DOE/MC/29309 -- 4056
(DE95009708)

Tracy Power Station -- Unit No. 4
Piñon Pine Power Project
Public Design Report

Topical Report

December 1994

Work Performed Under Contract No.: DE-FC21-92MC29309

For
U.S. Department of Energy
Office of Fossil Energy
Morgantown Energy Technology Center
Morgantown, West Virginia

By
Sierra Pacific Power Company
Reno, Nevada

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Morgantown, West Virginia 26507-0880

By
Sierra Pacific Power Company
P.O. Box 10100
6100 Neil Road
Reno, Nevada 89520-0400

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GLOSSARY

ACFM	Actual Cubic Feet per Minute
BFW	Boiler Feed Water
Btu	British thermal unit
$CaCO_3$	Calcium Carbonate
CaO	Calcium Oxide
CaS	Calcium Sulfide
$CaSO_4$	Calcium Sulfate
CEMS	Continuous Emissions Monitoring System
CFM	Cubic Feet per Minute
COS	Carbonyl Sulfide
DAS	Data Acquisition System
DC	Direct Current
DCS	Digital Control System
DHEW	Department of Health, Education and Welfare
DOE	U. S. Department of Energy
EHSS	Environmental, Health, Safety and Socioeconomic
EIS	Environmental Impact Statement
FW USA	Foster Wheeler USA Corporation
GPM	Gallons Per Minute
H_2O	Water
H_2S	Hydrogen Sulfide
Hg	Mercury
HgA	Mercury Absolute
HHV	High Heating Value
HRSG	Heat Recovery Steam Generator
HVAC	Heating, Ventilation, Air Conditioning
I/O	Input/Output
IGCC	Integrated Gasification Combined-Cycle
ISO	International Standards Organization
KRW	Kellogg-Rust-Westinghouse
kW	Kilowatt
kWh	Kilowatt hour
LASH	Coal ash with spent limestone
LHV	Low Heating Value
MCE	Maximum Credible Earthquake
MW	Megawatt (1 million watts) or Molecular Weight
MWe	Million Watts
MWK	M. W. Kellogg Company
NFPA	National Fire Prevention Association
NiO	Nickel Oxide
NIOSH	National Institute of Occupational Safety and Health

NiS	Nickel Sulfide
NO_x	Nitrogen Oxides
O	Oxygen
OSHA	Occupational Health and Safety Act
P.I.V.'s	Post indicator valves
PDU	Process development unit
pf	Power factor
PON	Program Opportunity Notice
ppmv	Parts per million by volume
psia	Pounds per square inch, absolute
RH	Relative Humidity
RIE	Remote Instrument Enclosure
RPM	Revolutions Per Minute
SCFM	Standard Cubic Feet per Minute
SO_2	Sulfur Dioxide
SO_x	Sulfur Oxides
SPPCo	Sierra Pacific Power Company
SUFCO	Southern Utah Fuel Company
TPD	Tons Per Day
TPH	Tons Per Hour
U/G	Underground
UPS	Uninterruptible Power Source
ZnO	Zinc Oxide
ZnS	Zinc Sulfide

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1.0 INTRODUCTION

This Public Design Report describes the Piñon Pine Project will be located at the Sierra Pacific Power Company's (SPPCo) Tracy Station near Reno, Nevada. The integrated gasification combined-cycle (IGCC) plant is designed to process 880 tones per day (TPD) of bituminous coal producing approximately 107 gross megawatts of electric power (MWe). This project is receiving cost-sharing from the U.S. Department of Energy (DOE) in accordance with DOE Cooperative Agreement DE-FC21-92MC29309.

The plant incorporates the Kellogg-Rust-Westinghouse (KRW) fluidized bed gasification technology which produces a low-Btu gas which is used as fuel in a combined cycle power plant which has been modified to accommodate the fuel gas produced by an air-blown gasifier. The gasification system also includes hot gas removal of particulates and sulfur compounds from the fuel gas resulting in a plant with exceptionally low atmospheric emissions. Desulfurization is accomplished by a combination of limestone injection into the KRW fluidized bed gasifier and by a transport reactor system. Particulate removal is accomplished by high efficiency cyclones and a barrier filter.

The Piñon Pine Project Schedule is divided into three phases as shown in the Project Schedule on the following Page. Phase I includes permitting and preliminary design. Phase II, which overlaps Phase I, covers detailed design, procurement, and construction. Phase III will cover the initial operation and demonstration portion of the project.

The Budget Periods are also shown on the Project Schedule along with major project milestones. Budget Period 1 ($42,980,000) funds permitting and pre-design. Budget Period 2 ($186,681,000) covers detailed engineering, procurement, construction, and start-up. Budget Period 3 ($104,690,000) will fund the operation and demonstration phase.

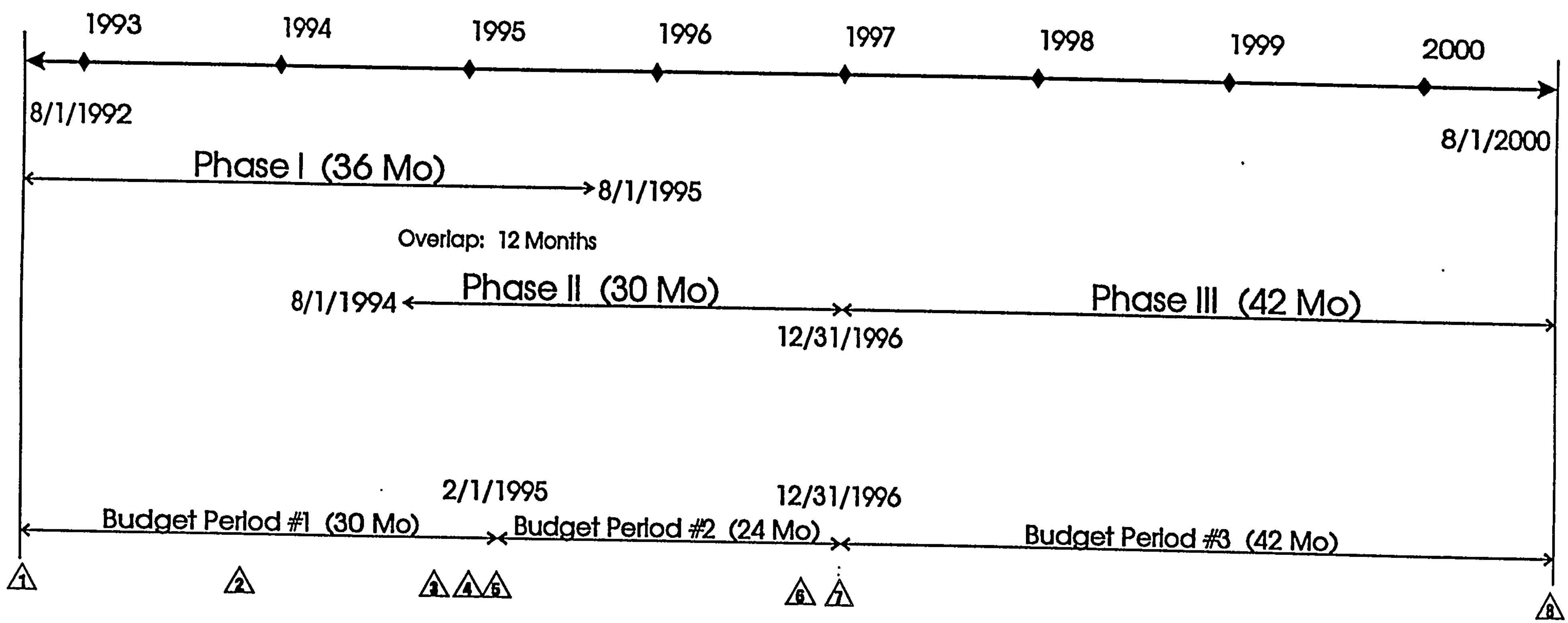
2.0 PROGRAM BACKGROUND

In January 1991, the DOE issued a Program Opportunity Notice (PON) soliciting proposals to demonstrate clean coal technologies that were capable of being commercialized in the 1990's. These technologies were to be capable of achieving significant reduction in the emissions of sulfur dioxide and/or nitrogen oxides and to provide for future energy needs in an environmentally acceptable manner. In response to the PON, DOE received proposals for projects that involved both advanced technologies that can be "retrofitted" to existing facilities and "re-powering" technologies that increase plant generating capacity, extend the operating life of a facility, and also reduce air pollution. The Piñon Pine Project proposed by SPPCo of Reno, NV was one of the nine projects selected for funding. The scope of theproject provides for the design, construction, and operation of an air blown KRW fluidized bed coal gasifier IGCC demonstration plant.

The Piñon Pine Project integrates a number of technologies fostered by DOE. Among these are the KRW fluidized-bed gasifier, in-bed desulfurization using limestone sorbent, and zinc based sorbent sulfur removal from a hot gas stream. DOE and its predecessor agencies have supported development of this fluidized-bed gasification technology since 1972 when the design of a process development unit

SCHEDC.CDR

Total Project (96 Months)



Milestone	Description
1	Project Starts - 8/1/1992
2	PSCN Approves Project - 10/25/1993
3	NEPA Completed - Record of Decision 11/8/1994
4	UEPA / Permits Approved - 1/4/1995

Milestone	Description
5	Construction Starts - 2/21/1995
6	Construction Complete - 10/17/1996
7	Startup Complete - 12/31/1996
8	Testing Complete - 8/1/2000

Piñon Pine IGCC Power Project Schedule

(PDU) was first initiated under contract with Westinghouse Electric Corporation. Construction of the PDU was completed in 1975 at Westinghouse's Waltz Mill Facility near Madison, Pennsylvania. From 1984 to 1988 the addition of dolomite and limestone sorbents to the gasifier bed for in-bed sulfur removal was successfully demonstrated at the PDU. These tests indicated that 85 to 90 percent sulfur removal efficiencies could be routinely achieved while using coal feedstocks containing 2 to 4.5 percent sulfur. In addition, the use of these sorbents in the gasifier was found to increase the product gas heating value while decreasing the production of ammonia, a major contributor to NO_x (oxides of nitrogen) emissions.

The Cooperative Agreement between SPPCo and the DOE was executed in August 1992. Foster Wheeler USA Corporation (FW USA) is providing engineering and construction management services for the project. The M. W. Kellogg Company (MWK) is providing engineering for the gasifier island. Start of construction is expected to begin by February 21, 1995 with operation scheduled for December 31, 1996.

3.0 TECHNOLOGY OVERVIEW

The Piñon Pine Project located at SPPCo Tracy Station will incorporate the KRW gasification technology which produces a clean low-Btu gas for use as fuel in a combined cycle power plant for production of low cost electricity in an environmentally sound manner.

The KRW process improves upon first generation IGCC technology in several aspects. Its pressurized, air-blown fluidized bed gasification technology will provide a higher thermal efficiency than a similar oxygen-blown system because it will consume less auxiliary power. A portion of the sulfur pollutants will be captured within the fluidized bed before they can exit the gasifier. Additional impurities will be removed through an advanced hot gas cleanup system which will operate with a regenerative sulfur sorbent to remove sulfur compounds, and with barrier filters to remove particulates. In addition, the inherent modular design of the system and simple process configuration will yield significantly lower engineering and construction costs.

Almost all of the previous IGCC demonstration plants were designed around a more conventional approach, i.e., gas produced in the gasifier was either quenched or cooled and scrubbed for low temperature removal of sulfur compounds. These plants also removed ash/slag in a wet state. In order to limit the size of cool down trains and desulfurizer systems, gasifiers for these early plants were oxygen blown, thereby adding to capital cost and parasitic power consumption. Cooling of gas for sulfur removal not only lowered the cycle efficiency, but also required extensive equipment and handling of process water.

In order to meet challenges of the market place and environment, a simplified IGCC system incorporating air-blown gasification with hot gas cleanup has been developed. By eliminating the oxygen plant and minimizing the need for gas cooling and wastewater processing equipment, the capital cost was reduced and plant efficiency improved. Key features of the simplified IGCC system are described below:

- Air-Blown Gasification

In the simplified IGCC system, about 15 to 20 percent of the gas turbine compressor discharge air will be extracted for use as oxidant in the gasifier. A booster air compressor increases the pressure of this extracted air to compensate for pressure losses through the gasifier and downstream hot gas cleanup system and fuel control valve.

- Hot Gas Cleanup

To date, most major gasification plants have utilized cold (wet) cleanup processes. The alternate approach of filtering the gas at high temperature enables the gas to maintain most of the sensible heat resulting in a higher plant efficiency. Equipment will be minimized and there will be no waste water production. Several types of filtering devices have been tested in pilot facilities and are available from several suppliers.

- Hot Gas Desulfurization

Sulfur contained in coal will be removed in two steps. Addition of limestone to the gasifier will capture the hydrogen sulfide produced in the reducing environment of the gasifier. Sulfur not captured by the limestone will leave with the product gas and be removed in an external desulfurizer system.

- Sulfation

Coal ash with spent limestone (LASH) contains calcium sulfide (CaS) along with unconverted carbon. The sulfator will oxidize the CaS produced in the gasifier into calcium sulfate ($CaSO_4$,), combust unconverted char and absorb sulfur dioxide (SO_2) in regeneration gas from the external desulfurizer system. Small amounts of transport and depressurization gas will also combust in the sulfator. The sulfator will operate as a fluidized bed. The heat generated will be removed by generating steam to maintain the bed material at a temperature of 1600°F. Additional heat will be recovered from flue gas exiting the sulfator by generating and superheating steam. The sulfated lash will be suitable for landfill. Results from the on-going bench scale testing are being used to develop design data.

4.0 DESIGN CONSIDERATIONS

4.1 Location and Description of Site

The site selected for the Piñon Pine Project will be the existing Tracy Power Plant located approximately 17 miles east of Reno, Nevada.

Tracy is a 724-acre site located in a rural portion of Storey County, Nevada, approximately 17 miles east of the Reno/Sparks area (population 250,000) and 15 miles west of the Town of Fernley (population 7,000) Nevada. U.S. Interstate 80 is immediately adjacent and provides easy access to the site. The site is capable of accommodating the gasification plant, power plant facilities and all support facilities, with minimal site work.

4.2 Area Geology

The proposed site is located in the Truckee River Canyon. Late during the Pleistocene Epoch, the Truckee River Canyon was occupied by Lake Lahontan, which covered an area extending approximately 40.2 km (25 miles) south from Pyramid Lake. As the lake receded, the Truckee River began to downcut into the lake deposits and subsequently formed the present canyon. Where the river eroded away the lake sediments, it deposited fluvial channel (beds of river materials) and overbank deposits in their place. As a result, near-surface sediments at the site are composed primarily of river deposits consisting of minor clays, silts, sands, gravelly sands, sandy gravels, and coarse gravels. Lake deposits of clay, silt, sand, gravel, and calcareous tufa (porous stone containing calcium) may occur beneath the site. The most recent deposits are relatively thin eolian (windblown) deposits of silt and fine sand that mantle (cover) portions of the surface.

The hills south of the site consist largely of olivine basalt (rock of volcanic origin containing a mineral silicate of magnesium and iron) and hornblende andesite (mineral consisting of silicate of calcium, magnesium, and iron in fine-grained volcanic rock) flows of the Pleistocene Kate Peak Formation, which provided much of the material that presently fills the canyon. The site itself is relatively level to very gently rolling terrain with moderate relief. The site elevation is highest toward the south and gently slopes to the north toward the Truckee River. Relief in the surrounding area varies from very low in some of the intermountain basins to quite high in the adjacent mountain ranges. The average elevation at the site is approximately 1,295 meters (4,250 feet). Typical elevations of the nearby basins are between 1,219 and 1,829 meters (4,000 and 6,000 feet); elevations at the tops of bordering mountain blocks range between 1,829 meters and 2,438 meters (6,000 and 8,000 feet). The major structural elements in the general region surrounding the site are the Pah Rah Range to the north; the Virginia Range to the south; the Walker Lane Fault Zone to the northeast; and the Olinghouse Fault Zone, which trends east west along the southern flanks of the Pah Rah Range.

The Tracy Power Station project site is located in the western part of the Great Basin Tectonic Province. The site is located about 40.2 km (25 miles) from the adjacent Sierra Nevada Tectonic Province. This location, in a transition zone between two tectonic provinces, is one of the most seismically active (Seismic Zone 4) and complex regions of the United States.

Based on seismicity and style of faulting, the western Great Basin has been divided into three subprovinces (*Selmmons, 1980*): (1) the transition between the Sierra Nevada Frontal Fault Zone and the Walker Lane Fault Zone: (2) the Walker Lane Fault Zone: and (3) the Great Basin Zone east of Walker Lane Fault Zone. The Walker Lane Fault Zone is a 32.2-km (20 mile) wide, northwest trending zone of mainly right-lateral faults that extend from near Walker Lake northwest through Pyramid Lake and into the Modoc Plateau of California. North of Pyramid Lake, the faults tend to radiate more northward and the Walker Lane Fault Zone becomes wider and more diffuse overall. The Walker Lane faults south of Pyramid Lake are relatively quiet compared to the faults in the other sub provinces, although active faults are abundant in northeast California. The closest active fault to the site within the Walker Lane is the Pyramid Lake strand, which is approximately 22 km (15 miles) from the site. It has an estimated Maximum Credible Earthquake value of 7.5. (A maximum credible earthquake, MCE, is the most serious earthquake that can be hypothesized from known geologic characteristics.)

East of the Walker Lane Fault Zone, faults are generally north-south trending normal faults. This part of the Great Basin has had several historic earthquakes of magnitude 6.6 to 7.7, including the 1954 Rainbow Mountain Fairview Peak, and Dixie Valley earthquakes. Epicenters along the Dixie Valley-Fairview Peak area continue south across the Walker Lake Fault Zone and intersect the Sierra Nevada Frontal Fault Zone. Forty-four earthquakes of magnitude greater than 5.0 have been reported in the area between 1852 and 1992.

The Truckee-Verdi-Reno-Olinghouse Transverse Fault Zone is of particular concern because it passes near the proposed site and includes the Olinghouse Fault Zone. The active portion of the Olinghouse Fault Zone extends from 16 km (10 miles) east of Reno along the north side of the Truckee River Canyon, passes through Olinghouse Canyon, and abruptly arcs to the northeast to terminate against a fault of the Walker Lane Fault Zone for a total length of 23 km (14 miles). In 1869, a series of earthquakes with magnitudes up to 6.7 occurred along this fault producing surface rupture north, west, and east of Tracy. This fault is located approximately 1.6 km (1 mile) from the proposed site at its closest approach; it has an estimated Maximum Credible Earthquake value of 7.1.

The largest historical seismic events close to the project site are the 1852 event with a possible magnitude of 7.0 and the three December 1869 earthquakes with estimated magnitudes of between 5.5 and 6.7. The 1852 earthquake was located just south of Tracy Station; however, the precise location of the earthquake has not been determined because information is based solely on descriptions by members of the Paiute Indian Tribe who were camping south of Pyramid Lake near Wadsworth. The epicenters of the 1869 earthquakes were located on the Olinghouse Fault Zone 16 to 39 km (10 to 24 miles) east of Reno. This zone is where the surface rupture occurred and includes the closest approach of the fault to the site.

The extent of wetlands is sufficiently limited to the extreme northern portion of the property and, siting new facilities has been done to avoid permanent wetland disturbance. A temporary fence was erected to restrict construction activities within the wetlands.

4.3 Environmental, Safety and Hazard Considerations

The Piñon Pine Project will comply with environmental, health, safety and socioeconomic (EHSS) statues and regulations. The probability of EHSS compliance is essentially assured. EHSS risks will be minimized. Health and safety plans were based on existing experience, and are referenced. Adverse environmental impacts will be at acceptable levels, and socioeconomic impacts will be beneficial. Mitigation measures identified in the Final Environmental Impact Statement (EIS) have been incorporated into the Record of Decision. All other midigation actions will be completed concurrent with plant construction.

EHSS compliance for the Piñon Pine Project is essentially assured because of the understanding of permit and regulatory requirements, and the adherence to safety regulations and codes.

Construction and operation of the Piñon Pine Project will be undertaken in a safe manner and in compliance with the general requirements of the Occupational Health and Safety Act (OSHA) PL 91-596, Part 1926 for construction and Part 1910 for operating.

Hazardous wastes will be handled in full compliance with OSHA Standard 29 CFR Part 1910.1200. These requirements relate to the Hazard Communication/Right-to-Know Program.

Presently there are no specific OSHA requirements in Nevada for the protection of workers in gasification plants. Guidelines for workers health and safety at coal gasification facilities have been recommended by the National Institute of Occupational Safety and Health (NIOSH) in:

- "Recommended Health and Safety Guidelines for Coal Gasification Pilot Plants", Department of Health, Education and Welfare (DHEW) (NIOSH) Publication No. 78-120, January 1978.

- "Criteria for Recommended Standard, Occupational Exposure in Coal Gasification Plants", DHEW (NIOSH) Publication No. 78-191, September 1978.

4.4 Supplied Utilities

4.4.1 Coal Supply

The gasifier is designed to operate with a wide variety of coals. For each coal property, there is a considerable range acceptable to the gasifier. The flexibility of fuel supply is a major advantage of this process. During the operation of the Piñon Pine Project the predominant fuel will be low sulfur coals from the western U.S., with high sulfur coals from areas such as Pennsylvania being used for demonstration tests. The western coals used will be sub-bituminous and bituminous coals such as those found in Utah, Colorado, Wyoming, and Montana.

Coal in these states is abundant. Supplies will not only be available for the life of this project, but will also be available into the future. Currently, coal in this region is in an oversupply situation that has driven market prices down to levels last seen in the 1960's. SPPCo's economic forecast for fuel prices projects that these coal prices will remain stable in the future, and will not increase at rates exceeding general inflation.

SPPCo has interviewed major coal producers in the area who are able to supply required quantities from existing facilities at attractive prices.

All deliveries will be made by railcar to the Tracy facility. There are facilities of the Southern Pacific Railroad currently on-site.

4.4.2 Limestone

Sorbent requirements for in-bed desulfurization have been evaluated for the life of the project. High quality limestone supplies suitable for project needs are available from several active producers in Nevada and western Utah. Although a variety of sorbents of various qualities are suitable for use as sorbents in the gasification process, optimum sulfur removal efficiency will be achieved with maximum concentration of calcium carbonate.

Project requirements are approximately 80 tons/day of 90% + calcium carbonate ($CaCO_3$) limestone. The material will be delivered to the site as limestone sand, 16 x 200 mesh, maintained dry so that no additional preparation is needed prior to injection into the gasifier. Dust-free truck transportation and storage will be incorporated.

4.4.3 Natural Gas

Start-up and emergency backup fuel will be provided by a 12" diameter pipeline, pressurized at nominal 500 psia utilized to provide natural gas to the combustion turbine. This line is on-site and connected to the Paiute gas transmission line at the plant boundary. The Paiute transmission line is the main line to the Reno area, and its transmission capacity will accommodate the requirements of the project except for brief periods during the winter when use of natural gas for electric power generation is curtailed. During these periods, propane will be utilized.

4.4.4 Electric Power

The plant is within SPPCo's service area. Construction power will be provided from existing buses, with electric power of 4.1 KV, approximately 100 feet from the project boundary.

4.4.5 Water Requirement and Availability

For the project, cooling water make-up will be taken from the existing cooling pond which is supplied from the Truckee River which adjoins the site, using an additional pump and existing water rights. Raw water for the demineralization train will be taken from existing deep wells. SPPCo serves water to 53,000 customers in northern Nevada and has extensive water management experience throughout the region. Sufficient water rights exist to provide the Tracy site with the required water for the gasification process, the steam cycle, the cooling water and the balance of the plant through the year 2030.

4.4.6 Transportation System

Both highway and rail transportation will be used during the construction and operation phases of the project. The property is adjacent to I-80, a four-lane interstate highway. The site is served by the main line of the Southern Pacific Railroad which runs through the property. An extended rail spur for coal transport will be provided. Air transportation is available through Reno Tahoe International Airport, a major airport located in Reno approximately 20 miles from the Tracy site.

4.4.7 Solid Waste Handling

Cooled solid waste consisting of ash, fines and sulfated limestone from the sulfation unit will be conveyed continuously to the solid waste storage silo.

The solid waste material in the silo will be loaded onto trucks by gravity during the day shift operation, 5 days per week. The silo will be equipped to minimize dusting during the truck loading operation. The solid waste will be hauled to the lined landfill located approximately 2,000 ft. southeast of the process area. A local landfill has expressed interest in using the material as cover.

The solid waste silo will be sized for three days of storage to handle the solid waste production over the weekend without the need of the truck load-out operation.

5.0 PLANT DESCRIPTION

The major systems of the Piñon Pine Project IGCC facility are described in this section of the report. Equipment List, Process Flow Diagrams, Plot Plans, and Heat and Material Balances are included in the Appendices.

5.1 Combined Cycle

5.1.1 Gas Turbine Generator (Area 700)

A General Electric Model MS6001FA Gas Turbine Engine (70.1 MW International Standards Origanization (ISO) rating) has been selected as the prime mover for the Piñon Pine Project. The engine's output shaft power will be reduced in rotative speed in a gearbox, from the optimum-efficiency value for a gas turbine of this size to 3600 Revolutions per minute (RPM). Mechanical power will then be converted to electrical power in a once-through air-cooled synchronous generator.

The gas turbine generator's, GT701, operating characteristics using syngas fuel at annual-average ambient air conditions (50°F, 12.56 psia, 20% relative humidity (RH)) are approximately as follows:

Output:	60,990 kilowatts (kW)[1]
Heat Input:	568.4 MMBtu/hr
Exhaust to heat recovery steam generator (HRSG):	flow: 1,422,000 lb/hr
	temp: 1,103°F

[1] = at the generator terminals, 0.85 power factor (pf)
[2] = chemical release, i.e. does not include syngas sensible heat

Available thermal energy in the exhaust gases will be captured in a heat recovery steam generator, SG801, (Section 800) to drive a condensing steam turbine generator.

The gas turbine will be an eighteen stage axial flow compressor with modulated inlet guide vanes. Interstage extraction will be used for turbine nozzle and wheelspace cooling. Because the blading material in the compressor will have high corrosion resistance, a coating will not be required. Approximately 20% of the total compressor discharge air will be extracted from the engine for the air-blown gasifier, and return as part of the syngas fuel.

The gas turbine engine will be provided with a conventional array of auxiliary systems and accessory devices, supplemented where necessary by special provisions for gasifier air extraction and combustion of syngas. Gas turbine auxiliary systems and accessory devices include:

- Load gear
- Synchronous generator
- Excitation system
- Control panel
- Fuel system
- Lubrication oil system
- Starting system
- Inlet air/evaporative cooler system
- Compressor cleaning system
- Fire protection system
- Noise abatement

5.1.2 Steam Turbine Generator and Heat Recovery Steam Generator (Area 800)

5.1.2.1 Heat Recovery Steam Generator

A heat recovery steam generator (HRSG), SG801, will be provided to recover the heat in the gas turbine exhaust gas stream. Two (2) levels of steam will be generated:

Level 1	1006.7 psia
Level 2	59.1 psia

Steam generated in the HRSG at 1006.7 psia, and high pressure steam generated in the gasifier island, will be combined, superheated in the HRSG and sent to the steam turbine generator at 950 psia, 950°F for expansion. The 59.1 psia steam generated will be superheated and sent at 55 psia, 360°F to the deaerator, DH801, for heating and stripping with the excess sent to the steam turbine generator, TG801.

The following items will be included in the HRSG:

Item No.	Description
D801	High Pressure Steam Drum

D802	Low Pressure Steam Drum
DS801	Main Steam Attemperator

5.1.2.2 Stack

The exhaust gasses exiting the steam generator and gasifier island will vent to the atmosphere via a 28' dia. x 225' high concrete shell stack.

The stack, ST801, will contain two (2) insulated steel flues; one (1) 13' dia. and one (1) 4' dia.

The 13' dia. flue will be dedicated to gas turbine exhaust while the remaining flue will be dedicated to the gasification plant. The stack shall be equipped with test ports, interior access, lighting, aviation warning lights and lightning protection.

5.1.2.3 Steam Turbine Generator

The steam turbine generator, TG801, will be a condensing type unit with extraction at nominally 485 psia providing steam, after pressure control and desuperheating to the gasifier at 420 psia, 700°F. High pressure steam letdown will be used if and when low throttle steam rates cause the extraction pressure to fall below that required to provide 420 psia steam. This letdown will provide steam for injection to the gas turbine generator at 420 psia, 700°F for NO_x control when operating on natural gas or propane fuel.

The steam turbine will exhaust into a surface condenser, E801. Cooling water from Section 1200 will condense the exhaust steam at 2 inches of mercury pressuge (in. Hg), based on normal gasifier load at 50 °F ambient temperature. Condensate will be pumped from the condenser by the hotwell condensate pumps, P801 A/B, through the condensate preheater in the HRSG for the recovery of low level heat and thence to the deaerator. Venting of the condenser will be accomplished by a vacuum pump system.

High pressure boiler feed water (BFW) will be pumped from the deaerator to the high pressure evaporator and Section 300, Gasification, and Section 600, Sulfation by the high pressure BFW pumps, P803 A/B. High pressure BFW to the high pressure evaporator will be preheated in an economizer section of the HRSG. Deaerated low pressure BFW will be pumped to the low pressure evaporator by the low pressure BFW pumps, P802 A/B. BFW to the low pressure evaporator will be preheated in an economizer section of the HRSG.

The steam turbine generator will have an output of 46,226 kW at a power factor of .85, 329,133 lb/hr throttle flow, 11,855 lb/hr extraction @ 485 psia, 15,304 lb/hr induction at 54 psia and 360°F and 2.0 inches of mercury absolute pressure (in.HgA) exhaust backpressure.

A deaerator, DH801, shall be supplied to deàerate returned condensate and demineralized water make-up.

In addition, the following equipment shall be provided in the steam generation system:

Item No.	Description
DS802	M.P. Steam Desuperheater
DS803	Pegging Steam Desuperheater
E802	Gland Condenser
P804A/B	Vacuum Pumps
D803	Continuous Blowdown Drum
D804	Intermittent Blowdown Drum

5.2 Gasifier Island

The gasifier island is based on utilizing a KRW air blown, fluidized-bed coal gasifier to produce a fuel gas for use by the combustion gas turbine which will utilize a low Btu fuel gas. During normal base load operation, the gasification system will:

1.	Produce:	285,000 lb/hr syngas with a heating value of 129 btu/scf
2.	Export:	156,000 lb/hr of steam for power production to the combined cycle area
3.	Consume:	880 TPD Raw Coal 50 TPD Limestone
4.	Discharge:	120 TPD of LASH (limestone/ash mixture) for deposit to landfill

5.2.1 Coal Gasification (Area 300)

This area will contain the solids feed system and the gasifier with its associated cyclone. Solids feeds will consist of the coal to be gasified and limestone sorbent used for capture of sulfur compounds emitted during gasification.

Coal and limestone (as well as coke breeze during start-up) will be fed from a single conveyor to the atmospheric feed surge bin, BN301, which will be equipped with the feed surge bin vent filter, F302, to capture fugitive dust. This bin will periodically discharge solids into the feed pressurization hopper, BN302. After transfer of solids into BN302, it will be isolated from BN301 and pressurized with air from the air receiver, D301. Pressurization will be done through the hopper vent filter, F301, which back flows solids collected during the depressurization step back into BN302. After pressure equalization with the feed hopper, BN303, solids will be transferred from BN302 to BN303. When BN302 is empty, it will be isolated and depressurized to begin the next cycle. The feed hopper, BN303, will never be emptied.

The feed hopper, BN303, will provide a continuous feed of coal and limestone to the gasifier through the coal feeder, FD301. Solids from the feeder will be picked up by transport air from E204 and fed directly into the gasifier central feed tube. Additional air from the recuperator, E201, will be fed through the same feed tube and the streams merge to form a central jet where the coal will quickly devolatilize, with the remaining char and limestone entering the bed. Combustion of char and gas will occur within the jet to provide heat necessary for endothermic devolatilization, gasification and desulfurization chemical reactions. Extraction steam from the steam turbine will be fed to the gasifier bed. Steam will be injected at the gasifier grid to aid in fluidization of the gasifier bed. The primary gasification and combustion reactions whichwill occur in the gasifier are:

$C + H_2O$	---->	$CO + H_2$	(carbon + water yields carbon monoxide + hydrogen)
$C + CO_2$	---->	$2CO$	(carbon + carbon dioxide yields carbon monoxide)
$CO + H_2O$	---->	$CO_2 + H_2$	(carbon monoxide + water yields carbon dioxide +.hydrogen)
$C + O_2$	---->	CO_2	(carbon + oxygen yields carbon dioxide)

Carbon monoxide and hydrogen will form the major combustible constituents of the product gas. Methane and other hydrocarbons will be produced in lesser quantities, primarily from the devolatilization process. The operating temperature of the gasifier will be sufficiently high to crack any tars or oils that might be produced.

Gasification will result in the release of sulfur from the coal, primarily in the form of hydrogen sulfide (H_2S). At gasifier operating conditions (nominal 295 psia and 1800°F gas exit), the limestone sorbent fed with the coal will quickly calcine and react with the H_2S according to the following reactions:

$CaCO_3$	---->	$CaO + CO_2$	(calcium carbonate yields calcium oxide + carbon dioxide)
$CaO + H_2S$	---->	$CaS + H_2O$	(calcium oxide + hydrogen sulfide yields calcium sulfice + water)

The amount of H_2S that will be captured is limited by chemical equilibrium. With the low sulfur Southern Utah Fuel Company (SUFCO) coal, approximately 50% of the sulfur released from the coal will be removed from the gas by reaction with CaO. Sulfur exiting the gasifier in gaseous form will be captured by the external desulfurizer system in Area 600.

The product gas which will exiting the top of the gasifier will contain a significant quantity of entrained solids, consisting of char (unconverted coal), ash, and sorbent. The gas will enter the gasifier cyclone, S301, which will remove most of the solids. Gas from the cyclone will be directed to the product gas cooler, E401, and the product gas trim cooler, E403, for heat recovery.

Solids collected in the gasifier cyclone, S301, will be returned to the gasifier via the dipleg. Recycle gas from the recycle gas compressor, C901, will be used to fluff the dipleg to facilitate flow of solids back to the gasifier bed. Recycle gas will be used to provide fluidization gas and for cooling of the spent solids in the annulus at the bottom of the gasifier.

As carbon in char is consumed, the particles will become enriched in ash. Ash particles tend to agglomerate, and along with dense calcium sulfide/oxide particles, separate from the char bed because of different density and fluidization characteristics. This separation will occur primarily in a region that surrounds the central feed tube at the bottom of the gasifier. These solids will be further cooled in the gasifier annulus by a counter current stream of recycle gas. The spent solids leaving the gasifier will be transferred via the ash feeder, FD302, to the ash collection hopper, BN501.

The gasifier and sulfator start-up heater, H301, will heat the gas turbine extraction air to 1000°F for preheating the gasifier and downstream equipment during start-up.

5.2.2 Oxidant Compression and Supply (Area 200)

This area will provide air to the gasifier, air for regeneration of the desulfurization sorbent, air for coal and limestone feed pressurization and transport air for feeding coal and limestone into the gasifier.

Air for the gasifier island will be extracted from the gas turbine's air compressor. A portion of this air will be diverted for use during startup of the gasifier. The major portion of the air, which will be the oxidant feed to the gasifier, will have to be compressed above gasifier operating pressure. To minimize power consumption during compression, this air will be cooled to 120°F in three exchangers in series. E201 will be the air recuperator which reheats the gasifier air after compression. Further cooling will be done in the air precooler, E203, which will heat BFW, and the trim cooler, E202, which will use cooling water for the final gas cooling. The knockout drum, D201, will be provided downstream of the trim cooler to remove any water condensed from air during cooling. Any water collected will be sent to the waste water treatment system.

Air exiting the knockout drum will be compressed by the boost air compressor, C201, to above gasifier pressure level. A portion of this air will be cooled by cooling water in the transport air cooler, E204, and is split into two streams. One of the streams is used as transport air to feed solids into the gasifier. The other stream will be diverted to the suction of the pressurization air compressor, C301. The major portion of the air exiting the boost air compressor, C201, will be reheated in the air recuperator, E201, and again divided into two streams. A major portion of this stream will be fed to the gasifier while the other portion will be used for regeneration of the zinc oxide based desulfurization sorbent.

A portion of air exiting the transport air cooler will be compressed to about 600 psia by C301 and sent to the pressurization air receiver, D301, which will dampen out compressor fluctuations and serve as a surge vessel. Air from D301 will be used directly for coal/limestone feed pressurization.

5.2.3 Gas Stream Heat Recovery (Area 400)

This area will include cooling of the main product gas from the gasifier as well as cooling of the recycle gas.

Product gas from the gasifier cyclone, S301, will be cooled to about 1000°F in the product gas cooler, E401, and the product gas trim cooler, E403. The rejected heat will generate steam from BFW supplied from the steam drum, SG401. Circulation through these two exchangers will be by natural convection.

The particulate free, desulfurized product gas exiting the hot gas filter, F501, is cooled in the recycle gas cooler, E402 by high pressure BFW. A portion of the cooled gas will be used for solids transport in the sulfator system. The major quantity will be sent to Area 900 (recycle gas compression) for further treatment.

The gasifier steam drum, SG401, will operate at 1075 psia (nominal) and will be supplied by BFW from Area 800. Steam from the gasifier steam drum will be combined with superheated steam from the HRSG steam drum, D602, and passed through the superheater section of the HRSG, SG602, in order to superheat it to 600°F prior to delivery to Area 800. Blowdown from the gasifier steam drum will be combined with blowdown from the HRSG steam drum and also returned to Area 800.

The high pressure BFW at 230°F from Area 800 will be split into several streams. A portion will be sent directly to the air precooler, E203, and the recycle gas cooler, E402. Heated BFW exiting these exchangers will be routed to the gasifier steam drum. The remaining BFW from Area 800 will flow directly into the gasifier steam drum, SG401, and the HRSG steam drum, D602. Some BFW from SG401 will flow to the regenerator effluent gas cooler, E607. The mixture of BFW and steam exiting E607 will flow back to SG401. BFW entering the sulfator steam drum will be preheated in the economizer section of SG602.

5.2.4 Gas Stream Particulate Removal (Area 500)

This area will provide final cleanup of particulates in the product gas stream and collection of all spent solids prior to final processing.

Desulfurized product gas from the desulfurization section will contains a small quantity of particulates. This stream will be sent to the hot gas filter, F501, which essentially removes all of the remaining particulates. The hot gas filter will be a ceramic candle type utilizing back pulse gas for cleaning. Candle elements used for filtration will be housed in a steel vessel with access capability for replacement of candles. The particulate free desulfurized gas exits the filter and will be sent to the gas turbine.

Blowback gas for cleaning of the filter elements will be provided from the recycle gas receiver, D901. Fines removed by the filter elements will be collected in the bottom of the filter vessel and discharged through the filter fines screw cooler, E501, which will cool the fines prior to discharging them into the filter fines collection hopper, BN503. Cooling will be accomplished in E501 by a closed heat transfer fluid system, PG501, which will be cooled by cooling water. The collected fines will be sent to the filter fines collection hopper, BN503, for further processing.

Hoppers BN501/502/508 and BN503/504/507 will be parallel systems for collection of feed ash and filter fines, respectively. Ash collected in BN501 will be ischarged into the ash depressurization hopper, BN502, which will be pressurized with high pressure recycle gas from the recycle gas receiver, D901. Pressurization will be done through the ash vent filter, F502, which will serve as a particulate filter during the depressurization cycle. Ash from BN502 will be discharged into the ash feed hopper, BN508, from where will be continuously transported to the sulfator by cooled recycle gas stream. The fines collection and feed system will be operated in a similar manner utilizing the filter fines collection hopper, BN503, filter fines depressurization hopper, BN504, filter fines feed hopper, BN507, and the filter fines vent filter, F503. Filter fines from BN507 will be conveyed by a stream of recycle gas to the fines combustor, H602. Vent gas from the ash depressurization hopper and the filter fines depressurization hopper will be routed to the sulfator.

5.2.5 Desulfurization (Area 600)

This area will desulfurize the product fuel gas prior to delivery to the hot gas filter, FG501, and condition the solids waste for disposal.

· Desulfurization (Fuel Gas):

Fuel gas from E403 will be fed to the fuel gas desulfurization system at approximately 1000°F. Sulfur compounds will be removed from the gas by a zinc oxide based sorbent, which will contain nickel oxide, according to the following reactions:

$ZnO + H_2S$ ----> $ZnS + H_2O$ (zinc oxide + hydrogen sulfide yields zinc sulfide + water)
$ZnO + COS$ ----> $ZnS + CO_2$ (zinc oxide + carbonyl sulfide yields zinc sulfide + carbon dioxide)
$NiO + H_2S$ ----> $NiS + H_2O$ (nickel oxide + hydrogen sulfide yields nickel sulfide + water)
$NiO + COS$ ----> $NiS + CO_2$ (nickel oxide + carbonyl sulfide yields nickel sulfide + carbon dioxide)

The sulfur compounds in the product gas to the gas turbine will be reduced to less than 20 parts per million by volume (ppmv) and the mildly exothermic absorption reactions will result in a small increase in the fuel gas temperature.

The fuel gas desulfurization system will comprise a transport desulfurizer, R603, and a transport regenerator, R604. The fuel gas from E403 will be fed to the mixing zone at the bottom of the riser of R603 where it will mixe with zinc oxide based sorbent from the desulfurizer cyclone, S603, that will be recirculated to the riser via the standpipe. Absorption of gaseous sulfur compounds will take place in the narrower riser section as the fuel gas and sorbent flow upward and into S603.

The sorbent leaving the riser of R603 will be partially sulfided. Bulk separation of the gas and solid phases will take place in S603. The solids separated in S603 will be collected in the standpipe from where a portion of the sulfided sorbent will be transferred to the regenerator riser and the remainder will be recirculated to the reactor. The fuel gas leaving S603 will be desulfurized and flow to the hot gas filter, F501, where it will undergoe final particulate (fines escaping the gasifier cyclone and attrited sorbent) removal before being fed to the gas turbine.

Fresh sorbent from bulk storage will be dumped into the sorbent storage hopper, BN603, pressurized in the sorbent feed hopper, BN604, and fed to R603 via the standpipe to maintain sorbent inventory and reactivity. Sorbent fines escaping BN603 and BN604 will be collected in the sorbent storage hopper vent filter, F604, and the sorbent pressurization hopper vent filter, F605, respectively.

The stream of sulfided sorbent withdrawn from the standpipe will flow to the mixing zone at the bottom of the transport regenerator, R604. Regeneration air from E201will be preheated in the sorbent regeneration air heater, H608, and will be fed to the mixing zone of R604. The sulfided sorbent will be regenerated by air according to the following highly exothermic reactions as both the sorbent and air flow up the regenerator riser:

$2ZnS + 3O_2$ ----> $2ZnO + 2SO_2$ (zinc sulfide + oxygen yields zinc oxide + sulfur dioxide)
$2NiS + 3O_2$ ----> $2NiO + 2SO_2$ (nickel sulfide + olygen yields nickel oxide + sulfur dioxide)

The temperature of the gas exiting the regenerator riser will be approximately 1200°F and will be controlled by varying the inlet temperature of the regeneration air, the circulation rate and sulfur loading of the sulfided solids. The mixture of regenerated sorbent and gaseous products of regeneration leaving the riser will enter the regenerator cyclone, S604, where bulk separation of the solids and gaseous phases occur. The regenerated sorbent will be returned to the standpipe of R603. The SO_2-rich gas from regeneration will be cooled in the regenerator effluent cooler, E607, and then routed to the sulfator, R602, for SO_2 capture.

Sorbent withdrawal from the fuel gas regeneration system, if required, will normally be from the bottom of S604. However, at times when emergency dumping of solids is required, solids may also be drawn from the solids return leg on R603 standpipe or from the bottom of R603 mixing zone. The solids will be stored in the spent sorbent hopper, BN605, and will then be sent either to disposal or returned to BN603. BN605 will be provided with the sorbent depressurization hopper vent filter, F606, to capture any sorbent fines.

- Waste Solids Treatment:

With the exception of a small quantity of sulfur in the fuel gas to the gas turbine, all of the sulfur in coal will ultimately be disposed of in the sulfator system. This system will serve the following functions:

1. Combustion of residual char in the ash and fines collected from gasification.
2. Capture of SO_2 from both the residual char combustion and the desulfurizer regeneration effluent gas.
3. Oxidation of calcium sulfide (CaS) produced in the gasifier to calcium sulfate.

The sulfur reactions which will occur in the sulfator can be represented by the following equations:

$S + O_2$	----> SO_2	(sulfur + oxygen yields sulfur dioxide)
$CaO + SO_2 + 1/2\ O_2$	----> $CaSO_4$	(calcium oxide + sulfur dioxide + olygen yields calcium sulfate)
$CaS + 2O_2$	----> $CaSO_4$	(calcium sulfide + olygen yields calcium sulfate)

All of these reactions are highly exothermic and may not proceed to completion. In addition, a small recycle gas stream (transport and pressurization gas) will be combusted in the sulfator.

The sulfator, R602, will be a bubbling bed reactor which will be fluidized by air supplied by the sulfator air compressor, C601. Solids exiting gasifier bottom which contain unconverted calcined limestone, sulfided limestone and ash (LASH) will be conveyed from the ash feed hopper, BN508, to the sulfator with cooled recycle gas from the recycle gas cooler, E402. Regeneration effluent gas from the desulfurization system will be fed to the sulfator for capture of SO_2 by reaction with the unconverted calcined limestone in the solids from the gasifier. Provision will be made to add additional fresh limestone, from the limestone feed hopper, BN505.

Instrument air will be used to pressurize BN505 to add fresh limestone to the sulfator during normal operation. Any fugitive dust from BN505 will be captured by the limestone feed hopper vent filter, F504. During the start-up, air from C601 will be preheated in the gasifier and sulfator start-up heater, H301, and passed through the sulfator and downstream equipment.

The sulfator will be operated at essentially atmospheric pressure. In order to maximize SO_2 capture and sulfide oxidation, the sulfator temperature will be maintained at about 1600°F. This will be done by generating saturated steam in the primary solids cooler, E605, which will be supplied with BFW from the HRSG steam drum, D602, by natural convection. Steam generated in E605 will be collected in D602.

Filter fines from BN507 will be conveyed by a stream of recycle gas to the fines combustor, H602, to burn off carbon for additional heat recovery. Air for combustion temperature control will be supplied by C601.

Flue gas leaving the sulfator will pass through the sulfator cyclone, S601, for removal of particulates and will then be mixed with flue gas from H602 prior to cooling in the HRSG, SG602, to about 300°F. The gas will then pass through the sulfator flue gas bag house filter, F602, for final removal of particulates and will be sent to the stack.

Gas cooling in SG602 will be acheived by generating steam at 1075 psia and preheating BFW, respectively. Additional saturated steam will be generated in HRSG coils with BFW supplied from D602 by natural circulation. Deaerated BFW from Area 800 will be heated in the economizer section of SG602 prior to transfer to D602.

Saturated steam generated in HRSG and solids coolers will be collected in D602, mixed with steam from SG401 and passed through the superheater section of SG602 to superheat to 600°F (approximately 50°F superheat at battery limit pressure of 1025 psia) prior to exporting it to Area 800.

Solids leaving the bottom of the sulfator will be cooled in the sulfator solids screw cooler, E602, and collected in the sulfator solids collection hopper, BN601. These will then be combined with solids collected in the sulfator flue gas bag house filter, F602, in the sulfator solids depressurization hopper, BN602, which will be pressurized by instrument air and collect solids from BN601. Solids from BN602 will be discharged on to a conveyor for transfer to Area 1100.

5.2.6 Recycle Gas Compression (Area 900)

This area will provide for recompression and distribution of recycle gas to various users.

Recycle gas from the recycle gas cooler, E402, will be split into three streams. A portion will be sent directly to the sulfator system for use as transport gas. A second stream will be compressed by the recycle gas compressor, C901, to gasifier pressure for recycle directly to the gasifier and for use as fluffing gas in the desulfurizer riser.

A third stream will be further cooled in the recycle gas booster compressor trim cooler, E901, to 120°F before compression. Cooling will result in condensation of a small amount of water from gas which will be removed in the recycle gas knockout drum, D902, and disposed to the sulfator. The cooled gas from D902 will be fed to the recycle gas booster compressor C902 which will boost the pressure to about 1750 psia. The high pressure gas will be sent to the recycle gas receiver, D901, which will act as a surge vessel. Gas from D901 will be used as blowback gas to clean the gas filter, F501, and also for pressurization of the ash depressurization hopper, BN502, and the filter fines depressurization hopper BN504. A small amount of this gas will be used for fluidization of the transport desulfurizer standpipe.

5.3 Offsites

5.3.1 Solids Receiving and Grinding (Area 100)

5.3.1.1 Raw Coal Receiving and Storage

Raw coal, size 2" x 0, will be received at the plant from a unit train consisting of up to eighty-four 100-ton railcars every seven days. The coal will be received at the unloading station and transferred to the coal storage dome. The unloading station will be enclosed and provided with a dust collection system to avoid uncontrolled coal dust emissions. The unloading station will consist of two receiving hoppers, each equipped with belt type unloading feeder which will feed the raw coal to the raw coal transfer conveyor. Coal will be weighed in transit by the raw coal receiving scale located at the tunnel exit of the raw coal transfer conveyor. A sweep type automatic sampling system will be installed on the coal transfer conveyor, and located after the conveyor tunnel exit, to collect a representative raw coal sample to determine the quality of coal received. The raw coal unloading and conveyor system will be sized to handle an 84 railcar train unloading operation in a four-hour period, at a design rate of 2,250 std. tons/hr. The raw coal receiving system will consist of the following major components:

Item No.	Description	Duty
BN101A/B	Raw Coal Receiving Hoppers	100 std. tons each
FD101A/B	Raw Coal Receiving Feeders	1,125 std. tons/hr each
CR102	Raw Coal Transfer Conveyor	2,250 std. tons/hr
WS101	Raw Coal Receiving Scale	2,250 std. tons/hr
F106	Coal Receiving Dust Filter	58,800 ACFM*
B105	Coal Receiving Exhaust Fan	58,800 ACFM*
CR111	Filter Discharge Conveyor	4.3 std. tons/hr
FD111	Receiving Filter Airlock Feeder	4.3 std. tons/hr
PG103	Sampling System consisting of:	2,250 std. tons/hr
	CR116 Sample Rejects Bucket Elevator	
	FD116 Primary Sample Feeder	
	FD118 Secondary Sample Feeder	
	SR103 Primary Sample Crusher	
	SS103 Primary Sampler	
	SS104 Secondary Sampler	

P101A/B	Sump Pump	100 GPM

*Actual Cubic Feet per Minute

The coal will be stored in a 250' diameter field erected storage dome which will be sized to store 16,400 std. tons of coal, or approximately a twenty day supply. No exposed storage of coal, such as a coal pile, is planned, thus all coal storage will be within the dome. The material in the coal storage dome will be stockpiled and reclaimed by an automated circular coal pile stacker/reclaimer assembly. The raw coal will be discharged through a vibratory feeder onto the raw coal collecting conveyor. This conveyor will transfer the coal to the crushing station for sizing and screening. In the event of an emergency, provisions will be made to discharge the stockpile through an emergency reclaim hopper equipped with a feeder into the raw coal collecting conveyor. The coal storage system will consist of the following major components:

Item No.	Description	Duty
X100	Coal Storage Dome	16,400 std. tons
CR105	Raw Coal Collecting Conveyor	340 std. tons/hr
SE101	Raw Coal Magnetic Separator	340 std. tons/hr design
F107A/B/C	Raw Coal Storage Dust Filters	2,500 ACFM (each)
B106A/B/C	Raw Coal Storage Exhaust Fans	2,500 ACFM (each)
PG102	Stacker Reclaimer Package consisting of:	
	CR118 Stacking Conveyor	2,250 std. tons/hr
	RL101 Coal Pile Reclaimer	110 std. tons/hr normal 340 std. tons/hr max.
FD114A/B	Coal Pile Discharge Feeders	110 std. tons/hr normal 340 std. tons/hr max.
BN108	Emergency Reclaim Hopper	
P103A/B	Reclaim Tunnel Sump Pump	50 GPM

5.3.1.2 Coal Crushing and Screening

In coal crushing and screening, the raw coal will pass through a magnetic separator to remove tramp iron and will then be screened through a dual deck vibrating screen, which will control the product gasifier feed size of ¼" x 0 through the ¼" square holes of the lower deck of the vibrating screen. The oversize material from the upper deck will be fed to the coal crusher to bring the material size from 2" x 0 to the required ¼" x 0. This sized product will be recycled to the dual deck coal screen through flexible wall elevating conveyors. The ¼" x 0 product-size material will be transported into the coal storage silo utilizing an elevating flexible wall conveyor. The coal silo will be sized for 24-hour feed to the gasifier and will be filled daily through an 8-hour period operation of the crusher and the elevating conveyor.

A common single gasifier feed elevating conveying equipment system will be provided from the coal and/or start-up coke and the limestone silos to the gasifier area. The conveying system will consist of a weigh belt feeder from each silo and the common elevating conveyor. The system will be operating continuously during feeding of the gasifier. As with the raw coal handling system, care will be taken to control any dust emission sources by means of dust collection system. The coal crushing and screening system will consist of the following major components:

Item No.	Description	Duty
B111	Crushing Station Dust Filter Fan	19,750 ACFM
FD115	Crushing Station Dust Filter Feeder	2.0 std. tons/hr
CR114	Oversize Coal Elevator	125 std. tons/hr
CR115	Sized Coal Conveyor	50 std. tons/hr
F109	Crushing Station Dust Filter	19,750 ACFM
SE104	Coal Screen	235 std. tons/hr
SR102	Coal Crusher	125 std. tons/hr
FD117	Oversize Coal Feeder	125 std. tons/hr
BN109	Emergency Surge Hopper	20 std. tons/hr
CR117	Emergency By-pass Conveyor	340 std. tons/hr
DV105	Coal Dust By-pass Diverter	340 std. tons/hr
DV106	Coal Dust By-pass Diverter	2.0 std. tons/hr

5.3.1.3 Coal, Coke and Limestone Feeding

Dried coke breeze, ¼" x 0, will be received in the plant via trucks with pneumatic trailers for initial plant start-up and for each subsequent gasifier start-up. The sized coke will be transferred from the trucks pneumatically to an 800-ton capacity coke storage silo using the truck-trailer's own pneumatic blower. Exhaust air from the filling operation will be vented through a dust control filter installed atop the coke silo. The material from the coke silo will be conveyed to the gasifier utilizing the common coal/coke/limestone elevating conveyor. The coke silo will be equipped with a constant speed weigh feeder provided with a feed depth regulating valve to feed the required coke to the common elevating conveyors.

Sized limestone will be received at the job site, on a daily basis, via trucks with pneumatic trailers. The sized limestone will be conveyed pneumatically to a 300 ton (5-day) capacity limestone storage silo using the truck trailer pneumatic blower. Exhaust air from this filling operation will be vented through a dust control filter installed atop the limestone silo. The material from the limestone silo will then be fed at a controlled rate by a variable speed weigh feeder and blended with the coal on the same elevating conveying line feeding the gasifier. Provisions will be included to transport limestone to the sulfator limestone feed hopper by pneumatic conveying. The material will be discharged from the limestone silo and distributed to the two conveying lines utilizing a bifurcated feed line. The pneumatic conveying line to the sulfator will be provided with the required conveying air blower and a stand-by air blower. The coal, coke and limestone feeding system will consist of the following major components:

Item No.	Description	Duty
BN105	Sized Coal Silo	818 std. tons
BV102	Coal Silo Bin Discharger	15-50 std. tons/hr
FD106	Coal Silo Discharge Feeder	15-50 std. tons/hr
F102	Coal Silo Exhaust Filter	2,500 CFM*

F105	Gasifier Feed Dust Filter	3,700 ACFM
B104	Gasifier Feed Dust Collection Fan	3,700 ACFM
BN106	Coke Silo	800 std. tons
BV103	Coke Bin Discharger	15-50 std. tons/hr
FD107	Coke Silo Discharge Feeder	15-50 std. tons/hr
F103	Coke Silo Exhaust Filter	1,250 CFM*
BN107	Limestone Silo	300 std. tons
BV104	Limestone Bin Discharger	1.5-5.0 std. tons/hr
B112	Coal Silo Fan	2,500 ACFM
F104	Limestone Silo Exhaust Filter	1,250 ACFM
FD108	Limestone Silo Discharge Feeder	1.5-5.0 std. tons/hr
B110A/B	Limestone Transport Blower	4 std. tons/hr
CR110	Gasifier Feed Elevating Conveyor	50 std. tons/hr
SE102	Gasifier Feed Magnetic Separator	50 std. tons/hr
WS102	Truck Scale	100 std. tons
D104	Limestone Transporter	4 std. tons/hr

*Cubic Feet per Minute

5.3.1.4 Dust Collection System

Dust collection systems will be provided in the plant for proper environmental control. Fabric filter collectors will be used to control fugitive dust emissions from the transport and transfer of coal, coke and limestone.

All material handling systems will be enclosed and supplied with dust collection systems for environmental control, with special attention being paid to dust generating areas mainly transfer points.

5.3.2 Solid Waste Handling (Area 1100)

Cooled solid waste consisting of ash, fines and sulfated limestone (LASH) from the sulfation unit will be conveyed continuously to the solid waste storage silo using a pneumatic conveying system. The air displaced from the silo will be vented through the bin filter, installed atop the solid waste silo.

The LASH in the silo will be loaded onto trucks during the day shift operation, 5 days per week. The silo will be equipped with a bin discharger, discharge valve and a telescopic loading chute with a bag filter and fan to minimize dusting during the truck loading operation. The LASH will be then hauled to the final disposal point. A local landfill has expressed interest in using the material as a cover, and other usages are being investigated.

The solid waste silo will be sized for three days of storage (400 tons) to handle the solid waste production over the weekend without the need of the truck load-out operation. The solid waste handling system will consist of the following major components:

Item No.	Description		Duty
BN1101	Solid Waste Bin		400 std. tons
BV1101	Solid Waste Discharger		100 std. tons/hr
PG1101	Sold Waste Load-Out package consisting of:		
	B1102	Load-Out Exhaust Fan	1,000 SCFM*
	CH1101	Solid Waste Loading Chute	100 std. tons/hr
	F1102	Solid Waste Load-Out Filter	1,000 SCFM*
	XV1101	Cut-off Gate	100 std. tons/hr
	B1103A/B	Pneumatic Transport Blowers	5 std. tons/hr
	D1101	Solid Waste Transporter	7,000 lbs/hr
	D1102	Ash Transporter	3,000 lbs/hr
F1101	Silo Vent Filter		2,500 CFM

*Standard Cubic Feet per Minute

5.3.3 Balance of Plant (Area 1200)

5.3.3.1 Raw Water System

The raw water system will provide water to the demineralization package, PG1201, which in turn will provide BFW makeup to the deaerator, DH801. Additionally the raw water system will provide water for the plant utility water system for miscellaneous users such as service wash stations. Well water from Well No. 4 will be the source of water for the plant raw water system. Well water will be pumped to the existing Unit 3 raw water tank and then pumped by the raw water pumps, P1202A/B, to the plant raw water system. Pumps P1202A/B will be designed to draw water from either the existing tank or directly fromWell No. 4.

Potable water for safety showers and eyewashes will be provided by the existing plant system. Drinking water will be provided as a brought-in bottled source.

5.3.3.2 Boiler Feedwater Supply and Storage

Makeup BFW will be demineralized by a package, PG1201, consisting of cation, degasification, anion and mixed bed units. Additionally, there will be storage and feeding of regenerating caustic and sulfuric acid, and appropriate local controls, including neutralization controls. Spare acid and caustic pumps and the neutralization air mixing system will also be included.

Regeneration waste will be stored in a neutralization tank, TK1202, where the waste will be mixed and neutralized before being sent to the dirty water sewer. Acid and caustic pumps will be provided for neutralization.

Demineralized water will be stored in TK1201 and pumped to the condensate system by the demineralized water pumps, P1208 A/B/C.

This system will produce demineralized water from raw well water for BFW make-up at a rate of 280 GPM. The demineralization system will consist of the following major components:

Item No.	Description
D1203A/B	Cation Units
T1201	Degasifier
D1204A/B	Anion Units
D1211A/B	Mixed Bed Units
P1203A/B	Acid Regeneration Pumps
P1204A/B	Caustic Regeneration Pumps
P1205A/B	Acid Neutralization Pumps
P1206A/B	Caustic Neutralization Pumps
P1217A/B	Booster Pumps
B1202A/B	Degasifier Blowers
E1201	Caustic Water Heater
D1201	Acid Storage Drum (8' - 0" dia. x 10' - 0" T-T)
D1202	Caustic Storage Drum (8' - 0" dia. x 13' - 0" T-T)
TK1201	Demineralized Water Tank (12' - 0" dia. x 32' - 0" high)
P1208A-C	Demineralized Water Pumps
TK1202	Neutralization Tank (12' - 0" dia. x 32' - 0" high)

5.3.3.3 Boiler Water Treatment System

A package of chemical dosing equipment will be provided for the conditioning of the boiler water. The boiler water treatment system will consist of the following major components:

Item No.	Description
TK1203	Phosphate Tank
M1201	Phosphate Mixer
P1211A/B	H.P. Phosphate Pumps
P1211C	Spare Phosphate Pump
P1212A/B	L.P. Phosphate Pumps
P1210A/B	Oxygen Scavenging Pump
P1213A/B	Amine Pump

5.3.3.4 Cooling Water System

The cooling pond will provide makeup water for the cooling tower, CT1201. Pond water will be pumped from the existing pond water pump structure to the cooling tower basin by the make-up pump, P1201.

A conventional induced-draft 3-cell counter-flow cooling tower, CT1201, will be used for the plant cooling water system. The top of the basin is 3' - 6' above grade. Cooling water will be circulated through cells 1 and 2 by the vertical turbine cooling water pumps, P1211 A/B/C, and through cell 3 by pumps P1220A/B through the use of a split basin. (See Waste Water System Section 1000.)

The cooling tower will be designed for the 2½% occurrence condition of a 61°F wet bulb temperature and provide 80.5°F cooling water at that condition. Blowdown from cell 3 will be sent to the waste water treatment system.

Biocide injection will be provided by a biocide feeder. Other additives, corrosion inhibitors, pH controlling, biocides, and scale/deposit inhibitors, will be injected into the cooling water by the water treatment injection system. The cooling water system will consist of the following major components:

Item No.	Description
CT1201	Cooling Tower
P1209A-C	Cooling Water Pumps (cells 1 & 2)
D1208	Inhibitor Tank
D1209	Acid Tank
P1214A/B	Inhibitor Pumps
P1215A/B	Acid Pumps
FD1201	Biocide Feeder
P1220A/B	Circulating Water Pumps (cell 3)

5.3.3.5 Instrument and Plant Air System

A conventional plant and instrument air compression system will be provided. Two air compressors, one operating, one spare, will be provided for the system. A single air receiver will provide adequate surge capacity. The air will be dried to a -40°F dewpoint using an air drying desiccant system prior to branching off to plant and instrument air headers.

The following equipment will be provided to supply both Instrument and Plant Air:

Item No.	Description
C1201A/B	Compressors
D1207	Air Receiver
DR1201A/B	Air Dryers

5.3.3.6 Flare System

A flare system will be provided to incinerate the full product gas flow from the gasifier in the event of a power plant outage, gasifier start-up, or other emergencies. The flare, FL1201, will be a vertical free-standing system. Pilots will be designed to use natural gas or propane.

A 48" dia. x 60' - 0" flare stack with a capacity of 290,498 lbs/hr will be provided.

5.3.3.7 Nitrogen System

Nitrogen will be required for maintaining a constant flow of purge gas through selected equipment and instruments, blow-back cleaning of the hot gas filter (when normal process gas is unavailable), pneumatic conveying of coal dust and system purging at shutdown.

The Nitrogen Package, PG1205, will be a cryogenic air separation plant wherein the constituents of air will be separated by cryogenic distillation delivering high purity nitrogen (99.7%) in the required quantity.

Components of the package will include compressors, storage tanks, a liquid nitrogen pump and vaporizers sized to provide for start-up, normal operation and a safe shutdown of the facility.

5.3.3.8 Propane System

Propane will be the tertiary fuel to the combustion gas turbine. Liquid propane will be delivered by tank truck or tank car and stored in two 100,000 gallon (nominal) storage drums. The drums will be oriented, and earthen berms constructed, to minimize damage in the event of tank failure. Storage will be in accordance with the applicable National Fire Prevention Association (NFPA) requirements. When required, liquid propane will be drawn off the storage drums and pumped to the vaporizer prior to combustion as fuel in the combustion gas turbine. The propane system will consist of the following major components:

Item No.	Description
D1205	Propane Storage Drum
D1206	Propane Storage Drum
P1216A/B	Vaporizer Feed Pumps
E1202	Vaporizer

5.3.4 Waste Water Treatment (Area 1000)

Wastewater from the demineralization system and the blowdown from cells 1 and 2 of the cooling tower will be sent to the wastewater treatment system.

This system will soften and clarify these wastes and forward the treated water to the cooling tower cell 3 as make-up.

The sludge generated in the clarifier will be thickened and dewatered. The supernatant (surface) water from these processes is recycled within the waste treatment system.

Blowdown from cell 3 of the cooling tower will be discharged to an evaporation pond.

The pond will be double lined, and the system will be designed to meet the requirements of the Nevada Division of Environmental Protection (NDEP). The pond surface area (approx. 4 acres) is minimized by the use of eleven (11) floating water spray units, SX1001A-K. These will be located across the pond surface, each equipped with its own electric drive system. Water will be pumped up through each unit and sprayed across the pond surface improving the evaporation rate. The wastewater will not pose any adverse effect on wildlife such as migrating water fowl. Monofilament line with 25' spacing, which is unobtrusive to the human observer, has been used by SPPCo to successfully discourage migrating water fowl from landing in several of SPPCo's facilities.

The system will consist of the following items:

Item No.	Description
CL1001	Reactor Clarifier
CL1002	Thickener
D1001	Caustic Drum
F1001	Plate Filter Press
FR1001	Soda Ash Feeder
P1001A/B	Dirty Waste Water Pumps
P1002A/B	Clean Waste Water Pumps
P1003A/B	Clarifier Effluent Pumps
P1004A/B	Clarifier Blowdown Pumps
P1005A/B	Sludge Sump Pumps
P1006A/B	Thickener Sludge Pumps
P1007A/B	Caustic Pumps
P1008A/B	Soda Ash Pumps
P1009A/B	Magnesium Chloride Pumps
SX1000A-K	Spray Modules
TK1001	Clarifier Effluent Aging Tank
TK1002	Magnesium Chloride Tank
TK1003	Soda Ash Tank

5.4 Electrical Distribution

The existing Tracy sub-station is supplied at 120 KV by SPPCo. Connection to this system will be through tie and service breakers feeding unit transformers connected to the gas and steam turbrbine generators. The generators will be rated at 13.8 KV with maximum generator output equal to elevated temperature and/or auxiliary cooling transformer rating as required. The auxiliary power will be fed from each generator transformer servicing large motors 250 hp and over at 4.16 KV and 480 V for general distribution. The 4.16 KV and 480 V will be distributed radially. A second feeder from an existing 4.16KV transformer will permit alternate service in the event of maintenance turnarounds or equipment outages. However, this transformer will not be able to carry the coal gasification process in addition to the generator auxiliaries.

Metering will be on the 120 KV system for assessment. Additional metering will be furnished for gasifier, steam plant, material handling and auxiliary services. Protection will be arranged as required to coordinate with the SPPCo system and internal users.

Auxiliary systems within the plant will be serviced by Uninterruptible Power Supply (UPS) or batteries to support personnel safety and critical equipment during shutdowns or power outages.

5.5 Instrumentation

5.5.1 Digital Control System (DCS)

Plant process and supervisory control shall be performed with a DCS "Process Manager" type redundant processor located in the main control building. DCS Input/Output (I/O) cabinetry will be mounted close to the entry point of the field wiring into the control room. The cabinetry will contain the I/O terminals, I/O processing equipment, the controller files for the DCS, and all interconnecting vendor prefabricated cables. Redundant DCS network cables interconnecting the equipment mounted in the I/O cabinetry and the DCS operator's consoles will be vendor prefabricated "coax" cables. Gasifier island signals will be interfaced with the DCS operators console via a remote I/O unit located in the Gasifier Remote Instrument Enclosure (RIE) (see Section 3.5.5). The DCS will comprise equipment, hardware, and software of one single manufacturer, and be "equal" in functionality, quality, and proven operability, to the TDC-3000 LCN, UCN, and Process Manager product line as manufactured by Honeywell, Inc., Phoenix Arizona.

5.5.2 Continuous Emission Monitoring System (CEMS)

Two (2) CEMS shall be provided for monitoring of SO_2, NOx, O_2, opacity and flow. The systems shall be housed in an enclosure with Heating, Ventilation, Air Conditioning (HVAC) and sampling systems. A Data Acquisition System (DAS) shall be provided with the PC located in an analyzer house. The systems shall be certified by the system vendor's subcontractor to be in compliance with all federal and state requirements.

5.5.3 Water Analysis

A panel shall be provided with analyzers to analyze/monitor the following water constituents:

a. Dissolved Oxygen (DO) - qty (2)
b. Oxygen Scavenger - qty (1)
c. Sodium - qty (2)
d. Ammonia - qty (2)
e. pH - qty (4)
f. Silicates (S_1O_2) - qty (2)
g. Conductivity - qty (4)
h. Hydrogen - qty (1)

The above analyzers shall be mounted in a "dry" section of the panel. A "wet" section shall be provided for the sample conditioning systems, sink, etc.

5.6 Fire Protection System

Current plant fire protection for the steam plant area will be, as a minimum, per NFPA 850, "Fire Protection for Electric Generating Plants".

Fire water supply shall be from the existing plant underground loop system. 10" dia. undergroung (U/G) piping from the existing plant loop system shall be extended throughout for service to new equipment areas including the gasifier island.

Sprinkler systems (dry pipe or deluge) shall be provided as required for the following areas:

- steam turbine generator/utility building
- administration building
- maintenance building
- yard piping including fire hydrants, hose stations and post indicator valves (P.I.V.'s)
- propane system
- coal handling and storage systems

A CO_2 System shall be provided for the control room expansion.

5.7 Buildings

The steam turbine generator along with its auxiliary components (surface condenser, condensate pumps, boiler feed water pumps, boiler feed water heaters, water treating facilities, compressor and deaerator) will be housed in one building. The gasifier will be supported in a steel structure but will not be enclosed. The gas turbine generator set and ancillary subsystems will have their own, vendor-provided enclosures.

Two pre-engineered buildings will be constructed to provide new maintenance/machine shop facilities and administration offices. A car port of 40' x 120' will be built near the office and maintenance buildings.

The administration building will include the following:

- Reception Area
- Manager's Office and nine other single offices
- Lunch Room - 6-8 people seating
- Conference Room - 14 people
- Toilet Facilities for men and women and janitorial closet
- Locker and Shower Facility - 12 men and 8 women
- Utility Room

- Files/Prints/Storage Room
- Visitor Center - 30 people
- HVAC Facility for entire office building

Above will be a pre-engineered 50' x 100' building with finish appearance of office building, gypsum board partition walls and acoustical tile ceiling.

The maintenance building will include the following:

- Maintenance Supervisor's Office
- Tool Storage
- Welding Area/Lathe Benches
- Laydown Area
- Machinist's Work Area/Repair Shop
- Lunch Room - 10 people seating
- Toilet Facilities for men and women and janitorial closet
- Locker and Shower Facility - 24 men and 6 women

Above will be a pre-engineered 50' x 100' x 14' high building with insulated siding provided with louvers and exhaust fans (roof), roll-up door 10' wide x 12' high at each end, and 2 ton monorail.

All other equipment will be located outside without enclosures. Outside, small rotating equipment items will be provided as totally enclosed fan cooled or with equivalent protection.

The existing Unit 3 control room will be expanded to accommodate the Piñon Pine Project needs. Heated enclosures and/or heat tracing shall be provided for steam drum level controls, and any other system where freezing conditions may cause service interruptions.

5.8 Access Roads/Storm Water Treatment

5.8.1 Drainage and Erosion Control

Storm water control will be based on zero discharge. A number of small retention basins will be created during the initial stage of construction. All storm water during construction as well as during normal plant operation will be drained to the nearest basin.

Since the plant site receives very little precipitation, all of it will ultimately evaporate or be absorbed in the ground, and there will be no run-off.

5.8.2 Area Surfacing and Roads

Roads around combined-cycle area will be asphalt paved. Roads in material handling and out laying areas will be gravel or crushed stone finish. Also, all areas around major equipment foundations, cooling tower, stack and electrical substations will be gravel finish.

Heavy embankments or deep cuts along the railroad spur and other places will receive riprap to protect the soil from erosion.

6.0 ESTIMATED PLANT PERFORMANCE

The following table shows the approximate plant performance at the plant average ambient condition of 50°F, 20% RH.

PIÑON PINE POWER PROJECT ESTIMATED PLANT PERFORMANCE	
IGCC Item & Units*	**Quantity**
Coal Feed (TPD)*	880.6
Gas Turbine Power (MWe)	60.99
Steam Turbine Power (MWe)	46.23
Gross Power (MWe)	107.22
Auxiliary Power (MWe)	7.51
Net Power (MWe)	99.71
Net Heat Rate (Btu(LHV)/kWh)	8096
Net Heat Rate (Btu(HHV)/kWh)	8390
Thermal Efficiency (LHV) %	42.1
Thermal Efficiency (HHV) %	40.6

*Refer to Glossary

7.0 APPENDICES

7.1 Equipment List - Revision 9 dated 9/29/94

7.2 Process Flow Diagrams (PFD's)

Drawing No.	Description	Rev.
4141-2-50-112	Oxidant Compression and Supply Coal Gasification	5
4141-2-50-113	Coal Gasification	5
4141-2-50-114	Gas Stream Heat Recovery, Gas Stream Particulate Removal and Recycle Gas Compression	5
4141-2-50-116	Gas Stream Particulate Removal	5
4141-2-50-117	Desulfurization and Waste Solids Treatment	5
4141-2-50-118	Transport Desulfurization	1
MWK J-7514	Gasifier Island Heat and Material Balance - Base Case	3
4142-2-50-200	BFW/Steam/Condensate-Heat and Material Balance	D
4142-2-50-201	BFW/Steam/Condensate-Heat and Material Balance	D
4142-2-50-210	Gas Turbine Generator	C
4142-2-50-211	Heat Recovery Steam Generator	D
4142-2-50-212	Steam Turbine Generator	D
4142-2-50-213	Deaerator Heater & Blowdown Drums	D
4143-2-50-310	Solids Receiving, Storing & Crushing	H
4143-2-50-311	Wastewater Treatment	C
4143-2-50-312	Solid Waste Handling System	D
4143-2-50-313	Boiler Feedwater Treatment	C
4143-2-50-314	Cooling Water System	C
4143-2-50-315	River & Raw Water Systems	C
4143-2-50-316	Boiler Water Treatment	C
4143-2-50-317	Instrument & Plant Air System	C
4143-2-50-318	Flare System	C
4143-2-50-319	Propane System	C

7.3 Plot Plans

Drawing No.	Description	Rev.
61-D1	Gasifier Island - Overall	3
61-D2	Gasifier Island - Plan at Grade	3
61-D3	Gasifier Island - Plan at El. 97'-0" to El. 117'-0"	3
61-D4	Gaisifer Island - Plan at El. 117-0" to El. 137'-0"	3
61-D5	Gasifier Island - Plan at El. 137'-0" to El. 177'-0"	3
61-D6	Gasifier Island - Plan at El. 177'-0" and Above	3
61-D7	Gasifier Island - Plan South Elevation	3
61-D8	Gasifier Island - Plan Isometric View	3
61-D9	Gasifier Island - Plan West Elevation	3
4142-1-51-100	Site Key Plot Plan	D
4142-1-51-101	Key Plot Plan - Gasification Island, Combined-Cycle Power Island & Offsites	D
4142-1-51-102	Key Plot Plan - Offsites	D
4142-1-51-1	Steam Turbine at Grade	C
4142-1-51-2	Steam Turbine at Upper Level	C
4142-1-51-3	Gas Turbine	C
4142-1-51-4	HRSG at Grade	C
4142-1-51-5	HRSG at Upper Level	C
4142-1-51-6	Section 800 / 1200	C
4143-1-51-1	Section 100 and 1100 at Grade	C
4143-1-51-2	Section 100 and 1100 at Upper Level	C
4143-1-51-3	Coal Storage Dome	C
4143-1-51-4	Flare Stack	C
4143-1-51-5	Gasification Area (Rack only)	C
4143-1-51-6	Switchyard	C
4143-1-51-7	Transfer Sump	C
4143-1-51-8	Nitrogen Facility	C
4143-1-51-9	Cooling Tower	C
4143-1-51-10	Unloading Station	C

7.4 Heat and Material Balances

EQUIPMENT LIST

CONTRACT: 15–4140
CLIENT: SIERRA PACIFIC POWER COMPANY
LOCATION: RENO, NEVADA – TRACY STATION

SECTION 100 – SOLIDS RECEIVING, STORING AND CRUSHING
4143

REV.	ORIG.	7	8	9	4	5	6
DATE	12/3/92	8/31/94	9/7/94	9/29/94	2/25/94	6/22/94	7/26/94

CLASS	ITEM NO.	DESCRIPTION	EFD	REQ. NO.	P.O. NO	REMARKS	REV.
FANS							
	B103	DELETED					
	B104	GASIFIER FEED DUST COLLECTION FAN	326	1356A			
	B104B	DELETED					
	B105	COAL RECEIVING EXHAUST FAN	325	1356A			
	B106	RAW COAL STORAGE EXHAUST FAN	326	1356A			
	B106B	DELETED					
	B107	DELETED					
	B108	DELETED					
	B109	DELETED					
	B110A	LIMESTONE TRANSPORT BLOWER	324				
	B110B	SPARE FOR B110A	324				
	B111	CRUSHING STATION DUST FILTER FAN	325	1356A			
	B112	COAL SILO FAN	324	1356A			
BINS							
	BN101A	RAW COAL RECEIVING HOPPER	321	1361A			
	BN101B	RAW COAL RECEIVING HOPPER	321	1361A			
	BN101C	DELETED					
	BN101D	DELETED					
	BN102	DELETED					
	BN104A	DELETED					
	BN104B	DELETED					
	BN105	COAL SILO	324	2345A			
	BN106	COKE SILO	324	2345A			
	BN107	LIMESTONE SILO	324	2345A			
	BN108	EMERGENCY RECLAIM HOPPER	322	1361A			
	BN109	EMERGENCY SURGE HOPPER	323	1361A			
BIN VIBRATORS							
	BV101A/B/C/D	DELETED					
	BV101E/F/G/H	DELETED					
	BV102	COAL SILO BIN DISCHARGER	324	1349A			
	BV103	COKE BIN DISCHARGER	324	1349A			
	BV104	LIMESTONE BIN DISCHARGER	324	1349A			
	BV105A	DELETED					
	BV105B	DELETED					
CONVEYORS	CR101	DELETED					
	CR102	RAW COAL TRANSFER CONVEYOR	321	1361A			
	CR103	DELETED					

EQUIPMENT LIST

CONTRACT: 15-4140
CLIENT: SIERRA PACIFIC POWER COMPANY
LOCATION: RENO, NEVADA – TRACY STATION

SECTION 100 – SOLIDS RECEIVING, STORING AND CRUSHING
4143

REV.	ORIG.	7	8	9	4	5	6
DATE	12/3/92	8/31/94	9/7/94	9/29/94	2/25/94	6/22/94	7/26/94

CLASS	ITEM NO.	DESCRIPTION	EFD	REQ. NO.	P.O. NO.	REMARKS	REV.
CONVEYORS CONT'D	CR104	DELETED					
	CR105	RAW COAL COLLECTING CONVEYOR	322	1361A			
	CR106	DELETED					
	CR107	DELETED					
	CR108	DELETED					
	CR109A	DELETED					
	CR109B	DELETED					
	CR110	GASIFIER FEED ELEVATING CONVEYOR	324	1361A			
	CR110B	DELETED					
	CR111	FILTER DISCHARGE CONVEYOR	325	1356A			
	CR112	DELETED					
	CR113	DELETED					
	CR114	OVERSIZE COAL ELEVATOR	323	1363A			
	CR115	SIZED COAL CONVEYOR	323	1361A			
	CR116	SAMPLE REJECT BUCKET ELEVATOR	321	1343A		PART OF PG103	
	CR117	EMERGENCY BY-PASS CONVEYOR	323	1361A			
	CR118	STACKING CONVEYOR	322	1369A		PART OF PG102	
DIVERTERS	DV101	DELETED					
	DV102	DELETED					
	DV103	DELETED					
	DV104	DELETED					
	DV105	COAL BY-PASS DIVERTER	323	1361A			
	DV106	COAL DUST BY-PASS DIVERTER	326	1356A			
DRUMS	D101	DELETED					
	D102A	DELETED					
	D102B	DELETED					
	D103	DELETED					
	D104	LIMESTONE TRANSPORTER					
FILTERS	F101	DELETED					
	F102	COAL SILO DUST FILTER	324	1356A			
	F103	COKE SILO EXHAUST FILTER	324	1356A			
	F104	LIMESTONE SILO EXHAUST FILTER	324	1356A			
	F105	GASIFIER FEED DUST FILTER	326	1356A			
	F105B	DELETED					
	F106	COAL RECEIVING DUST FILTER	325	1356A			
	F107	RAW COAL STORAGE DUST FILTER	326	1356A			

EQUIPMENT LIST

CONTRACT: 15-4140
CLIENT: SIERRA PACIFIC POWER COMPANY
LOCATION: RENO, NEVADA – TRACY STATION

SECTION 100 – SOLIDS RECEIVING, STORING AND CRUSHING
4143

REV.	ORIG.	7	8	9	4	5	6
DATE	12/3/92	8/31/94	9/7/94	9/29/94	2/25/94	6/22/94	7/26/94

CLASS	ITEM NO.	DESCRIPTION	EFD	REQ. NO.	P.O. NO	REMARKS
FILTERS CONT'D						
	F108	DELETED				
	F109	CRUSHING STATION DUST FILTER	325	1356A		
FEEDERS						
	FD101A	RAW COAL RECEIVING FEEDER	321	1361A		
	FD101B	RAW COAL RECEIVING FEEDER	321	1361A		
	FD101C	DELETED				
	FD101D	DELETED				
	FD102A/B/C/D	DELETED				
	FD102E/F/G/H	DELETED				
	FD103	DELETED				
	FD104	DELETED				
	FD105	DELETED				
	FD106	COAL SILO DISCHARGE FEEDER	324	1342A		
	FD106B	DELETED				
	FD107	COKE SILO DISCHARGE FEEDER	324	1342A		
	FD108	LIMESTONE SILO DISCHARGE FEEDER	324	1342A		
	FD108B	DELETED				
	FD109	DUST FILTER FEEDER	326	1356A		
	FD111	RECEIVING FILTER AIRLOCK FEEDER	325	1356A		
	FD112	RAW COAL STORAGE DUST FILTER FEEDER	326	1356A		
	FD113	DELETED	324			
	FD113B	DELETED				
	FD114A	COAL PILE DISCHARGE FEEDER	322	1361B		
	FD114B	COAL PILE DISCHARGE FEEDER	322	1361B		
	FD114C	DELETED				
	FD115	CRUSHING STATION DUST FILTER FEEDER	325	1356A		
	FD116	PRIMARY SAMPLE FEEDER	321	1343A		PART OF PG103
	FD117	OVERSIZE COAL FEEDER	323			
	FD118	SECONDARY SAMPLE FEEDER	321	1343A		PART OF PG103
HEATERS	H101	DELETED				
MISC.	X100	COAL STORAGE DOME	322	2499A		
PACKAGES	PG101	DELETED				
	PG102	STACKER – RECLAIMER PACKAGE	322	1369A		
	PG103	RAW COAL SAMPLING PACKAGE	321			

EQUIPMENT LIST

CONTRACT: 15-4140
CLIENT: SIERRA PACIFIC POWER COMPANY
LOCATION: RENO, NEVADA - TRACY STATION

SECTION 100 - SOLIDS RECEIVING, STORING AND CRUSHING
4143

REV.	ORIG.	7	8	9	4	5	6
DATE	12/3/92	8/31/94	9/7/94	9/29/94	2/25/94	6/22/94	7/26/94

CLASS	ITEM NO.	DESCRIPTION	EFD	REQ. NO.	P.O. NO.	REMARKS	REV.
PUMPS							
	P101A	UNLOADING STATION SUMP PUMP	321				
	P101B	SPARE FOR P101A	321				
	P102	DELETED					
	P103A	RECLAIM TUNNEL SUMP PUMP	322				
	P103B	SPARE FOR P103A	322				
RECLAIMERS							
	RL101	COAL PILE RECLAIMER	322	1369A		PART OF PG102	
SEPARATORS							
	S101	DELETED					
SIZING EQUIPMENT	SE101	RAW COAL MAGNETIC SEPARATOR	322	1359A			
	SE102	GASIFIER FEED MAGNETIC SEPARATOR	324	1359A			
	SE102B	DELETED					
	SE103	DELETED					
	SE104	COAL SCREEN	323	1355A			
SIZE REDUCTION	SR101	DELETED					
	SR102	COAL CRUSHER	323	1351B			
	SR103	PRIMARY SAMPLE CRUSHER	321	1343A			
SAMPLING	SS101	DELETED					
	SS102	DELETED					
	SS103	PRIMARY SAMPLER	321	1343A		PART OF PG103	
	SS104	SECONDARY SAMPLER	321	1343A		PART OF PG103	
SCALES							
	WS101	RAW COAL RECEIVING SCALE		1343A			
	WS102	TRUCK SCALE		1366A			

EQUIPMENT LIST

CONTRACT: 15-4140
CLIENT: SIERRA PACIFIC POWER COMPANY
LOCATION: RENO, NEVADA – TRACY STATION

SECTION 200 – OXIDANT COMPRESSION AND SUPPLY

REV.	ORIG.	7	8	9	4	5	6
DATE	12/3/92	8/31/94	9/7/94	9/29/94	2/25/94	6/22/94	7/26/94

CLASS	ITEM NO.	DESCRIPTION	EFD	REQ. NO.	P.O. NO.	REMARKS	REV.
COMPRESSORS							
	C201	BOOST AIR COMPRESSOR					
	C201B	DELETED					
DRUMS							
	D201	KNOCK–OUT DRUM					
EXCHANGERS							
	E201	AIR RECUPERATOR					
	E202	TRIM COOLER					
	E203S1	AIR PRECOOLER					
	E203S2	AIR PRECOOLER					
	E204	TRANSPORT AIR COOLER					
	E205S1	LUBE OIL COOLER				PART OF C-201	
	E205S2	LUBE OIL COOLER				PART OF C-201	
PUMPS							
	P201	MAIN LUBE OIL PUMP				PART OF C-201	
	P202	AUX. LUBE OIL PUMP				PART OF C-201	

EQUIPMENT LIST

CONTRACT: 15-4140
CLIENT: SIERRA PACIFIC POWER COMPANY
LOCATION: RENO, NEVADA – TRACY STATION

SECTION 300 – COAL GAS., SOLIDS PRESS., FEEDING & ASH REMOVAL

REV.	ORIG.	7	8	9	4	5	6
DATE	12/3/92	8/31/94	9/7/94	9/29/94	2/25/94	6/22/94	7/26/94

CLASS	ITEM NO.	DESCRIPTION	EFD	REQ. NO.	P.O. NO	REMARKS	REV.
BINS							
	BN301	FEED SURGE BIN					
	BN302	FEED PRESSURIZATION HOPPER					
	BN303	FEED HOPPER					
COMPRESSORS							
	C301	PRESSURIZATION AIR COMPRESSOR					
	C301B	DELETED					
DRUMS							
	D301	PRESSURIZATION AIR RECEIVER					
	D302	AFTERCOOLER MOISTURE SEP.				PART OF C-301	
FILTERS							
	F301	FEED HOPPER VENT FILTER					
	F302	FEED SURGE BIN VENT FILTER					
FEEDERS							
	FD301	COAL FEEDER					
	FD302	ASH FEEDER					
HEATERS							
	H301	GASIFIER AND SULFATOR START-UP HEATER					
MISC.	EL301	PERSONNEL ELEVATOR					
	FT301	GASIFIER FEED TUBE				INSTALLED IN R301	
REACTORS	R301	GASIFIER					
SEPARATORS	S301	GASIFIER CYCLONE					
EXCHANGERS	E301	AFTERCOOLER				PART OF C301	
PACKAGE	PG301	COAL/LIMESTONE FEED PACKAGE					

EQUIPMENT LIST

CONTRACT: 15-4140
CLIENT: SIERRA PACIFIC POWER COMPANY
LOCATION: RENO, NEVADA – TRACY STATION

SECTION 400 – GAS STREAM HEAT RECOVERY

REV.	ORIG.	7	8	9	4	5	6
DATE	12/3/92	8/31/94	9/7/94	9/29/94	2/25/94	6/22/94	7/26/94

CLASS	ITEM NO.	DESCRIPTION	EFD	REQ. NO.	P.O. NO.	REMARKS	REV.
EXCHANGERS							
	E401	PRODUCT GAS COOLER					
	E402S1	RECYCLE GAS COOLER				IN SERIES WITH E402S2	
	E402S2	RECYCLE GAS COOLER				IN SERIES WITH E402S1	
	E403	PRODUCT GAS TRIM COOLER					
STEAM GENERATORS	SG401	GASIFIER STEAM DRUM				1075 psia	
SEPARATORS							
	S401	DESULFURIZER FEED CYCLONE					9

EQUIPMENT LIST

CONTRACT: 15–4140
CLIENT: SIERRA PACIFIC POWER COMPANY
LOCATION: RENO, NEVADA – TRACY STATION

SECTION 500 – GAS STREAM PARTICULATE REMOVAL

REV.	ORIG.	7	8	9	4	5	6
DATE	12/3/92	8/31/94	9/7/94	9/29/94	2/25/94	6/22/94	7/26/94

CLASS	ITEM NO.	DESCRIPTION	EFD	REQ. NO.	P.O. NO	REMARKS	REV.
BINS							
	BN501	ASH COLLECTION HOPPER				PART OF PG502	
	BN502	ASH DEPRESSURIZATION HOPPER				PART OF PG502	
	BN503	FILTER FINES COLLECTION HOPPER				PART OF PG503	
	BN504	FILTER FINES DEPRESS. HOPPER				PART OF PG503	
	BN505	LIMESTONE FEED HOPPER					
	BN507	FILTER FINES FEED HOPPER				PART OF PG503	
	BN508	ASH FEED HOPPER				PART OF PG502	
	BN512	DELETED					
	BN513	DELETED					
DRUMS	D501	HEAT TRANS. FLUID SURGE DRUM				PART OF PG501	
EXCHANGERS							
	E501	FILTER FINES SCREW COOLER					
	E502	HEAT TRANS. FLUID COOLER				PART OF PG501	
FILTERS							
	F501	HOT GAS FILTER					
	F502	ASH VENT FILTER				PART OF PG502	
	F503	FILTER FINES VENT FILTER				PART OF PG503	
	F504	LIMESTONE FEED HOPPER VENT FILTER					
	F505	ASH COLLECTION HOPPER VENT FILTER					9
PACKAGES							
	PG501	FINES HEAT TRANSFER FLUID SYSTEM					
	PG502	ASH COLLECTION SYSTEM PACKAGE					
	PG503	FILTER FINES COLLECTION SYSTEM PKG.					
SEPARATORS							
	S501	DELETED					
PUMPS							
	P501A	HEAT TRANS. FLUID CIRC. PUMP				PART OF PG501	
	P501B	SPACE FOR P501A				PART OF PG501	

EQUIPMENT LIST

CONTRACT:	15-4140		SECTION 600 – DESULFURIZATION									
CLIENT:	SIERRA PACIFIC POWER COMPANY		REV.	ORIG.	7	8	9	4	5	6		
LOCATION:	RENO, NEVADA – TRACY STATION		DATE	12/3/92	8/31/94	9/7/94	9/29/94	2/25/94	6/22/94	7/26/94		

CLASS	ITEM NO.	DESCRIPTION	EFD	REQ. NO.	P.O. NO	REMARKS	REV.
FANS	B601A	DELETED					
	B601B	DELETED					
BINS	BN601	SULFATOR SOLIDS COLLECTION HOPPER					
	BN602	DELETED					
	BN603	SORBENT STORAGE HOPPER					
	BN604	SORBENT FEED HOPPER					
	BN605	SPENT SORBENT HOPPER					
COMPRESSORS							
	C601	SULFATOR AIR COMPRESSOR					
	C602	FINES COMBUSTOR AIR COMPRESSOR					9
DRUMS							
	D601	DELETED					
	D602	HRSG STEAM DRUM				PART OF SG602	
	D603	DELETED					
EXCHANGERS	E601	DELETED					
	E602	SULFATOR SOLIDS SCREW COOLER					
	E603	DELETED					
	E604	DELETED					
	E605	PRIMARY SOLIDS COOLER					
	E607	REGENERATOR EFFLUENT GAS COOLER					
	E610	LUBE OIL COOLER				PART OF C601	
FILTERS	F602	SULFATOR FLUE GAS BAG HOUSE FILTER					
	F603	DELETED					9
	F604	DELETED					9
	F605	SORBENT PRESSURIZATION HOPPER VENT FILTER					
	F606	DELETED					9
HEATERS	H601	DELETED					
	H602	FINES COMBUSTOR					
	H603	DELETED					
	H608	SORBENT REGENERATION AIR HEATER					9

EQUIPMENT LIST

CONTRACT: 15-4140
CLIENT: SIERRA PACIFIC POWER COMPANY
LOCATION: RENO, NEVADA – TRACY STATION

SECTION 600 – DESULFURIZATION

REV.	ORIG.	7	8	9	4	5	6
DATE	12/3/92	8/31/94	9/7/94	9/29/94	2/25/94	6/22/94	7/26/94

CLASS	ITEM NO.	DESCRIPTION	EFD	REQ. NO.	P.O. NO	REMARKS	REV.
REACTORS							
	R601A	DELETED					
	R601B	DELETED					
	R601C	DELETED					
	R602	SULFATOR					
	R603	TRANSPORT DESULFURIZER					
	R604	TRANSPORT REGENERATOR					
SEPARATORS							
	S601	SULFATOR CYCLONE					
	S602	DELETED					9
	S603	DESULFURIZER CYCLONE					
	S604	REGENERATOR CYCLONE					
PUMPS	P601	MAIN LUBE OIL PUMP				PART OF C601	
	P602	AUX. LUBE OIL PUMP				PART OF C601	
CONVEYORS	CR602	BAG HOUSE SCREW CONVEYOR				PART OF F602	
SIZING EQUIPMENT	SE601	DELETED					
STEAM GENERATORS	SG601	DELETED					
	SG602	HEAT RECOVERY STEAM GENERATOR					
SIZE REDUCTION							
	SR601	DELETED					

EQUIPMENT LIST

CONTRACT: 15-4140
CLIENT: SIERRA PACIFIC POWER COMPANY
LOCATION: RENO, NEVADA – TRACY STATION

SECTION 700 – GAS TURBINE/GENERATOR

REV.	ORIG.	7	8	9	4	5	6
DATE	12/3/92	8/31/94	9/7/94	9/29/94	2/25/94	6/22/94	&7/26/94

CLASS	ITEM NO.	DESCRIPTION	EFD	REQ. NO.	P.O. NO.	REMARKS	REV.
GAS TURBINES							
	GT701	GAS TURBINE GENERATOR	221				

EQUIPMENT LIST

CONTRACT: 15-4140
CLIENT: SIERRA PACIFIC POWER COMPANY
LOCATION: RENO, NEVADA – TRACY STATION

SECTION 800 — STEAM TURBINE/GENERATOR
4142

REV.	ORIG.	7	8	9	4	5	6
DATE	12/3/92	8/31/94	9/7/94	9/29/94	2/25/94	6/22/94	7/26/94

CLASS	ITEM NO.	DESCRIPTION	EFD	REQ. NO.	P.O. NO	REMARKS	REV.
DEAERATING HEATERS	DH801	DEAERATOR HEATER	226	1934A			
DESUPER- HEATERS	DS801	MAIN STEAM ATTEMPERATOR	222			PART OF SG801	
	DS802	MP STEAM DESUPERHEATER	227				
	DS803	PEGGING STEAM DESUPERHEATER					
DRUMS	D801	MAIN STEAM DRUM	222			PART OF SG801	
	D802	LOW PRESSURE STEAM DRUM	223			PART OF SG801	
	D803	CONTINUOUS BLOWDOWN DRUM	225				
	D804	INTERMITTENT BLOWDOWN DRUM	225				
	D805	DELETED					
EJECTORS	J801A	DELETED					
	J801B	DELETED					
	J802A	DELETED					
	J802B	DELETED					
	J803	DELETED					
EXCHANGERS	E801	SURFACE CONDENSER	228	1219A			
	E802	GLAND CONDENSER				PART OF TG801	
	E803	DELETED					
	E804	DELETED					
	E805	DELETED					
EXPANSION JOINTS	EJ801	EXPANSION JOINT	228			BETWEEN TG801 AND E801	
	EJ802	EXPANSION JOINT	222			PART OF SG801	
	EJ803	EXPANSION JOINT	224			PART OF SG801	
HOISTS	HM801	STEAM TURBINE GENERATOR CRANE		1368A			

EQUIPMENT LIST

CONTRACT:	15–4140		SECTION 800 – STEAM TURBINE/GENERATOR 4142				
CLIENT:	SIERRA PACIFIC POWER COMPANY		REV.	ORIG.	7	8 / 9 / 4 / 5 / 6	
LOCATION:	RENO, NEVADA – TRACY STATION		DATE	12/3/92	8/31/94	9/7/94 / 9/29/94 / 2/25/94 / 6/22/94 / 7/26/94	

CLASS	ITEM NO.	DESCRIPTION	EFD	REQ. NO.	P.O. NO.	REMARKS	REV.
PUMPS							
	P801A	HOTWELL CONDENSATE PUMP	228	1311B			
	P801B	SPARE FOR P801A	228	1311B			
	P802A	L.P. BOILER FEEDWATER PUMP	226	1311A			
	P802B	SPARE FOR P802A	226	1311A			
	P803A	H.P. BOILER FEEDWATER PUMP	226	1311C			
	P803B	SPARE FOR P803A	226	1311C			
	P804A	VACUUM PUMP	228			PART OF E801	
	P804B	SPARE FOR P804A	228			PART OF E801	
SAMPLE COOLERS	SC801	SAMPLE COOLER	222			@ D801 B.D.	
	SC802	SAMPLE COOLER	223			@ D802 B.D.	
	SC803	SAMPLE COOLER	226			@ DH801	
	SC804	SAMPLE COOLER	222				
	SC805	SAMPLE COOLER	223				
SILENCERS	SL801	DELETED					
STACKS	ST801	STACK	224	2926A			
STEAM GENERATORS	SG801	HEAT RECOVERY STEAM GENERATOR	222	1921A			
STEAM TURBINES	TG801	STEAM TURBINE GENERATOR	227	1332B			

EQUIPMENT LIST

CONTRACT: 15-4140
CLIENT: SIERRA PACIFIC POWER COMPANY
LOCATION: RENO, NEVADA – TRACY STATION

SECTION 900 – RECYCLE GAS COMPRESSION

REV.	ORIG.	7	8	9	4	5	6
DATE	12/3/92	8/31/94	9/7/94	9/29/94	2/25/94	6/22/94	7/26/94

CLASS	ITEM NO.	DESCRIPTION	EFD	REQ. NO.	P.O. NO.	REMARKS	REV.
COMPRESSORS							
	C901	RECYCLE GAS COMPRESSOR					
	C901B	DELETED					
	C902	RECYCLE GAS BOOSTER COMPRESSOR					
	C902B	DELETED					
DRUMS							
	D901	RECYCLE GAS RECEIVER					
	D902	RECYCLE GAS BOOSTER COMP. K. O. DRUM					
EXCHANGERS							
	E901	RECYCLE GAS BOOSTER COMPRESSOR TRIM COOLER					

EQUIPMENT LIST

F:
CONTRACT: 15-4140
CLIENT: SIERRA PACIFIC POWER COMPANY
LOCATION: RENO, NEVADA – TRACY STATION

SECTION 1000 – WASTE WATER TREATMENT
4143

REV.	ORIG.	7	8	9	4	5	6
DATE	12/3/92	8/31/94	9/7/94	9/29/94	2/25/94	6/22/94	7/26/94

CLASS	ITEM NO.	DESCRIPTION	EFD	REQ. NO.	P.O. NO	REMARKS	REV.
BASINS	X1000	DELETED					
PACKAGES	PG1001	TOWER BLOWDOWN TREATMENT PACKAGE					
MISC.	SX1000A to K	SPRAY MODULES				FOR WASTEWATER POND	
PUMPS	P1001A	DIRTY WASTEWATER PUMPS	339				
	P1001B	SPARE FOR P1001A	339				
	P1002A	CLEAN WASTEWATER PUMP	339				
	P1002B	SPARE FOR P1002A	339				
	P1003A	CLARIFIER EFFLUENT PUMP				PART OF PG1001	
	P1003B	SPARE FOR P1003A				PART OF PG1001	
	P1004A	CLARIFIER BLOWDOWN PUMP				PART OF PG1001	
	P1004B	SPARE FOR P1004A				PART OF PG1001	
	P1005A	SLUDGE SUMP PUMP				PART OF PG1001	
	P1005B	SPARE FOR P1005A				PART OF PG1001	
	P1006A	THICKENER SLUDGE PUMP				PART OF PG1001	
	P1006B	SPARE FOR P1006A				PART OF PG1001	
	P1007A	CAUSTIC PUMP				PART OF PG1001	
	P1007B	SPARE FOR P1007A				PART OF PG1001	
	P1008A	SODA ASH PUMP				PART OF PG1001	
	P1008B	SPARE FOR P1008A				PART OF PG1001	
	P1009A	MAGNESIUM CHLORIDE PUMP				PART OF PG1001	
	P1009B	SPARE FOR P1009A				PART OF PG1001	
CLARIFIERS	CL1001	REACTOR CLARIFIER				PART OF PG1001	
	CL1002	THICKENER				PART OF PG1001	
FILTERS	F1001	PLATE FILTER PRESS				PART OF PG1001	
FEEDER	FR1001	SODA ASH FEEDER				PART OF PG1001	
DRUMS	D1001	CAUSTIC TANK				PART OF PG1001	
TANKS	TK1001	CLARIFIER EFFLUENT AGING TANK				PART OF PG1001	
	TK1002	MAGNESIUM CHLORIDE TANK				PART OF PG1001	
	TK1003	SODA ASH TANK				PART OF PG1001	

EQUIPMENT LIST

CONTRACT: 15-4140
CLIENT: SIERRA PACIFIC POWER COMPANY
LOCATION: RENO, NEVADA – TRACY STATION

SECTION 1100 – SOLID WASTE DISPOSAL
4143

REV.	ORIG.	7	8	9	4	5	6
DATE	12/3/92	8/31/94	9/7/94	9/29/94	2/25/94	6/22/94	7/26/94

CLASS	ITEM NO.	DESCRIPTION	EFD	REQ. NO.	P.O. NO.	REMARKS	REV.
FANS							
	B1101	DELETED					
	B1102	LOAD-OUT EXHAUST FAN	327	1347A		PART OF PG1101	
	B1103A	PNEUMATIC TRANSPORT BLOWER	327				
	B1103B	SPARE FOR B1103A	327				
BINS	BN1101	SOLID WASTE SILO	327	2345A			
BIN VIBRATORS	BV1101	SOLID WASTE DISCHARGER	327	1349A			
CHUTES	CH1101	SOLID WASTE LOADING CHUTE	327	1347A		PART OF PG1101	
CONVEYORS	CR1101	DELETED					
	CR1102	DELETED					
DRUMS	D1101	SOLID WASTE TRANSPORTER					
	D1102	ASH TRANSPORTER					
FILTERS	F1101	SILO VENT FILTER	327	1356A			
	F1102	LOAD-OUT FILTER	327	1347A		PART OF PG1101	
PACKAGES	PG1101	SOLID WASTE LOAD OUT PACKAGE	327				
	XV1101	CUT-OFF ROTARY VALVE		1347A		PART OF PG1101	9

EQUIPMENT LIST

CONTRACT: 15–4140
CLIENT: SIERRA PACIFIC POWER COMPANY
LOCATION: RENO, NEVADA -- TRACY STATION

SECTION 1200 – BALANCE OF PLANT
4143

REV.	ORIG.	7	8	9	4	5	6
DATE	12/3/92	8/31/94	9/7/94	9/29/94	2/25/94	6/22/94	7/26/94

CLASS	ITEM NO.	DESCRIPTION	EFD	REQ. NO.	P.O. NO	REMARKS	REV.
FANS							
	B1201	PROPANE VAPORIZER FORCED DRAFT FAN				PART OF PG1204	
	B1202A	DEGASIFIER BLOWER	337			PART OF PG1201	
	B1202B	SPARE FOR B1202A	337			PART OF PG1201	
COMPRESSORS	C1201A	INSTRUMENT & PLANT AIR COMPRESSOR	334	1326A			
	C1201B	SPARE FOR C1201A	334	1326A			
	C1202	PROPANE INSTRUMENT AIR COMPRESSOR				PART OF PG1204	
	C1203	NITROGEN PKG AIR COMPRESSOR	341			PART OF PG1205	
	C1204	NITROGEN LP BOOSTER COMPRESSOR	341			PART OF PG1205	
	C1205	NITROGEN HP BOOSTER COMPRESSOR	341			PART OF PG1205	
COOLING TOWERS	CT1201	COOLING TOWER (CELL 1 & 2)	332	2924A			
		COOLING TOWER (CELL 3)	333				
DRUMS	D1201	ACID STORAGE DRUM	338				
	D1202	CAUSTIC STORAGE DRUM	338				
	D1203A	CATION UNIT	337			PART OF PG1201	
	D1203B	CATION UNIT	337			PART OF PG1201	
	D1203C	DELETED					
	D1204A	ANION UNIT	336			PART OF PG1201	
	D1204B	ANION UNIT	336			PART OF PG1201	
	D1204C	DELETED					
	D1205	PROPANE STORAGE DRUM				PART OF PG1204	
	D1206	PROPANE STORAGE DRUM				PART OF PG1204	
	D1207	INSTRUMENT & PLANT AIR RECEIVER	334			PART OF C1201A/B	

EQUIPMENT LIST

CONTRACT: 15–4140
CLIENT: SIERRA PACIFIC POWER COMPANY
LOCATION: RENO, NEVADA – TRACY STATION

SECTION 1200 – BALANCE OF PLANT
4143

REV.	ORIG.	7	8	9	4	5	6
DATE	12/3/92	8/31/94	9/7/94	9/29/94	2/25/94	6/22/94	7/26/94

CLASS	ITEM NO.	DESCRIPTION	EFD	REQ. NO.	P.O. NO	REMARKS	REV.
DRUMS CONT'D							
	D1208	INHIBITOR DRUM	342				
	D1209	ACID DRUM	342				
	D1210	PROPANE INSTRUMENT AIR RECEIVER				PART OF PG1204	
	D1211A	MIXED BED UNIT	336			PART OF PG1201	
	D1211B	MIXED BED UNIT	336			PART OF PG1201	
DRYERS							
	DR1201A	INSTRUMENT & PLANT AIR DRYER	334			PART OF C1201A/B	
	DR1201B	SPARE FOR DR1201A	334			PART OF C1201A/B	
	DR1202	PROPANE INSTRUMENT AIR DRYER				PART OF PG1204	
EXCHANGERS							
	E1201	CAUSTIC WATER HEATER	338			PART OF PG1201	
	E1202	PROPANE VAPORIZER				PART OF PG1204	
	E1203A to G	LN2 VAPORIZER SKIDS				PART OF PG1205	
	E1204	DELETED					
	E1205	DELETED					9
FEEDERS	FD1201A	BIOCIDE FEEDER (CELL 1 & 2)	342			PART OF PG1202	
	FD1201B	BIOCIDE FEEDER (CELL 3)	342			PART OF PG1202	
FILTERS	F1201A	DELETED					
	F1201B	DELETED					
	F1201C	DELETED					
FLARES							
	FL1201	FLARE	340				
MIXERS							
	M1201	L.P. PHOSPHATE TANK MIXER	331			PART OF PG1203	
	M1202	DELETED					
PUMPS							
	P1201	COOLING TOWER MAKE-UP WATER PUMP	344				
	P1201B	DELETED					
	P1202A	RAW WATER PUMP	343				
	P1202B	SPARE FOR P1202A	343				

EQUIPMENT LIST

F

CONTRACT: 15–4140
CLIENT: SIERRA PACIFIC POWER COMPANY
LOCATION: RENO, NEVADA – TRACY STATION

SECTION 1200 – BALANCE OF PLANT
4143

REV.	ORIG.	7	8	9	4	5	6
DATE	12/3/92	8/31/94	9/7/94	9/29/94	2/25/94	6/22/94	7/26/94

CLASS	ITEM NO.	DESCRIPTION	EFD	REQ. NO.	P.O. NO	REMARKS	REV.
PUMPS CONT'D							
	P1203A	ACID REGENERATION PUMP	338			PART OF PG1201	
	P1203B	SPARE FOR P1203A AND P–1206	338			PART OF PG1201	
	P1204A	CAUSTIC REGENERATION PUMP	338			PART OF PG1201	
	P1204B	SPARE FOR P1204A AND P–1206	338			PART OF PG1201	
	P1205	ACID NEUTRALIZATION PUMP	338			PART OF PG1201	
	P1205B	DELETED					
	P1206	CAUSTIC NEUTRALIZATION PUMP	338			PART OF PG1201	
	P1206B	DELETED					
	P1207A	DELETED					
	P1207B	DELETED					
	P1208A	DEMINERALIZED WATER PUMP	335	1311B			
	P1208B	DEMINERALIZED WATER PUMP	335	1311B			
	P1208C	SPARE FOR P1208A/B		1311B			
	P1209A	CIRCULATING WATER PUMP	332	1311A			
	P1209B	CIRCULATING WATER PUMP	332	1311A			
	P1209C	SPARE FOR P1209A/B	332	1311A			
	P1210A	OXYGEN SCAVANGER PUMP	331			PART OF PG1203	
	P1210B	SPARE FOR P1210A	331			PART OF PG1203	
	P1211A	PHOSPHATE PUMP	331			PART OF PG1203	
	P1211B	PHOSPHATE PUMP	331			PART OF PG1203	
	P1211C	SPARE FOR P1211A/B/D/E	331			PART OF PG1203	
	P1211D	PHOSPHATE PUMP	331			PART OF PG1203	
	P1211E	PHOSPHATE PUMP	331				
	P1212A	DELETED					
	P1212B	DELETED					
	P1212C	DELETED					
	P1213A	AMINE PUMP	331			PART OF PG1203	
	P1213B	SPARE FOR P1213B	331			PART OF PG1203	

EQUIPMENT LIST

CONTRACT: 15-4140
CLIENT: SIERRA PACIFIC POWER COMPANY
LOCATION: RENO, NEVADA – TRACY STATION

SECTION 1200 – BALANCE OF PLANT
4143

REV.	ORIG.	7	8	9	4	5	6
DATE	12/3/92	8/31/94	9/7/94	9/29/94	2/25/94	6/22/94	7/26/94

CLASS	ITEM NO.	DESCRIPTION	EFD	REQ. NO.	P.O. NO	REMARKS	REV.
PUMPS CONT'D							
	P1214A & C	INHIBITOR PUMPS	342			PART OF PG1202	
	P1214B	SPARE FOR P1214A & C	342			PART OF PG1202	
	P1215A & C	ACID PUMPS	342			PART OF PG1202	
	P1215B	SPARE FOR P1215A & C	342			PART OF PG1202	
	P1216A	PROPANE VAPORIZER FEED PUMP				PART OF PG1204	
	P1216B	SPARE FOR P1216A				PART OF PG1204	
	P1217A	BOOSTER PUMP	337			PART OF PG1201	
	P1217B	SPARE FOR P1217A	337			PART OF PG1201	
	P1218	LN2 TRANSFER PUMP	341			PART OF PG1205	
	P1219A	CIRCULATING WATER BOOSTER PUMP	345				
	P1219B	SPARE FOR P1219A	345				
	P1220A	CIRCULATING WATER PUMP (CELL 3)	333				
	P1220B	SPARE FOR P1220A	333				

EQUIPMENT LIST

CONTRACT: 15-4140
CLIENT: SIERRA PACIFIC POWER COMPANY
LOCATION: RENO, NEVADA – TRACY STATION

SECTION 1200 – BALANCE OF PLANT
4143

REV.	ORIG.	7	8	9	4	5	6
DATE	12/3/92	8/31/94	9/7/94	9/29/94	2/25/94	6/22/94	7/26/94

CLASS	ITEM NO.	DESCRIPTION	EFD	REQ. NO.	P.O. NO	REMARKS	REV.
PACKAGES							
	PG1201	DEMINERALIZATION PACKAGE	336	1932A			
	PG1202	CIRCULATING WATER TREATMENT PACKAG	342				
	PG1203	BOILER WATER TREATMENT PACKAGE	331				
	PG1204	PROPANE PACKAGE					
	PG1205	NITROGEN PACKAGE	341				
	PG1206	COMPRESSED AIR PRETREATMENT SKID	341			PART OF PG1205	
SAMPLE COOLERS	SC1201	DELETED					
TANKS	TK1201A/B	DEMINERALIZED WATER TANKS	335				
	TK1202	NEUTRALIZATION TANK	335				
	TK1202B	DELETED					
	TK1203	PHOSPHATE TANK	331			PART OF PG1203	
	TK1205	HP LN2 STORAGE TANK	341			PART OF PG1205	
	TK1206	LP LN2 STORAGE TANK	341			PART OF PG1205	
TOWERS	T1201	DEGASIFIER	337			PART OF PG1201	
	T1202	NITROGEN PACKAGE COLD BOX	341			PART OF PG1205	

MISC.-1\EQUIPLST.WK1/lm