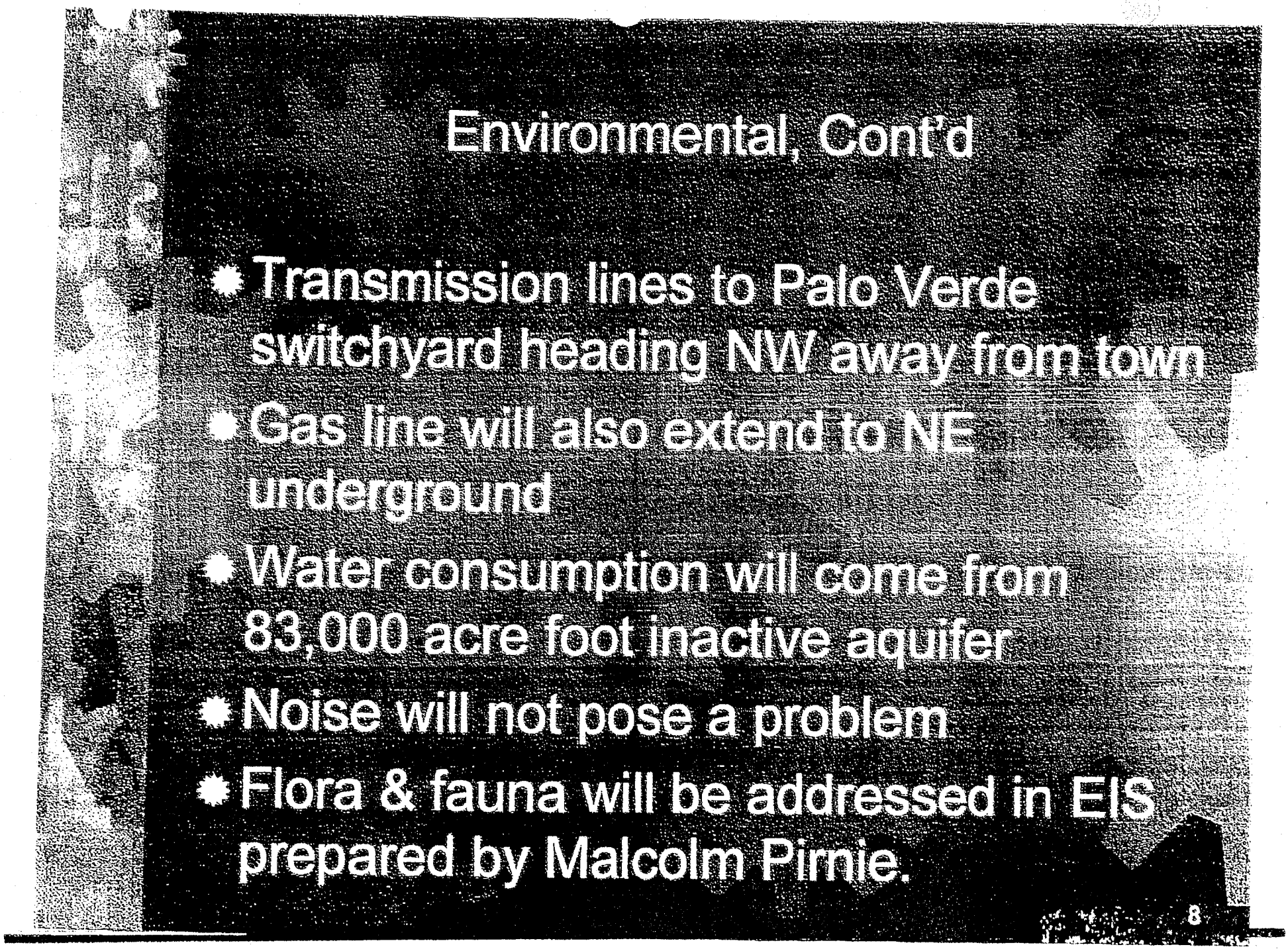
Gila Bend Power Project
People & Organizations Involved

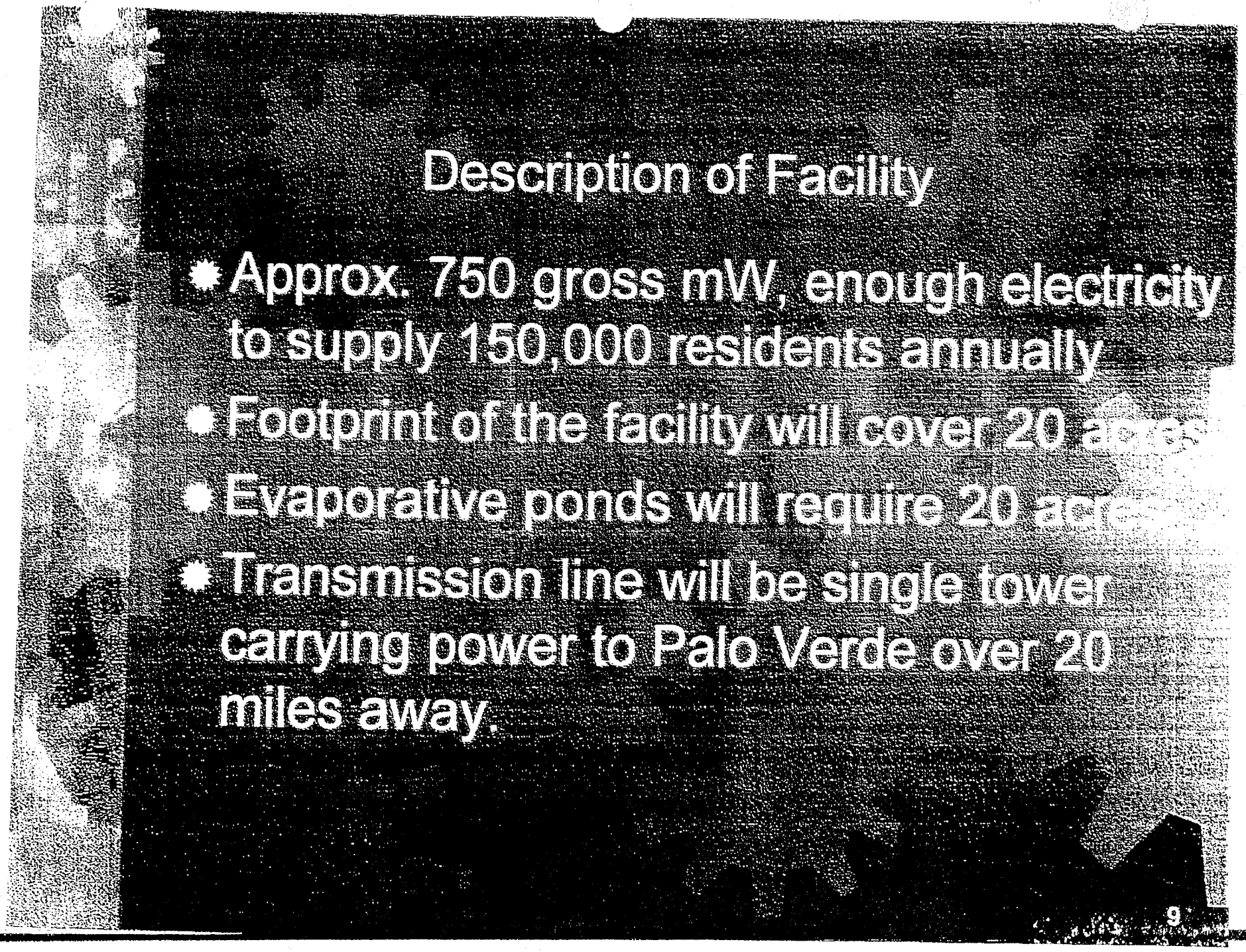
- Land & Water – Norris Farms, LLC
- Gila Bend – Chuck Turner, Mayor
- Labor – Local Area Preference
- Transmission – Palo Verde Switchyard
- Environmental – Malcolm Pirnie
- Gas Supply – El Paso Energy
- Equipment – ABB, GE or Siemens
- Operations – Experienced Operating Team
- Project Development – *PowerDevelopment Enterprises Inc.* & Industrial Power Technology

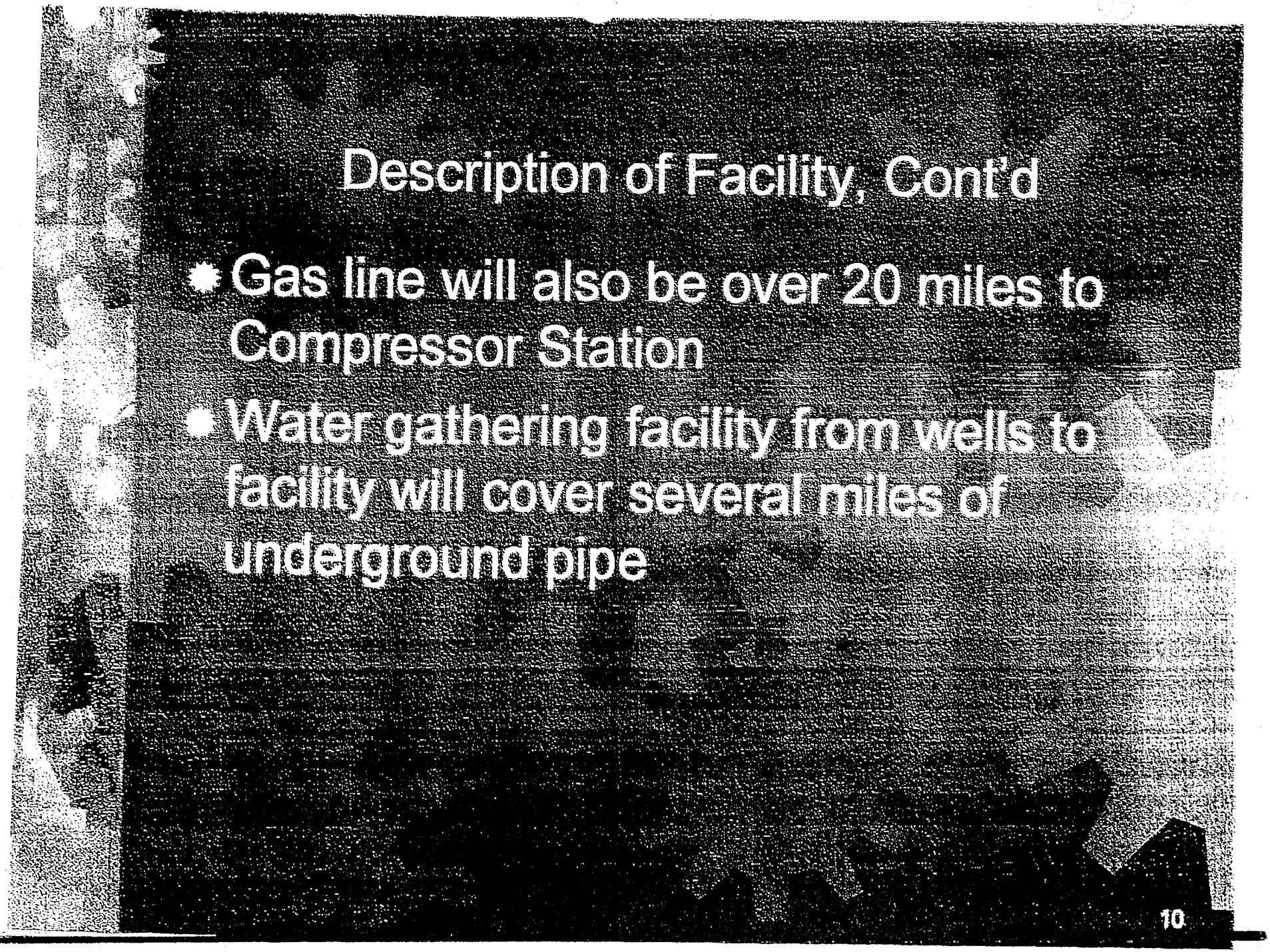

Project Benefits
Local jobs need for 2-year construction
(approx. 200 @ peak) and approx. 30 permanent positions will be available
Training programs for operating team
Addition to Gila Bend Property Tax Base
Ripple effect on local economy
Inexpensive, more reliable power for AZ
Palo Verde shut down in 2014, and
7% growth in AZ indicates the need for more local capability.
5

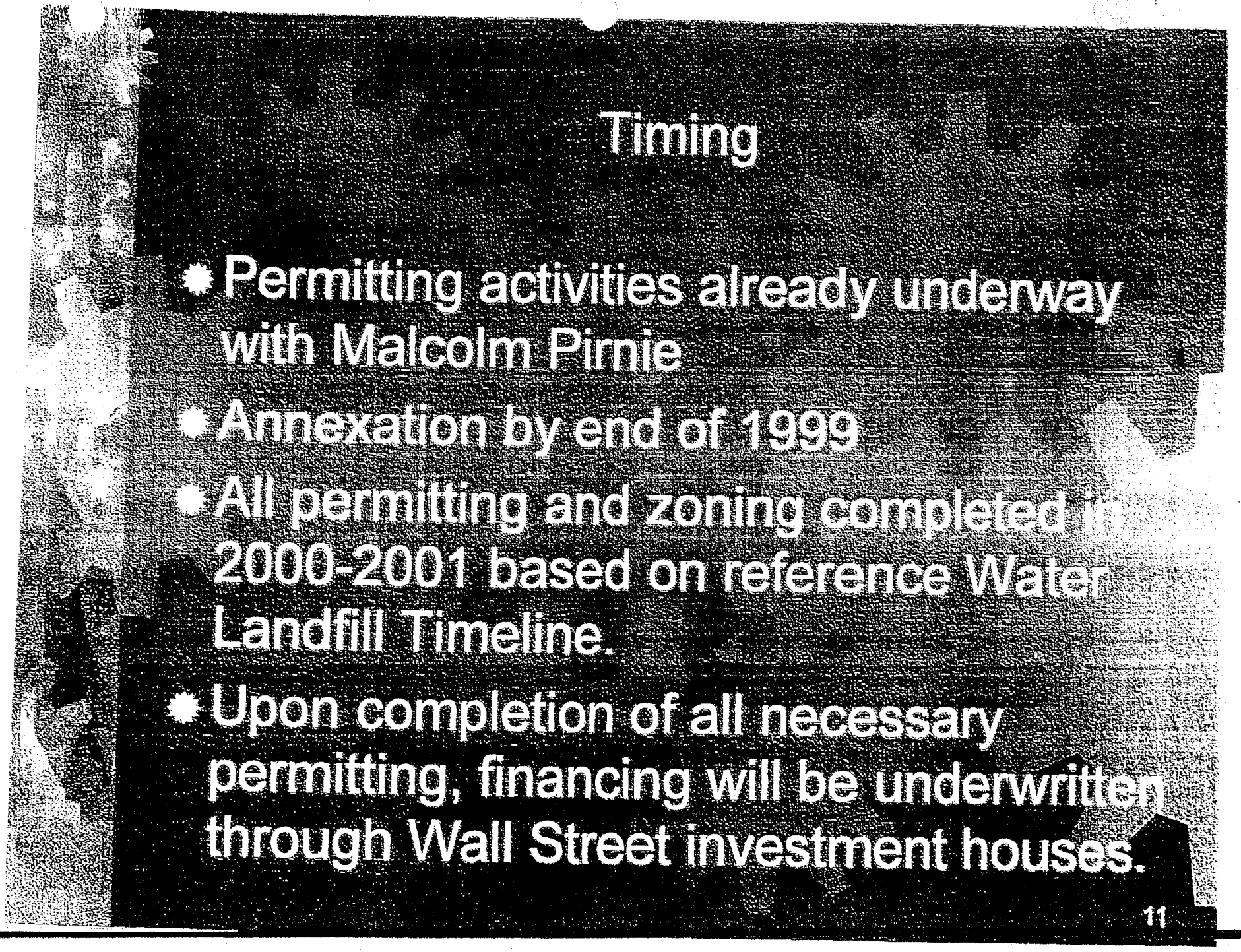

Project Benefits, Cont'd
Attraction of industry to a nearby source of power that can be marketed directly to the industrial end-user.
Evaporative ponds may lend themselves to recreational use.
6

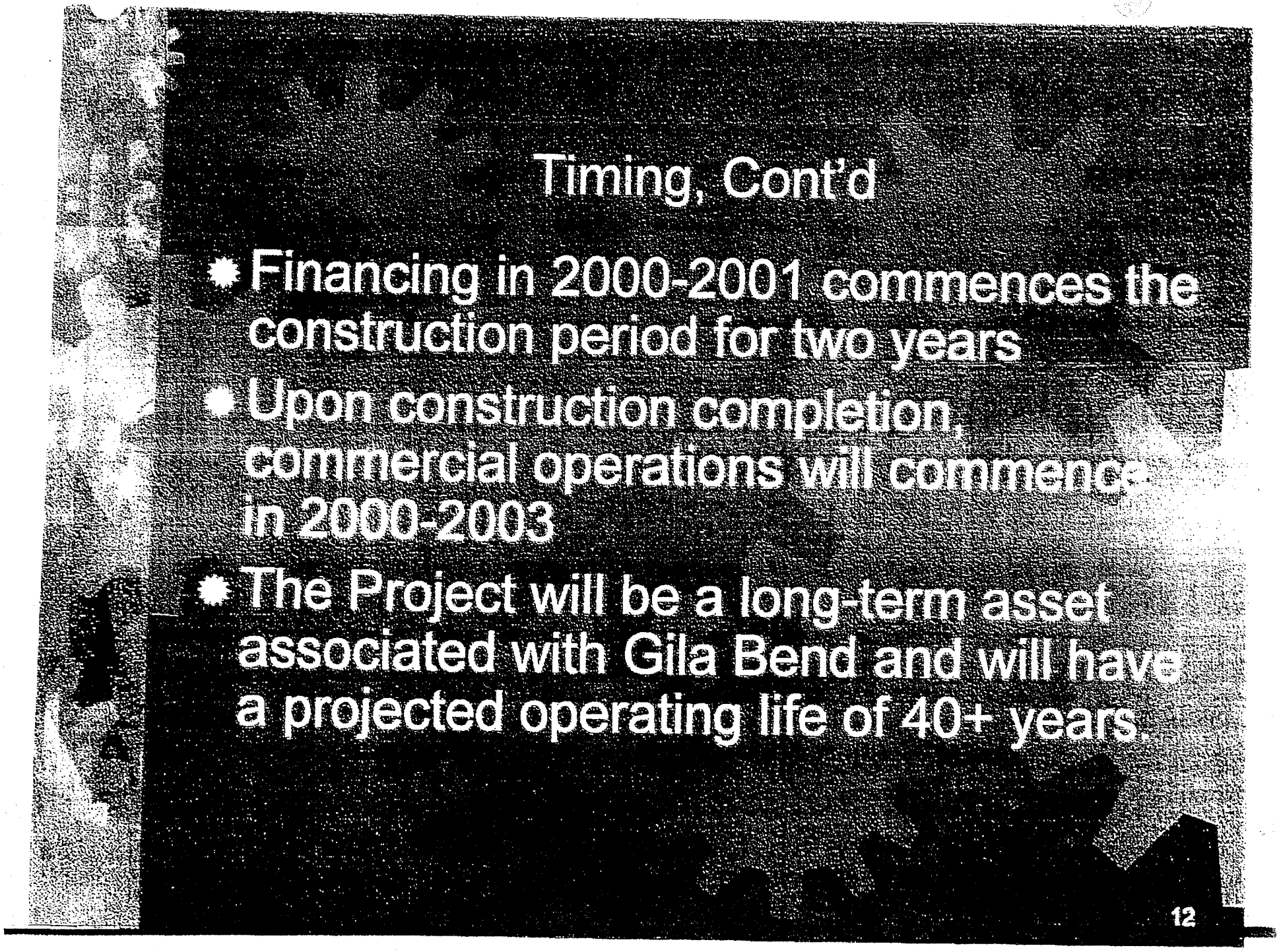

Location of Project - Environmental
1800 Acres - Norris Farm, LLC
6 Miles NW of Town, adjacent to Waste Landfill site, recently permitted
Plant equipment & technology will be low air emissions, zero water discharge
7

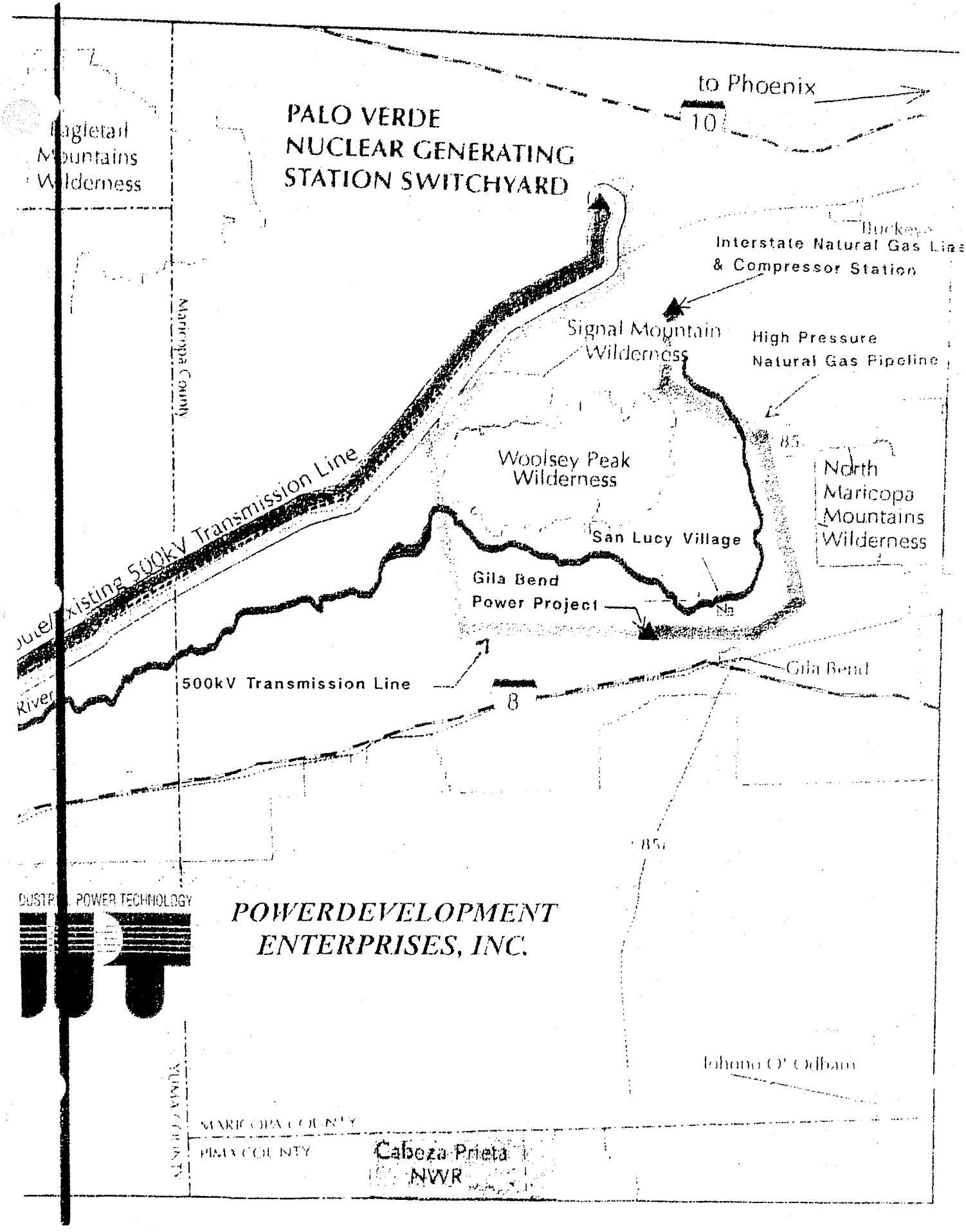

Environmental, Cont'd
Transmission lines to Palo Verde switchyard heading NW away from town
Gas line will also extend to NE underground
Water consumption will come from 83,000 acre foot inactive aquifer
Noise will not pose a problem
Flora & fauna will be addressed in EIS prepared by Malcolm Pirnie.
8


Description of Facility
Approx. 750 gross mW, enough electricity to supply 150,000 residents annually
Footprint of the facility will cover 20 a
Evaporative ponds will require 20 a
Transmission line will be single tower carrying power to Palo Verde over 20 miles away.
9


Description of Facility, Cont'd
Gas line will also be over 20 miles to Compressor Station
Water gathering facility from wells to facility will cover several miles of underground pipe
10


Timing
Permitting activities already underway with Malcolm Pirnie
Annexation by end of 1999
All permitting and zoning completed in 2000-2001 based on reference Water Landfill Timeline.
Upon completion of all necessary permitting, financing will be underwritten through Wall Street investment houses.


Timing, Cont'd
Financing in 2000-2001 commences the construction period for two years
Upon construction completion, commercial operations will commence in 2000-2003
The Project will be a long-term asset associated with Gila Bend and will have a projected operating life of 40+ years.
12


to Phoenix
10
PALO VERDE
NUCLEAR GENERATING
STATION SWITCHYARD
Eagletail
Mountains
Wilderness
Buckeye
Interstate Natural Gas Line
& Compressor Station
Signal Mountain
Wilderness
High Pressure
Natural Gas Pipeline
Maricopa County
Woolsey Peak
Wilderness
85
North
Maricopa
Mountains
Wilderness
San Lucy Village
Existing 500kV Transmission Line
Gila Bend
Power Project
500kV Transmission Line
Gila Bend
8
85
POWER TECHNOLOGY
POWERDEVELOPMENT
ENTERPRISES, INC.
Tohono O'Odham
MARICOPA COUNTY
PIMA COUNTY
Cabeza Prieta
NWR

e-business solutions starting at $30 a month.
USWEST Dex.

Power firms plan plant in Gila Bend

By Max Jarman
The Arizona Republic
Oct. 15, 1999

Power Development Enterprises of Dallas and Industrial Power Technology of Santa Rosa, Calif., have announced plans to build a $400 million gas-fired power plant near Gila Bend.

The plant is proposed for a site 70 miles southwest of Phoenix that is scheduled to be annexed next month into Gila Bend.

About 200 jobs will be created during the plant's estimated two-year construction, and more than 30 permanent positions will be available once it is operational.

"This project advances the interests of the town of Gila Bend," Mayor Chuck Turner said. "It should move forward rapidly."

Bob Innamorati, president of Power Development Enterprises, said construction is scheduled to begin at the site, six miles north of Gila Bend, by late 2001 with completion set for early 2004. He said the 2,000-acre site was selected because of its proximity to a natural pipeline and the Palo Verde Nuclear Generating Station switch yard, 27 miles to the north. By connecting with the switch yard, power from the Gila Bend plant will flow onto the Western power grid, which distributes electricity to a 14-state region. The availability of water and the fact that the area is under no Environmental Protection Agency emissions restrictions contributed to the decision to locate near Gila Bend, Innamorati said.

"The community also has been very receptive to our plans," he added.

The plant will use about 5,000 acre-feet of water per year and emit about 250 toms of ozone-forming nitrogen oxide. The emissions are significantly less than those produced at older gas-fired plants and traditional coal facilities.

Known as the Gila Bend Generating Station, the facility would be a

merchant plant selling power to wholesale customers instead of end users. It's the seventh such facility to be announced in Arizona during the past year and reflects an emerging competitive electric industry where newer, more efficient plants will have a competitive edge.

Combined cycle plants, such as the one proposed for Gila Bend, use natural-gas turbines and steam generators to produce electricity 30 to 40 percent more efficiently than traditional coal plants.

$$$

Max Jarman can be reached at (602) 444-7351 or at max.jarman@pni.com.

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Cars | Computing

News | Sports | Entertainment
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Contact us

at 29¾. Phelps fell ¼, to 57¼. Grupo Mexico dropped 0.6 peso.

Radyne wins big contract

Radyne ComStream has been awarded a contract for more than $3 million by ITI Corp. to provide satellite communications equipment for a network in India.

Phoenix-based Radyne ComStream will supply frequency converters and digital satellite modems for two-way telephone, data and video applications.

ITI, based in Bangalore, India, provides products and services to corporations for their corporate networks and to telecommunication service providers and Internet service providers for public network infrastructure.

Special meeting slated

Allied Waste Industries Inc. said it will hold a special shareholders meeting on Nov. 17 to vote on two stock proposals.

Shareholders in the Scottsdale-based company will be asked to approve the issuance of additional shares of common stock in conjunction with the conversion of the company's senior convertible preferred stock and to increase the maximum number of shares of stock covered under its stock incentive plan.

The meeting will be held at 9 a.m. at the company's headquarters, 15880 N. Greenway-Hayden Loop, Suite 100, Scottsdale.

Acquisition closes

Poore Bros. Inc. said it has closed the acquisition of Wabash Foods LLC, maker of Tato Skins and other snacks formerly under the Keebler umbrella.

The Goodyear-based company paid Pate Foods Corp. 4.4 million shares of common stock, worth about $5.6 million, and a warrant to purchase an additional 400,000 shares.

Compiled from wire and staff reports. To submit a news item to AZ Inc, call the Business desk at (602) 444-8142, fax us at (602) 444-4439 or send e-mail to repbiz@pni.com.

azcentral.com

Get business news 24 hours a day on Arizona Central, the online service of The Arizona Republic. You'll find it at www.azcentral.com/business

lowed by Florida and Texas.

The cost to maintain a regular checking account averages about $176 in Arizona, USPIRG estimates, compared with $217 nationally. However, Arizonans pay the highest average

said David Ponder, USPIRG's campaign director in Tempe.

"Banks continue to make more money and charge consumers more to gain access to their money," he said. "And banks are charging new fees

"Most cu
their accour
avoid fees."
study assum
scenario wh

— *Pleas*

Power firms plan plant in Gila Bend

FYI Gary B.

By Max Jarman
The Arizona Republic

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— *Please see* GILA BEND, *Page E3*

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On Take Your So
Kyle Greenberg
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BI

Y2K the theme of comed

Making jokes is a time-honored way to ease tense moments. Now it's also a way raise money for charities.

The Scottsdale-South YMCA will yuk it up over the potential problems of Y2K in a themed comedy night, dinner and silent auction on Oct. 29.

The theme will include a Y2K bunker for a dry run at surviving the end of the world. And if laughing at the decline and fall of civilization isn't bad enough, the event will include a Y2K sing-along. Lo comedian **Sean Hoy** is the emcee and ch doomsayer. He will be assisted by a cast several.

Thursday's markets summary

CLOSING QUOTES:

■ NYSE:	■ AMEX:	■ Composite volume:
591.33	785.95	1,015,492,700
-0.76	-3.46	

■ Toronto:	■ Russell 2000:
8,969.70	419.31
-67.31	-0.01

ONE DOLLAR EQUALS:

Dollar	1.4810	Yen	107.35
	-0.0008		+0.75
Peso	9.6400	Mark	1.8141
	+0.1000		+0.0023

METALS AND

Troy oz
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Troy oz.
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...continuing opera-
tions was $6.5 million, up 8 per-
cent from the $6 million in the
same period a year ago.

Sales of its higher-margin golf
club shafts increased 24 percent

Revenue for the July-September
period totaled $14 million, a
7.3 percent increase over revenue
of $13.1 million a year ago.

Personnel changes and new sales
and marketing strategies are just
beginning to take effect at the

...final fourth-quarter profits increased
31.5 percent, to $16.4 million, or
21 cents per share on revenue of
$135.7 million, up 23.1 percent
over last year.

Apollo's stock price was up 1½
to 20¾ on news of the Phoenix-
based company's earnings.

...ila Bend to get $400 million power plant

GILA BEND, *from Page E1*

Gila Bend plant will flow onto the Western power grid, which distributes electricity to a 14-state region. The availability of water and the fact that the area is under no Environmental Protection Agency emissions restrictions contributed to the decision to locate near Gila Bend, Innamorati said.

"The community also has been very receptive to our plans," he added.

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Combined cycle plants, such as the one proposed for Gila Bend, use natural-gas turbines and steam generators to produce electricity 30 to 40 percent more efficiently than traditional coal plants.

Max Jarman can be reached at (602) 444-7351 or at max.jarman@pni.com.

DIVIDENDS

THURSDAY DIVIDENDS DECLARED

	Pfd	Rate	Amt	Rec date	Pay date
REGULAR					
...	z	.354	11-1	11-16
approx. amount per ADS					
STOCK					
...	x				
... 1 split subject to approval					
...	z	11-2	11-18	
x - 3 for-2 split					
...		Apc	10-22	11-1
INCREASED					
...	Q	.10	11-15	11-19
...	Q	.17	10-25	

Front Mutual	Q	.50	11-1	12-1
Natl Commerce Bncrp	Q	.10	12-10	1-3
SPECIAL				
Berkshire Bancorp	–	.12	10-15	10-29
REGULAR				
Arrow Wilbur Vntrs	Q	.215	11-17	12-1
Coors Ceramics	Q	.075	10-29	11-15
Coudersville Bncrp	Q	.11	10-26	11-5
Community Fin Bncrp	C	.065	10-25	11-10
Cordant Tech.	C	.10	11-30	12-13
Doral Fin'l	Q	.08	11-12	12-3
Eastern Utils Assoc	Q	.415	11-1	11-15
Elmer Trust	Q	.285	10-28	11-12
Emcor Corp	Q	.125	12-1	12-20

FONS Corp	Q	.10	10-25	11-5
G&T Terminals	Q	.056	10-29	10-29
Gibralfaro Inc. Dlr	M	.10	10-25	10-29
Haven Bancorp	Q	.275	10-4	10-22
Iowa Hlmg Trust	Q	.16	10-25	10-29
Peapl Bldng Corp	Q	.05	12-10	1-1
Procter & Gamble	Q	.32	10-15	11-15
Reading Bncorp	A	.05	10-1	10-25
Restaurant Elec	Q	.04	11-1	12-1
Thomas Indus	Q	.075	12-3	1-1
Tompkins Bollvare	Q	.04	10-25	11-19
Waynesburg	Q	.40	10-25	11-25

y – payable in Canadian funds

The Arizona Republic

444-2424

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...ook at what's ahead
...e Valley's real estate
...rket and what the next

THURSDAY, NOVEMBER 4, 1999
Arizona Biltmore Pavilion
7:30 a.m. - 10:00 a.m.

The Economy and the Commercial Real Estate Market
Elliott D. Pollack, President, Chief Economist

$27,99...
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$289 Down
Pitre Buick/Pontiac/GMC
AutoNation USA
www...
* 60 mo. closed end lease. $289 Down payment. $289 ... vehicles subject to prior sale. Vehicles quantities ...

Let T...

The 4th Annual

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and Michael ...
baby boys bor...

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October 20th ...
You'll hear an e...
marketing to Hi...
communication ...
And you'll ...

POWERDEVELOPMENT ENTERPRISES, INC.
Gila Bend Generation Station
Fact Sheet

Project Description:	750 megawatt gas-fired combined cycle electric power generation facility with a projected operating life of 40 years.
Site Location:	The facility will be situated on an approximate 2,000-acre parcel of land, six miles West Northwest of the existing Gila Bend Town boundary and anticipated to be annexed into the Town of Gila Bend in the near future.
Power Transmission:	Transmission line from the Site heading North to Palo Verde Nuclear Station Switchyard, approximately 20 miles point-to-point.
Fuel Source:	Natural gas being taken from the El Paso Energy pipeline, approximately 20 miles North of the Site.
Environmental Considerations:	All emissions, air, water, and noise, will conform to and meet United States Environmental Protection Agency highest standards. With respect to water discharge the facility will be zero discharge accomplished through the usage of evaporative ponds.
Permitting:	Under the direction of the Arizona Department of Environmental Quality.
Water consumption:	Approximately 10,000 acre-feet per year and within the guidelines established by the Arizona Department of Water Resources.
Timing:	Construction is scheduled for early 2001 and commercial operations for early 2003.
Local and Regional Economic Benefits:	Additional local and state tax revenues; ripple effect on local economy; cheaper, more reliable power for the region and Arizona; attraction of industry to the Gila Bend area to buy power directly.
Job Opportunities:	Approximately 150 to 200 construction jobs over the two-year build out of the Project and approximately 30 permanent plant operation jobs upon its commercial operation.
Contacts:	*POWERDEVELOPMENT ENTERPRISES, INC.* 5949 Sherry Lane, Suite 1880, Dallas, Texas 75225 Robert A. Innamorati, President (214) 210-5080 Pete Wright, Managing Director (214) 210-5072

Gila Bend Power Partners, L.L.C.

NEWSLETTER SUMMER 2000

GILA BEND POWER PARTNERS TO BUILD POWER PLANT NEAR GILA BEND

Gila Bend Power Partners, L.L.C., a joint venture comprised of Sammons Enterprises, Inc., Dallas, Texas, PowerDevelopment Enterprises, L.P., Dallas, Texas, and Industrial Power Technology, Santa Rosa, California, has committed to build an approximately 800 megawatt gas-fired electric power plant approximately 7 miles northwest of Gila Bend. Construction on this new "merchant" electric power plant will commence in the First Quarter of 2001 with operations scheduled for early 2003.

Merchant power plants such as the new Gila Bend facility are being made possible by the deregulation of the electric power business on a national and on a state-by-state basis. State deregulation will soon allow consumers, including Arizona consumers, freedom of choice at the residential level of consumption. Over the coming years deregulation should benefit all consumers by promoting competition and thereby lowering prices at the retail level. Additional benefits of this new facility to the Town of Gila Bend will include temporary construction and permanent plant operation jobs, more taxes for schools, emergency services, libraries, roads and other Town needs, as well as overall economic development of the area surrounding Gila Bend.

- *Who are the companies involved?*

  Sammons Enterprises, Inc., based in Dallas, Texas, has over $7.0 billion in assets and $1.7 billion in net worth and is ranked as the 76th largest privately-held company in the United States with interests in 11 operating subsidiaries, including businesses in such diverse areas insurance, travel, bottled water and mortgage banking.

  PowerDevelopment Enterprises, L.P., based in Dallas, Texas is a company recently formed to develop merchant power opportunities in the United States as a result of recent deregulation of the electric power industry. The principals of PDE, L.P. have extensive backgrounds in development and financing of electric power projects.

  Industrial Power Technology, based in Santa Rosa, California, is a global engineering firm with comprehensive experience in the design and construction of electric power plants.

- *How will the new Gila Bend Generation Station affect the natural environment?*

  There will be no aspect of the plant that will upset the environment including site specific areas of concern such as air, water, noise and local site conditions. Power transmission and gas transmission lines will be built along existing utility corridors north of the Town.

  Will the plant negatively impact the local air quality?

  No, the plant will utilize advanced pollution control equipment that will be approved by Maricopa County before an air permit is issued. This will result in emissions that are below Best Available Control Technology standards.

  Will the plant discharge any waste into the groundwater?

  No, the plant is technically known as a "Zero Discharge Facility" which means cooling water used at the plant will be collected into double lined evaporative ponds for evaporation. These

evaporation ponds will be approved by Arizona Department of Environmental Quality before receiving their permits for operation.

Will the plant be noisy?

No, studies show the noise level at the nearest residence to be below all federal noise guidelines.

Will groundwater pumping in this area hurt other local farmers?

No, the plant will be taking water form the Citrus Valley Aquifer, a naturally replenishing basin that has been in substantial disuse since the early 1980's. An independent hydrogeologist has determined that any nearby irrigation wells will not be affected by any draw downs from the plant.

- *What are the direct economic benefits to the local economy?*

  During construction of the new Station the peak workforce deployment will be approximately 300 to 400 jobs in the local area with an estimated $15 to $20 million workforce payroll during that period. Permanent employment will be approximately 30 jobs directly associated with the plant and approximately 75 to 100 related new jobs in the area. Local purchases associated with the Station should be an annual $2 to $3 million over the project's life estimated at 30 to 40 years.

  The Project will contribute to the local ISD through property tax contributions estimated currently at several millions of dollars per year average over the life of the project. At a state and federal level the facility will pay an estimated several hundred millions of dollars of taxes over its useful life.

- *What is the timing for the Project?*

  Targeted commencement of construction is scheduled for First Quarter of 2001 with commercial operations of the Station targeted at first Quarter of 2003. We plan on making a presentation on timing and other areas of interest at the second Tuesday of September, Town Hall meeting, or September 12, 2000, at 6:00 PM. We hope to see you there.

- *Contact:*

  PowerDevelopment Enterprises, L.P.
  5949 Sherry Lane, Suite 1880
  Dallas, Texas 75225
  (P) (214) 210-5080
  (F) (214) 210-5079

5949 Sherry Lane, Suite 1880
Dallas, Texas 75225

Resident
Gila Bend, Arizona 85337

From The Town Hall

Town Manager
Carl Stephani

Power and Water

GILA BEND POWER PARTNERS

This is a power plant development group that is proposing the construction of a new power plant at the northwest quadrant of Citrus Valley Road and Watermelon Road. They had been planning to meet with the Town Council on Tuesday, August 22, 2000, at 7 PM the Town Council, but that meeting has been postponed until: DATE:" Tuesday, September 12, 2000
TIME: 6PM
LOCATION: Town Hall

That meeting will include an open discussion of the construction of the power plant and its impact on the area. Please plan to attend. GB Power Partners will be providing refreshments and they want everyone to feel welcome.

This new power plant will generate 800 megawatts of energy which will be carried from the plant on power transmission lines along Watermelon Road to join the lines that will be installed to serve the other proposed power plant at Stout and Watermelon Roads.

The Town is pleased that Gila Bend Power Partners have selected Gila Bend for the location of their new project, and we look forward to hearing community comments about the proposal at the September 12th meeting.

WATER TREATMENT
REVERSE OSMOSIS

The good news here is that the Town recently received more than half a million dollars to build a new plant to remove the fluoride from our water. The bad news is that the operating costs for the new treatment plant are going to make our water more expensive. Just how expensive is a subject that will be discussed at the two next Council meetings with water treatment plain experts.

On Tuesday, August 22, at 7 PM, the Council will be meeting with Dr. Brent Cluff, of Clean Water Products, and with his engineer to discuss installing a reverse osmosis water system for treating the Town's water. These systems produce very high quality water, but they also throw off about 25% of the water they process as waste water. That waste water contains higher concentrations of minerals and other chemicals that are undesirable and can be a problem for the ground water. It need to be contained in a large evaporation pond, which would be cleaned every so often to remove the chemical residue, or it might possibly be put to some beneficial use. It appears that this type of process may be more costly than other alternatives, although it does have the benefit of providing cleaner water than just about any other process.

WAFER TREATMENT ACTIVATED ALUMINA

On Tuesday, August 29 at 7:00 pm, the Council will meet with Dr. Fred Rubel of Rubel Engineering. Mr. Rubel has an office in Tucson and he is the author of "Removal of Excess Fluoride from Drinking Water," a document published by the United Slates Environment at Protection Agency Office of Water Supply. Dr. Rubel is an expert in the field of activated alumina water treatment systems, and he designed the water treatment plant that the Town owns at the corner of Stout Street and St. Louis, where the two large water tanks are located. That system was built many years ago and was used to remove fluoride from the Town's water when Well #4, which is located next to the old plant, was used to provide the Town with drinking water. That well was replaced by Well #6 several years ago because Well #6 had cooler water with less fluoride. Well #4 is now only used for irrigation purposes. Dr. Rubel will speak about possibly relocating

EXHIBIT J-2

LETTERS OF SUPPORT

TOWN OF GILA BEND

The Heart of Arizona

August 29, 2000

Thom Shelton, Development Manager
Industrial Power Technology
2227 Capricorn Way, Suite 101
Santa Rosa, California 95407

Dear Mr. Shelton:

Thank you for your August 24th letter regarding the zoning process suitable for reviewing the proposed Gila River Power Partners, L.L.C. 800 megawatt power generating plant. I have discussed your letter with the Town Attorney, Mr. Steve McClure, and we are in agreement that a single conditional use permit would be appropriate for both the proposed power plant and the transmission line.

I understand that Mr. Bergdale has our conditional use permit application materials and I am confident that the filing that he will prepare will be of excellent quality. I look forward to working with your team on this exciting project for the Town of Gila Bend. We all are anxious to help complete the zoning permit processing that we have begun in the near future so that your project will be able to move forward as expeditiously as possible.

Please let me know if I can be of any other assistance.

Yours very truly,

Carl J. Stephani
Town Manager

cc: Karen Peters, Squire, Sanders & Dempsey
Steve McClure, Town Attorney

F:\all\Corr\shelton.wpd

TOWN OF GILA BEND

The Heart of Arizona

August 29, 2000

To Whom it May Concern:

This letter is in support of the Gila Bend Power Partners proposed 800 megawatt generating plant in Gila Bend. The Gila River merchant power plant project will benefit the community of Gila Bend greatly. Please be assured that as the Vice-Mayor of the Town of Gila Bend. I firmly believe that this plant will bring significant tax dollars to our community and provide needed electrical energy for the Metropolitan area and other parts of the Southwest.

The proposed plant site has been selected carefully and offers minimal disruptions to the surrounding environment and local communities. It appears as though you have taken care to site the plant in a location that offers the least visual impact to area residents; and relates well to the powergrid in this area.

Sincerely,

Fred Hull

Fred Hull
Vice-Mayor

P.O. Box A, 644 W. Pima St. Gila Bend, Arizona 85337-0019 (602) 683-2255 or Phoenix line (602) 256-65

TOWN OF GILA BEND

The Heart of Arizona

August 29, 2000

To Whom it May Concern:

Gila River Power Partners, L.L.C. has plans for a power plant immediately north of the Gila Bend area. The power plant project is expected to bring significant economic benefit to the Gila Bend area, and the Town Council (of which I am a member) and Mayor have welcomed the project.

As a Councilman and as a business owner in Gila Bend, I wanted to advise of my support for this proposed 800 megawatt power generating plant.

I commend Gila Bend Power Partners in their efforts taken to this point.

Sincerely,

Steve Holt
Councilman

P.O. Box A, 644 W. Pima St. Gila Bend, Arizona 85337-0019 (602) 683-2255 or Phoenix line (602) 256-650

EXHIBIT J-3

WSCC APPLICATION

INDUSTRIAL POWER TECHNOLOGY

August 23, 2000

Mr. Dennis E. Eyre, Executive Director
Western Systems Coordinating Council
University of Utah Research Park
540 Arapeen Drive, Suite 203
Salt Lake City, UT 84108-1288

RE: Industrial Power Technology - Application for Affiliate Membership in Western Systems Coordinating Council

Dear Mr. Eyre,

Industrial Power Technology (IPT) would like to apply for an affiliate membership in the WSCC. IPT is managing the development of a 845 mW natural gas fired, combined cycle power plant in the Town of Gila Bend. The combined cycle project will utilize 3 GE Frame 7 FA combustion turbine generators, 3 HRSGs and a 335 mW steam turbine generator. The Project is one of the interconnectors in the Hassayampa Switchyard, at the Palo Verde Nuclear Generating Station, the plant output will be delivered via express 500kV transmission line. Natural gas fuel will be supplied from the El Paso Natural Gas pipeline, some 16 miles from the project site.

The Project Management will sign the WSCC Reliability Management Agreement to assure compliance with WSCC Reliability Management Systems (RMS) criteria.

The facility is currently in the permitting stages with the Arizona Department of Corporations, Arizona Department of Environmental Quality, Aquifer Protection Division, Maricopa County Environmental Services Department, Air Quality Division, Bureau of Land Management and others. The Notice to Proceed with construction will be given in the 2nd quarter of 2001, with commercial operation occurring in the second quarter of 2003.

If you need additional information, please contact me at (707) 528-8900.

Sincerely,

R C. Walther

Robert C. Walther, PE
President

RCW:crz
147100
Enc: WSCC application

2227 Capricorn Way - Suite 101 - Santa Rosa, CA 95407 - TEL 707/528-8900 - FAX 707/528-8901

Western Systems Coordinating Council

APPLICATION FOR WSCC MEMBERSHIP

I. Organization Name: INDUSTRIAL POWER TECHNOLOGY

Address: 2227 CAPRICORN WAY, #101 SANTA ROSA, CA 95407

Telephone No. 707-528-8900

II. Name of Contact Person ROBERT C. WALTHER, PE

Telephone No. 707-528-8900

Fax No. 707-528-8901

E-Mail Address RCWALTHER@AOL.COM

III. Incorporated Yes X No ____ Year Organization Formed 1983

IV. Organization Classification

Electric System _____

Electric System Organization Composed of a Group of Electric System Organizations _____

Independent Power Producer YES

Owner Yes X No ____

Operator Yes X No ____

Qualified Facility NO

Owner Yes ____ No ____

Operator Yes ____ No ____

Independent Transmission Organization NO

Owner Yes ____ No ____

Operator Yes ____ No ____

Marketer (FERC approved) _____

Power Exchange _____

Broker _____

ISO _____

Power Pool _____

State/Federal Regulatory Agency _____

Other _____

_____

V. Description of Organization (Membership if appropriate) and Its Primary Responsibilities including its Dispatch Facilities, Operational Functions, and Scheduling Capabilities.

AGENT FOR DEVELOPER, OWNER AND OPERATOR OF INDEPENDENT POWER PROJECTS WITH 750 MW COMBINED CYCLE PLANT UNDER DEVELOPMENT IN GILA BEND, AZ.

VI. Principal Officers and Titles:

ROBERT C. WALTHER, PE
PRESIDENT

VII. Briefly Describe Why Your Organization is interested in WSCC Membership?

AS AGENT FOR THE DEVELOPING AND PERMITTING OF A 750 MW COMBINED CYCLE PLANT TO SUPPLY MERCHANT POWER TO THE SOUTHWEST THROUGH THE PALO VERDE SWITCHYARD, WE WISH TO PARTICIPATE IN WSCC ACTIVITIES WHICH APPLY TO INDEPENDENT POWER PROJECTS AND MERCHANT POWER PLANTS.

VIII. Membership Application is for:

- Full Member _____

  Membership Category
  Major Transmission Utilities_____
  Transmission Dependent Utilities_____
  Independent Power Producers/Marketers/Power Exchanges_____

- Affiliate Member ___X_____

IX. Does your Organization meet the WSCC Membership Requirements (set forth in the WSCC Agreement attached)?

Yes __X__ No ____

If yes, explain how it meets each requirement.

AS AGENT FOR THE OWNER WHO PLANS TO BUILD, OWN AND OPERATE A 750 MW COMBINED CYCLE PLANT IN GILA BEND, AZ TO DELIVER POWER TO HASSAYAMPA SWITCHYARD, WE ARE PREPARED TO SIGN THE WSCC RELIABILITY MANAGEMENT AGREEMENT TO ASSURE COMPLIANCE WITH WSCC RELIABILITY MANAGEMENT SYSTEMS (RMS) CRITERIA.

X. Do you operate a Control Area Yes ____ No X

If answer is No, in whose Control Area do you operate?

ARIZONA PUBLIC SERVICE COMPANY

XI. Attach map or one-line diagram showing owned transmission facilities, Kv rating, line ownership, and the power transfer capability of existing and future transmission interconnections.

SEE MAP ATTACHED

Attach listing of existing and planned generation facilities, indicating generation ownership, operating responsibility, in-service dates, and the MW capability of each unit and plant owned or operated.

GILA BEND POWER PROJECT OWNED AND OPERATED BY GILA BEND POWER PARTNER, LLC TO BE IN COMMERCIAL OPERATION MAY 1, 2003 WITH 750 MW (NOMINAL)

XII. The responses contained in this document and the attachments have been reviewed by me and are correct and complete.

OFFICER OF ORGANIZATION

R C Walther

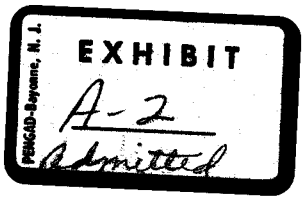
(Signature)

NAME ROBERT C. WALTHER, PE

8/23/00

(Date)

TITLE PRESIDENT



Karen L. Peters
Justin D. Steltenpohl
Squire, Sanders & Dempsey L.L.P.
Two Renaissance Square
40 North Central Avenue, Suite 2700
Phoenix, Arizona 85004-4441
(602) 528-4000

Attorneys for Gila Bend Power Partners, L.L.C.

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DOCUMENT CONTROL

BEFORE THE POWER PLANT AND

TRANSMISSION LINE SITING COMMITTEE

In the matter of the Application of Gila Bend Power Partners, L.L.C., or their assignee(s), in conformance with the requirements of Arizona Revised Statutes 40-360.01 *et seq.*, for a Certificate of Environmental Compatibility authorizing construction of a natural gas-fired, combined cycle generating plant, switchyard, and related facilities in the Town of Gila Bend, Maricopa County, Arizona located in the southwest quarter of Section 19, Township 5 South, Range 5 West, Gila and Salt River Base and Meridian.	Case No.: L-00000V-00-0106 **SUBMISSION OF SUPPLEMENT TO ORIGINAL APPLICATION FOR A CERTIFICATE OF ENVIRONMENTAL COMPATIBILITY**

Gila Bend Power Partners, L.L.C., as Applicant, hereby submits to the Power Plant and Transmission Line Siting Committee the attached Supplemental Information (hereinafter the "Supplement") to its Application for a Certificate of Environmental Compatibility (hereinafter the "Original Application"), filed with the Arizona Corporation Commission on September 7, 2000.

The Supplement contains information that has been assembled since the Original Application was submitted. The following additions are included in the Supplement:

A. Air Quality Permit Application Addendum No. 1.

B. Summary of Aquifer Testing Activities.

C. Application for an Amendment to the General Plan and Application for a Change in Zoning for the Town of Gila Bend.

The Applicant believes these materials will be useful to the Committee in its consideration of the Original Application. For purposes of clarification, any references in the Original Application and accompanying exhibits to "PowerDevelopment Enterprises, Inc." as the project applicant should be to Gila Bend Power Partners, L.L.C.

RESPECTFULLY SUBMITTED this 2nd day of November, 2000.

SQUIRE, SANDERS & DEMPSEY L.L.P.

By _____

Karen L. Peters
Justin D. Steltenpohl
Squire, Sanders & Dempsey L.L.P.
Two Renaissance Square
40 North Central Avenue, Suite 2700
Phoenix, Arizona 85004-4441
(602) 528-4000

Attorneys for Applicant

ORIGINAL and 25 copies of the foregoing filed this 2nd day of November, 2000, with:

Arizona Corporation Commission
ATTN: Docket Control
1200 West Washington
Phoenix, Arizona 85003

COPY of the foregoing hand-delivered this 2nd day of November, 2000, to:

Janice M. Alward, Attorney
Arizona Corporation Commission
1200 West Washington Street
Phoenix, Arizona 85007

COPY of the foregoing mailed this
2nd day of November, 2000, to:

John Washburn
Gila Bend Power Partners, L.L.C.
5949 Sherry Lane, Suite 1880
Dallas, Texas 75225

BEFORE THE
POWER PLANT AND TRANSMISSION LINE SITING COMMITTEE

In the matter of the Application of Gila Bend Power Partners, L.L.C., or their assignee(s), in conformance with the requirements of Arizona Revised Statutes 40-360.01 *et seq.*, for a Certificate of Environmental Compatibility authorizing construction of a natural gas-fired, combined cycle generating plant, switchyard, and related facilities in the Town of Gila Bend, Maricopa County, Arizona located in the southwest quarter of Section 19, Township 5 South, Range 5 West, Gila and Salt River Base and Meridian.	)	Case No.: L-00000V-00-0106

APPLICATION FOR
CERTIFICATE OF ENVIRONMENTAL COMPATIBILITY

SUPPLEMENTAL INFORMATION

Exhibit A

MALCOLM PIRNIE

Gila Bend Power Generation Station

Air Quality Permit Application Addendum No. 1

September, 2000

Submitted by:

Gila Bend Power Partners, L.L.C.
5949 Sherry Lane, Suite 1880
Dallas, Texas 75225

Prepared by:

Malcolm Pirnie, Inc.
432 N. 44th Street, Suite 400
Phoenix, Arizona 85008-7603

RECYCLED PAPER

MALCOLM PIRNIE

MALCOLM PIRNIE, INC.
INDEPENDENT ENVIRONMENTAL ENGINEERS, SCIENTISTS & CONSULTANTS

September 25, 2000

Mr. Dale Lieb
Title V Air Permitting Manager
Air Quality Division
Maricopa County Environmental Services Department
1001 N. Central Avenue, Suite 150
Phoenix, Arizona 85004

Re: Gila Bend Power Generation Station
Addendum No. 1 to Air Quality Permit Application (V00-001)

Dear Mr. Lieb:

On behalf of the Gila Bend Power Partners, L.L.C, Malcolm Pirnie is submitting two copies of Addendum No. 1 to the Air Quality Permit Application (V00-001) submitted on March 31, 2000 for the Gila Bend Power Generation Station. Addendum No. 1 includes supplemental information requested by the Department's consultant (URS) as well as revisions to the Application due to the following changes:

- Business name
- Facility location
- Equipment
- Meteorological data
- Ambient air quality impact analyses

Please call me at (602) 231-5591 if you have any questions or need additional information.

Very truly yours,

MALCOLM PIRNIE, INC.

for

Gary H. Bacon, P.E.
Associate

Enclosures

c: Scott Bohning, USEPA (Region IX)
Steve Branoff, USEPA (Region IX)
Peter Lahm, US Forest Services
Tonnie Maniero, US Park Services
Shirley Pearson, URS
Bob Innamorati, GBPP
Pete Wright, GBPP
Bob Walther, IPT
Karen Peters, SSD
Gary Rogers, MPI
Jim Laughlin, MPT
Phyllis Diosey, MPI
Linda Micale, MPI
Chris Stenger, MPI

Air Quality
Permit Application
Addendum No. 1

Gila Bend Power Generation Station

September, 2000

GILA BEND POWER GENERATION STATION
AIR QUALITY PERMIT APPLICATION
ADDENDUM No.1

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INTRODUCTION

This addendum is prepared to supplement the previously submitted Air Quality Permit Application for the Gila Bend Power Generation Station dated March 2000. Section 1 "Additional Information" of this Application Addendum was prepared in response to the URS letter dated May 31, 2000.

Section 2 "Revisions" of this Application Addendum was prepared in response to facility modifications that have occurred since the original application submittal. The following list details changes.

- **Change in Business Name**: PowerDevelopment Enterprises, Inc. has formed another company named Gila Bend Power Partners, L.L.C.

- **Change in Plant Location** : The Plant will be relocated within the originally proposed Section 19 in Township 5 South, Range 5 West of the Gila and Salt River Base and Meridian, Maricopa County, Arizona.

- **Addition of Equipment**: One 356 MM BTU/hr rated duct will be added to each of the three Heat Recovery Steam Generators (HRSG). The power generation capacity will be increased to 845 megawatts from 750 megawatts due to the addition of duct burners.

- **Change in Equipment**: One 16,500-gpm, twelve-cell cooling tower will replace the three 181,800-gpm, four-cell cooling towers.

Appropriate changes to text, calculations, modeling, etc. have been made to the respective sections from the previous Air Quality Permit Application and inserted in Section 2 of this Application Addendum.

1.0 ADDITIONAL INFORMATION

URS, the reviewing consultant to the Department, requested additional information relative to the following questions through a letter dated May 31, 2000.

Q. Item No. 10.e : The fuel oil sulfur content and heating value were not provided.

A. The emergency generator and fire pumps will use #2 fuel oil with 0.05% sulfur content. A typical energy value for #2 fuel oil is 18,600 BTU per pound, which is approximately 130,388 BTU per gallon.

Q. Item No. 11.a-g : The type, name, model, size / capacity of the control equipment were not provided.

A. The final control equipment selection has not yet been made. The proposed control equipment are three selective catalytic reduction units, which are capable of controlling NOx to 3 ppm corrected to 15% oxygen. The above information should be sufficient for permitting considering the Department deemed other applications complete without selecting specific control equipment.

Q. Item No. 12.a-g : The stack descriptions for the emergency generator and fire pump were not provided.

A. The emergency generator and fire pump will each be equipped with a 6-inch diameter stack that will be 15 feet in height.

Q. Item No. 14.a : The applicable test methods were not identified.

A. The following table details air pollutants and their respective applicable test methods.

Air Pollutants	Method
NOx	EPA Method 7e
CO	EPA Method 10
PM10	EPA Method 5 and 202
VOC	EPA Method 25a and 18
Opacity	EPA Method 9

Q. Item No. 14.b : The identification, location and description of the continuous emission monitoring system (CEMS) were not included in the application.

A. The CEMS, which will be located on the base of turbine stacks, are capable of measuring and recording NOx, CO and O_2 hourly, 3-hour rolling average, and rolling 24-hour average.

Q. Item No.15 : The turbine, boiler and engine make, model and manufacturer information was not provided.

A. The final equipment selection has not yet been made. The following table details possible equipment and their specifications.

Equipment	No. of Units	Make	Model	Size	Type
Combustion Turbine	3	GE	MS7001FA	170 MW	Natural Gas Fired
HRSG	3	Deltek		1,000 ton	Flue-gas Driven
Steam Turbine	1	GE		300 MW	Steam Driven
Auxiliary Boiler	1	Cleaver Brooks		26 MM BTU/hr	Natural Gas Fired

Equipment	No. of Units	Make	Model	Size	Type
Emergency Generator	1	Caterpillar	3412	500 kw	Diesel Fired
Fire Pump	1	Caterpillar	3406	400 BHP	Diesel Fired
Cooling Tower	1	Marley		12 cells	Counter-flow

If any of the above equipment is substituted with other equipment, it will be equivalent in size, performance, emissions, etc.

Q. Item No. R210.301.4h : A site-specific list of the insignificant activities was not provided.

A. A list of site-specific insignificant activities is included in the Section 2.12 "List of Insignificant Activities" of this Application Addendum.

Q. Item No. R240.302.3 : Visibility impact analysis was not included.

A. A visibility impact analysis is included in the Section 2.10 "New Major Source Information" of this Application Addendum.

Q. Item No. 18.b.3 : The air impact analysis was completed however, not all the emission sources were included. Sources omitted included the emergency generator, the fire pump, and the cooling towers. Although the engines are listed on the insignificant activities list, Title V sources must list/describe the insignificant activities and include the emission from these activities. The emissions from the cooling tower are quantifiable according to the EPA AP-42 document. Therefore, we request a copy of the EPRI study from which the conclusion was drawn that the "PM-10 emissions from cooling towers are negligible."

A. Based on information provided by the Department, other power plant applications did not include emissions from the emergency diesel equipment such as generators and fire pumps in the air impact analysis and are not likely to be a large contributor to overall facility emissions. Therefore, air emissions from the emergency diesel equipment will not be included in the air impact analysis. The PM-10 emissions from cooling towers have been included in the revised air quality impact analysis. The PM-10 emissions were revised in accordance with the EPA AP-42 document and reflected in all the applicable sections of this Application Addendum.

2.0 REVISIONS

As noted in the Introduction, the previously submitted Air Quality Permit Application had to be modified in response to changes in business name and the proposed equipment. This section contains the modified text, figures, calculations, etc., which supersedes the corresponding information provided in the original application submittal.

2.1 STANDARD PERMIT APPLICATION FORM

There are two changes to the Standard Permit Application Form, which are listed below in details.

- Name of Owner has been changed from PowerDevelopment Enterprises, Inc. to Gila Bend Power Partners, L.L.C.

- Cooling Tower has been added to the Emission Sources Form as a source of PM-10.

This section supersedes the Standard Permit Application Form of the Application.

MARICOPA COUNTY
ENVIRONMENTAL SERVICES DEPARTMENT
DIVISION OF AIR POLLUTION CONTROL

1001 N. Central Ave., Ste 201
Phoenix, AZ 85004
(602) 506-6010

STANDARD PERMIT APPLICATION FORM

(As required by A.R.S. § 49-480, and Chapter 3, Article 3, Arizona Administrative Code)

Internet Copy

1. Permit to be issued to: (Business license name of organization that is to receive permit)
   Gila Bend Power Partners, L.L.C.
2. Mailing Address: 5949 Sherry Lane, Suite 1880
   City: Dallas State: TX ZIP: 75225
3. Plant Name (if different from item #1 above): Gila Bend Power Generation Station
4. Name (or names) of Owner or Operator: Gila Bend Power Partners, L.L.C.
   Phone: (214) 210-5080
5. Name of Owner's Agent: Not Applicable
   Phone: _____
6. Plant/Site Manager or Contact Person: Robert C. Walther
   Phone: (707) 528-8900
7. Proposed Equipment/Plant Location Address: 35400 West Sisson Road
   City: Gila Bend County: MARICOPA ZIP: 85337
   Indian Reservation (if applicable): Not Applicable
   Section/Township/Range: Section 19/ Township 5S/ Range 5w
   Latitude: 32 ° 58 ' 3(" Longitude: 11: ° 49 ' 15 " Elevation: 678 ft.
8. General Nature of Business: Electric Power Generation
   Standard Industrial Classification Code: _____
9. Type of Organization: ☑ Corporation ☐ Individual Owner ☐ Partnership
   ☐ Government Entity (Government Facility Code: _____)
   ☐ Other: _____
10. Permit Application Basis: ☑ New Source ☐ Revision ☐ Renewal of Existing Permit
    ☐ Portable Source ☐ General Permit (Check all that apply)
    For renewal or modification, include existing permit number: _____
    Date of Commencement of Construction or Modification: January, 2001
    Is **any** of the equipment to be leased to another individual or entity? ☐ Yes ☑ No
11. Signature of Responsible Official of Organization _____
    Official Title of Signer: _____
12. Typed or Printed Name of Signer: _____
    Date: _____ Phone Number: _____

11. Signature of Responsible Official of Organization _____

Official Title of Signer:

Gila Bend Power Partners, L.L.C.

By: PowerDevelopment Gila Bend, L.P., Member

By: PowerDevelopment Enterprises, L.P., G.P.

By: Robert A. Innamorati & Co., Inc., G.P.

By: _____
Robert A. Innamorati
Its: President

12. Typed or Printed Name of Signer: Robert A. Innamorati

Date: August 7, 2000 Phone Number: (214) 210-5080

COMPANY NAME & LOCATION Gila Bend Power Partners, L.L.C. - Gila Bend Power Generation Station, 35400 West Sisson Road, Gila Bend, AZ 85337

Addendum No. 1

EMISSION SOURCES

Date 08/04/00

Estimated "Potential to Emit" as per Rule 100

Review of applications and issuance of permits will be expedited by supplying all necessary information on this Table.

REGULATED AIR POLLUTANT DATA					EMISSION POINT DISCHARGE PARAMETERS										
EMISSION POINT (1)		CHEMICAL COMPOSITION OF TOTAL STREAM	R. AIR POLLUTANT EMISSION RATE		UTM COORDINATES OF EMISSION PT. (5)			STACK SOURCES (6)					NONPOINT SOURCES (7)	
NUMBER	NAME	REGULATED AIR POLLUTANT NAME (2)	#/ hr. (3)	TONS/ YEAR (4)	ZONE	EAST (Mtrs)	NORTH (Mtrs)	HEIGHT ABOVE GROUND (feet)	HEIGHT ABOVE STRUC. (feet)	EXIT DATA DIA. (ft.)	EXIT DATA VEL. (fps.)	EXIT DATA TEMP. (°F)	LENGTH (ft.)	WIDTH (ft.)
1	CTG1	Nox	24.700			330500	3649546	165	105	18	70	188		
2	CTG2 (same emission rate)	CO	69.800			330500	3649500	165	105	18	70	188		
3	CTG3 (same emission rate)	SO2	4.820			330500	3649454	165	105	18	70	188		
		VOC	10.800											
		PM10	32.660											
		PM	32.660											
		1-3 Butadiene		0.003										
		Acetaldehyde		0.293										
		Acrolein		0.047										
		Benzene		0.091										

GROUND ELEVATION OF FACILITY ABOVE MEAN SEA LEVEL 678 feet

ADEQ STANDARD CONDITIONS ARE 293K AND 101.3 KILOPASCALS (A.A.C. R18-2-101)

GENERAL INSTRUCTIONS:

1. Indentify each emission point with a unique number for this plant site, consistent with emission point identification used on plot plan, previous permits, and Emissions Inventory Questionnaire. Include fugitive emissions. Limit emission point number to eight (8) character spaces. For each emission point use as many lines as necessary to list regulated air pollutant data. Typical emission point names are: heater, vent, boiler, tank, reactor, separator, beghouse, fugitive, etc. Abbreviations are O.K.
2. Components to be listed include regulated air pollutants as defined in R18-2-101. Examples of typical component names are: Carbon Monoxide (CO), Nitrogen Oxides (NO_x), Sulfur Dioxide (SO_2), Volatile Organic Compounds (VOC), particulate matter (PM), particulate less than 10 microns (PM_{10}), etc. Abbreviations are O.K.
3. Pounds per hour (#/HR) is maximum potential emission rate expected by applicant.
4. Tons per year is annual maximum potential emission expected by applicant, which takes into account process operating schedule.
5. As a minimum applicant shall furnish a facility plot plan as described in the filing instructions. UTM coordinates are required only if the source is a major source or is required to perform refined modeling for the purposes of demonstrating compliance with ambient air quality guidelines.
6. Supply additional information as follows if appropriate:
   (a) Stack exit configuration other than a round vertical stack. Show lenght and width for a rectangular stack. Indicate if horizontal discharge with a note.
   (b) Stack's height above supporting or adjacent structures if structure is within 3 "stack height above the ground" of stack.
7. Dimensions of nonpoint sources as defined in R18-2-101.

COMPANY NAME & LOCATION Gila Bend Power Partners, L.L.C. - Gila Bend Power Generation Station, 35400 West Sisson Road, Gila Bend, AZ 85337

Addendum No. 1

EMISSION SOURCES

Date 08/04/00

Estimated "Potential to Emit" as per Rule 100

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NUMBER	NAME	REGULATED AIR POLLUTANT NAME (2)	#/ hr. (3)	TONS/ YEAR (4)	ZONE	EAST (Mtrs)	NORTH (Mtrs)	HEIGHT ABOVE GROUND (feet)	HEIGHT ABOVE STRUC. (feet)	EXIT DATA DIA. (ft.)	EXIT DATA VEL. (fps.)	EXIT DATA TEMP. (°F)	LENGTH (ft.)	WIDTH (ft.)
4	Auxiliary Boiler	Nox	3.110			330491	3649589	95	75	2	35.0	450		
		CO	3.950											
		SO2	0.030											
		VOC	0.420											
		PM10	0.260											
		PM	0.260											
		Formaldehyde		0.008										
		Hexane		0.201										
5	Cooling Tower	PM10	0.17			330468	3649691	50	0	30	30	70		
6	Cooling Tower	PM10	0.17			330457	3649691	50	0	30	30	70		

GROUND ELEVATION OF FACILITY ABOVE MEAN SEA LEVEL 678 feet

ADEQ STANDARD CONDITIONS ARE 293K AND 101.3 KILOPASCALS (A.A.C. R18-2-101)

GENERAL INSTRUCTIONS:

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COMPANY NAME & LOCATION Gila Bend Power Partners, L.L.C. - Gila Bend Power Generation Station, 35400 West Sisson Road, Gila Bend, AZ 85337

Addendum No. 1

EMISSION SOURCES

Date 08/04/00

Estimated "Potential to Emit" as per Rule 100
Review of applications and issuance of permits will be expedited by supplying all necessary information on this Table.

REGULATED AIR POLLUTANT DATA					EMISSION POINT DISCHARGE PARAMETERS										
EMISSION POINT (1)		CHEMICAL COMPOSITION OF TOTAL STREAM	R. AIR POLLUTANT EMISSION RATE		UTM COORDINATES OF EMISSION PT. (5)			STACK SOURCES (6)					NONPOINT SOURCES (7)	
NUMBER	NAME	REGULATED AIR POLLUTANT NAME (2)	#/ hr. (3)	TONS/ YEAR (4)	ZONE	EAST (Mtrs)	NORTH (Mtrs)	HEIGHT ABOVE GROUND (feet)	HEIGHT ABOVE STRUC. (feet)	EXIT DATA			LENGTH (ft.)	WIDTH (ft.)
										DIA. (ft.)	VEL. (fps.)	TEMP. (°F)		
1	CTG1	Dichlorobenzene		0.002		330500	3649546	165		18	70.0	188		
2	CTG2 (same emission rate)	Ethylbenzene		0.234		330500	3649500	165		18	70	188		
3	CTG3 (same emission rate)	Formaldehyde		5.311		330500	3649454	165		18	70	188		
		Hexane		2.751										
		Naphthalene		0.011										
		PAHs		0.016										
		Propylenen Oxide		0.212										
		Toluene		0.96										
		Xylenes		0.468										

GROUND ELEVATION OF FACILITY ABOVE MEAN SEA LEVEL 678 feet
ADEQ STANDARD CONDITIONS ARE 293K AND 101.3 KILOPASCALS (A.A.C. R18-2-101)

GENERAL INSTRUCTIONS:

1. Indentify each emission point with a unique number for this plant site, consistent with emission point identification used on plot plan, previous permits, and Emissions Inventory Questionnaire. Include fugitive emissions. Limit emission point number to eight (8) character spaces. For each emission point use as many lines as necessary to list regulated air pollutant data. Typical emission point names are: heater, vent, boiler, tank, reactor, separator, baghouse, fugitive, etc. Abbreviations are O.K.
2. Components to be listed include regulated air pollutants as defined in R18-2-101. Examples of typical component names are: Carbon Monoxide (CO), Nitrogen Oxides (NO_x), Sulfur Dioxide (SO_2), Volatile Organic Compounds (VOC), particulate matter (PM), particulate less than 10 microns (PM_{10}), etc. Abbreviations are O.K.
3. Pounds per hour (#/HR) is maximum potential emission rate expected by applicant.
4. Tons per year is annual maximum potential emission expected by applicant, which takes into account process operating schedule.
5. As a minimum applicant shall furnish a facility plot plan as described in the filing instructions. UTM coordinates are required only if the source is a major source or is required to perform refined modeling for the purposes of demonstrating compliance with ambient air quality guidelines.
6. Supply additional information as follows if appropriate:
   (a) Stack exit configuration other than a round vertical stack. Show lenght and width for a rectangular stack. Indicate if horizontal discharge with a note.
   (b) Stack's height above supporting or adjacent structures if structure is within 3 "stack height above the ground" of stack.
7. Dimensions of nonpoint sources as defined in R18-2-101.

COMPANY NAME & LOCATION Gila Bend Power Partners, L.L.C. - Gila Bend Power Generation Station, 35400 West Sisson Road, Gila Bend, AZ 85337

Addendum No. 1

EMISSION SOURCES

Date 08/04/00

Estimated "Potential to Emit" as per Rule 100
Review of applications and issuance of permits will be expedited by supplying all necessary information on this Table.

REGULATED AIR POLLUTANT DATA					EMISSION POINT DISCHARGE PARAMETERS									
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NUMBER	NAME	REGULATED AIR POLLUTANT NAME (2)	#/ hr. (3)	TONS/ YEAR (4)	ZONE	EAST (Mtrs)	NORTH (Mtrs)	HEIGHT ABOVE GROUND (feet)	HEIGHT ABOVE STRUC. (feet)	EXIT DATA			LENGTH (ft.)	WIDTH (ft.)
										DIA. (ft.)	VEL. (fps.)	TEMP. (°F)		
7	Cooling Tower	PM10	0.17			330446	3649691	50	0	30	30	70		
8	Cooling Tower	PM10	0.17			330435	3649691	50	0	30	30	70		
9	Cooling Tower	PM10	0.17			330424	3649691	50	0	30	30	70		
10	Cooling Tower	PM10	0.17			330413	3649691	50	0	30	30	70		
11	Cooling Tower	PM10	0.17			330468	3649707	50	0	30	30	70		
12	Cooling Tower	PM10	0.17			330457	3649707	50	0	30	30	70		
13	Cooling Tower	PM10	0.17			330446	3649707	50	0	30	30	70		
14	Cooling Tower	PM10	0.17			330435	3649707	50	0	30	30	70		
15	Cooling Tower	PM10	0.17			330424	3649707	50	0	30	30	70		
16	Cooling Tower	PM10	0.17			330413	3649707	50	0	30	30	70		

GROUND ELEVATION OF FACILITY ABOVE MEAN SEA LEVEL 678 feet
ADEQ STANDARD CONDITIONS ARE 293K AND 101.3 KILOPASCALS (A.A.C. R18-2-101)

GENERAL INSTRUCTIONS:

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2. Components to be listed include regulated air pollutants as defined in R18-2-101. Examples of typical component names are: Carbon Monoxide (CO), Nitrogen Oxides (NO_x), Sulfur Dioxide (SO_2), Volatile Organic Compounds (VOC), particulate matter (PM), particulate less than 10 microns (PM_{10}), etc. Abbreviations are O.K.
3. Pounds per hour (#/HR) is maximum potential emission rate expected by applicant.
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5. As a minimum applicant shall furnish a facility plot plan as described in the filing instructions. UTM coordinates are required only if the source is a major source or is required to perform refined modeling for the purposes of demonstrating compliance with ambient air quality guidelines.
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7. Dimensions of nonpoint sources as defined in R18-2-101.

COMPANY NAME & LOCATION Gila Bend Power Partners, L.L.C. - Gila Bend Power Generation Station, 35400 West Sisson Road, Gila Bend, AZ 85337

Addendum No. 1

EMISSION SOURCES

Date 08/04/00

Estimated "Potential to Emit" as per Rule 100
Review of applications and Issuance of permits will be expedited by supplying all necessary information on this Table.

REGULATED AIR POLLUTANT DATA					EMISSION POINT DISCHARGE PARAMETERS									
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NUMBER	NAME	REGULATED AIR POLLUTANT NAME (2)	#/ hr. (3)	TONS/ YEAR (4)	ZONE	EAST (Mtrs)	NORTH (Mtrs)	HEIGHT ABOVE GROUND (feet)	HEIGHT ABOVE STRUC. (feet)	EXIT DATA DIA. (ft.)	EXIT DATA VEL. (fps.)	EXIT DATA TEMP. (°F)	LENGTH (ft.)	WIDTH (ft.)
17	Diesel Generator	NOx	15.500			330454	3649592	15	2	0.5	130	792		
		CO	3.340											
		SO2	1.030											
		VOC	1.240											
		PM10	1.100											
18	Diesel Fire Pump	NOx	12.400			330500	3649638	15	2	0.5	65	792		
		CO	2.670											
		SO2	0.820											
		VOC	0.990											
		PM10	0.880											

GROUND ELEVATION OF FACILITY ABOVE MEAN SEA LEVEL 678 feet
ADEQ STANDARD CONDITIONS ARE 293K AND 101.3 KILOPASCALS (A.A.C. R18-2-101)

GENERAL INSTRUCTIONS:

1. Indentify each emission point with a unique number for this plant site, consistent with emission point identification used on plot plan, previous permits, and Emissions Inventory Questionnaire. Include fugitive emissions. Limit emission point number to eight (8) character spaces. For each emission point use as many lines as necessary to list regulated air pollutant data. Typical emission point names are: heater, vent, boiler, tank, reactor, separator, beghouse, fugitive, etc. Abbreviations are O.K.
2. Components to be listed include regulated air pollutants as defined in R18-2-101. Examples of typical component names are: Carbon Monoxide (CO), Nitrogen Oxides (NO_x), Sulfur Dioxide (SO_2), Volatile Organic Compounds (VOC), particulate matter (PM), particulate less than 10 microns (PM_{10}), etc. Abbreviations are O.K.
3. Pounds per hour (#/HR) is maximum potential emission rate expected by applicant.
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5. As a minimum applicant shall furnish a facility plot plan as described in the filing instructions. UTM coordinates are required only if the source is a major source or is required to perform refined modeling for the purposes of demonstrating compliance with ambient air quality guidelines.
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7. Dimensions of nonpoint sources as defined in R18-2-101.

2.2 EXECUTIVE SUMMARY

The enclosed Executive Summary reflects the following four changes from the previous submittal.

- Business name was changed from PowerDevelopment Enterprises, Inc. to Gila Bend Power Partners, L.L.C.
- The Plant's generation capacity was changed from 750 MW to 845 MW.
- Three duct burners were added.
- One cooling tower replaced three cooling towers.

This section supersedes the Executive Summary of the Application.

EXECUTIVE SUMMARY

This document comprises the Clean Air Act Title V and PSD Air Quality Permit Application ("Application"), as required by Maricopa County Air Pollution Control Regulations ("County Rules"), Rules 200, 210, and 240. This Application was prepared by Malcolm Pirnie, Inc. ("MPI") on behalf of Gila Bend Power Partners, L.L.C ("GBPP") for the construction and operation of the Gila Bend Power Generation Station ("Facility").

GBPP is proposing to construct a nominal 845-megawatt combined-cycle electric power generation plant in Maricopa County. The Facility will be located approximately 70 miles southwest of Phoenix in the Town of Gila Bend, Arizona. The Facility's address is 35400 West Sisson Road, Gila Bend, Arizona 85337. The Facility will be located in an attainment area for all criteria pollutants and will be subject to the Title V and PSD regulations.

The Facility will consist of three combined-cycle combustion turbine generators ("CTGs"), three heat recovery steam generators ("HRSG") each with a duct burner, one steam turbine, one natural gas-fired auxiliary boiler, one emergency diesel generator, one diesel fire pump, one cooling tower, and ancillary equipment. The CTGs will be fired exclusively with natural gas.

This Application identifies, describes, and quantifies the regulated emission sources, including air pollution control devices. In addition, the Application references information used to determine regulatory applicability and the Facility's compliance status with the federal, state, and County requirements. The construction and operations at the Facility will comply with the applicable federal, state, and County regulations.

This Application is organized to correspond to the order in which the information requested in Appendix B (Standard Permit Application Form and Filing Instructions) of the County Rules is listed. A copy of the County's Appendix B is also included in Reference 1 of this Application.

2.3 DESCRIPTION OF FACILITY AND PROCESSES

This section notes the addition of duct burners and reduction in the number of cooling towers. In addition, Figure 1-1 and 1-2 were modified to reflect the changes in equipment locations. This section supersedes Section 1 of the Application.

1.0 DESCRIPTION OF FACILITY AND PROCESSES

1.1 Site Location

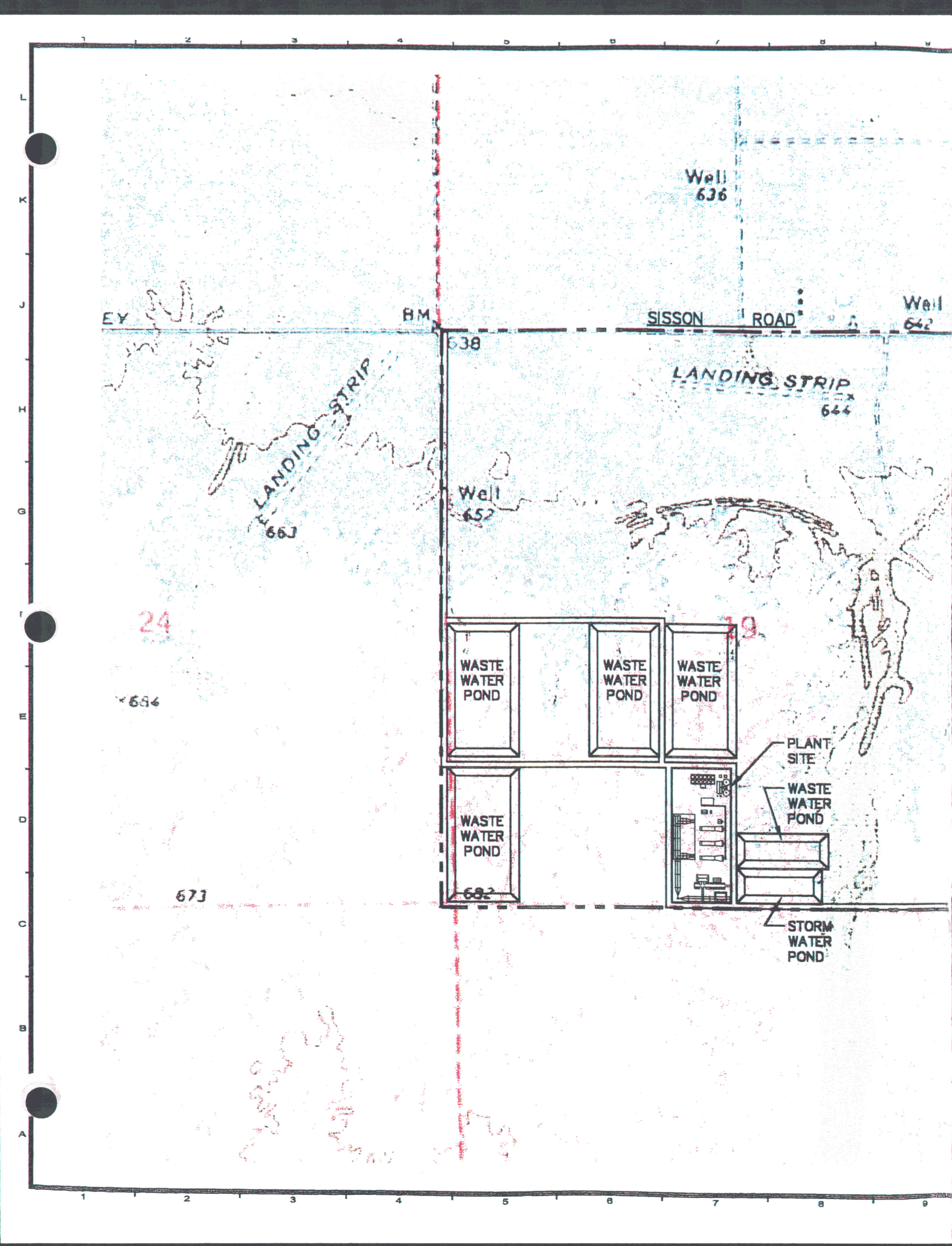
The Facility will be located approximately 70 miles southwest of Phoenix in the Town of Gila Bend, Arizona. The general coordinates of the site are 32° 58' 30" N latitude and 112° 49' 15" W longitude. The site is located north of Interstate 8 and just south of West Sisson Road. The Facility's address will be 35400 West Sisson Road, Gila Bend, Arizona 85337. A facility location map and site plan is shown in Figure 1-1 and 1-2, respectively.

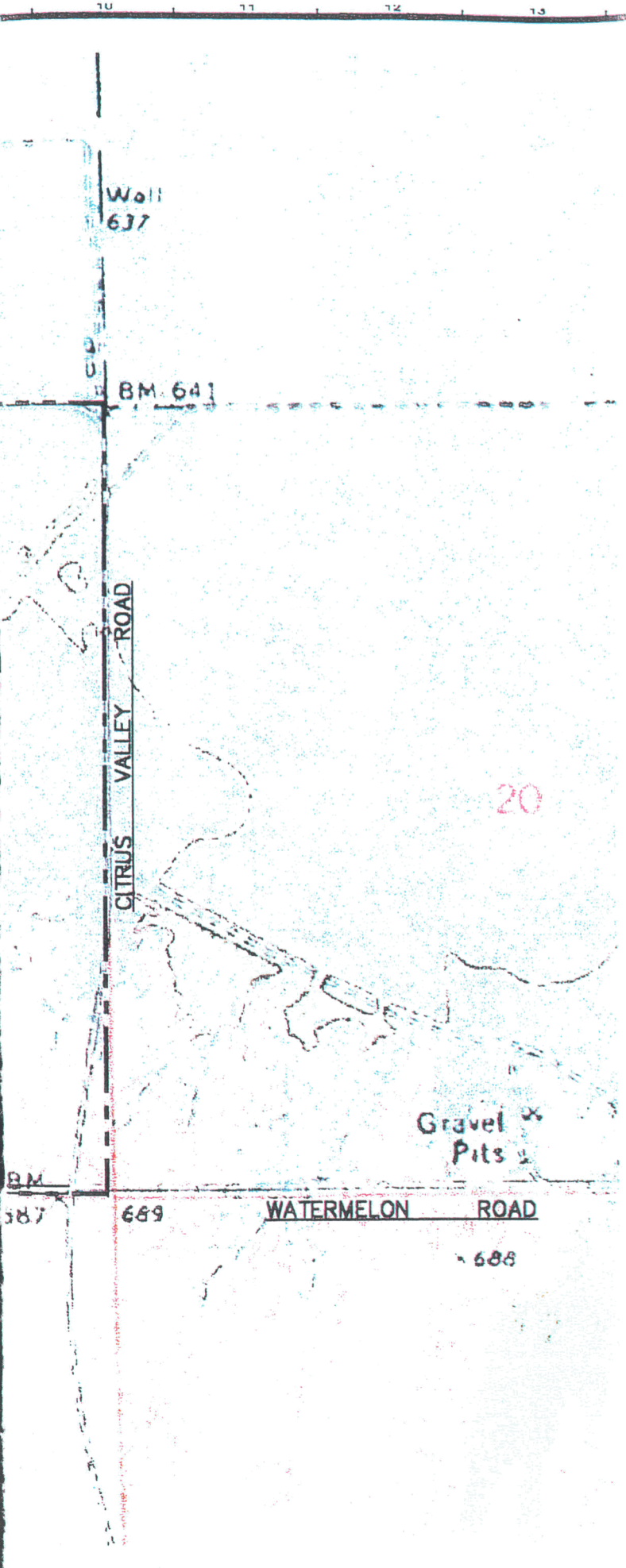
1.2 Physical Description

The Facility will be situated on approximately 120 contiguous acres in Section 19 in Township 5 South, Range 5 West of the Gila and Salt River Base and Meridian, Maricopa County, Arizona. The proposed site is located in a sparsely populated region in Gila Bend, Arizona. A dirt road borders the site property to the west. Native desert borders the property to the south and east. Fallow agricultural land, including a former cotton gin and landing strip, borders the property to the north. Entrance to the site is from the bordering dirt road. The property across the dirt road is native desert. The land to the north of the property consists of abandoned agricultural property. These former cotton fields are now overgrown with Salt Cedars. Native desert borders the subject property to the south and east.

1.3 Employment

Total employment at the Facility will vary during operations, but is estimated to range between approximately 25 to 35 employees. The Facility is expected to operate 24 hours per day and seven days per week. The facility entrance will be attended at all times.


Well
636
SISSON ROAD
Well
642
638
LANDING STRIP
644
LANDING STRIP
663
Well
652
24
694
673
WASTE WATER POND
WASTE WATER POND
WASTE WATER POND
WASTE WATER POND
682
PLANT SITE
WASTE WATER POND
STORM WATER POND



INDUSTRIAL POWER TECHNOLOGY
2227 CAPRICORN WAY SUITE 101
SANTA ROSA, CALIFORNIA 95407
TEL: 707-528-8900/FAX: 707-528-8901

No.	Revisions	Date

GILA BEND POWER PROJECT

PRELIMINARY PROJECT CONFIGURATION

TS	SS	RW
DESIGN	DRAWN	ENG.

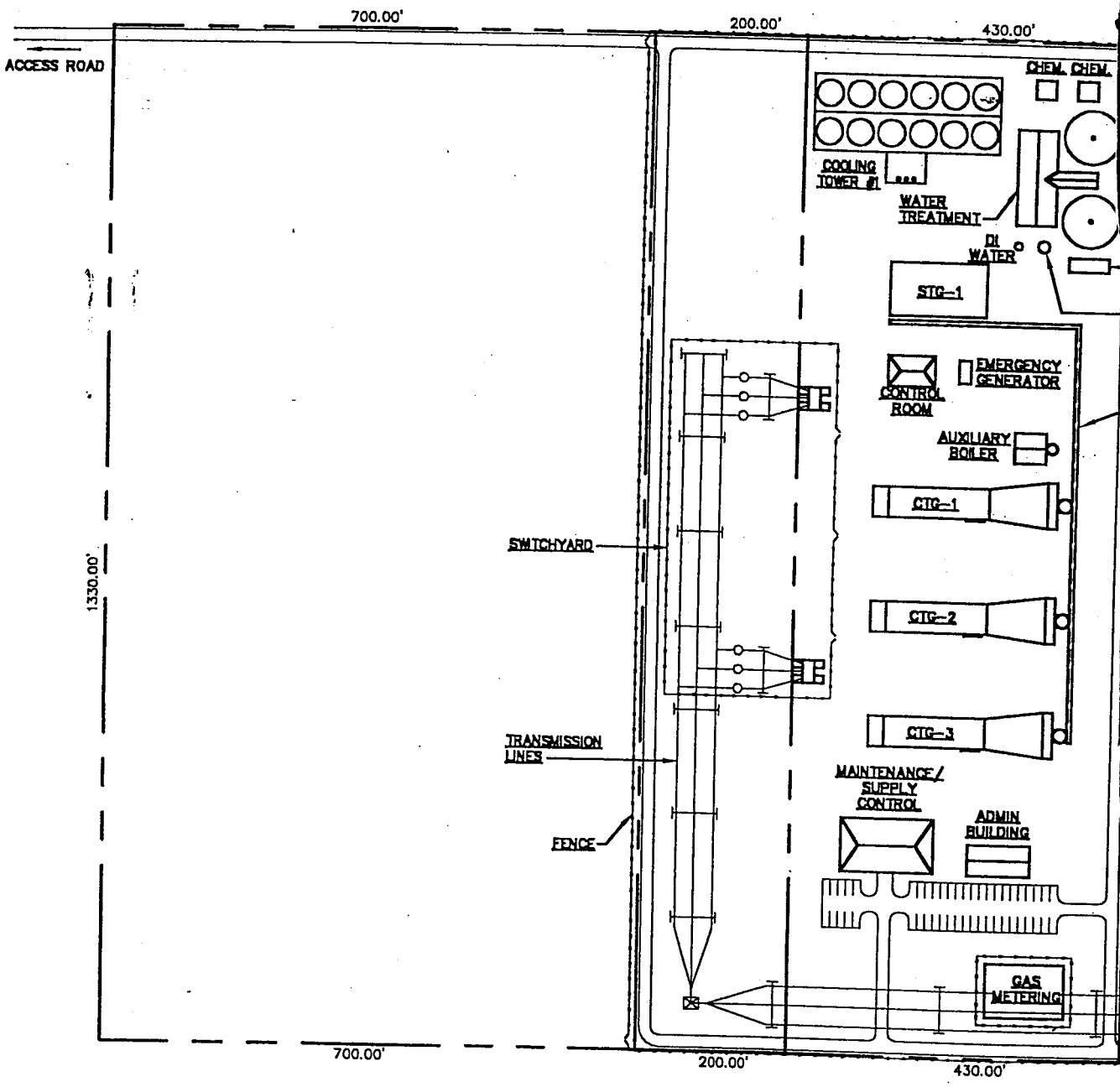
Job Number:	Date:
147100	8/30/00

Sheet Number

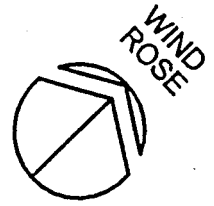
Figure 1-1

1 of 1 sheets

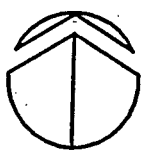
20000830.101617

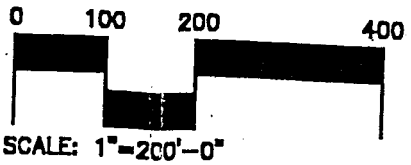

700.00'
200.00'
430.00'
ACCESS ROAD
CHEM.
CHEM.
COOLING TOWER #1
WATER TREATMENT
DI WATER
STG-1
EMERGENCY GENERATOR
CONTROL ROOM
AUXILIARY BOILER
CTG-1
CTG-2
CTG-3
SWITCHYARD
TRANSMISSION LINES
FENCE
MAINTENANCE / SUPPLY CONTROL
ADMIN BUILDING
GAS METERING
1330.00'
700.00'
200.00'
430.00'

COOLING TOWER:	240'x100'x50'
CTG 1–3:	250'x60'x55'
CTG STACK:	18' DIA.x165'
AUX. BOILER BLDG.:	40'x40'x20'
AUX. BOILER STACK:	45'x31"
WATER TANK:	70' DIA.x40'
WATER TREATMENT BLDG.:	125'x50'x20'
CONTROLS ROOM:	40'x60'x20'
STG 1:	125'x70'x30'
MAINT./SUPPLY CONTROL:	120'x60'x30'
ADMIN. BLDG.:	80'x40'x25'
COOLING WATER TANK:	15' DIA.x15'
DI WATER TANK:	10' DIA.x10'



NORTH





SCALE: 1"=200'-0"

INDUSTRIAL POWER TECHNOLOGY
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No.	Revisions	Date

GILA BEND POWER PROJECT

PRELIMINARY SITE LAYOUT

DESIGN DRAWN ENG.

Job Number: 147100 | Date: 8/30/00

Sheet Number

Figure 1-2

1 of 1 sheets

20000830.103008

1.4 Product/Process Description

The following are the major processes and equipment associated with the operation of the Facility:

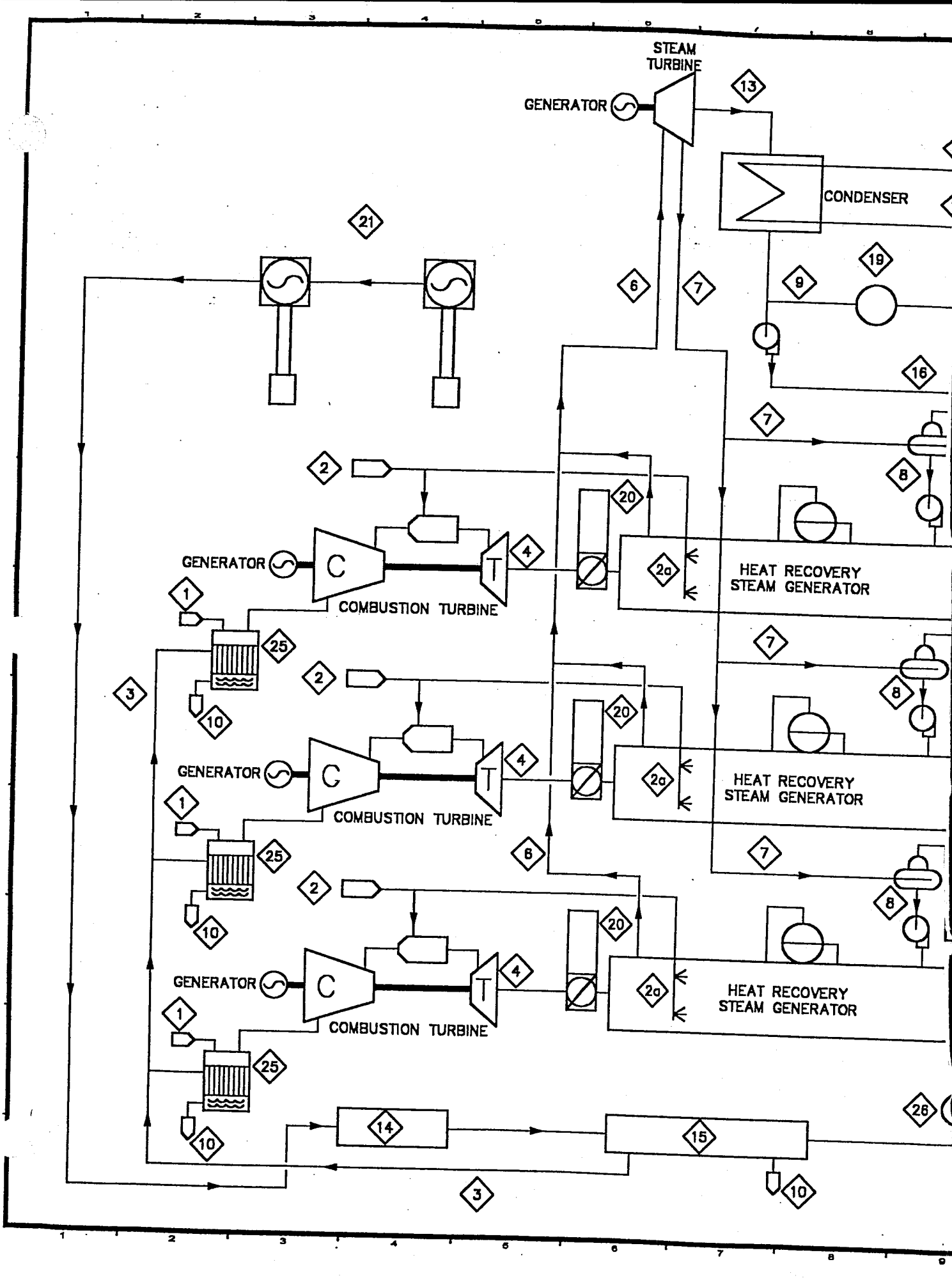
- Natural gas-fired combustion turbine generators (3)
- Heat recovery steam generators, each with a duct burner(3)
- Steam turbine (1)
- Natural gas-fired auxiliary boiler (1)
- Emergency diesel generator (1)
- Diesel fire pump (1)
- Cooling tower (1)

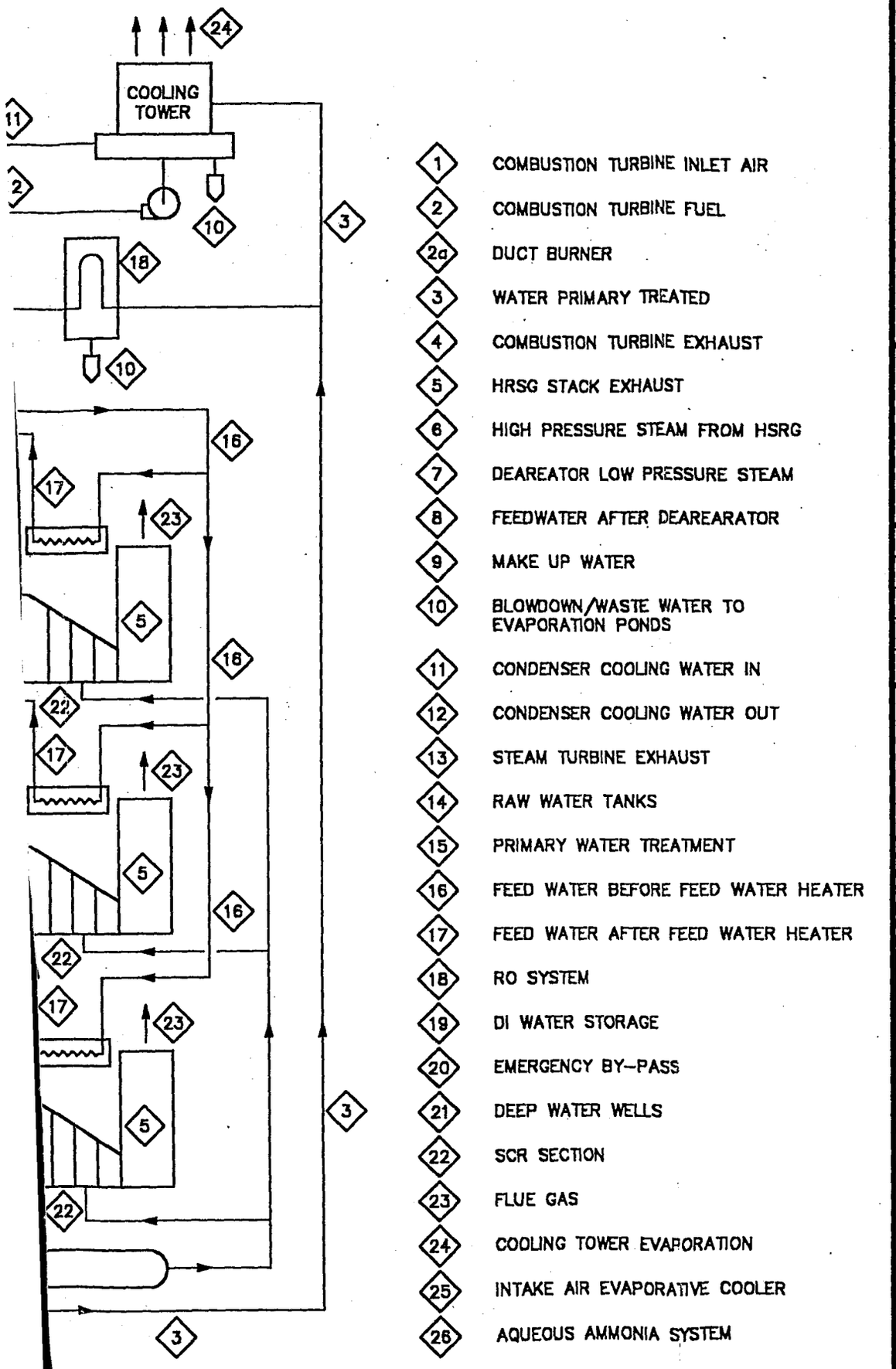
2.4 PROCESS FLOW DIAGRAM

This section documents the addition of duct burners and the reduction in the number of cooling towers. In addition, the referenced Figure 5-1 is modified to reflect equipment changes. This section supersedes Section 5 of the Application.

5.0 PROCESS FLOW DIAGRAM

The Facility will consist of three natural gas-fired combined cycle combustion turbine generators (CTGs), three heat recovery steam generators (HRSG) each with one duct burner, one steam turbine, one natural gas-fired auxiliary boiler, one emergency diesel generator, one diesel fire pump, and one cooling tower. In addition to the combustion turbines and engines, the Facility will include a balance of plant equipment and systems such as natural gas metering systems; natural gas handling systems; instrumentation and control systems; water treatment, storage and handling systems; transformers; and administration and warehouse/maintenance buildings. Water treatment equipment will be required to support the boiler feed water and coolant for the cooling tower. A preliminary process flow diagram for the Facility is presented in Figure 5-1.


STEAM TURBINE
GENERATOR
CONDENSER
HEAT RECOVERY STEAM GENERATOR
COMBUSTION TURBINE
C
T
GENERATOR
HEAT RECOVERY STEAM GENERATOR
COMBUSTION TURBINE
GENERATOR
HEAT RECOVERY STEAM GENERATOR
COMBUSTION TURBINE



1. COMBUSTION TURBINE INLET AIR
2. COMBUSTION TURBINE FUEL
2a. DUCT BURNER
3. WATER PRIMARY TREATED
4. COMBUSTION TURBINE EXHAUST
5. HRSG STACK EXHAUST
6. HIGH PRESSURE STEAM FROM HSRG
7. DEAREATOR LOW PRESSURE STEAM
8. FEEDWATER AFTER DEAREARATOR
9. MAKE UP WATER
10. BLOWDOWN/WASTE WATER TO EVAPORATION PONDS
11. CONDENSER COOLING WATER IN
12. CONDENSER COOLING WATER OUT
13. STEAM TURBINE EXHAUST
14. RAW WATER TANKS
15. PRIMARY WATER TREATMENT
16. FEED WATER BEFORE FEED WATER HEATER
17. FEED WATER AFTER FEED WATER HEATER
18. RO SYSTEM
19. DI WATER STORAGE
20. EMERGENCY BY-PASS
21. DEEP WATER WELLS
22. SCR SECTION
23. FLUE GAS
24. COOLING TOWER EVAPORATION
25. INTAKE AIR EVAPORATIVE COOLER
26. AQUEOUS AMMONIA SYSTEM

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No.	Revisions	Date

GILA BEND POWER PROJECT

PROCESS FLOW DIAGRAM

TS DESIGN | SS DRAWN | RW ENG.

Job Number: 147100 | Date: 8/30/00

Sheet Number

Figure 5-1

1 of 1 sheets

20000830.102851

2.5 EMISSION RELATED INFORMATION

This section includes the addition of duct burners and the reduction in the number of cooling towers. In addition, Table 7-1 Emission Source Summary reflects emission changes due to these equipment changes. Also, Section 7.3 was revised to state the insignificant activities list will be facility-specific. This section supersedes Section 7 of the Application.

7.0 EMISSIONS-RELATED INFORMATION

7.1 Basis for Estimating Air Emissions

The Facility's air emission estimates were based on manufacturer's and supplier's emission factors as well as USEPA's AP-42 factors. Table 7-1 summarizes the hourly and annual air emissions from the significant emission sources.

7.2 Significant Emission Sources

The sources of regulated air emissions from the Facility that are required to be included in the Application include:

- 3 CTGs (includes 3 combustion turbines, 3 duct burners, 3 HRSGs, and 1 steam turbine)
- 1 auxiliary boiler (26 MMBtu/hr)
- 1 diesel generator (500kW)
- 1 diesel fire pump (400 BHP)
- 1 cooling tower (12 cells)

7.3 Insignificant Emission Sources

The Department has classified various activities associated with electric utility facilities as insignificant. Reference 2 includes a list of insignificant activities for the facility-specific operations. In addition, all relevant insignificant activities listed in County Rule 200, Section 3.3.3(c) are also incorporated herein by reference.

Table 7-1 Emission Source Summary [1]

Regulated Pollutants	Combustion Turbines[2]		Auxiliary Boiler		Diesel [3] Generator		Diesel Fire[3] Pump		Cooling Towers		Facility Total	
	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(tpy)
NOx	74.1	324.6	3.1	13.6	15.5	3.9	12.4	3.1	0	0	105.1	345.2
CO	209.5	917.4	4.0	17.3	3.3	0.8	2.7	0.7	0	0	219.4	936.3
SO2	14.5	63.3	0.0	0.14	1.0	0.3	0.8	0.2	0	0	16.3	63.9
VOC [4]	32.4	141.9	0.4	1.84	1.2	0.3	1.0	0.3	0	0	35.1	144.3
PM10	98.1	429.3	0.3	1.2	1.1	0.3	0.9	0.2	2.07	9.05	102.5	440.1
TSP	98.1	429.3	0.3	1.2	1.1	0.3	0.9	0.2	4.14	18.1	104.5	449.2
HAPs	(tpy)		(tpy)		(tpy)		(tpy)		(tpy)		(tpy)	
Acetaldehyde	0.88		--		0.001		Trace		0		0.88	
Benzene	0.27		Trace		0.001		Trace		0		0.27	
Ethylbenzene	0.70		--		--		--		0		0.70	
Formaldehyde	15.93		0.008		0.002		Trace		0		15.94	
Hexane	8.46										8.46	
Naphthalene	0.03		Trace		Trace		Trace		0		0.03	
PAH's	0.05		--		--		--		0		0.05	
Propylene Oxide	0.64		--		--		--		0		0.64	
Toluene	2.87		Trace		Trace		Trace		0		2.87	
Xylenes	1.41		--		Trace		Trace		0		1.41	
Total HAPs	22.56		0.21		0.01		0.00		0		31.41	

[1] Emission estimates are based on the calculations and assumptions included in Reference 4.
[2] Emission estimates include duct burners.
[3] Diesel generator and fire pump annual emissions are based 500 hours per year.
[4] VOC emissions from each source include the HAP emissions.

2.6 DESCRIPTION OF PROCESS AND CONTROL EQUIPMENT

This section notes an increase in power generation capacity, addition of duct burners, and reduction in the number of cooling towers. In addition, this section contains information regarding storage vessels used for storing fuel oil and chemicals, which previously was not described. This section supersedes Section 11 of the Application.

11.0 DESCRIPTION OF PROCESS AND CONTROL EQUIPMENT

As described in Section 1 of this Application, the Facility will consist of three natural gas-fired CTGs, three HRSGs each with one duct burner, one steam turbine, one natural gas-fired auxiliary boiler, one emergency diesel generator, one diesel fire pump, and one cooling tower. Table 11-1 summarizes the type, make, model, and capacity of this process equipment. In addition to the combustion turbines and engines, the Facility will include a balance of plant equipment and systems such as natural gas metering systems; natural gas handling systems; instrumentation and control systems; water treatment, storage and handling systems; transformers; and administration and warehouse/maintenance buildings. Water treatment equipment will be required to support the boiler feed water and coolant for the cooling tower.

TABLE 11-1
PROCESS AND CONTROL EQUIPMENT

Equipment Name	# of Units	Make	Model	Size or Production Capacity	Type
CT	3	GE	MS700IFA	170 MW	Combined-cycle
Duct Burners	3			356 MMBTU/hr	Natural gas-fired low NOx
HRSG	3	Deltek		1,000 ton	Fluegas-driven
Steam Turbine	1	GE		300 MW	Steam-driven
Auxiliary Boiler	1	Cleaver Brooks		26 MMBtu/hr	Natural gas-fired
Emergency Generator	1	Caterpillar	3412	500 kw	Diesel-fired
Fire Pump	1	Caterpillar	3406	400 BHP	Diesel-fired
Cooling Tower	1	Marley		12 cells	Counter-flow

11.1 Combustion Turbines

The three combined-cycle combustion turbine generators are fired exclusively with natural gas. Each CTG package will incorporate a GE MS7001FA (or equivalent) combustion turbine. At full load operations, nitrogen oxide (NO_x) emissions at the CTG exhaust will be controlled to a level of 3 ppmvd corrected to 15 percent O_2 using a combination of selective catalytic reduction (SCR) and Dry Low NO_X (DLN) combustion.

The energy consumption and production of each CTG are summarized in Table 11-2. Hourly production rates are dependent on operating and ambient conditions such as loading, ambient temperature, and relative humidity. The production rates are based on full output of the Facility at the ambient conditions noted. The normal combined output of the Facility will be approximately 845 MW.

TABLE 11-2

SUMMARY OF ENERGY PRODUCTION DESIGN CRITERIA
GILA BEND POWER GENERATION STATION

Number of units	3
Natural gas operation	
➢ Nominal Maximum Electrical Capacity	181.2 MW each
➢ Energy Input (HHV)	1,546 MMBtu/hr each

The combustion turbines will be designed to operate continuously 24 hours per day, with each turbine potentially operating every day of the year. The turbines are not expected to operate less than 70 percent of base load for significant periods of time.

11.2 Heat Recovery Steam Generators

In addition to the CTGs, the Facility will operate three heat recovery steam generators (HRSGs). The HRSGs will take advantage of the hot exhaust gases from the combustion turbines to produce high pressure steam, which will then power the steam turbine to produce electricity. The Facility will operate three duct burners, one in each HRSG, to supplement steam generation. The duct burners will be natural gas fired low-NOx burners.

11.3 Steam Turbine

The facility will operate one steam turbine, which will be driven by the steam produced by the HRSGs. There are no emissions generated from the steam turbine because there is no fuel combustion.

11.4 Selective Catalytic Reduction System

The HRSGs will each be fitted with a SCR system, which will be used as an add-on emission control system for NO_X emissions. Operating time will parallel turbine operations and will be based on average annual ambient conditions. This system will be discussed further in the BACT Analysis.

11.5 Auxiliary Boiler

The Facility will utilize an auxiliary boiler with a rated heat input of 26 MMBtu/hr to augment turbine start-up. The boiler will fire natural gas exclusively and will be permitted to operate 8,760 hours per year.

11.6 Emergency Diesel Generator and Diesel Fire Pump

The emergency diesel generator and the diesel fire pump will be used as backup systems in the event that there is a power outage. The emergency diesel generator is rated at 500 kW and the diesel fire pump is rated at 400 BHP. These internal combustion engines will be limited to a maximum annual operation of 500 hours. These emission units are considered exempt according to County Rule 200.

11.7 Cooling Tower

The Facility will utilize one cooling tower, comprising 12 cells. The cooling tower function will provide cool water to the condensing steam turbine. The tower will be a mechanical draft counter-flow design.

11.8 Construction Activities

It is estimated that construction of the Facility will take approximately 24 months. The construction activities during that period will include:

- Set up of temporary construction trailers and field management office.
- Set up of temporary utilities.
- Preparation of construction roads and parking.
- Use of site preparation and construction equipment such as diesel powered earth movers and auxiliary equipment.
- Building construction.
- Connection to existing utilities.

- Surface coating.
- Welding.
- Plant testing and cleaning.

11.9 Storage Vessels

Table 11-3 includes a summary of storage tanks proposed for storing fuel oil and process chemicals at the facility.

TABLE 11-3
STORAGE TANK SUMMARY

Material	# of Tanks	Approximate Capacity (gal)
Diesel Fuel	2	150
Ammonia (aqueous)	1	20,000
Sulfuric Acid Solution (or equivalent)	1	6,000
Sodium Hydroxide Solution (or equivalent)	1	6,000
Sodium Sulfate Solution (or equivalent)	1	6,000

Additional on-site chemical storage may become necessary for the water treatment system. The types and quantities of chemicals requiring storage will be known after the detailed water treatment system design has been completed. Any additional storage tanks needed will be permitted as required by Maricopa County regulations.

2.7 STACK INFORMATION

This section reflects changes in exhaust gas velocity due to addition of duct burners and added stack information for the diesel-fired emergency generator and fire pump. This section supersedes Section 12 of the Application.

12.0 STACK INFORMATION

All relevant information for the significant emission sources such as identification number, location, exit gas temperature, exit gas velocity, height, and inside dimension is provided in the Emission Sources tables of the Department's Standard Application Forms included in this Application.

TABLE 12-1
STACK INFORMATION

Source ID	Description	Bldg. Dimensions	Exhaust Gas Temp (°F)	Exhaust Gas Velocity (ft/sec)	Stack Height (ft)	Stack ID (ft)
1	CT-1	(1)	188	70	165	18
2	CT-2	(1)	188	70	165	18
3	CT-3	(1)	188	70	165	18
4	Aux. Boiler	(1)	450	35	95	2
5-16	Cooling Tower	(1)	70	30	50	30
17	Diesel Generator	(1)	792	130	15	0.5
18	Diesel Fire Pump	(1)	792	65	15	0.5

Notes: (1) Refer to Figure 1-2 (site plan) for all building dimensions.

2.8 SITE DIAGRAM

This section reflects changes in the closest distance between equipment (Combustion Turbine 1) and property boundary (eastern fence line). This section supersedes Section 13 of the Application.

13.0 SITE DIAGRAM

A facility location plan (Figure 1-1) and site plan (Figure 1-2) for the Facility is provided in Section 1 of this Application. The plans include the following information:

- Property boundaries.
- Adjacent streets and roads.
- Directional arrow indicating "North".
- Ground elevation of 678 feet above mean sea level (msl).
- Closest distance between equipment (Combustion Turbine 1) and property boundary (east) of approximately 100 feet at the eastern fence line of the Facility.
- Equipment layout showing the major process areas.
- Relative location of emission sources.
- Location of emission points.
- Location of air pollution control equipment.

2.9 COMPLIANCE CERTIFICATION

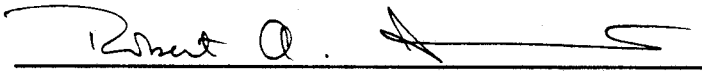
This section reflects changes in the business name and supersedes Section 17 of the Application.

17.0 COMPLIANCE CERTIFICATION

I certify under penalty of law that the enclosed documents and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on information and belief formed after my reasonable inquiry, the statements and information in the documents submitted are true, accurate and complete.

I further certify under penalty of law that, to the best of my knowledge and belief, my facility is in continuous compliance with all applicable federal, state, and Maricopa County requirements. I also certify that I will ensure that my facility continues to comply with all requirements that apply.

Responsible Official: Mr. Robert A. Innamorati

Signature: 

Title: Gila Bend Power Partners, L.L.C.

By: PowerDevelopment Gila Bend, L.P., Member

By: PowerDevelopment Enterprises, L.P., G.P.

By: Robert A. Innamorati & Co., Inc., G.P.

By: Robert A. Innamorati

Its: President

Date: August 28, 2000

2.10 NEW MAJOR SOURCE INFORMATION (RULE 240)

This section includes visibility impact and nitrogen deposition analyses for the Class II areas, which are located within 50 km, as Mr. Peter Lahm (FLM) and Ms. Shirley Pearson (URS) requested. This section supersedes Section 18 of the Application.

18.0 NEW MAJOR SOURCE INFORMATION (RULE 240)

18.1 Gila Bend Power Generation Project Source Classification

The Facility, a nominal 845 megawatt combined-cycle electric power generation plant, will be located approximately 70 miles southwest of Phoenix in the Town of Gila Bend, Arizona. It will be located in an attainment area for all conventional pollutants.

The Facility is a Categorical Source, a fossil fuel-fired steam electric plant and combined cycle gas turbines of more than 250 MM BTU per hour rated heat input, as defined by the County Rule 240 Section 202. It also has a potential to emit more than 100 tons per year for NOx, CO and PM_{10}. Since the Facility is classified as a Categorical Source which has potential to emit more than 100 tons per year of conventional air pollutants, it is a new major source as defined in the County Rule 240 Section 210.

A new major source in an attainment area must demonstrate an ability to comply with provisions of Prevention of Significant Deterioration (PSD) in the County Rule 240. The following sections will discuss requirements for the Facility as listed in Item 18.b of the Maricopa County Permit Application Filing Instructions.

18.2 Rule 240 Requirements in an Attainment Area

The applicable requirements and compliance method are listed in Section 20 – Additional Requirements.

18.3 Best Available Control Technology Applicability and Analysis

The Facility will emit more than significant emission levels as defined in the County

Rule 100 for NOx, CO, SO2, PM10, and VOC. Table 7-1 (Emission Source Summary) summarizes the projected emissions for the Facility. PSD requires Best Available Control Technology (BACT) for all conventional pollutants exceeding the significant emission levels. Reference 5 (BACT Analysis) includes the required BACT determinations.

18.4 Ambient Air Quality Analysis

Reference 6 (PSD Modeling Protocol) includes the protocol used in the ambient air impact modeling and Reference 7 (Ambient Air Quality Analysis) describes the analysis and summarizes the results.

18.5 Visibility Impact Analysis

Mr. Peter Lahm, the local Federal Land Manager (FML) representative, requested a visibility impact analysis for Class II areas that are located within 50 kilometers of the Facility. The Class II areas within 50 kilometers of the Facility are listed below:

- Woolsey Peak Wilderness
- Signal Mountain Wilderness
- North Maricopa Mountains Wilderness
- South Maricopa Mountains Wilderness

A Level 2 visibility impact screening analysis was performed using VISCREEN, a plume visual impact screening model, and following the methods outlined in the *Workbook For Plume Visual Impact Screening And Analysis* (USEPA 1992).

The most important input for a Level 2 screening analysis is the meteorological conditions: the worst-case wind direction and speed and atmospheric stability. Two years of

Pacificorp meteorological data was used to prepare tables of joint frequency of occurrence of wind speed, wind direction, and stability class. On the basis of location of Class II areas, the Facility, observer and topography, the wind direction sector that transports emissions closest to a given Class II area observer point was selected so that the frequency of occurrence of impact could be assessed. To find the worst-case meteorological conditions, the dispersion condition that has a $\sigma_y\sigma_z u$ product with a cumulative probability of 1 percent was determined excluding the conditions with transit time of more than 12 hours.

Another important input to the screening analysis was the background visual range. As the FLM requested, the background visual range of 225 kilometers was used for the analysis.

Currently, there are not any established screening criteria for Class II areas. The default screening criteria for Class I areas were used in the VISCREEN output. The four Class II area visibility impact screening results exceeded the Class I criteria. These results indicate that there may be a potential to impact visibility from the Facility's emissions. However, these screening results are based on extremely conservative screening methods and conditions that occur less than 4 days per year. It is probable that more refined modeling would not result in a significant visibility impact in the nearby Class II areas. The VISCREEN output for the four Class II areas are included in the Reference 7.

The nearest Class I area (Superstitions Wilderness Area) is located more than 120 kilometers from the Facility. Therefore, there are no anticipated impacts from the Facility on visibility in any Class I areas.

18.6 Nitrate Deposition on Class II Wilderness Areas

In addition to the visibility impact analysis, the FLM requested a nitrate deposition

analysis for Class II areas that are located within 50 kilometers of the Facility. Table 18-1 shows the resulting nitrate deposition for each of the four Class II areas. The method to estimate deposition from NO_2 concentration at a discreet receptor is described in the Interagency Workgroup on Air Quality Modeling (IWAQM) Phase I Report (USEPA, 1993).

Table 18-1

Nitrate Deposition

Class II Areas	Annual NO2 Concentration ($\mu g/m^3$)	Nitrate Deposition (kg/hectare)
Woolsey Peak	0.05263	1.14
Signal Mountain	0.10029	2.17
North Maricopa Mountains	0.07558	1.63
South Maricopa Mountains	0.05307	1.15

The method used provides conservative deposition estimates because the ISCST3 used to model NO_2 concentrations, a Gaussian plume model, does not actually remove any mass from the plume. There are no established significance levels to compare the above nitrate depositions, but the impacts seem minimal considering the conservative estimation method and its results.

2.11 ADDITIONAL REQUIREMENTS

This section notes the visibility impact analysis performed for the Class II areas and supersedes Section 20 of the Application.

20.0 ADDITIONAL REQUIREMENTS

20.1 Rule 210 - Title V Permit Provisions

In addition to required items from the "Standard Permit Application Form and Filing Instructions for Maricopa County", there are several items listed below that must be addressed.

- **Federal delayed compliance orders or consent decrees**: The Facility is a new source. There is no Federal delayed compliance orders or consent decrees.
- **The list of insignificant activities**: Reference 2 includes the list of insignificant activities.
- **Emission Trading Information**: The Facility is not requesting terms and conditions allowing for the trading of emissions increases and decreases.
- **A Copy of Application for EPA Region IX**: A copy of the application will be submitted to the US EPA Region IX.
- **Confidential Trade Information**: There is no confidential information.
- **Applicable MACT**: The Facility is not a listed NESHAP operation. No MACT is applicable.

20.2 Rule 240 - Permits For New Major Sources And Major Modification

In addition to the above requirements, the Rule 240 also requires the following items listed below.

- **Air Impact Analysis for Any Geographical Area**: The analysis is done in accordance with the Rule 240, Section 303.
- **More Stringent Rule Required**: Applicable sections from County Rule 360 and Regulation III of the County rules do not overlap any operation. Therefore, there

is no conflict with more stringent rule requirement.

- **Visibility Impact Analysis:** Section 18.5 "Visibility Impact Analysis" of this Application Addendum describes the analyses performed.
- **GEP Stack Height**: Stack height in excess of GEP stack height and any other dispersion technique will not affect the degree of emission limitation required for control of any pollutant.
- **Fugitive Dust Emission**: The facility will comply with the Rule 310 – Fugitive Dust Sources and Rule 311 - Particulate Matter from Process Industry. The Rule 316 – Nonmetallic Mineral Mining and Processing is not applicable.
- **Lead emission**: Lead emissions are estimated to be less than five tons per year.

2.12 LIST OF INSIGNIFICANT ACTIVITIES

This section lists the insignificant activities specific to the Facility's operations. This section supersedes Reference 2 of the Application.

LIST OF INSIGNIFICANT ACTIVITIES

Activities
A. Size-Based Exemptions 1. Stationary reciprocating internal combustion engines of 250 or less aggregate horsepower, with no individual internal conbustion engine exceeding 50 horsepower. 2. Stationary reciprcating internal combustion engines that are emergency or standby units and are operated less that 500 hours per year.
B. Labortories and Pilot Plants 1. Noncommercial (in-house) experimental and analytical laboratory equipment which emit less than 3 pounds of VOC's per day and are bench scale in nature including quality control/quality assurance laboratories supporting an electric utility facility, and reseach and development labortories.
C. Storage and Distribution 1. Chemical Storage and Process Holding Tanks a. Chemical storage tanks and storage areas. b. Process holding tanks. 2. Storage of butane, propane, or liquified petroleum gas. 3. Petroleum product storage tanks containing the following substances: a. Diesel fuels and fuel oils b. Lubricating oil c. Transformer oil d. Used oil e. Fuel storage and dispensing equipment operated solely for company-owned vehicles where the individual storage tank capacity is 250 gallons or less. 4. Piping and storage systems for natural gas, propane, and liquified petroleum gas. 5. Piping of fuel oils, used oil and transformer oil. 6. Storage and handling of drums or other transportable containers where the containers are sealed during storage (including containers of RCRA waste and used oil). 7. Storage tanks of any size containing exclusively soaps, detergents, waxes, greases, aqueous salt solutions, aqueous acid solutions, or aqueous caustic solutions at ambient temperatures.

LIST OF INSIGNIFICANT ACTIVITIES

Activities
D. Water and Wastewater Treatment 1. Water treatment or storage systems for boiler and feedwater. 2. Storage of chemicals (not exempted by C 7 above) associated with water and wastewater treatment where the water is treated for comsumption and/or use within the permitted facility. 3. The collection, transmission, liquid treatment, and solids treatment processes at domestic wastewater and sewage treatment works, or treatment facilityes, including septic tank systems, which treat only domestic type wastewater and sewage.
E. Office/Administrative 1. Housekeeping activities and associated products used for cleaning purposes, including collecting spilled and accumulated materials at the source, including operation of fixed vacuum cleaning systems specifically for such purposes. 2. Air conditioning, cooling, heating or ventilating equipment of less than 500,000 Btu/hour not designed to remove air contaminants generated by or released from associated or other equipment. 3. General office activities, such as paper shredding, copying, photographic activities, and blueprinting, but not to include incineration. 4. Rest room facilities and associated cleanup operations, and stacks or vents used to prevent the escape of sewer gases through plumbing traps. 5. Smoking rooms and areas 6. Use of consumer products, including hazardous substances as that term is defined in the Federal Hazardous Substances Act (15 U.S.C. 1261 et. seq.) where the product is used at a source in the same manner as normal consumer use. 7. Vacuum cleaning systems where the system is used exclusively for industrial or commercial purposes.
F. Groundskeeping 1. Landscaping and site housekeeping equipment. 2. Fugitive emissions from landscaping activities. 3. Use of pesticides, fumigants, and herbicides. 4. Groundskeeping activities and products.

LIST OF INSIGNIFICANT ACTIVITIES

Activities
G. Burning
1. Fire fighting activities and training conducted at the source in preparation for fighting fires.
2. Flares used to indicate danger.
H. Roadways (Sources must comply with Maricopa county Rule 310 for Open Fugitive Dust Sources)
1. Activities associated with the construction, repair or maintenance of roads or other paved or open ares, including operation of street sweepers, vacuum trucks, spray trucks and other vehicles related to the control of fugitive emissions of such roads or other areas.
2. Unpaved public and private roadways, except for haul roads located within a stationary source site boundary (pertains to regularly trafficked roadways, will vary according to facility).
3. Road and lot paving operations at commercial and industrial facilities.
4. Street and parking lot striping.
5. Fugitive dust emissions from the operation of a passenger vehicle (car, pickup truck or van).
I. Miscellaneous
1. Cafeterias, kitchens, and other facilities used for preparing food or beverages primarily for consumption at the source.
2. Equipment using water, water and soap or detergent for purposes of cleaning or finishing.
3. Construction and disturbance of surface ares for purposes of land development.
4. Activities at a source associated with the maintenance, repair or dismantlement of an emission unit or other equipment installed at the source, including preparation for maintenance, repair or dismantlement and preparation for subsequent startup, including preparation of a shutdown vessel for entry, replacement of insulation, welding and cutting, and steam purging of a vessel prior to startup; also includes maintenance, repair or dismantlement of buildings, utility lines, pipelines, wells, excavations, earthworks and other structures that do not constitute an emission unit (sources must comply with all applicable requirements).
5. Containers, reservoirs, or tanks used exclusively in dipping operations to coat objects with unheated oils, waxes, or greases.
6. Activities directly used in the diagnosis and treatment of disease, injury or other medical condition.
7. Manually operated equipment that is used for buffing, polishing, carving, cutting, drilling, machining, routing, sanding, sawing, surface grinding or turning and associated with venting hoods.
8. Wood working equipment with an aggregate horsepower of 50 or less.

LIST OF INSIGNIFICANT ACTIVITIES

Activities
I. Miscellaneous (continued)
9. Individual points of emission or activities as follows: a. Individual sampling points, analyzers, and process instrumentation, whose operation may result in emissions. b. Individual test equipment that is transportable or activities within a facility established for testing units prior to sale or for purposes of research. c. Property maintained individual flanges, valves, pump seals, pressure relief valves and other individual components that have the potential for leaks.
10. Brazind, soldering, or welding operations.
11. Battery recharging areas.
12. Aerosol can usage.
13. Plastic pipe welding.
14. Acetylene, butane, and propane torches.
15. Architecutural painting and associated surface coating using an aggregate of not more that one gallon per day for maintenance purposes at industrial or commercial facilities.
16. Steam vents, condenser vents and boiler blowdown.
17. Equipment used exclusively for portable steam cleaning with an aggregate heat input of less that 2,000,000 BTU per hour.
18. Blast-cleaning equipment with an aggregate heat input of less than 2,000,000 BTU per hour using a suspension of abrasive in water and any exhaust system or collector serving them exclusively.
19. Surface impoundments, such as evaporation ponds and storm water ponds.
20. Pump/motor oil reservoirs, such as gear box lubrication.
21. Transformer vents.
22. Lubricating system reservoirs.
23. Hydraulic system reservoirs.
24. Adhesive use which is not related to production.
25. Caulking operations which are not part of a production process.
26. Electric motors.
27. Cathodic protection systems.

LIST OF INSIGNIFICANT ACTIVITIES

Activities	
I. Miscellaneouns (continued)	
28.	Corona (the arc, halo, or light from high voltage lines power poles, and insulators which emits ozone).
29.	Freon recovery equipment.
30.	Soil gas sampling.
31.	Filter draining.
32.	General vehicle maintenance and servicing activities at the source.
33.	Station transformers.
34.	Circuit breakers.
35.	Generation unit gas vents (solenoid valves that vent uncombusted natural gas from generation units).
36.	Storage cabinets for flammable products.
37.	Unheated, non-conveyerized, cleaning or coating equipment that does not include control enclosures: with an open surface area of one square meter or less and an internal volume of 350 liters or less, having an organic solvent loss of three gallons per day of less, or, using only organic solvents with an initial boiling point of 302 degrees F or greater and having an organic solvent loss of three gallons per day or less, or; using materials with a VOC content of two percent or less by volume.

2.13 ACID RAIN PROGRAM – CERTIFICATE OF PRESENTATION

This section contains a revised Certificate of Representation Form to reflect the change in the business name. This section replaces only the first page of the form in the Reference 3 of the Application.

United States
Environmental Protection Agency
Acid Rain Program

OMB No. 2060-0258

Certificate of Representation

For more information, see instructions and refer to 40 CFR 72.24

This submission is: [X] New [ ] Revised (revised submissions must be completed in full; see instructions)

This submission includes combustion or process sources under 40 CFR part 74 [ ]

STEP 1
Identify the source by plant name, State, and ORIS code.

Plant Name	State	ORIS Code
Gila Bend Power Generation Station	AZ	*

* Will provide ORIS Code ans Unit IDs when received from EIA.

STEP 2
Enter requested information for the designated representative.

Name	Robert A. Innamorati
Address	Gila Bend Power Partners, L.L.C. 5949 Sherry Lane, Suite 1880 Dallas, TX 75225
Phone Number	(214) 210-5080
Fax Number	(214) 210-5079
E-mail address (if available)	

STEP 3
Enter requested information for the alternate designated representative, if applicable.

Name	Not Available
Phone Number	
Fax Number	
E-mail address (if available)	

STEP 4
Complete Step 5, read the certifications, and sign and date. For a designated representative of a combustion or process source under 40 CFR part 74, the references in the certifications to "affected unit" or "affected units" also apply to the combustion or process source under 40 CFR part 74 and the references to "affected source" also apply to the source at which the combustion or process source is located.

I certify that I was selected as the designated representative or alternate designated representative, as applicable, by an agreement binding on the owners and operators of the affected source and each affected unit at the source.

I certify that I have given notice of the agreement, selecting me as the 'designated representative' for the affected source and each affected unit at the source identified in this certificate of representation, in a newspaper of general circulation in the area where the source is located or in a State publication designed to give general public notice.

I certify that I have all necessary authority to carry out my duties and responsibilities under the Acid Rain Program on behalf of the owners and operators of the affected source and of each affected unit at the source and that each such owner and operator shall be fully bound by my actions, inactions, or submissions.

I certify that I shall abide by any fiduciary responsibilities imposed by the agreement by which I was selected as designated representative or alternate designated representative, as applicable.

I certify that the owners and operators of the affected source and of each affected unit at the source shall be bound by any order issued to me by the Administrator, the permitting authority, or a court regarding the source or unit.

Where there are multiple holders of a legal or equitable title to, or a leasehold interest in, an affected unit, or where a utility or industrial customer purchases power from an affected unit under life-of-the-unit, firm power contractual arrangements, I certify that:

I have given a written notice of my selection as the designated representative or alternate designated representative, as applicable, and of the agreement by which I was selected to each owner and operator of the affected source and of each affected unit at the source; and

Allowances and the proceeds of transactions involving allowances will be deemed to be held or distributed in proportion to each holder's legal, equitable, leasehold, or contractual reservation or entitlement or, if such multiple holders have expressly provided for a different distribution of allowances by contract, that allowances and the proceeds of transactions involving allowances will be deemed to be held or distributed in accordance with the contract.

The agreement by which I was selected as the alternate designated representative, if applicable, includes a procedure for the owners and operators of the source and affected units at the source to authorize the alternate designated representative to act in lieu of the designated representative.

2.14 EMISSION RATE CALCULATIONS

This section contains revised emission rate calculation tables, which have been adjusted to reflect the equipment changes. The two specific changes that affected emission rates are the addition of three 356 MM BTU/hr duct burners and reduction in the number of cooling tower to one. This section replaces only the respective tables in Reference 4 and 5 of the Application.

APPENDIX TABLE A-1
EMISSIONS SUMMARY TABLE

GILA BEND POWER GENERATION PROJECT
GILA BEND, ARIZONA

(All emissions based on data obtained by Industrial Power Technology, unless otherwise noted)

Parameters	Single Combustion Turbine								Auxiliary Boiler	Diesel Generator	Diesel Fire Pump	Cooling Towers
Load Condition	Base - 100%			Base - 100%			75%		105%	100%	100%	
Duct Firing	Off	Off	Off	On	On	On	Off	Off	–	–	–	–
Ambient Temperature, F	13	66.3	121	13	66.3	121	13	66.3				
Fuel Type	Natural Gas									Diesel Fuel		
Power Output, kW	181,200	170,600	166,506	181,200	170,600	166,506	135,900	121,200	–	500kW	400 BHP	
Heat Input, (LHV) MMBtu/hr	1,546	1,579	1,671	1,874	1,912	2,027	1,346	1,234	26	5.6	3	
Operating Time, hrs/yr	8,760								8,760	500		8,760
Emissions:												
NOx, ppm	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0				
NOx, lb/MMBtu	0.0129	0.012	0.0111	0.0132	0.0121	0.0111	0.0123	0.0122	0.12	–	–	
Total NOx as NO2, lb/hr	20.0	19.0	18.5	24.7	23.1	22.6	16.5	15.0	3.11	15.5	12.4	
Total NOx as NO2, TPY	87.6	83.2	81.0	108.2	101.1	98.9	72.3	65.7	13.62	3.88	3.1	
CO, lb/MMBtu	0.0328	0.0301	0.0278	0.0373	0.0343	0.0316	0.0301	0.304	0.152	–	–	
Total CO, lb/hr	50.7	47.6	46.5	69.8	65.6	64.0	40.5	37.6	3.95	3.34	2.67	
Total CO, TPY	222.1	208.3	203.5	305.8	287.1	280.5	177.2	164.5	17.3	0.83	0.67	
SO2, lb/MMBtu	0.0026	0.0023	0.0022	0.0026	0.0024	0.0022	0.0023	0.0024	0.001	–	–	–
Total SO2, lb/hr	4.00	3.70	3.65	4.82	4.52	4.41	3.15	2.9	0.03	1.03	0.82	
Total SO2, TPY	17.3	16.2	16	21.1	19.8	19.3	13.8	12.7	0.13	0.26	0.21	
VOC, ppm (methane)	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4				
VOC, lb/MMBtu	0.0019	0.0018	0.0016	0.0058	0.0053	0.0049	0.0017	0.0018	0.016	–	–	
Total VOC, lb/hr	2.9	2.8	2.7	10.8	10.2	10.0	2.3	2.2	0.42	1.24	0.99	
Total VOC, TPY	12.8	12.1	11.9	47.3	44.7	43.7	10.2	9.5	1.84	0.31	0.248	
TSP, lb/MMBtu	0.018	0.018	0.017	0.017428	0.017079	0.016113	0.021	0.023	0.0102			
TSP, lb/hr	28.00	28.00	28.00	32.66	32.66	32.66	28.00	28.00	0.26	1.1	0.88	4.14
% that is PM10	100%								100%	100%	100%	50%
Total PM10 Portion, lb/hr	28.00	28.00	28.00	32.66	32.66	32.66	28.00	28.00	0.26	1.1	0.88	2.07
TSP, TPY	122.6	122.6	122.6	143.1	143.1	143.1	122.6	122.6	1.16	0.28	0.22	18.1
PM10 Portion, TPY	122.6	122.6	122.6	143.1	143.1	143.1	122.6	122.6	1.16	0.28	0.22	9.05
Stack Parameters:												
Base Elevation, ft	678											
Site Pressure, psia	14.46											
Height, ft	165								95	–	–	50
Diameter, ft	18								2			30.3
Flow@Base Load, lb/hr	3,718,000	3,506,000	3,437,000	3,733,000	3,520,000	3,451,000	2,967,000	2,766,000	–			
Flow@Base Load, acfm	996,043	926,936	932,656	1,069,301	1,015,505	1,025,460	776,039	706,870	6,597			1,297,919
Exhaust Temp., F	216	205	221	188	191	209	200	183	450			70
Velocity, fps	65.2	60.7	61.1	70	66.5	67.2	50.8	46.3	35			30.0/cell

Note:

(1) Concentration reflects NOx emissions from SCR technology for the CT

(2) Emissions were calculated using drift to circulating water ratio of 0.0005% and a TDS of 10,000 ppm.

(3) According to AP-42, Chapter 3, all PM emissions for uncontrolled natural gas combustion and diesel industrial engines are considered less than 1 micrometer, and therefore 100% is considered PM10.

(4) Combustion turbine particulate emissions take into account the backend emissions as referred to in the EPA Method 5 testing protocol for combustion turbines.

(5) Emissions are based on firing pipeline quality natural gas.

APPENDIX TABLE A-2
MAXIMUM HAZARDOUS AIR POLLUTANT (HAP) CALCULATIONS

GILA BEND POWER GENERATION PROJECT
GILA BEND, ARIZONA

				CT Generators (Total)	Duct Burners (Total)	Auxiliary Boiler	Diesel Emergency Generator	Diesel Fire Pump	Facility Total HAPs Emissions
Annual Operation				8,760 hrs/yr	8,760 hrs/yr	8,760 hrs/yr	500 hrs/yr		
Fuel Type				Natural Gas					–
Heat Input (HHV)				1,671 MMBtu/hr	356 MMBtu/hr	26 MMBtu/hr	5.6 MMBtu/hr	3.0 MMBtu/hr	
Number of Units				3	3	1	1	1	
HAPs Emitted	Emission Factors from Natural Gas-Fired Turbines (lb/MMBtu)	Emission Factors from Natural Gas Combustion (lb/MMBtu)	Diesel Engines Uncontrolled Emission Factors (lb/MMBtu)	Annual Emissions	Annual Emissions	Annual Emissions	Annual Emissions	Annual Emissions	Annual Emissions
				(TPY)	(TPY)	(TPY)	(TPY)	(TPY)	(TPY)
1,3-Butadiene	4.30E-07	–	3.91E-05	0.009	–	–	trace	trace	0.009
2-Methylnaphthalene	–	2.35E-08	–	–	Trace	Trace	–	–	0.000
Acetaldehyde	4.00E-05	–	7.67E-04	0.878	–	–	0.001	trace	0.879
Acrolein	6.40E-06	–	9.25E-05	0.141	–	–	trace	trace	0.141
Benzene	1.20E-05	2.06E-06	9.33E-04	0.263	0.010	Trace	0.001	trace	0.274
Dichlorobenzene	–	1.18E-06	–	–	0.006	Trace	–	–	0.006
Ethylbenzene	3.20E-05	–	–	0.703	–	–	–	–	0.703
Fluoranthene	–	2.94E-09	–	–	Trace	Trace	–	–	0.000
Fluorene	–	2.75E-09	–	–	Trace	Trace	–	–	0.000
Formaldehyde	7.10E-04	7.35E-05	1.18E-03	15.589	0.344	0.008	0.002	trace	15.943
Hexane	–	1.76E-03	–	–	8.255	0.201	–	–	8.456
Naphthalene	1.30E-06	5.98E-07	8.48E-05	0.029	0.003	Trace	trace	trace	0.031
PAHs	2.20E-06	–	–	0.048	–	–	–	–	0.048
Phenanathrene	–	1.67E-08	–	–	Trace	Trace	–	–	0.000
Propylene	–	–	2.58E-03	–	–	–	0.004	0.002	0.006
Propylene Oxide	2.90E-05	–	–	0.637	–	–	–	–	0.637
Pyrene	–	4.90E-09	–	–	Trace	Trace	–	–	0.000
Toluene	1.30E-04	3.33E-06	4.09E-04	2.854	0.016	Trace	0.001	trace	2.871
TMA	–	–	–	–	–	–	–	–	0.000
Xylenes	6.40E-05	–	2.85E-04	1.405	–	–	trace	trace	1.405
Total				22.557	8.632	0.209	0.008	0.002	31.409

Note:
(1) Emissions factors obtained from the 7/98 AP-42 for Natural Gas Combustion (External Combustion Sources)
(2) Only the significant emission factors were taken from the list of Speciated Organic Compounds.
(3) Emission factor is based on AP-42 Table 3.1-3, Emission Factors for Hazardous Air Pollutants From Natural Gas-Fired Stationary Gas Turbines. 4/2000

Calculation Equation:

Annual Emissions (tpy):
(Heat Input)(Emission Factor)(Hours of Operation)(No. of Units)(ton/2,000 lb)

APPENDIX TABLE A-4
COOLING TOWER EMISSION CALCULATIONS

GILA BEND POWER GENERATION PROJECT
GILA BEND, ARIZONA

Potential Cooling Tower Emission Calculations

Circulating Water Flow (gpm)	Water Density (lbs/gal)	Percent Drift from Coolant (%)	Assumed TDS [1] (PPM)	Estimated PM-10 Emissions [1] (lbs/ hr)
165,000	8.345	0.0005	10,000	**2.07**

Note:
(1) It is assumed that 50% of TDS is PM-10.

APPENDIX TABLE A-5
Controlled Estimated
Maximum emission Data Set

GILA BEND POWER GENERATION PROJECT
GILA BEND, ARIZONA

(All emissions based on data obtained by Industrial Power Technology, unless otherwise noted)

Parameters	CTG (Per Unit)	Auxiliary Boiler	Diesel Generator	Diesel Fire Pump	Cooling Tower	Total Facility Annual Emissions
Load Condition	Base -100%	--	--	--	--	--
Duct Firing	On					
Ambient Temperature, F	13.00					
Fuel Type	Natural Gas		No. 2 Fuel Oil			
Power Output, kW	181,200		500 kW	400 BHP		
Heat Input, (LHV) MMBtu/hr	1,874	26	5.6	3		
Operating Time, hrs/yr	8,760	8,760	500		8760	
Emissions:						
NOx, ppm	3.00				--	--
NOx, lb/MMBtu	0.01	0.12				
Total NOx as NO2, lb/hr	24.70	3.11	15.5	12.4		345.2
Total NOx as NO2, TPY	108.2	13.62	3.88	3.1		--
CO, lb/MMBtu	0.04	0.152				936.3
Total CO, lb/hr	69.82	3.95	3.34	2.67		--
Total CO, TPY	305.8	17.3	0.83	0.67		63.9
SO2, lb/MMBtu	0.00	0.001				--
Total SO2, lb/hr	4.82	0.03	1.03	0.82		144.3
Total SO2, TPY	21.1	0.13	0.26	0.21		--
VOC, ppm (methane)	1.40					
VOC, lb/MMBtu	0.01	0.016				
Total VOC, lb/hr	10.80	0.42	1.24	0.99		449.2
Total VOC, TPY	47.3	1.84	0.31	0.248		440.1
TSP, lb/MMBtu	0.02	0.0102				
TSP, lb/hr	32.70	0.26	1.1	0.88	4.14	--
% that is PM10	1.00	100%	100%	100%	50%	
Total PM10 Portion, lb/hr	32.70	0.26	1.1	0.88	2.07	
TSP, TPY	143.10	1.16	0.28	0.22	18.1	
PM10 Portion, TPY	143.10	1.16	0.28	0.22	9.05	
Stack Parameters:						
Base Elevation, ft	678.00					
Site Pressure, psia	14.46					
Height, ft	165.00	95	--	--	50	--
Diameter, ft	18.00	2			30.3	
Flow@Base Load, lb/hr	3,733,000.00	--			--	
Flow@Base Load, acfm	1,069,301.00	6,597			1,297,919	
Exhaust Temp., F	188.00	450			70	
Velocity, fps	70.00	35			30.0/cell	

Note:
(1) Emissions were calculated using drift to circulating water ratio of 0.0005% and a TDS of 10,000 ppm.
(2) Total Emissions includes the total emissions for three turbines, three duct burners, three cooling towers, one auxiliary boiler, one diesel generator, and one diesel fire pump.

2.15 BACT ANALYSIS

This section contains the revised Table 5-1 and cooling tower subsection, which reflect the emission changes from the cooling tower due to design alterations including recirculation water rate, drift eliminator efficiency, and number of cooling towers. In addition, this section now includes a NOx incremental cost analysis for reducing the emission level from 3 ppm to 2.5 ppm (adjusted to 15% oxygen). This section replace only the respective table and pages in Reference 5 of the Application.

TABLE 5-1
SUMMARY OF PROPOSED BACT

GILA BEND POWER GENERATION PROJECT
GILA BEND, ARIZONA

Emission Unit	Emissions Limit and Basis				
	TSP/PM_{10}	SO_2	NO_X	CO	VOC
Natural Gas-Fired Combustion Turbines:					
Emission Rate	0.023 lbs/MMBtu	0.003 lbs/MMBtu	3.0 ppmvd @ 15% O_2	17.0 ppmvd @ 15% O_2	1.4 ppmvw @ 15% O_2
Proposed BACT	Use of natural gas, and good combustion practices/design	Use of Natural Gas	DLN Combustion and SCR	Good combustion practices/design	Good combustion practices/design
Natural Gas-Fired Auxiliary Boiler:					
Emission Rate	0.0102 lbs/MMBtu	0.001 lbs/MMBtu	0.12 lbs/MMBtu	0.152 lbs/MMBtu	0.016 lbs/MMBtu
Proposed BACT	Good Combustion Practice/Design	Use of Natural Gas	Low NO_X Burner	Good Combustion Practice/Design	Good Combustion Practice/Design
Emergency Diesel Generator:					
Emission Rate	1.1 lb/hr	1.1 lb/hr	15.5 lb/hr	3.34 lb/hr	1.24 lb/hr
Proposed BACT	Good Engine Design	Very Low Sulfur Fuel	Good Engine Design	Good Engine Design	Good Engine Design
Diesel Fire Pump:					
Emission Rate	0.9 lb/hr	0.82 lb/hr	12.4 lb/hr	2.7 lb/hr	1.0 lb/hr
Proposed BACT	Good Engine Design	Very Low Sulfur Fuel	Good Engine Design	Good Engine Design	Good Engine Design
Cooling Tower:					
Emission Rate	2.07 lb/hr	N/A	N/A	N/A	N/A
Proposed BACT	Drift Eliminators				

5.8.6 Total Suspended Particulates/PM_{10}

Control technologies available for TSP and PM_{10} include filters such as particulate traps, proper engine design, and fuel additives and/or modifications. Because the uncontrolled emission rates of TSP and PM_{10} are estimated to be only 0.9 lbs/hr, any particulate controls will be prohibitively expensive. Therefore, proper engine design is proposed as BACT for particulate emissions from the diesel fire pump. The proposed BACT will not have any expected adverse environmental or energy impacts.

5.9 COOLING TOWER

5.9.1 Background

The cooling tower will be multi-celled, mechanical draft, counterflow type with an associated liquid drift. This drift is a source of particulate emission, caused by dissolved and suspended solids inherently contained within the liquid droplets. The water droplets then will evaporate allowing the particulates to agglomerate.

The annual operating time is expected to be 8,760 hours. The BACT determination for particulates is discussed below.

5.9.2 Total Suspended Particulates/ PM_{10}

There are no technically feasible alternatives that can be installed on the cooling tower, which specifically reduce particulate emissions; however, cooling towers are typically designed with drift elimination features. The drift eliminators are specially designed baffles that collect and remove condensed water droplets in the air stream. These drift eliminators, according to a review of the EPA's RBLC, can reduce drift to 0.0015 percent to 0.004 percent of cooling water flow, which reduces particulate emissions.

Therefore the use of drift eliminators to attain an emission rate of 2.07 lbs/hr is proposed as BACT for cooling tower PM-10 emissions. The proposed BACT will not have any expected adverse environmental or energy impacts.

5.10 PROPOSED COMPLIANCE DEMONSTRATION METHODS

The proposed compliance demonstration methods, including the averaging period, compliance method, and frequency, are shown in Table 5-5. The compliance methods include the initial performance testing and continuous emissions monitoring.

5.11 NOx INCREMENTAL COST ANALYSIS

Introduction

As the Department requested, the following summarizes the incremental cost analysis for reducing the Gila Bend Power Generation Station's nitrogen oxides (NOx) from 3.0 ppm to 2.5 ppm. Tables 1 through 6 provide the details of the incremental cost analysis.

- Table 1 – Capital Cost Analysis for Selective Catalytic Reduction Unit (SCR), 3 ppm limit
- Table 2 – Annualized Cost Analysis for SCR, 3 ppm
- Table 3 – Capital Cost Analysis for SCR, 2.5 ppm
- Table 4 – Annualized Cost Analysis for SCR, 2.5 ppm
- Table 5 – Incremental Capital Cost Analysis for SCR, 2.5 ppm minus 3 ppm
- Table 6 – Incremental Annualized Cost Analysis for SCR, 2.5 ppm minus 3 ppm

Summary of Cost Analysis

The incremental annualized cost contained in Table 6 includes 5 percent risk of the SCONOX annualized cost (approximately $4,300,000) as a contingency cost. This cost is included to account for the event that a 2.5 ppm NOx limitation cannot be achieved by SCR and must substitute SCR with SCONOX. The contingency cost only contains a 5% risk of not achieving 2.5 ppm NOx limitation.

The incremental annualized cost associated with reducing NOx emissions down to 2.5 ppm is approximately $300,850. The NOx emissions would be reduced by 18 tons per year (16.7% reduction) by decreasing the outlet

concentration to 2.5 ppm. The resulting incremental cost per ton of NOx removed is approximately $16,700.

Since the incremental cost analysis will be used to determine the Best Available Control Technology for the Facility, it is important to also consider other factors as well as economic impacts.

Other BACT Factors

As a first step in a top-down analysis, all available control options should be identified. For the incremental cost analysis, the only available control technologies considered are dry low NOx turbines combined with SCR units at emission level of 2.5 ppm and 3.0 ppm.

As a second step, the control options should be evaluated for technical feasibility with respect to the source-specific factors. The first reason for considering the 2.5 ppm option as technically infeasible is that the level of control has not been demonstrated. There are no known sources of similar size (845 MW plant firing supplementary duct burners) demonstrating compliance with 2.5 ppm using SCR. The *New Source Review Workshop Manual* notes, "For example, in cases where the level of control in a permit is not expected to be achieved in practice (e.g., a source has received a permit but the project was cancelled, or every operating source at that permitted level has been physically unable to achieve compliance with the limit), and supporting documentation showing why such limits are not technically feasible is provided, the level of control (but not necessarily the technology) may be eliminated from further consideration." Lack of compliance demonstrations with a 2.5 ppm NOx limit implies the level of control is physically not possible to achieve in practice.

The second reason is the 2.5 ppm option is not technically feasible is that Continuous Emissions Monitors (CEMs) have a +/- 0.5 ppm accuracy limitation. It is stated in the *New Source Review Workshop Manual*, "If the reviewing authority determines that there is no economically reasonable or technologically feasible way to accurately measure the emissions, and hence to impose an enforceable emissions standard, it may require the source to use design, alternative equipment, work practices or operational standards to reduce emissions of the pollutant to the maximum extent." It is not technologically feasible to accurately measure the emissions reduction (0.5 ppm) if CEMs have a +/- 0.5 ppm accuracy limitation.

A technically feasible control option has to be both available and applicable. "Available" is defined as a control option that can be obtained through commercial channels or is otherwise available within the common sense meaning of the term. "Applicable" is defined as a control option that can reasonably be installed and operated on the source type under consideration. While the dry low NOx turbines and SCR system capable of 2.5 ppm NOx may be considered available, this control option is not applicable. This control option cannot be reasonably installed and operated at the Facility. As previously stated, there are no known sources similar in size that demonstrated compliance with 2.5 ppm using a dry low NOx turbine combined with SCR unit.

Conclusion

In conclusion, the dry low NOx turbine and SCR system capable of 2.5 ppm NOx is not a technically feasible control option in addition to the high cost of additional NOx removal ($16,700 per ton). Therefore, the dry low NOx turbine combined with a SCR unit to control NOx emissions to 3 ppm represents and meets all BACT requirements.

TABLE 1 CAPITAL COST
SCR at 3 ppm for a Combined CycleCombustion Turbine System
Gila Bend Power Generation Project
Gila Bend, Arizona

Basis: 1.) General cost information provided by ABB Alstom Power.
2.) EPA Control Technologies for HAP, Table 4.3-3 Annual Cost Factors (pg-4-16)
3.) 8,760 hours of operation per year

Direct Costs	Total	Factors
Purchased Equipment Costs		
Catalyst/ Reactor System & Auxiliary Equipment	$1,172,000	Cost Estimate, (EC1)
Instrumentation	$117,200	0.10 *EC1
Sales Taxes	$35,160	0.03 *EC1
Freight	$93,760	0.08 *EC1
Purchased Equipment Cost, (PEC)	$1,418,120	
Direct Installation Costs		
Foundation & Supports	$141,812	0.10 PEC
Handling & Erection	$198,537	0.14 PEC
Piping & Electrical	$85,087	0.06 PEC
Installation for Ductwork	$14,181	0.01 PEC
Painting	$14,181	0.01 PEC
Direct Installation Cost, (DI)	$453,798	
Total Direct Cost, DC	$1,871,918	PEC+DI
Indirect Costs (installation)		
Engineering	$141,812	0.10 PEC
Construction and Field Expenses	$70,906	0.05 PEC
Contractor Fees	$141,812	0.10 PEC
Start-up	$28,362	0.02 PEC
Performance Tests	$14,181	0.01 PEC
Contingences	$70,906	0.05 PEC
Total Indirect Cost, (IC)	$467,980	
Total Capital Cost, Year 2000 dollars (TCC) = DC + IC	**$2,339,898**	

TABLE 2 ANNUAL COSTS
SCR at 3 ppm for a Combined CycleCombustion Turbine System
Gila Bend Power Generation Project
Gila Bend, Arizona

Basis: 1.) General cost information provided by ABB Alstom Power.
2.) EPA Control Technologies for HAP, Table 4.2-8 Annual Cost Factors (pg-4-9)
3.) 8,760 hours of operation per year

Total Capital Cost, (TCC):	$2,339,898	
Direct Annal Costs		Factors
Utilities		
Energy Penalty	$165,080	(4,127,011 kW)($0.04kW)steam consumption
Catalyst Replacement	$246,667	every 3 years
Operating Labor		
Operator	$76,650	($30.00 /hr)(3.5hrs/shift)(shift/12hrs)(8,760hrs)
Supervisor	$11,498	15% of operator labor
Maintenance		
Labor	$21,900	($30.00 /hr)(1hrs/shift)(shift/12hrs)(8,760hrs)
Materials	$21,900	100% of maintenance labor
Replacement Parts		
Other	$117,200	(10%)(EC1)
Indirect Annual Costs		
Administrative	$46,798	2% of TCC
Property Taxes	$23,399	1% of TCC
Insurance	$23,399	1% of TCC
Capital Recovery	$333,149	0.1424 TCC
Total Annual Cost	$1,087,639	

TABLE 3 CAPITAL COST
SCR at 2.5 ppm for a Combined CycleCombustion Turbine System
Gila Bend Power Generation Project
Gila Bend, Arizona

Basis: 1.) General cost information provided by ABB Alstom Power.
2.) EPA Control Technologies for HAP, Table 4.3-3 Annual Cost Factors (pg-4-16)
3.) 8,760 hours of operation per year

Direct Costs	Total	Factors
Purchased Equipment Costs		
Catalyst/ Reactor System & Auxiliary Equipment	$1,326,571	Cost Estimate, (EC1)
Instrumentation	$132,657	0.10 *EC1
Sales Taxes	$39,797	0.03 *EC1
Freight	$106,126	0.08 *EC1
Purchased Equipment Cost, (PEC)	$1,605,151	
Direct Installation Costs		
Foundation & Supports	$160,515	0.10 PEC
Handling & Erection	$224,721	0.14 PEC
Piping & Electrical	$96,309	0.06 PEC
Installation for Ductwork	$16,052	0.01 PEC
Painting	$16,052	0.01 PEC
Direct Installation Cost, (DI)	$513,648	
Total Direct Cost, DC	$2,118,799	PEC+DI
Indirect Costs (installation)		
Engineering	$160,515	0.10 PEC
Construction and Field Expenses	$80,258	0.05 PEC
Contractor Fees	$160,515	0.10 PEC
Start-up	$32,103	0.02 PEC
Performance Tests	$16,052	0.01 PEC
Contingences	$80,258	0.05 PEC
Total Indirect Cost, (IC)	$529,700	
Total Capital Cost, Year 2000 dollars (TCC) = DC + IC	**$2,648,499**	

TABLE 4 ANNUAL COSTS
SCR at 2.5 ppm for a Combined CycleCombustion Turbine System
Gila Bend Power Generation Project
Gila Bend, Arizona

Basis: 1.) General cost information provided by ABB Alstom Power.
2.) EPA Control Technologies for HAP, Table 4.2-8 Annual Cost Factors (pg-4-9)
3.) 8,760 hours of operation per year

Total Capital Cost, (TCC):	$2,648,499	
Direct Annal Costs		Factors
Utilities		
Energy Penalty	$177,695	(4,442,371 kW)($0.04kW)steam consumption
Catalyst Replacement	$246,667	every 3 years
Operating Labor		
Operator	$76,650	($30.00 /hr)(3.5hrs/shift)(shift/12hrs)(8,760hrs)
Supervisor	$11,498	15% of operator labor
Maintenance		
Labor	$21,900	($30.00 /hr)(1hrs/shift)(shift/12hrs)(8,760hrs)
Materials	$21,900	100% of maintenance labor
Replacement Parts		
Other	$132,657	(10%)(EC1)
Indirect Annual Costs		
Administrative	$52,970	2% of TCC
Property Taxes	$26,485	1% of TCC
Insurance	$26,485	1% of TCC
Capital Recovery	$377,087	0.1424 TCC
Total Annual Cost	$1,171,993	

TABLE 5 INCREMENTAL CAPITAL COST
Combined CycleCombustion Turbine System
Gila Bend Power Generation Project
Gila Bend, Arizona

Basis: 1.) General cost information provided by ABB Alstom Power.
2.) EPA Control Technologies for HAP, Table 4.3-3 Annual Cost Factors (pg-4-16)
3.) 8,760 hours of operation per year

Direct Costs	Total	Factors
Purchased Equipment Costs		
Catalyst/ Reactor System & Auxiliary Equipment	$154,571	2.5 ppm - 3 ppm
Instrumentation	$15,457	2.5 ppm - 3 ppm
Sales Taxes	$4,637	2.5 ppm - 3 ppm
Freight	$12,366	2.5 ppm - 3 ppm
Purchased Equipment Cost, (PEC)	$187,031	
Direct Installation Costs		
Foundation & Supports	$18,703	2.5 ppm - 3 ppm
Handling & Erection	$26,184	2.5 ppm - 3 ppm
Piping & Electrical	$11,222	2.5 ppm - 3 ppm
Installation for Ductwork	$1,870	2.5 ppm - 3 ppm
Painting	$1,870	2.5 ppm - 3 ppm
Direct Installation Cost, (DI)	$59,850	
Total Direct Cost, DC	$246,881	PEC+DI
Indirect Costs (installation)		
Engineering	$18,703	2.5 ppm - 3 ppm
Construction and Field Expenses	$9,352	2.5 ppm - 3 ppm
Contractor Fees	$18,703	2.5 ppm - 3 ppm
Start-up	$3,741	2.5 ppm - 3 ppm
Performance Tests	$1,870	2.5 ppm - 3 ppm
Contingences	$9,352	2.5 ppm - 3 ppm
Total Indirect Cost, (IC)	$61,720	
Total Capital Cost, Year 2000 dollars (TCC) = DC + IC	**$308,601**	

TABLE 6 INCREMENTAL ANNUALIZED COSTS
Combined CycleCombustion Turbine System
Gila Bend Power Generation Project
Gila Bend, Arizona

Basis: 1.) General cost information provided by ABB Alstom Power.
2.) EPA Control Technologies for HAP, Table 4.2-8 Annual Cost Factors (pg-4-9)
3.) 8,760 hours of operation per year

Total Capital Cost, (TCC):	$308,601	
Direct Annal Costs		Factors
Utilities		
Energy Penalty	$12,614	2.5 ppm - 3 ppm
Catalyst Replacement	$0	
Operating Labor		
Operator	$0	
Supervisor	$0	
Maintenance		
Labor	$0	
Materials	$0	
Replacement Parts		
Other	$15,457	(10%)(EC1)
Contingencies*	$216,500	
Indirect Annual Costs		
Administrative	$6,172	2% of TCC
Property Taxes	$3,086	1% of TCC
Insurance	$3,086	1% of TCC
Capital Recovery	$43,938	0.1424 TCC
Total Annual Cost	$300,853	

2.16 PSD MODELING PROTOCOL

This section contains the revised PSD modeling protocol dated August 4, 2000, which was approved by the Department September 6, 2000. This protocol supersedes the previous Reference 6 materials in the Application.

MALCOLM PIRNIE

PREVENTION OF SIGNIFICANT DETERIORATION (PSD) MODELING PROTOCOL SUPPLEMENT

GILA BEND POWER GENERATION STATION

Prepared for:
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3962-001

August 4, 2000

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EXECUTIVE SUMMARY

Power Development Enterprises, Inc. is proposing to construct a nominal 840-megawatt combined cycle, natural gas fired electric power generation facility in Maricopa County, Arizona. The facility, the Gila Bend Power Generation Station, will be located approximately 60 miles southwest of Phoenix in the town of Gila Bend, Arizona. The proposed power generation facility will be a new major source and will be subject to the Prevention of Significant Deterioration (PSD) regulations contained in 40 CFR Part 52.21. As part of the permit application process, the PSD regulations require modeling of air pollutant emissions from the proposed facility to evaluate ambient air quality impacts. This modeling protocol contains information on the proposed modeling approach including a description of the site, model input data, meteorological data, and other assumptions and information that will be used to complete the modeling analysis.

SECTION 1.0
INTRODUCTION

1.1 SITE DESCRIPTION

The proposed location of the Gila Bend Power Generation Station (Facility) is in southwestern Arizona approximately 70 miles southwest of Phoenix in Maricopa County. The site is located in Gila Bend north of Interstate 8 and just south of the Citrus Valley. The general coordinates of the site are 32° 58' 30" N latitude and 112° 49' 15" W longitude. A map showing the proposed site location is provided as Figure 1-1 Facility Location.

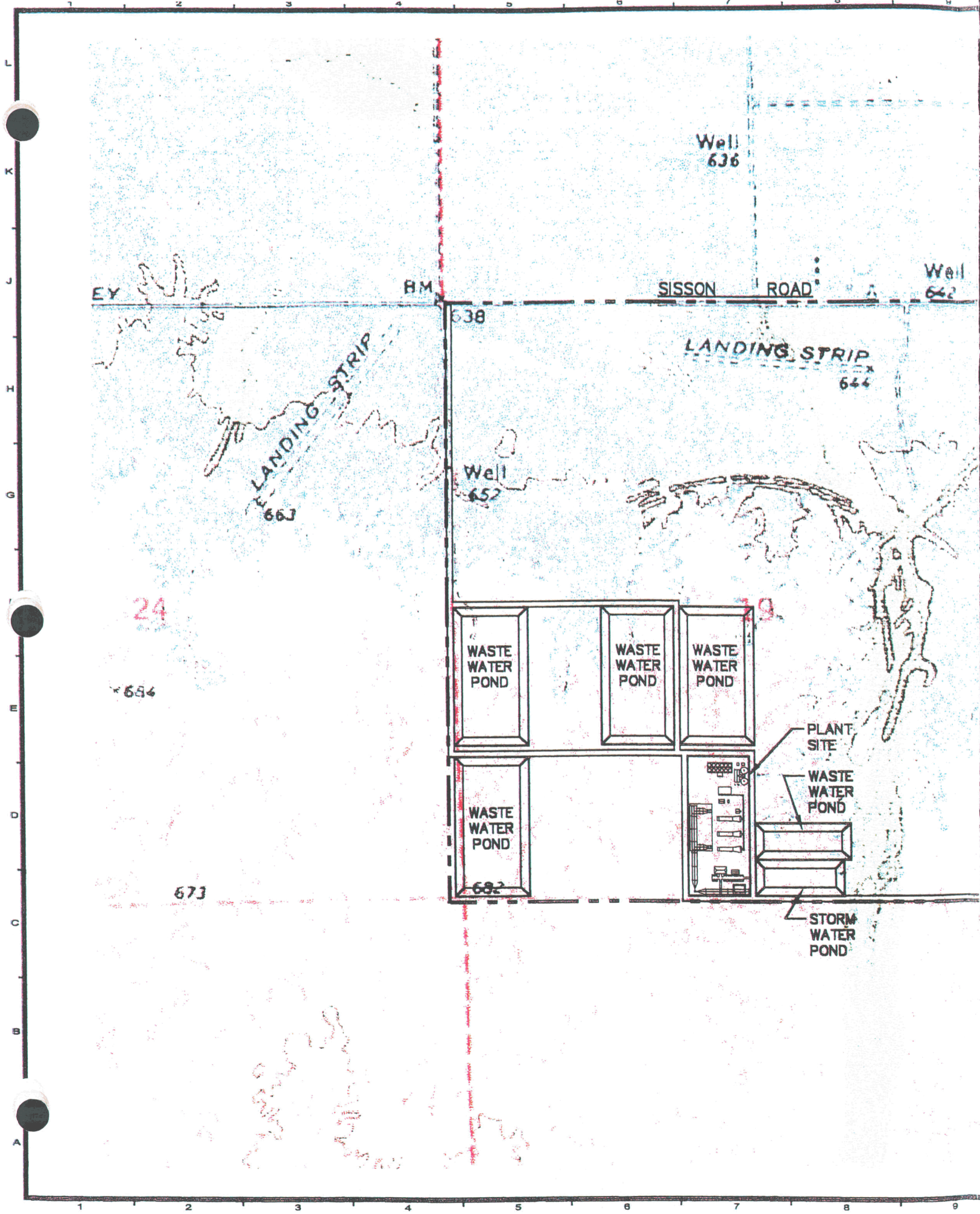
1.2 PROJECT DESCRIPTION

Power Development Enterprises, Inc. is proposing to construct a nominal 840-megawatt combined cycle electric power generation facility in Maricopa County, Arizona. The Facility will be located approximately 70 miles southwest of Phoenix in the town of Gila Bend, Arizona.

Upon completion, the Facility will consist of three combined cycle combustion turbine generators (CTG), three duct burners, three heat recovery steam generators (HRSG), one natural gas-fired auxiliary boiler, one emergency diesel generator, one diesel fire pump, cooling towers and ancillary equipment. The CTG's will be fired exclusively with natural gas.

1.3 APPLICATION FORMS

The applicable application forms are included at the end of this section.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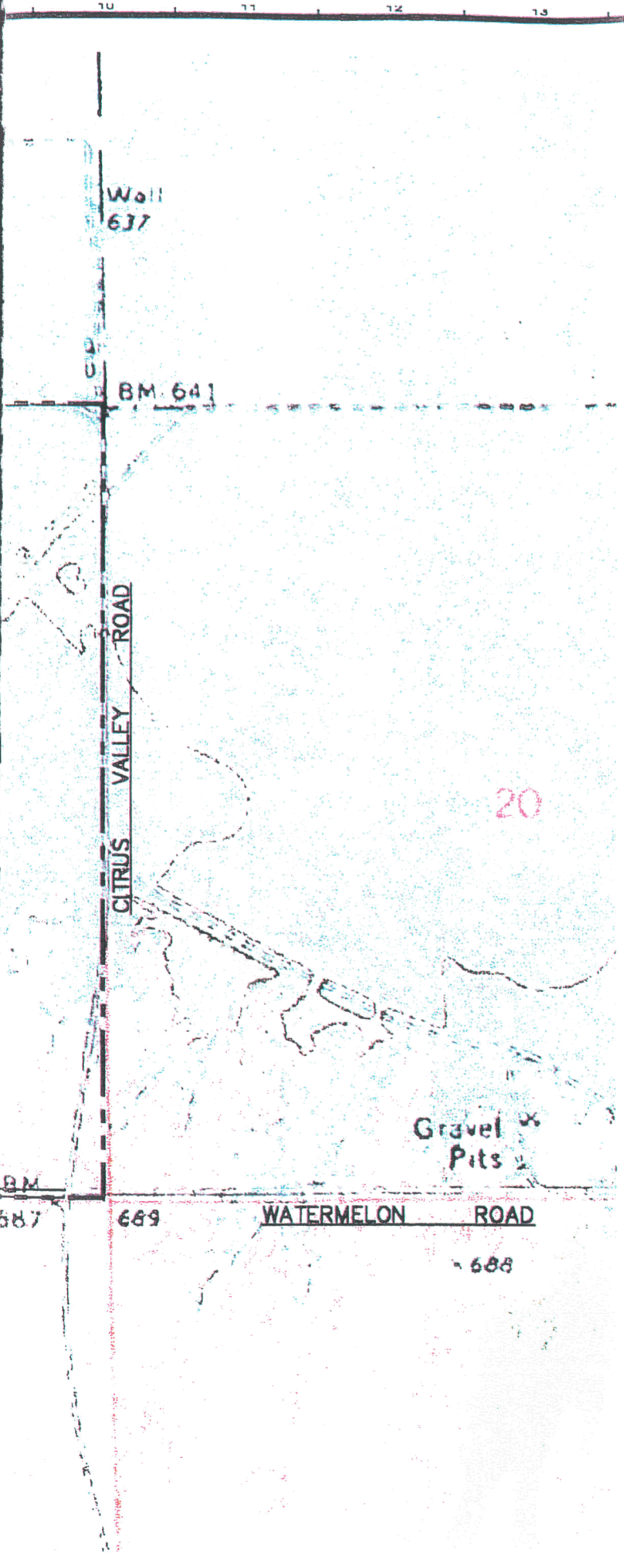
STORM WATER POND



INDUSTRIAL POWER TECHNOLOGY
2227 CAPRICORN WAY SUITE 101
SANTA ROSA, CALIFORNIA 95407
TEL: 707-528-8900/FAX: 707-528-8901

No.	Revisions	Date

GILA BEND POWER PROJECT

PRELIMINARY PROJECT CONFIGURATION

TS	SS	RW
DESIGN	DRAWN	ENG.

Job Number: 147100
Date: 8/30/00

Sheet Number

Figure 1-1

1 of 1 sheets

20000830.101617

COMPANY NAME & LOCATION **Power Development Enterprises, Inc. - Gila Bend Power Generation Station, 35400 West Sisson Road, Gila Bend, AZ 85337**

EMISSION SOURCES

Date 08/04/00

Estimated "Potential to Emit" as per Rule 100

Review of applications and issuance of permits will be expedited by supplying all necessary information on this Table.

REGULATED AIR POLLUTANT DATA					EMISSION POINT DISCHARGE PARAMETERS										
EMISSION POINT (1)		CHEMICAL COMPOSITION OF TOTAL STREAM	R. AIR POLLUTANT EMISSION RATE		UTM COORDINATES OF EMISSION PT. (5)			STACK SOURCES (6)					NONPOINT SOURCES (7)	
NUMBER	NAME	REGULATED AIR POLLUTANT NAME (2)	#/ hr. (3)	TONS/ YEAR (4)	ZONE	EAST (Mtrs)	NORTH (Mtrs)	HEIGHT ABOVE GROUND (feet)	HEIGHT ABOVE STRUC. (feet)	EXIT DATA DIA. (ft.)	EXIT DATA VEL. (fps.)	EXIT DATA TEMP. (°F)	LENGTH (ft.)	WIDTH (ft.)
1	CTG1	Nox	24.700			330500	3649546	165	105	18	70	188		
2	CTG2 (same emission rate)	CO	69.600			330500	3649500	165	105	18	70	188		
3	CTG3 (same emission rate)	SO2	4.820			330500	3649454	165	105	18	70	188		
		VOC	10.800											
		PM10	32.660											
		PM	32.660											
		1-3 Butadiene		0.003										
		Acetaldehyde		0.393										
		Acrolein		0.047										
		Benzene		0.091										

GROUND ELEVATION OF FACILITY ABOVE MEAN SEA LEVEL 676 feet

ADEQ STANDARD CONDITIONS ARE 293K AND 101.3 KILOPASCALS (A.A.C. R18-2-101)

GENERAL INSTRUCTIONS:

1. Indentify each emission point with a unique number for this plant site, consistent with emission point identification used on plot plan, previous permits, and Emissions Inventory Questionnaire. Include fugitive emissions. Limit emission point number to eight (8) character spaces. For each emission point use as many lines as necessary to list regulated air pollutant data. Typical emission point names are: heater, vent, boiler, tank, reactor, separator, beghouse, fugitive, etc. Abbreviations are O.K.
2. Components to be listed include regulated air pollutants as defined in R18-2-101. Examples of typical component names are: Carbon Monoxide (CO), Nitrogen Oxides (NO_x), Sulfur Dioxide (SO_2), Volatile Organic Compounds (VOC), particulate matter (PM), particulate less than 10 microns (PM_{10}), etc. Abbreviations are O.K.
3. Pounds per hour (#/HR) is maximum potential emission rate expected by applicant.
4. Tons per year is annual maximum potential emission expected by applicant, which takes into account process operating schedule.
5. As a minimum applicant shall furnish a facility plot plan as described in the filing instructions. UTM coordinates are required only if the source is a major source or is required to perform refined modeling for the purposes of demonstrating compliance with ambient air quality guidelines.
6. Supply additional information as follows if appropriate:
   (a) Stack exit configuration other than a round vertical stack. Show lenght and width for a rectangular stack. Indicate if horizontal discharge with a note.
   (b) Stack's height above supporting or adjacent structures if structure is within 3 "stack height above the ground" of stack.
7. Dimensions of nonpoint sources as defined in R18-2-101.

COMPANY NAME & LOCATION **Power Development Enterprises, Inc. - Gila Bend Power Generation Station, 35400 West Sisson Road, Gila Bend, AZ 85337**

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1	CTG1	Dichlorobenzene		0.002		330500	3649546	165		18	70.0	188		
2	CTG2 (same emission rate)	Ethylbenzene		0.234		330500	3649500	165		18	70	188		
3	CTG3 (same emission rate)	Formaldehyde		5.311		330500	3649454	165		18	70	188		
		Hexane		2.751										
		Naphthalene		0.011										
		PAHs		0.016										
		Propylenen Oxide		0.212										
		Toluene		0.96										
		Xylenes		0.468										

GROUND ELEVATION OF FACILITY ABOVE MEAN SEA LEVEL 678 feet

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4	Auxiliary Boiler	Nox	3.110			330491	3649569	95	75	2	35.0	450		
		CO	3.950											
		SO2	0.030											
		VOC	0.420											
		PM10	0.260											
		PM	0.260											
		Formaldehyde		0.008										
		Hexane		0.201										
5	Cooling Tower	PM10	0.47			330468	3649691	50	0	30	30	70		
6	Cooling Tower	PM10	0.47			330457	3649691	50	0	30	30	70		

GROUND ELEVATION OF FACILITY ABOVE MEAN SEA LEVEL 678 feet
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7	Cooling Tower	PM10	0.470			330446	3649691	50	0	30	30	70		
8	Cooling Tower	PM10	0.470			330435	3649691	50	0	30	30	70		
9	Cooling Tower	PM10	0.470			330424	3649691	50	0	30	30	70		
10	Cooling Tower	PM10	0.470			330413	3649691	50	0	30	30	70		
11	Cooling Tower	PM10	0.470			330468	3649707	50	0	30	30	70		
12	Cooling Tower	PM10	0.470			330457	3649707	50	0	30	30	70		
13	Cooling Tower	PM10	0.470			330446	3649707	50	0	30	30	70		
14	Cooling Tower	PM10	0.470			330435	3649707	50	0	30	30	70		
15	Cooling Tower	PM10	0.470			330424	3649707	50	0	30	30	70		
16	Cooling Tower	PM10	0.470			330413	3649707	50	0	30	30	70		

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										DIA. (ft.)	VEL. (fps.)	TEMP. (°F)		
17	Diesel Generator	NOx	15.500			330454	3649592	8	2	0.5	130	792		
		CO	3.340											
		SO2	1.030											
		VOC	1.240											
		PM10	1.100											
18	Diesel Fire Pump	NOx	12.400			330500	3649638	8	2	0.5	65	792		
		CO	2.670											
		SO2	0.820											
		VOC	0.990											
		PM10	0.880											

GROUND ELEVATION OF FACILITY ABOVE MEAN SEA LEVEL 678 feet
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7. Dimensions of nonpoint sources as defined in R18-2-101.

2.1 SOURCE DESIGNATION

The Facility is a new major source of air pollutant because it is a categorical source and emits more than 100 tons per year of criteria pollutants. The Facility will utilize combined cycle gas turbines of more than 250 million BTU per hour rated heat input, which is a category source. In addition, emissions from the Facility will be more than 100 tons per year for NOx, CO and PM10.

2.2 AREA CLASSIFICATIONS

The proposed location of the Facility is currently in an attainment area for all criteria pollutants.

2.3 BASELINE DATES

2.3.1 Major Source Baseline Date

Major source baseline date for PM_{10}, SO2 and NO2 are listed in Table 2-1.

2.3.2 Trigger Date

Trigger date for PM_{10}, SO2 and NO2 are listed in Table 2-1.

2.3.3 Minor Source Baseline Date

Minor source baseline date for PM, SO2 and NO2 are listed in Table 2-1.

TABLE 2-1 BASELINE DATES			
Pollutants	**Major Source Baseline Date**	**Trigger Date**	**Minor Source Baseline Date**
PM_{10}	**1/6/1975**	**8/7/1977**	**3/3/1980**
SO2	**1/6/1975**	**8/7/1977**	**3/3/1980**
NO2	**2/8/1988**	**2/8/1988**	**1/20/1993**

2.4 BASELINE AREA

The baseline area for the Facility is the Maricopa County Air Quality District.

2.5 INCREMENT CONSUMPTION AND EXPANSION

The PSD increment consumption has begun as the applicable baseline date has already been set. The amount of PSD increment that has been consumed in a PSD area is determined from the emissions increases and decreases which have occurred from sources since the applicable baseline date.

3.1 PRE-APPLICATION AIR QUALITY MONITORING

Based on the significance modeling, the maximum ground-level concentrations will be compared to the PSD *de minimis* monitoring concentrations (pre-application air quality monitoring exemption levels) listed in Table 3-1. If the significance modeling indicates that the resulting concentrations from the proposed emission increase are below the PSD *de minimis* monitoring level, then a waiver from pre-application air quality monitoring will be requested.

TABLE 3-1
PSD *DE MINIMIS* MONITORING LEVELS

Pollutant	Averaging Period	De Minimis Monitoring Concentration (ug/m^3)
SO_2	24-hour	13
PM_{10}	24-hour	10
TSP	24-hour	10
NO2	Annual	14
CO	8-hour	575

3.2 POST-CONSTRUCTION AIR QUALITY MONITORING

The Air Quality Division of the Maricopa County Environmental Services Department may require post-construction monitoring after the PSD application has been thoroughly reviewed. The post-construction monitoring may be required if there is a valid reason, such as (1) when the NAAQS are

threatened, and (2) when there are uncertainties in the databases for modeling.

3.3 METEOROLOGICAL MONITORING

Meteorological data needed for model input as part of the air quality analysis will not be site specific data from on-site monitoring. The meteorological data, which is representative of the atmospheric dispersion and climatological conditions at the Facility site, will be from a nearby meteorological station (Pacificorp Station).

3.4 BACKGROUND CONCENTRATION

It is anticipated that results from the modeling analysis will be below the PSD significance levels for all pollutants, therefore a NAAQS analysis will most likely not be required. However, if a NAAQS analysis is required, Malcolm Pirnie will coordinate with Maricopa County to designate appropriate background concentrations for the analysis.

4.1 SOURCE EMISSIONS INVENTORY

A summary of the emission estimates for the pollutants for which modeling will be performed is presented in Table A-5. The modeling analysis will include an assessment of emissions from the three combustion turbines with heat recovery steam generators while firing three duct burners, three cooling towers and the auxiliary boiler. Other facility emission units including the emergency diesel generator, and diesel fire pump will be included in the modeling analysis for short-term averaging periods (1-hour, 3-hour, and 8-hour) based on their typical operating schedules.

The diesel emergency generator and diesel fire pump will be used on a limited basis in emergency situations. Limited testing of this equipment will also occur periodically.

4.1.1 THE NAAQS INVENTORY

The NAAQS Inventory will be conducted if the Facility's impacts exceed the EPA significant impact levels; thereby requiring a full impact analysis. This inventory will include all nearby sources within a distance from the Facility equal to the Significant Impact Area (SIA) plus 50 kilometers. The sources will be modeled as part of the NAAQS full impact analysis. Once the impact area(s) is determined, Malcolm Pirnie will coordinate with Maricopa County to determine which emissions inventories from stationary sources within the area will be used.

4.1.2 THE INCREMENT INVENTORY

The PSD increment inventory will be prepared if the Facility impacts exceed the EPA significant impact levels; thereby requiring a full impact analysis. The increment inventory will include all PSD sources and any increment-affecting sources within a calculated distance from the Facility equal to the SIA plus 50 kilometers. Malcolm Pirnie will work with Maricopa County to determine which stationary sources to include in the increment inventory for the multi-source analysis.

4.1.3. NONCRITERIA POLLUTANTS INVENTORY

Noncriteria air pollutant emissions data are provided in Table A-2.

APPENDIX TABLE A-1
EMISSIONS SUMMARY TABLE

GILA BEND POWER GENERATION PROJECT
GILA BEND, ARIZONA

(All emissions based on data obtained by Industrial Power Technology, unless otherwise noted)

Parameters	Single Combustion Turbine								Auxiliary Boiler	Diesel Generator	Diesel Fire Pump	Cooling Towers
Load Condition	Base - 100%			Base - 100%			75%		105%	100%	100%	
Duct Firing	Off	Off	Off	On	On	On	Off	Off	–	–	–	–
Ambient Temperature, F	13	66.3	121	13	66.3	121	13	66.3				
Fuel Type	Natural Gas									Diesel Fuel		
Power Output, kW	181,200	170,600	166,506	181,200	170,600	166,506	135,900	121,200	–	500kW	400 BHP	
Heat Input, (LHV) MMBtu/hr	1,546	1,579	1,671	1,874	1,912	2,027	1,346	1,234	26	5.6	3	
Operating Time, hrs/yr	8,760								8,760	500		8,760
Emissions:												
NOx, ppm	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0				
NOx, lb/MMBtu	0.0129	0.012	0.0111	0.0132	0.0121	0.0111	0.0123	0.0122	0.12	–	–	
Total NOx as NO2, lb/hr	20.0	19.0	18.5	24.7	23.1	22.6	16.5	15.0	3.11	15.5	12.4	
Total NOx as NO2, TPY	87.6	83.2	81.0	108.2	101.1	98.9	72.3	65.7	13.62	3.88	3.1	
CO, lb/MMBtu	0.0328	0.0301	0.0278	0.0373	0.0343	0.0316	0.0301	0.304	0.152	–	–	
Total CO, lb/hr	50.7	47.6	46.5	69.8	65.6	64.0	40.5	37.6	3.95	3.34	2.67	
Total CO, TPY	222.1	208.3	203.5	305.8	287.1	280.5	177.2	164.5	17.3	0.83	0.67	
SO2, lb/MMBtu	0.0026	0.0023	0.0022	0.0026	0.0024	0.0022	0.0023	0.0024	0.001	–	–	–
Total SO2, lb/hr	4.00	3.70	3.65	4.82	4.52	4.41	3.15	2.9	0.03	1.03	0.82	
Total SO2, TPY	17.3	16.2	16	21.1	19.8	19.3	13.8	12.7	0.13	0.26	0.21	
VOC, ppm (methane)	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4				
VOC, lb/MMBtu	0.0019	0.0018	0.0016	0.0058	0.0053	0.0049	0.0017	0.0018	0.016	–	–	
Total VOC, lb/hr	2.9	2.8	2.7	10.8	10.2	10.0	2.3	2.2	0.42	1.24	0.99	
Total VOC, TPY	12.8	12.1	11.9	47.3	44.7	43.7	10.2	9.5	1.84	0.31	0.248	
TSP, lb/MMBtu	0.018	0.018	0.017	0.017428	0.017079	0.016113	0.021	0.023	0.0102			
TSP, lb/hr	28.00	28.00	28.00	32.66	32.66	32.66	28.00	28.00	0.26	1.1	0.88	11.14
% that is PM10	100%								100%	100%	100%	50%
Total PM10 Portion, lb/hr	28.00	28.00	28.00	32.66	32.66	32.66	28.00	28.00	0.26	1.1	0.88	5.57
TSP, TPY	122.6	122.6	122.6	143.1	143.1	143.1	122.6	122.6	1.16	0.28	0.22	48.8
PM10 Portion, TPY	122.6	122.6	122.6	143.1	143.1	143.1	122.6	122.6	1.16	0.28	0.22	24.4
Stack Parameters:												
Base Elevation, ft	678											
Site Pressure, psia	14.46											
Height, ft	165								95	–	–	50
Diameter, ft	18								2			30.3
Flow@Base Load, lb/hr	3,718,000	3,506,000	3,437,000	3,733,000	3,520,000	3,451,000	2,967,000	2,766,000	–			
Flow@Base Load, acfm	996,043	926,936	932,656	1,069,301	1,015,505	1,025,460	776,039	706,870	6,597			1,297,919
Exhaust Temp., F	216	205	221	188	191	209	200	183	450			70
Velocity, fps	65.2	60.7	61.1	70	66.5	67.2	50.8	46.3	35			30.0/cell

Note:

(1) Concentration reflects NOx emissions from SCR technology for the CT

(2) Emissions were calculated using drift to circulating water ratio of 0.003% and a TDS of 12,000 ppm. Also calculations are based on a single cooling tower per turbine with 4 cells per coooling tower.

(3) According to AP-42, Chapter 3, all PM emissions for uncontrolled natural gas combustion and diesel industrial engines are considered less than 1 micrometer, and therefore 100% is considered PM10.

(4) Combustion turbine particulate emissions take into account the backend emissions as referred to in the EPA Method 5 testing protocol for combustion turbines.

(5) Emissions are based on firing pipeline quality natural gas.

APPENDIX TABLE A-2
MAXIMUM HAZARDOUS AIR POLLUTANT (HAP) CALCULATIONS

GILA BEND POWER GENERATION PROJECT
GILA BEND, ARIZONA

				CT Generators (Total)	Duct Burners (Total)	Auxiliary Boiler	Diesel Emergency Generator	Diesel Fire Pump	Facility Total HAPs Emissions
Annual Operation				8,760 hrs/yr	8,760 hrs/yr	8,760 hrs/yr	500 hrs/yr		
Fuel Type				Natural Gas					
Heat Input (HHV)				1,671 MMBtu/hr	356 MMBtu/hr	26 MMBtu/hr	5.6 MMBtu/hr	3.0 MMBtu/hr	--
Number of Units				3	3	1	1	1	
HAPs Emitted	Emission Factors from Natural Gas-Fired Turbines (lb/MMBtu)	Emission Factors from Natural Gas Combustion (lb/MMBtu)	Diesel Engines Uncontrolled Emission Factors (lb/MMBtu)	Annual Emissions	Annual Emissions	Annual Emissions	Annual Emissions	Annual Emissions	Annual Emissions
				(TPY)	(TPY)	(TPY)	(TPY)	(TPY)	(TPY)
1,3-Butadiene	4.30E-07	--	3.91E-05	0.009	--	--	trace	trace	0.009
2-Methylnaphthalene	--	2.35E-08	--	--	Trace	Trace	--	--	0.000
Acetaldehyde	4.00E-05	--	7.67E-04	0.878	--	--	0.001	trace	0.879
Acrolein	6.40E-06	--	9.25E-05	0.141	--	--	trace	trace	0.141
Benzene	1.20E-05	2.06E-06	9.33E-04	0.263	0.010	Trace	0.001	trace	0.274
Dichlorobenzene	--	1.18E-06	--	--	0.006	Trace	--	--	0.006
Ethylbenzene	3.20E-05	--	--	0.703	--	--	--	--	0.703
Fluoranthene	--	2.94E-09	--	--	Trace	Trace	--	--	0.000
Fluorene	--	2.75E-09	--	--	Trace	Trace	--	--	0.000
Formaldehyde	7.10E-04	7.35E-05	1.18E-03	15.589	0.344	0.008	0.002	trace	15.943
Hexane	--	1.76E-03	--	--	8.255	0.201	--	--	8.456
Naphthalene	1.30E-06	5.98E-07	8.48E-05	0.029	0.003	Trace	trace	trace	0.031
PAHs	2.20E-06	--	--	0.048	--	--	--	--	0.048
Phenanathrene	--	1.67E-08	--	--	Trace	Trace	--	--	0.000
Propylene	--	--	2.58E-03	--	--	--	0.004	0.002	0.006
Propylene Oxide	2.90E-05	--	--	0.637	--	--	--	--	0.637
Pyrene	--	4.90E-09	--	--	Trace	Trace	--	--	0.000
Toluene	1.30E-04	3.33E-06	4.09E-04	2.854	0.016	Trace	0.001	trace	2.871
TMA	--	--	--	--	--	--	--	--	0.000
Xylenes	6.40E-05	--	2.85E-04	1.405	--	--	trace	trace	1.405
Total				22.557	8.632	0.209	0.008	0.002	31.409

Note:
(1) Emissions factors obtained from the 7/98 AP-42 for Natural Gas Combustion (External Combustion Sources)
(2) Only the significant emission factors were taken from the list of Speciated Organic Compounds.
(3) Emission factor is based on AP-42 Table 3.1-3, Emission Factors for Hazardous Air Pollutants From Natural Gas-Fired Stationary Gas Turbines. 4/2000

Calculation Equation:

Annual Emissions (tpy):
(Heat Input)(Emission Factor)(Hours of Operation)(No. of Units)(ton/2,000 lb)

APPENDIX TABLE A-5
Controlled Estimated
Maximum emission Data Set

GILA BEND POWER GENERATION PROJECT
GILA BEND, ARIZONA

(All emissions based on data obtained by Industrial Power Technology, unless otherwise noted)

Parameters	CTG (Per Unit)	Auxiliary Boiler	Diesel Generator	Diesel Fire Pump	Cooling Tower	Total Facility Annual Emissions
Load Condition	Base -100%	--	--	--	--	--
Duct Firing	On					
Ambient Temperature, F	13.00					
Fuel Type	Natural Gas		No. 2 Fuel Oil			
Power Output, kW	181,200		500 kW	400 BHP		
Heat Input, (LHV) MMBtu/hr	1,874	26	5.6	3		
Operating Time, hrs/yr	8,760	8,760	500		8760	
Emissions:						
NOx, ppm	3.00				--	--
NOx, lb/MMBtu	0.01	0.12				
Total NOx as NO2, lb/hr	24.70	3.11	15.5	12.4		
Total NOx as NO2, TPY	108.2	13.62	3.88	3.1		345.2
CO, lb/MMBtu	0.04	0.152				--
Total CO, lb/hr	69.82	3.95	3.34	2.67		
Total CO, TPY	305.8	17.3	0.83	0.67		938.3
SO2, lb/MMBtu	0.00	0.001				--
Total SO2, lb/hr	4.82	0.03	1.03	0.82		
Total SO2, TPY	21.1		0.26	0.21		63.8
VOC, ppm (methane)	1.40	0.13				--
VOC, lb/MMBtu	0.01	0.016				
Total VOC, lb/hr	10.80	0.42	1.24	0.99		
Total VOC, TPY	47.3	1.84	0.31	0.248		144.3
TSP, lb/MMBtu	0.02	0.0102				--
TSP, lb/hr	32.70	0.26	1.1	0.88	11.44	
% that is PM10	1.00	100%	100%	100%	50%	
Total PM10 Portion, lb/hr	32.70	0.26	1.1	0.88	5.57	
TSP, TPY	143.10	1.16	0.28	0.22	48.8	577.4
PM10 Portion, TPY	143.10	1.16	0.28	0.22	24.4	504.2
Stack Parameters:						
Base Elevation, ft	678.00					
Site Pressure, psia	14.46					
Height, ft	165.00	95	--	--	50	--
Diameter, ft	16.00	2			30.3	
Flow@Base Load, lb/hr	3,733,000.00	--			--	
Flow@Base Load, acfm	1,069,301.00	6,597			1,297,919	
Exhaust Temp., F	188.00	450			70	
Velocity, fps	70.00	35			30.0/cell	

Note:
(1) Emissions were calculated using drift to circulating water ratio of 0.003% and a TDS of 12,000 ppm.
(2) Total Emissions includes the total emissions for three turbines, three duct burners, three cooling towers, one auxiliary boiler, one diesel generator, and one diesel fire pump.

5.1 REGIONAL TOPOGRAPHY

The proposed facility is located in southwestern Arizona. The site elevation is approximately 670 feet (204 meters) above mean sea level (msl). A review of the United States Geological Survey (USGS) quadrangle map for the area indicates that terrain elevations vary from approximately 610 feet to 720 feet within a 3-kilometer radius of the site. The surrounding terrain at distances greater than 10 kilometers from the site consists of various mountain ranges including the Gila Bend Mountains to the north, the Maricopa Mountains to the northeast, the Sauceda and Sand Tank Mountains to the south, and the Painted Rock Mountains to the west.

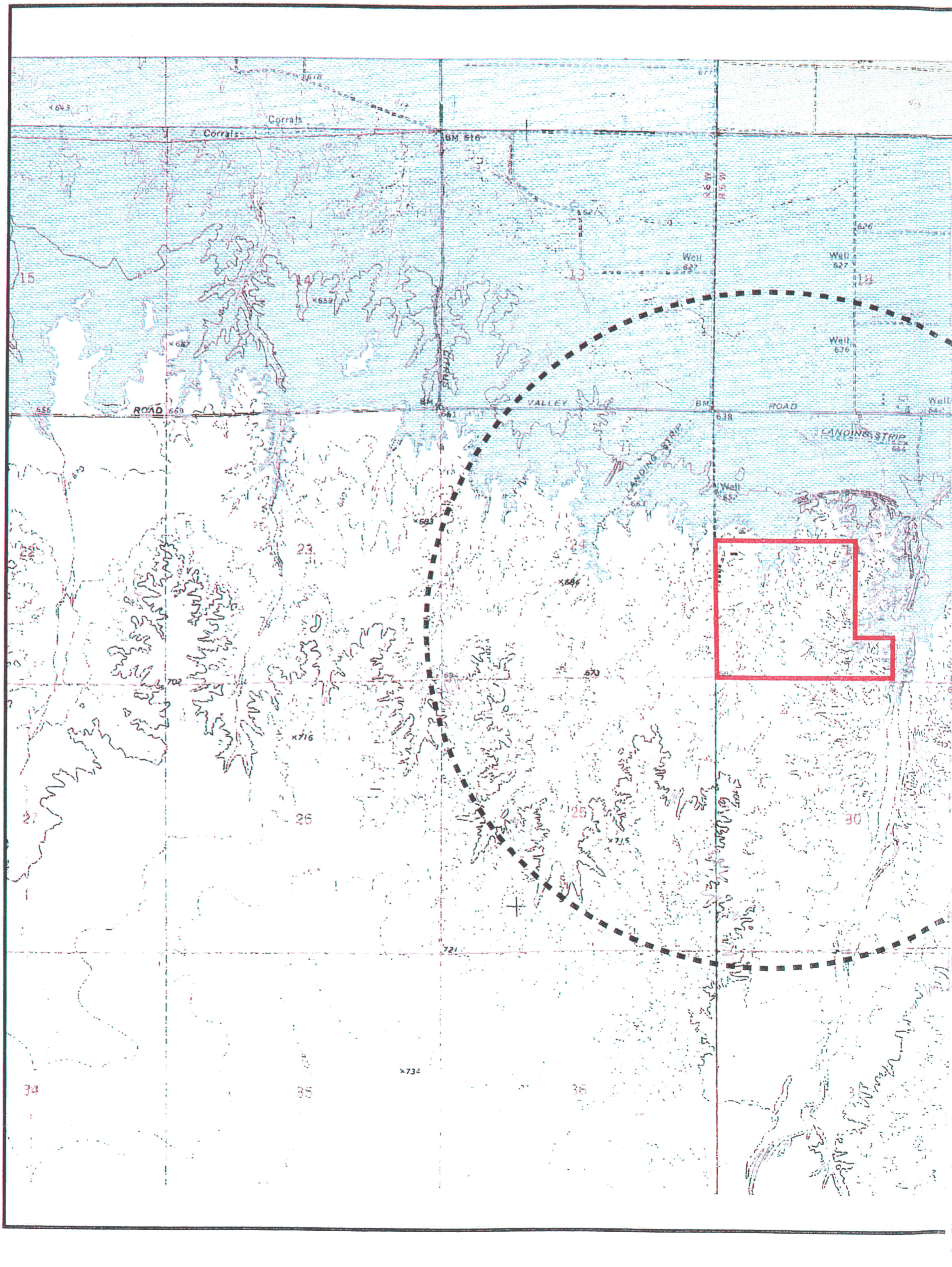
Two topographic maps showing areas 2 and 10 kilometers in radius surrounding the proposed site location are provided as Figure 5-1 and 5-2. These maps show applicable wilderness areas, Indian Reservations, and national monuments.

5.1.1 Simple Terrain

The terrain surrounding the proposed facility within a 3-kilometer radius is generally flat with isolated elevated terrain and depressions. The site elevation is approximately 670 feet above mean sea level (msl) and terrain elevations vary from approximately 610 feet to 720 feet within a 3-kilometer radius of the site. This indicates the presence of simple terrain in the general vicinity of the site.

5.1.2 Intermediate Terrain

Intermediate Terrain is discussed in Section 5.1.3 of this protocol.



Corrals
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ROAD
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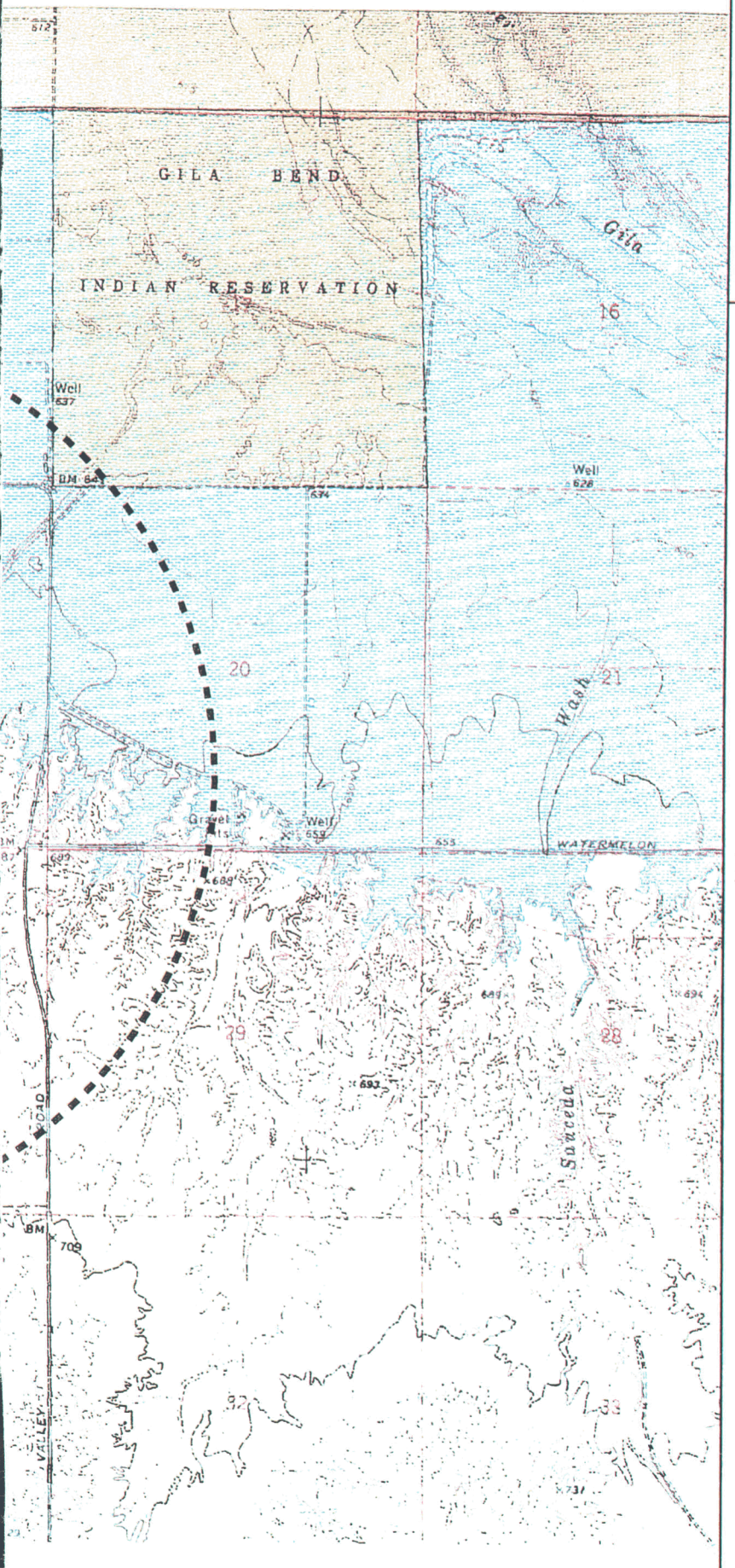
×734
721
702



Gila Bend
2km Radius Map
Figure 5-1

General Reference Features

- Minor Arterials
- Railroad
- Two Mile Radius
- Project Site Location

Land Status Ledgend

- Gila Bend Indian Reservation
- Lands subject to inundation
- Private Lands

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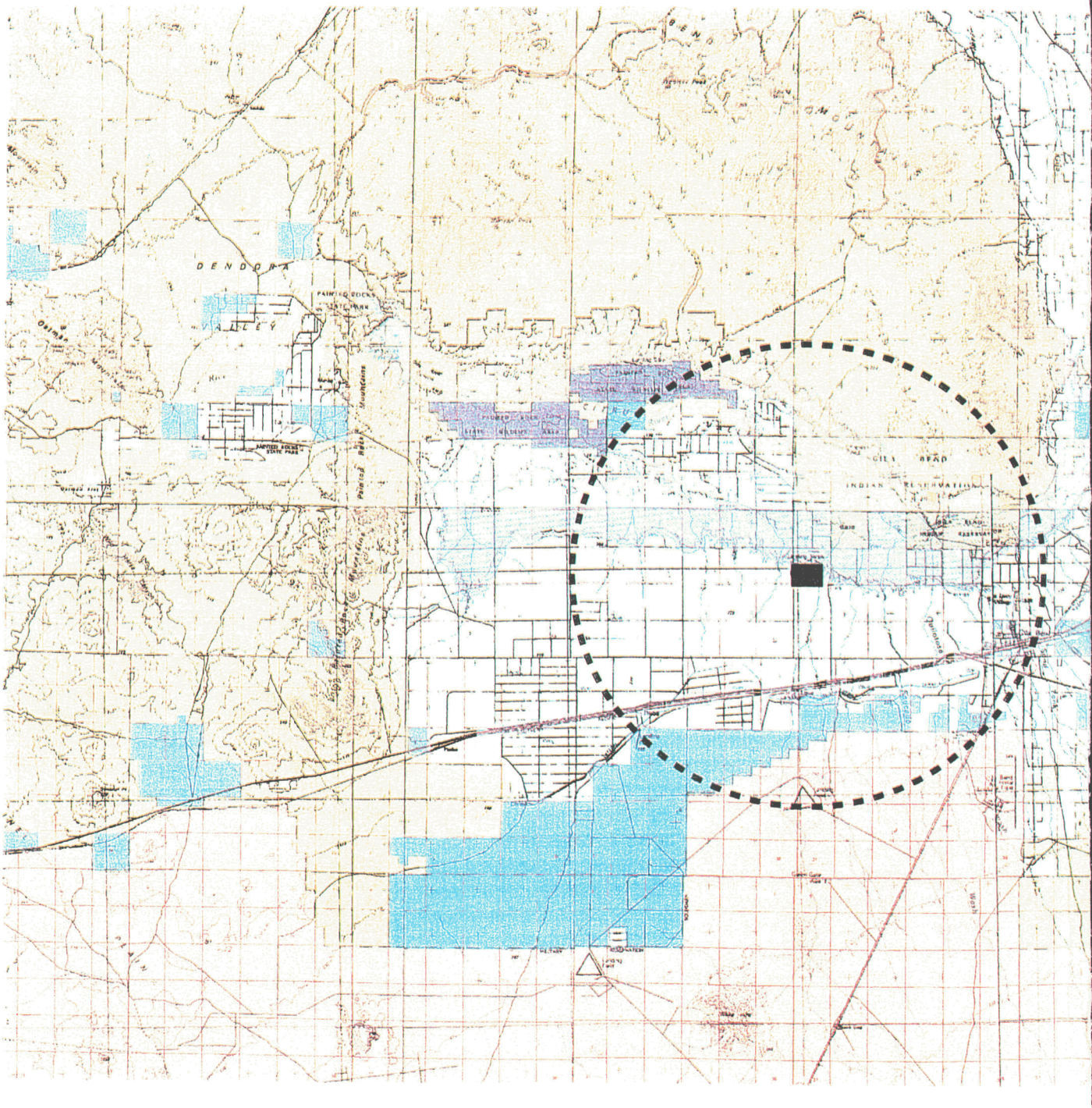
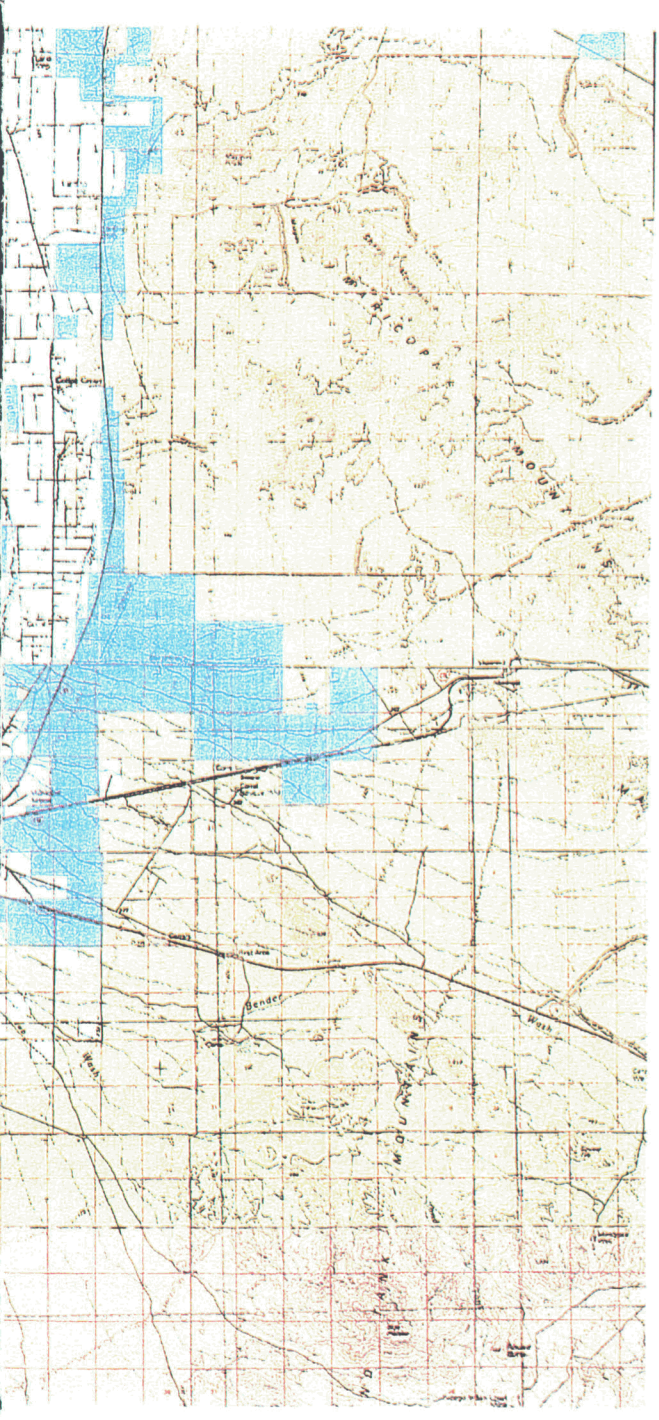
Miles

m:/3962001/reports/CEC Exhibits/Site Maps/2km radius.ai


DENDORA
VALLEY
PAINTED ROCKS
STATE PARK
PAINTED ROCKS
STATE PARK
GILA
INDIAN RESERVATION

Gila Bend
10km Radius Map
Figure 5-2



General Reference Features

- Major Arterials
- Minor Arterials
- Railroad
- Ten kilometer Radius
- Project Site Location

Land Status Ledgend

- Native Lands
- Private Lands
- State Lands
- Military Reservation
- State Wildlife Area

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m: 3962001 reports CEC Exhibits Site Maps 10km Radius.ai

5.1.3 Complex Terrain

Intermediate and complex terrain is present only at distances greater than 10 kilometers from the site. The ISCST3 modeling analysis will use the complex terrain model, COMPLEX1, to calculate ambient air concentrations in simple, intermediate, and complex terrain in accordance with EPA guidance.

5.2 REGIONAL CLIMATOLOGY

Climate for Gila Bend is typical for Southwestern Arizona, warm and dry. There are more than 300 days of sunshine and only 5.5 inches of rain per year. The average yearly high and low temperatures for the area are 90 °F and 55 °F degrees, respectively. Average yearly relative humidity is 32 %. Average yearly wind speed is 11 mph.

5.3 REGIONAL METEOROLOGY

5.3.1 Surface Meteorology

The ISCST3 model requires the use of hourly surface measurements of wind speed and direction, temperature, mixing heights, and stability in the RAMMET format. For the Gila Bend Power Generation Station site, surface data from Pacificorp Station will be used. This data consists of surface data collected at the Gila Bend Municipal Airport from 1994 - 1995, and upper air (mixing height) data collected at the National Weather Service (NWS) station in Tucson, Arizona from 1994-1995. The Pacificorp surface data was collected for a prospective permitting project. According to the Panda Gila

River PSD/Title V Application, the data were gathered in accordance with the U.S. Environmental Protection Agency *On-Site Meteorological Program Guidance for Regulatory Modeling Applications* (USEPA, 1993a). The meteorological tower was located approximately 7.8 miles east from the proposed Gila Bend Power Generation Station site.

5.3.1.1 Wind Speed and Wind Directions

Pacificorp windrose (1994-1995) showing wind speeds and directions are included at the end of this section. The general wind directions is from the west with the average wind speeds ranging from 2 to 3 meters per second.

5.3.1.2 Stability Class

The following table provides a stability class summary for the Pacificorp Station. The meteorological data for the two-year period indicate that stability class 4 (neutral stability) is the predominant stability class.

STABILITY CLASS SUMMARY – PACIFICORP STATION (1994-1995)

Stability Class *	1	2	3	4	5	6
Frequency, %	9	10	14	33	24	10

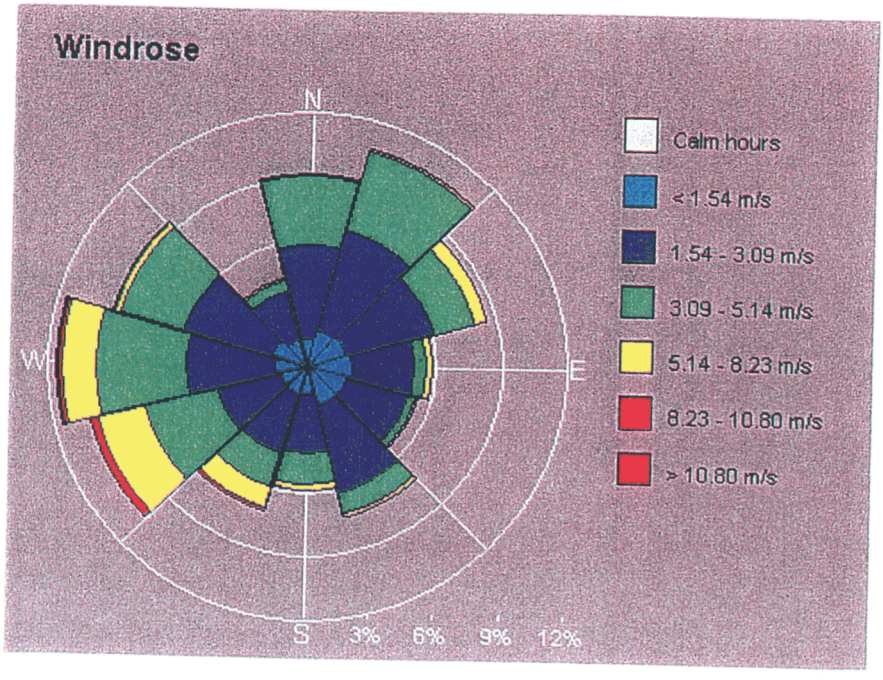
* Stability classes correspond to the following Pasquill-Gifford stability categories:

1 - A (extremely unstable)
2 - B (unstable)
3 - C (slightly unstable)
4 - D (neutral)
5 - E (slightly stable)
6 - F (stable)

5.3.1.3 Data Capture

According to the Panda Gila River PSD/Title V Application, the

Pacificorp Station Windrose (1994-1995)



Pacificorp surface meteorological data capture rate (1994-1995) is greater than 90 percent.

5.3.1.4 Treatment of Calms

The default, "calm wind processing", option will be used for treatment of calms. Section 6.2 (Model Input Defaults/Options) provides detailed information regarding calm wind processing.

5.3.2 Upper Air Data

The upper air (mixing height) data was collected at the NWS station in Tucson, Arizona from 1994 - 1995.

6.1 MODELING SELECTION

The USEPA Guideline on Air Quality Models describes appropriate models and techniques for use in regulatory applications. These models vary depending upon source types, receptor terrain elevations, and averaging times. Model selection is based upon consideration of each of these characteristics for a given project.

For this analysis, the modeling must determine impacts from multiple point sources in simple and complex terrain and for short-term and annual averaging periods. Therefore, the preferred model based on EPA guidance is the most recent version of the Industrial Source Complex model in the Short-Term mode, known as ISCST3 (version 00101).

6.1.1 Screen Modeling

This section is not applicable.

6.1.2 Refined Screen Modeling

The section is not applicable.

6.1.3 Refined Modeling

The ISCST3 model will be used.

6.2 MODEL INPUT DEFAULTS/OPTIONS

The ISCST3 model contains a number of user-specified options. Following USEPA guidance, the "regulatory default" switch will be selected,

which includes buoyancy-induced dispersion, final plume rise, the effects of stack-dip downwash, and calm wind processing. In addition, ISCST3 will employ different dispersion coefficients into the model depending on the land-use classification of the surrounding area. As described in Section 6.3, an analysis was performed which determined that the area around the site was rural; therefore, the rural dispersion coefficients will be selected in the model.

6.3 RURAL/URBAN CLASSIFICATION

6.3.1 Land Use Classification

The proposed plant site is located in a sparsely populated region in Gila Bend, Arizona. The land to the north of the property consists of abandoned agricultural fields and a landing strip. These former cotton fields are now overgrown with Salt Cedars. Native desert borders the property to the south and east. Entrance to the site is from the west on the bordering dirt road. The property across the dirt road is native desert.

6.3.2 Rural vs. Urban

An initial review of USGS topographic maps of the site indicate that the surrounding area is rural. However, for modeling purposes, a detailed land-use classification analysis (suggested by Irwin[1]) will be performed to

[1] J.S. Irwin, *Proposed criteria for Selection of Urban Versus Rural Dispersion Coefficients (Draft Staff Report)*. Meteorology and Assessment Division, U.S. Environmental Protection Agency, Research Triangle Park, North Carolina. Docket Number A-80-46, II-B-8 1978.

determine if the site is considered urban or rural. This criteria is outlined below:

- Classify the land use within a 3-km radius from the proposed facility using the meteorological land-use typing scheme proposed by Auer[2].
- If the land use Types I1, I2, C1, R2, and R3 account for 50 percent or more of the area located within 3 km of the source, the area should be considered urban for modeling purposes. Otherwise, the area should be considered rural.

6.4 RECEPTOR NETWORK

6.4.1 Coarse Receptors

The modeling analysis will be performed with a coarse Cartesian receptor grid extending from the center of the site, with 1-kilometer spacing. The extent of the grid will be based upon the distance to maximum impacts.

6.4.2 Medium Receptors

Although maximum impacts are not expected to occur near to the Facility, a medium Cartesian receptor grid will be modeled. The grid will extend approximately 1 kilometer from the edge of the site fenceline with 200-meter spacing.

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[2] August H. Auer, Jr. "*Correlation of Land Use and Cover with Meteorological*

6.4.3 Fine Receptors

The locations of maximum impacts will be further refined with smaller Cartesian receptor grids centered on the coarse grid or medium grid maximum impact receptor location. The refined receptor grids will extend a minimum of 1 kilometer out from the coarse or medium grid receptor points, at 100-meter spacing.

6.4.4 Tight Receptors

Tight receptors will not be used.

6.4.5 Discrete Receptors

Although maximum impacts are not expected to occur near to the Facility, discrete receptors will be placed along the Facility fenceline at approximately 50-meter spacing.

6.4.6 Class I Receptors

Class I Receptors will not be used since there are no Class I areas within 100 kilometers of the site.

6.4.7 Nonattainment Area Boundary Receptors

Nonattainment area boundary receptors will not be used.

6.5 RECEPTOR ELEVATIONS

Terrain heights for the course and medium grid receptors will be obtained from 1-minute USGS digital elevation maps (DEMs). Terrain

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Anomalies," Journal of Applied Meteorology. 17(5): 636-643 1978.

heights for the fine grid receptors and fenceline receptors will be obtained from 7.5-minute USGS DEMs.

6.6 SOURCE CHARACTERIAZATION

6.6.1 Point Sources

The proposed facility will have the potential to emit VOC, SO_2, NO_x, CO, and PM_{10} from three combustion turbines, three duct burners, auxiliary boiler, three cooling towers, emergency generator, and fire pump. The combustion turbines and duct burners will release emissions to the atmosphere through three separate exhaust stacks. The auxiliary boiler has a single exhaust stack. Each cooling tower has four exhaust stacks. Lastly, the emergency generator and fire pump each has a single exhaust stack.

For conservatism, "worst-case" stack parameters from a modeling perspective will be used to conduct the modeling analysis. To determine the worst case conditions of the combustion turbines, modeling will be performed for each of the operating loads with the respective emission rates and stack parameters. The operating load that generates the highest off-site impact will be used in subsequent analysis. If needed, this analysis will be performed for the duct burners, cooling towers and /or the auxiliary boiler.

6.6.2 Area Sources

This section is not applicable.

6.6.3 Volume Sources

This section is not applicable.

6.6.4 Line Sources

This section is not applicable.

6.6.5 Mobile Sources

This section is not applicable.

6.6.6 Open Pit/Pit Retention

This section is not applicable.

6.6.7 Dry Deposition

This section is not applicable.

6.7 SOURCE LOCATIONS AND PARAMETERS

Source locations and parameters, which includes UTM coordinates of emission points, base elevation, stack height, height above structure, diameters, velocity, temperature, are provided in the Emission Sources Sheets in Section 1 of this protocol.

6.8 BUILDING WAKE DOWNWASH AND GEP

The ISCST3 model has the ability to include the effects of building wakes on the dispersion of plumes released from facility stacks. A software package using USEPA Building Profile Input Program (BPIP), will be used to determine the potential effects of on-site and nearby structures. The program requires the input of the horizontal, lateral, and vertical extent of

each building, as well as, the source-specific parameters of facility stacks. These data will be used to calculate the predominant building dimensions associated with each emission source at wind directions of every 10 degrees. This output will be used by the ISCST3 model in determining downwash effects on the dispersion of plumes.

7.1 PRELIMINARY ANALYSIS

The preliminary analysis will model potential Facility emissions of SO_2, NO_x, CO and PM_{10}. The results of this preliminary analysis will be compared to Class II significant impact levels. If the impacts are below the levels, then no further analysis is required. If the impacts are above the levels, then a full impact analysis must be performed which includes emissions from the Facility, existing off-site sources and any secondary emissions associated with the Facility.

7.1.1 Preliminary Impact Determination

Facility impacts will be determined within a 50-kilometer radius around the site. If the results are below the significant impact levels than the analysis is complete, and a full impact analysis will not be required.

7.1.2 Sources Within Area of Impact

The modeling analysis will include an assessment of emissions from the three combustion turbines with heat recovery steam generators while firing three duct burners, three cooling towers and the auxiliary boiler. In addition, emergency diesel generator and diesel fire pump will be included in the modeling analysis for short-term averaging periods (1-hour, 3-hour, and 8-hour) based on their typical operating schedules.

Section 4.1 (Source Emissions Inventory) provides additional detailed information.

7.1.3 Sources Omitted

All of the major pieces of equipment are included in the modeling analysis. There are not any major pieces of equipment omitted from the source emissions.

7.1.4 Significant Impacts

Results from the preliminary analysis compared to significant ambient impact levels will provide the following information:

- If a full impact analysis is needed,
- Impact area for a full impact analysis is determined,
- If the ambient monitoring data requirement can be waived.

7.2 FULL IMPACT ANALYSIS

A full impact analysis is required for any pollutant for which the Facility's estimated pollutant concentrations exceed prescribed significant ambient impact levels. This analysis expands the preliminary analysis in that it considers emissions from the Facility, existing sources and any secondary emissions associated with the Facility. A full impact analysis is not expected for the Facility at this time.

7.2.1 The NAAQS Analysis

To be performed at a later date if a full impact analysis is required.

7.2.2 The Increment Analysis

To be performed at a later date if a full impact analysis is required.

7.2.3 AAAQG Pollutant Analysis

Since the combustion turbines will operate using natural gas, emissions of hazardous air pollutants (HAP) from the proposed facility are expected to be minimal. A breakdown of individual and total HAP emissions from the proposed facility will be provided in the PSD permit application submittal to Maricopa County. If emissions of any single HAP are above the major source threshold of 10 tons per year, then a HAP assessment will be conducted. As appropriate, modeling results will be compared with Arizona Ambient Air Quality Guidelines to evaluate compliance.

8.1 GROWTH ANALYSIS

Growth analysis for the Facility will be performed only if a full impact analysis is required by Maricopa County. Growth analysis estimates the secondary emissions, which is a projection of the associated industrial, commercial, and residential source growth that will occur within the area due to the Facility. This information is used in a full impact analysis.

8.2 SOILS AND VEGETATION ANALYSIS

Ambient concentrations of criteria pollutants below the secondary national ambient air quality standards will not result in harmful effects for most types of soils and vegetation. If the estimated concentrations exceed the secondary national ambient air quality standards, soils and vegetation analysis will be conducted.

8.3 VISIBILITY IMPAIRMENT ANALYSIS

In the visibility impairment analysis, the Facility is concerned with impacts that occur within the area affected by the estimated emissions. Components of a visibility impairment analysis are:

- a determination of the visual quality of the area;
- an initial screening of emission sources to assess the possibility of visibility impairment; and
- if warranted, a more in-depth analysis involving computer models.

8.3.1 Level One Screening

The level 1 visibility screening analysis is a series of conservative calculations designed to identify those emission sources that have an unlikely potential of adversely affecting visibility. The VISCEEN model is proposed for this first level screening analysis. Calculated values relating source emissions to visibility impacts are compared to a standardized screening value. Those sources with calculated values greater than the screening cirteria are said to have potential visibility impairments. If potential visibility impairments are indicated, then the Level 2 analysis is required.

8.3.2 Level Two Screening

Level two screening will be conducted only if required by Maricopa County.

8.3.3 Level Three Screening

Level three screening will be conducted only if required by Maricopa County.

8.4 CONCLUSIONS

Only a Level 1 visibility screening is proposed for additional impact analysis at this time. Level 2 and 3 screening will be conducted as they become required by Maricopa County.

There is not a plan to conduct growth analysis or soils and vegetation analysis. A growth analysis will be conducted if a full impact analysis

becomes necessary. A soils and vegetation analysis will be conducted if the estimated criteria pollutant concentrations exceed the secondary NAAQs.

SECTION 9.0

CLASS I IMPACT ANALYSIS

The PSD program provides for extra protection for pristine areas of the United States, such as national parks, forests, and wildlife refuges. These areas (Class I Areas) have lower ambient air quality thresholds with respect to significance levels and allowable impacts. A Class I Area impact analysis is conducted to predict ambient impacts at Class I Areas located near a proposed facility. Because there are no Class I Areas within 100 kilometers of the proposed Facility site, a Class I Area impact analysis will not be completed. However, the Federal Land Manager (FLM) may require that additional analyses be completed to address impacts at nearby Class II Wilderness Areas located within 50 kilometers of the site. If necessary, these analyses will be completed based on future discussions and negotiations with the FLM and Maricopa County.

MALCOLM PIRNIE

SECTION 10.0
REFERENCES

References were provided throughout this protocol.

SECTION 11.0
APPENDICES

A completed ADEQ Air Quality Permit Application – Refined Modeling Protocol Checklist is attached as an Appendix.

ADEQ Air Quality Permit Application – Refined Modeling Protocol Checklist

Is the Requirement Sufficiently Addressed? (✓ one)			Refined Modeling Protocol Comments (Headings and Chapters should be labeled as follows:)
Yes	No	N/A	
✓			Executive Summary
✓			ADEQ Completeness Checklist
			1.0 Introduction
✓			1.1 Site Description
✓			1.2 Project Description
✓			1.3 Application Forms
			2.0 Regulatory Status
✓			2.1 Source Designation
✓			2.2 Area Classifications
✓			2.3 Baseline Dates
✓			2.3.1 Major Source Baseline Date
✓			2.3.2 Trigger Date
✓			2.3.3 Minor Source Baseline Date
✓			2.4 Baseline Area
✓			2.5 Increment Consumption and Expansion
			3.0 Ambient Data Requirements
✓			3.1 Pre-Application Air Quality Monitoring
✓			3.2 Post-Construction Air Quality Monitoring
✓			3.3 Meteorological Monitoring
✓			3.4 Background Concentrations
			4.0 Emissions Inventory
✓			4.1 Source Emissions Inventory
✓			4.1.1 The NAASQ Inventory
✓			4.1.2 The Increment Inventory
✓			4.1.3 Noncriteria Pollutants Inventory

ADEQ Air Quality Permit Application – Refined Modeling Protocol Checklist

			5.0 Topography, Climatology and Meteorology
✓			5.1 Regional Topography
✓			5.1.1 Simple Terrain
✓			5.1.2 Intermediate Terrain
✓			5.1.3 Complex Terrain
✓			5.2 Regional Climatology
✓			5.3 Regional Meteorology
✓			5.3.1 Surface Meteorology
✓			5.3.1.1 Wind Speed and wind Direction
✓			5.3.1.2 Stability Class
✓			5.3.1.3 Data Capture
✓			5.3.1.4 Treatment of Calms
✓			5.3.2 Upper Air Data
			6.0 Modeling Analysis Design
✓			6.1 Modeling Selection
		✓	6.1.1 Screen Modeling
✓			6.1.2 Refined Screen Modeling
		✓	6.1.3 Refined Modeling
✓			6.2 Model Input Defaults/Options
✓			6.3 Rural/Urban Classification
✓			6.3.1 Land Use Classification
✓			6.3.2 Rural Vs Urban
✓			6.4 Receptor Network
✓			6.4.1 Coarse Receptors
		✓	6.4.2 Medium Receptors
✓			6.4.3 Fine Receptors
		✓	6.4.4 Tight Receptors
✓			6.4.5 Discrete Receptors

ADEQ Air Quality Permit Application – Refined Modeling Protocol Checklist

		✓	6.4.6 Class I Receptors
		✓	6.4.7 Nonattainment Area Boundary Receptors
✓			6.5 Receptor Elevations
✓			6.6 Source Characterization
✓			6.6.1 Point Sources
		✓	6.6.2 Area Sources
		✓	6.6.3 Volume Sources
		✓	6.6.4 Line Sources
		✓	6.6.5 Mobile Sources
		✓	6.6.6 Open Pit/Pit Retention
		✓	6.6.7 Dry Deposition
✓			6.7 Source Locations and Parameters
✓			6.8 Building Wake Downwash and GEP
			7.0 Dispersion Modeling Impact Analysis
✓			7.1 Preliminary Analysis
✓			7.1.1 Preliminary Impact Determination
✓			7.1.2 Sources Within Area of Impact
✓			7.1.3 Sources Omitted
✓			7.1.4 Significant Impacts
✓			7.2 Full Impact Analysis
✓			7.2.1 The NAAQS Analysis
✓			7.2.2 The Increment Analysis
✓			7.2.3 AAAQG Pollutant Analysis
			8.0 Additional Impact Analysis
✓			8.1 Growth Analysis
✓			8.2 Soils and Vegetation Analysis
✓			8.3 Visibility Impairment Analysis
✓			8.3.1 Level One Screening

ADEQ Air Quality Permit Application – Refined Modeling Protocol Checklist

✓			8.3.2 Level Two Screening
✓			8.3.3 Level Three Screening
✓			8.4 Conclusions
			9.0 Class I Impact Analysis
		✓	9.1 Class I Increments
		✓	9.2 Air Quality Related Values
		✓	9.2.1 Flora and Fauna
		✓	9.2.2 Water
		✓	9.2.3 Acid Deposition
		✓	9.3 Visibility Impact Analysis
✓			10.0 References
✓			11.0 Appendices
		✓	Minutes from pre-application meetings
		✓	Copies of all correspondence

2.17 AMBIENT AIR QUALITY ANALYSIS

This section contains a new ambient air quality analysis as a result of equipment changes and modification to equipment locations. In addition, this section contains computer output for the visibility impact modeling analysis. This section supersedes the Reference 7 materials in the Application.

7.1 INTRODUCTION

As a proposed new major source of air pollution to be located in an attainment area, the proposed Gila Bend Power Generation Station (GBPGS) is subject to the Prevention of Significant Deterioration (PSD) regulations prescribed under 40 CFR Part 52.21. As part of the permitting process, the PSD regulations require an assessment of the ambient air quality impacts resulting from the proposed facility's operations. To address these requirements, an air quality analysis has been completed and is described in the sections below.

The proposed GBPGS will be located approximately 70 miles southwest of Phoenix in the town of Gila Bend, Arizona. This area is currently in attainment with all established National Ambient Air Quality Standards (NAAQS). The pollutants emitted by the facility subject to review under the PSD regulations, and for which NAAQS have been established, are nitrogen dioxide (NO_2), carbon monoxide (CO), sulfur dioxide (SO_2), and particulate matter (PM_{10}). Therefore, an air quality analysis was performed for each of these pollutants. Additionally, an analysis was performed for emissions of formaldehyde (HCHO) from the proposed facility to evaluate compliance with Arizona Ambient Air Quality Guidelines (AAAQGs).

A revised modeling protocol dated August 4, 2000 was submitted and approved by the Maricopa County Environmental Services Department, Air Quality Division on September 6, 2000. The revised modeling protocol, as presented in Reference 6 of this Application Addendum No. 1, was developed to outline dispersion modeling procedures in accordance with the Guideline on Air Quality Models (40 CFR 51, Appendix W) and the New Source Review Workshop Manual (USEPA, 1990).

The New Source Review Workshop Manual (USEPA, 1990) describes two levels of modeling analyses required for NSR/PSD applicants: preliminary and

refined. The preliminary analysis (or significance analysis) is conducted to estimate impacts on ambient air quality from the proposed source alone. Results from the preliminary analysis are used to determine if a refined (full impact) analysis is necessary and to then define the significant impact region for the full impact analysis. A full impact analysis is performed for each pollutant that exceeds its PSD significant impact level. The full impact analysis is more complex than the preliminary analysis because it considers the combined impact due to emissions from the proposed source, existing sources in the impact area, and growth (industrial, residential, and commercial) that accompanies the new source.

7.2 CLASS II AREA ANALYSIS

The sections presented below describe the methodology used and summarize the results obtained from the Class II area modeling analysis completed for the proposed GBPGS.

7.2.1 Model Selection

The EPA Guideline on Air Quality Models describes appropriate models and techniques for use in regulatory applications depending upon source types, receptor elevations, and building downwash potential and averaging times. Model selection should be based upon consideration of each of these characteristics for a given project. For the GBPGS, the modeling addresses impacts from point sources in simple and complex terrain and for short-term and annual averaging periods. Therefore, the Industrial Source Complex model in the short-term mode, known as ISCST3 (version 00101) was used as recommended by EPA.

The ISCST3 model requires four basis types of input data including source data, meteorological data, receptor data, and model options. Each type of input data used in the modeling effort is described in the sections below.

7.2.2 Source Data

The GBPGS will consist of three-combined cycle combustion turbine generators (CTGs) with duct burners, one cooling tower, and one auxiliary boiler. The combustion turbine generators, the duct burners, and the auxiliary boiler will be fired exclusively with natural gas. Other emission sources planned for use at the facility include one emergency diesel generator and one diesel fire pump. The emergency diesel generator and diesel fire pump were not included in the modeling analysis since they will be used on a limited basis in emergency situations. A site plan showing the layout of the proposed equipment at the site is presented in Section 1.0 of this Application Addendum No. 1 in Figure 1-2.

The proposed GBPGS will have the potential to emit various criteria air pollutants including NO_x, CO, SO_2, PM_{10}, and also smaller quantities of hazardous air pollutants (HAPs). For purposes of comparison to the PSD significance level and for conservatism, NO_x emissions from the turbines are assumed to convert entirely to NO_2 in the atmosphere. Modeling was performed for each of the four criteria pollutants to identify the maximum predicted concentrations for comparison with established significant impact levels. Also, since potential emissions of formaldehyde from the proposed facility will exceed major HAP source levels (10 tons per year), a modeling analysis was completed to evaluate facility compliance with established AAAQGs for formaldehyde.

Table 7-1 summarizes the source data used for the modeling analysis including stack parameters and emission rates. The stack parameters and emission rates used represent conservative, "worst-case" values from a modeling

TABLE 7-1

MODELING INPUT DATA

GILA BEND POWER GENERATION STATION
GILA BEND, ARIZONA

Stack Parameters & Emission Rates	Combustion Turbine (3 units) NOx, CO, SO2	Combustion Turbine (3 units) PM10	Combustion Turbine (3 units) HCHO	Cooling Tower (1 unit, 12 cells)	Auxiliary Boiler (1 unit)
Stack Height, ft	165	165	165	50	95
Stack Diameter, ft	18	18	18	30	2
Temperature (deg. F)	188	183	209[1] 183[2]	70	450
Exit Velocity (ft/s)	70	46.3	67.2[1] 46.3[2]	30	35

	Emission Rates Per Unit (lb/hr)		
Pollutant	Combustion Turbine (3 units)	Cooling Towers (1 unit, 12 cells)	Auxiliary Boiler (1 unit)
CO	69.8	NA	3.95
NO_x	24.7	NA	3.11
SO_2	4.8	NA	0.03
PM_{10}	28	2.07	0.26
HCHO	1.2[1] 0.88[2]	NA	0.002

Notes:
1. "Worst-case" formaldehyde stack temperature, stack exit velocity, and emission rate for the 1-hour significance analysis.
2. "Worst-case" formaldehyde stack temperature, stack exit velocity, and emission rate for the 24-hour and the annual significance analyses.

perspective considering all proposed operating load conditions. The stack parameters and emission rates for the "worst-case" condition are based on turbine performance values for different ambient air temperatures. A screening analysis was conducted to determine the "worst-case" load/temperature scenario using both years of meteorological data for each pollutant.

7.2.3 Meteorological Data

Based on guidance from the Department and USEPA Region IX, the meteorological data, which is representative of the atmospheric dispersion and climatological conditions at the facility site, is from a nearby meteorological station (Pacificorp station). This data consists of surface data collected at the Gila Bend Municipal Airport from 1994 -1995, and upper air (mixing height) data collected at the National Weather Service (NWS) Station in Tucson, Arizona from 1994 - 1995. According to the Panda Gila River PSD/Title V Application, the data were gathered in accordance with the U.S. Environmental Protection Agency *On Site Meteorological Program Guidance for Regulatory Modeling Applications* (USEPA 1993a). The meteorological tower was located approximately 7.8 miles east from the proposed Gila Bend Power Generation Site.

7.2.4 Receptor Data

Coarse, medium, and fine Cartesian receptor grids were used to complete the Class II area impact analysis. To define the receptor grid size, an initial analysis was performed using a coarse grid and a medium grid. The coarse grid extended out 20 kilometers in each direction from the proposed site location with receptor spacing of 1 kilometer. The medium grid extended out 3 kilometers in each direction from the proposed site location with receptor spacing of 200 meters. Terrain elevations were derived from 7.5-minute United States

Geological Survey (USGS) digital elevation models (DEMs) for Gila Bend, Smurr, Theba, Cotton Center, Citrus Valley East, and Citrus Valley West, Arizona. Two years of meteorological data from the Pacificorp station (Gila Bend Municipal Airport) was used in this analysis (as discussed above in Section 7.2.3). The results obtained from the initial analysis indicate that maximum impacts occur either at the facility's fenceline or within 10 kilometers from the site.

Based on results from the initial coarse grid and medium grid analysis and to ensure that the locations of maximum impacts were identified, fine grids (minigrids) were added to the model setup. The minigrids centered on coarse grid or medium grid maximum impact receptor locations. If the location of maximum impact was located in the coarse grid, the minigrid extended out 1 kilometer in each direction from the point of maximum impact. If the location of the maximum impact was located in the medium grid, the minigrid extended out 200 meters in each direction from the point of maximum impact. Receptor spacing of 100 meters was used for all minigrid receptors. Similar to the coarse grid and medium grid set-up, terrain elevations for the minigrid receptors were derived from 7.5-minute USGS DEMs for Gila Bend, Smurr, Theba, Cotton Center, Citrus Valley East, and Citrus Valley West, Arizona. In addition to the grids discussed above, discrete receptors were placed along the proposed facility's fenceline using 50-meter spacing. The terrain elevations for the fenceline receptors were also derived from the 7.5-minute USGS DEMs for Gila Bend, Smurr, Theba, Cotton Center, Citrys Valley East, and Citrus Valley West, Arizona.

The results from the coarse, medium, and fine grid analyses indicate that all maximum predicted impacts occur within 1.2-kilometers of the proposed site location with the exception of 1-hour impacts from CO and formaldehyde, and 3-hour impacts from SO_2. These impacts are predicted to occur at receptors located within 10 kilometers of the site.

7.2.5 Model Control Options/BPIP Analysis

The ISCST3 model contains certain user-specified options. Following USEPA guidance, the regulatory-default options were selected by not selecting the user-specified options. These default options include buoyancy-induced dispersion, final plume rise, the effects of stack-dip downwash, and calm wind processing. The switch for "missing data processing" was selected since site specific meteorological data was used which had some data missing. According to the Panda Gila River PSD/Title V Application, the Pacificorp surface meteorological data capture rate (1994-1995) is greater than 90 percent.

The proposed plant site (as shown in Section 1.0, Figure 1-1 of this Application Addendum No. 1) is located in Gila Bend, Arizona. This area in southwestern Arizona (70 miles southwest of Phoenix) is a sparsely populated rural area with fallow agricultural land covering the majority of the area in the vicinity of the site. Since the area around the proposed site is predominantly rural, the rural option was selected for the modeling.

The ISCST3 model also has the ability to include effects of building wakes on the dispersion of plumes released from exhaust stacks using the Building Profile Input Program (BPIP) (USEPA, 1993). BPIP incorporates building downwash guidance into a computer program that calculates building heights (BH) and projected building widths (PBW). When an emission source height is less than the Good Engineering Practice (GEP) stack height and the source is located within a region of building influence, direction-specific building dimensions are included in the modeling analysis for calculating wake and downwash concentrations. Since the proposed stack heights are below GEP stack heights, an analysis of building downwash and wake effects was conducted.

To determine whether potential building downwash effects might occur, the combustion turbines and other structures to be located at the site were evaluated. All structures of sufficient size (heights greater than or equal to 40 percent of the stack heights) were incorporated into the model. BPIP was utilized to determine the direction-specific downwash data, which were then included as part of the ISCST3 modeling.

7.2.6 Cavity Analysis

A cavity effect analysis was performed for the GBPGS using the EPA-approved SCREEN3 model. Dimensions of the on-site structures were input into the SCREEN3 model to obtain cavity heights and cavity distances. Then, emission stacks with heights below the predicted cavity heights and located within the cavity zones were identified and SCREEN3 was used to determine cavity effects for these stacks. Results from the cavity analysis indicate that cavity effects will not occur beyond the fenceline. Therefore, cavity effect concentration values were not considered in determining maximum impacts for the proposed facility.

7.2.7 Class II Area Analysis Results

A Class II area preliminary modeling analysis was completed to determine maximum facility impacts on ambient air quality for comparison with the established PSD significance levels. Coarse, medium, and fine grid model runs were executed to identify the maximum impacts for all pollutants and averaging periods considering two years of meteorological data.

Table 7-2 presents a summary of the maximum impacts for the GBPGS along with the PSD significance level for each pollutant of concern. Detailed results tables for each pollutant, averaging period, and years examined are

TABLE 7-2

CLASS II AREA MODELING ANALYSIS RESULTS

GILA BEND POWER GENERATION STATION
GILA BEND, ARIZONA

POLLUTANT	AVERAGING PERIOD	MAXIMUM PREDICTED IMPACT ($\mu g/m^3$)	PSD CLASS II AREA SIGNIFICANCE LEVEL ($\mu g/m^3$)
NO_2	Annual	0.49	1
CO	8-hr	16.3	500
	1-hr	40.7	2000
SO_2	Annual	0.042	1
	24-hr	0.35	5
	3-hr	2.00	25
PM_{10}	Annual	0.43	1
	24-hr	5.17	5

included in Appendix F. As shown in Table 7-2, the maximum predicted impacts are below the PSD significance levels for all pollutants and averaging periods of concern. Therefore, a full impact modeling analysis is not required in accordance with PSD modeling guidance.

An analysis was also completed to evaluate compliance with AAAQGs established for formaldehyde based on three averaging periods. As shown in Table 7-3, maximum predicted impacts are below the AAAQGs for each averaging period.

7.3 CLASS I AREA IMPACT ANALYSIS

The PSD program provides for extra protection for pristine areas of the United States, such as national parks, forests, and wildlife refuges. These areas are designated as Class I areas, and have lower ambient air thresholds with respect to significance and allowable impacts. Criteria have been proposed for SO_2, PM_{10}, and NO_x within Class I areas. Since there are no Class I Areas within 100 kilometers of the proposed site location, a Class I Area impact analysis was not performed.

7.4 AIR QUALITY ANALYSIS SUMMARY

An air quality analysis was performed for the proposed GBPGS in accordance with the modeling protocol approved by Maricopa County. The analysis involved determining maximum impacts on ambient air quality from emissions of NO_x, CO, SO_2, PM_{10}, and formaldehyde based on the operation of three combined cycle combustion turbines with duct burners, one cooling tower, and one auxiliary boiler at the proposed facility. Maximum predicted impacts were determined using the ISCST3 model. The maximum predicted impacts were compared with applicable PSD significance levels for criteria pollutants and

TABLE 7-3

FORMALDEHYDE MODELING ANALYSIS RESULTS

GILA BEND POWER GENERATION STATION
GILA BEND, ARIZONA

POLLUTANT	AVERAGING PERIOD	MAXIMUM PREDICTED IMPACT ($\mu g/m^3$)	ARIZONA AAQG GUIDELINE ($\mu g/m^3$)
Formaldehyde (HCHO)	Annual	0.012	0.08
	24-hr	0.092	12
	1-hr	0.676	20

established AAAQGs for formaldehyde. For all pollutants of concern, the maximum predicted impacts are below the applicable significance levels and standards. Therefore, the analyses demonstrate that the GBPGS will comply with all applicable air quality standards.

APPENDIX F

AIR QUALITY ANALYSIS - ADDITIONAL INFORMATION

Included in this appendix to Section 6.0 (Air Quality Analysis) are the following:

1) Modeling Input Table for the Class II Analysis

2) Results Tables for the Class II Area Analysis

3) List of Modeling Analysis Disk Contents

SUMMARY OF EMISSION RATES, STACK PARAMETERS, & BUILDING DIMENSIONS

ISC Dispersion Modeling Analysis for Gila Bend Power Generation Project

Emission Source	Pollutant Emission Rate Per Unit (lb/hr)					
	Nitrogen Oxides	Carbon Monoxide	Sulfur Dioxide	Formaldehyde (HCHO)	Particulate (PM10)	Total Particulate (TSP)
Combined Cycle CT Generator (3 units)	24.7	69.8	4.8	1.2[1] 0.88[2]	28[3]	28[3]
Auxiliary Boiler (1 unit)	3.11	3.95	0.03	0.002	0.26	0.26
Cooling Tower (1 unit)	NA[4]	NA[4]	NA[4]	NA[4]	2.07	1.36

Notes:

1. This is the formaldehyde emission rate used for the 1-hour significance analysis based on "worst-case" base load model runs.
2. This is the formaldehyde emission rate used for the 24-hour and annual significance analyses based on "worst-case" base load model runs.
3. This is the emission rate used in the modeling analysis based on the "worst-case" base load model runs and is not necessarily the maximum emission rate.
4. NA = Not Applicable.

Emission Source	Base Elevation (feet)	Stack Height (feet)	Stack Temperature (deg. F)	Stack Exit Velocity (feet/sec)	Stack Diameter (feet)
Combined Cycle CT Generator (3)					
NOx	678	165	188	70	18
CO	678	165	188	70	18
SO2	678	165	188	70	18
HCHO	678	165	209[1] 183[2]	67.2[1] 46.3[2]	18
PM10	678	165	183	46.3	18
Auxiliary Boiler (1)	678	95	450	35	2.0
Cooling Towers (1 unit, 12 cells)	678	50	70	30	30

Notes:

1. This is the stack temperature and stack exit velocity used for the 1-hour significance analysis based on "worst-case" base load model runs.
2. This is the stack temperature and stack exit velocity used for the 24-hour and annual significance analyses based on "worst-case" base load model runs.

Structure	Base Elevation (feet)	Maximum Height (feet)	Maximum Length (m)	Maximum Width (m)	Radius (feet)
Combined Cycle CT Generator (3)	678	55	72	18.3	--
Aux. Boiler Bldg.	678	20	15	7	--
Control Bldg.	678	20	19	13	--
Emergency Generator Building	678	15	10	4	--
Cooling Tower	678	50	71	37.9	--
Steam Generator #1	678	30	39	19.1	--
Water Treatment Building	678	20	37.9	15	--
Water Storage Tank #1	678	40	--	--	35
Water Storage Tank #2	678	40	--	--	35
Supply/Maintenance Building	678	30	36.2	22	--
Administration Building	678	25	28	11	--

SUMMARY OF MODELED CONCENTRATIONS

ISC3 Dispersion Modeling Analysis for Gila Bend Power Generation Project

Met Data Year	1994	1995	Significance Level
NOx			
Annual	0.43	**0.49**	*1*
CO			
8-hr	12.1	**16.3**	*500*
1-hr	**40.7**	39.5	*2000*
SO_2			
Annual	0.040	**0.042**	*1*
24-hr	0.34	**0.35**	*5*
3-hr	1.64	**2.00**	*25*
PM_{10}			
Annual	0.42	**0.43**	*1*
24-hr	3.73	**5.17**	*5*
HCHO*			
Annual	0.011	**0.012**	*0.08*
24-hr	0.090	**0.092**	*12*
1-hr	0.673	**0.676**	*20*

Note:
* All concentrations are in ug/m^3.
** Bold concentrations represent the maximum concentration for that averaging period.

09/25/2000

MODELING ANALYSIS DISK CONTENTS

PSD PERMIT APPLICATION - AIR QUALITY ANALYSIS
GILA BEND POWER GENERATION STATION

The enclosed modeling analysis compact disk contains the following folders and files:

1. **Bpip folder**

   Files (4): bpi, bpo, dat, & wak

2. **DEMs folder**

   - 7.5-minute degree subfolder
     Files (6): 32112h6.dem, 32112h7.dem, 32112h8.dem, 33112a6.dem, 33112a7.dem, & 33112a8.dem

3. **Metdata folder**

   Files (2): Panmet94.asc and Panmet95.asc

4. **Turbtest folder (Combined Cycle CT Generators "worst-case" base load condition model runs**

   Folders (5): COtest, HCHOtest, NOxtest, PMtest, & SO2test

   Files: dat and lst files for 8 separate load conditions for 1994 and 1995 met data. Some bpi, bpo, and wak files are also included.

5. **Psdsig folder (class II area modeling analysis)**

   Folders (5): CO, HCHO, NOx, PM, & SO2

   Files (lst and dat files set up with coarse grid and medium grid receptors)
   Example: *<pollutant name>_<metdata year>*.lst & .dat

   Files (lst and dat files with minigrid receptors set up around maximum impact locations)
   Example: *<pollutant name>_<metdata yearmg>*.lst &.dat

Visual Effects Screening Analysis for
Source: GBPGS
Class I Area: North Maricopa Mtn Wilde

*** User-selected Screening Scenario Results ***

Input Emissions for

Particulates	100.28	LB /HR
NOx (as NO2)	77.21	LB /HR
Primary NO2	.00	LB /HR
Soot	.00	LB /HR
Primary SO4	.00	LB /HR

PARTICLE CHARACTERISTICS

	Density	Diameter
Primary Part.	2.5	6
Soot	2.0	1
Sulfate	1.5	4

Transport Scenario Specifications:

Background Ozone:	.04 ppm
Background Visual Range:	225.00 km
Source-Observer Distance:	18.50 km
Min. Source-Class I Distance:	18.50 km
Max. Source-Class I Distance:	36.00 km
Plume-Source-Observer Angle:	11.25 degrees
Stability:	6
Wind Speed:	1.00 m/s

R E S U L T S

Asterisks (*) indicate plume impacts that exceed screening criteria

Maximum Visual Impacts INSIDE Class I Area
Screening Criteria ARE Exceeded

					Delta E		Contrast	
Backgrnd	Theta	Azi	Distance	Alpha	Crit	Plume	Crit	Plume
SKY	10.	157.	36.0	11.	2.00	26.177*	.05	.620*
SKY	140.	157.	36.0	11.	2.00	6.344*	.05	-.201*
TERRAIN	10.	84.	18.5	84.	2.00	33.120*	.05	.230*
TERRAIN	140.	84.	18.5	84.	2.00	2.248*	.05	.019

Maximum Visual Impacts OUTSIDE Class I Area
Screening Criteria ARE Exceeded

					Delta E		Contrast	
Backgrnd	Theta	Azi	Distance	Alpha	Crit	Plume	Crit	Plume
SKY	10.	1.	1.0	168.	2.00	59.881*	.05	1.794*
SKY	140.	1.	1.0	168.	2.00	18.966*	.05	-.513*
TERRAIN	10.	1.	1.0	168.	2.00	59.128*	.05	.691*
TERRAIN	140.	1.	1.0	168.	2.00	25.054*	.05	.504*

Visual Effects Screening Analysis for
Source: GBPGS
Class I Area: Signal Mountain Wilderne

*** User-selected Screening Scenario Results ***

Input Emissions for

Particulates	100.28	LB /HR
NOx (as NO2)	77.21	LB /HR
Primary NO2	.00	LB /HR
Soot	.00	LB /HR
Primary SO4	.00	LB /HR

PARTICLE CHARACTERISTICS

	Density	Diameter
Primary Part.	2.5	6
Soot	2.0	1
Sulfate	1.5	4

Transport Scenario Specifications:

Background Ozone:	.04 ppm
Background Visual Range:	225.00 km
Source-Observer Distance:	25.00 km
Min. Source-Class I Distance:	25.00 km
Max. Source-Class I Distance:	31.00 km
Plume-Source-Observer Angle:	11.25 degrees
Stability:	6
Wind Speed:	2.00 m/s

R E S U L T S

Asterisks (*) indicate plume impacts that exceed screening criteria

Maximum Visual Impacts INSIDE Class I Area
Screening Criteria ARE Exceeded

					Delta E		Contrast	
Backgrnd	Theta	Azi	Distance	Alpha	Crit	Plume	Crit	Plume
SKY	10.	132.	31.0	37.	2.00	6.893*	.05	.149*
SKY	140.	132.	31.0	37.	2.00	1.651	.05	-.048
TERRAIN	10.	84.	25.0	84.	2.00	16.976*	.05	.112*
TERRAIN	140.	84.	25.0	84.	2.00	.880	.05	.009

Maximum Visual Impacts OUTSIDE Class I Area
Screening Criteria ARE Exceeded

					Delta E		Contrast	
Backgrnd	Theta	Azi	Distance	Alpha	Crit	Plume	Crit	Plume
SKY	10.	0.	1.0	168.	2.00	43.706*	.05	1.154*
SKY	140.	0.	1.0	168.	2.00	11.505*	.05	-.336*
TERRAIN	10.	0.	1.0	168.	2.00	46.869*	.05	.538*
TERRAIN	140.	0.	1.0	168.	2.00	14.197*	.05	.280*

Visual Effects Screening Analysis for
Source: GBPGS
Class I Area: South Maricopa Mtn Wilde

*** User-selected Screening Scenario Results ***

Input Emissions for

Particulates	100.28	LB /HR
NOx (as NO2)	77.21	LB /HR
Primary NO2	.00	LB /HR
Soot	.00	LB /HR
Primary SO4	.00	LB /HR

PARTICLE CHARACTERISTICS

	Density	Diameter
Primary Part.	2.5	6
Soot	2.0	1
Sulfate	1.5	4

Transport Scenario Specifications:

Background Ozone:	.04 ppm
Background Visual Range:	225.00 km
Source-Observer Distance:	27.50 km
Min. Source-Class I Distance:	27.50 km
Max. Source-Class I Distance:	47.00 km
Plume-Source-Observer Angle:	11.25 degrees

Stability: 6
Wind Speed: 2.00 m/s

R E S U L T S

Asterisks (*) indicate plume impacts that exceed screening criteria

Maximum Visual Impacts INSIDE Class I Area
Screening Criteria ARE Exceeded

					Delta E		Contrast	
Backgrnd	Theta	Azi	Distance	Alpha	Crit	Plume	Crit	Plume
SKY	10.	154.	47.0	15.	2.00	11.149*	.05	.239*
SKY	140.	154.	47.0	15.	2.00	2.338*	.05	-.078*
TERRAIN	10.	84.	27.5	84.	2.00	15.695*	.05	.107*
TERRAIN	140.	84.	27.5	84.	2.00	.813	.05	.009

Maximum Visual Impacts OUTSIDE Class I Area
Screening Criteria ARE Exceeded

					Delta E		Contrast	
Backgrnd	Theta	Azi	Distance	Alpha	Crit	Plume	Crit	Plume
SKY	10.	0.	1.0	168.	2.00	42.780*	.05	1.107*
SKY	140.	0.	1.0	168.	2.00	11.138*	.05	-.322*
TERRAIN	10.	0.	1.0	168.	2.00	44.544*	.05	.513*
TERRAIN	140.	0.	1.0	168.	2.00	13.714*	.05	.276*

Visual Effects Screening Analysis for
Source: GBPGS
Class I Area: Woolsey Peak Wilderness

*** User-selected Screening Scenario Results ***

Input Emissions for

Particulates	100.28	LB /HR
NOx (as NO2)	77.21	LB /HR
Primary NO2	.00	LB /HR
Soot	.00	LB /HR
Primary SO4	.00	LB /HR

PARTICLE CHARACTERISTICS

	Density	Diameter
Primary Part.	2.5	6
Soot	2.0	1
Sulfate	1.5	4

Transport Scenario Specifications:

Background Ozone:	.04 ppm
Background Visual Range:	225.00 km
Source-Observer Distance:	11.50 km
Min. Source-Class I Distance:	11.50 km
Max. Source-Class I Distance:	25.50 km
Plume-Source-Observer Angle:	11.25 degrees
Stability:	6
Wind Speed:	2.00 m/s

R E S U L T S

Asterisks (*) indicate plume impacts that exceed screening criteria

Maximum Visual Impacts INSIDE Class I Area
Screening Criteria ARE Exceeded

					Delta E		Contrast	
Backgrnd	Theta	Azi	Distance	Alpha	Crit	Plume	Crit	Plume
SKY	10.	160.	25.5	9.	2.00	21.074*	.05	.494*
SKY	140.	160.	25.5	9.	2.00	5.151*	.05	-.160*
TERRAIN	10.	160.	25.5	9.	2.00	40.537*	.05	.386*
TERRAIN	140.	160.	25.5	9.	2.00	5.724*	.05	.080*

Maximum Visual Impacts OUTSIDE Class I Area
Screening Criteria ARE Exceeded

					Delta E		Contrast	
Backgrnd	Theta	Azi	Distance	Alpha	Crit	Plume	Crit	Plume
SKY	10.	1.	1.0	168.	2.00	49.715*	.05	1.417*
SKY	140.	1.	1.0	168.	2.00	14.072*	.05	-.412*
TERRAIN	10.	1.	1.0	168.	2.00	64.485*	.05	.690*
TERRAIN	140.	1.	1.0	168.	2.00	17.823*	.05	.267*

Woolsey Peak

Dispersion Condition (stability, windspeed)	OyOzU (m3/s)	Transport Time (hrs)	Time of Day (percent)							
			0-6		6-12		12-18		18-24	
			f	cf	f	cf	f	cf	f	cf
F,1	7.39E+03	6.39	0.57%	0.57%	0.00%	0.00%	0.00%	0.00%	0.21%	0.21%
E,1	1.91E+04	6.39	0.12%	0.69%	0.05%	0.05%	0.00%	0.00%	0.17%	0.38%
F,2	2.22E+04	2.13	0.38%	1.08%	0.02%	0.07%	0.00%	0.00%	0.14%	0.52%
F,3	3.70E+04	1.28	0.02%	1.10%	0.00%	0.07%	0.00%	0.00%	0.02%	0.55%
D,1	4.41E+04	6.39	0.02%	1.13%	0.10%	0.17%	0.00%	0.00%	0.05%	0.59%
E,2	5.72E+04	2.13	0.38%	1.51%	0.02%	0.19%	0.05%	0.05%	0.14%	0.74%
E,3	9.54E+04	1.28	0.02%	1.53%	0.00%	0.19%	0.05%	0.09%	0.02%	0.76%
D,2	1.32E+05	2.13	0.02%	1.56%	0.05%	0.24%	0.07%	0.17%	0.21%	0.98%
D,3	2.20E+05	1.28	0.02%	1.58%	0.12%	0.36%	0.33%	0.50%	0.19%	1.17%
C,1	2.60E+05	6.39	0.02%	1.60%	0.26%	0.62%	0.07%	0.57%	0.07%	1.24%
D,4	3.08E+05	0.91	0.02%	1.63%	0.02%	0.65%	0.24%	0.81%	0.12%	1.36%
C,2	7.80E+05	2.13	0.00%	1.63%	0.67%	1.32%	0.38%	1.19%	0.07%	1.43%

Signal Mountain

Dispersion Condition (stability, windspeed)	OyOzU (m3/s)	Transport Time (hrs)	Time of Day (percent)							
			0-6		6-12		12-18		18-24	
			f	cf	f	cf	f	cf	f	cf
F,1	2.03E+04	13.89	0.57%	0.00%	0.00%	0.00%	0.00%	0.00%	0.21%	0.00%
E,1	5.45E+04	13.89	0.12%	0.00%	0.05%	0.00%	0.00%	0.00%	0.17%	0.00%
F,2	6.09E+04	4.63	0.38%	0.38%	0.02%	0.02%	0.00%	0.00%	0.14%	0.14%
F,3	1.01E+05	2.78	0.02%	0.41%	0.00%	0.02%	0.00%	0.00%	0.02%	0.17%
D,1	1.36E+05	13.89	0.02%	0.41%	0.10%	0.02%	0.00%	0.00%	0.05%	0.17%
E,2	1.63E+05	4.63	0.38%	0.79%	0.02%	0.05%	0.05%	0.05%	0.14%	0.31%
E,3	2.72E+05	2.78	0.02%	0.81%	0.00%	0.05%	0.05%	0.09%	0.02%	0.33%
D,2	4.07E+05	4.63	0.02%	0.84%	0.05%	0.10%	0.07%	0.17%	0.21%	0.55%
D,3	6.79E+05	2.78	0.02%	0.86%	0.12%	0.22%	0.33%	0.50%	0.19%	0.74%
C,1	1.05E+06	13.89	0.02%	0.86%	0.26%	0.22%	0.07%	0.50%	0.07%	0.74%
D,4	9.51E+05	1.98	0.02%	0.89%	0.02%	0.24%	0.24%	0.73%	0.12%	0.86%
C,2	3.15E+06	4.63	0.00%	0.89%	0.67%	0.91%	0.38%	1.11%	0.07%	0.93%

North Maricopa Mountain

Dispersion Condition (stability, windspeed)	OyOzU (m3/s)	Transport Time (hrs)	Time of Day (percent)							
			0-6		6-12		12-18		18-24	
			f	cf	f	cf	f	cf	f	cf
F,1	1.35E+04	10.28	0.93%	0.93%	0.02%	0.02%	0.00%	0.00%	0.29%	0.29%
E,1	3.63E+04	10.28	0.74%	1.68%	0.12%	0.14%	0.00%	0.00%	0.21%	0.50%
F,2	4.04E+04	3.43	1.10%	2.78%	0.02%	0.17%	0.00%	0.00%	0.52%	1.02%
F,3	6.74E+04	2.06	0.22%	2.99%	0.02%	0.19%	0.00%	0.00%	0.07%	1.09%
D,1	8.79E+04	10.28	0.12%	3.11%	0.17%	0.36%	0.00%	0.00%	0.10%	1.19%
E,2	1.09E+05	3.43	1.72%	4.84%	0.74%	1.10%	0.02%	0.02%	0.79%	1.97%
E,3	1.81E+05	2.06	2.49%	7.33%	0.69%	1.80%	0.07%	0.09%	0.88%	2.86%
E,4	2.54E+05	1.47	0.74%	8.07%	0.45%	2.25%	0.00%	0.09%	0.26%	3.12%
D,2	2.64E+05	3.43	0.74%	8.81%	0.02%	2.27%	0.02%	0.12%	0.43%	3.55%
E,5	3.27E+05	1.14	0.14%	8.96%	0.19%	2.47%	0.00%	0.12%	0.07%	3.62%
D,3	4.39E+05	2.06	0.98%	9.94%	0.67%	3.14%	0.14%	0.26%	0.90%	4.52%
E,6	4.72E+05	0.79	0.02%	9.96%	0.12%	3.26%	0.00%	0.26%	0.00%	4.52%

South Maricopa Mountain

Dispersion Condition (stability, windspeed)	OyOzU (m3/s)	Transport Time (hrs)	Time of Day (percent)							
			0-6		6-12		12-18		18-24	
			f	cf	f	cf	f	cf	f	cf
F,1	2.18E+04	15.28	0.67%	0.00%	0.02%	0.00%	0.00%	0.00%	0.26%	0.00%
E,1	6.01E+04	15.28	0.38%	0.00%	0.02%	0.00%	0.00%	0.00%	0.38%	0.00%
F,2	6.53E+04	5.09	1.17%	1.17%	0.12%	0.12%	0.00%	0.00%	0.62%	0.62%
F,3	1.09E+05	3.06	0.26%	1.44%	0.02%	0.14%	0.00%	0.00%	0.10%	0.71%
D,1	1.56E+05	15.28	0.19%	1.44%	0.29%	0.14%	0.00%	0.00%	0.17%	0.71%
E,2	1.80E+05	5.09	2.42%	3.86%	0.22%	0.36%	0.00%	0.00%	0.98%	1.69%
E,3	3.01E+05	3.06	1.56%	5.41%	0.02%	0.38%	0.00%	0.00%	1.12%	2.81%
E,4	4.21E+05	2.18	0.22%	5.63%	0.00%	0.38%	0.00%	0.00%	0.31%	3.12%
D,2	4.68E+05	5.09	0.84%	6.47%	0.55%	0.93%	0.02%	0.02%	0.43%	3.55%
E,5	5.41E+05	1.70	0.14%	6.61%	0.00%	0.93%	0.00%	0.02%	0.17%	3.71%
E,6	6.62E+05	1.39	0.02%	6.63%	0.00%	0.93%	0.00%	0.02%	0.00%	3.71%
D,3	7.79E+05	3.06	0.60%	7.23%	0.26%	1.20%	0.05%	0.07%	0.43%	4.14%

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November 1, 2000

VIA HAND DELIVERY

Mr. Thom Shelton
Development Manager
INDUSTRIAL POWER TECHNOLOGY
2227 Capricorn Way, Suite 101
Santa Rosa, CA 95407

Re: Summary of Aquifer Testing Activities; Proposed Gila Bend Power Project, Gila Bend, Arizona.

Dear Mr. Shelton:

This letter report has been prepared to summarize the methods and results of aquifer testing activities conducted on behalf of the Gila Bend Power Partners LLC (GBPP) by Hargis + Associates, Inc. (H+A) at the proposed Gila Bend Power Plant (the proposed plant) site. The proposed plant will be located in the Town of Gila Bend, Arizona, within Section 19 of Township 5 South, Range 5 West (C-5-5) of the Gila and Salt River Baseline and Meridian (Figure 1).

Originally, a 3-5 day constant rate aquifer test was to be conducted at the site. However, due to pumping equipment malfunctions, the pumping portion of the aquifer test was limited to approximately 24 hours. This 1-day aquifer test was conducted during the period October 25 through October 27, 2000. This letter report summarizes the results of the 1-day aquifer test.

PURPOSES AND SCOPE

The purposes of the aquifer testing activities were to: 1) provide estimates of the aquifer transmissivity (T) of the upper basin fill in the area of the proposed plant; and 2) provide information on groundwater quality in the area of the proposed plant.

Groundwater will be used to meet water demand for the proposed plant. Selected site wells and/or newly constructed wells, will serve to supply groundwater to the proposed plant. Groundwater modeling was conducted as part of an application for a Certificate of Environmental Compatibility for the proposed plant. Groundwater modeling was conducted to evaluate the impacts to the local groundwater table by pumping site wells to meet water demand. Aquifer hydraulic properties used in the groundwater modeling were determined by the examination of drillers logs of area wells. Aquifer testing was conducted to verify and/or revise the aquifer T used in the groundwater modeling. Water quality data collected during the aquifer testing activities can be used to begin to evaluate plant water supply treatment methodologies.

The scope of the aquifer testing activities included:

- Clearing access routes to selected site wells;

Other Offices:
Tucson, AZ
San Diego, CA

- Conducting video surveys of selected site wells;
- Performing well rehabilitation (cleaning); and
- Conducting a constant rate aquifer test and collecting a groundwater quality sample.

All earthwork, video surveys, and well rehabilitation activities were conducted by Gilbert Pump, Phoenix, Arizona (Gilbert). The results of these activities will be summarized under separate cover.

A 500-horsepower diesel engine driven turbine pump was installed in well (C-5-5)19aba (the pumped well) by Gilbert to conduct the constant rate aquifer test (Figure 2). The pumped well was selected based on its relatively good overall condition, its proximity to the proposed plant, and its proximity to other wells to serve as observation wells. The pumped well was pumped at an average rate of approximately 1,767 gallons per minute for 1,397 minutes. Gilbert personnel monitored the pumping rate at the pumped well each half hour. Drawdown and recovery were monitored in the pumped well with electronic sounders by H+A personnel. Discharge water was directed away from the pumped well, other wells, and access roads, to stormwater collection areas along Sisson Road.

Wells (C-5-5)18ddc and (C-5-5)18ddd served as observation wells during the aquifer test (the observation wells). Observation wells (C-5-5)18ddc and (C-5-5)18ddd are located approximately 700 feet north, and approximately 1,425 feet northeast of the pumped well, respectively (Figure 2). Drawdown and recovery were monitored in each of the observation wells with electronic sounders by H+A personnel.

RESULTS OF THE AQUIFER TEST

Drawdown and recovery data were collected at the pumped well and the two observation wells. The following sections discuss the results of the analyses of the drawdown and recovery data.

Pumped Well

Drawdown and recovery graphs for the pumped well have been provided (Figures 3 and 4). Drawdown at the pumped well was 300.65 feet at the end of pumping. Drawdown data for the pumped well could not be analyzed due to fluctuations in the amount of drawdown. Recovery data for the pumped well were analyzed for T using the Jacob straight-line method (Table 1). T was determined to be approximately 12,000 square feet per day (ft^2/d) based on the recovery data.

Observation Wells

Drawdown and recovery graphs for the two observation wells have been provided (Figures 5 through 8). Drawdown at observation well (C-5-5)18ddc was 0.17 feet at the end of pumping. Drawdown at observation well (C-5-5)18ddd was 2.94 feet at the end of pumping. Data for observation well (C-5-5)18ddc could not be analyzed for T or storativity (S) due to an insufficient amount of drawdown. Drawdown and recovery data for observation well (C-5-5)18ddd were analyzed for T and S using the Jacob straight-line method (Table 1).

T was determined to be approximately 19,000 ft^2/d at observation well (C-5-5)18ddd based on the drawdown data. S was determined to be approximately 0.0021 based on drawdown data collected from

observation well (C-5-5)18ddd. T was determined to be approximately 17,300 ft^2/d at observation well (C-5-5)18ddd based on recovery data (Table 1).

RESULTS OF GROUNDWATER SAMPLING

A groundwater quality sample was collected from the pumped well during the aquifer testing activities. The groundwater quality sample was analyzed for selected common ions and inorganic constituents (Attachment A). The groundwater quality sample was collected and analyzed using methods and procedures in accordance with Arizona Department of Environmental Quality and U.S. Environmental Protection Agency protocols.

A review of the groundwater quality sample results indicates that groundwater in the area of the pumped well is of poor quality (Attachment A). Groundwater is a sodium-chloride type high in total dissolved solids (TDS). TDS was detected at a concentration of 3,100 milligrams per liter (mg/l). Nitrate as nitrogen was detected in the groundwater quality sample collected from the pumped well at a concentration greater than the federal primary maximum contaminant level (MCL) (Attachment A). Total recoverable iron, chloride, fluoride, sulfate, and TDS were detected in the groundwater quality sample collected from the pumped well at concentrations greater than their respective federal secondary MCLs (Attachment A). The results of the groundwater quality sample from the pumped well are similar in nature to groundwater quality samples collected from other wells in the area.

DISCUSSION OF RESULTS

The results of the aquifer test estimate an average value of T of approximately 16,100 ft^2/d and a value of S of 0.0021 for the site. The average value of T and the value of S are lower than those reported by other workers for the upper basin fill in the Gila Bend basin. These lower T and S values may be attributable to:

- The short duration of the aquifer test.
- The observation wells partially penetrate the upper basin fill to depths of approximately 400 and 670 feet below land surface. The use of standard aquifer test analytical methods for wells that partially penetrate aquifer systems can, in some instances underestimate values of T.
- Plugged perforations in both the pumped well and the observation wells; this condition results in increased well loss, low well efficiency, and an underestimation of aquifer hydraulic properties.

Based on these conditions it is likely that properly constructed and maintained, fully-penetrating supply wells will produce more water with less well loss and higher pumping efficiency.

The results of the groundwater quality sampling indicate that groundwater quality at the site is poor. Groundwater is a sodium-chloride type high in TDS. This is consistent with the results of groundwater quality sampling of other wells in the site area. Some treatment of raw groundwater is likely.

REVISED SIMULATIONS

Revised simulations were conducted to evaluate the impacts created by future groundwater withdrawals at the site. The revised simulations use a hydraulic conductivity (K) value of 20 feet per day (f/d). This K value is based on the results of the T values from the 1-day aquifer test. This value of K is considered low for the reasons listed above. Simulations conducted using a K of 20 f/d should be considered conservative in that the revised simulations will overestimate the amount of drawdown at the site.

An S value of 0.0021 is considered significantly low for the reasons listed above. Simulations conducted using an S of 0.0021 will create unrealistic estimates of drawdown at the site. Therefore, S values used in the revised simulations are 0.05 and 0.12. These values are based on the type of materials known to be present at the site and on estimates of specific yield for unconfined aquifers contained in the literature.

Four pumping scenarios were simulated using the revised K and S values. Pumpage was distributed evenly at four existing well locations at the site. The four pumping scenarios are:

1. Pumping 10,000 acre-feet per year (af/y); for 50 years; using K of 20 f/d and S of 0.05
2. Pumping 10,000 af/y; for 50 years; using K of 20 f/d and S of 0.12
3. Pumping 15,000 af/y; for 50 years; using K of 20 f/d and S of 0.05
4. Pumping 15,000 af/y; for 50 years; using K of 20 f/d and S of 0.12

The results of the simulations for the four pumping scenarios indicate that the impacts created by groundwater withdrawals at the site will not create excessive additional drawdown at or near project area boundaries. Figures depicting the amount of drawdown based on the four above-referenced pumping scenarios have been prepared (Figures 9 through 12).

As expected, the maximum amount of drawdown was created for the pumping scenario using an S value of 0.05 and pumping 15,000 af/y for 50 years (Scenario 3). Even under this conservative condition, projected drawdown at the four existing project area wells after 50 years of pumping is less than 85 feet. The projected drawdown at the project area boundary for Scenario 3 ranges from approximately 36 to 50 feet (Figure 11). The minimum amount of drawdown was projected using an S value of 0.12 and pumping 10,000 af/y for 50 years (Scenario 2). Projected drawdown for Scenario 2 at the four existing project area wells after 50 years of pumping is less than 55 feet. The projected drawdown at the project area boundary for Scenario 2 ranges from approximately 20 to 30 feet (Figure 10).

CONCLUSIONS

A review of the 1-day aquifer test data and the revised simulations indicates that pumping groundwater to serve as a source of water supply will not produce significant drawdown in the area. Assuming these conservative conditions, i.e. using conservative (low) estimates of K and S in scenario 3 above, additional drawdown at the site will likely range from approximately 1.2 to 1.7 feet per year, or a total drawdown of approximately 60 to 85 feet over the 50 year estimated life of the project.

The observed responses and the results of this 1-day constant rate aquifer test indicate that the pumping rate achieved during the test was adequate to stress the aquifer system and obtain reliable estimates of

transmissivity. However, based on the proposed work plan the test was to be conducted for a minimum of 72 hours. Due to pumping equipment problems the test was suspended at approximately 24 hours. Although the test results indicate that the pumping period was sufficient to get an estimate of transmissivity, at your direction the pumping equipment has been repaired and the test will be completed for at least 72 hours.. A 3-day constant rate aquifer test is currently being conducted at the site. A separate letter report will be prepared summarizing the results of the 3-day aquifer test when available.

H+A has appreciated this opportunity to provide hydrogeologic consulting services to GBPP. If you have any questions or comments regarding this letter, or any aspect of either aquifer test, please do not hesitate to contact me.

Sincerely,

HARGIS + ASSOCIATES, INC.

Michael R. Long, RG
Principal Hydrogeologist, Director of Arizona Operations

MRL:clt

Enclosures

TABLE 1

SUMMARY OF AQUIFER HYDRAULIC PROPERTIES

WELL IDENTIFIER	TRANSMISSIVITY (square feet per day)	STORATIVITY (dimensionless)
Pumped well (C-5-5)19aba	12,000(b)	Not applicable
Observation well (C-5-5)18ddc	Not determined	Not determined
Observation well (C-5-5)18ddd	19,000(a) 17,300(b)	0.0021(a)
Average	16,100	Not applicable

(a) Determined using drawdown data
(b) Determined using recovery data

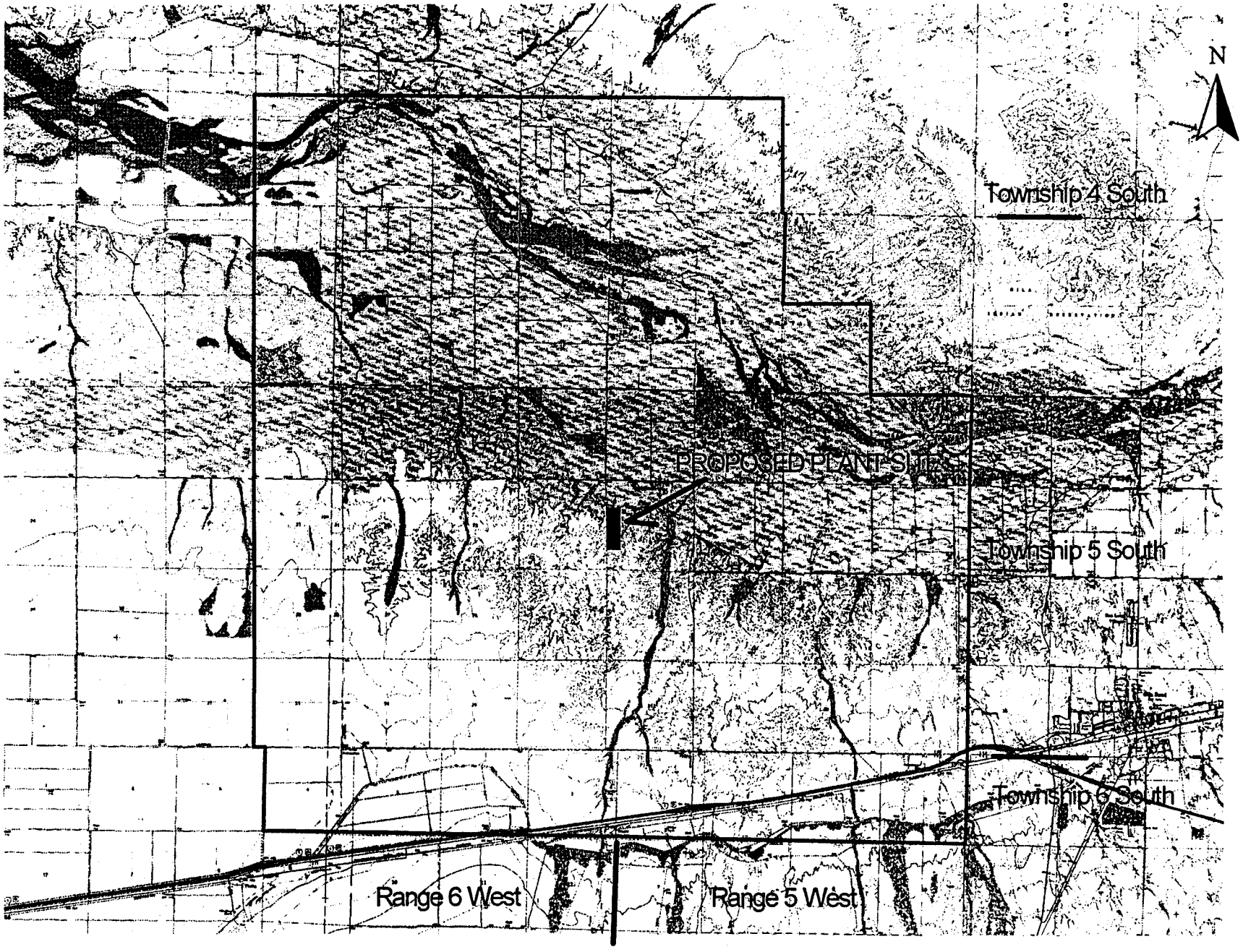

Figure 1. Study Area

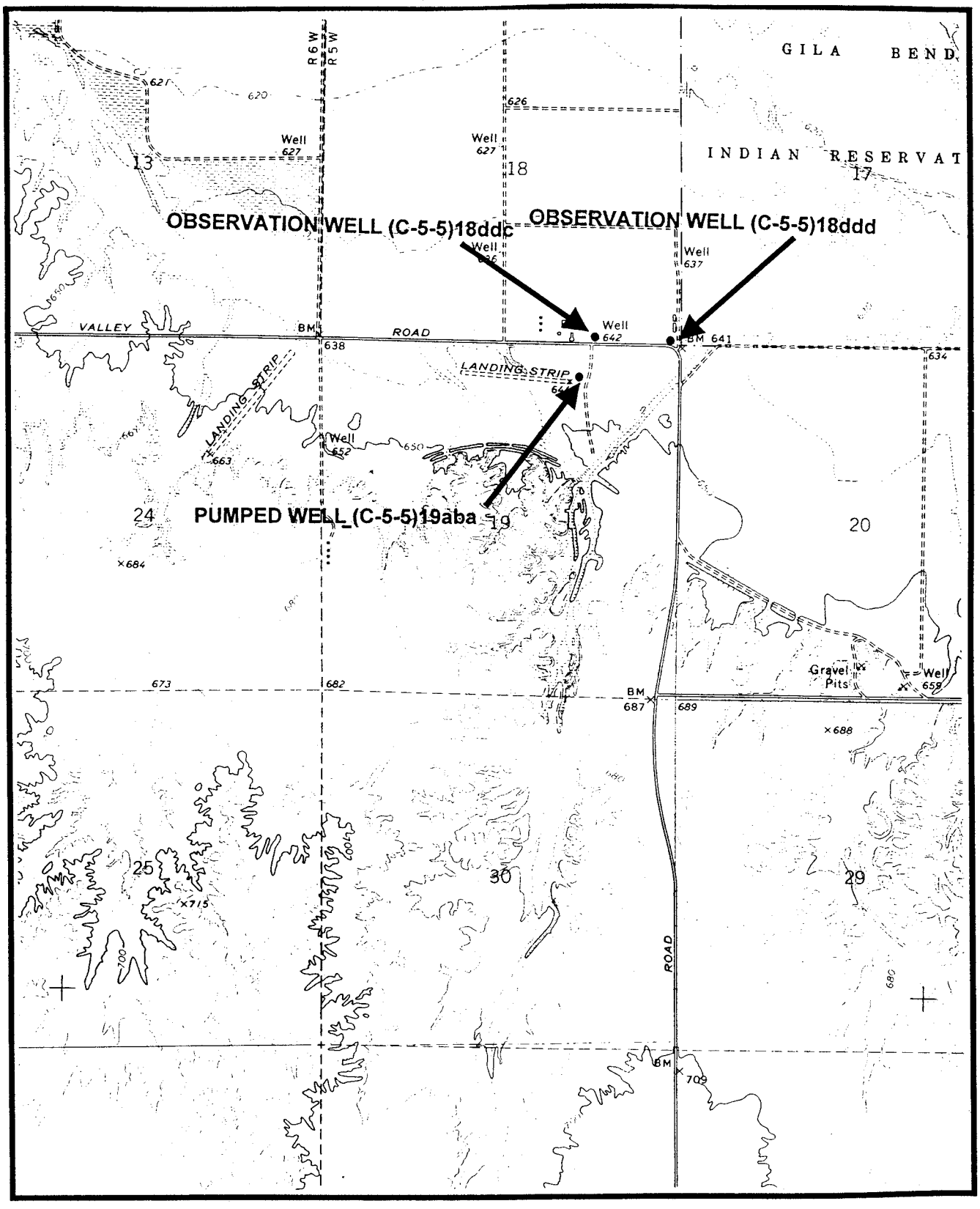

FIGURE 2. WELL LOCATIONS

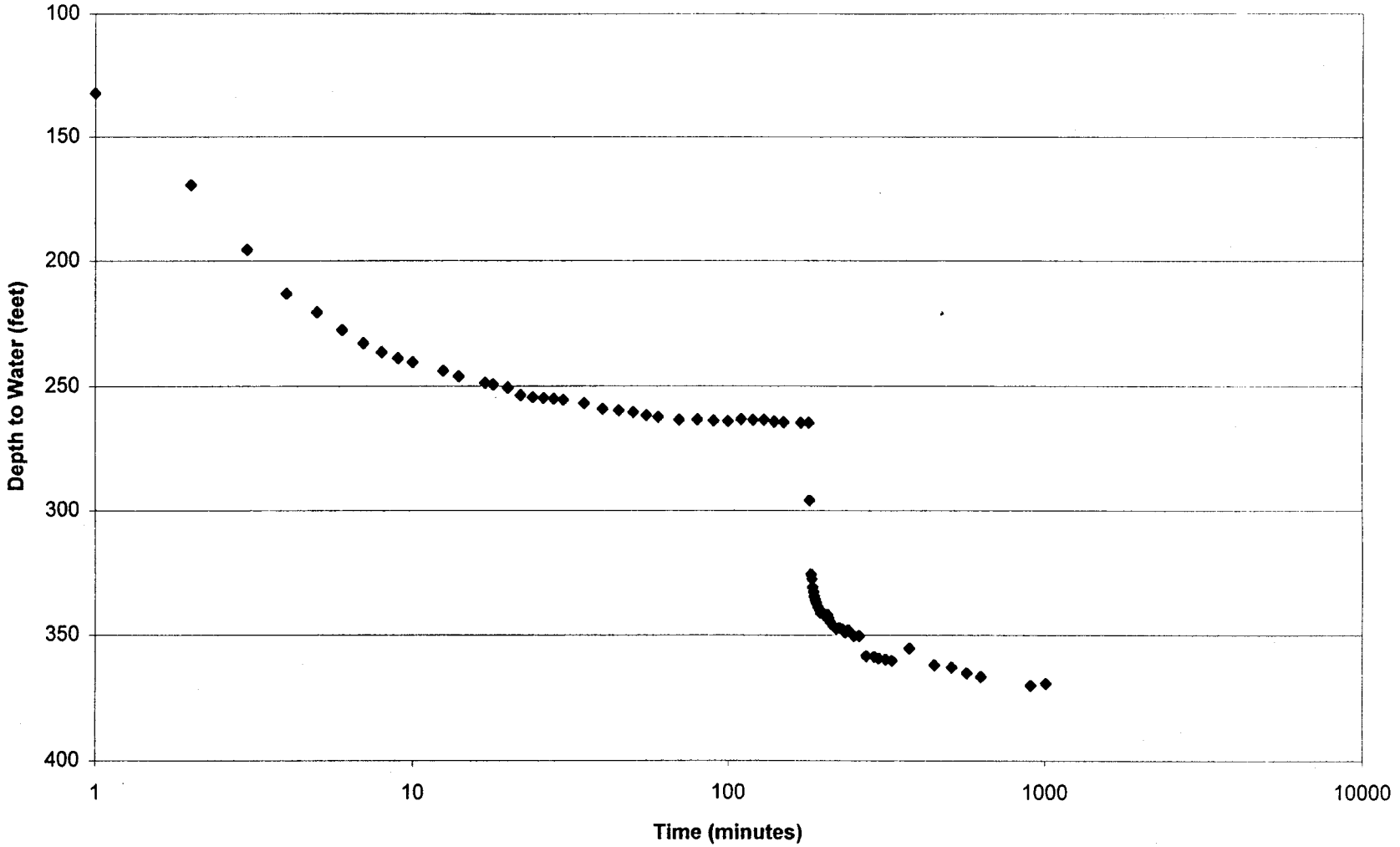

FIGURE 3. DRAWDOWN DATA FOR PUMPED WELL (C-5-5)19aba

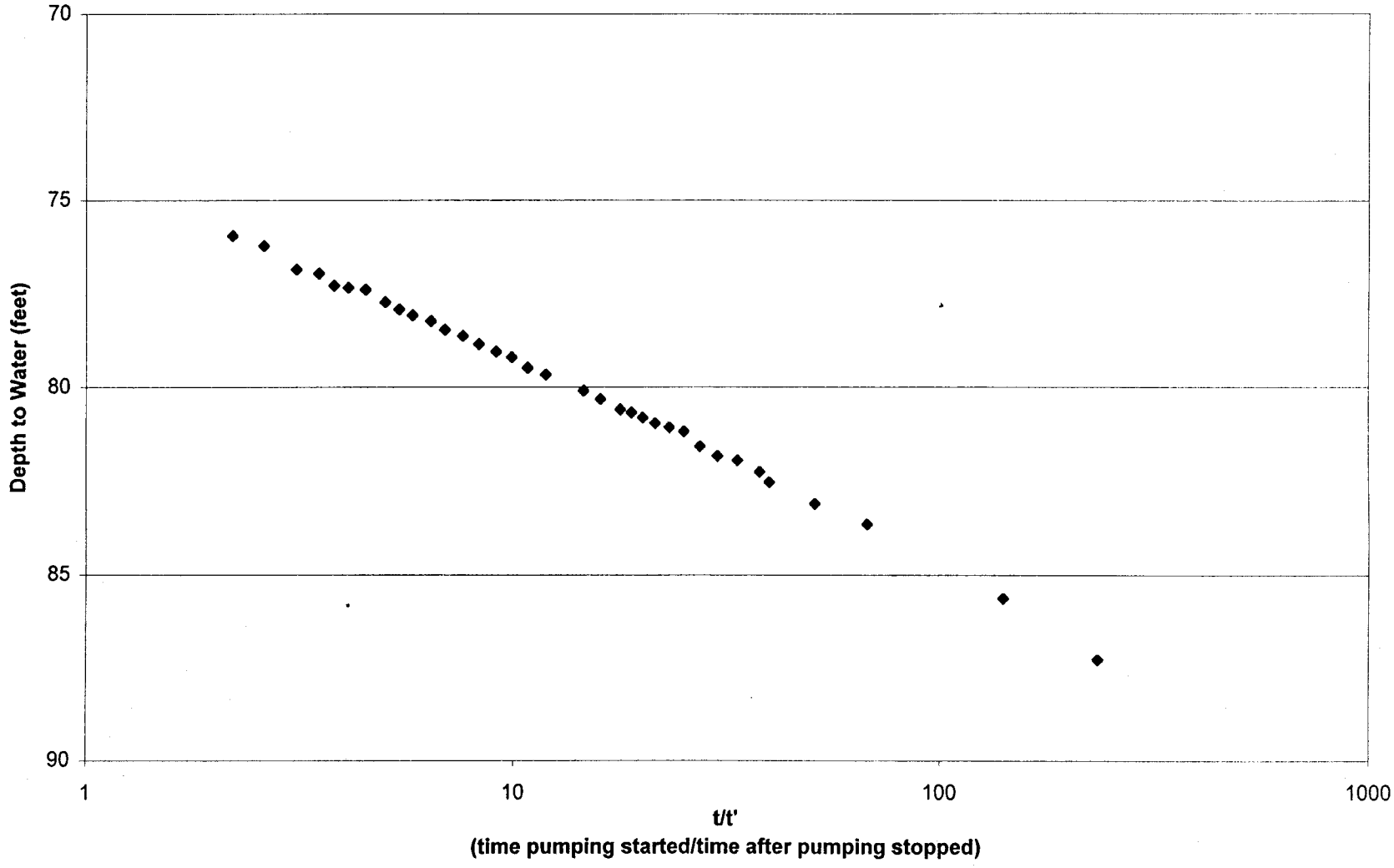

FIGURE 4. RECOVERY DATA FOR PUMPED WELL (C-5-5)19aba

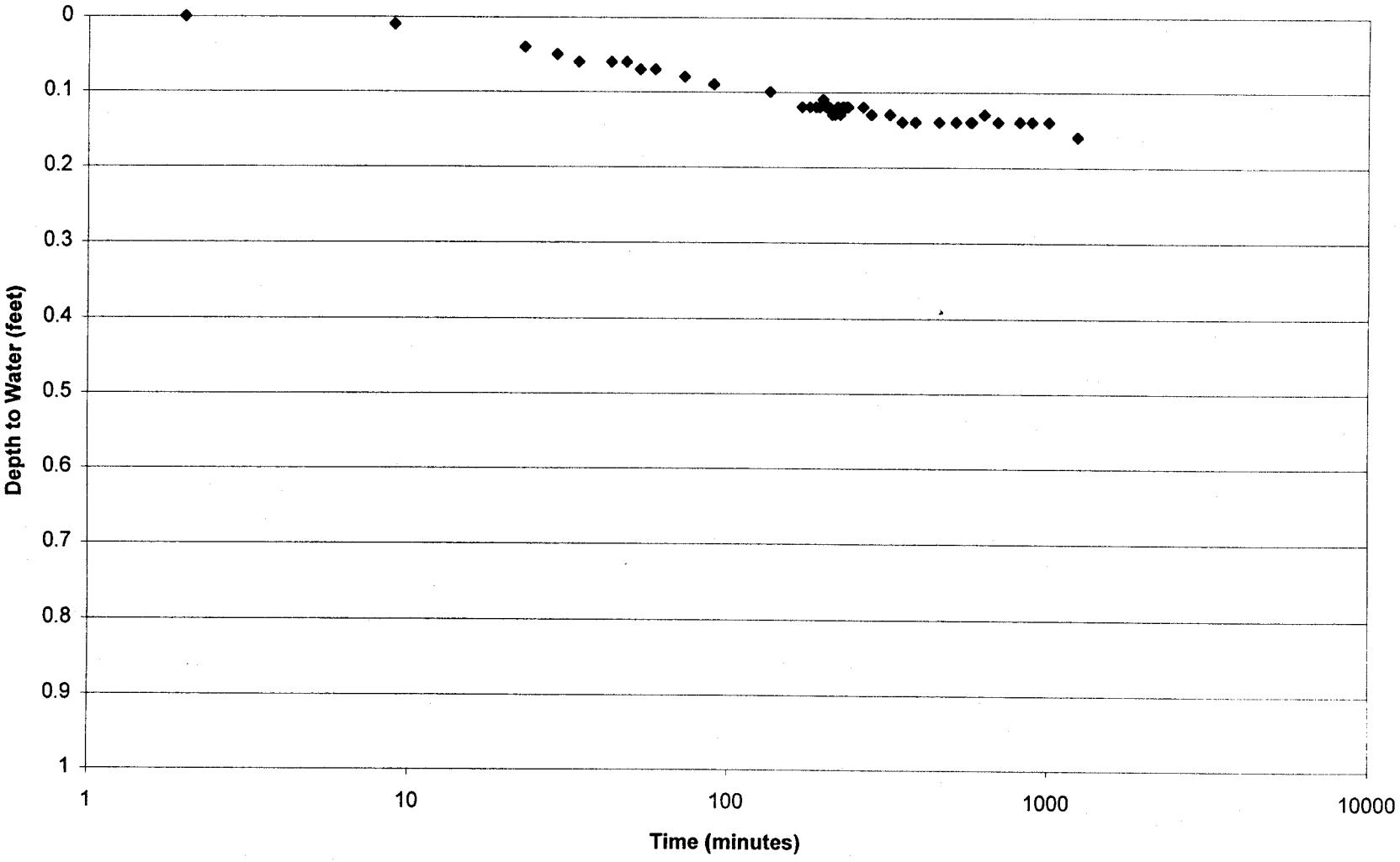

FIGURE 5. DRAWDOWN DATA FOR OBSERVATION WELL (C-5-5)18ddc

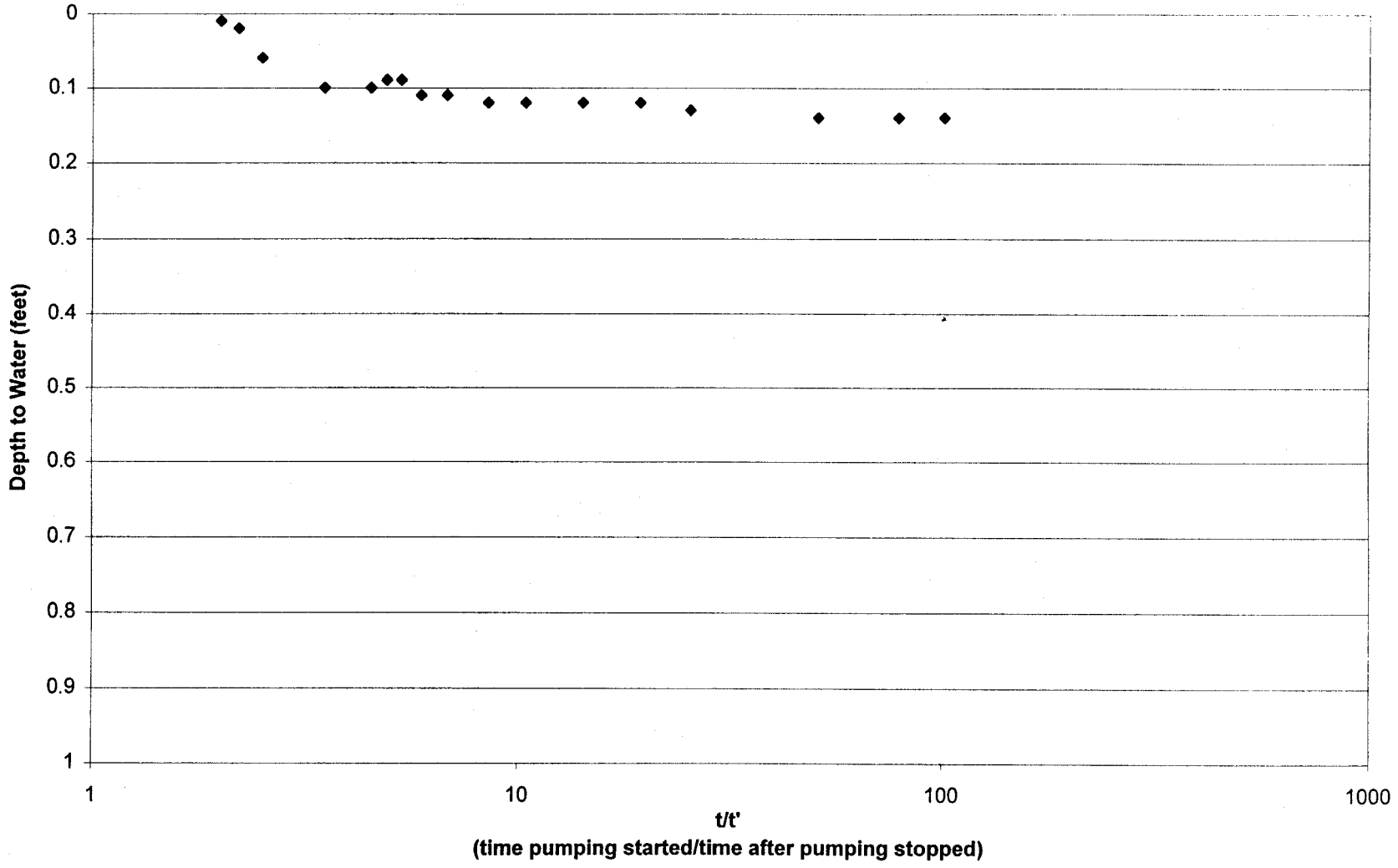

FIGURE 6. RECOVERY DATA FOR OBSERVATION WELL (C-5-5)18ddc

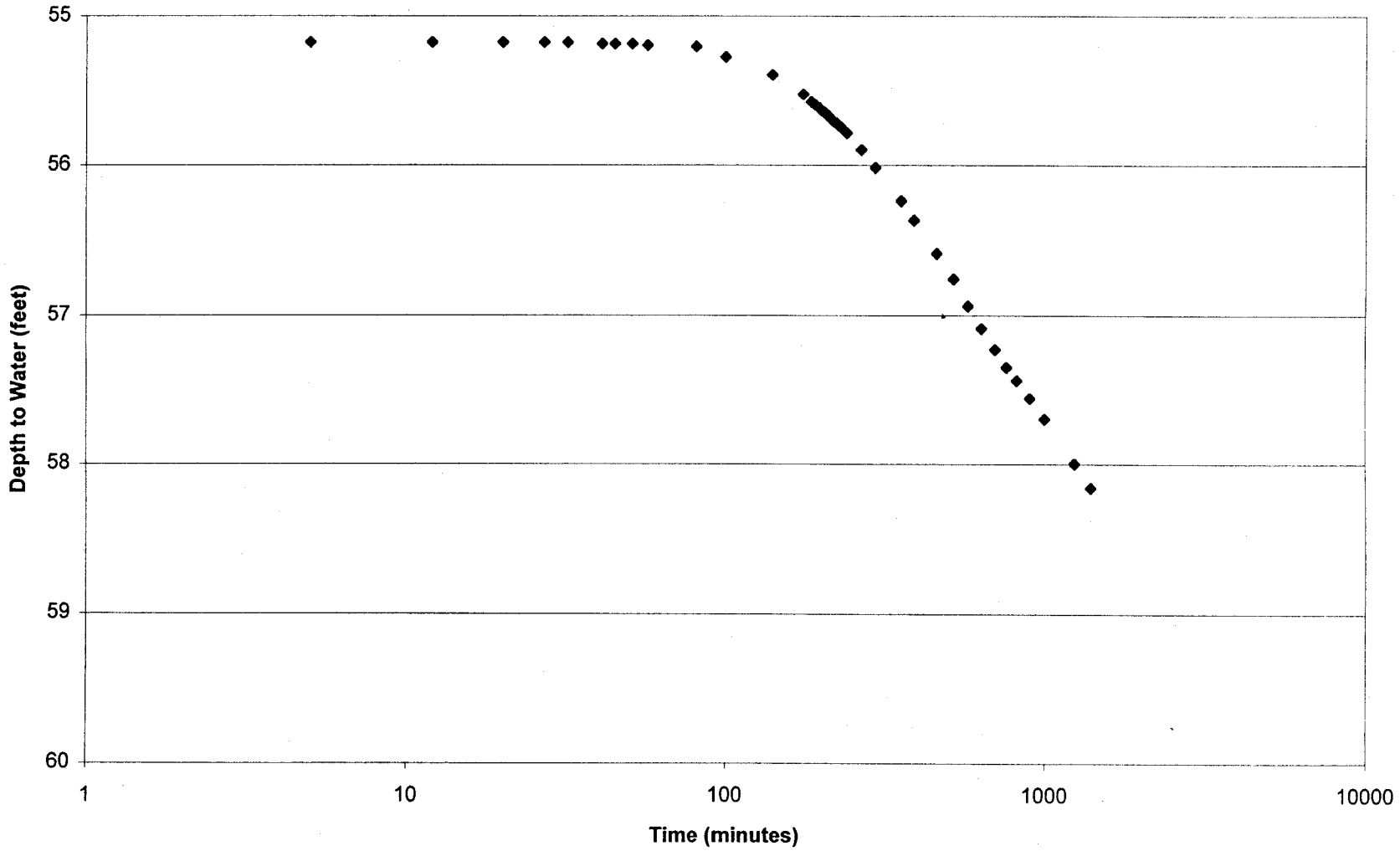

FIGURE 7. DRAWDOWN DATA FOR OBSERVATION WELL (C-5-5)18ddd

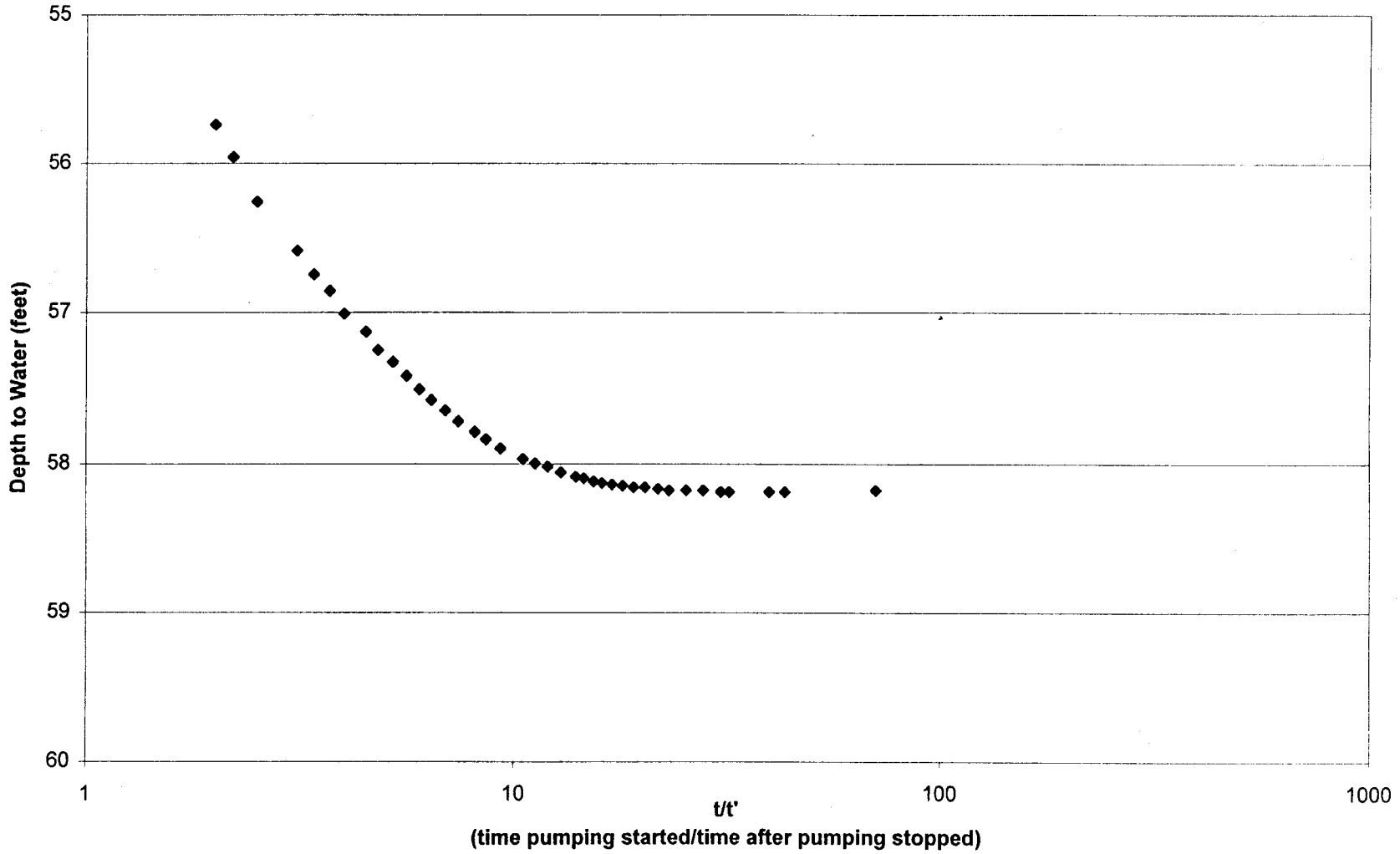

FIGURE 8. RECOVERY DATA FOR OBSERVATION WELL (C-5-5)18ddd

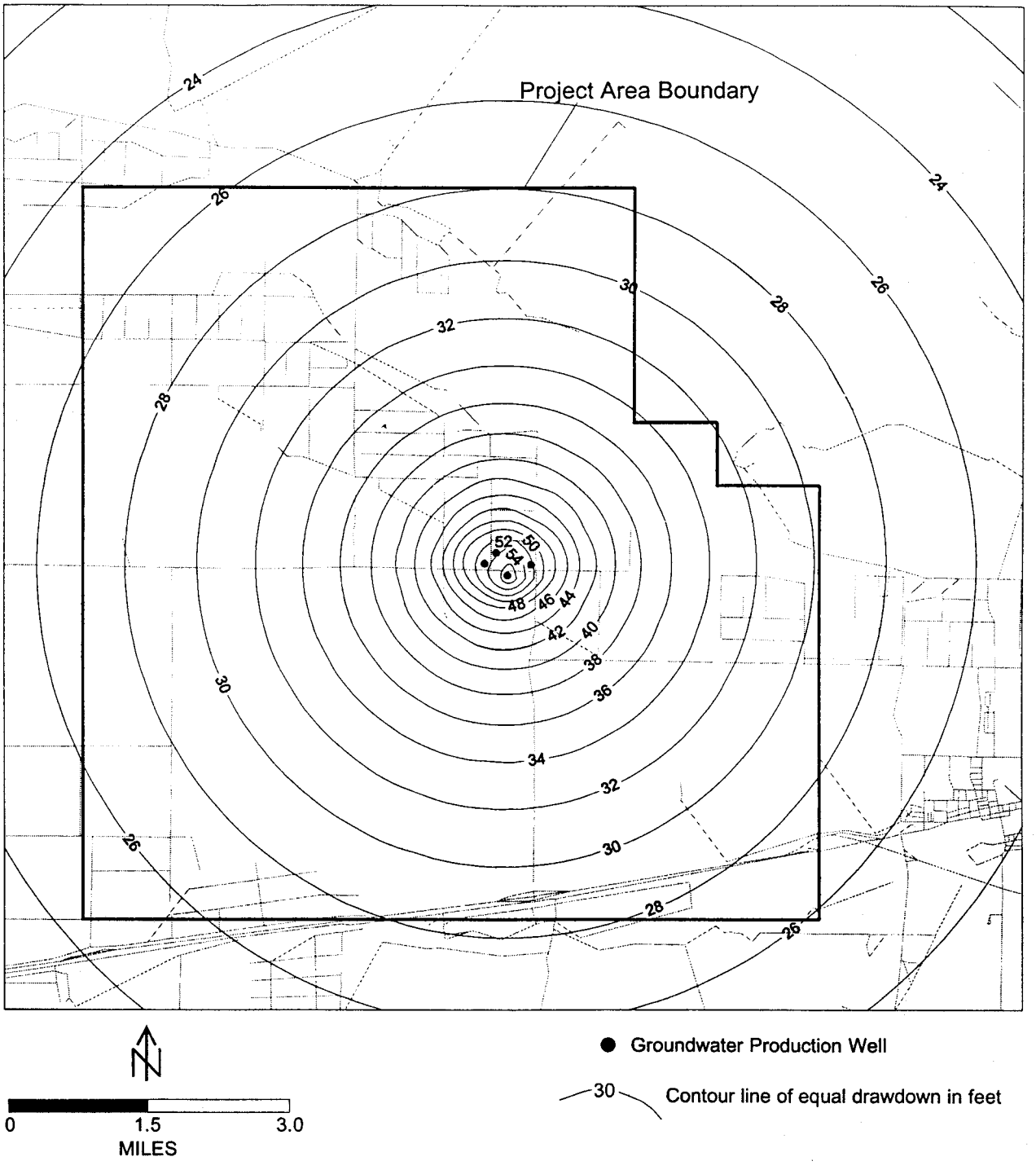

FIGURE 9. PROJECTED DRAWDOWN FOR SCENARIO 1

HARGIS + ASSOCIATES, INC.
Hydrogeology/Engineering

GB12

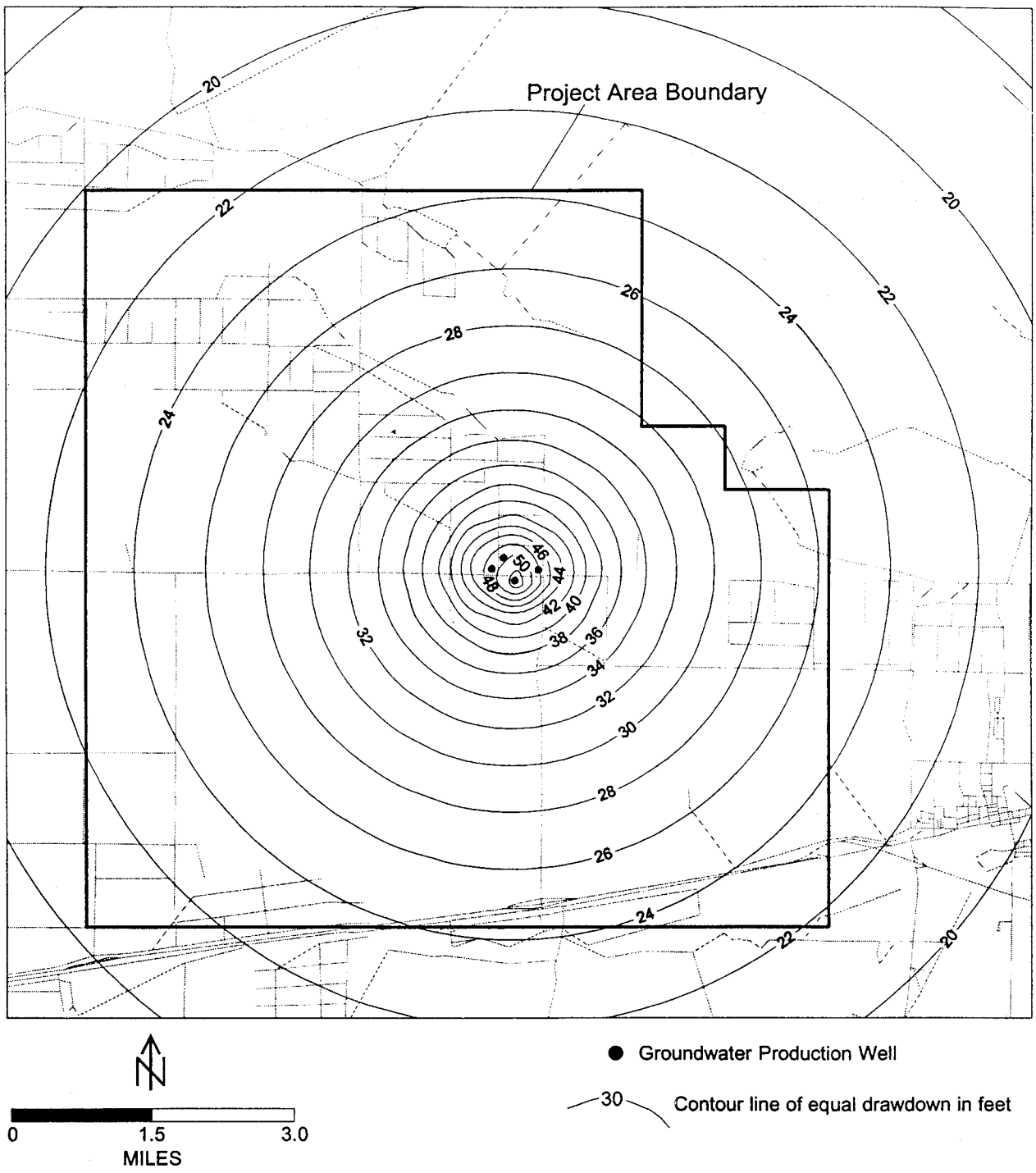

FIGURE 10. PROJECTED DRAWDOWN FOR SCENARIO 2

HARGIS + ASSOCIATES, INC.
Hydrogeology/Engineering

GB13

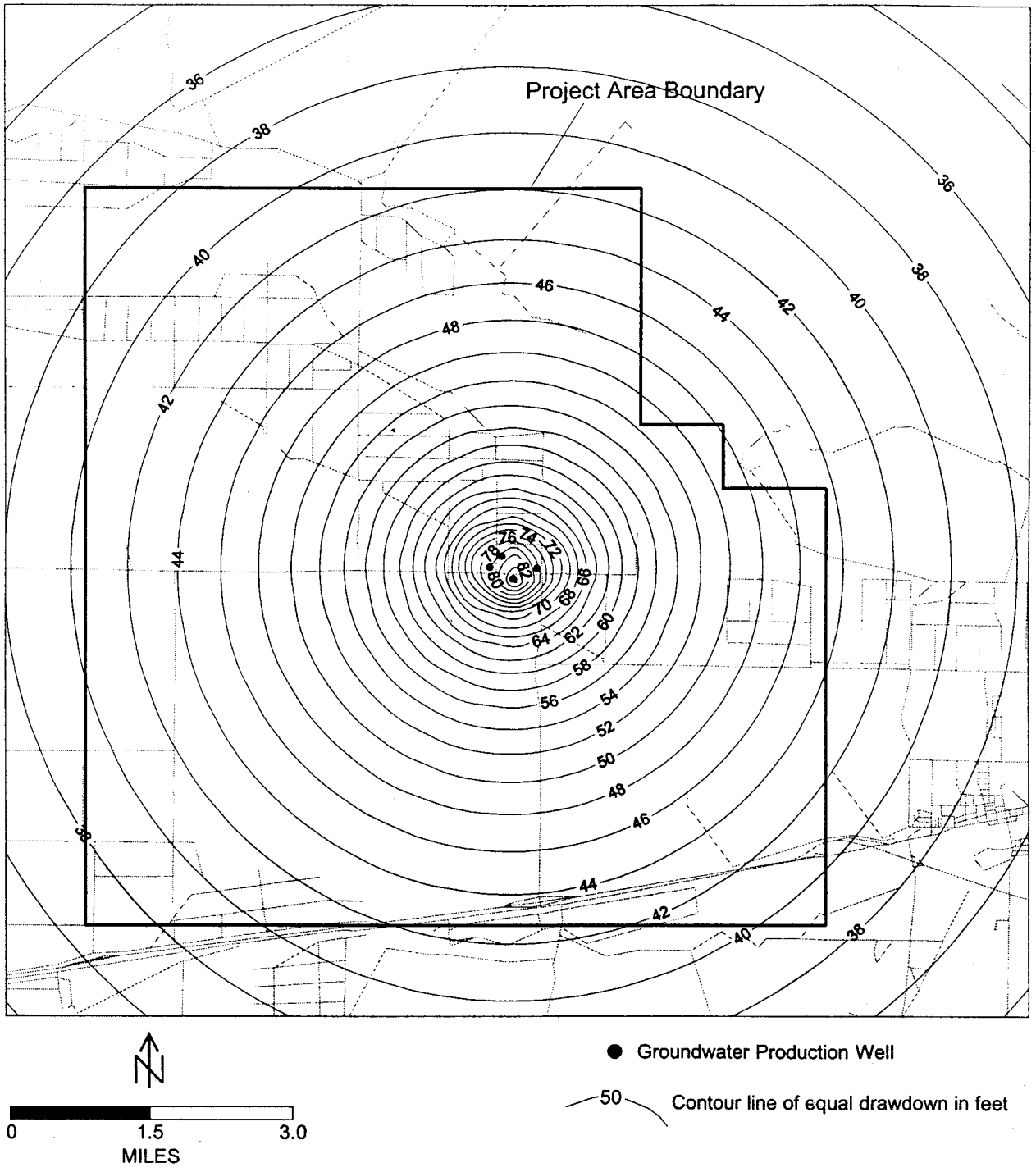

FIGURE 11. PROJECTED DRAWDOWN FOR SCENARIO 3

HARGIS + ASSOCIATES, INC.
Hydrogeology/Engineering

GB15

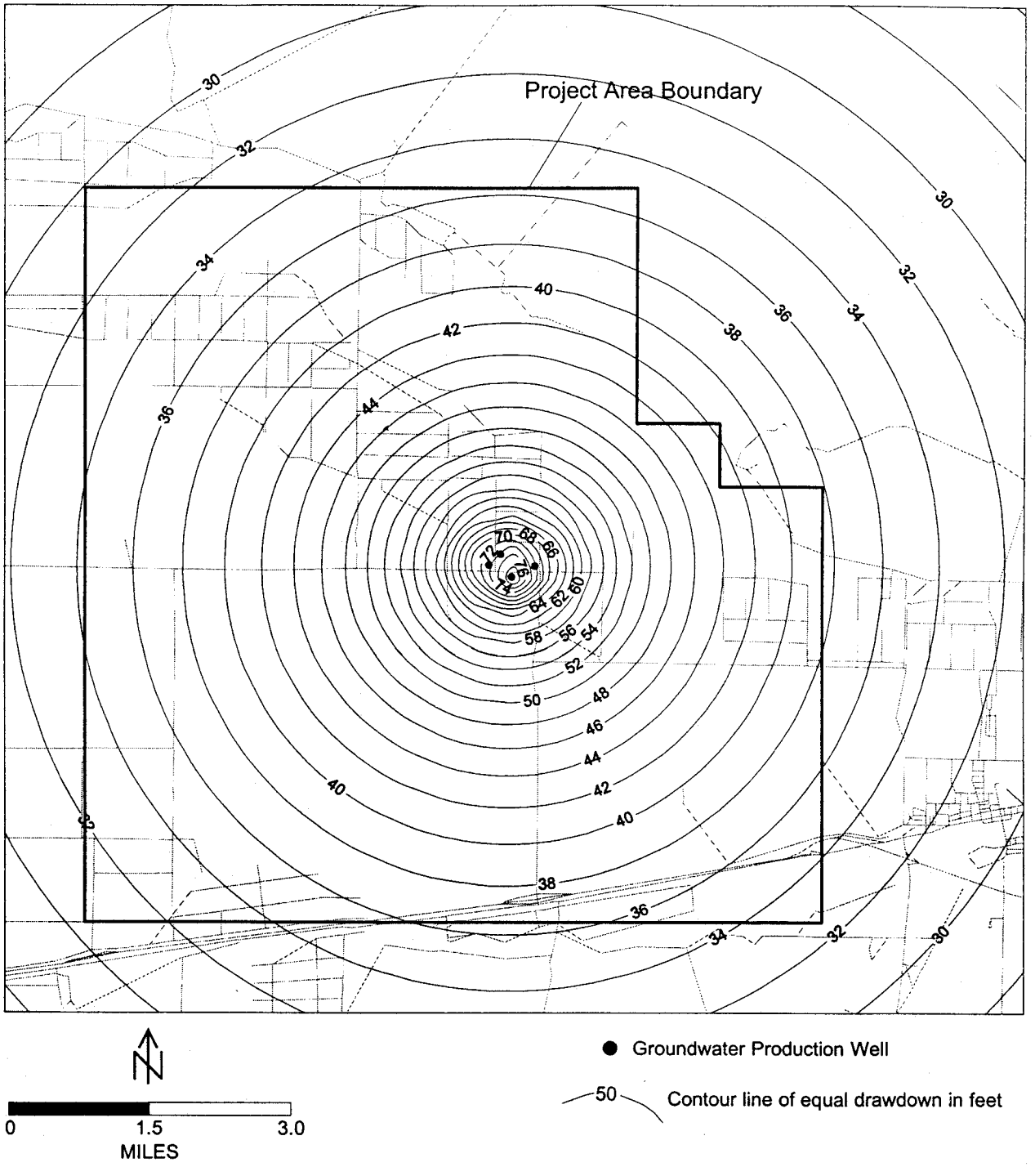

FIGURE 12. PROJECTED DRAWDOWN FOR SCENARIO 4

HARGIS + ASSOCIATES, INC.
Hydrogeology/Engineering

GB17

HARGIS + ASSOCIATES, INC.

ATTACHMENT A

LABORATORY ANALYTICAL REPORTS

Del Mar Analytical

2852 Alton Ave., Irvine, CA 92606 (949) 261-1022 FAX (949) 261-1228
1014 E. Cooley Dr., Suite A, Colton, CA 92324 (909) 370-4667 FAX (909) 370-1046
7277 Hayvenhurst, Suite B-12, Van Nuys, CA 91406 (818) 779-1844 FAX (818) 779-1843
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9830 South 51st St., Suite B-120, Phoenix, AZ 85044 (480) 785-0043 FAX (480) 785-0851

Hargis & Associates, Inc. - Tempe
1400 E. Southern Ave., Ste. 620
Tempe, AZ 85282
Attention: Michael Long

Client Project ID: GBPP 886

Report Number: PJJ0425

Sampled: 10/26/00
Received: 10/26/00

TOTAL RECOVERABLE METALS

Analyte	Method	Batch	Reporting Limit mg/l	Sample Result mg/l	Dilution Factor	Date Extracted	Date Analyzed	Data Qualifiers
Sample ID: PJJ0425-01 (Well No.1 - Water)								
Antimony	EPA 200.7	P0J2703	0.050	ND	1	10/27/00	10/27/00	C
Arsenic	EPA 200.7	P0J2703	0.050	ND	1	10/27/00	10/27/00	
Barium	EPA 200.7	P0J2703	0.010	**0.072**	1	10/27/00	10/27/00	
Cadmium	EPA 200.7	P0J2703	0.0050	ND	1	10/27/00	10/27/00	
Calcium	EPA 200.7	P0J2703	2.0	**250**	1	10/27/00	10/27/00	
Chromium	EPA 200.7	P0J2703	0.010	ND	1	10/27/00	10/27/00	
Copper	EPA 200.7	P0J2703	0.020	**0.043**	1	10/27/00	10/30/00	
Iron	EPA 200.7	P0J2703	0.10	**0.64**	1	10/27/00	10/27/00	
Lead	EPA 200.7	P0J2703	0.050	ND	1	10/27/00	10/27/00	
Magnesium	EPA 200.7	P0J2703	0.50	**43**	1	10/27/00	10/27/00	
Manganese	EPA 200.7	P0J2703	0.020	**0.036**	1	10/27/00	10/27/00	
Mercury	EPA 245.1	P0J2708	0.00020	ND	1	10/27/00	10/27/00	
Nickel	EPA 200.7	P0J2703	0.050	ND	1	10/27/00	10/27/00	
Potassium	EPA 258.1	P0J2703	1.0	**14**	1	10/27/00	10/27/00	
Selenium	EPA 200.7	P0J2703	0.050	ND	1	10/27/00	10/27/00	
Silica	EPA 200.7	P0J2703	2.5	**43**	1	10/27/00	11/1/00	
Sodium	EPA 273.1	P0J2703	50	**680**	10	10/27/00	10/27/00	
Zinc	EPA 200.7	P0J2703	0.050	**0.13**	1	10/27/00	10/27/00	

DEL MAR ANALYTICAL, PHOENIX (AZ0426)

Beth Price
Project Manager

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Del Mar Analytical

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Hargis & Associates, Inc. - Tempe
1400 E. Southern Ave., Ste. 620
Tempe, AZ 85282
Attention: Michael Long

Client Project ID: GBPP 886

Report Number: PJJ0425

Sampled: 10/26/00
Received: 10/26/00

DISSOLVED METALS

Analyte	Method	Batch	Reporting Limit mg/l	Sample Result mg/l	Dilution Factor	Date Extracted	Date Analyzed	Data Qualifiers
Sample ID: PJJ0425-02 (Well No.1 - Water)								
Antimony, Dissolved	EPA 200.7	P0J2703	0.050	ND	1	10/27/00	10/27/00	C
Arsenic, Dissolved	EPA 200.7	P0J2703	0.050	ND	1	10/27/00	10/27/00	
Barium, Dissolved	EPA 200.7	P0J2703	0.010	**0.072**	1	10/27/00	10/27/00	
Cadmium, Dissolved	EPA 200.7	P0J2703	0.0050	ND	1	10/27/00	10/27/00	
Calcium, Dissolved	EPA 200.7	P0J2703	2.0	**250**	1	10/27/00	10/27/00	
Chromium, Dissolved	EPA 200.7	P0J2703	0.010	ND	1	10/27/00	10/27/00	
Copper, Dissolved	EPA 200.7	P0J2703	0.020	ND	1	10/27/00	10/30/00	
Iron, Dissolved	EPA 200.7	P0J2703	0.10	**0.11**	1	10/27/00	10/27/00	
Lead, Dissolved	EPA 200.7	P0J2703	0.050	ND	1	10/27/00	10/27/00	
Magnesium, Dissolved	EPA 200.7	P0J2703	0.50	**46**	1	10/27/00	10/27/00	
Manganese, Dissolved	EPA 200.7	P0J2703	0.020	ND	1	10/27/00	10/27/00	
Mercury, Dissolved	EPA 245.1	P0J2708	0.00020	ND	1	10/27/00	10/27/00	
Nickel, Dissolved	EPA 200.7	P0J2703	0.050	ND	1	10/27/00	10/27/00	
Potassium, Dissolved	EPA 258.1	P0J2703	1.0	**14**	1	10/27/00	10/27/00	
Selenium, Dissolved	EPA 200.7	P0J2703	0.050	ND	1	10/27/00	10/27/00	
Silica, Dissolved	EPA 200.7	P0J2703	2.5	**42**	1	10/27/00	11/1/00	
Sodium, Dissolved	EPA 273.1	P0J2703	50	**780**	10	10/27/00	10/27/00	
Zinc, Dissolved	EPA 200.7	P0J2703	0.050	**0.14**	1	10/27/00	10/27/00	

DEL MAR ANALYTICAL, PHOENIX (AZ0426)

Beth Price
Project Manager

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Hargis & Associates, Inc. - Tempe
1400 E. Southern Ave., Ste. 620
Tempe, AZ 85282
Attention: Michael Long

Client Project ID: GBPP 886
Report Number: PJJ0425

Sampled: 10/26/00
Received: 10/26/00

INORGANICS

Analyte	Method	Batch	Reporting Limit	Sample Result	Dilution Factor	Date Extracted	Date Analyzed	Data Qualifiers
			mg/l	mg/l				
Sample ID: PJJ0425-01 (Well No.1 - Water)								
Alkalinity as CaCO3	SM2320B	P0J2729	5.0	**110**	1	10/27/00	10/27/00	
Carbon Dioxide	SM4500-CO2C	P0J2626	1.0	**25**	1	10/26/00	10/26/00	HS,HT-I
Chloride	EPA 300.0	P0J2610	50	**1300**	100	10/26/00	10/26/00	
Dissolved Sulfide	SM4500-S-B,C,D	P0J3019	0.10	ND	1	10/27/00	10/30/00	
Fluoride	EPA 300.0	P0J2610	0.10	**3.2**	1	10/26/00	10/26/00	
Hardness (CaCO3)	SM2340B	P0J2703	1.0	**800**	1	10/27/00	10/27/00	
Hydrogen Sulfide	SM4500-S-H	P0J3021	0.10	ND	1	10/27/00	10/30/00	
Nitrate-N	EPA 300.0	P0J2610	1.0	**11**	10	10/26/00	10/26/00	
Nitrite-N	EPA 300.0	P0J2610	1.0	ND	10	10/26/00	10/26/00	
Orthophosphate	EPA 300.0	P0J2610	5.0	ND	10	10/26/00	10/26/00	
			pH Units	pH Units				
Sample ID: PJJ0425-01 (Well No.1 - Water)								
pH	EPA 150.1	P0J2618	NA	**8.01**	1	10/26/00	10/26/00	HT-I
			umhos/cm	umhos/cm				
Sample ID: PJJ0425-01 (Well No.1 - Water)								
Specific Conductance	SM2510B	P0J2611	2.0	**5000**	1	10/26/00	10/26/00	
			mg/l	mg/l				
Sample ID: PJJ0425-01 (Well No.1 - Water)								
Sulfate	EPA 300.0	P0J2610	50	**620**	100	10/26/00	10/26/00	
			°C	°C				
Sample ID: PJJ0425-01 (Well No.1 - Water)								
Temperature	EPA 170.1	P0J2614	NA	**19**	1	10/26/00	10/26/00	HT-I
			mg/l	mg/l				
Sample ID: PJJ0425-01 (Well No.1 - Water)								
Total Dissolved Solids	SM2540C	P0J2629	100	**3100**	1	10/26/00	10/26/00	
Total Suspended Solids	EPA 160.2	P0J2609	10	**25**	1	10/26/00	10/26/00	

Beth Price
Project Manager

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1400 E. Southern Ave., Ste. 620
Tempe, AZ 85282
Attention: Michael Long

Client Project ID: GBPP 886
Report Number: PJJ0425

Sampled: 10/26/00
Received: 10/26/00

INORGANICS

Analyte	Method	Batch	Reporting Limit mg/l	Sample Result mg/l	Dilution Factor	Date Extracted	Date Analyzed	Data Qualifiers
Sample ID: PJJ0425-01 (Well No.1 - Water)								
Total Kjeldahl Nitrogen	SM4500-N-O,C	C0J3014	0.50	ND	1	10/30/00	10/31/00	

Beth Price
Project Manager

The results pertain only to the samples tested in the laboratory. This report shall not be reproduced, except in full, without written permission from Del Mar Analytical.

HARGIS + ASSOCIATES, INC.

CHAIN-OF-CUSTODY RECORD AND ANALYSIS REQUEST FORM

DATE 10.25.00 PAGE 1 OF 1

PROJECT NAME: GBPP
PROJECT No./TASK No.: 886
PROJECT MANAGER: Michael R. Long
Phone No.: (480) 345-0883
QA MANAGER: Brian R. Waggle
FAX No.: 730-0503
SAMPLER (SIGNATURE): Brian R Waggle
SAMPLER (PRINTED): BRIAN R. WAGGLE

LAB ID	SAMPLE ID	SAMPLE COLLECTION Date	SAMPLE COLLECTION Time	MATRIX: Soil	MATRIX: Ground-water	MATRIX: Surface water	PRESERVATION: HCl	PRESERVATION: HNO3	PRESERVATION: NaOH	PRESERVATION: H2SO4	PRESERVATION: Ice	PRESERVATION: NaOH+Zn acetate	SAMPLE CONTAINERS: 1 L Poly	SAMPLE CONTAINERS: 500 ml Poly	SAMPLE CONTAINERS: 500 ml glass amber	ANALYSES REQUESTED: Semi-volatile List	ESTIMATED CONCENTRATION RANGE (ppb FOR VOA'S)	SPECIAL HANDLING: Field Filtered
PJT0425-02	Well No. 1	10.26.00	0820	X							X		1					
-02				X					X		X			2				1
				X							X			1				
				X							X				1			
				X							X	X			1			

Total number of Containers per analysis:

LABORATORY INFORMATION: Del Mar

REMARKS: 72-hour Turnaround Time Requested For all Analyses

Total No. of Containers:

Relinquished by:	Date	Received by:	Date
Brian R Waggle	10/26/00	Vicki Foster	10/26/00
HHA Company	Time 1015	Del Mar A. Company	Time 10:15
Relinquished by:	Date	Received by:	Date
Company	Time	Laboratory	Time

INSTRUCTIONS

1. Fill out form completely except for shaded areas (lab use only); sign only after verified for completeness.
2. Complete in ballpoint pen. Draw one line through errors, initial and date correction.
3. Indicate number of sample containers in analysis request space; indicate choice with ✓ or x.
4. Note applicable preservatives, special instructions, and deviations from typical environmental samples.
5. Consult project QA documents for specific instructions.

Sample Receipt:
- ☐ No. of containers correct
- ☐ received good condition/cold
- ☐ custody seals secure
- ☐ conforms to COC document

Shipment Method: hand delivered
Send Results to: Brian Waggle

- ☐ 2365 NORTHSIDE DRIVE, SUITE C-100 SAN DIEGO, CA 92108 (619) 521-0165
- ☒ 1400 EAST SOUTHERN AVENUE, SUITE 620 TEMPE, AZ 85282 (480) 345-0883
- ☐ 1820 EAST RIVER ROAD, SUITE 100 TUCSON, AZ 85718 (520) 881-7300

Send invoice to San Diego, CA
Attn: Accounts Payable

NOTICE OF PUBLIC HEARING

A Public Hearing will be held before the Planning Commissioin of The Town of Gila Bend on:

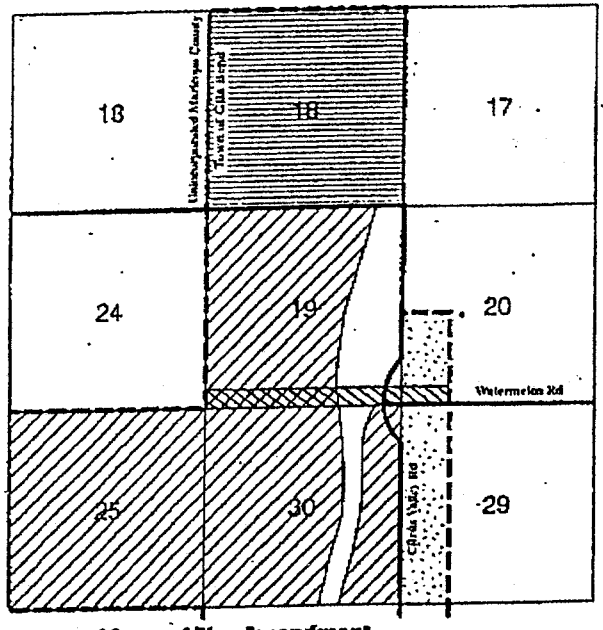
DATE: Thursday, November 9, 2000

TIME: 7:00 pm

PLACE: Gila Bend Town Hall, 644 West Pima Street
Gila Bend, AZ 85337

CASE: GPA-00-05

GPA-00-05, to consider a proposed General Plan Amendment to the Town of Gila Bend General Plan to change the land use designation on Section 19 Township 5 South Range 5 West from unplanned to Heavy Industrial and open space.



Proposed General Plan Amendment

- Town Boundary
- Utility Corridor (500')
- Heavy Industrial
- Unplanned
- Light Industrial
- Parks/Open Space

Interested persons may file written comments concerning the proposed amendments and/or appear and be heard at the public meeting. Copies of the proposed amendments will be available at the Town Hall.

Accessibility for all persons with disabilities will be provided upon request. Please telephone your accommodation request (683-2255 or 1-800-367-8939 ADD Arizona Relay Service) 72 hours in advance if you need a sign language interpreter or alternate materials for a visual or hearing impairment.

Number of Publications two: Dates of Publication, October 19 & 26, 2000

NOTICE OF PUBLIC HEARING

A Public Hearing will be held before the Planning Commissioin of The Town of Gila Bend on:

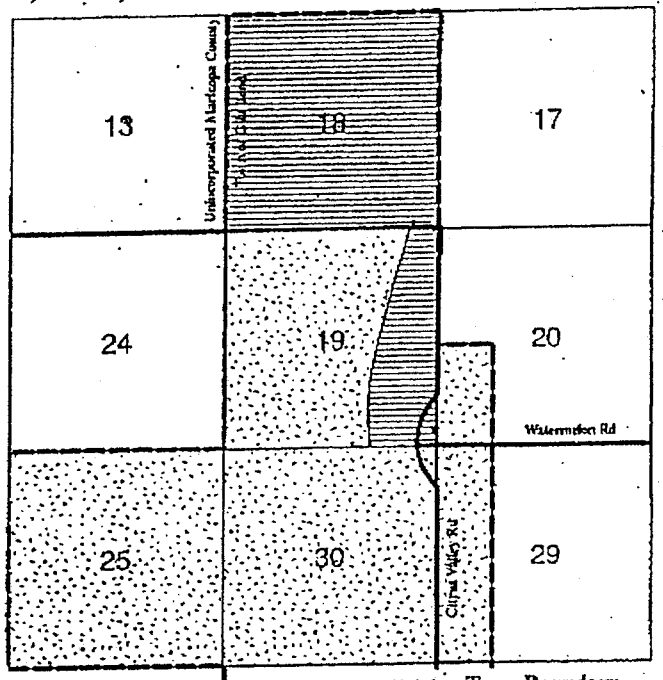
DATE: Thursday, November 9, 2000

TIME: 7:00 pm

PLACE: Gila Bend Town Hall, 644 West Pima Street
Gila Bend, AZ 85337

CASE: Z-00-26

Z-00-26, to consider a proposed amendment to the Zoning Ordinance to change the zoning on Section 19 Township 5 South Range 5 West from AG to Heavy Industry.



Proposed Zoning Change

- Town Boundary
- Agriculture
- I-3

Interested persons may file written comments concerning the proposed amendments and/or appear and be heard at the public meeting. Copies of the proposed amendments will be available at the Town Hall.

Accessibility for all persons with disabilities will be provided upon request. Please telephone your accommodation request (683-2255 or 1-800-367-8939 ADD Arizona Relay Service) 72 hours in advance if you need a sign language interpreter or alternate materials for a visual or hearing impairment.

Number of Publications two: Dates of Publication, October 19 & 26, 2000

TOWN OF GILA BEND

APPLICATION FOR AN AMENDMENT TO THE GENERAL PLAN

DATE FILED:_____ APPLICATION FEE PAID: **$0** DEPOSIT PAID: **$0**

CHECK NO:_____ BANK:_____ RECEIVED BY:_____

ZONING: Existing ***AG*** Proposed **I-3 and AG** Number of Acres **640**

GENERAL PLAN DESIGNATION: Existing: **Unplanned** Proposed **Open Space and Heavy Industrial**

Property Legal Description, Assessor's Parcel Number, and Address:

Assessor's Parcel Number: 403-15-049E, 049H, 049J, 049K, 049L, 049M, 049N, 048

T&R, Sec: Township 5S, Range 5W, Section 19

Applicant Name: **Gila Bend Planning Commission**

Address (mailing and physical): _____

Telephone: _____ FAX: _____

Owner's Name (If other than petitioner): **S&P Farms, Paloma Ranch, and US Government**

Address: **See Section 3 for full addresses**

Telephone: _____

INSTRUCTIONS

The following items must be submitted with the application at the time of filing:

____ Assessor's Parcel Map(s) showing all properties within 100 feet

____ A description of the impact of the proposed use will have in relation to the health, safety, and general welfare of the occupants of surrounding lands, and consistency of the proposed amendment with the General Plan outside of the proposed amendment area.

____ Vicinity map showing all property within 300 feet by name of owner, a set of mailing labels for each property owner within 300 feet, and a copy of the vicinity map in an 8½" X 11" format on white paper and on a transparency

Certification:

I certify that the information I have given on this application is true and accurate to the best of my knowledge.

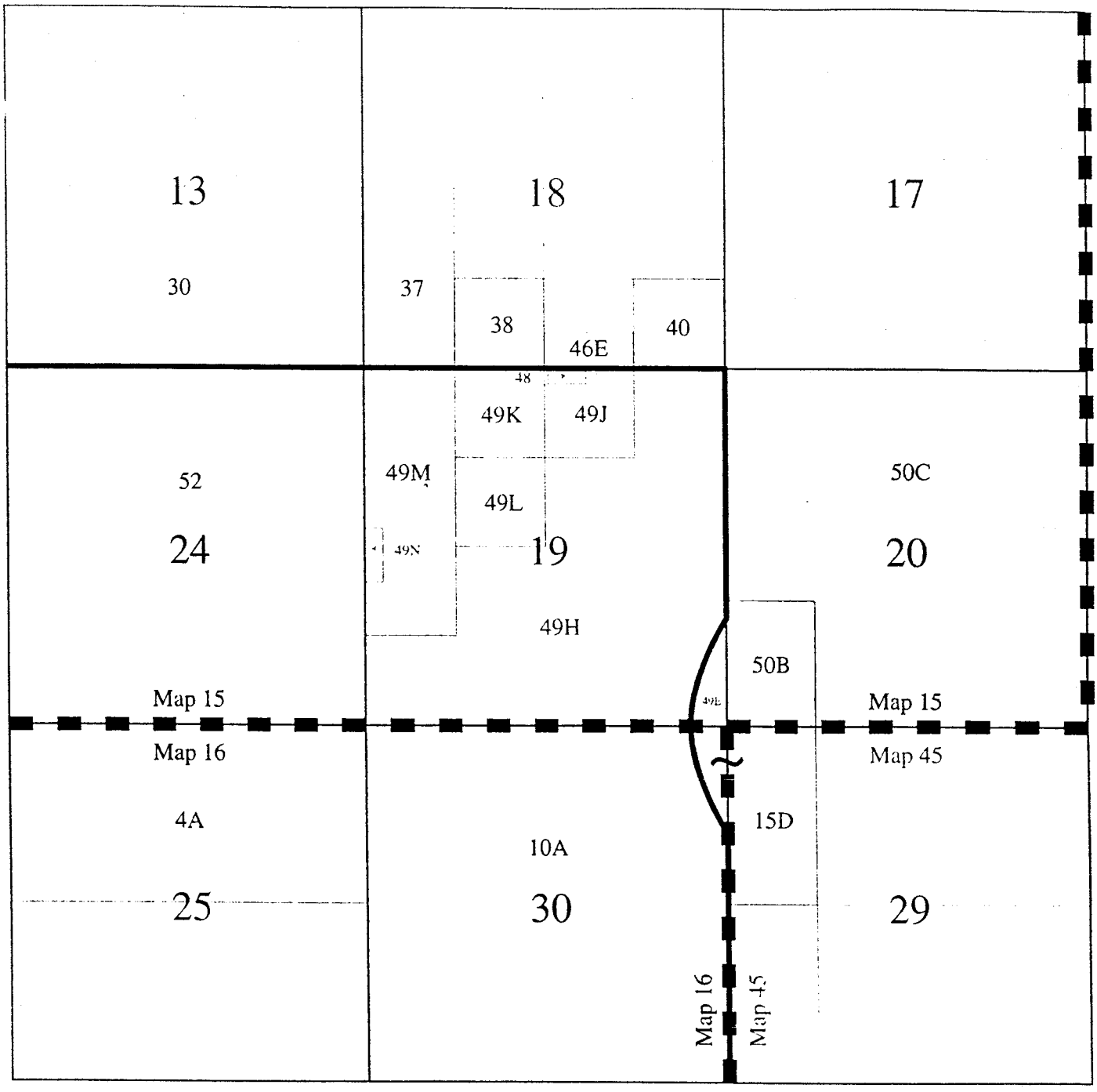
_____ _____

Applicant's Signature

SECTION 2: IMPACT ASSESSMENT

The site is located on the west side of Citrus Valley Road immediately north of approximately 1,500 acres of land in Section 30, T5S, R5W, that is planned for heavy industrial use, specifically a commercial landfill. The surrounding lands include a mixture of agricultural and desert lands. The proposed use of the parcel, Heavy Industrial, is consistent with the General Plan designation for the adjacent properties within the town limits, which are Heavy Industrial to the south and Light Industrial to the east.

The site is intended to be developed for a combined cycle power generating facility. There are no occupants on surrounding lands within 300 feet of the subject parcel and, therefore, impacts to residents will be minimal. Additional information regarding health, safety, and welfare is included in the Application for a Certificate of Environmental Compatibility (Gila Bend Power Partners, LLC, September 2000).

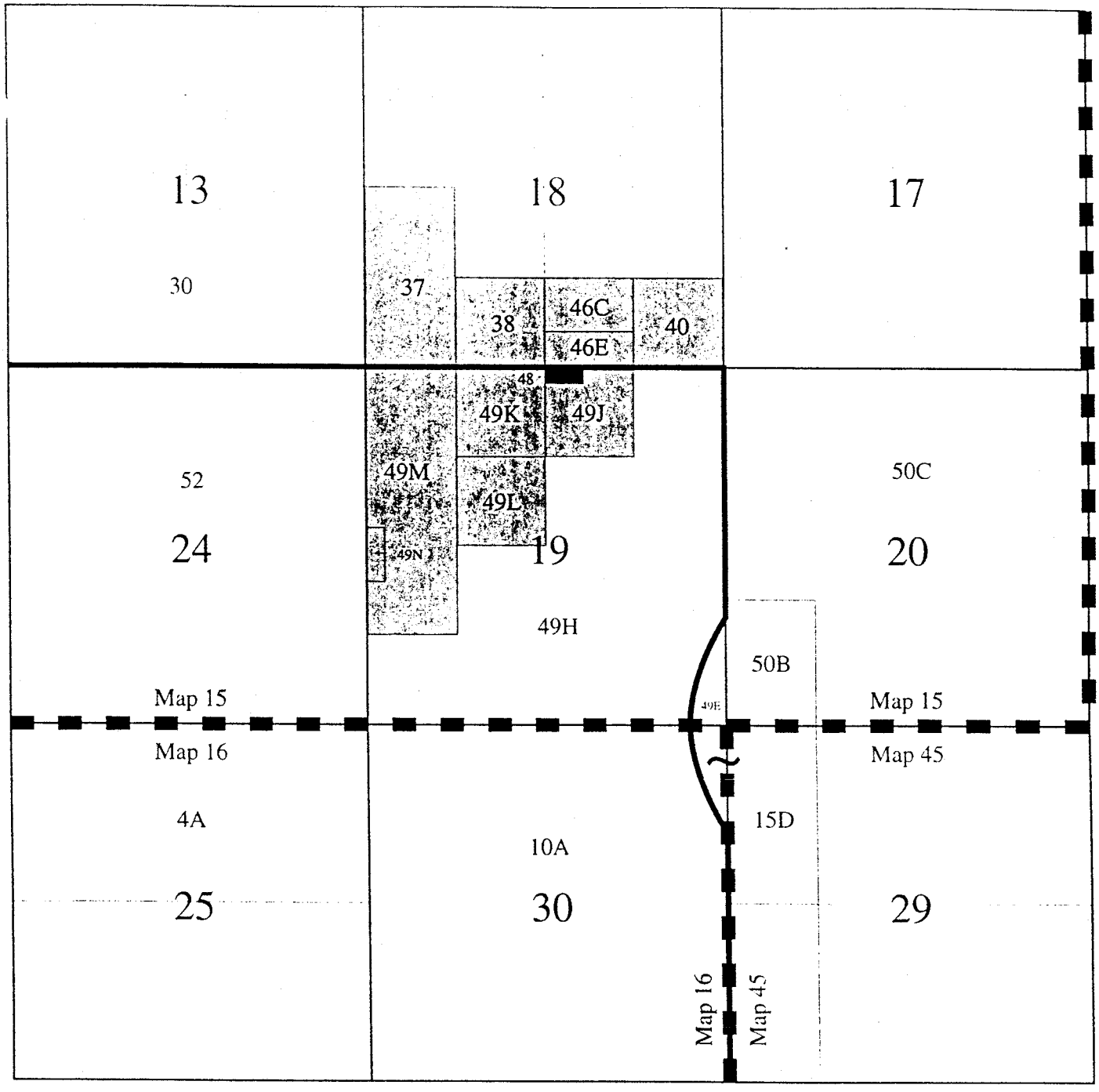


Properties Within 100' of Site

Properties Within 100'

Area Subject to Plan Amendment

Figure 1
Township 5S, Range 5W
Section 19



Parcels and Landowners Within 300' of Site*

*See Attachment for Addresses

- Paloma Ranch
- S&P Farms
- San Lucy District, Tohono O'Odham Nation
- United States Government

Figure 2
Township 5S, Range 5W
Section 19

SECTION 3: MAILING ADDRESSES OF LANDOWNERS

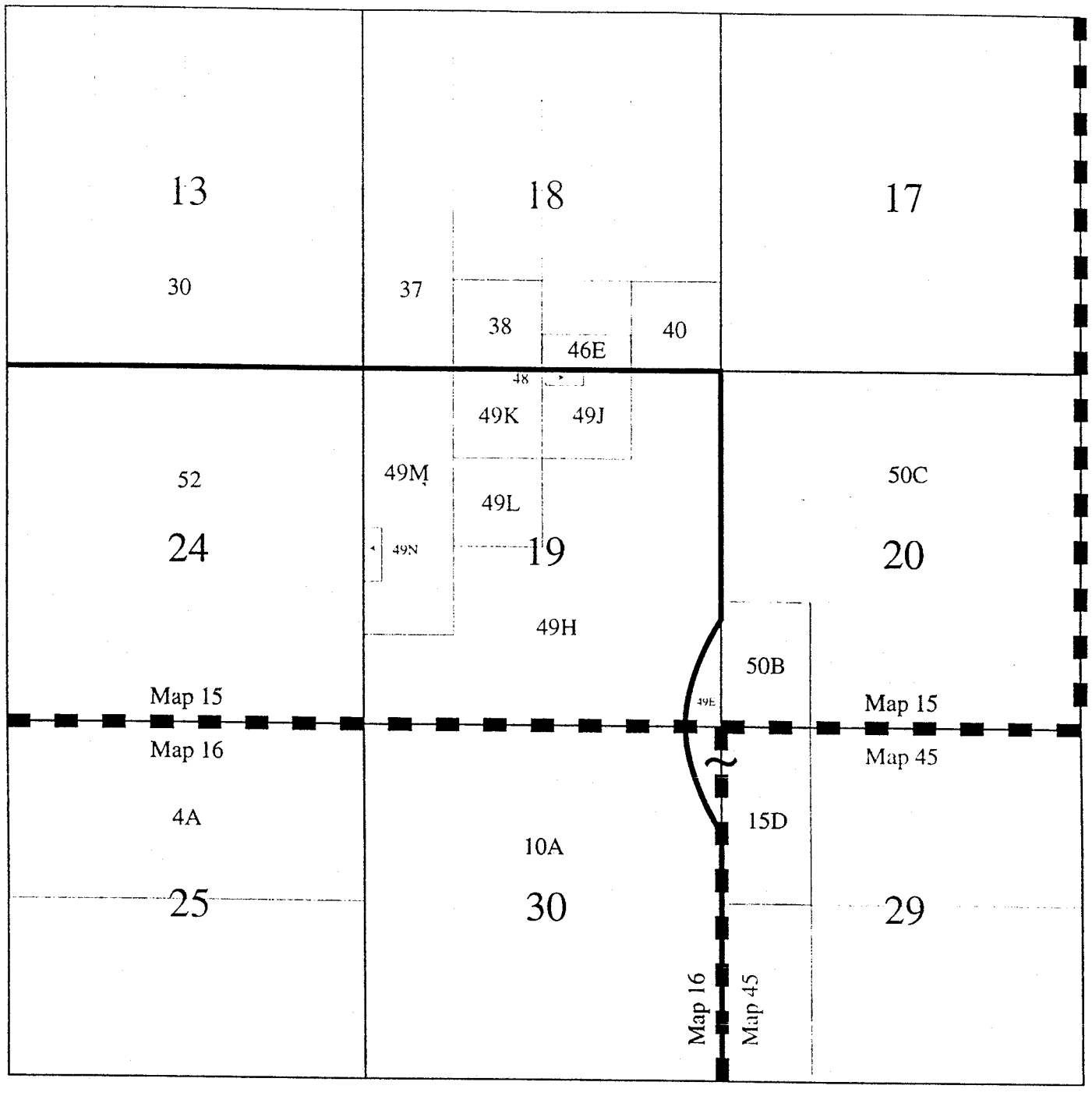
S&P Farms
205 W. Sonoma Dr.
Litchfield Park, AZ 85340

Paloma Ranch
1999 Avenue of the Stars, Suite 1200,
Los Angeles, CA 90067

United States Government
PO Box 81169
Phoenix, AZ 85068

San Lucy Division, Tohono O'Odham Nation

520 683 2343



Properties Within 100' of Site

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Area Subject to Plan Amendment

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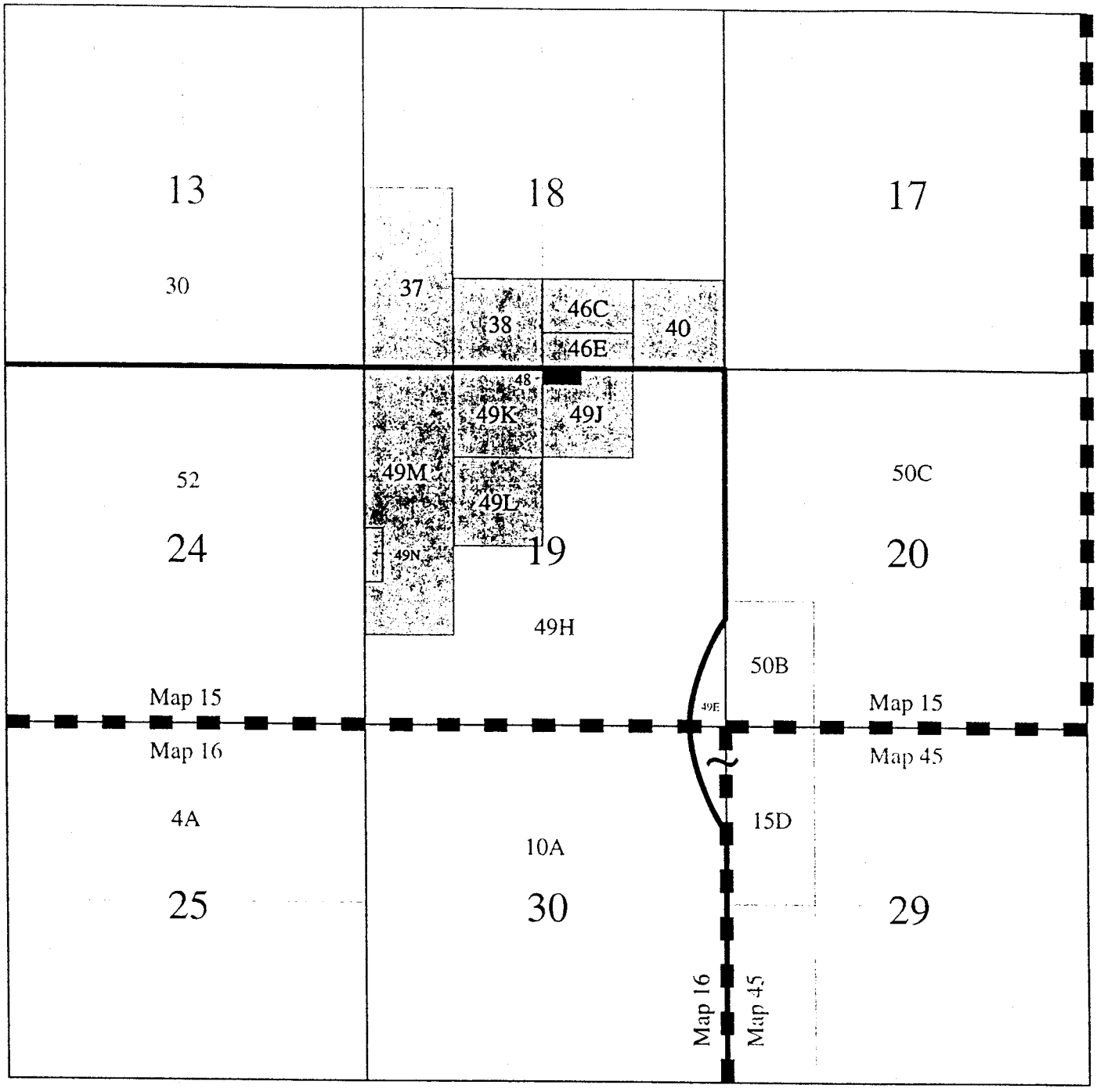
Township 5S, Range 5W
Section 19
DRAFT 10/23/00



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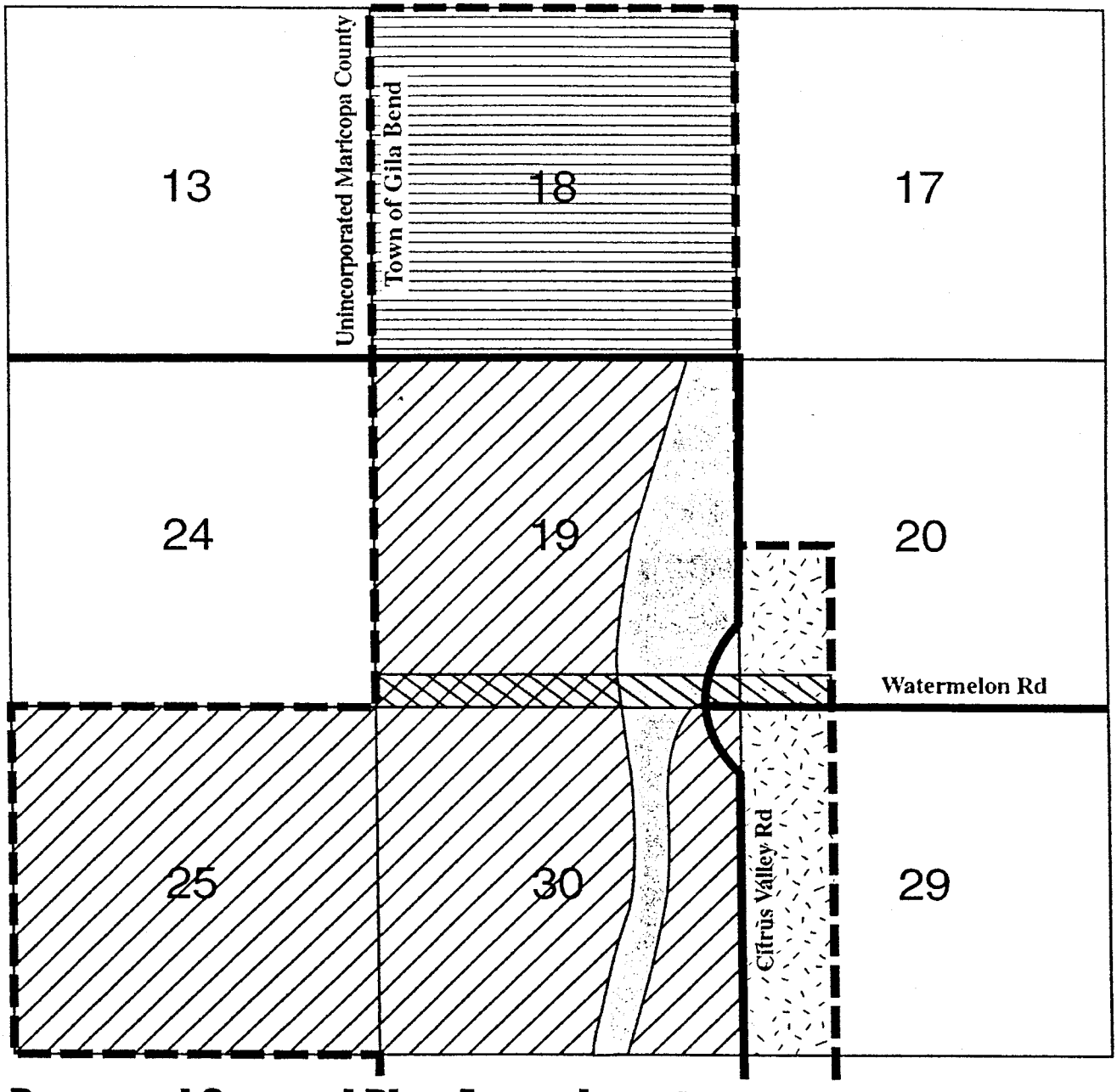
DRAFT 10/23/00



Proposed General Plan Amendment

- Town Boundary
- Heavy Industrial
- Light Industrial
- Parks/Open Space
- Utility Corridor (500')
- Unplanned

Section 19, Township 5S
Range 5W

TOWN OF GILA BEND

APPLICATION FOR A CHANGE IN ZONING

DATE FILED:_____

APPLICATION FEE PAID: **$0** DEPOSIT PAID: **$0** CHECK NO:_____

BANK:_____ RECEIVED BY:_____

General Plan Designation: **Unplanned**

Property Legal Description, Assessor's Parcel Number, and Address:

Assessor's Parcel Number: 403-15-049H, 049J, 049K, 049L, 049M, 049N, 048

T&R, Sec: T5S, R5W, Section 19, except a portion of the E ½ of the E ½ of Section 19.

NUMBER OF ACRES **480** ZONING: Existing **AG** Proposed **I-3**

Applicant Name: **Gila Bend Planning Commission**

Address (mailing and physical): _____

Telephone: _____ FAX: _____

Owner's Name (If other than petitioner): **S&P Farms, Paloma Ranch, and US Government**

Address: **See Section 3 for full addresses**

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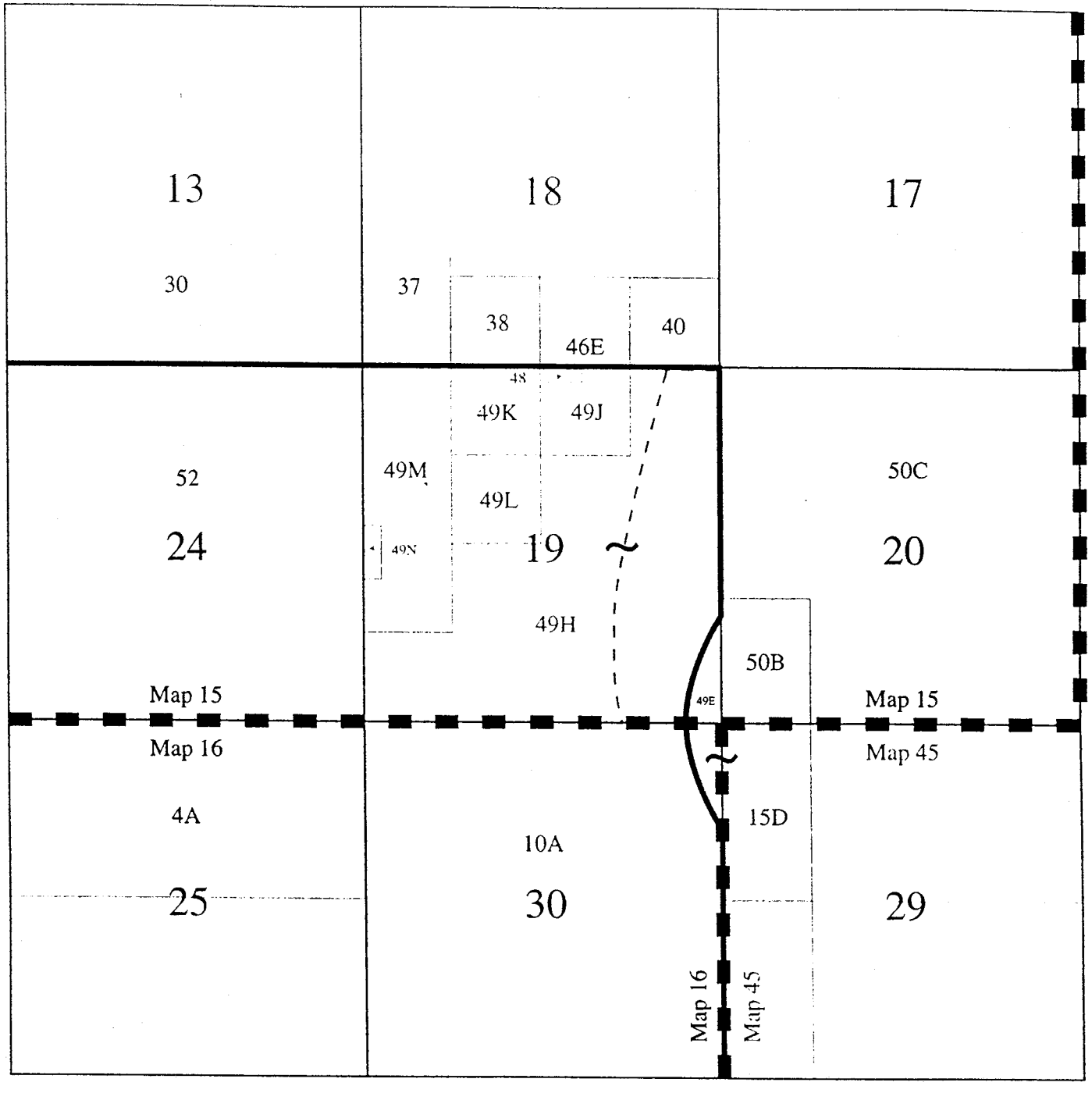

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Area Subject to Zoning Change

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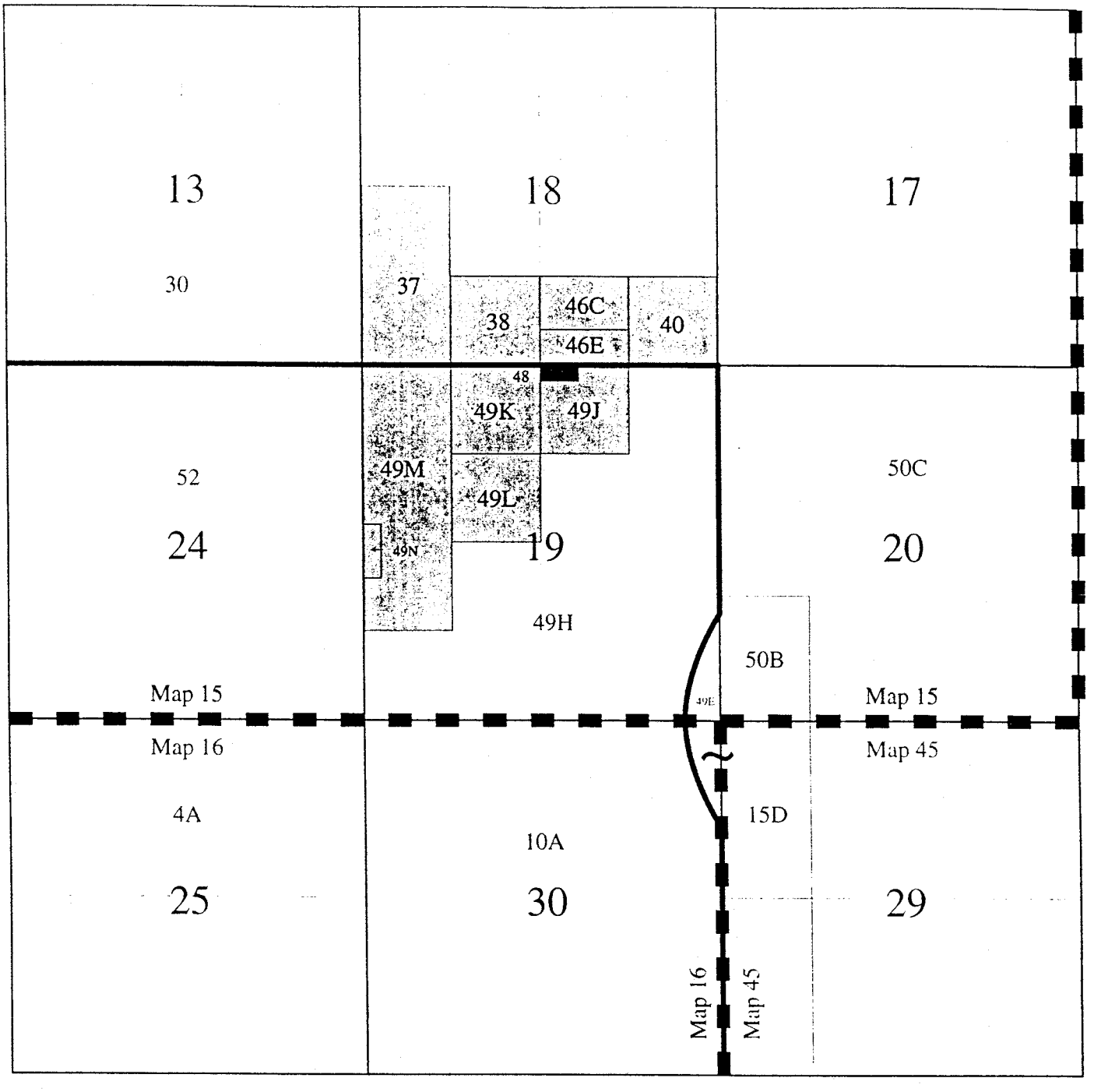
Township 5S, Range 5W
Section 19



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Litchfield Park, AZ 85340

Paloma Ranch
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Los Angeles, CA 90067

United States Government
PO Box 81169
Phoenix, AZ 85068

San Lucy Division, Tohono O'Odham Nation

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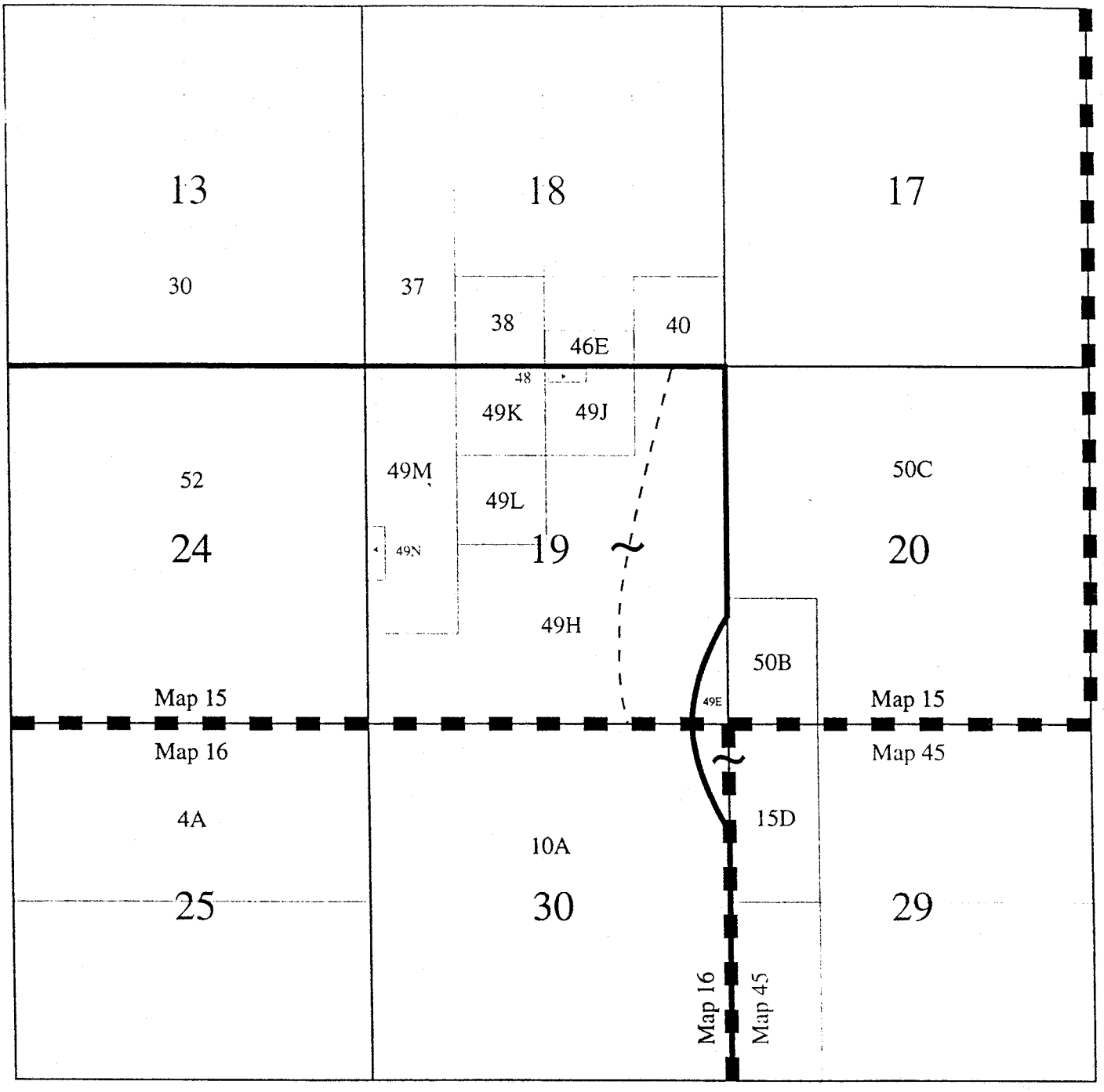

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Area Subject to Zoning Change

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Township 5S, Range 5W
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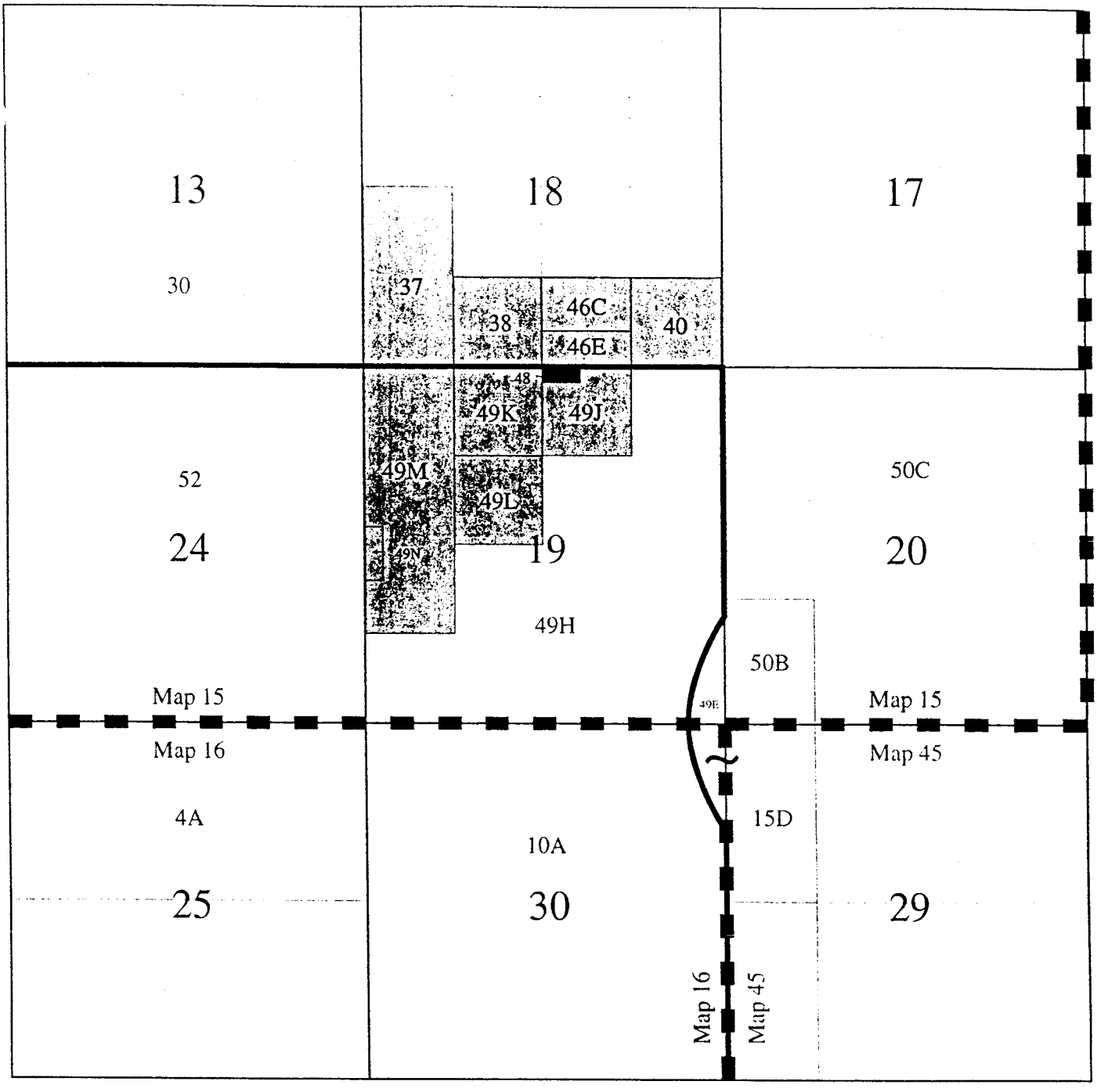
DRAFT 10/23/00



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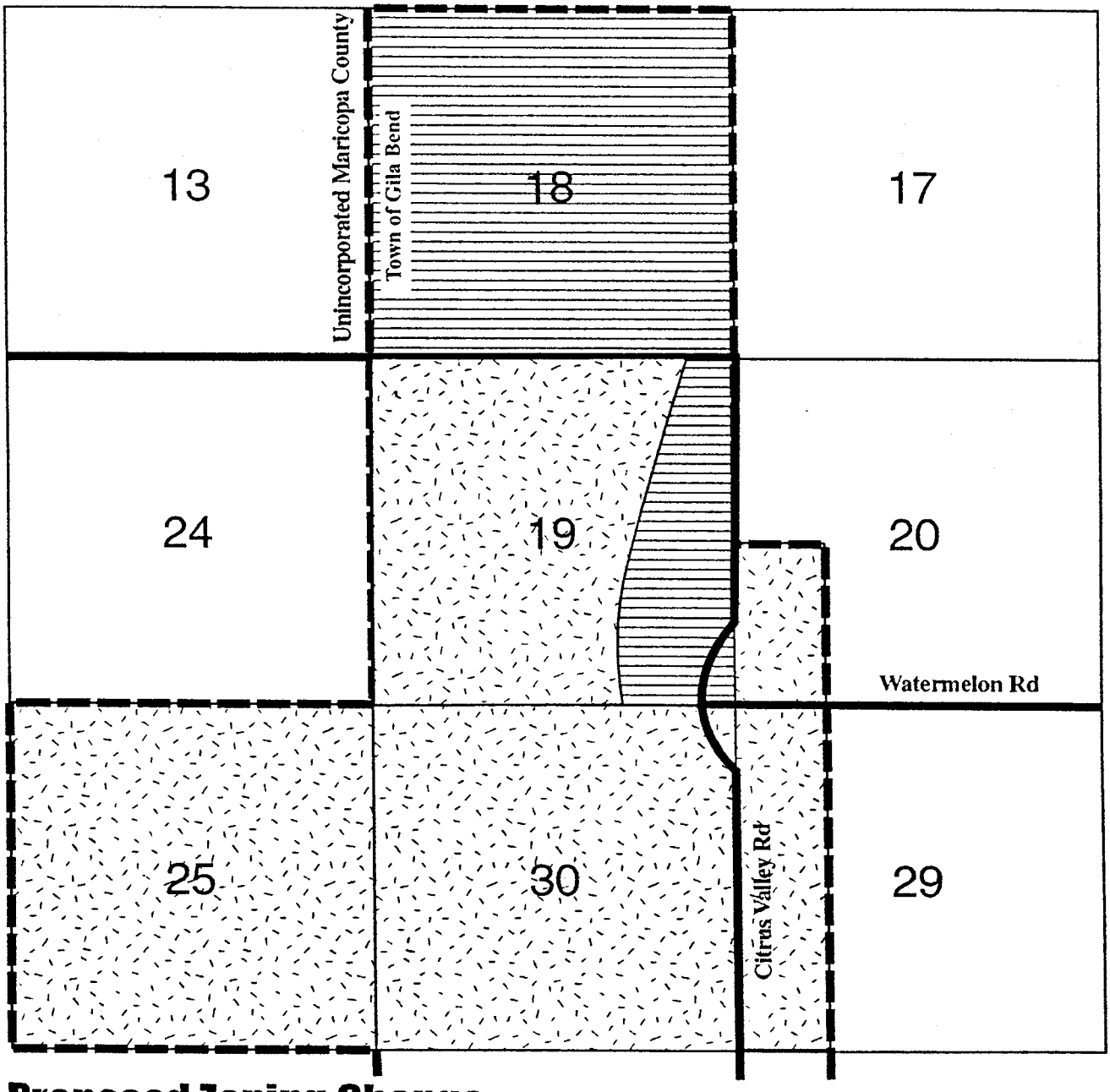


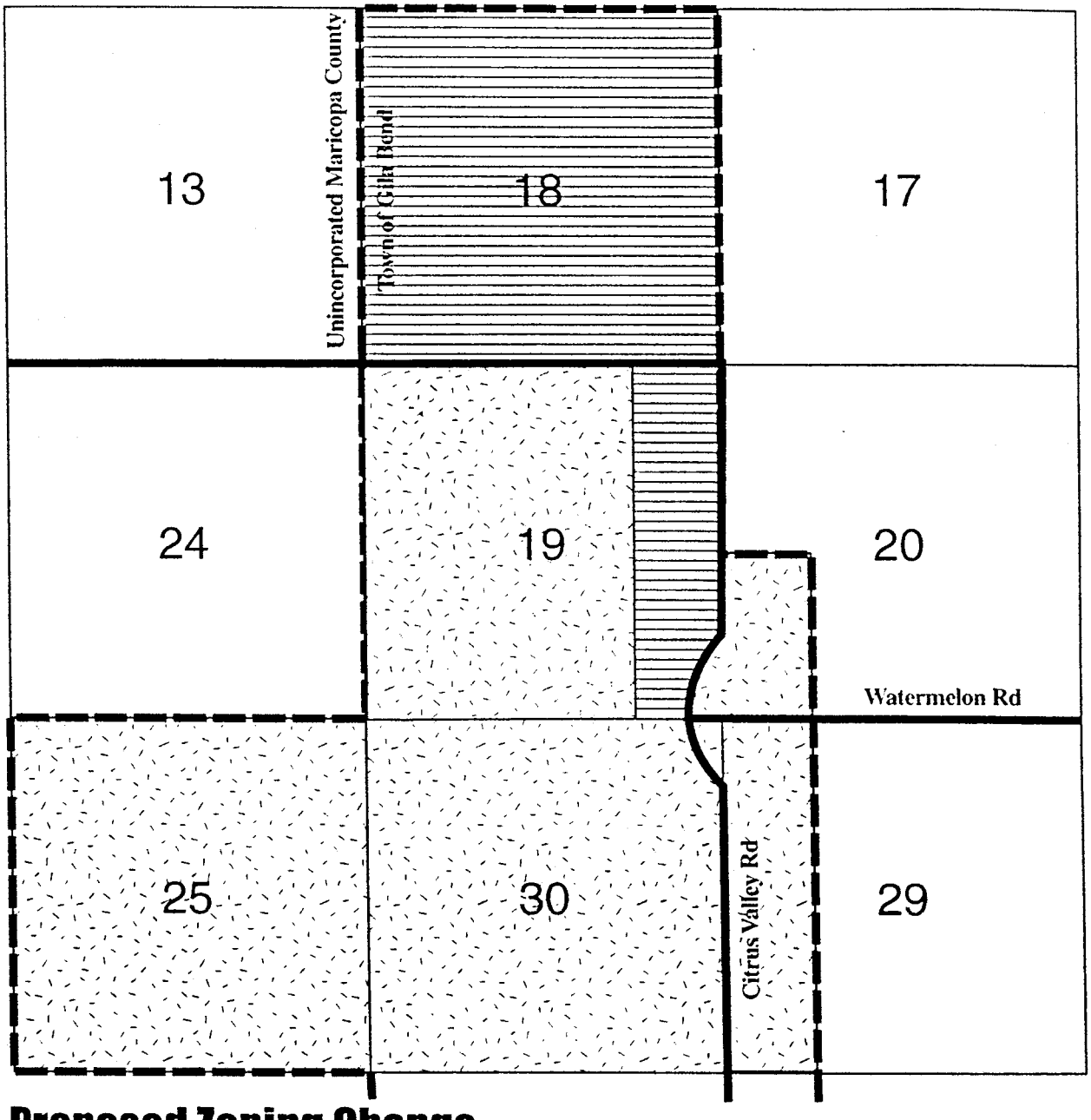
Proposed Zoning Change

Town Boundary

Agriculture

I-3

Section 19, Township 5S
Range 5W
DRAFT 10/23/00



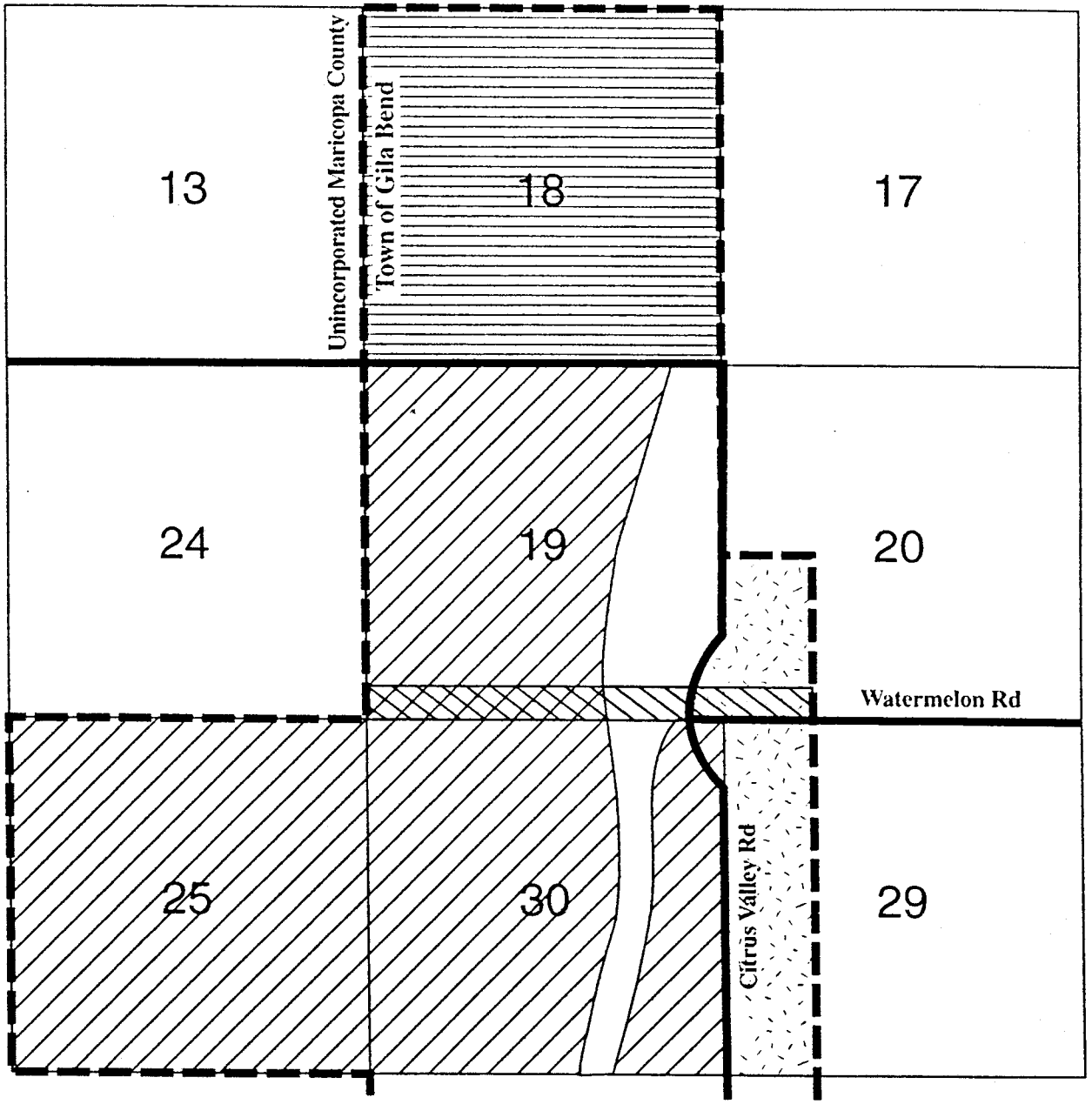
Proposed Zoning Change

Town Boundary

Agriculture

I-3

Section 19, Township 5S
Range 5W



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- Town Boundary
- Heavy Industrial
- Light Industrial
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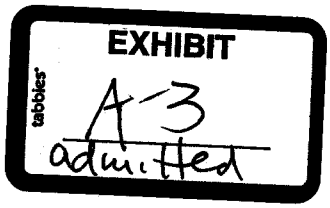
Section 19, Township 5S
Range 5W



BIOGRAPHICAL INFORMATION

OF

WITNESSES

POWER PLANT AND TRANSMISSION LINE SITING COMMITTEE HEARING NOVEMBER 15, 2000

Robert A. Innamorati
5949 Sherry Lane, Suite 1880
Dallas, Texas 75225
(214) 210-5080

business experience

summary

Twenty one years of project and general investment/merchant banking finance (including twelve years in management positions); six years of government service with the United States Secret Service.

1995-present

POWERDEVELOPMENT ENTERPRISES, LP ("PDELP") **Dallas, TX**
President. Private power project development firm that provides development and permanent capital for power and other energy related assets on a global basis. PDELP develops and finances projects for its own account and also seeks to form joint ventures with other developers in need of development and/or permanent project financing.

ROBERT A. INNAMORATI & CO., INC. **Dallas, TX**
President. Private investment and merchant banking firm. Serve as exclusive financial advisor to Sammons Enterprises, Inc., a Dallas-based diversified private company with approximately $7.0 billion of assets and $1.5 billion of net worth.

1990-1995

BANC ONE CAPITAL CORPORATION, **Dallas, TX**
BANC ONE CORPORATION
Managing Director, Corporate Finance Department
Investment banking firm.

1986-1990

DREXEL BURNHAM LAMBERT INCORPORATED **Dallas, TX**
First Vice President and Regional Manager
Investment banking firm.

1980-1986

PAINEWEBBER INCORPORATED ("PWI") **New York, NY**
First Vice President, Corporate Finance Department
Investment banking firm.

1979-1980

BLYTH EASTMAN DILLON & CO., INC. **New York, NY**
("BEDCO")
Associate, Corporate Finance Department
Investment banking firm.
BEDCO was acquired by PWI in 1980.

1971-1977

UNITED STATES SECRET SERVICE **Washington, DC**
Special Agent.

education

1977-1979

COLGATE DARDEN GRADUATE SCHOOL **Charlottesville, VA**
OF BUSINESS ADMINISTRATION
UNIVERSITY OF VIRGINIA
Master of business administration degree with concentration in finance.

education (continued)

1971 — **PROFESSIONAL SCHOOLS** — **Washington, DC**
U. S. Secret Service School and U. S. Treasury Department Law Enforcement Officer's School.

1965-1970 — **McINTIRE SCHOOL OF COMMERCE** — **Charlottesville, VA**
UNIVERSITY OF VIRGINIA
Bachelor of science degree in commerce with concentration in finance. Completed 90 hours towards bachelor of science degree in civil engineering.

military experience

1969-1971 — **U. S. MARINE CORPS RESERVES**
Honorable discharge, 1971.

Licenses — National Association of Securities Dealers ("NASD") Series 7, 8 and 63.

current or former volunteer activities — BSA Troop 82 Adult Leadership; YMCA fund raising; Dallas Symphony fund raising; Great State of Texas Gala fund raising; U. Va. Graduate Business School Class Agent.

personal — Held U. S. Government Top Secret security clearance. Excellent health, married, two children. Hobbies include boating, hunting and skiing.

November, 2000

ROBERT C. WALTHER, P.E., President

Industrial Power Technology
2227 Capricorn Way, Suit 101
Santa Rosa, CA 95407
(707) 528-8900 Fax: (707) 528-8901
Email: RCWalther@aol.com

Bob Walther has been President and CEO of Industrial Power Technology (IPT) from its inception in 1983 to the present. As a professional engineer and certified plant engineer, he is responsible for the strategic planning, design, and construction of power generation and control systems. Mr. Walther has demonstrated a unique talent and inherent ability in project siting, regulatory, and permitting activities, which extends to design, construction management, and plant operations. In addition, Mr. Walther directs IPT's independent engineering services and owners' representative services for lending institutions and plant owners.

EDUCATION: La Sierra College, Arlington, CA
University of the Pacific, Stockton, CA
San Francisco State, San Francisco, CA
Bell Laboratories, Brooklyn, NY & Murray Hill, NJ

ADVANCED STUDIES: A total of 4 years advanced engineering study with 1.5 years of automated circuit and power control.

LICENSES: Professional Engineer/Control Systems - Certificate No. 4233
Certified Plant Engineer - Certificate No. 15114

PUBLICATIONS: Standard Handbook Of Plant Engineering (1994) Electric Systems Management"
Electrical Consultant (May, 1996) "Combustion Turbine Installation"

EXPERT WITNESS: Mr. Walther has provided expert services in investigation, analysis and testimony in a variety of high-voltage equipment failures and electrical related accidents involving personal injury.

EXPERIENCE SUMMARY:

Over the last 25 years, Bob Walther has been the team leader in the development and construction of numerous utility and private sector power generating stations and transmission systems. Combining this leadership role with an in depth understanding of fuel and its availability, he has developed programs of effective fuel utilization and energy optimization, as well as cost-effective long-term fuel acquisition.

Mr. Walther has been involved in numerous U.S. projects and his international experience has included Great Britain, the Philippines, India and the People's Republic of China, where he was instrumental in the development of several projects in the 33 - 350 mW range. He has provided engineering services to major investment houses in Europe and the U.S., including, Banque Paribas, Credit Suisse, Kansallis-Osake-Pankki Bank, Morgan Stanley, Drexel Burnham Lambert, E.F. Hutton, and Aetna Insurance Funds. He is experienced in the challenges of developing, financing and constructing international projects.

His projects have utilized a wide variety of fuels and energy conversion systems. Representative fuels include: natural gas, coal, wellhead residual gas, digester gas, urban waste, scrap tires, biomass fuels, agricultural waste and hydropower. Project responsibilities included specifying and ordering heavy equipment including gas turbines, and all facets of procurement, including shipping, customs, and installation for such equipment. He has also had extensive experience in planning, engineering and construction of roads, utilities, environmental systems, including zero discharge, liquid waste streams, and air quality clean-up systems.

PROJECT EXPERIENCE:

Gila Bend Power Project (2000)
Type: 833 mW Natural Gas Combined-cycle Power Plant

Tangshan Huaao Thermal Power Plant, Tangshan, Heibei, Peoples Republic of China (1999)
Type: 350 mW Coal Thermal Power Station

Texaco Sunrise Power Plant, Fellows, CA (1999)
Type: 262 mW Combined Cycle Power Project

American Samoa Government (1997)
Type: Fuel Storage Facility Expansion

Monterey Regional Water Pollution Control Agency &
Monterey Regional Waste Management District, Monterey, CA (1996)
Type: Wastewater Treatment Plant/Waste Management Treatment

Ruzhou Thermal Power Generating Station, Henan Province, China (1996)
Type: 300mW Coal Thermal Power Station

Continental Resources, Enid, OK (1996)
Type: 90 mW Simple Cycle Gas Turbine utilizing wellhead gas

Exxon Billings Refinery, Billings, MT (1996)
Type: 7 mW Condensing Steam Turbine Facility

Napacor, Minanao, Republic of the Phillipines (1995)
Type: 200 mW Coal thermal Power Station

Funing City Thermal Power Station; Qinhuangdao, China (1995)
Type: 100 mW Coal Thermal Power Station

Pinole Point Steel, Richmond, CA (1994)
Type: 115 kV sub-station & 12.47 kV metering and switchgear.

Stockton Regional Wastewater Control Facility (1993)
Type: Wastewater Treatment Plant

Sonoma Landfill Gas Project - Cotati, CA (1992)
Type: 6 mW from gas engines using landfill gas recovery

Overton REA High Voltage Transmission Line, Overton, NV (1991)
Type: 138 kV Transmission Line

Moapa Energy Project - Moapa, NV (1991)
Type: 60 mW Tires-to-Energy Facility

CBS Cogeneration Project - Television City, Burbank, CA (1990)
Type: 1.4 mW Cogeneration/Natural Gas/Residual Gas

PROJECT EXPERIENCE: (CONT'D)

City of Redding Peaking Plant, Redding, CA (1989)
Type: 71.3 mW Simple Cycle Gas Turbine Peaking Power Plant

Xerox Corporation, Webster, NY (1988)
Type: 3.5 mile, 15,000 ton pumped industrial cooling loop

Southwest Project - Southwest United Kingdom (1988)
Type: 400 mW Coal Fired Steam Generating Station

Wadham Energy Company Project - Williams, CA (1987)
Type: 29 mW Rice Hulls-to-Energy Project

Modesto Energy Company Project - Westley, CA (1986)
Type: 15.6 mW Tires-to-Energy Project

Monterey Regional Water Pollution Control Agency, Monterey, CA (1986)
Type: Wastewater Treatment Plant

Box Canyon Dam Hydro Power Plant - Lake Siskiyou, CA (1986)
Type: 7.0 mW Hydro Project

Williams Air Force Base - Chandler, AZ
Type: Jet fuel distribution & cathodic protection system.

Cortez County Hydro Penstock (13-mile), Cortez County, CO
Type: Controls design & corrosion protection.

MICHAEL R. LONG, RG, Principal Hydrogeologist

SUMMARY OF EXPERIENCE

Professional experience in hydrogeology and geology since 1973. Current professional responsibilities include directing technical operations in Arizona including management of offices, supervision of technical staff, and project management involving hydrogeologic assessments, soil and groundwater contamination studies, field investigations, environmental permitting, litigation support, expert witness testimony, and groundwater modeling. Areas of specialization include hydrogeologic assessments, groundwater and soil investigations, feasibility studies, wellfield design and construction, aquifer testing, and development of field methods for testing, sampling, well drilling, and well abandonment.

EDUCATION

- B.S., Geology, Northern Arizona University, Flagstaff, Arizona, 1973.
- Additional technical training in groundwater modeling, aquifer testing and hydrogeologic sample collection methodology at the U.S. Geological Survey Training Center, Denver, Colorado, and the U.S. Environmental Protection Agency-sponsored training program, Rolla, Missouri.
- 40-hour Occupational Safety and Health Administration (OSHA) Health and Safety Training for Hazardous Waste Sites.
- 8-hour OSHA Health and Safety Supervisory Training for Hazardous Waste Sites.
- 24-hour Mine Safety and Health Administration (MSHA) New Miner Training for Surface and Underground Operations.
- 8-hour MSHA Refresher Training for Surface and Underground Operations.

PROFESSIONAL AFFILIATIONS

- Arizona Association of Industries
- Arizona Rock Products Association

PROFESSIONAL REGISTRATION

- Registered Geologist, Arizona, 1986
- Registered Geologist, California, 1987

EXPERIENCE RECORD

1985 to Present	Principal Hydrogeologist and Director of Arizona Operations, Hargis + Associates, Inc., Tempe, Arizona. - Senior Hydrogeologist
1978 to 1985	Chief Hydrologist, Arizona Department of Water Resources, Phoenix, Arizona. - Hydrologist IV (Basic Data Chief), - Hydrologist III
1975 to 1978	Project Hydrogeologist, Fugro, Inc., Long Beach, California.

1975	Geologist, Harshbarger & Associates, Tucson, Arizona.
1973 to 1975	Hydrologist, Fugro, Inc., Phoenix, Arizona.

REPRESENTATIVE PROFESSIONAL ASSIGNMENTS

Groundwater Supply and Development

- Managed and supervised a hydrogeologic assessment and application for an Underground Water Storage and Recovery Permit required by the Arizona Department of Water Resources (ADWR) for the Del Webb Sun City Grand Property Development located in Surprise, Arizona.

- Managed and supervised a hydrogeologic assessment and application for a Certificate of Assured Water Supply required by the ADWR for three West Valley Ranches located near Tonopah, Arizona, for Ben Brooks & Associates, Inc.

- Managed and supervised a hydrogeologic assessment and application for a Certificate of Assured Water Supply required by the ADWR for the Reems Road Development located near Tonopah, Arizona, for Ben Brooks & Associates, Inc.

- Managed and supervised a hydrogeologic assessment and application for a Certificate of Assured Water Supply required by the ADWR for Belmont Ranches consisting of approximately 2,200 acres near Tonopah, Arizona, for River Investments, Inc. / Phoenix Holdings, Inc.

- Managed and supervised a hydrogeologic assessment and application for a Certificate of Assured Water Supply required by ADWR for Lakeview City, Inc., a 5,740-acre development located near New River, Arizona.

- Managed and supervised a hydrogeologic assessment and development of groundwater resources including well design, construction, and development; aquifer testing; and design of pumping equipment and facilities for the Del Webb Desert Hills Development, New River, Arizona.

- Supervised a hydrogeologic assessment of groundwater conditions and prepared report summarizing monitoring programs for the Palo Verde Nuclear Generating Station, Arizona Public Service Company.

Regulations/Permits

- Supervised a Resource Conservation and Recovery Act (RCRA) closure of a hazardous waste management unit at Beckman Instruments, Inc. facility in Porterville, California.

- Provided technical guidance for submittal of an application for an industrial use permit, prepared response to comments from public review, and provided support to legal counsel on permitting issues for the Del Webb Desert Hills Development, New River, Arizona

- Provided technical oversight for the hydrogeologic investigations in support of aquifer protection permit applications for a major underground copper mine and two open-pit copper mines in Arizona for BHP Copper, Inc.

- Prepared the application for variance to NPDES discharge permit requirements for groundwater remediation system discharge for Beckman Instruments Superfund Site, Porterville, California.

Soil and Groundwater Contamination Studies

- Managed and directed the site assessment activities and remedial actions involving volatile organic compound (VOC) contamination of soil and groundwater at the ChemResearch Company Facility, Phoenix, Arizona; a site within the West Van Buren Water Quality Assurance Fund (WQARF) study area

- Designed and managed Remedial Investigation (RI) involving VOC contamination of groundwater and soils, designed and installed remedial wellfield system, prepared and submitted RI Report, evaluated and implemented remedial actions at the Beckman Instruments Superfund Site, Porterville, California.

- Designed and managed the RI for nitrate-contaminated groundwater and soil, and supervised preparation and submittal of RI Report for the Apache Powder Superfund Site, Benson, Arizona.

- Managed and supervised a RCRA Facility Investigation and solar evaporation pond closure at the Beckman Instruments Superfund Site, Porterville, California.

- Supervised the construction, testing, and development of monitor wells at various manufacturing facilities in California, Arizona, and Texas.

Remedial Design and Implementation

- Supervised the assessment and evaluation of a sulfuric acid spill and the neutralization of the contaminated soil at Apache Products, Inc., Benson, Arizona.

- Supervised the development, construction, and testing of a remedial wellfield system, and preparation of the Remedial Action Plan for the Beckman Instruments Superfund Site, Porterville, California.

Litigation Support/Expert Witness Testimony

- Provided technical support and expert witness testimony during depositions and for recovery of costs for environmental impairment at an industrial site from a major insurance carrier for Apache Nitrogen Products, Inc., Benson, Arizona.

- Provided technical consultation to legal counsel during depositions of opposition experts for a major insurance carrier regarding cost recovery of environmental impairment for a Federal Superfund Site in Benson, Arizona, for Apache Nitrogen Products, Inc.. Provided expert testimony concerning hydrogeologic conditions and the nature, extent, and timing of soil and groundwater contamination.

- Provided technical consultation and litigation support for negotiations with USEPA involving a Federal Superfund Site in Porterville, California, for Beckman Instruments, Inc. Evaluated the nature, extent, timing, and potential sources of soil and groundwater contamination.

- ▷ Reviewed and compiled the site history, timing of facility operations, and chemical use data; and prepared historical land use maps; and presented technical graphics to legal counsel for Apache Nitrogen Products, Inc., Benson, Arizona.

Computer Modeling

- ▷ Developed a digital groundwater model of the Salt River Valley and prepared report for the ADWR.

- ▷ Provided technical oversight for development of a three-dimensional groundwater flow and solute transport model for the Apache Powder Superfund Site, Benson, Arizona.

- ▷ Supervised the development of a three-dimensional groundwater flow and solute transport model for the Beckman Instruments Superfund Site, Porterville, California.

Field Method Development

- ▷ Developed methods for controlling elevated groundwater sample pH caused by cement grout contamination in monitor wells at the Beckman Instruments Superfund Site, Porterville, California.

- ▷ Developed methods for abandoning cased and gravel-packed irrigation and domestic wells in the City of Porterville, California, for the Tulare County Health Department.

- ▷ Developed computerized method for estimating transmissivity and specific yield from driller's logs for the ADWR.

PUBLICATIONS

Long, M. R., 1983. "Groundwater Conditions in the Hassayampa Sub-basin of the Phoenix Active Management Area, Maricopa and Yavapai Counties, Arizona 1982." Phoenix, Arizona: Arizona Department of Water Resources Hydrologic Map Services Report Number 10.

Long, M. R., M. A. Niccoli, R. Hollander, and J. L. Watts, 1982. "Final Report: Salt River Valley Cooperative Study Modeling Effort, a Comprehensive Study of Ground-Water Conditions of the Salt River Valley Aquifer System and Description of Digital Modeling Efforts by the ADWR." Phoenix, Arizona: Arizona Department of Water Resources.

Long. M. R., and M. A. Niccoli, 1981. "Determination of Transmissivity Values in the Salt River Valley Using Recovery Tests, Specific Capacity Data, and the Arizona Department of Water Resources Driller Log Program." Hydrology and Water Resources in Arizona and the Southwest: Proceedings of the 1981 Meetings of the Arizona Section - American Water Resources Association and the Hydrology Section - Arizona Academy of Science. Phoenix, Arizona: American Water Resources Association.

Long, M. R., and S. Erb, 1980. "Computerized Depth Interval Determination of Groundwater Characteristics from Well Driller's Logs." Hydrology and Water Resources in Arizona and the Southwest: Proceedings of the 1980 Meetings of the Arizona Section - American Water Resources Association and the Hydrology Section - Arizona Academy of Science. Phoenix, Arizona: Arizona Water Resources Association.

Boyer, J. L., M. R. Long, and T. M. Turner, 1980. "Estimates of Deep Percolation Used in Groundwater Modeling of the Salt River Valley." Proceedings of the Deep Percolation Symposium, Phoenix, Arizona: Department of Water Resources.

MALCOLM PIRNIE

Gary H. Bacon

Mr. Bacon has more than 14 years of experience in permitting, compliance, engineering, design, and procurement of all types of industrial and municipal projects. He is currently involved in regulatory applicability and compliance determinations (including PSD, NSR, RACT, BACT, and LAER), compliance auditing (air quality, hazardous and solid waste, wastewater, stormwater, etc.), process hazards analyses, process safety and risk management planning, hazardous materials management planning, emergency response planning, preparing air emissions inventories, coordinating stack tests, and developing continuous emission monitoring systems for industrial and municipal projects. His background also includes contract negotiating, planning, and managing various phases of air quality, hazardous waste, and solid waste programs.

Detailed Experience

- **Continental Waste Industries: Gila Bend Regional Landfill Title V Air Permit Application / Gila Bend, AZ.** Project manager for the preparation of a Title V air permit application under the regulatory agencies 'accelerated' permitting rules. The project included regulatory evaluations, emission inventories, compliance program development, and operating scenario assessments. The project required extensive meetings with Maricopa County and U.S. EPA Region IX staff to expedite the issuance of the Title V permit. This was the first project to receive a Title V permit from the Maricopa County Environmental Services Department.

- **Penn Racquet Sports: Title V Operating Permit Applications / Phoenix, AZ.** Project manager for one of the first Title V air permitting projects in Arizona. The project included emission inventories, regulatory applicability analysis, compliance status evaluation, compliance program development, and operating scenario evaluation. This was the second project to receive a Title V air permit from Maricopa County.

  Project manager for a process safety management project as required by OSHA. The process safety management project included conducting process hazard analyses for affected plant processes, training plant personnel, evaluating process and safety hazards, preparing operating procedures, developing contractor safety programs, compiling incident investigation reports, and developing a process hazard analysis report and process safety management plan.

  Project manager for an emissions reduction credit (ERC) project. The ERC project included certifying emission reductions, modifying the Title V permit, and negotiating the sale of ERCs to another industry as part of an emissions offset program. This was the first ERC transaction for emission offsets to occur in Arizona.

Title/Firm

Associate,
Malcolm Pirnie, Inc.

Years of Experience

16

Education

BS Chemical Engineering Bucknell University 1986
MBA Quality Management Fordham University 1995

Registration and Certifications

1995 Professional Engineer
Hazardous Materials Health and Safety Certificate

Societies

Air and Waste Management Association
American Institute of Chemical Engineers
Beta Gamma Sigma, MBA Honor Society

Employment History

Malcolm Pirnie, Inc. 1987 to present
U.S. Army Corps of Engineers 1986 to 1987
Pennsylvania Department of Transportation 1984 to 1985

- **Gila Bend Power Partners, LLC: Gila Bend Power Generation Station / Gila Bend, AZ.** Project Manager responsible for multi-media permitting of a new 845-MW natural gas-fired combined cycle electric generation facility. Permitting activities included PSD and Title V permits, Aquifer Protection Permit, biological resources evaluation, archaeological and cultural resources assessment, wetlands delineation, Section 404 and 401 permitting, water resources assessment, and Phase I Environmental Site Assessments. Assisted our client with successfully negotiating a Certificate of Environmental Compatibility with the Arizona Corporation Commissions Siting Committee.

- **CRSS Capital, Inc.: Cogeneration Facility Environmental and Air Quality Compliance Audit / Ripon, CA.** Project Manager, responsible for reviewing regulatory and permitting requirements affecting the cogeneration plant and determining its compliance status with respect to each regulation. Some of the regulations included Air Toxics 'Hot Spots,' Title V program (San Joaquin Valley Unified Air Pollution Control District, SJVUAPCD, Rule 2520), operating permits (SJVUAPCD Rule 2010), federal and state CEMS requirements, Accidental Chemical Reliance Rule (Clean Air Act Section 112 [r]), and other California programs related to risk management and prevention, spill prevention, and hazardous materials management.

- **City of Phoenix: 91st Avenue Wastewater Treatment Facility: Synthetic Minor Air Permit Application / Phoenix, AZ.** Project manager for the evaluation of 91st Avenue Wastewater Treatment Plant's digester gas flare controls to maintain the emissions from the 87-mgd facility below the major source and Title V thresholds. Managed numerous air quality permitting and compliance projects for the 91st Avenue WWTP. Projects have included annual emission inventories, compliance audits, stack testing, permit modifications, O&M plan development, odor control equipment design, and permit negotiations.

- **Coleman Spas: Title V Air Permit Application / Chandler, AZ.** Project manager responsible for conducting regulatory applicability analyses, compliance evaluations, emissions inventories, alternative operating scenario development, and compliance program preparation. In addition, lead engineer in developing and implementing an odor evaluation program for the manufacturer.

- **Revlon: Synthetic Minor Permit Application / Phoenix, AZ.** Project manager responsible for conducting a regulatory applicability analyses, regulatory compliance evaluations, emissions inventories, alternative operating scenario development, and compliance program preparation.

- **City of Phoenix: 23rd Avenue Wastewater Treatment Plant / Phoenix, AZ.** Project Manager responsible for preparing a compilation of historical improvements constructed at the plant, as well as, conducting a neighborhood odor survey around the plant. The study served to summarize the plant improvements made by the City to reduce

wastewater related odors. The results of the odor survey also indicated the odor control improvements have reduced plant-related odors in the community.

- **City of Phoenix: 23rd Avenue Wastewater Treatment Plant Odor Remedial Measures Project / Phoenix, AZ.** Project Manager responsible for coordinating and conducting the following activities to further improve plant related odors:
  - Implement odor panel programs
  - Evaluate existing odor control equipment
  - Design and construct aluminum covers over influent channels to convey foul air to existing odor control system
  - Conduct manhole odor survey
  - Develop sludge drying bed closure plans
- **City of Phoenix: 91st Avenue Interceptor Odor Control Study / Phoenix, AZ.** Project Manager responsible for planning and implementing an odor characterization and odor control evaluation for a 40-mile wastewater pipeline. The characterization phase was conducted during a 12-month period to account for seasonal variations. The odor control evaluation consisted of studying the effects of adding chemicals to the wastewater, as well as implementing active odor control systems throughout the sewer line.
- **City of Glendale: Glendale Water Reclamation Facility / Glendale, AZ.** Project Manager responsible for preparing an air quality permit application for odor control systems and combustion equipment at a new water reclamation facility.
- **City of Phoenix: 91st Avenue Wastewater Treatment Plant Odor Control System Design / Phoenix, AZ.** Project Manager responsible for coordinating and completing the design of an odor control system at the 87-mgd wastewater treatment plant. The odor control system consisted of four 60,000-cfm dual-stage wet scrubbers designed to treat foul air from the facility's headworks area. The system also included design for covering the plant's processes and constructing all chemical and auxiliary facilities associated with the odor control equipment.
- **City of Scottsdale: Central Arizona Project Water Treatment Plant: Hazardous Materials Management Planning Project (HMMP) / Scottsdale, AZ.** As Project Manager, prepared a HMMP document for a 27-mgd water treatment plant that handled chemicals such as sulfuric acid, aluminum sulfate, chlorine, potassium permanganate, sodium hydroxide, and miscellaneous polymers. The HMMP included information such as emergency response plans, incident reporting documentation, employee training, inspection policies, monitoring and labeling

program, waste disposal, chemical compatibility and handling evaluations, and vulnerability analyses.

- **Communities Southwest, Inc.: Tolleson Community Odor Impact Evaluation / Tolleson , AZ.** Project Manager responsible for evaluating the potential odor impacts on a proposed residential community from the nearby Tolleson Wastewater Treatment Plant. Sampled and collected air and liquid-phase data to estimate potential odor related emissions from the plant. Conducted air dispersion modeling based on estimated H2S emissions to estimate probate odor impacts at the proposed community receptors.
- **Pima County Wastewater Management Department: Roger Road Wastewater Treatment Plant Title V Operating Permit Application / Tucson, AZ.** Senior project engineer. Activities included quantifying air emissions, evaluating regulatory applicability, compliance status, and operating scenarios, as well as developing regulatory compliance plans.

Publications

Bacon, G.H.,**"Expediting a Title V Permit,"** Malcolm Pirnie's *Air Currents*, September 2000. Not peer-reviewed.

Bacon, G.H., Kozuh, W.J., Linder, M.G.,**"Expediting a Landfill Title V Permit,"** *Proceedings*, Third Annual Landfill Symposium of the Solid Waste Association of North America, Palm Beach Gardens FL, June 23, 1998.

Bacon, G.H.,**"Risk Management Program and Process Safety Management,"** presented at the 71st Annual Conference of the Arizona Water and Pollution Control Association, Chandler AZ, May 6-8, 1998.

Bacon, G.H., Liang, K.Y., Li, R. .,**"Controlling Particulate Matter and Metal HAPs,"** *Chemical Engineering Progress*, pp. 59-67, December 1997.

Bacon, G.H., Frillici, P.W.,**"Evaluation of Mercury Emission Reduction Alternatives for the Fort Dix Resource Recovery Facility,"** presented at the Annual Meeting of the Air and Waste Management Association, Denver CO, June 1993.

Title Principal and Senior Project Manager

Expertise Environmental/Public Planning and Assessment – NEPA Compliance
Visual, Land Use, and Recreational Resource Planning

Academic Background MLA, 1984, Landscape Architecture, Harvard University
BSLA, 1980, Outdoor Recreation/Landscape Architecture

Representative Experience

Mr. Palmer provides coordination of multidisciplinary environmental studies on planning projects with an emphasis on utilities and infrastructure. This includes more than 15 years of experience in the preparation of National Environmental Policy Act (NEPA) compliance studies including environmental reports (ERs), environmental assessments (EAs), and environmental impact statements (EISs). He also serves as a land use, visual resource, and recreational specialist, and is the coordinator for data management activities including applications of computer technology for inventory, mitigation, planning, design, monitoring, and visual simulations. Selective examples of Mr. Palmer's project experience are summarized below:

- Project manager for the development of the Land Management Plan and Concept Site Plan as a part of Gila Bend Power Partner's application for a Certificate of Environmental Compatibility (CEC) to the Arizona State Siting Committee (845 MW power plant). Also coordinated these tasks with the recently approved General Plan and Zoning amendment through the Town of Gila Bend for the project.
- Project coordinator for the Santan Expansion Project for environmental planning, visual studies, public participation activities, design mitigation and enhancement concepts; and preparation of portions of the CEC application for the 825 megawatt (MW) power plant expansion at SRP's facilities in Gilbert, Arizona.
- Project coordinator for the Kyrene Expansion Project for environmental planning, visual studies, public participation activities, design mitigation and enhancement concepts; and preparation of portions of the CEC application for the 250 MW power plant expansion at SRP's facilities in Tempe, Arizona.
- Project coordination for the preparation of the Panda Gila River Land Management and Site Plan for consideration by the State Siting Committee in conjunction with the CEC application for the Panda Gila River 2000 MW power plant in Gils Bend, Arizona. Responsibilities included oversight of concept and final Site Plan including landscape specifications, which have been approved by the planning commission and Gila Bend Town Council.
- Project coordinator for conceptual land use planning studies, visual resource assessment, and public involvement program for a 1200 MW power plant, confidential client, Texas.
- Project manager for environmental studies and the completion of a fatal flaw analysis on the siting of a new power plant (≥600 MW), confidential client, Arizona.
- Project manager for the completion of the CEC application for the Navajo Transmission Project submitted and presented to the Arizona State Siting Committee.
- Project manager for the Navajo Transmission Project (EIS) in northern New Mexico and Arizona from the Four Corners area west to Nevada, including portions of the Navajo, Hopi, and Hualapai Indian reservations; Bureau of Land Management (BLM), U.S. Forest Service (USFS), and National Parks Service (NPS) lands; and state and private lands. Managed technical studies, coordination of public involvement program, and preparation of the EIS for Western Area Power Administration (Western) and the Diné Power Authority.

- Project manager for the completion of the Construction, Operation, and Maintenance (COMP) in conjunction with Diné Power Authority for the Navajo Transmission Project, submitted to the USFS, BLM, NPS, Bureau of Indian Affairs (BIA), and Hualapai Indian Reservation.
- Project manager in support of right-of-way applications with Diné Power Authority, submittal to the USFS, BLM, NPS BIA, Navajo-Hopi Land Commission, and the Navajo Nation.
- Project manager for environmental studies and public involvement activities on the Reach 11 Recreation Master Plan EIS for the City of Phoenix and Bureau of Reclamation in Phoenix, Arizona.
- Project manager for the preparation of planning and analysis studies, public involvement program, and ER for the Divide Transmission Loop 115kV Transmission Project, for Public Service Company of Colorado on the Pike and San Isabel National Forest. Included review of alternatives with respect to designation of the South Platte River as a Wild and Scenic River.
- Project manager for the Pauline-Moore 345kV Transmission Line Project including planning studies, multidisciplinary environmental studies, routing studies, mitigation, and public involvement program in southeastern Nebraska for the Nebraska Public Power District.
- Project manager for the route selection, environmental studies, assessment, mitigation, and public involvement program for the rerouting of 230kV transmission line facilities and substations at the New Denver International Airport.
- Project manager for the Tower/Picadilly Front Range Project Assessment and Permit Application for transmission and substation facilities in Aurora for Public Service Company of Colorado.
- Assisted in the assessment of land use and visual resources for siting and environmental studies directed to assist the City of Colorado Springs Department of Utilities in locating a 345kV transmission and substation facilities in a manner compatible with existing and future development.
- Project coordinator and land use resource investigator for the Blue River-Summit 115kV Transmission Project (EA) in Summit County, for Western. Performed land use, recreation, and visual resource studies on the Arapaho National Forest.
- Project coordinator and principal investigator for land use studies, EA, and mitigation planning for the Bickerdike-Kaybob, Bickerdike-Cold Creek, and ANG Cochrane transmission line siting projects for TransAlta Utilities in Alberta, Canada.
- Land use planning, recreation and visual resource specialist for the Cascade Power and Water Development EA for TransAlta Utilities, in Banff National Park, Alberta, Canada.
- Resource investigator on the Conrad to Shelby 230kV Transmission Line Project for Western. Performed land use and visual resource studies for the EIS.
- Resource investigator for the Charlie Creek-Belfield 345kV Transmission Project. Performed visual resource studies and assisted in the land use documentation in the EIS.
- Project coordinator and principal investigator for land use and visual resource studies for the upgrade of the Fort Peck-Wolf Point transmission line (EA) for Western.
- Served as a visual resource specialist on the evaluation of pipeline alternatives for the Altamont Project in Wyoming. Conducted focused evaluations of options and environmental impacts in the historical South Pass area.
- Assisted in the preparation of land use and visual resource assessments for the Corlett-Skyline facility siting study (69kV line) in Cheyenne, Wyoming for the Public Service Company.
- Directed the application of a GIS used to evaluate slope sensitivity and visibility mapping for a 345kV transmission line in Austin, Texas. Viewshed runs and slope maps were produced through digital terrain modeling and used in the evaluation of preferred routes for a transmission location study prepared for the City of Austin.

- Assistance in development of methodologies for final visual impact assessment of the 230kV Geothermal Public Power Line in northern California. Other responsibilities included coordination of visual resource mapping and computer viewshed mapping along with preparation of visual simulations.
- Managed the production of visual simulations for the Greenwood to Daniels Park transmission line for Public Service Company of Colorado.
- Managed the production of visual simulations for the Lookout Mountain Microwave Relay Facility for the Public Service Company of Colorado.
- Resource investigator for land use and visual resource assessments for the Southwest Intertie Transmission Line Study (EIS) in Utah, Nevada, and Idaho for Idaho Power Company.
- Resource investigator responsible for preparation of visual simulations for a 69kV transmission line in Scottsdale, Arizona for Arizona Public Service Company.
- Project manager for recreational and environmental studies for the Broken Arrow Project (Pink Jeep Tours) on the Coconino National Forest in Sedona, Arizona.
- Principal investigator for land use planning and visual resource evaluations of the Price Road/Southeast Loop Project EIS in the southeastern Phoenix metropolitan area for the Arizona Department of Transportation (ADOT).
- Directed GIS application for the Beeline Highway Siting Project (EIS) on the Tonto National Forest for ADOT. Responsible for input and modeling of all environmental and engineering criteria used for corridor and preferred route selection.
- Project director for environmental studies conducted in conjunction with the preparation of the Pikes Peak Road Master Plan on the Pike and San Isabel National Forest. Conducted environmental evaluations for alternatives developed for the Pikes Peak Highway for the City of Colorado Springs.
- Project coordinator for the BLM, recreation and Wilderness Planning, Basic Services Contract. Contract called for environmental and planning studies on an as-needed basis throughout the state.
- Project coordinator for environmental studies conducted for the Alternative Transportation Modes, Feasibility Study for Yosemite National Park. Supervised preparation of environmental inventory, field review, and environmental comparison of alternative modes of transportation for the NPS, including the identification and analysis of options within the adjacent to the park.
- Project manager for environmental studies conducted for the Transportation Feasibility Study at Mount Rainer National Park for NPS. Supervised preparation of environmental inventory, sensitivity overview, agency contacts, and environmental comparison of Visitor Transportation System alternatives. The environmental analysis was coordinated with the General Management Plan and potential transportation alternatives in order to evaluate the impacts on developed areas and sites in the park.
- Directed GIS application in evaluating master plan alternatives for the City of Yuma Town Hall. This included data collection to evaluate different planning scenarios and long-range planning goals for the City of Yuma.

Instructor of Landscape Architecture and Planning

- Graduate level instruction at Colorado University and undergraduate instruction at Colorado State University. Semester courses included regional landscape and environmental planning, landscape planning and design, landscape construction, visual resource assessment, and computer aided planning and design.

Project Designer/Landscape Architect, DHM, Inc.

- Site planning and design for residential, institutional, and resort development in the Colorado Front Range.

Associate/Landscape Architect, M.J.P. & Associates

- Consultant in visual resource assessment, including computer database construction and viewshed analysis. Projects include Baca Geothermal Generating Station and Transmission Line, Ceboletta Pump Storage Station, Los Alamos, New Mexico; Anaconda Nevada Molybdenum Project; Queens Canyon Quarries, Colorado Springs, Colorado; and Exxon Surface Oil Shale Retorting Program, Piceance Basin, Colorado.

Professional Experience
For
Gary L. Deshazo

July 1996 – Present
Salt River Project – Phoenix, Arizona
Manager, Transmission System Planning

Directly responsible for representing SRP's technical interests in matters relating to SRP's transmission system such as new and/or joint transmission projects, import capability, and interconnection requests by other utilities.

Job responsibilities include the supervision of twelve senior professional and technical staff including one Senior Principal Engineer. Primary duties include directing the planning and engineering of SRP's electric system to meet customer expectations for power quality and reliability in a cost effective manner, directly providing technical operational support to Transmission and Generation Dispatching, and providing planning and technical analysis expertise to other SRP departments. Current regional planning activities include managing the performance of the Harquahala Generating Project studies for the Harquahala Generating Company, LLC and the Palo Verde Interconnection project studies for the Hassayampa Switchyard participants.

Current inter-utility responsibilities include membership to the following:

- Southwest Area Subregional Group serving as Chairman
- WSCC Operational Transfer Capability Policy Group serving as Secretary
- WSSC Rating Methods Task Force serving as Chairman
- WSSC Reliability Subcommittee serving as Secretary

Past inter-utility involvement included Chairman of the WSCC Technical Studies Subcommittee and Vice-Chairman of the WSCC Operational Capability Study Group.

R. Thomas Sankey, CSE, PWS, Associate - Malcolm Pirnie, Inc. (*BS, University of South Carolina, 1981. MA, University of Kansas, 1985*). Mr. Sankey leads Malcolm Pirnie's environmental sciences and planning practice and has 15 years of experience in wetland management and permitting, ecological risk assessment, wildlife, vegetation and land use analysis, and environmental impact assessment. He has worked on all aspects of ecological risk assessment including fish, wildlife and vegetation inventories, ecological modeling, and risk quantification. His wetlands management experience includes wetland delineation and cover type mapping, impact assessment, functional evaluation, mitigation design, mitigation project construction and monitoring, wetland treatment design and construction, endangered species surveys, and state and federal permitting. His experience includes investigations under various programs including Sections 404 and 401 of the Clean Water Act, the Comprehensive Environmental Response Compensation and Liability Act / Superfund Amendment and Reauthorization Act (CERCLA/SARA), the National Environmental Policy Act (NEPA), Section 7 of the Endangered Species Act, Section 106 of the National Historic Preservation Act, and various state and federal regulatory programs. Mr. Sankey is recognized by the Ecological Society of America as a Certified Senior Ecologist and by the Society of Wetland Scientists as a Professional Wetland Scientist.

Detailed Experience:

Wetlands Management

Project Technical Leader for the completion of a wetland delineation and Section 404 Permit Application for the proposed Metro Light Rail System, Houston, Texas.

Project Leader for the Woodside High School Project, Newport News, Virginia. Completed a wetland delineation, evaluation, Individual permit application, endangered species surveys, and cultural resources coordination, for the project located in the environmentally sensitive Grafton Ponds Sinkhole Complex. Worked with local environmental groups, state natural heritage organizations, local landowners, and federal regulatory agencies to develop a unique collaborative conservation easement land set-aside as mitigation for the project.

Deputy Project Manager for the Air Liquide America Corporation Cogeneration Facility, Geismar, Louisiana. Part of an interdisciplinary team which completed federal and state wetlands permitting, air quality modeling, environmental justice analysis, noise monitoring, storm water management, and wetlands mitigation analysis.

Senior Environmental Scientist and Quality Assurance Manager for a subsurface wetland treatment study completed for the ABX Airport in Wilmington, OH. Evaluated several glycol treatment options, directed bench-scale wetland studies to evaluate the feasibility of using wetlands to treat glycol runoff, and directed construction of a 35,000 square foot pilot scale subsurface treatment wetland adjacent to receiving streams draining the airport's runways, taxiways, and cargo loading areas.

Project Manager for a Wetland Treatment Feasibility Study completed for the City of Philadelphia Water Department, Philadelphia, Pennsylvania. Directed an interdisciplinary team of scientists and engineers in evaluating several treatment options for improving water quality of Sandyford Run, an urbanized stream heavily impacted by untreated sewage discharges from several sources. Final report included an evaluation of treatment alternatives, conceptual design of the wetland treatment system, feasibility analysis, cost-benefit analysis, funding analysis, and a regulatory analysis.

Completed wetland delineations, wetland functional assessments, permitting, fisheries studies and evaluation of natural systems treatment options for the Oak Hollow storm water wetland treatment facility, High Point, NC. Tasks included an evaluation of wetland and biofilter treatment options for the removal of suspended sediments, TOC, and BOD, selection of appropriate sites for the construction of the stormwater treatment facilities, and development of plans and planting specifications for constructing the facilities.

Completed wetland delineation, permitting, mitigation planning, constructed wetland design, and environmental monitoring of a stormwater management/treatment wetland area for the Lake Liberty redevelopment project, Norfolk, VA. Delineated both tidal and non-tidal wetland systems, evaluated existing wetland functions, directed the construction of various islands, emergent fringes, and aquatic benches, and completed a 5-year monitoring program. The aquatic benches, islands, and emergent fringe wetlands have developed into successful, well-vegetated stormwater treatment areas over the monitoring period.

Project Scientist for the Jacksonville Land Treatment System Section 404/NC CAMA permitting and wetlands mitigation project, Onslow County, NC. Completed sections of NC SEPA environmental assessment, completed wetlands delineation, classification, evaluation, and mitigation plan, completed detailed plans and specs, and directed the construction of 20-acre and 15-acre wetland systems. The pine flatwood and bottomland hardwood systems were constructed in 1996 and monitoring results show that both will be successful.

Project Manager for the Swedesboro North Wetland Mitigation Design-Build Project, Gloucester County, NJ. Directed the site selection and detailed soils, hydrology, vegetation, and cultural resources studies to evaluate the feasibility of restoring wetlands on a prior-converted cropland site. Completed the detailed mitigation plan, construction plans and specs, and directed the construction of the site which was completed in 1996.

Project Manager for the Denbigh Middle School wetlands permitting project, Newport News, Virginia. Directed a team of scientists in completing a ground water monitoring study, a wetland delineation, a wetland evaluation, an Individual Permit Application, an alternatives evaluation, and a wetland mitigation plan for the project.

Energy

Project Manager for a proposed gas-fired power plant for a confidential client on a 40-acre site in Loudoun County, Virginia. Responsible for directing air quality, community input, cultural resources, fish and wildlife, wetlands, and endangered species programs, as well as obtaining State Corporation Commission approval for the project.

Technical advisor for a gas fired power plant project for a confidential client in Indiana. Responsible for directing cultural resources, wetlands, and endangered species studies.

Technical advisor for a gas fired power plant project for a confidential client in Ohio. Responsible for directing cultural resources, wetlands, and endangered species studies.

Project Manager for a gas-fired power plant project for a confidential client in Mississippi. Responsible for completing wetlands, endangered species, and cultural resources studies.

Technical advisor for a gas-fired power plant project for a confidential client in Mississippi. Responsible for directing cultural resources, wetlands, and endangered species studies

Project Manager for the Red Hills Generating Facility wetlands permitting project, Choctaw County, Mississippi. Directed a team of scientists in completing a wetland delineation and functional evaluation, a joint permit application, an alternatives evaluation, and a conceptual wetland mitigation plan for the 350-acre site.

Municipal Planning

Project Manager for the Town of Kinderhook Revised Master Plan, Columbia County, New York. Completed an inventory and analysis of land use, demographics, market conditions, infrastructure, environmental constraints, and historic resources; implemented a community input plan which included the development and distribution of questionnaires and the conducting of controversial public informational meetings; developed recommendations for land use controls including performance zoning and transferable development rights, and recommended changes to the land use plan. Also completed a generic environmental impact statement for the revised master plan.

Project Manager for the Town of Rensselaerville Comprehensive Land Use Plan, Albany County, New York. Implemented a public input plan which consisted of developing and distributing a public opinion survey, conducting public informational meetings, and developing a statement of goals; completed an inventory and analysis of the township's demographics, market conditions, municipal budget, infrastructure, environmental constraints, natural resources, and historic resources; developed recommendations for

land use controls and changes to the land use plan. Also completed a generic environmental impact statement for the revised master plan.

Water Quality Studies

Senior Environmental Scientist and Technical Leader for the completion of the Knells Ridge Water Quality Study, Chesapeake, Virginia. The study consisted of designing a water quality sampling program, analyzing water quality data provided by the City of Chesapeake, determining the eutrophication status of the five storm water ponds, and developing recommendations for potential BMPs that could be used to control nutrient loadings to the lakes.

Technical Leader for the completion of a water quality sampling program for the Hamptons Golf Course storm water lakes, Hampton, Virginia. Lake temperature, dissolved oxygen (DO), and nutrients were determined, water budgets were calculated, temperature/DO profiles were developed, and trophic status was determined for the golf course lakes. Developed recommendations for controlling nutrient loading to the lakes.

Technical leader for evaluating a 16,000-acre watershed owned by the Birmingham Waterworks and Sewer Board, Blount, Jefferson, and Shelby Counties, Alabama. Evaluated existing water quality, land use, geology, topography, soils, buffer zones, wetlands, potential endangered species habitat, and existing and potential sources of contamination within the watershed, and developed a ranking methodology to determine which properties were critical to the long-term protection of reservoir water quality.

Stream Investigations

Lead environmental scientist for the Sandy Hill Landfill Stream Investigation, Prince George's County, MD. Study consisted of stream habitat, benthic macroinvertebrate, and water quality surveys. Conducted public informational meetings with adjacent landowners. Developed recommendations for re-establishing benthic habitat through the use of in-stream and watershed best management practices.

Quality Assurance Manager for the City of Akron CSO Study, Akron, OH. Evaluated fisheries and benthic habitat for the Cayuhoga River and its tributaries in a basin-wide study of degraded urban streams. Developed recommendations for improving fisheries and benthic habitat in these streams and rivers.

Senior Environmental Scientist for the Regional Raw Water Supply Study, King William County, VA. Evaluated various stream restoration projects as components of overall comprehensive mitigation plan to compensate for reservoir impacts to stream and riparian habitat. Examined intermittent, first order streams degraded by agricultural runoff. Developed restoration concepts including the establishment of weir structures, in-stream bank stabilization, riparian re-vegetation, and forested buffer zones.

Senior Environmental Scientist for the Rocky Pen Run Reservoir Stream Investigation, Stafford County, VA. Completed benthic, fisheries, and freshwater mussel surveys on Rocky Pen Run, a tributary of the Potomac River, and evaluated several mitigation options for improving in-stream habitat in England Run, located in an adjacent habitat. Also developed concepts for improving best management techniques and establishing water quality basins within the England Run basin, as mitigation for stream impacts associated with the proposed reservoir.

Ivy Landfill Stream Investigation, Albemarle County, VA. Completed a stream survey, which included habitat, fisheries, and benthic invertebrate components, and developed stream restoration concepts. Various proposed techniques included re-establishing stream bank vegetation, establishing check-dams, rock revetments, rock vortex weirs, rock deflectors, K-logs, gabions and fascines, as well as other bio-engineering techniques.

Lakeside Refinery Davis Creek Restoration, Kalamazoo, MI. As part of an interdisciplinary remediation team, completed a stream restoration project for a 600-foot stretch of creek. Completed a stream assessment, evaluated various bio-engineering components, and developed a stream restoration design. Various components included in the design were rock vortex weir structures, rock deflectors, boulder fields, plunge pools, low level pools, and vegetative stream bank stabilization.

Ecological Risk Assessment

Completed vegetation, mammal, bird, benthic macroinvertebrate, fisheries, and stream surveys, as well as an ecological risk assessment for an RI/FS completed for the U.S. Naval Surface Warfare Center, White Oak, Maryland. Seven terrestrial and aquatic sites contaminated with PCBs and metals were investigated under the U.S. Navy's Installation Restoration Program (IRP). Developed terrestrial and stream remedial options and recommendations based upon the results of the ecological risk assessment.

For the 45-acre Eustis Lake Site at Fort Eustis, Virginia, completed vegetation and wildlife surveys, fish electro-shocking surveys and flesh analysis, and ecological risk assessment. Evaluated and recommended remedial actions for clean-up of PCB/pesticide/PAH contaminated sediments in the lake.

Completed vegetation and wildlife surveys and an ecological risk assessment for the Fire Training Area, Fort Story, Virginia. Recommended remedial actions for clean up of TPH/SVOC/VOC contaminated sediments, soils, and groundwater based on the results of the eco-risk assessment.

Completed vegetation and wildlife surveys and an ecological risk assessment for the LARC 60 Maintenance Area Site, Fort Story, Virginia. Recommended remedial actions for clean-up of TPH/VOC contaminated surface water, sediments, soils, and groundwater based on the results of the eco-risk assessment.

Completed vegetation and wildlife surveys and an ecological risk assessment for the Auto Craft Building Area Site, Fort Story, Virginia. Recommended remedial measures for clean-up of TPH/VOC contaminated soils and groundwater based on the result of the eco-risk assessment.

For the DOL Storage Yard Site at Fort Eustis, Virginia, completed vegetation and wildlife surveys, wetland surveys, and ecological risk assessment. Recommended measures to clean up pesticide/PAH/metal contaminated sediments and groundwater in down gradient forested wetland.

Completed vegetation and wildlife surveys, ecological risk assessment, and wetland restoration plan for the Bailey's Creek Site, Fort Eustis, Virginia. Recommended wetland restoration measures for the clean up of PCB contaminated sediments in palustrine forested and estuarine emergent areas.

Technical Director Delegate and Senior Scientist for screening level ecological risk assessments completed for the McGregor Ponds Range Camp, Dona Ana Range Camp, Meyer Range Camp, and Orogrande Range Camp Sewage Lagoons, Fort Bliss, New Mexico. Sewage lagoons at these four sites are contaminated with various COCs including pesticides, metals, and PCBs. Evaluated the technical approach and completeness of eco-risk assessments, applied accepted USEPA screening level standards for data collected for these sites, and selected sites for further quantitative ecological risk assessments.

Endangered Species Studies

Completed a habitat evaluation and endangered species survey for the Cactus Ferruginous Pygmy-owl (*Glaucidium brasilianum cactorum*) , for a proposed 160-acre power generating facility, Maricopa County, Arizona. Used USFWS survey protocol to determine the presence or absence of this species.

Completed a habitat evaluation and endangered species survey for the Bog Turtle (*Clemmys muhlenbergii*) on a 250-acre proposed dredge disposal landfill site in Washington County, New York. The special study was completed in support of the Hudson River PCB Reclamation Project EIS. All appropriate sedge meadows, low gradient streams, and herbaceous wetlands were identified and mapped as appropriate habitat on the site. Several early spring and summer surveys were conducted to determine the presence or absence of the species. No Bog Turtle specimens were detected or identified.

Completed habitat evaluations and field surveys for the Bog Turtle for the MCI fiber optics cable project in Seneca, Cayuga, and Onondaga Counties, New York. Aerial photography and New York State DEC freshwater wetlands mapping were examined to identify potential habitat for several proposed fiber optics cable crossings. Winter field surveys were completed to field verify the presence of bogs, sedge meadows, herbaceous

wetlands and other potential habitat. Developed avoidance and mitigation measures to reduce the potential impacts to the species.

Assisted in the completion of an endangered species survey for the Blanding's Turtle (*Emydoidea blandingi*) on a proposed 40-acre residential development site located adjacent to the Crum Elbow Creek, Town of Hyde Park, Dutchess County, New York. Suitable aquatic habitat in and adjacent to the creek was identified based on late winter site inspections. Hoop trapping and visual surveys were completed during the spring breeding season to determine that the species was not present in the area.

Completed herpetological surveys for a proposed 2,200-acre raw water reservoir in King William County, Virginia. Aerial photography and large-scale topographic mapping were utilized to identify a wide variety of upland and wetland communities and to identify search areas. Three-day field surveys were completed during early spring, late spring, early summer and mid-summer to detect breeding herpetofauna. A total of 74 species of reptiles and amphibians were detected.

Performed a site inspection, wetland delineation and endangered species survey for proposed 16-inch water reuse and 24-inch sewage force mains in Orlando, Florida. A habitat evaluation was completed for the Gopher Tortoise (*Gopherus polyphemus*), Red-cockaded Woodpecker (*Picoides borealis*), Florida Scrub Jay (*Aphelocoma coerulescens*), and American Kestrel (*Falco sparverius*). Several active Gopher Tortoise burrows were located along the corridor. Active burrows were flagged in the field and a salvage/transplantation plan was developed and implemented during project construction.

Completed a habitat evaluation and endangered species survey for the Barking Treefrog (*Hyla gratiosa*), Mabee's Salamander (*Ambystoma mabeei*), and Harper's Fimbristylis (*Fimbristylis perpusilla*) for the Virginia Natural Gas pipeline project in the Grafton Ponds Sinkhole Complex, York County and Newport News, Virginia. Evaluated aerial photography and large-scale topographic mapping to identify potential sinkhole pond and forested wetland habitat. Spring and summer surveys were completed and avoidance and mitigation measures were developed to reduce the potential effects on these species.

Completed a habitat evaluation and endangered species survey for the Harper's Fimbristylis for the proposed Turnberry Boulevard Extension corridor, Newport News, Virginia.

Completed a habitat evaluation and endangered species survey for the Barking Treefrog and Mabee's Salamander on a 45-acre site for the proposed Woodside High School project, Newport News, Virginia in support of a USCOE and Virginia DEQ Joint Permit Application. Completed an on-site habitat evaluation to determine appropriate habitat and reference sites, as well as completed late winter, spring and summer surveys for the rare amphibians. No rare species were detected.

Lead project scientist for a habitat evaluation and endangered species survey for the 6,500-acre Jacksonville Land Treatment System project, Onslow County, North Carolina.

Color infrared aerial photography, topographic mapping, and hydric soils mapping were examined to identify sinkholes, bottomland hardwoods, remnant pocosin, remnant savannah, and other potential habitat for rare plant and animal species. Late winter field inspections to refine potential search areas, as well as spring and summer surveys were completed to detect the presence or absence of federally listed and state listed threatened or endangered species.

Completed an endangered species survey for the state-listed Red-shouldered Hawk (*Buteo lineatus*) on a 300-acre proposed large-lot development in Ulster County, New York. Habitat evaluations were completed to identify appropriate upland hardwood and forested wetland habitat. Early spring transect surveys were completed for the proposed 300-acre residential site.

Completed endangered species survey for the Rough-leaved Loosestrife (*Lysimachia asperulifolia*) and Red-cockaded Woodpecker for a proposed 10-acre solid waste transfer station in the Croatan National Forest, Carteret County, North Carolina. No individual plants or active nest sites were found.

Completed Small-whorled Pogonia (*Isotria medeoloides*) (SWP) surveys for several projects as described below:

1. Newport News Waterworks Northern Zone Water Pipeline Survey, James City County, Va., July 1991. No individuals found.
2. College Woods, Williamsburg, Va., June 1993. Status of individual SWP plant discovered by Virginia Crouch. One individual plant examined.
3. King William Reservoir Site Survey, King William County, Va., June 1993 One individual seen.
4. Black Creek Reservoir Site Survey, New Kent County, Va., July 1993. No individuals seen.
5. Chisel Run Colony, James City County, Va., May 1994. Checked on the status of the colony being monitored by Dr. Donna Ware.
6. Ware Creek Reservoir Site Survey, James City and New Kent Counties, Va., May 1994. Two individuals discovered.
7. King William Reservoir Site Survey, King William County, Va., June 1994. New colony of 5 plants discovered. Individual discovered in 1993 was examined.
8. Virginia Natural Gas 20-Inch Northern Trunk Line, James City County, Va., June 1994. Habitat assessment and SWP survey. No individuals found.
9. Black Creek Reservoir Site Survey, New Kent County, Va., August 1994. No individuals found.
10. Rocky Pen Run Reservoir Site Survey, Stafford County, Va., May-June 1996. Principal Investigator and Field Crew Leader. No individuals found.
11. Fredericksburg Outer Connector, Stafford and Spotsylvania Counties, Va., June-July 1998. Crew leader. Three individuals discovered.
12. Fredericksburg Outer Connector, Stafford and Spotsylvania Counties, Va., June 1999. Project Manager. No individuals discovered.

13. Chisel Run Colony, James City County, Va., August 1999. Checked on the status of the colony being monitored by Dr. Donna Ware. 40 individuals examined. No new individuals discovered.

Environmental Impact Assessment

Mr. Sankey has been a principal author in the preparation of the following documents:

Lower Virginia Peninsula Regional Raw Water Supply NEPA EIS
Rocky Pen Run Reservoir NEPA EA, Stafford County, VA
King Street Bridge NEPA EA, Hampton, Virginia
Radford Army Ammunition Plant WWTP Extension NEPA EA, Radford, Virginia
CRSWA Solid Waste Transfer Station NEPA EA, Carteret County, NC
Jordan Lake Pipeline Crossing NEPA EA, Piedmont, NC
Boswell Loop Alternatives Environmental Assessment
Dahlgren WWTP Expansion NEPA EA, Dahlgren, VA
Crooked Creek Reservoir NEPA EA, Jefferson County, AL

Additional Professional Training:

Wetland Identification and Delineation, University of Massachusetts, 1990; Habitat Evaluation Procedures (HEP), Colorado State University, 1991; Winter Botany, Environmental Concern, 1994; Evaluation for Planned Wetlands, Environmental Concern, 1995; Aquatic Ecological Risk Assessment, WERF, 1996; Constructed Wetlands for Wastewater Treatment, Henricopolis Soil & Water Conservation District, 1997; Watershed Planning, Center for Watershed Planning, 1999.

Publications and Research:

Sankey, R. T. 2000. "Created Wetlands: Innovative Storm Water Management and Reuse." Workshop presented at the AWWA 2000 Water Reuse Conference, January 30, 2000, San Antonio, TX.

Sankey, R. T. 1999. "Innovative Mitigation Plan Preserves Unique Grafton Ponds." Presented at the 20th Annual Meeting of the Society of Wetlands Scientists, Norfolk, VA.

Sankey, R. T. 1996. "Pocosin and Bottomland Hardwood Restoration in the North Carolina Coastal Plain: A Case Study." Presented at the 17th Annual Meeting of the Society of Wetland Scientists, Kansas City, MO.

Powers, P. H., L. O'Neil, W. Fuscoe, and R. T. Sankey. 1995. "Innovative Storm Water Treatment at the Oak Hollow Reservoir." Presented at the 75th Annual Conference of the North Carolina American Water Works Association / Water Environment Association, Greensboro, NC.

Johnson, R. L., Sankey, R. T., Dembinsky, R. P., and Thurrott, J. C. 1995. "City of Daytona Beach Wellfield Wetland Monitoring Program." Presented at the American Water Works Association Annual Meeting, Anaheim, CA.

Sankey, R. T. 1995. "Vernal Ponds in Virginia." Published in the Virginia Association of Wetland Professionals Newsletter, Volume II, Issue 2, July 1995.

Sankey, R. T. and Schwenneker, B. W. 1992. "Ecology of the Grafton Ponds Sinkhole Complex in Eastern Virginia." Presented at the Thirteenth Annual Meeting of the Society of Wetland Scientists, New Orleans, LA.

Sankey, R. T. and B. W. Schwenneker. 1992 "Creation of an Open Water/Emergent Marsh in the Albany Pine Bush." Presented at the Nineteenth Annual Conference on Wetlands Restoration and Creation, Tampa, FL.

Sankey, R. T. 1985. "Islands on the Prairie: The Flora and Avifauna of Shelterbelts in Stafford County, Kansas." Master's Thesis. The University of Kansas, Lawrence, KS.

MALCOLM PIRNIE

Stacie R. Alter [redacted]

Ms. Alter is a project hydrogeologist specializing in solid waste facility permitting, subsurface contamination investigations, groundwater monitoring, aquifer protection permitting, and environmental field work, including well installation, soil sampling, and subcontractor management.

Detailed Experience

- **Abitibi Consolidated Sales: Aquifer Protection Permitting / Snowflake, AZ.** Responsible for on-going APP compliance, including the preparation of major and minor permit modifications.
- **Tucson Electric Power Company: Aquifer Protection Permit for Springerville Generating Station / Springerville, AZ.** Prepared Aquifer Protection Permit for coal-fired power plant.
- **Abitibi Consolidated Sales: Sampling Plan for a Paper Fiber Waste Lagoon / Snowflake, AZ.** Used U.S. EPA Method SW-846 to develop a sampling plan, which was conducted per aquifer protection permit requirements and included a statistical analysis of existing data.
- **CALMAT: Alternative Liner Demonstration for Calmat Landfill / Tucson, AZ.** Completed the demonstration, which included a comparison of a Subtitle D final cover system, an Arizona Department of Environmental Quality-approved final cover system, and an alternative final cover system. The demonstration also included the use of HELP modeling. Following the demonstration, requested a minor modification to the landfill's aquifer protection permit.
- **City of Tucson: Aquifer Protection Permit for Irvington Landfill / Tucson, AZ.** Responsible for permitting activities, including reviewing site geology/ hydrogeology and water quality data, conducting a borrow source evaluation, and negotiating permit requirements. Performed regulatory review of ordinances or permit requirements associated with various end uses of the site. The regulatory review included the examination of Section 404 requirements, the WASH/ERZ ordinances, the native plant ordinance, zoning and development standards for the site, the availability of utilities in the area, restrictive covenant requirements, air quality permit requirements, endangered species clearance, NPDES requirements, and state historic preservation clearance.
- **City of Tucson: Groundwater Remediation at Los Reales Landfill / Tucson, AZ.** Conducted field work associated with the design of a groundwater remediation system at the landfill site. The fieldwork included conducting aquifer tests and collecting groundwater samples to determine the degree of hydrologic connection (and related impact of contaminant transport) between two aquifers. Subsequent fieldwork included grouting wells that were screened across two water-bearing units to mitigate cross-contamination.

Title/Firm

Project Hydrologist,
Malcolm Pirnie, Inc.

Years of Experience

6

Education

Studies in Geology Arizona State University
BA Geology Vassar College 1994
MS Hydrology University of Arizona 2000; Tucson

Registration and Certifications

2000 Geologist-in-Training

Health and Safety Training

Hazardous Waste Operations Eight (8) hour refresher
Bloodborne Pathogens Exposure Control
Cardiopulmonary Resuscitation
First Aid
Medical

Societies

Arizona Hydrological Society (Member)

Employment History

Malcolm Pirnie, Inc. 2000 to present
IT/EMCON 1996 to 2000
Delta Environmental 1995 to 1996
Basin & Range 1994 to 1995

- **City of Tucson: Aquifer Protection Permit for Speedway Landfill / Tucson, AZ.** Assisted with permitting procedures, including HELP modeling, a hydrogeologic study, obtaining necessary clearances from state and federal agencies, calculating Alert Levels, and preparing a compliance schedule.
- **Glenn Weinberger: Landfill Slope Stability Modeling, Weinberger Rainbow Valley Landfill / Mobile, AZ.** Modeling performed to determine factor of safety values for a waste tire monofill.
- **Glenn Weinberger: Slope Stability Modeling at Weinberger 43rd Avenue Landfill / Phoenix, AZ.** Performed modeling using PCSTABL to determine factor of safety values for the landfill's slopes. Also, performed HELP modeling to determine the potential of leachate migration from the base of the landfill. The HELP modeling was performed as part of the aquifer protection permitting activities.
- **Tucson Electric Power Company: Aquifer Protection Permit Activities for Springerville Generating Station / Springerville, AZ.** Prepared closure plans for an inactive landfill located adjacent to an active ash disposal area. Performed HELP modeling to determine the viability of using fly ash and bottom ash as cover material on the inactive landfill. Compiled historical landfill use data and prepared a closure report for Arizona Department of Environmental Quality submittal.
- **USA Waste of Arizona, Inc.: Aquifer Protection Permit for Deer Valley Landfill / Maricopa County, AZ.** Prepared the permit and an SWFP, including HELP modeling, endangered species clearance, State Historic Preservation clearance, closure and postclosure plans, a hydrogeologic study, and a demonstration of compliance with standards.
- **Arizona Army National Guard: Site Characterization Activities / AZ.** Supervised geophysical team as part of site characterization activities. Also supervised well construction and conducted subsequent groundwater monitoring.
- **Confidential Client, ITT, and F&B Manufacturing: Site Characterization Activities / Phoenix, AZ.** Conducted groundwater monitoring for chlorinated solvent contamination at Water Quality Assurance Revolving Fund sites in Phoenix. Collected quarterly groundwater samples and monthly water levels, and prepared reports for agency submittal.
- **Yellow Cab: Site Characterization Activities / AZ.** Monitored BTEX concentrations, alkalinity, pH, redox potential, dissolved oxygen, nitrate, dissolved iron, and carbon dioxide.

BARBARA S. MACNIDER
Principal Investigator II

Archaeological Consulting Services, Ltd.
424 W. Broadway Road
Tempe, Arizona 85282-1339

EDUCATION

1979-82 Graduate studies in archaeology (all work completed toward a master's degree except the thesis), Arizona State University
1978 Graduate studies in archaeology, Florida State University
1977 B. A. anthropology (archaeology) and minoring in history, University of Illinois
1973-75 Undergraduate studies majoring in biology, Denison University, Ohio

PROFESSIONAL EXPERIENCE

ARCHAEOLOGICAL CONSULTING SERVICES, LTD., Tempe, AZ

- Vice president (August 1997-present)
- Principal investigator II (August 1998-present)
- Senior project manager (May 1992-August 1998)
- Project manager (Oct. 1989-May 1992)
- Crew chief/assistant project manager (Jan. 1985; Dec. 1986-Oct. 1989)
- Field archaeologist/lab assistant (Oct. 1983; Dec. 1984; Aug.-Dec. 1986)

Current duties include overseeing (and sometimes performing) archaeological surveys and small- to medium-sized excavations, writing and editing project reports, interacting with agency personnel and clients, and developing proposals and budgets. Since becoming a project manager in 1989, I have supervised over 600 projects conducted throughout Arizona, from Bullhead City to Yuma and from near Douglas to Rock Point on the Navajo Reservation. These projects took place on private land as well as on land managed by various agencies, including the Apache-Sitgreaves, Coconino, Kaibab, Prescott, and Tonto National Forests; the Phoenix and Yuma Districts of the Bureau of Land Management; the Bureau of Reclamation; the US Fish and Wildlife Service; the Arizona State Land Department; the Bureau of Indian Affairs; the US Postal Service; the Arizona Department of Transportation; Maricopa and Pinal Counties; Ak-Chin, Cocopah, Gila River, Salt River Pima-Maricopa, Fort McDowell, Fort Mojave, and Navajo Indian Communities; and the Towns/Cities of Buckeye, Goodyear, Gilbert, Mesa, Tempe, Page, Kingman, and Florence. Sample of the larger projects follow.

1997-98 **Cave Creek Agriculture Sites**–Wheeler Construction. Supervised archaeological and geomorphological study of prehistoric agricultural sites along Cave Creek. Conducted a damage assessment of two prehistoric sites, prepared budgets for different phases, and edited and produced all project reports.

1996-99 **Red Mountain Freeway EIS**-Entranco and ADOT. Supervised archaeological and architectural study along the alternative alignments for the freeway between Country Club Road and US 60. Participated in monthly team meetings and two public hearings. Prepared responses to public comments about the cultural resources in the DEIS. Developed plan and supervised mitigation for Lehi District.

1995-98 **Bank One Ballpark, Maricopa County Stadium District**–SCS Engineers. Assisted in the management of the testing and data recovery excavations for the ca. 25 acre ballpark. Provide communication between archaeological investigations and construction management to ensure smooth sailing through a sea of scheduling nightmares.

1995-97 **US 93 Realignment**–ADOT. Supervised surveys and excavations within new US 93 right-of-way north of Kingman. Prepared budgets for different phases, prepared data recovery plans, surveyed one of the realigned areas, and edited and produced all project reports.

1994-95 **SR 98 Realignment**–ADOT. Supervised survey of new right-of-way for SR 98 near Page, AZ. Prepared testing/data recovery budget, assisted in preparation of data recovery plan, and edited and produced the data recovery report.

1993-94 **Bonneybrook Substation**–APS. Directed survey and data recovery investigations of a prehistoric agricultural field located east of Florence, AZ. Worked closely with the Arizona State Land Department to coordinate the work.

1993 **Bullhead Parkway, East Branch Sewerline, and Rio Rancho/Rancho del Rio Projects.** Series of projects in Bullhead City, AZ, that involved managing survey and data recovery tasks. Prepared data recovery plans for the projects. Worked closely with the Bureau of Land Management to insure rapid completion of the fieldwork to meet the needs of the clients.

1992-93 **Price Expressway Testing and Data Recovery**–ADOT. Prepared testing plan and served as project director overseeing the fieldwork and managing the project.

Rillito and Toltec Loops (Casa Grande to Tucson)–ADOT. Managed survey, testing, monitoring, and data recovery efforts along two 20-mile pipeline rights-of-way located between Tucson and Phoenix. Edited reports, prepared testing and data recovery plans, and coordinated field and laboratory efforts.

1991 **Grand Canyon Airport Data Recovery.** Prepared data recovery plan, coordinated field, laboratory, and report writing efforts.

Mohave Line Survey and Monitoring. Coordinated with Woodward-Clyde Consultants, Transwestern Pipeline, and State Historic Preservation Office to monitor pipeline construction activities between Topock and Bullhead City. Also provided additional survey of proposed realignment.

Knuck Land Exchange–Prescott National Forest. Conducted field survey and prepared report on land exchange project.

Reno-Cannon Airport Survey. Coordinated with Nevada state personnel to perform archaeological survey. Edited report and interfaced with client.

1990 **State Route 69 Widening Project**–ADOT. Surveyed Cordes Junction to Mayer, AZ, right-of-way and prepared report.

Cocopah Land Use Study. Prepared cultural resource overview of Cocopah Indian Community lands in Yuma County.

Nevada Lateral to Topock Station–El Paso Natural Gas Company. Conducted an assessment of previously recorded sites along the El Paso Natural Gas Company's proposed right-of-way.

Christopher Creek Testing Project–Tonto National Forest. Conducted field testing and prepared report of a site located in the Christopher Creek Campground, Tonto National Forest.

Dude Timber Salvage Project. Conducted field survey east of Payson and wrote the historic portion of a culture history for the sub-Rim area on the Tonto National Forest.

1989 **Pima Freeway Project.** Conducted archaeological survey and wrote report for the proposed Pima Freeway right-of-way located on the Salt River Pima-Maricopa Indian Community.

Siphon Draw Project–TRW. Conducted field survey for proposed state land sale in Apache Junction, AZ.

1987-89 **Prescott and Tonto National Forests Overviews.** Wrote data synthesis and culture history chapters for both cultural resource overviews.

Childs and Irving Hydroelectric Plants National Register Nomination–APS. Conducted archaeological survey and archival research for the National Register nomination of Arizona Public Service Company's Childs and Irving hydroelectric plants near Strawberry, AZ.

1986-89 Crew chief. Conducted survey projects throughout Arizona, primarily in Yavapai, Gila, and Maricopa counties.

1986 **Waddell Data Recovery Project**–Bureau of Reclamation. Crew member, laboratory technician, and data entry personnel.

1985 **Agua Fria Borrow Area and Waddell Canal.** Crew chief.

1984 **Castle Hot Springs Road Relocation.** Field archaeologist. Participated in survey near Peoria, AZ.

1983 **Aztec Timber Sale**, Heber, AZ. Field archaeologist. Apache-Sitgreaves National Forest timber sales survey. Duties occasionally included supervising a survey crew.

SOIL SYSTEMS, INC. (SSI), Phoenix, AZ

1986 **East Papago Testing Project 3.3.** Field archaeologist. Participated in testing tasks in Phoenix.

American Telephone and Telegraph Fiber Optics Mitigation Project, along the Pinal Pioneer Parkway, Oracle, AZ. Joint SSI/ACS project. Field director overseeing excavation of prehistoric village site.

1985-86 **Pinnacle Peak Urban Planning Project test excavations,** Scottsdale, AZ. Crew chief, duties included planning testing strategies, running field testing, and preparing testing report including suggestions for a mitigation program.

Ak-Chin Indian Community Data Recovery Project. Crew chief, duties included site report writing as well as directing field excavations at two prehistoric sites (one site also had a protohistoric component).

1985 **American Telephone and Telegraph Testing Project.** Joint SSI/ACS project. Field archaeologist. Participated in testing tasks along the Pinal Pioneer Parkway, Oracle, AZ.

Papago Park Planning Area Project. Archaeologist. Duties included researching known sites within Tempe Papago Park and writing an overview for the area.

1983 **Phoenix Redevelopment Project, Block 24 Mitigation.** Field archaeologist. Participated in prehistoric excavations.

1982-83 **New River Authorized Dam Project.** Assistant crew chief. Project involved prehistoric and historic data recovery excavations near Peoria, AZ.

1982 **Phoenix Redevelopment Project, Murphy Addition Data Recovery.** Field archaeologist. Project involved excavating historic features.

1981 **Phoenix Redevelopment Project, Calmark (Murphy Addition) Testing,** AZ. Field archaeologist and historic artifact analyst.

BUREAU OF LAND MANAGEMENT, PHOENIX DISTRICT, Phoenix, AZ

1984 **Hopi-Navajo Relocation Program and the Ron Cohn Range Land.** Field archaeologist. Surveys were in Rainbow Valley, Tortolita Mountains, and Avra Valley, AZ.

WESTERN ARCHAEOLOGICAL AND CONSERVATION CENTER, NPS, Tucson, AZ

1984 **Saguaro National Monument, Rincon Mountain Unit Survey.** Field archaeologist.

ARIZONA ARCHAEOLOGICAL SOCIETY, Phoenix, AZ

1983 **Black Mesa Pueblo Field School.** Assistant field director. Duties included giving daily lectures on archaeological methods and excavation techniques and assisting in supervising site excavations near Show Low, AZ. Also directed survey crews to cover nearby BLM Asset Management acreage.

ARIZONA STATE UNIVERSITY, Tempe, AZ

1982 **AZ AA:6:1(ASU) Project**, near Arizona City, AZ. Computer data management and manipulation of lithic artifacts.

1980-81 **Noble Science Library Salvage Excavations,** ASU campus. Assistant director.

1979 **Veracruz (Mexico) Project.** Research assistant for Dr. Barbara Stark. Coding ceramic data for computer analysis. (National Science Foundation funded project)

NORTHLAND RESEARCH, INC., Flagstaff, AZ

1982 **Central Arizona Project, Indian Distribution Division,** AZ. Field archaeologist on Gila River Indian Reservation survey.

1980-81 **Central Arizona Project, Indian Distribution Division,** AZ. Field archaeologist on Ak-Chin Reservation survey. Also did preliminary analysis of ceramics.

UNIVERSITY OF GEORGIA, Athens, GA

1980 **Valley of Oaxaca Settlement Pattern Project,** Oaxaca, Mexico. Crew chief supervising field survey. Contributed to the chapter on preceramic sites in published report for the project. (National Science Foundation funded project)

IROQUOIS RESEARCH INSTITUTE, Fairfax, VA

1979 **St. Francis River Basin Survey**, MI and AR, and **Harry Truman Reservoir Survey**, MI. Crew member on several survey projects.

SOUTH EAST CONSERVATION AND ARCHAEOLOGICAL CENTER, NPS, Tallahassee, FL

1979 **Tyndall Air Force Base,** Panama City, Florida. Field archaeologist on survey of coast areas.

Mackeys Creek and Parr sites, northeast MS. Lithic analysis of chert artifacts.

NPS Natchez Trace (Mackeys Creek site), MS. Field archaeologist on salvage excavations.

1978 Volunteer work for National Park Service doing faunal analysis for a site in the Everglades.

ARCHAEOLOGICAL RESOURCE ASSESSMENT, Argenta, IL

1978 **Lincoln Log Cabin and Moore Home,** Illinois. Field archaeologist on outbuilding excavations.

UNIVERSITY OF ILLINOIS, Champaign-Urbana, IL

1978 **Chicap Petroleum Pipeline,** Chicago to Mount Vernon, IL. Field archaeologist on survey.

1977-78 **University of Illinois Field School and Earthwatch Expedition,** Middle Caicos, Turks Islands, West Indies. Co-supervisor of a field school and Earthwatch groups in both the field excavations and survey and the lab. Dissertation research.

1977 Crew member for various contract projects, including excavation and laboratory work, and for dissertation research involving survey of uplands in central Illinois,

1976, 78 Laboratory assistant and co-supervisor, ceramic analysis of Ecuadorian ceramics. Dissertation research.

1976 Collins Site, Middlefork River Valley, IL. Field archaeologist on excavations of Woodland and Mississippian village site.

PUBLICATIONS/MANUSCRIPTS/PAPERS

1998 Archaeological Survey of the Preacher Canyon Substation Access Road (Forest Road 436), Payson Ranger District, Tonto National Forest, Gila County, Arizona, by Jerryll L. Moreno and **Barbara S. Macnider**. Ms. on file, ACS, Tempe.

1997 Cultural Resource Literature Review and Site Assessment for the Santan Freeway, Chandler, Mesa, and Gilbert, Maricopa County, Arizona, by **Barbara S. Macnider** and Kim Adams. Draft on file, ACS, Tempe.

Geoarchaeological Investigations at AR-03-12-04-366, East of Star Valley, Gila County, Payson Ranger District, Tonto National Forest, by Bruce G. Phillips and **Barbara S. Macnider**. Ms. on file, ACS, Tempe.

Plan of Work for Geoarchaeological Investigations at AR-03-12-04-366, East of Star Valley, Gila County, Payson Ranger District, Tonto National Forest, by Bruce G. Phillips and **Barbara S. Macnider**. Ms. on file, ACS, Tempe.

Archaeological Survey of Red Mountain Freeway (State Route 202) from State Route 87 to Us Highway 60, Mesa, Maricopa County, Arizona, by **Barbara S. Macnider**, Holly DeMaagd, David E. Doyel, Shereen Lerner, and Jerryll Moreno. Cultural Resources Report No. 102. ACS, Tempe.

Cultural Assessment of Historic Properties in the Lehi Area, Mesa, Maricopa County, Arizona, by Karolyn Jackman Jensen, **Barbara S. Macnider** (both of ACS), and Gerald A. Doyle (of Gerald A. Doyle and Associates). Cultural Resources Report No. 103. ACS, Tempe.

Archaeological Data Recovery at AZ L:11:15 and AZ L:11:17(ASM), Windsor State Beach Park, Lake Havasu City, Mohave County, Arizona, by C. Scott Crownover, Bruce G. Phillips, **Barbara S. Macnider**, and Teresa L. Hoffman. Ms. on file, ACS, Tempe.

1996 *Lithic Resources and Land Use in the Gila Bend Landfill, Town of Gila Bend, Maricopa County, Arizona*, by David E. Doyel, John Rapp, Bruce Phillips, C. Scott Crownover, and **Barbara S. Macnider**. Cultural Resources Report No. 96. ACS, Tempe

Archaeological Survey of Realignment for US 93 Between Stations 101+660 and 102+380, North of Kingman, Mohave County, Arizona, by **Barbara S. Macnider**. Ms. on file, ACS, Tempe.

1995 *Archaeological Excavations at Pueblo Blanco: The MCDOT Alma School Road Project*, edited by David E. Doyel, Andrew T. Black, and **Barbara S. Macnider**. Cultural Resources Report No. 90. ACS, Tempe.

Archaeological Testing, Data Recovery, Monitoring, and Discovery Plan for the Bank One Ballpark, Phoenix, Maricopa County, Arizona, by Shereen Lerner, Karolyn Jackman Jensen, and **Barbara S. Macnider**. Ms. on file, ACS, Tempe.

1994 A Cultural Resources Assessment for the Proposed Citizens Utilities Lake Havasu to Gem Acres Fiber Optic Cable Right-of-way, Mohave County, Arizona, by C. Scott Crownover and **Barbara S. Macnider**. Ms. on file, ACS, Tempe.

Archaeological Investigations of AZ U:5:143(ASM), the McDowell Mountains Ground Stone Manufacturing Quarry, Scottsdale, Maricopa County, Arizona, by C. Scott, Crownover, John Rapp, and **Barbara S. Macnider**. Cultural Resources Report No. 93. ACS, Tempe.

Site and Project File Search for the Hohokam Irrigation and Drainage District and Florence-Coolidge Natural Resource Conservation District, South and West of Coolidge, Pinal County, Arizona, by **Barbara S. Macnider** and Gina Gage. Ms. on file, ACS, Tempe.

1993 An Archaeological Assessment of the Bullhead Parkway, Bullhead City, Mohave County, Arizona, by Joseph Crary and **Barbara S. Macnider**. Ms. on file, ACS, Tempe.

An Archaeological Assessment of the East Branch Sewerline, Bullhead City, Mohave County, Arizona, by **Barbara S. Macnider**, Walter Punzmann, and Joseph Crary. Ms. on file, ACS, Tempe.

Results of Archaeological Data Recovery of Sites Located Along Bullhead Parkway, Bullhead City, Mohave County, by Shereen Lerner, Walter Punzmann, Joseph Crary, **Barbara S. Macnider**, John Rapp, and Aline LaForge. Cultural Resources Report No. 81. ACS, Tempe.

Results of Testing in Eight Parcels and of Documentary Research of the Thude House, South Price Expressway, Tempe and Chandler, Maricopa County, by Walter R. Punzmann, Karolyn Jackman Jensen, and **Barbara S. Macnider**. Cultural Resources Report No. 77. ACS, Tempe.

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Cultural Resource Investigations at Two Sites Along the Nevada Lateral System Expansion Route, El Paso Natural Gas Line, Mohave County, Arizona, by Kim Adams, JoAnn Kisselburg, **Barbara S. Macnider**, and Walter Punzmann. Ms. on file, ACS, Tempe.

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Monitoring Report and Data Recovery Plan for the U.S. West Communications Dudleyville to Hayden Fiber Optic Right-of-Way, by **Barbara S. Macnider**, Kim Adams, and JoAnn Kisselburg. Ms. on file, ACS.

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1990 An Archaeological Assessment of the U.S. West Communications Hayden-Kearny Fiber Optic Cable Right-of-Way, Pinal and Gila Counties, Arizona. Ms. on file, ACS, Tempe.

Cocopah Land Use Study: Cultural Resources. Ms. on file, ACS, Tempe.

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Testing and Data Recovery Measures Performed at Five Prehistoric Sites along Siphon Draw, Pinal County, Arizona, by JoAnn Kisselburg, **Barbara S. Macnider**, Kim Adams, and Donald Irwin. Cultural Resources Report No. 58. ACS, Tempe.

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Cultural Resources Overview: The Prescott National Forest, by **Barbara S. Macnider**, Richard W. Effland, and George Ford. Cultural Resources Report No. 50. ACS, Tempe.

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Numerous small clearance reports for utility company rights-of-way also were written in 1988; most projects were located in central and southern Arizona. Mss. on file, ACS, Tempe.

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Numerous small clearance reports for utility company rights-of-way also were written in 1987; most projects were located in central and southern Arizona. Mss. on file, ACS, Tempe.

1986 A Cultural Resource Survey of the Proposed APS 12 kV Distribution Line to Serve the Gillespie All-American Pipeline Valve. Ms. on file, ACS, Tempe.

Test Excavations at Three Archaeological Sites in the Pinnacle Peak Urban Lands Project, Maricopa County, Arizona. Ms. on file, SSI, Phoenix.

1985 Cultural Resources Overview for the Papago Park Planning Area. Ms. on file, SSI, Phoenix.

1984 An Archaeological Survey of T12S, R11E, E 1/2 of Section 25. Ms. on file, BLM, Phoenix District.

1981 The Preceramic Occupation of the Valley of Oaxaca. Paper given at the 46th Annual Meeting of the Society for American Archaeology, San Diego.

PROFESSIONAL AFFILIATIONS

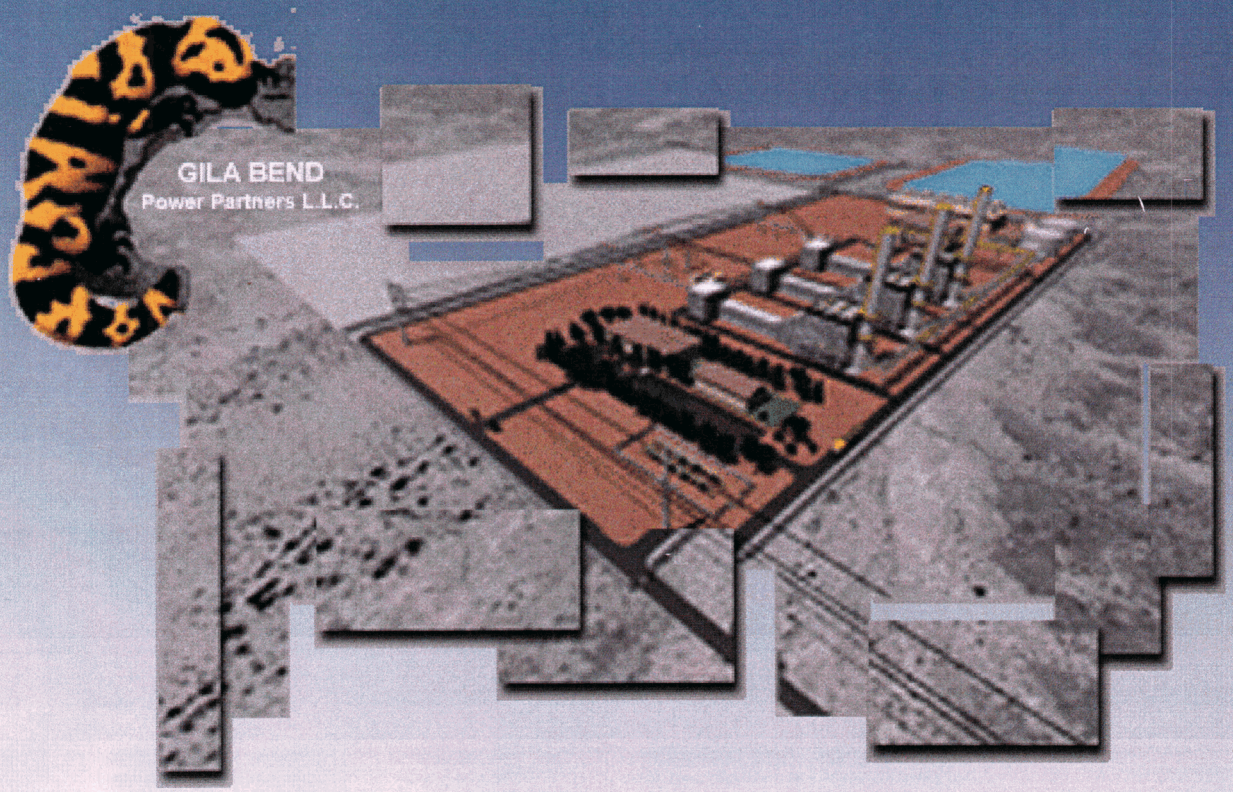
American Association for State and Local History
Arizona Archaeological Council
Arizona Archaeological and Historical Society
Arizona Historical Society
Museum Association of Arizona
Registrars Committee-Western Region

CITIZENSHIP COMMITTEES

Buckeye Airport Advisory Commission
Buckeye Valley Historical and Archaeological Museum (President of the Board of Directors)

Gila Bend Power Project

EXHIBIT
A-4
admitted



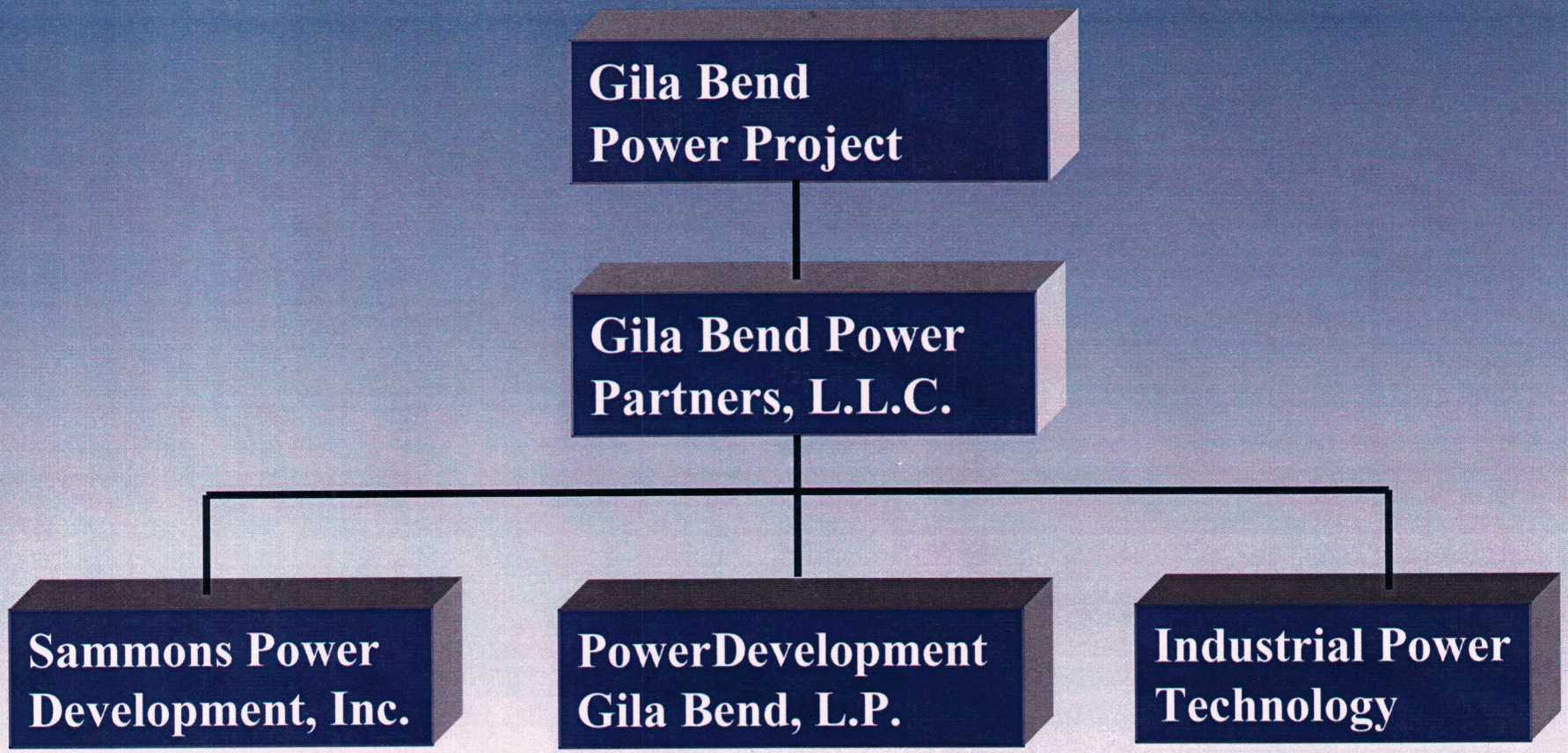
Power Plant and Transmission Line Siting Committee Hearing

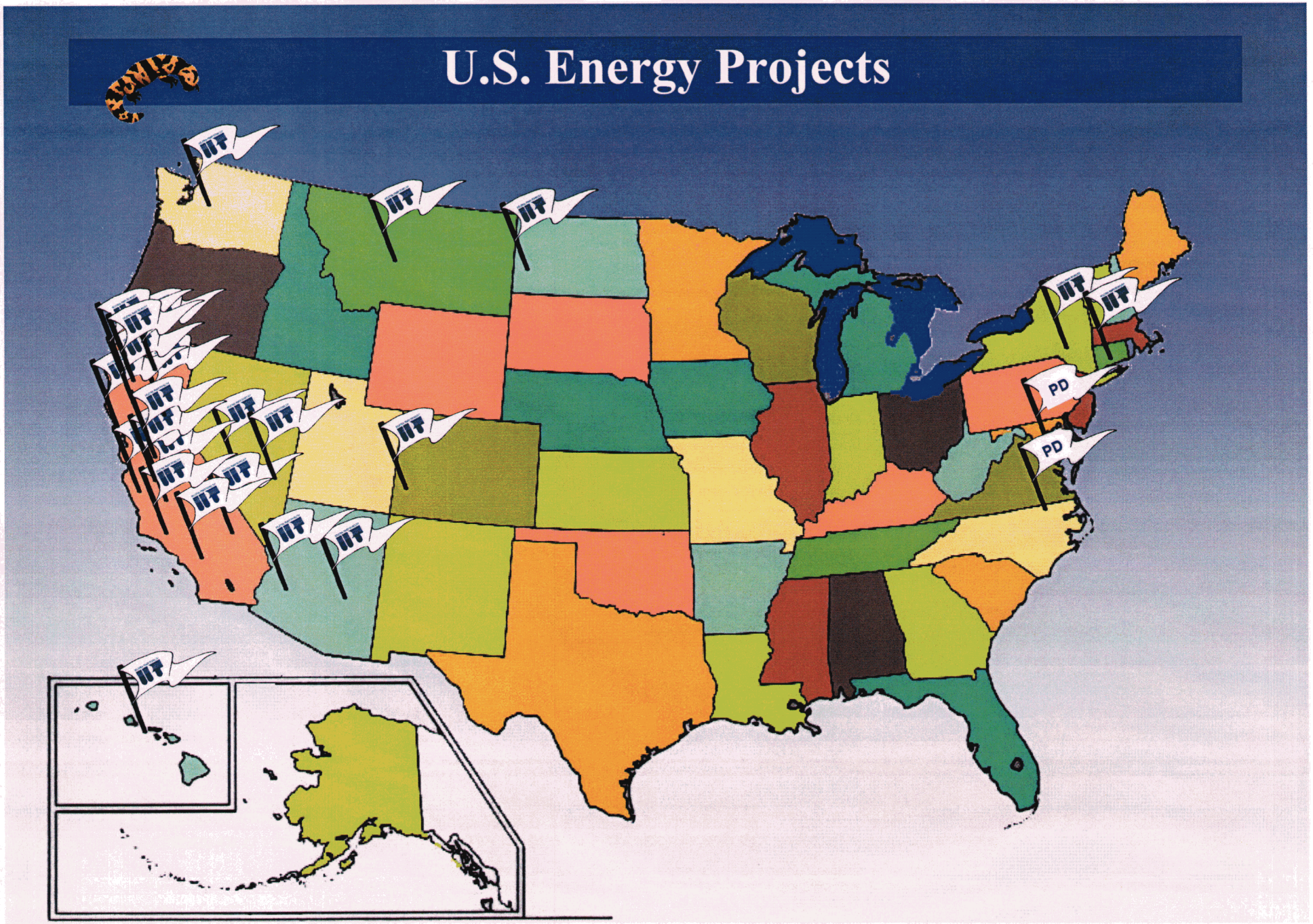
November 15, 2000

Topics - Presenters

- **Intro to Gila Bend Power Partners – Robert A. Innamorati**
  - *President, Power Development Enterprises*
- **Project Description – Robert C. Walther, P.E.**
  - *President, Industrial Power Technology*
- **Water Supply Issues – Michael Long**
  - *Principal Hydrogeologist, Hargis + Associates*
- **Environmental Issues – Gary Bacon, P.E.**
  - *Associate, Malcolm Pirnie, Inc.*
- **Land Use Issues – Randall Palmer**
  - *Principal, Environmental Planning Group*
- **Regional Transmission Planning – Gary L. DeShazo**
  - *Manager, Transmission System Planning, Salt River Project*
- **Transmission Issues – Robert C. Walther, P.E.**
  - *President, Industrial Power Technology*

Gila Bend Power Partners




U.S. Energy Projects
PD
PD

Worldwide Energy Projects

Community Outreach

- **Presentations to Town Council**
  - *October 12, 1999*
  - *September 12, 2000*
- **Arizona Toll-Free Number**
  - *1 (866) 279-4288*
- **Website**
  - *www.gilapower.com*
- **Chamber of Commerce Presentation**
- **Mailing to Community – Summer 2000**

Community Benefits

- 300 to 400 construction-related local jobs at peak workforce deployment
- Training programs for local workforce
- Approximately 30 permanent jobs at the plant
- Estimated 75 to 100 indirectly related new jobs in the area
- Local purchases associated with the plant of approximately $2 - $3 million annually over the life of the plant
- School district property tax contributions of several millions of dollars over the life of the plant

Market

- **Strong demand for power in Arizona and Southwest**

ANNUAL ENERGY LOADS
(Gigawatt Hours)*

	1999	2009	Compound Growth (%) 89-99	99-09
NWPP	348,946	418,673	1.8%	1.8%
RMPA	46,277	60,643	2.0%	2.7%
AZ/NM/SNV	96,946	134,988	3.1%	3.4%
CA/MX	262,261	324,152	1.4%	2.1%
WSCC	754,430	938,456	1.8%	2.2%

*WSCC June 2000

Market

2000-2009 GENERATION ADDITIONS*

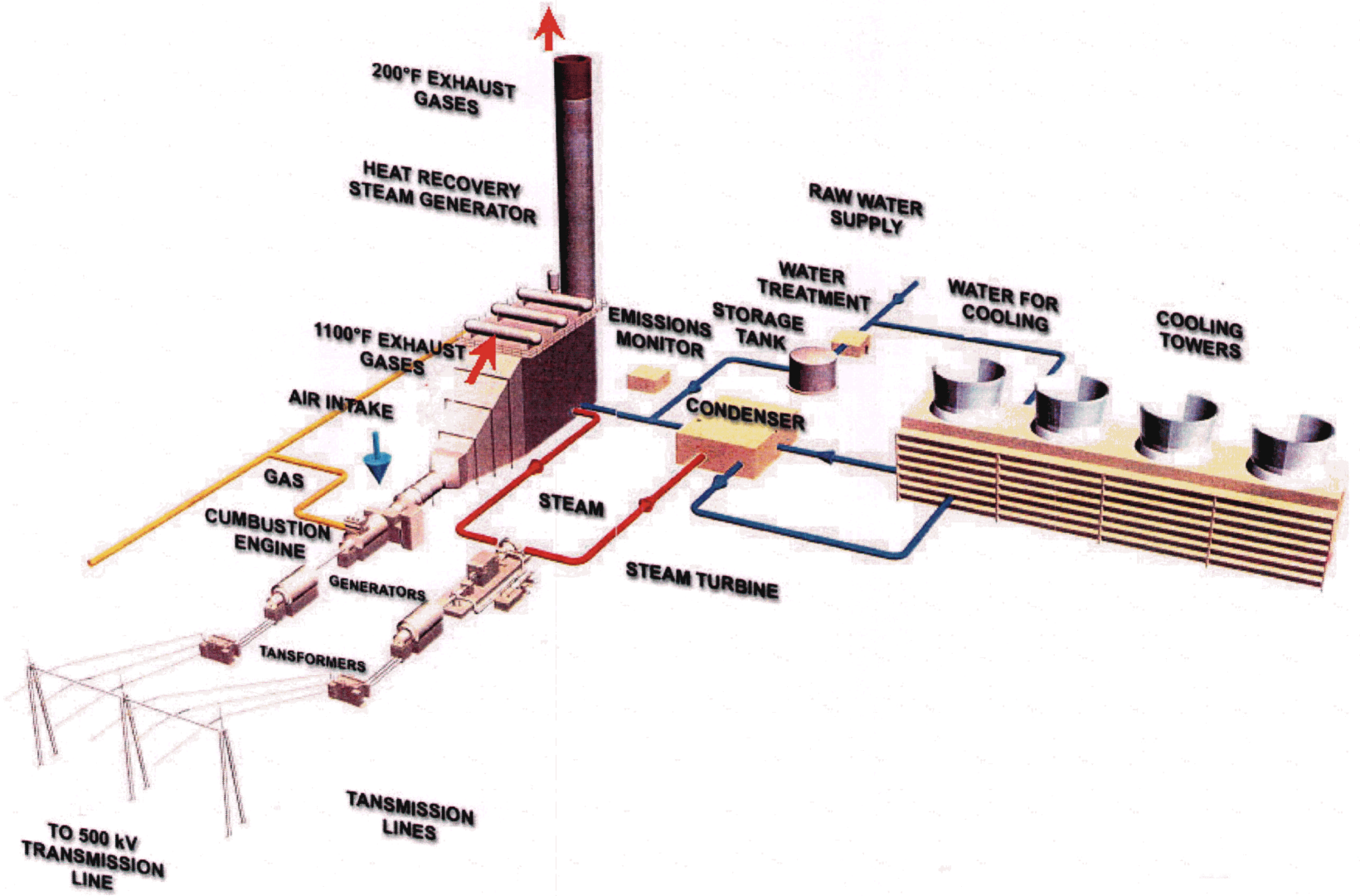
Generation	NWPP	PMPA	AZ/NM/SNV	CA/MS	WSCC
Hydro-Con.	310	-19	0	0	291
Hydro-P.S.	0	0	0	0	0
Steam-Coal	-551	-90	0	0	-641
Steam-Oil	0	0	0	-300	-300
Stam-Gas	-66	0	0	300	234
Nuclear	0	0	55	0	55
Comb. Turb.	-68	2,976	283	0	3,191
Comb. Cycle	4,570	780	11,425	8,222	24,997
Geothermal	88	0	0	100	188
Int. Comb.	0	0	0	-20	-20
Other	2,087	132	0	0	2,219
Total	6,370	3,779	11,763	8,302	30,214

*WSCC June 2000

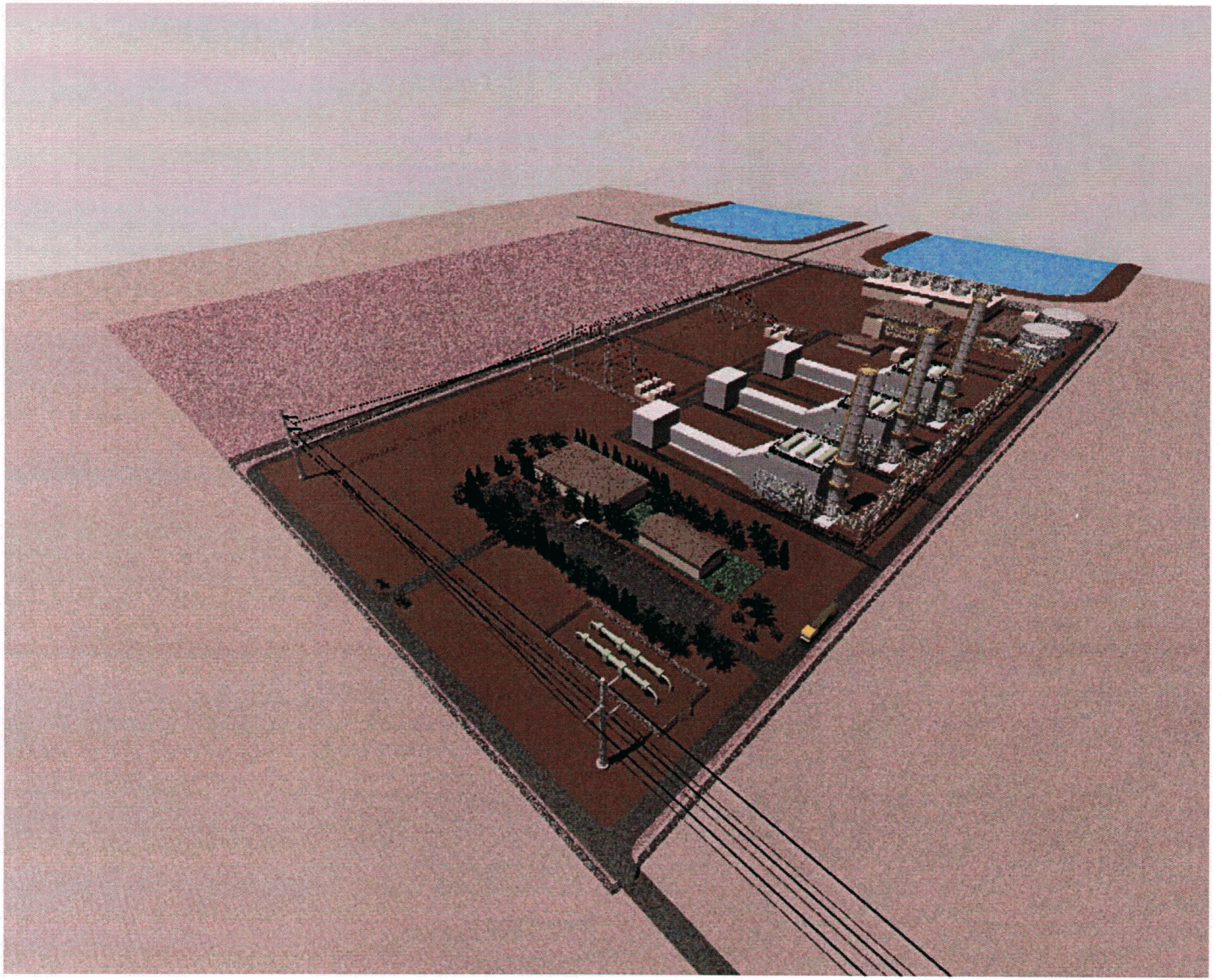
Gila Bend Power: Site Selection

- 1994 APS/Pacificorp research indicated Gila Bend as ideal location for power project
- Minimal Environmental Impacts
  - *Air attainment*
  - *Availability of largely unused water supply*
- Physical Location
  - *Receptive community and local government*
  - *Private land available for use*
- Available Resources
  - *Adequate water supply outside of Active Management Area*
  - *Available land*
  - *Available fuel supply*
  - *Available labor force*
- Access to PaloVerde power market hub
  - *Important marketplace for Arizona and southwest power*
  - *Hassayampa switchyard – consortium of participating interconnectors*

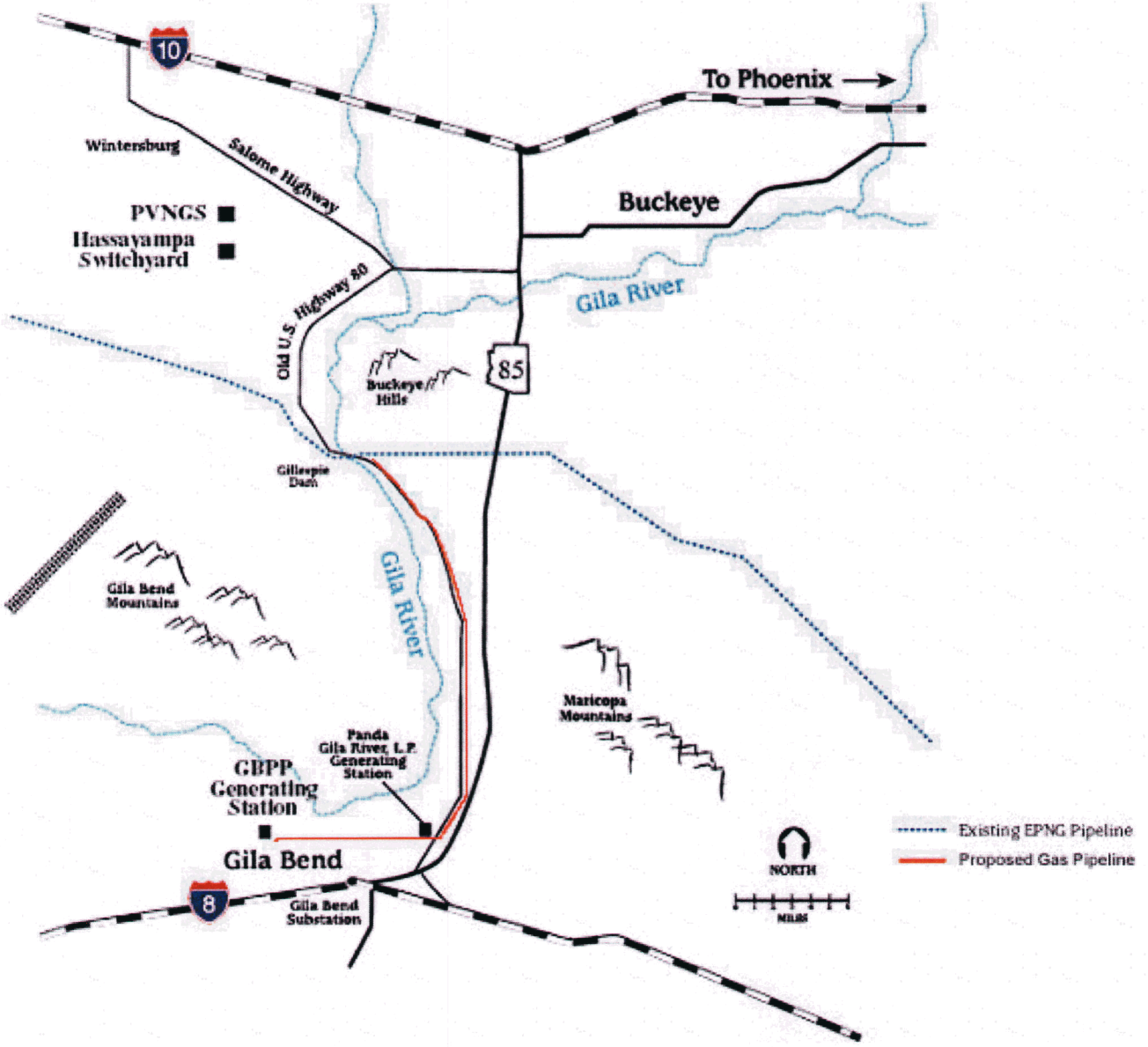
Typical Combined Cycle Plant Configuration



Gila Bend Power: Project Description



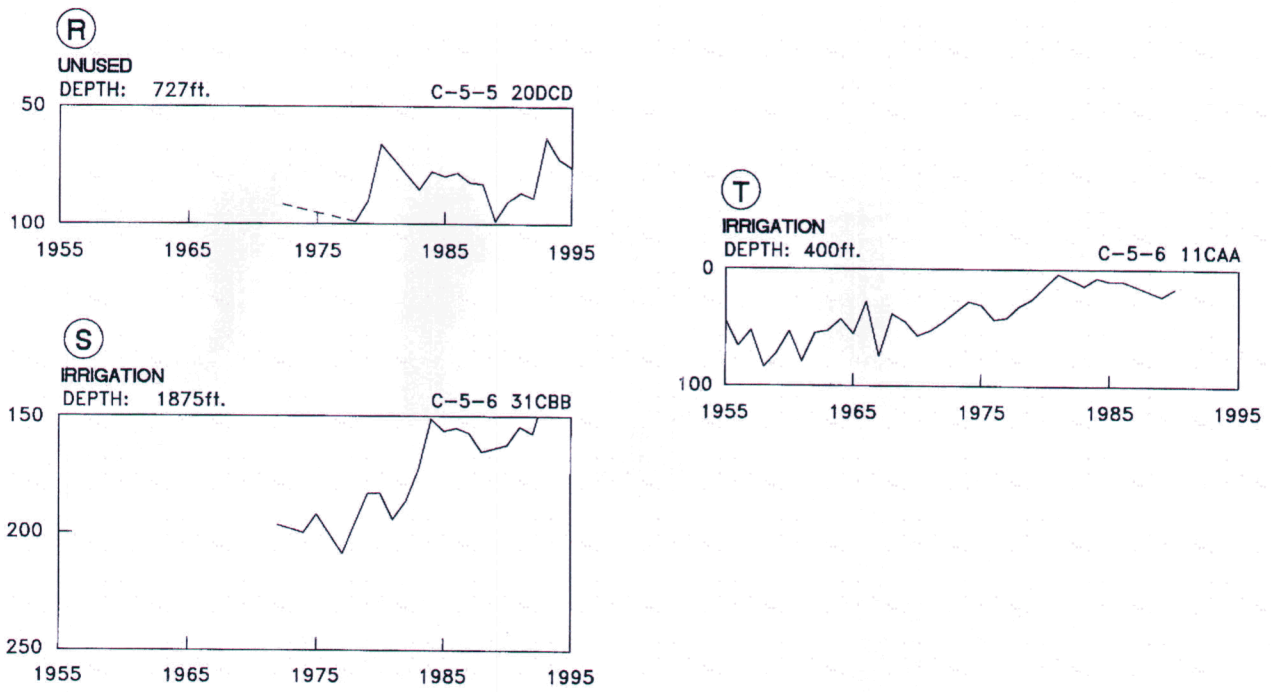
Natural Gas Pipelines



Groundwater Assessment

- **Groundwater resources in the Gila Bend Basin in the vicinity of the GBPP Site were evaluated to determine the impact of pumping groundwater for the GBPP supply**
- **Studies conducted by the ADWR and USGS indicate that:**
  - ***Groundwater in the Gila Bend Basin occurs in the basin fill alluvial sediments and that aquifer thickness exceeds 1000 feet***
  - ***Depths to ground water range from less than 50 feet near the Gila River to more than 400 feet near Gila Bend. Depth to water at the GBPP site ranged from 2 feet to 72 feet in 1993***
  - ***Agricultural usage has declined in the last 10 years and water levels are rising***

Water Level Changes



From ADWR HMS 29: Maps showing Groundwater Conditions in Gila Bend Basin, 1993 (Rascona, 1996)

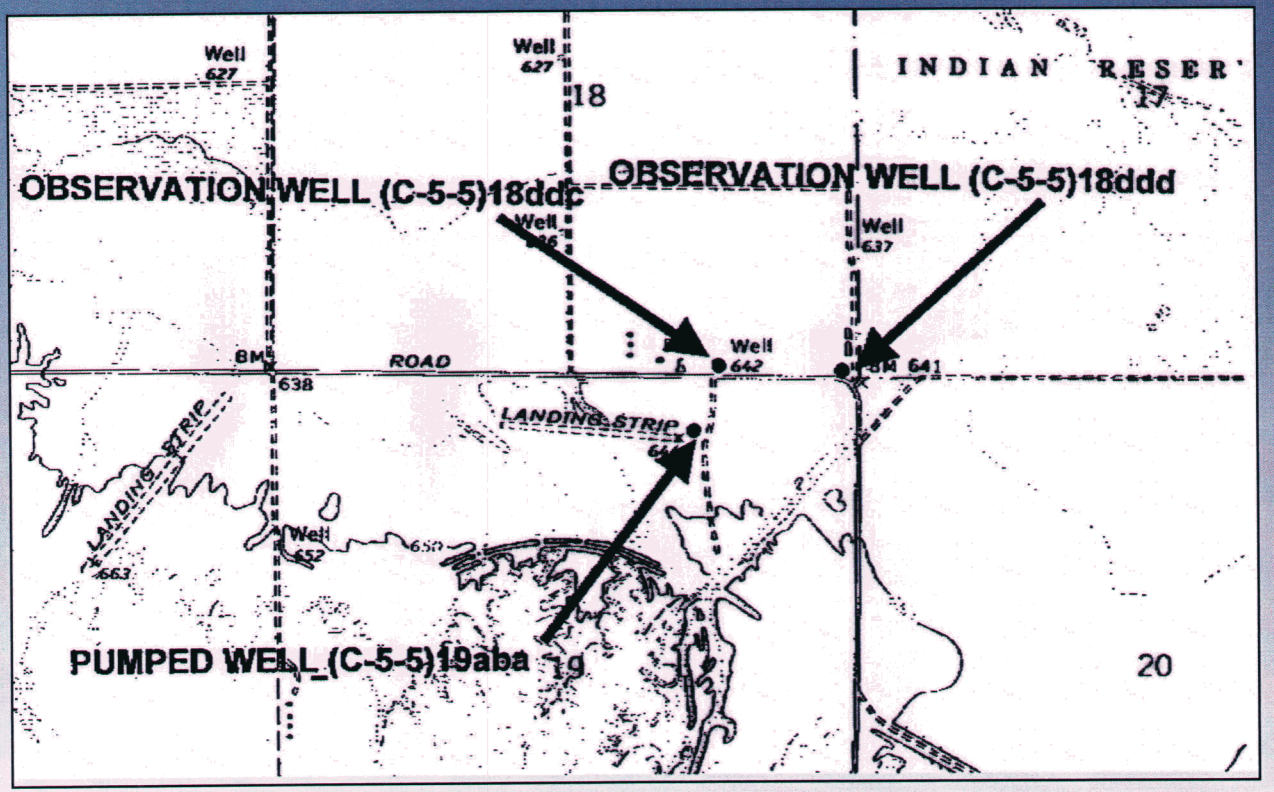
Groundwater Assessment (continued)

- **The groundwater assessment of the GBPP Site included**
  - *Review of well log, well yield data, estimates of aquifer hydraulic parameters using regional information and well log data and data from an aquifer test conducted on the property*
  - *Conducting an impact analysis using the Winflow analytical model method*
- **Results of the Groundwater Assessment**
  - *The initial assessment was conducted using well log data and published information*
  - *Based on well log analysis, hydraulic conductivity ranges from 50 feet per day to 100 feet per day, and specific yield ranges from 5% to 12%*
  - *Using this range of estimates for aquifer parameters, the impact of pumping 10,000 acre feet per year for 50 years was evaluated using the analytical model "Winflow"*

Groundwater Assessment (continued)

- The results of these analyses indicated that pumping 10,000 acre feet per year for 50 years would cause water levels to decline approximately 18 to 21 feet at the GBPP Site
  - *This is equal to 0.36 to 0.42 feet per year of water level decline at the Site*
  - *Water levels would decline approximately 15 to 17 feet, or approximately 0.3 to 0.34 feet per year, at a distance of 1 mile from the Site*
  - *The estimated water level decline at the Site based on the Winflow analysis was conservative, did not consider recharge and does not consider rising water levels*
- Subsequent to the initial assessment, an aquifer test was conducted at the GBPP Site
- The estimates of aquifer hydraulic parameters from the test were used to re-analyze impacts on groundwater at the GBPP Site using the Winflow model

Aquifer Test Site Map



- Drawdown and recovery were also monitored in the pumped well and each of the observation wells

Aquifer Test (continued)

Results of Aquifer Testing

- *Transmissivity was determined to be ~ 19,000 ft^2/d at observation well (C-5-5)18ddd based on the drawdown data*
- *Transmissivity was determined to be approximately 17,300 ft^2/d at observation well (C-5-5)18ddd based on recovery data*
- *Estimated range for Transmissivity was 12,000 – 19,000 and averaged 16,000. This Transmissivity value was used to estimate hydraulic conductivity*
- *The average Transmissivity value of 16,000 ft^2/d yields an average hydraulic conductivity equal to 20 feet per day*

Groundwater Assessment (continued)

- These estimated values of Transmissivity and hydraulic conductivity are lower than those estimated previously and reported by other researchers in the Gila Bend Basin area
- The low estimate of hydraulic conductivity is probably due to the condition of the wells (plugged perforations) and the fact that the analysis is based on partially penetrating observation wells
- Typically, short term tests underestimate the Specific yield

Groundwater Assessment (continued)

- Using the hydraulic conductivity estimated from the aquifer test results, the impact of pumping 10,000 acre feet per year for 50 years was re-evaluated using the Winflow model
- The impact was evaluated using a hydraulic conductivity of 20 feet per day and specific yield values of 5% and 12%
- The results of the analysis indicate that pumping 10,000 acre feet per year for 50 years at the GBPP Site will result in 52 to 56 feet of water level decline at the Site. This is equivalent to 1 to 1.2 feet of water level decline per year
- The analysis indicates that water levels would decline approximately 36 to 40 feet, or approximately 0.72 to .8 feet per year, at a distance of 1 mile from the Site

Environmental Assessments

- Air Quality
- Water Quality
- Surface Water
- Biological Resources
- Cultural Resources
- Noise
- Scenic Area Resources

Air Quality - Permit Status

- PSD application submitted - 3/30/2000
- Addendum No. 1 submitted - 9/25/2000
- Addendum No. 2 submitted - 11/14/2000
- PSD permit expected - 3/2001

Air Quality - Impacts Analyses

- Used USEPA-approved ISCST 3 model
- Determined emissions below regulatory limits
- Applied BACT (at a minimum)
- Complied with applicable standards

Water Quality - APP Status

- **APP Status**
  - *Pre-application meeting - 3/28/2000*
  - *APP application submitted - 11/14/2000*
  - *APP expected - 3/2001*
- **Evaporation Pond Design**
  - *Storm water & industrial wastewater containment*
  - *Prescriptive BADCT design*

Surface Water - Wetlands & Washes

- Site surveys conducted
- No wetlands identified
- Ephemeral washes observed
- 404/401 applications submitted - 11/30/2000
- Permits expected - 3/2001

Biological Resources - Wildlife & Vegetation

- Site surveys conducted
- AZ Game & Fish and US Fish & Wildlife contacted
- No threatened & endangered species identified
- Site previously disturbed
- No unique vegetation & wildlife impacted

Cultural Resources

- Class I cultural resources survey conducted
- Prehistoric & historic resources previously disturbed
- Class III intensive pedestrian survey completed
- No cultural resource impacts expected

Noise

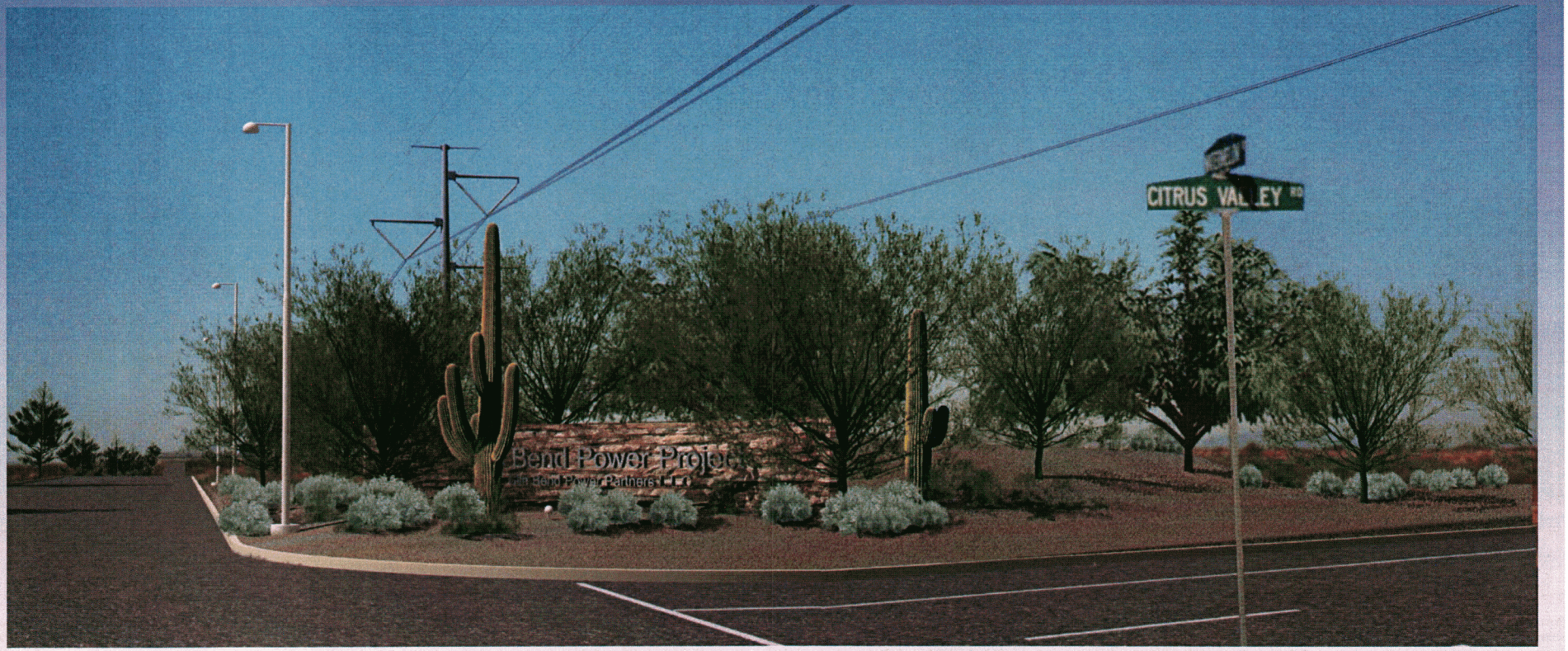
- Nearest receptor approximately 3 miles
- Noise levels < 25 dBA at 3 miles
- No increase in ambient noise levels expected

Scenic Area Resources (continued)

- Planned Future Setting

Scenic Area Resources

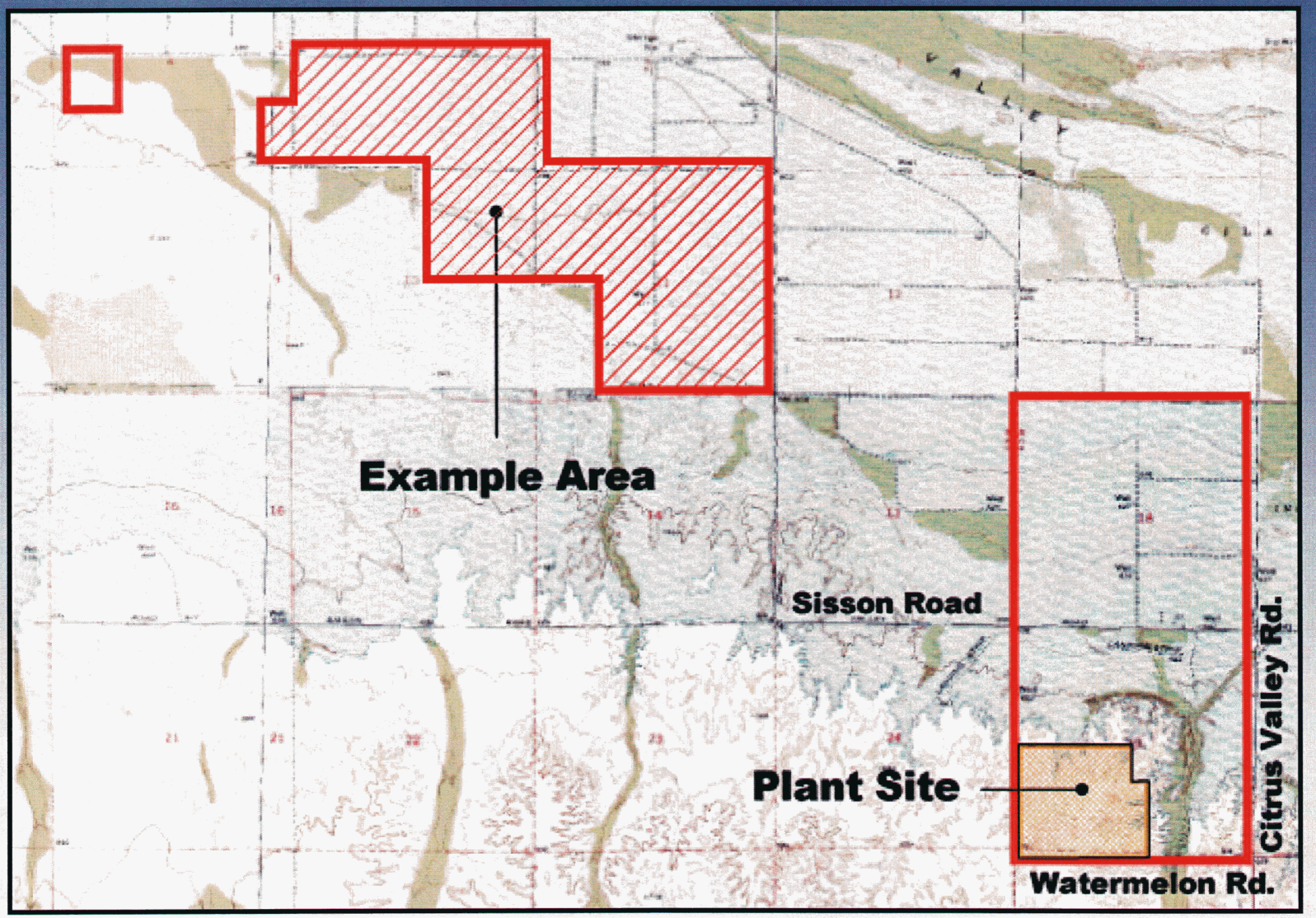
- Visual Enhancements



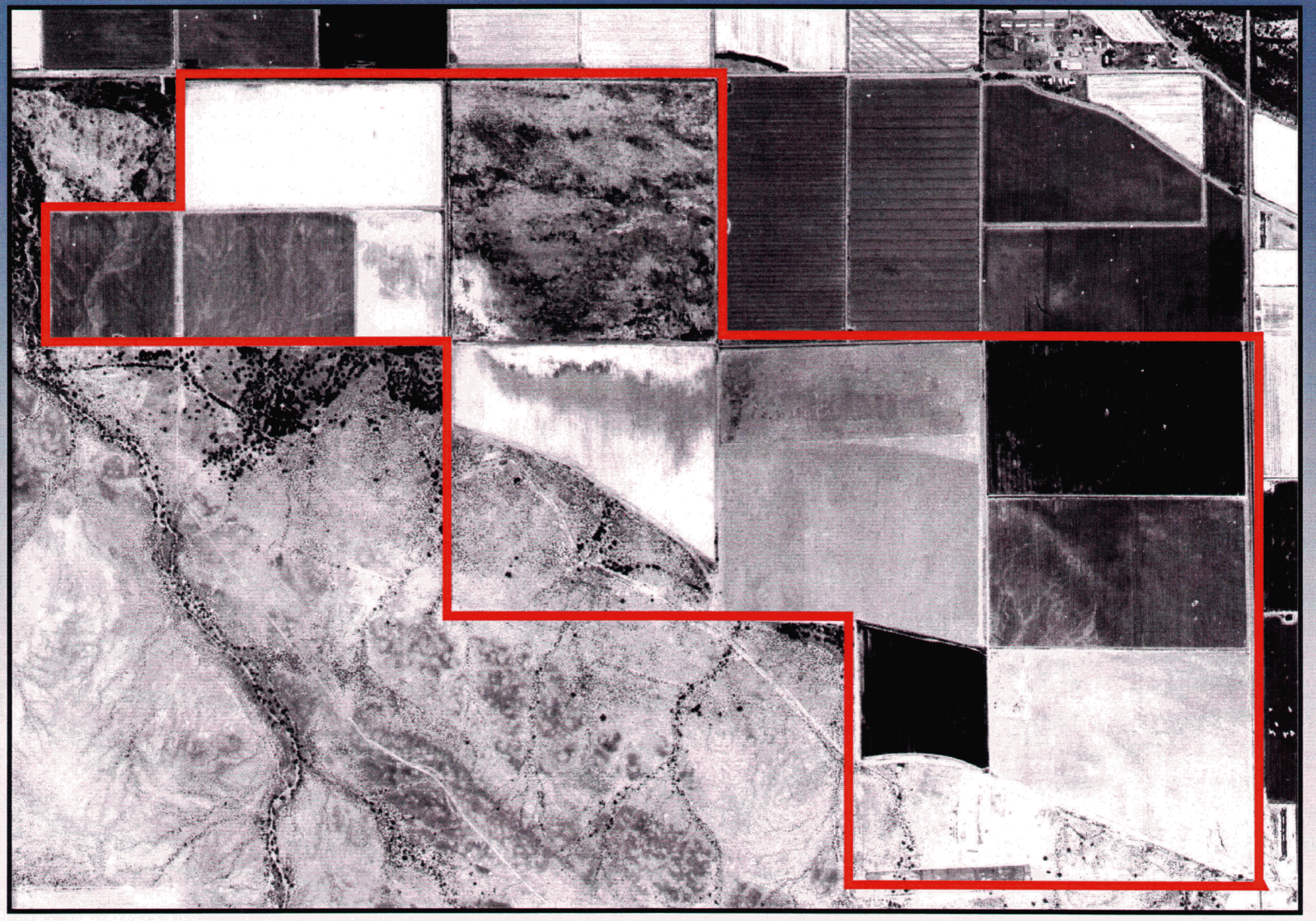
Landscape Management Plan

- Addresses long- and short-term practices associated with the plant site and surrounding area including the remaining lands owned by GBPP
- GBPP Property and Project Setting
  - *Historic and Current*
- Future Conditions and Setting
  - *Town of Gila Bend General Plan*
- Land Management Units
  - *Management Practices*

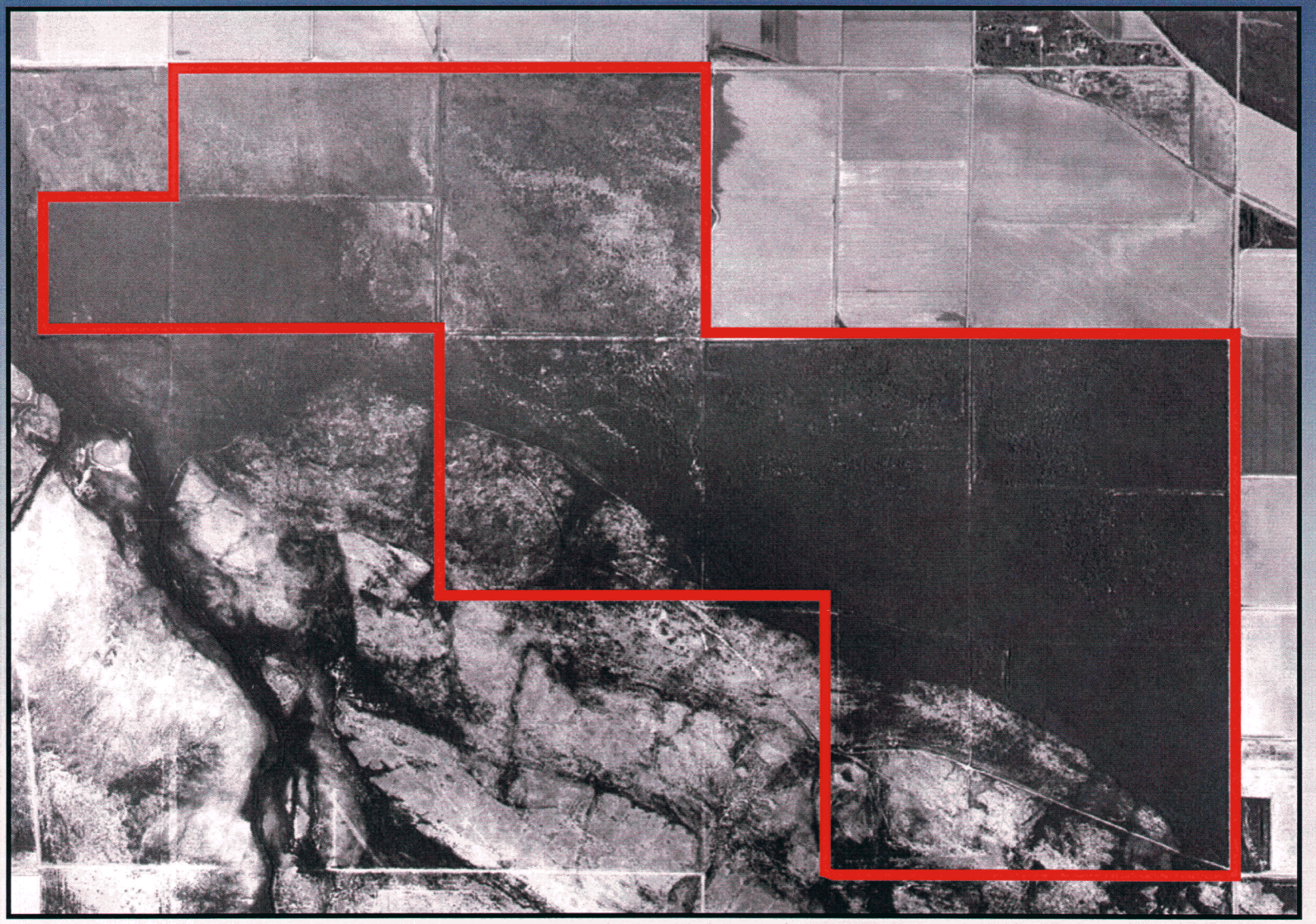
Project Setting: GBPP Property



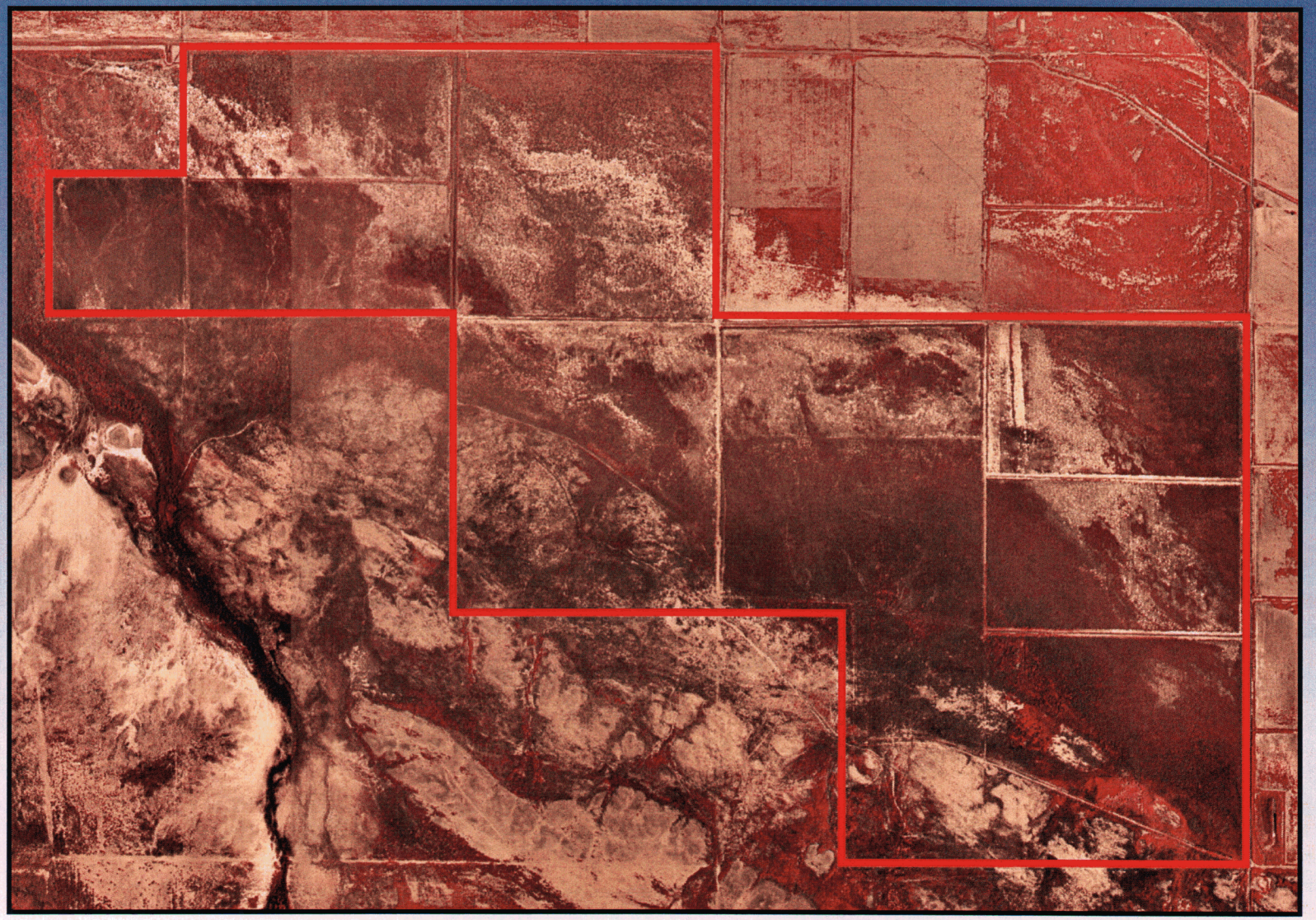
Example Area: 1970



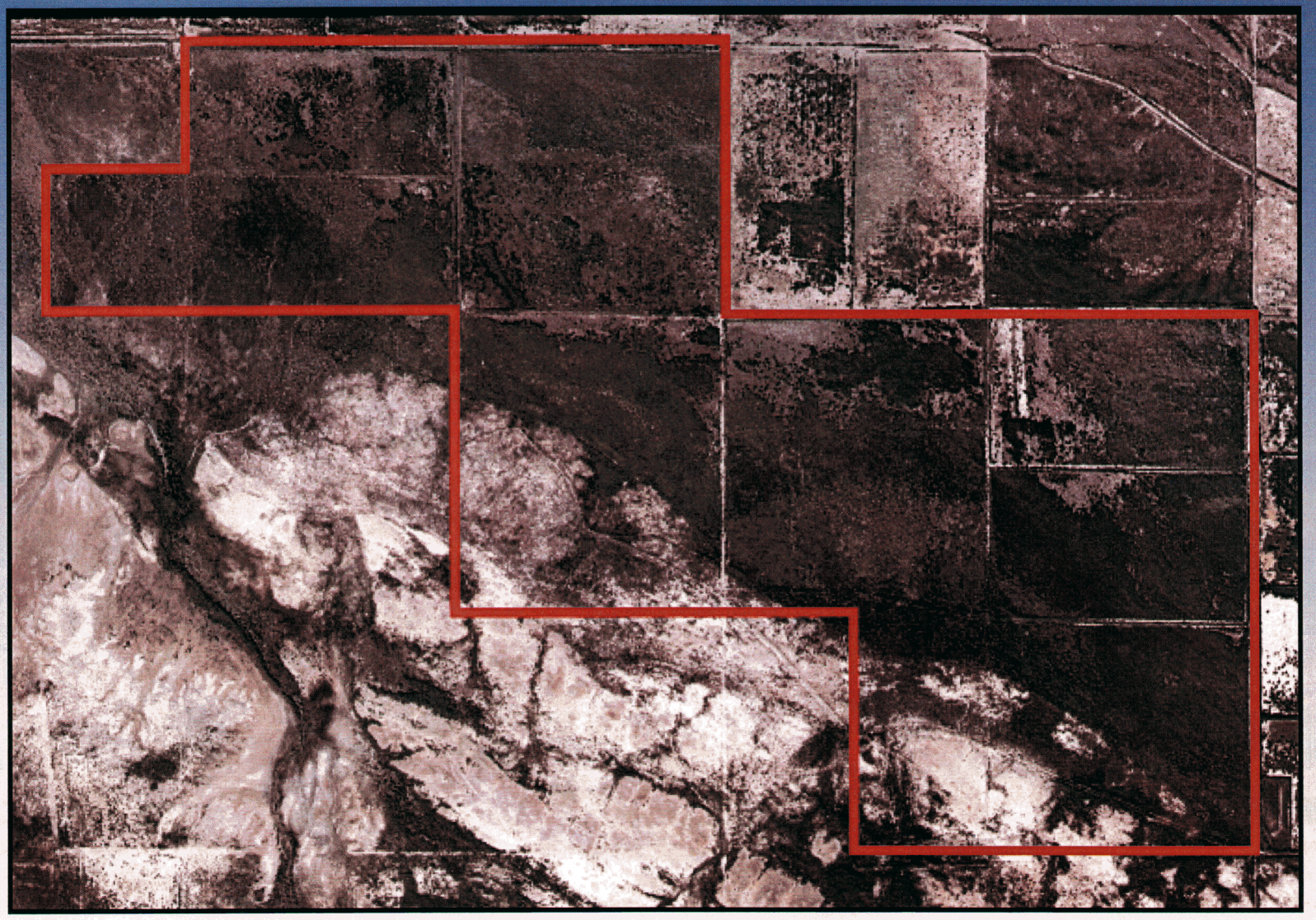
Example Area: 1986



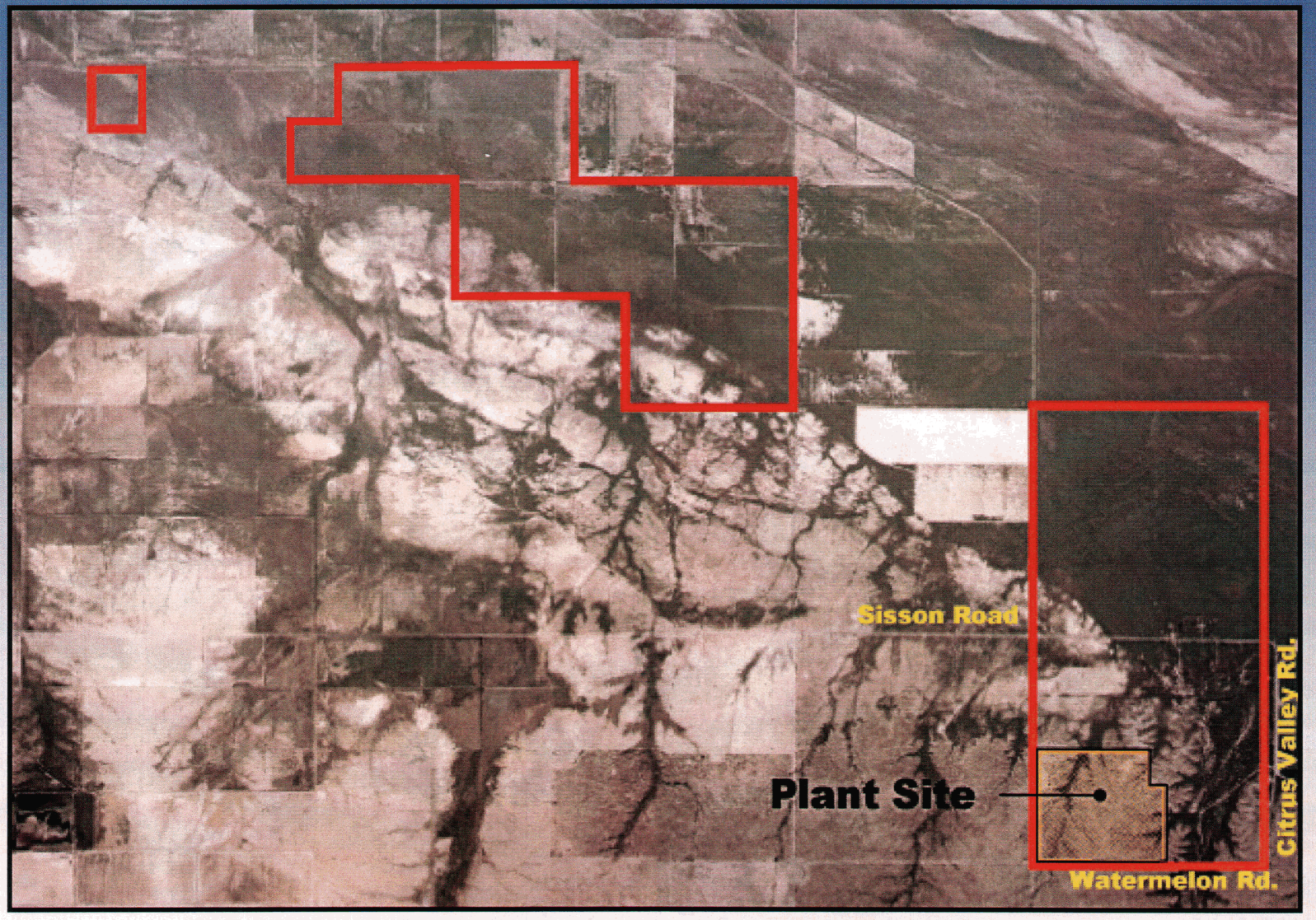
Example Area: 1996



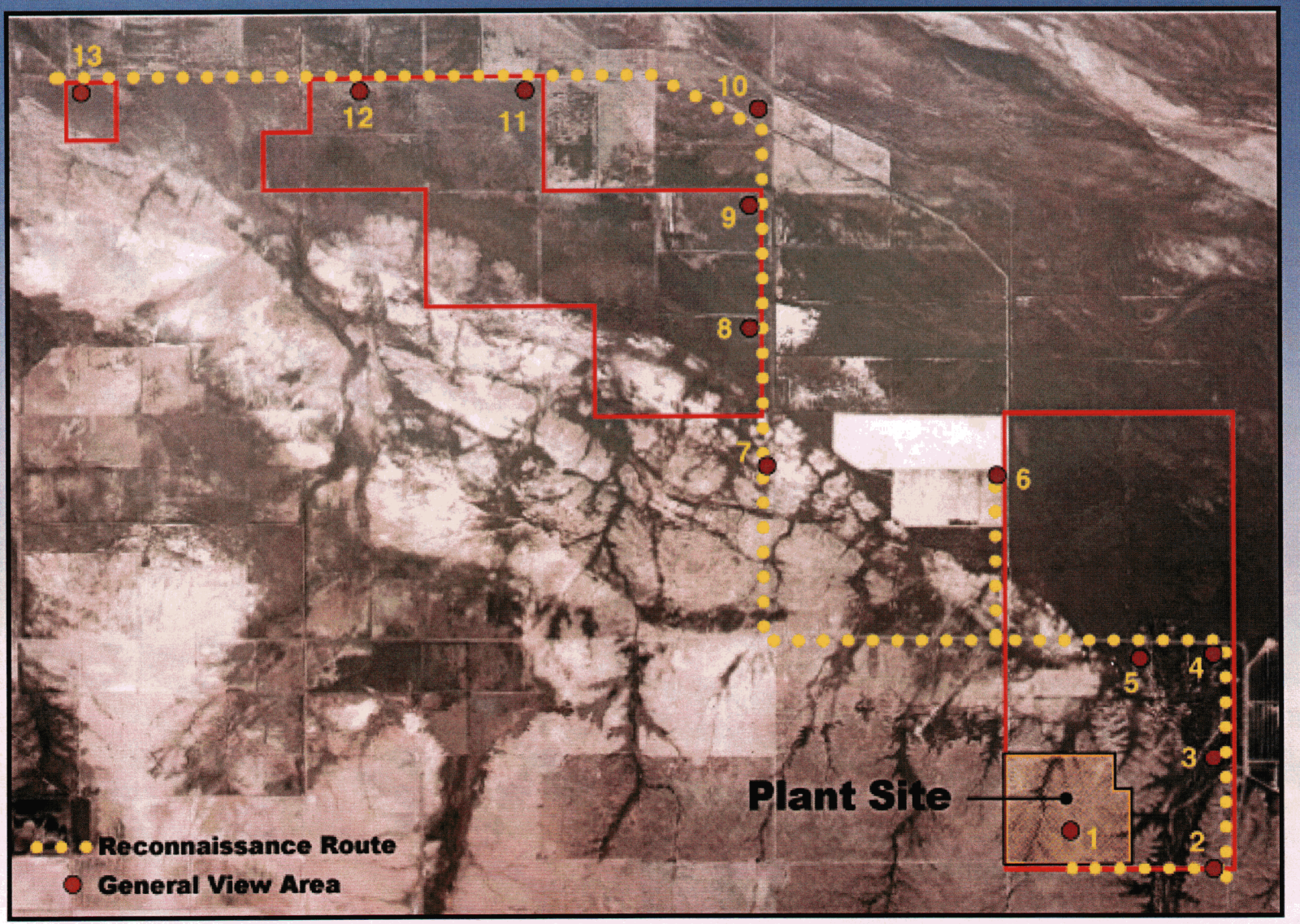
Example Area: 2000



Current Conditions: 2000



Examples of Current Conditions



Location 1

Location 2

Location 3

Location 4

Location 5

Location 6

Location 7

Location 8

Location 9

Location 10

Location 11

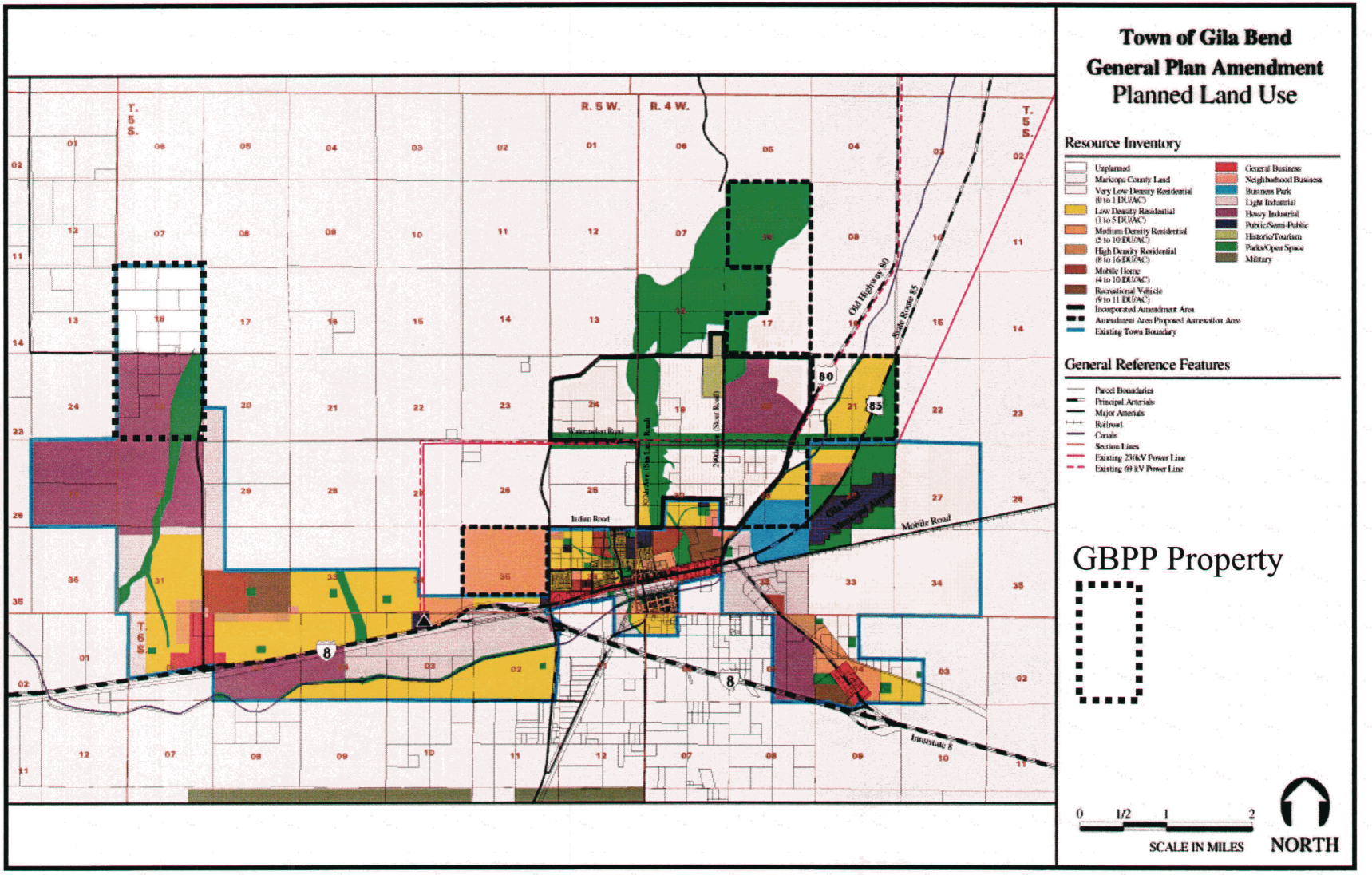
Location 12

Location 12

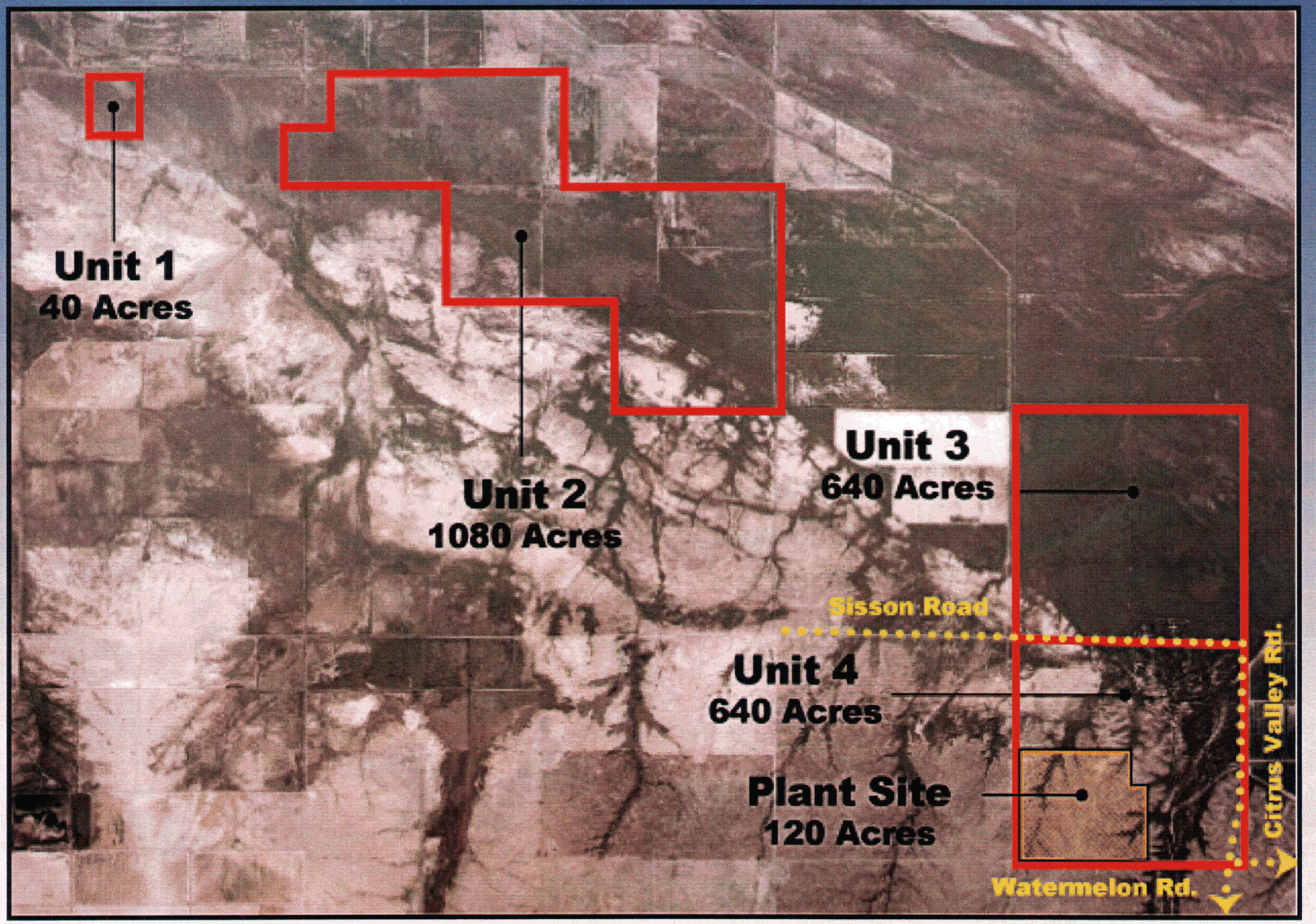
Location 13

Location 13

Future Conditions: Recently Approved



Management Units



Management Practices: Units 1-2

- **Total Acreage is 1,120 acres**
- **General Description**
  - ***Former agricultural areas. River floodplain continues to evolve***
- **Amount of Disturbance**
  - ***No additional disturbance to these units is anticipated***
- **Land Management Practices**
  - ***Passive landscape maintenance***

Management Practices: Unit 3

- **Total Acreage is 640 acres**
- **General Description**
  - *Former agricultural area located in the Town of Gila Bend. This area, similar to Units 1 and 2, is located in the river floodplain and continues to evolve*
- **Amount of Disturbance**
  - *No additional disturbance to this unit is anticipated with the exception of possible future well field development*
- **Land Management Practices**
  - *No Passive landscape maintenance*
  - *Consistent with Town of Gila Bend General Plan (currently designated as unplanned)*

Management Practices: Unit 4

- **Total acreage is 640 acres**
- **General Description**
  - ***This unit consists of upland desert scrub, washes, and floodplain area. Prior use in this area included a landing strip and rural residences***
- **Amount of Disturbance**
  - ***Disturbance will be limited to 120 acres (plant site) and access roads***
- **Land Management Practices**
  - ***Management practices in this area include site development, passive landscape maintenance, landscape mitigation and enhancements***
  - ***Site plan development to be consistent with Town of Gila Bend General Plan (industrial and open space)***

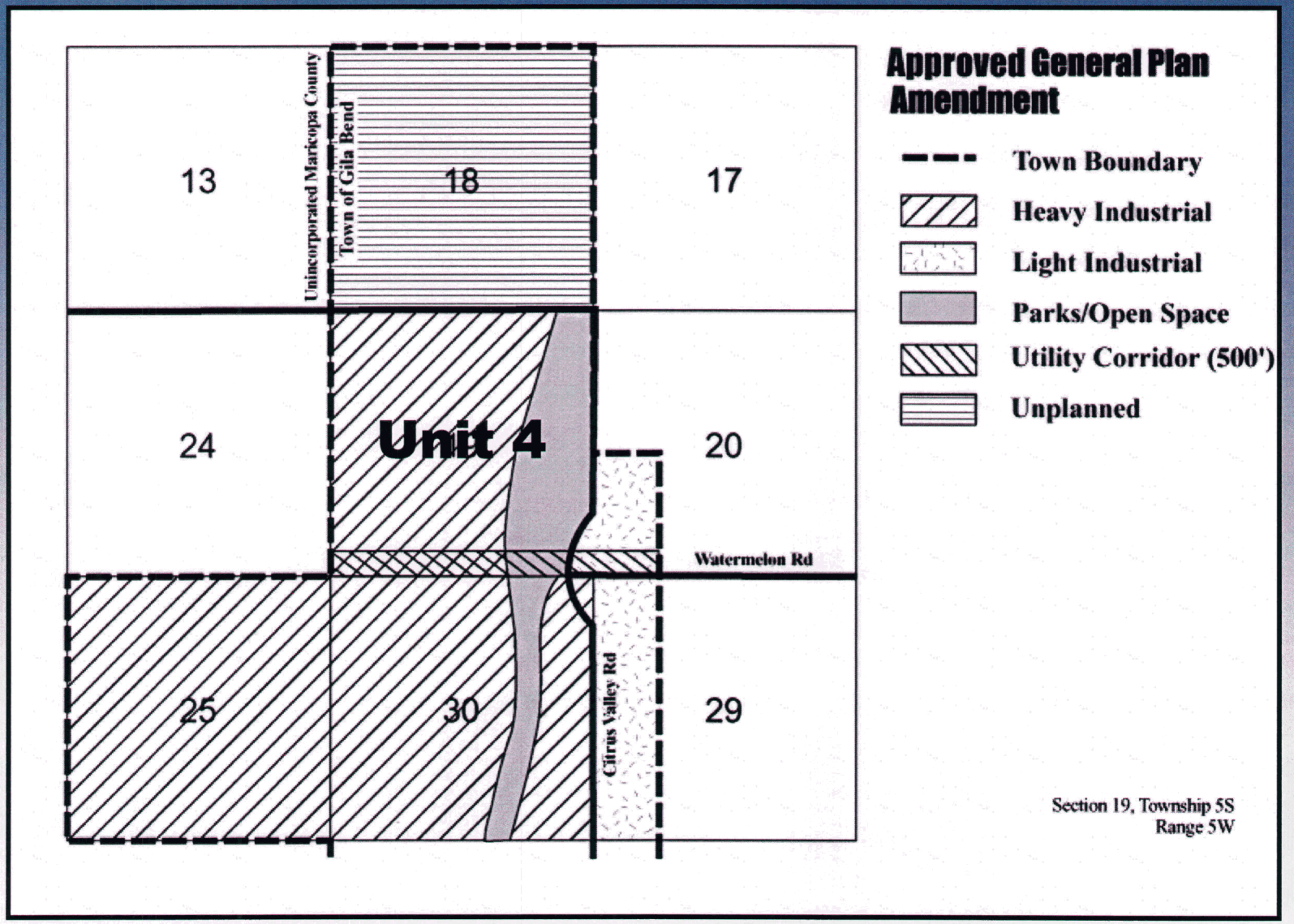
Unit 4: Existing Conditions

Unit 4: Existing Conditions

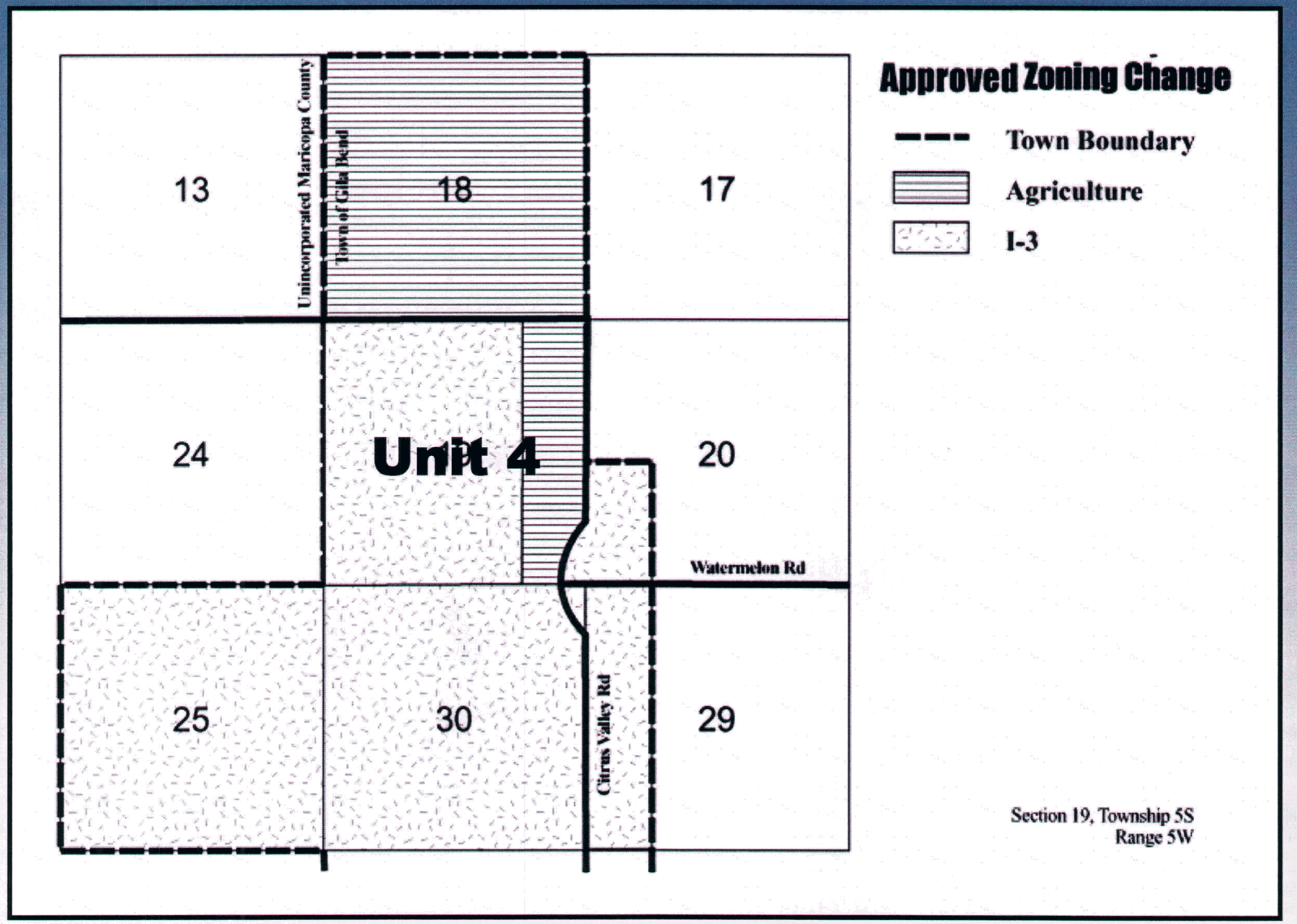
Unit 4: Existing Conditions

Unit 4 : Existing Conditions

Future Conditions: Recently Approved



Future Conditions: Recently Approved

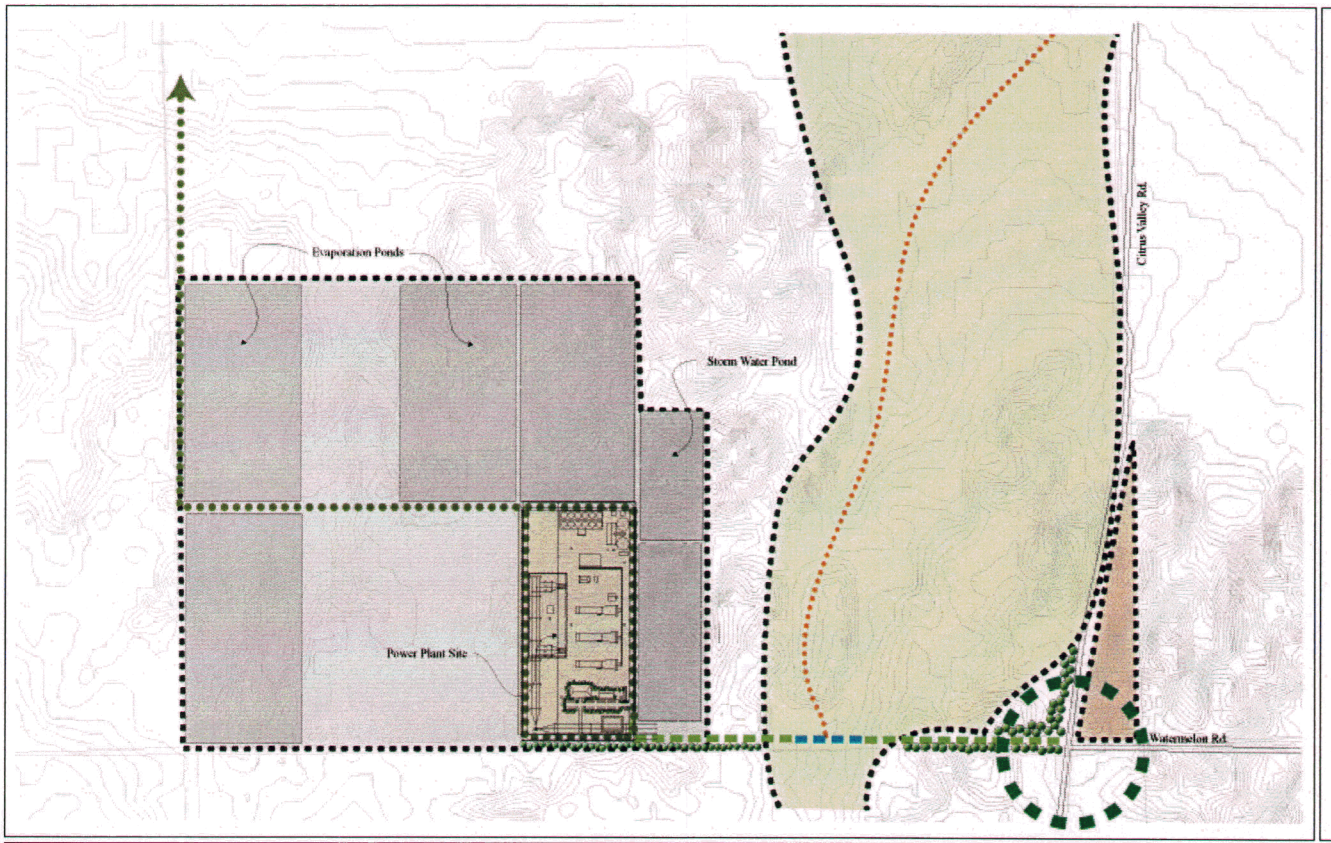


Conceptual Site Plan

- Provides landscape concepts for the plant site area that are consistent with proposed land management practices and that support the Town of Gila Bend planned land use as designated in the General Plan

- Concepts will be refined with the Town of Gila Bend and submitted for final site plan approval

Conceptual Site Plan



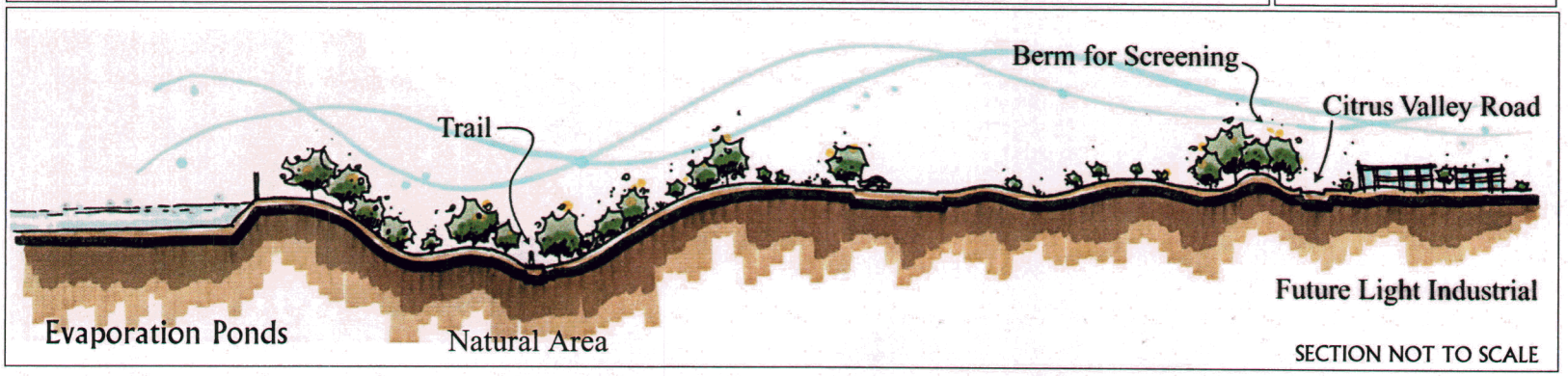
CONCEPTUAL SITE PLAN

Gila Bend Power Plant

- Entrance
- Open Space
- Existing Trail
- Plant Circulation
- Vegetation Enhancement
- Plant Site
- Watermelon Road Extension
- Drainage Crossing
- Future Light Industrial Area

0 100 200 400

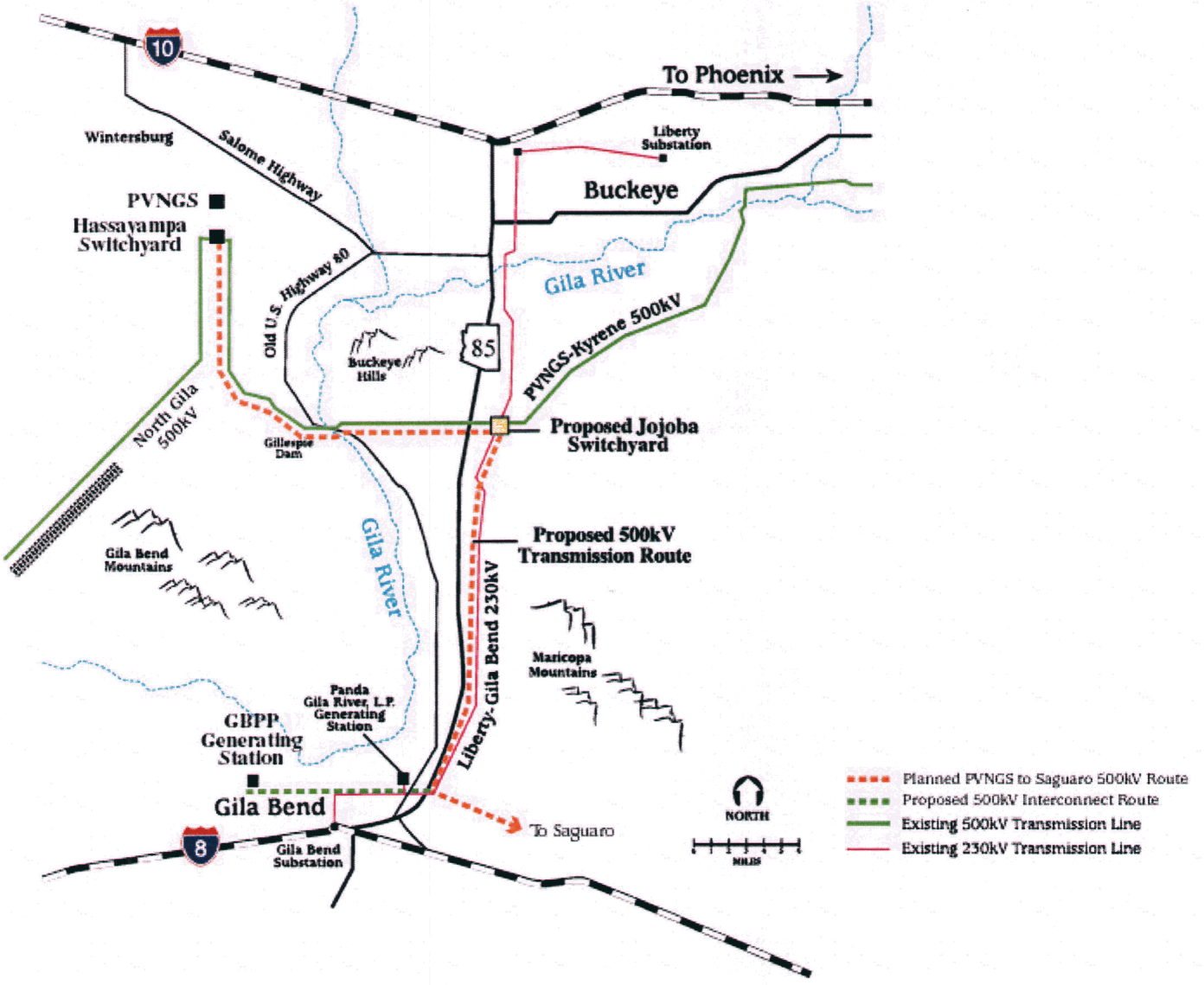
DRAFT 11/1/00: CONCEPT ONLY



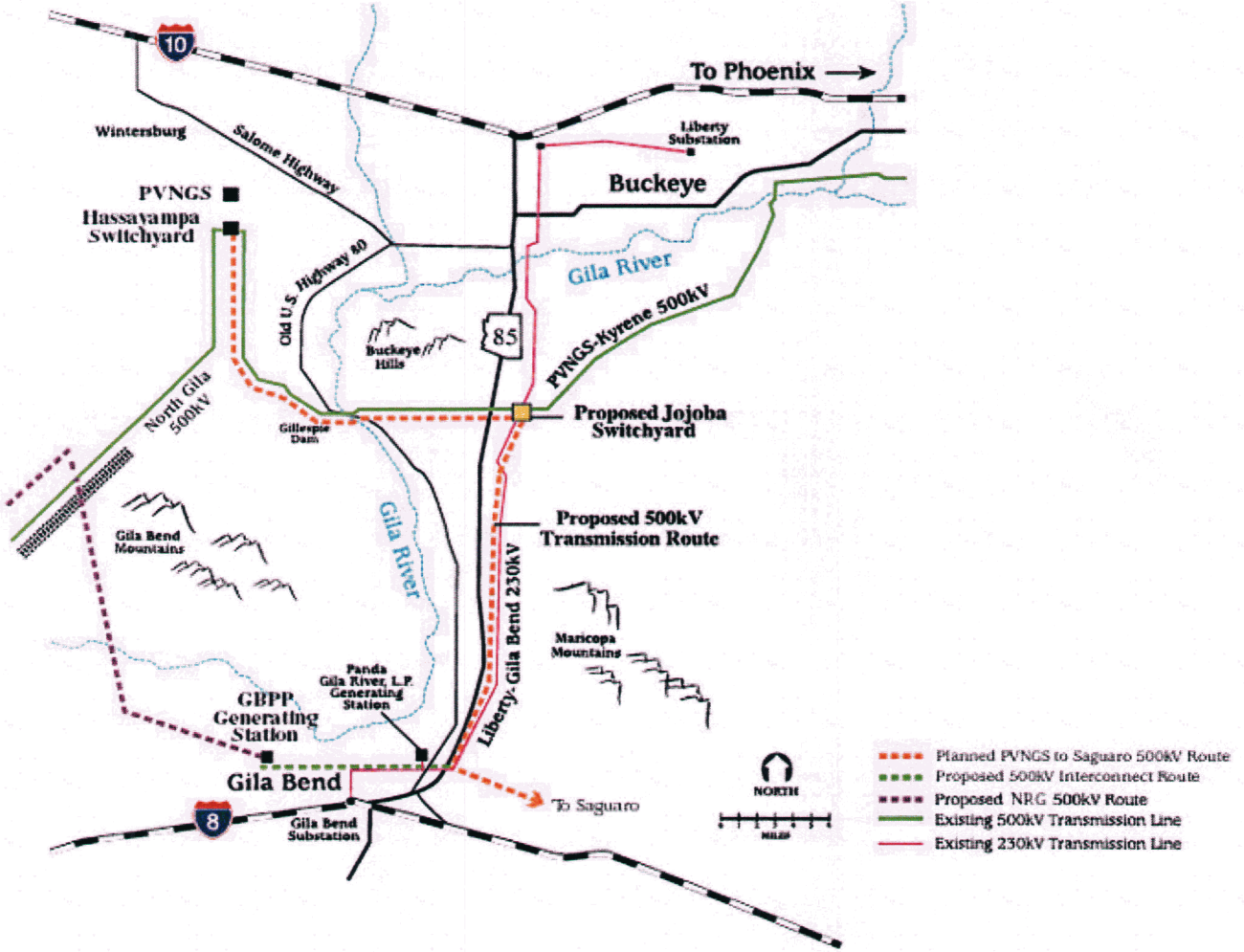
Transmission Interconnection

- **Transmission lines to Palo Verde switchyard following established utility corridors**
  - *Will be part of a regional system operated by one of the utility companies, e.g. SRP, APS*
  - *Will become part of the regional power distribution system*
- **NRG 500 kV line to Yuma West**
  - *Loop in thru Gila Bend Power Project High Yard*
- **Potential interconnection to the Projected Saguaro 500 kV Transmission Line**
  - *South Central Arizona*

Transmission Lines



Transmission Lines (continued)



Single Right of Way Siting of Transmission Lines

- Primary causes of sustained outages (CEA study)*

-Weather (lighting, wind, flood…)	74%
-Defective Equipment	12%
-System Conditions	7%
-Other	8%

- Reliability benefits of dual lines in a single right-of-way are significantly reduced due to correlated events

-Straight-line winds
-Hurricane winds
-Floods
-Airplanes
-Thunderstorm outflows
-Tornadoes
-Fires

*CEA – Canadian Electric Association

500 kV Transmission Line – Projection of Annual Forced Outages

	Forced Outage Rate (Outages/mile/year)	Mean Duration (Hours/Outage)
SCE (1962-1977)	0.0135	7.9
CEA (1992-1997)	0.0153	16.4
CA ISO (1998)	0.0194	12.6
Average	0.0161	12.3

42 mile Gila Bend Power Project 500 kV Line:
0.56 – 0.81 outages/year; 4.2 – 5.4 hours/year

"Southern California Edison: Transmission Line Outages Statistical Analysis (1980 Reliability Conference for the Electric Power Industry), Table 1

Forced Outage Performance of Transmission Equipment for the Period January I, 1992 to December- 31, 1996 ", Canadian Electric Association

Public domain data from CAISO for 500 kV lines under the CA ISO's operational control

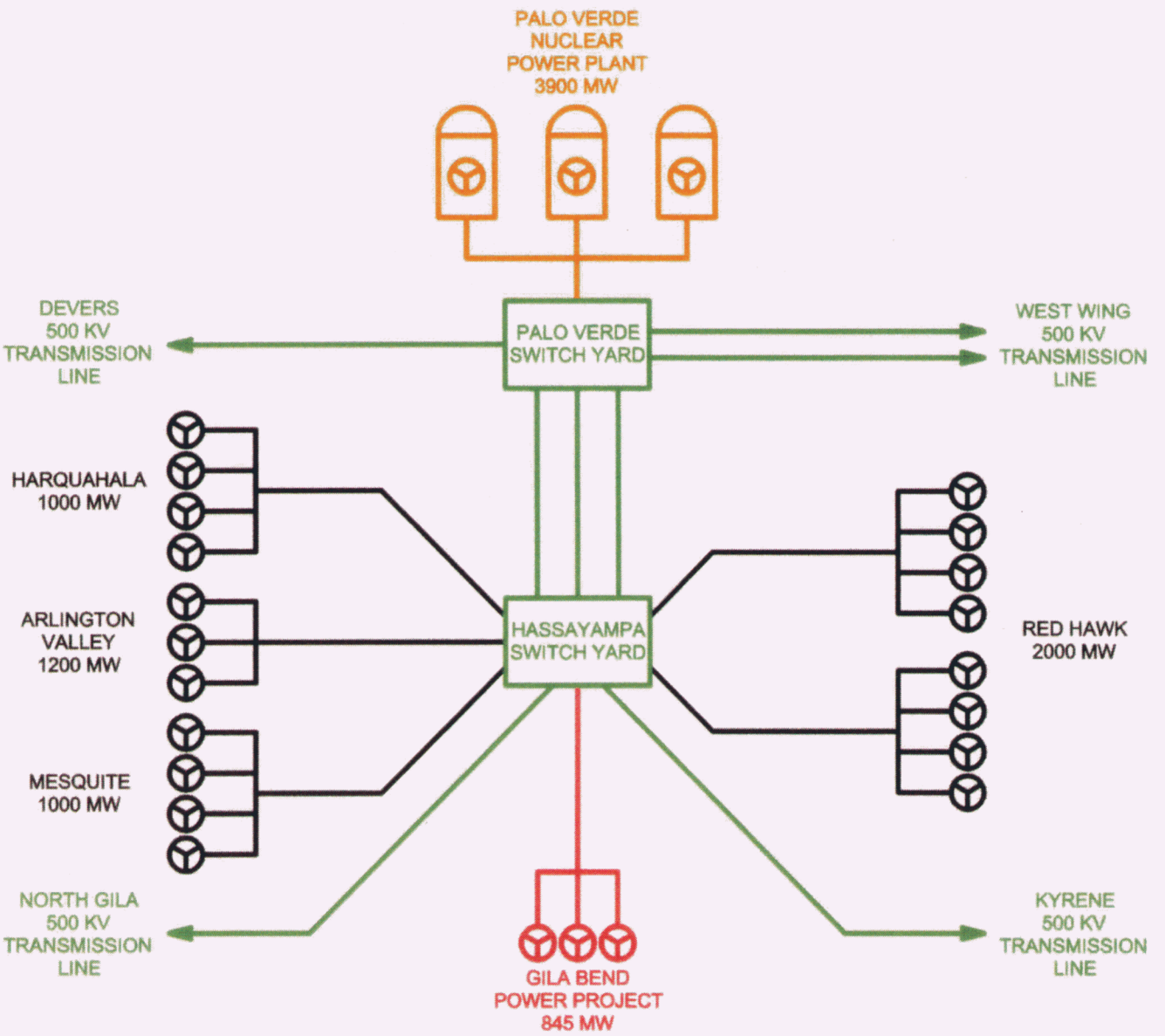
Combined Cycle Outage Comparison

Forced Outages of Generators

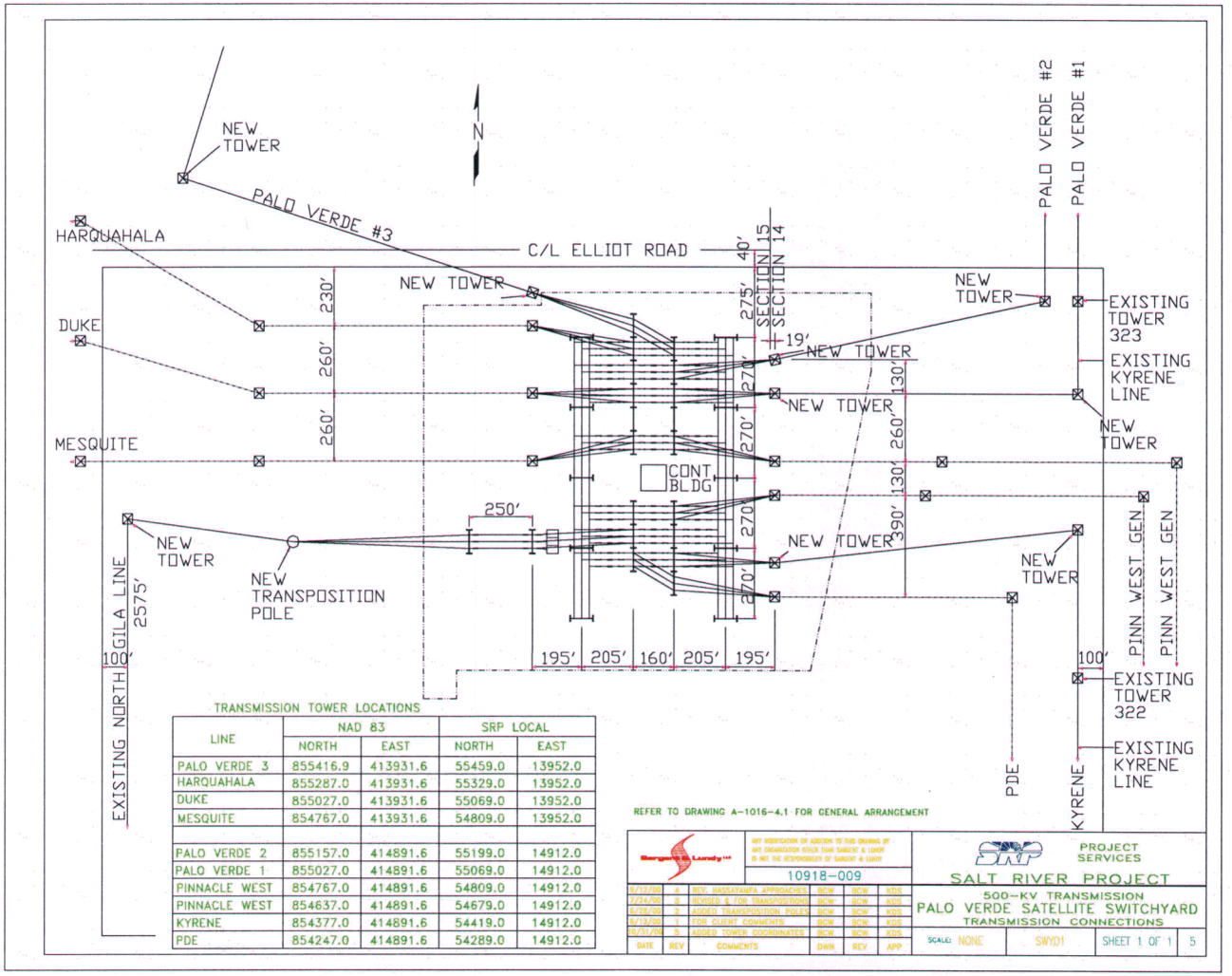
	Scheduled Outages (Hours/Year)	Forced Outages (Hours/Year)	Total (Hours/Year)
Fossil (All Fuel Types)	868	335	1203
Coal	851	343	1194
Gas-Fired	906	314	1220
Nuclear	1104	824	1928
Combined-Cycle	614	131	745

Source: NERC *Generating Unit Statistical Breakdown: 1994-1998 (August 1999)*

42 mile Gila Bend Power Project 500 kV Line:
0.56 – 0.81 outages/year; 4.2 – 5.4 hours/year


PALO VERDE
NUCLEAR
POWER PLANT
3900 MW
DEVERS
500 KV
TRANSMISSION
LINE
PALO VERDE
SWITCH YARD
WEST WING
500 KV
TRANSMISSION
LINE
HARQUAHALA
1000 MW
ARLINGTON
VALLEY
1200 MW
MESQUITE
1000 MW
HASSAYAMPA
SWITCH YARD
RED HAWK
2000 MW
NORTH GILA
500 KV
TRANSMISSION
LINE
GILA BEND
POWER PROJECT
845 MW
KYRENE
500 KV
TRANSMISSION
LINE

Hassayampa Switchyard



TRANSMISSION TOWER LOCATIONS

LINE	NAD 83		SRP LOCAL	
	NORTH	EAST	NORTH	EAST
PALO VERDE 3	855416.9	413931.6	55459.0	13952.0
HARQUAHALA	855287.0	413931.6	55329.0	13952.0
DUKE	855027.0	413931.6	55069.0	13952.0
MESQUITE	854767.0	413931.6	54809.0	13952.0
PALO VERDE 2	855157.0	414891.6	55199.0	14912.0
PALO VERDE 1	855027.0	414891.6	55069.0	14912.0
PINNACLE WEST	854767.0	414891.6	54809.0	14912.0
PINNACLE WEST	854637.0	414891.6	54679.0	14912.0
KYRENE	854377.0	414891.6	54419.0	14912.0
PDE	854247.0	414891.6	54289.0	14912.0

REFER TO DRAWING A-1016-4.1 FOR GENERAL ARRANGEMENT

Sargent & Lundy LLC

ANY MODIFICATION OR ADDITION TO THIS DRAWING BY ANY ORGANIZATION OTHER THAN SARGENT & LUNDY IS NOT THE RESPONSIBILITY OF SARGENT & LUNDY

10918-009

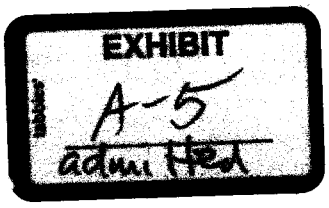
DATE	REV	COMMENTS	DWN	REV	APP
8/12/09	4	REV. HASSAYAMPA APPROACHES	BCW	BCW	KDS
7/24/09	3	REVISED & FOR TRANSPOSITIONS	BCW	BCW	KDS
6/18/09	2	ADDED TRANSPOSITION POLES	BCW	BCW	KDS
6/13/09	1	FOR CLIENT COMMENTS	BCW	BCW	KDS
10/31/08	0	ADDED TOWER COORDINATES	BCW	BCW	KDS

SRP PROJECT SERVICES

SALT RIVER PROJECT

500-KV TRANSMISSION
PALO VERDE SATELLITE SWITCHYARD
TRANSMISSION CONNECTIONS

SCALE: NONE | SWYD1 | SHEET 1 OF 1 | 5



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Attorneys for Applicant

BEFORE THE ARIZONA POWER PLANT AND
TRANSMISSION LINE SITING COMMITTEE

In the matter of the Application of Gila Bend Power Partners, L.L.C., or their assignee(s), in conformance with the requirements of Arizona Revised Statutes 40-360.01 *et seq.*, for a Certificate of Environmental Compatibility authorizing construction of a natural gas-fired, combined cycle generating plant, switchyard, and related facilities in the Town of Gila Bend, Maricopa County, Arizona located in the southwest quarter of Section 19, Township 5 South, Range 5 West, Gila and Salt River Base and Meridian.	Case No.: 106 Docket No.: L-00000V-00-0106 **PROPOSED CONDITIONS**

In connection with the Arizona Power Plant and Transmission Line Siting Committee's public hearing held on November 15, 2000 (the "Hearing") at the Arizona Corporation Commission for the purpose of determining the environmental compatibility of the above referenced project (the "Project"), Gila Bend Power Partners, L.L.C., as Applicant, hereby submits to the Arizona Power Plant and Transmission Line Siting Committee (the "Committee") the following, which the Applicant would agree to as conditions of the Certificate of Environmental Compatibility (the "Certificate") for the Project:

1. The Applicant and its assignees will comply with existing applicable air and water pollution control standards and regulations, and with all existing applicable ordinances, master plans and regulations

of the State of Arizona, the County of Maricopa, the United States and any other governmental entities having jurisdiction.

2. This authorization to construct the facility will expire five years from the date the Certificate is approved by the Arizona Corporation Commission unless construction is completed to the point that the facility is capable of operating at its rated capacity by that time; provided, however, that prior to such expiration the facility owner or its assignees may request that the Arizona Corporation Commission extend this time limitation.

3. This plant interconnection must satisfy the Western Systems Coordinating Council's ("WSCC") single contingency outage criteria (N-1) without reliance on remedial action such as generator unit tripping or load shedding.

4. The Applicant shall make available to the Commission, not more than 12 months prior to the commercial operation of the plant, a technical study regarding the sufficiency of transmission capacity from the plant to the wholesale electric market.

5. The Applicant shall make available to the Commission an interconnection agreement with the transmission provider with whom it is interconnecting.

6. The Applicant or one of its affiliates will become a member of WSCC, or its successor, and will file a copy of its WSCC Reliability Criteria Agreement or Reliability Management System (RMS) Generator Agreement with the Commission.

7. The Applicant will use commercially reasonable efforts to become a member of the Southwest Reserve Sharing Group or its successor, thereby making its units available for reserve sharing purposes, subject to competitive pricing.

8. Conditions 3 through 7 above shall automatically terminate if it or a substantially similar condition is not included in future generating facility Certificates of Environmental Compatibility as approved by the Commission or upon any subsequent amendment or invalidation by the Commission or review in Court.

RESPECTFULLY SUBMITTED this 15th day of November 2000.

SQUIRE, SANDERS & DEMPSEY L.L.P.

By_____

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