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

Topical Report

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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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Office of Fossil Energy
Morgantown Energy Technology Center
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December 1994

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 ₂ O	Water
H ₂ S	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 which 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 tons 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 the project 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

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 down-cut 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 (*Selmons, 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) statutes 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 mitigation 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 Organization (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:

<u>Item No.</u>	<u>Description</u>
D801	High Pressure Steam Drum

D802 Low Pressure Steam Drum
DS801 Main Steam Attenuator

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 pressure (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 deaerate returned condensate and demineralized water make-up.

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

<u>Item No.</u>	<u>Description</u>
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 which will occur in the gasifier are:

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:

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 exit 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 contain 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 discharged 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 it 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:

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 mix 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 undergo 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 E201 will 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:

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 SO₂-rich gas from regeneration will be cooled in the regenerator effluent cooler, E607, and then routed to the sulfator, R602, for SO₂ 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 SO₂ 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:

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 SO₂ 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 SO₂ 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 achieved 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:

<u>Item No.</u>	<u>Description</u>	<u>Duty</u>
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 $\frac{1}{4}$ " x 0 through the $\frac{1}{4}$ " 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 $\frac{1}{4}$ " x 0. This sized product will be recycled to the dual deck coal screen through flexible wall elevating conveyors. The $\frac{1}{4}$ " 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, 1/4" 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:

<u>Item No.</u>	<u>Description</u>	<u>Duty</u>
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 from Well 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:

<u>Item No.</u>	<u>Description</u>
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:

<u>Item No.</u>	<u>Description</u>
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:

<u>Item No.</u>	<u>Description</u>
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:

<u>Item No.</u>	<u>Description</u>
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:

<u>Item No.</u>	<u>Description</u>
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:

<u>Item No.</u>	<u>Description</u>
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 turbine 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 SO₂, NO_x, O₂, 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 (SiO₂) - 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. underground (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 CO₂ 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)

<u>Drawing No.</u>	<u>Description</u>	<u>Rev.</u>
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

<u>Drawing No.</u>	<u>Description</u>	<u>Rev.</u>
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	Gasifier 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

LL-1
TOPICALRPT/lm

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
EFD	REQ. NO.	P.O. NO.	REMARKS				REV.
326	1356A						
325	1356A						
326	1356A						
324							
324							
325	1356A						
324	1356A						
321	1361A						
321	1361A						
324	2345A						
324	2345A						
324	2345A						
322	1361A						
323	1361A						
324	1349A						
324	1349A						
324	1349A						
321	1361A						

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

EQUIPMENT LIST

CONTRACT: 15-4140 CLIENT: SIERRA PACIFIC POWER COMPANY LOCATION: RENO, NEVADA - TRACY STATION			SECTION 100 - SOLIDS RECEIVING, STORING AND CRUSHING 4143						
CLASS	ITEM NO.	DESCRIPTION	EFD	REQ. NO.	P.O. NO.	REV.			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						
CLASS	ITEM NO.	DESCRIPTION	EFD	REQ. NO.	P.O. NO.	REV.			
						ORIG.	7	8	9
						DATE	8/31/94	9/7/94	9/29/94
							2/25/94	6/22/94	7/26/94
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							
HEATERS	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	
	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.
<u>PUMPS</u>										
	P101A	UNLOADING STATION SUMP PUMP	321							
	P101B	SPARE FOR P101A	321							
	P102	DELETED								
	P103A	RECLAIM TUNNEL SUMP PUMP	322							
	P103B	SPARE FOR P103A	322							
<u>RECLAIMERS</u>										
	RL101	COAL PILE RECLAIMER	322	1369A		PART OF PG102				
<u>SEPARATORS</u>										
	S101	DELETED								
<u>SIZING EQUIPMENT</u>										
	SE101	RAW COAL MAGNETIC SEPARATOR	322	1359A						
	SE102	GASIFIER FEED MAGNETIC SEPARATOR	324	1359A						
	SE102B	DELETED								
	SE103	DELETED								
	SE104	COAL SCREEN	323	1355A						
<u>SIZE REDUCTION</u>	SR101	DELETED								
	SR102	COAL CRUSHER	323	1351B						
	SR103	PRIMARY SAMPLE CRUSHER	321	1343A						
<u>SAMPLING</u>	SS101	DELETED								
	SS102	DELETED								
	SS103	PRIMARY SAMPLER	321	1343A		PART OF PG103				
	SS104	SECONDARY SAMPLER	321	1343A		PART OF PG103				
<u>SCALES</u>										
	WS101	RAW COAL RECEIVING SCALE		1343A						
	WS102	TRUCK SCALE		1366A						

EQUIPMENT LIST

SECTION 200 - OXIDANT COMPRESSION AND SUPPLY									
CONTRACT: 15-4140		SIERRA PACIFIC POWER COMPANY							
CLIENT:		RENO, NEVADA - TRACY STATION							
LOCATION:									
CLASS	ITEM NO.	DESCRIPTION							
COMPRESSORS	C201	BOOST AIR COMPRESSOR							
	C201B	DELETED							
DRUMS	D201	KNOCK-OUT DRUM							
	E201	AIR RECUPERATOR							
EXCHANGERS	E202	TRIM COOLER							
	E203S1	AIR PRECOOLER							
	E203S2	AIR PRECOOLER							
	E204	TRANSPORT AIR COOLER							
	E205S1	LUBE OIL COOLER							
	E205S2	LUBE OIL COOLER							
PUMPS	P201	MAIN LUBE OIL PUMP							
	P202	AUX. LUBE OIL PUMP							
		PART OF C-201							
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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.
<u>BINS</u>										
	BN301	FEED SURGE BIN								
	BN302	FEED PRESSURIZATION HOPPER								
	BN303	FEED HOPPER								
<u>COMPRESSORS</u>										
	C301	PRESSURIZATION AIR COMPRESSOR								
	C301B	DELETED								
<u>DRUMS</u>										
	D301	PRESSURIZATION AIR RECEIVER								
	D302	AFTERCOOLER MOISTURE SEP.						PART OF C-301		
<u>FILTERS</u>										
	F301	FEED HOPPER VENT FILTER								
	F302	FEED SURGE BIN VENT FILTER								
<u>FEEDERS</u>										
	FD301	COAL FEEDER								
	FD302	ASH FEEDER								
<u>HEATERS</u>										
	H301	GASIFIER AND SULFATOR START-UP HEATER								
<u>MISC.</u>										
	EL301	PERSONNEL ELEVATOR								
	FT301	GASIFIER FEED TUBE						INSTALLED IN R301		
<u>REACTORS</u>										
	R301	GASIFIER								
<u>SEPARATORS</u>										
	S301	GASIFIER CYCLONE								
<u>EXCHANGERS</u>										
	E301	AFTERCOOLER						PART OF C301		
<u>PACKAGE</u>										
	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										
DRUMS	C601	SULFATOR AIR COMPRESSOR								
	C602	FINES COMBUSTOR AIR COMPRESSOR								9
	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								9
	H608	SORBENT REGENERATION AIR HEATER								

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								
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								

SECTION 700 - GAS TURBINE/GENERATOR									
REV.	DATE	ORIG.	7	8	9	4	5	6	
REV.	DATE	ORIG.	7	8	9	4	5	6	
CONTRACT: 15-4140 CLIENT: SIERRA PACIFIC POWER COMPANY LOCATION: RENO, NEVADA - TRACY STATION									
CLASS ITEM NO. DESCRIPTION GAS TURBINE GENERATOR 221									
P.O. NO. REQ. NO. EFD REMARKS REV.									

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 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.
<u>PUMPS</u>	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				
<u>SAMPLE COOLERS</u>	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							
<u>SILENCERS</u>	SL801	DELETED								
<u>STACKS</u>	ST801	STACK	224	2926A						
<u>STEAM GENERATORS</u>	SG801	HEAT RECOVERY STEAM GENERATOR	222	1921A						
<u>STEAM TURBINES</u>	TG801	STEAM TURBINE GENERATOR	227	1332B						

EQUIPMENT LIST

F:			SECTION 1000 — WASTE WATER TREATMENT								
CONTRACT: 15-4140			4143								
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.	
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			SECTION 1200 - BALANCE OF PLANT						
CLIENT: SIERRA PACIFIC POWER COMPANY			4143						
LOCATION: RENO, NEVADA - TRACY STATION			REV.	ORIG.	7	8	9	4	5
			DATE	12/3/92	8/31/94	9/7/94	9/29/94	2/25/94	6/22/94
CLASS	ITEM NO.	DESCRIPTION	EFD	REQ. NO.	P.O. NO.	REMARKS			REV.
<u>DRUMS</u> <u>CONT'D</u>	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			
<u>DRYERS</u>	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			
<u>EXCHANGERS</u>	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
<u>FEEDERS</u>	FD1201A	BIOCIDE FEEDER (CELL 1 & 2)	342			PART OF PG1202			
	FD1201B	BIOCIDE FEEDER (CELL 3)	342			PART OF PG1202			
<u>FILTERS</u>	F1201A	DELETED							
	F1201B	DELETED							
	F1201C	DELETED							
<u>FLARES</u>	FL1201	FLARE	340						
<u>MIXERS</u>	M1201	L.P. PHOSPHATE TANK MIXER	331			PART OF PG1203			
	M1202	DELETED							
<u>PUMPS</u>	P1201	COOLING TOWER MAKE-UP WATER PUMP	344						
	P1201B	DELETED							
	P1202A	RAW WATER PUMP	343						
	P1202B	SPARE FOR P1202A	343						

EQUIPMENT LIST

F			SECTION 1200 - BALANCE OF PLANT							
CONTRACT: 15-4140			4143							
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 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			PART OF PG1203				
	P1212A	DELETED								
	P1212B	DELETED								
	P1212C	DELETED								
	P1213A	AMINE PUMP	331			PART OF PG1203				
	P1213B	SPARE FOR P1213B	331			PART OF PG1203				

SECTION 1200 - BALANCE OF PLANT
4143

CLASS	ITEM NO.	DESCRIPTION
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[illegible]

EQUIPMENT LIST

CONTRACT: 15-4140										SIERRA PACIFIC POWER COMPANY										RENO, NEVADA - TRACY STATION										SECTION 1200 - BALANCE OF PLANT										4143																																																											
CLASS										ITEM NO.										DESCRIPTION										EFD										REQ. NO.										P.O. NO.										REMARKS										REV.																													
PACKAGES										PG1201										DEMINERALIZATION PACKAGE										336										1932A																																																											
										PG1202										CIRCULATING WATER TREATMENT PACKAGE										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																																																											

E01
PRESSURIZATION
AIR RECEIVER

C301
PRESSURIZATION
AIR COMPRESSOR

E204
TRANSPORT
AIR COOLER

E201
AIR RECUPERATOR

C201
BOOST
COMPRESSOR

AIR
SOP

D201
"LOCK-OUT" DRUM

E202
AIR PRECOOLER

E203
TRIM COOLER

NOTES:

1. AFTER COOLER IS TO BE INCLUDED
IN THE COMPRESSOR PACKAGE.

KEY:

- STREAM ID
- TEMPERATURE, °F
- PRESSURE, PSI ABS
- DUTY, MMBTU/HR
-

5	GEN. REV.	11/14/94	SN	JOD	4/94	GBH
4	GEN. REV.	3/11/94	SN	GKM		GBH
3	GEN. REV.	01/05/94	SN	GKM		GBH
2	GEN. REV.	12/8/93	SN	GKM		GBH
1	MINOR REV.	7/19/93	JJO'D	GKM		GBH
0	INITIAL ISSUE	5/25/93	NSD	GKM		GBH
NO.	DESCRIPTION	DATE	BY	CHK	REV.	APP

REVISIONS						
ENGINEER	CHECKED	APPROVED				
DRAWN	REVISED	DATE				

SIERRA PACIFIC POWER COMPANY
TRACY 4 - PINON PROJECT, RENO, NV
PROCESS FLOW DIAGRAM
OXIDANT COMPRESSION AND SUPPLY
COAL GASIFICATION
SECTION 200 & 300

15-4141

5	GEN. REV.	11/14/94	SN	JOD	GBH	
4	GEN. REV.	03/11/94	SN	GKM	GBH	
3	GEN. REV.	01/05/94	SN	GKM	GBH	
2	GEN. REV.	12/8/93	SN	GKM	GBH	
1	MINOR REV.	7/19/93	JJO'D	GKM	GBH	
0	INITIAL ISSUE	5/25/93	NSD	GKM	GBH	
NO.	DESCRIPTION	DATE	BY	CHK	REV.	APP

REVISIONS						
NO.	DESCRIPTION	DATE	BY	CHK	REV.	APP
1						

KEY:	
◇	STREAM ID
□	TEMPERATURE, °F
○	PRESSURE, PSI ABS
○	DUTY, MW/HR
▭	MASS FLOW, LB/HR

SIERRA PACIFIC POWER COMPANY
 TRACY 4 - PINON PROJECT, RENO, NV
 PROCESS FLOW DIAGRAM

COAL GASIFICATION
 SECTION 300

15-4141

7514

4141-2-50-113

4141-2-50-114

4141-2-50-114

5	GEN. REV.	11/18/94	SN	JJO/D	GKM	GBH
4	GEN. REV.	03/11/94	SN	GKM	GKM	GBH
3	GEN. REV.	01/05/94	SN	GKM	GKM	GBH
2	GEN. REV.	12/8/93	SN	GKM	GKM	GBH
1	ADD EQUIP.	7/19/93	JJO/D	GKM	GKM	GBH
0	INITIAL ISSUE	5/25/93	NSD	GKM	GKM	GBH

NO.	DESCRIPTION	DATE	BY	CHK	REV.	APP.
1	ENGINEERED					
2	DESIGNED					
3	REVIEWED					
4	APPROVED					

SIERRA PACIFIC POWER COMPANY
TRACY 4 - PINON PROJECT, RENO, NV
PROCESS FLOW DIAGRAM
GAS STREAM HEAT RECOVERY - SECTION 400
GAS STREAM PARTICULATE REMOVAL - SECT. 500
RECYCLE GAS COMPRESSION - SECTION 900

15-4141

7514 4141-2-50-114 5

BN503
FILTER FINES
COLLECTION
HOPPER

BN504
FILTER FINES
DEPRESSURIZATIO.
HOPPER

BN507
FILTER FINES
FEED HOPPER

F503
FILTER FINES
VENT FILTER

5	GEN. REV.	11/14/94	SN	JJO/gm	GBH
4	GEN. REV.	03/11/94	SN	GKM	GBH
3	GEN. REV.	01/05/94	SN	GKM	GBH
2	GEN. REV.	12/8/93	SN	GKM	GBH
1	ADD EQUIPMENT	7/19/93	JJO'D	GKM	GBH
0	INITIAL ISSUE	5/25/93	NSD	GKM	GBH
NO.	DESCRIPTION	DATE	BY	CHK	REV. APP

REVISIONS

EMP. CHECKED	CHECKED	APPROVED
DATE	DATE	DATE

KEY:

- ◇ STREAM ID
- TEMPERATURE, °F
- PRESSURE, PSI OBS
- DUTY, MWBTU/HR
- ▭ MASS FLOW, LB/HR

SIERRA PACIFIC POWER COMPANY
TRACY 4 - PINON PROJECT, RENO, NV
PROCESS FLOW DIAGRAM

GAS STREAM PARTICULATE REMOVAL -
SECTION 500

15-4141

7514

4141-2-50-116

5

5	GEN. REV	11/14/94	SN	JJO	GKM	GBH
4	GEN. REV	03/11/94	SN	GKM		GBH
3	GEN. REV	01/05/94	SN	GKM		GBH
2	GEN. REV	12/8/93	SN	GKM		GBH
1	ADD EQUIPMENT	7/19/93	JJO'D	GKM		GBH
0	INITIAL ISSUE	5/25/93	NSD	GKM		GBH
NO.	DESCRIPTION	DATE	BY	CHK	REV.	APP

REVISIONS

ENGINEERED	CHECKED	APPROVED
DATE	REVISED	DATED

SIERRA PACIFIC POWER COMPANY
TRACY 4 - PINON PROJECT, RENO, NV
PROCESS FLOW DIAGRAM

DESULFURIZATION AND WASTE SOLIDS TREATMENT
- SECTION 600

15-4141

153

7514

4141-2-50-117

5

KEY:

- ◇ STREAM ID
- TEMPERATURE, °F
- PRESSURE, PSI ABS
- DUTY, MMBTU/HR
- ▭ MASS FLOW, LB/HR

NOTES:
1. H602 AND SG602 ARE TO BE PART OF A
TRACY 4 - PINON PROJECT.

F602
TRANSPORT
DESULFURIZER

S603
DESULFURIZER
CYCLONE

BN603
T STORAGE
HOPPER

BN604
SORBENT FEED
HOPPER

F603
SORBENT PRE
HOPPER VE

4141-2-50-118

R604

E607

H608

REGENERATION AIR
4141-2-50-112

TO SG401
4141-2-50-114

FROM SG401
4141-2-50-114

REGENERATION PRODUCTS
4141-2-50-117

REVISIONS						
NO.	DESCRIPTION	DATE	BY	CHK	REV.	APP
1	GEN. REV.	11/14/94	SN	JOD		
0	INITIAL ISS.	09 JUN 94	SN	GKM		GBH
<div>ENGINEERED</div> <div>DESIGNED</div> <div>APPROVED</div> <div>DRAWN</div> <div>REVIEWED</div> <div>DATED</div>						
<div>SIERRA PACIFIC POWER COMPANY</div> <div>TRACY 4 - PINON PROJECT, RENO, NV</div> <div>PROCESS FLOW DIAGRAM</div> <div>TRANSPORT DESULFURIZER - SECTION 600</div>						
<div>15-4141</div> <div>7514 4141-2-50-112</div>						

NOTE: LOW POINT DRAINS TO BE PROVIDED FOR SORBENT REMOVAL AFTER SHUTDOWN AND COOLING

- KEY:
- ◇ STREAM ID
 - TEMPERATURE, °F
 - PRESSURE, PSI ABS
 - DUTY, MW/HR
 - ▭ MASS FLOW, LB/HR

CASE NO.	REVISION
I	
II	
III	
IV	
V	
VI	
VII	
VIII	
IX	
X	
XI	
XII	
XIII	
XIV	
XV	
XVI	
XVII	
XVIII	
XIX	
XX	
XXI	
XXII	
XXIII	
XXIV	
XXV	
XXVI	
XXVII	
XXVIII	
XXIX	
XXX	

INPUT												
BL FIRED	ENB EMP. %	CLASSIFIED LOAD CONDITION	GAS T/G GAS CONDITION	EXHAUST GAS TO STACK °C	STEAM GEN. BLOWDOWN	COND. PRESSURE IN. HG	COND. TEMP °F	C.W. SUPPLY TEMP. °F	C.W. RETURN TEMP. °C	GAS T/G OUTPUT °F	STM. T/G OUTPUT °F	POSS PLANT OUTPUT °F
YNFUEL	50	100	100	250.6	1.0	1.30	101.1	71.0	34	60.990	46.122	107.112
YNFUEL	45	100	100	251.9	1.0	1.53	110.0	90.5	103.4	57.930	44.746	102.676
YNFUEL	5	100	100	246.6	1.0	1.26	86.2	54.8	77.2	60.480	47.212	107.690
YNFUEL	50	60	40		1.0							
IFUEL/NG	5	100	100	250.2	1.0	1.12	92.5	52.9	73.7	60.020	43.510	103.530
T. GAS	50	0	100	254.0	1.0	1.20	79.1	61.7	74.4	66.340	25.127	32.077
T. GAS	50	2	80	249.0	1.0	1.00	79.1			54.040	23.650	77.690
T. GAS	50	2	50	243.2	1.0	1.00	79.1			34.010	20.544	54.554
OPANE	50	0	100	255.3	1.0	1.00	79.1			60.000	22.063	31.063

NOTES

1. REFER TO DWG. NO. 4142-2-50-201 FOR HEAT MATERIAL BALANCE PROCESS DATA.
2. 10% SYNFUEL, 30% NATURAL GAS.
3. LATER

LEGEND

- MATERIAL BALANCE FLOW STREAM NUMBER
- TEMPERATURE, °F
- PRESSURE, PSIA, UNLESS OTHERWISE NOTED
- FLOW STREAM TO BATTERY LIMITS
- FLOW STREAM FROM BATTERY LIMITS

PROCESS FLOW DIAGRAM
SECTIONS 700 AND 800
BFW/STEAM/CONDENSATE HEAT & MATERIAL BALANCE
TRACY POWER STATION - UNIT NO. 4
PINON PINE POWER PROJECT RENO, NEVADA

STREAM NO.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
DESCRIPTION	BFM	L.P. BFW	L.P. BFW	L.P. BFW	L.P. BFW	L.P. BFW	L.P. BFW	L.P. BFW	L.P. BFW	L.P. BFW	L.P. BFW	L.P. BFW	L.P. BFW	L.P. BFW	L.P. BFW	L.P. BFW	L.P. BFW	L.P. BFW	L.P. BFW	L.P. BFW	L.P. BFW	L.P. BFW	L.P. BFW	L.P. BFW	L.P. BFW
FLUID STATE	LIQUID	LIQUID	LIQUID	LIQUID	LIQUID	LIQUID	LIQUID	LIQUID	LIQUID	LIQUID	LIQUID	LIQUID	LIQUID	LIQUID	LIQUID	LIQUID	LIQUID	LIQUID	LIQUID	LIQUID	LIQUID	LIQUID	LIQUID	LIQUID	LIQUID
CASE I - SYNFUEL FIRED - 50°F. AMB TEMPERATURE, 100% G																									
FLOW, LB-HR	320,713	45,268	45,268	0	431	335,451	174,427			1580	159,823	172,683	155,985	330,888	330,888	0	0	0	44,815	44,815	13,510	31,385	31,385	11,356	11,356
TEMPERATURE, °F.	240	240	240	----	179.3	240	240			240	240	545.3	680	950	950	----	----	----	201.4	350	350	350	334.5	794.2	730.5
PRESSURE, PSIA	40	168	168	----	7.49	1,370	1,370			1,370	1,370	1,006	1,028	955	950	----	----	----	68.5	60	60	25	485.4	440	
ENTHALPY, BTU/LB	289.6	289.6	289.6	----	147.9	289.6	289.6			289.6	289.6	1,192.7	1,247	----	1,478.7	----	----	----	1180.1	1287.1	1287.1	1287.1	1410.2	1410.2	
CASE II - SYNFUEL FIRED - 95°F. AMB TEMPERATURE, 100% G																									
FLOW, LB-HR	376,850	43,571	43,571	0	431	333,279	170,487			3356	159,823	168,783	155,985	327,965	327,965	0	0	0	43,135	43,135	13,883	29,252	29,252	11,863	11,863
TEMPERATURE, °F.	240	240	240	----	179.6	240	240			240	240	545.3	680	950	950	----	----	----	201.4	350.1	350.1	350.1	334.8	792.6	789.2
PRESSURE, PSIA	40	168	168	----	7.44	1,370	1,370			1,370	1,370	1,006	1,028	955	950	----	----	----	68.5	60	60	25	481.1	440	
ENTHALPY, BTU/LB	289.6	289.6	289.6	----	147.6	289.6	289.6			289.6	289.6	1,192.7	1,247	----	1,478.7	----	----	----	1180.1	1287.1	1287.1	1287.1	1409.5	1409.5	
CASE III - SYNFUEL FIRED - 5°F. AMB TEMPERATURE, 100% G																									
FLOW, LB-HR	376,117	44,895	44,895	0	4291	332,022	170,060			1983	159,823	168,981	155,985	326,789	326,789	0	0	0	43,654	43,654	9,445	34,209	34,209	11,867	11,867
TEMPERATURE, °F.	240	240	240	----	178.7	240	240			240	240	545.3	680	950	950	----	----	----	201.4	350.1	350.1	350.1	334.8	791.7	789.4
PRESSURE, PSIA	40	168	168	----	7.31	1,370	1,370			1,370	1,370	1,006	1,028	955	950	----	----	----	68.5	60	60	25	487.7	440	
ENTHALPY, BTU/LB	289.6	289.6	289.6	----	146.7	289.6	289.6			289.6	289.6	1,192.7	1,247	----	1,478.7	----	----	----	1180.1	1287.1	1287.1	1287.1	1409.1	1409.1	
CASE IV - SYNFUEL FIRED - 50°F. AMB TEMPERATURE, 60% G																									
FLOW, LB-HR																									
TEMPERATURE, °F.																									
PRESSURE, PSIA																									
ENTHALPY, BTU/LB																									
CASE V - SYNFUEL/NATURAL GAS COFIRED - 5°F. AMB TEMPERATURE, 100% G																									
FLOW, LB-HR	364,523	49,689	49,689	0	4,086	314,920	182,628			3,340	123,889	184,343	128,675	348,359	285,850	0	0	0	49,113	49,113	16,145	32,968	32,968	0	0
TEMPERATURE, °F.	240	240	240	----	175.4	240	240			240	240	545.3	680	950	950	----	----	----	201.4	349.3	349.3	349.3	333.7	----	----
PRESSURE, PSIA	40	168	168	----	6.78	1,370	1,370			1,370	1,370	1,006	1,028	955	950	----	----	----	68.5	60	60	25	----	----	
ENTHALPY, BTU/LB	289.6	289.6	289.6	----	143.4	289.6	289.6			289.6	289.6	1,192.7	1,247	----	1,478.7	----	----	----	1180.1	1286.6	1286.6	1286.6	1286.6	----	----
CASE VI - NATURAL GAS FIRED - 50°F. AMB TEMPERATURE, 0% G																									
FLOW, LB-HR	265,550	47,266	47,266	0	2788	210,284	183,747			25,276	0	181,910	0	211,183	159,508	0	0	0	46,793	46,793	23,575	23,210	23,210	0	0
TEMPERATURE, °F.	240	240	240	----	153.2	240	240			240	----	545.3	----	950	950	----	----	----	201.4	348.9	348.9	348.9	333.3	----	----
PRESSURE, PSIA	40	168	168	----	4.82	1,370	1,370			1,370	----	1,006	----	955	950	----	----	----	68.5	60	60	25	----	----	
ENTHALPY, BTU/LB	289.6	289.6	289.6	----	121.1	289.6	289.6			289.6	----	1,192.7	----	----	1,478.7	----	----	----	1,180.1	1,286.4	1,286.4	1,286.4	1,286.4	----	----
CASE VII - NATURAL GAS FIRED - 50°F. AMB TEMPERATURE, 0% G																									
FLOW, LB-HR	237,596	36,205	36,205	0	2,689	201,391	160,830			36,205	0	159,222	0	195,425	159,222	0	0	0	37,958	37,958	16,687	21,271	21,271	0	0
TEMPERATURE, °F.	240	240	240	----	149.8	240	240			240	----	545.3	----	950	950	----	----	----	201.4	349.8	349.8	349.8	334.3	----	----
PRESSURE, PSIA	40	168	168	----	3.78	1,370	1,370			1,370	----	1,006	----	955	950	----	----	----	68.5	60	60	25	----	----	
ENTHALPY, BTU/LB	289.6	289.6	289.6	----	1067.4	289.6	289.6			289.6	----	1,192.7	----	----	1,478.7	----	----	----	1,180.1	1,286.9	1,286.9	1,286.9	1,286.9	----	----
CASE VIII - NATURAL GAS FIRED - 50°F. AMB TEMPERATURE, 0% G																									
FLOW, LB-HR	197,800	29,749	29,749	0	2,434	168,051	129,058			35,171	0	128,559	0	163,729	134,813	0	0	0	29,451	29,451	12,151	17,300	17,300	0	0
TEMPERATURE, °F.	240	240	240	----	142.8	240	240			240	----	545.3	----	950	950	----	----	----	201.4	351.3	351.3	351.3	336	----	----
PRESSURE, PSIA	40	168	168	----	5.10	1,370	1,370			1,370	----	1,006	----	955	950	----	----	----	68.5	60	60	25	----	----	
ENTHALPY, BTU/LB	289.6	289.6	289.6	----	111.6	289.6	289.6			289.6	----	1,192.7	----	----	1,478.7	----	----	----	1,180.1	1,287.7	1,287.7	1,287.7	1,287.7	----	----
CASE IX - PROPANE GAS FIRED - 50°F. AMB TEMPERATURE, 0% G																									
FLOW, LB-HR	269,472	47,936	47,936	0	2,610	221,536	185,984			28,286	0	184,845	0	212,866	146,127	0	0	0	47,456	47,456	23,284	24,172	24,172	0	0
TEMPERATURE, °F.	240	240	240	----	149.9	240	240			240	----	545.3	----	950	950	----	----	----	201.4	348.8	348.8	333.3	333.3	----	----
PRESSURE, PSIA	40	168	168	----	3.71	1,370	1,370			1,370	----	1,006	----	955	950	----	----	----	68.5	60	60	25	----	----	
ENTHALPY, BTU/LB	289.6	289.6	289.6	----	117.8	289.6	289.6			289.6	----	1,192.7	----	----	1,478.7	----	----	----	1,180.1	1,286.4	1,286.4	1,286.4	1,286.4	----	----

27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47
M.P.	M.P.	M.P.	M.P.	M.P.	M.P.	M.P.	M.P.	M.P.	M.P.	M.P.	M.P.	M.P.	M.P.	M.P.	M.P.	M.P.	M.P.	M.P.	M.P.	M.P.
STEAM	STEAM	STEAM	STEAM	STEAM	STEAM	STEAM	STEAM	STEAM	STEAM	STEAM	STEAM	STEAM	STEAM	STEAM	STEAM	STEAM	STEAM	STEAM	STEAM	STEAM
VAPOR	VAPOR	VAPOR	VAPOR	VAPOR	VAPOR	VAPOR	VAPOR	VAPOR	VAPOR	VAPOR	VAPOR	VAPOR	VAPOR	VAPOR	VAPOR	VAPOR	VAPOR	VAPOR	VAPOR	VAPOR

NOTES

1. REFER TO DNG. NO. 4142-2-50-200 FOR HEAT AND MATERIAL BALANCE DIAGRAM.
2. 10% SYNGAS, 90% NATURAL GAS.
3. LATER

ER LOAD, 100% GAS TURBINE LOAD

1,356	501	12,356	0	270	270	327,142	331,743	331,743	331,743	1,744	453	3,118	1,723	3,592	172	1,420	16,247	300	0	0
789.5	240	700	----	----	----	----	101.1	102.6	151	545.3	301.4	553	250.4	250.4	204.2	204.2	60	240	----	----
440	1,370	425	----	----	----	----	0.90	0.90	60	50	1,006	68.5	1075	30	30	12.56	12.56	95	24.97	----
1478.2	288.6	1,361.6	----	----	92.9	996.66	69.1	70.7	110.9	542.5	271.2	553.9	1164.2	219.1	1147.5	172.3	28	1068.5	----	----

ER LOAD, 100% GAS TURBINE LOAD

1,356	501	12,356	0	270	270	327,142	331,743	331,743	331,743	1,744	453	3,118	1,723	3,592	172	1,420	16,247	300	0	0
789.5	240	700	----	----	----	----	101.1	102.6	151	545.3	301.4	553	250.4	250.4	204.2	204.2	60	240	----	----
440	1,370	425	----	----	----	----	0.90	0.90	60	50	1,006	68.5	1075	30	30	12.56	12.56	95	24.97	----
1478.2	288.6	1,361.6	----	----	92.9	996.66	69.1	70.7	110.9	542.5	271.2	553.9	1164.2	219.1	1147.5	172.3	28	1068.5	----	----

ER LOAD, 100% GAS TURBINE LOAD

1,356	501	12,356	0	270	270	319,725	324,286	324,286	324,286	1,706	441	3,118	1,709	3,556	170	1,33	16,211	300	0	0
789.5	240	700	----	----	----	----	96.2	97.7	140	545.3	301.4	553	250.4	250.4	204.2	204.2	60	240	----	----
440	1,370	425	----	----	----	----	0.62	0.62	60	50	1,006	68.5	1075	30	30	12.56	12.56	95	24.97	----
1409.1	288.6	1,361.6	----	----	92.9	976.9	54.2	55.9	107.9	542.5	271.2	553.9	1164.2	219.1	1147.5	172.3	28	1068.5	----	----

ER LOAD, 40% GAS TURBINE LOAD

NOTE (3)

100% GASIFIER LOAD, 100% GAS TURBINE LOAD

NOTE (2)

22,508	2207	9,564	15,231	270	270	297,639	301,995	301,995	301,995	1022	496	2414	1518	3,254	156	3,098	28,348	300	0	0
919.2	240	700	700	----	----	----	82.5	84.1	144.6	545.3	301.4	553	250.4	250.4	204.2	204.2	60	240	----	----
440	1,370	425	425	----	----	----	0.55	0.55	60	50	1,006	68.5	1075	30	30	12.56	12.56	95	24.97	----
1478.7	288.6	1,361.6	1,361.6	----	92.9	973.2	50.5	52.2	112.5	542.5	271.2	553.9	1164.2	219.1	1147.5	172.3	28	1068.5	----	----

FIER LOAD, 100% GAS TURBINE LOAD

51,687	5,264	0	56,951	270	270	180,818	183,075	183,075	183,075	1,828	473	0	657	1,654	72	1,582	58,984	300	0	0
919.2	240	----	700	----	----	----	79.1	81.2	170	545.3	301.4	----	250.4	250.4	204.2	204.2	60	240	----	----
440	1,370	----	425	----	----	----	0.49	0.49	60	50	1,006	68.5	----	30	30	12.56	12.56	95	24.97	----
1478.7	288.6	----	1,361.6	----	92.9	977.9	47.1	49.4	130	1192.7	271.2	----	1164.2	219.1	1147.5	172.3	28	1068.5	----	----

IFIER LOAD, 80% GAS TURBINE LOAD

42,814	4356	0	47,170	270	270	166,340	169,299	169,299	169,299	1,689	384	0	574	1,418	68	1,350	48,889	300	0	0
919.2	240	----	700	----	----	----	79.1	81.6	165.5	545.3	301.4	----	250.4	250.4	204.2	204.2	60	240	----	----
440	1,370	----	425	----	----	----	0.49	0.49	60	50	1,006	68.1	----	30	30	12.56	12.56	95	24.97	----
1478.7	288.6	----	1,361.6	----	92.9	978.4	47.1	49.7	133.5	1192.7	271.2	----	1164.2	219.1	1147.5	172.3	28	1068.6	----	----

SIFIER LOAD, 50% GAS TURBINE LOAD

29,710	3,022	0	32,732	270	270	143,468	146,164	146,164	146,164	1,299	290	0	460	1,134	54	1,100	34,174	300	0	0
919.2	240	----	700	----	----	----	79.1	81.9	163.3	545.3	301.4	----	250.4	250.4	204.2	204.2	60	240	----	----
440	1,370	----	425	----	----	----	0.49	0.49	60	50	1,006	68.1	----	30	30	12.56	12.56	95	24.97	----
1478.7	288.6	----	1,361.6	----	92.9	980.3	47.1	50.1	131.2	1192.7	271.2	----	1164.2	219.1	1147.5	172.3	28	1068.5	----	----

FIER LOAD, 100% GAS TURBINE LOAD

66,744	6,806	0	73,550	270	270	166,531	169,411	169,411	169,411	1,859	479	0	664	1,674	60	1,594	75,524	300	0	0
919.2	240	----	700	----	----	----	79.1	81.6	176.4	545.3	301.4	----	250.4	250.4	204.2	204.2	60	240	----	----
440	1,370	----	425	----	----	----	0.49	0.49	60	50	1,006	68.5	----	30	30	12.56	12.56	95	24.97	----
1478.7	288.6	----	1,361.6	----	92.9	979.9	47.1	49.7	144.4	542.5	1180.1	----	1164.2	219.1	1147.5	172.3	28	1068.5	----	----

LEGEND

MATERIAL BALANCE FLOW
STREAM NUMBER

TEMPERATURE, °F

PRESSURE, PSIA, UNLESS
OTHERWISE NOTED

FLOW STREAM TO
BATTERY LIMITS

FLOW STREAM FROM
BATTERY LIMITS

NOTES

LEGEND

- MATERIAL BALANCE FLOW STREAM NUMBER
- TEMPERATURE, °F
- PRESSURE, PSIA, UNLESS OTHERWISE NOTED
- FLOW STREAM TO BATTERY LIMITS
- FLOW STREAM FROM BATTERY LIMITS

PROCESS FLOW DIAGRAM
 SECTION 700
 GAS TURBINE GENERATOR
 TRACY POWER STATION - UNIT NO. 4
 PINON PINE POWER PROJECT RENO, NEVADA

NOTES

LEGEND

- MATERIAL BALANCE FLOW STREAM NUMBER
- TEMPERATURE, °F
- PRESSURE, PSIA, UNLESS OTHERWISE NOTED
- FLOW STREAM TO BATTERY LIMITS
- FLOW STREAM FROM BATTERY LIMITS

PROCESS FLOW DIAGRAM
SECTION 800
STEAM TURBINE GENERATOR
TRACY POWER STATION - UNIT NO. 4
PINON PINE POWER PROJECT RENO, NEVADA

REV N
NOT ISSUED

PROCESS FLOW DIAGRAM	
SECTION 188	
SOLIDS RECEIVING, STORING & CRUSHING	
PIEMONTE POWER PROJECT	
TRACY POWER STATION	
RENO, NEVADA	
DRAWN BY:	SCALE:
REV:	REV:

NOTES

LEGEND

- MATERIAL BALANCE FLOW STREAM NUMBER
- TEMPERATURE, °F
- PRESSURE, PSIA, UNLESS OTHERWISE NOTED
- FLOW STREAM TO BATTERY LIMITS
- FLOW STREAM FROM BATTERY LIMITS

PROCESS FLOW DIAGRAM
SECTION 1000
WASTEWATER TREATMENT
TRACY POWER STATION - UNIT NO. 4
PINON PINE POWER PROJECT RENO, NEVADA

FROM
SULFATOR SOLIDS
DEPRESSURIZATION
HOPPER (GMS02)
SECTION 66A

CR-1102
SOLID WASTE
ELEVATING CONV.

B-1102
LOAD-OUT EXHAUST FAN

ATM

CR-1101
SOLID WASTE
LOADING CRANE

ATM

B-1101

TO VENT FAN

F-1101

TO VENT FILTER

101

TO
SITE
LO

BF-1101

SOLID WASTE
DISCHARGER

F-1102

LOC-OUT FILTER

SOLID WASTE
LANDFILL

4143-2-50-313

DWG 311 COOLING TOWER BLOWDOWN
TO X-1200

DWG 311 CLEAN WASTEWATER
FROM P-1002 A/B

NOTES

LEGEND

- MATERIAL BALANCE FLOW
STREAM NUMBER
- TEMPERATURE, °F
- PRESSURE, PSIA, UNLESS
OTHERWISE NOTED
- FLOW STREAM TO
BATTERY LIMITS
- FLOW STREAM FROM
BATTERY LIMITS

PROCESS FLOW DIAGRAM
SECTION 1200
COOLING WATER SYSTEM
TRACY POWER STATION - UNIT NO. 4
PINON PINE POWER PROJECT REHO, NEVADA

NOTES

LEGEND

- MATERIAL BALANCE FLOW STREAM NUMBER
- TEMPERATURE, °F
- PRESSURE, PSIA, UNLESS OTHERWISE NOTED
- FLOW STREAM TO BATTERY LIMITS
- FLOW STREAM FROM BATTERY LIMITS

PROCESS FLOW DIAGRAM
 SECTION 1200
 RIVER & RAW WATER SYSTEMS
 TRACY POWER STATION - UNIT NO. 4
 PINON PINE POWER PROJECT RENO, NEVADA
 DRAWN BY: J. B. F. 7/20/07 10:00 AM

NOTES

LEGEND

- MATERIAL BALANCE FLOW STREAM NUMBER
- TEMPERATURE, °F
- PRESSURE, PSIA, UNLESS OTHERWISE NOTED
- FLOW STREAM TO BATTERY LIMITS
- FLOW STREAM FROM BATTERY LIMITS

PROCESS FLOW DIAGRAM
SECTION 1200
BOILER WATER TREATMENT
TRACY POWER STATION - UNIT NO. 4
PINON PINE POWER PROJECT RENO, NEVADA
DRAWN BY: L. G. J. L. SCALE: NONE REV: 1

NOTES

LEGEND

- MATERIAL BALANCE FLOW STREAM NUMBER
- TEMPERATURE, °F
- PRESSURE, PSIA, UNLESS OTHERWISE NOTED
- FLOW STREAM TO BATTERY LIMITS
- FLOW STREAM FROM BATTERY LIMITS

PROCESS FLOW DIAGRAM
SECTION 1200

INSTRUMENT & PLANT AIR SYSTEM

TRACY POWER STATION - UNIT NO. 4

BRION BING POWER PROJECT

NOTES

LEGEND

MATERIAL BALANCE FLOW
STREAM NUMBER

TEMPERATURE, °F

PRESSURE, PSIA, UNLESS
OTHERWISE NOTED

FLOW STREAM TO
BATTERY LIMITS

FLOW STREAM FROM
BATTERY LIMITS

PROCESS FLOW DIAGRAM
SECTION 1200
FLARE SYSTEM

TRACY POWER STATION - UNIT NO. 4

PINON PINE POWER PROJECT RENO, NEVADA

DRAWN BY: C.C. SCALE: NONE REV

11
10
9
8
7
6
5
4
3
2
1

● PROPANE
TO GT-701

E-1202
PROPANE
VAPORIZER

NOTES

LEGEND

MATERIAL BALANCE FLOW
STREAM NUMBER

TEMPERATURE, °F

PRESSURE, PSIA, UNLESS
OTHERWISE NOTED

FLOW STREAM TO
BATTERY LIMITS

FLOW STREAM FROM
BATTERY LIMITS

PROCESS FLOW DIAGRAM
SECTION 1200
PROPANE SYSTEM
TRACY POWER STATION - UNIT NO. 4
PINON PINE POWER PROJECT RENO, NEVADA

FILE VII: ZJ1: [246, 113] 61D1, ACT, 1
DATE 24-OCT-94 TIME 13:28:08
ISSUE BY CLAYDEN BOX J13D

0
22X34

61-D1

BATTERY LIMIT S. 264.00

NOTE:

1. FOR PLAN OF STRUCTURE AT GRADE
SEE DRAWING 61-02.
2. FOR UPPER ELEVATIONS OF THE STRUCTURE
SEE DRAWINGS 61-03 THRU' 61-06.

NO.	REVISION DESCRIPTION	BY	DATE	SCALE
3	ISSUED FOR PLANT LAYOUT	R. C. CLAYDEN	9 SEP 66	1" = 20' FT.
2	ISSUED FOR APPROVAL	R. C. CLAYDEN	9 SEP 66	ISSUED FOR P&ID
1	ISSUED FOR F. C. E.	R. C. CLAYDEN	9 SEP 66	ISSUED FOR CONST.
0	PRELIMINARY PLOT PLAN ISSUE	R. C. CLAYDEN	9 SEP 66	
1	DESIGNED	EXAM. R. CLAYDEN	SCALE 1" = 20' FT.	
2	CHECK J. ENGELSON	DATE 9 SEP 66		
3	DESIGNED	APPR. R. CLAYDEN		
4	DATE 9 SEP 66			

TRACY POWER STATION - UNIT No. 4
PINON PINE POWER PROJECT, RENO, NV

**GASIFIER ISLAND PLOT PLAN
OVERALL**

M	CLIENT	15-4141	ISS
	DATE	7514	61-01
			3

FILE VII:ZJ11:246,113361D2.ACT,1
 DATE 21-OCT-94 TIME 13:12:18
 ISSUE BY CLAYDEN BOX J13D

0
 22X34

MWK UNIT LIMIT W 681.00

MWK UNIT LIMIT S 264.00

MWK UNIT LIMIT S 412.00

FILE 711125J11E246, 11336103, AC111
 DATE 21-OCT-84 TIME 13:12Z
 ISSUE BY CLAYTON BOX J13D

PLAN AT EL. 97'-0" TO EL. 117'-0"

NOTE:

- 1. FOR LOWER ELEVATIONS SEE DRAWING 61-02
- 2. FOR UPPER ELEVATIONS SEE DRAWINGS 61-04 THRU 61-06

3	ISSUED FOR PLANT LAYOUT REDRAWN - PLAN AT EL 117'-0" MOVED TO DWG. 61-04	R. C.	J. I.	M. G.	21 OCT 94
2	ISSUED FOR APPROVAL	R. C.	J. I.	M. G.	9 SEP 94
1	ISSUED FOR F. C. E.	R. C.	J. I.	M. G.	11 JUL 94
0	PRELIMINARY PLOT PLAN ISSUE	R. C.	—	—	—
NO	REVISION DESCRIPTION	BY	CHK.	APPR.	DATE
DESIGNED	DRWN R. CLAYDEN	SCALE	1"=10'-0"		
CHECKED	J. INGLISH	ISSUED FOR			
DESIGNED	UPPR. R. H. MINT	ISSUED FOR			
R. CLAYDEN	DATE 9 SEP 94	CONSTR			

TRACY POWER STATION - UNIT No. 4
PIÑON PINE POWER PROJECT, RENO, NV

GASIFIER ISLAND PLOT PLAN
PLAN AT EL. 97'-0" TO EL. 117'-0"

GRAPHIC SCALE

CLIENT 15-4141

ISS

22X34

61-D4

FILE V110-2J11-246-11316-05-AS7.1
 DATE 21-03-94 TIME 13:50:07
 BOX J13D
 ISSUE BY CLAYDEN

PLAN AT EL. 137'-0" TO EL. 157'-0"

NOTE:

1. FOR LOWER ELEVATIONS SEE DRAWINGS 61-02 THRU 61-04.
2. FOR UPPER ELEVATIONS SEE DRAWING 61-06.

NO.	REVISION DESCRIPTION	BY	CHK.	DATE
3	ISSUED FOR PLANT LAYOUT REDRAWN - PLANS ORIGINALLY SHOWN ON DWG. 61-04	R. C. J.	M. G.	21 MAY 94
2	ISSUED FOR APPROVAL	R. C. J. I.	M. G.	9 SEP 94
1	ISSUED FOR F.C.E.	R. C. J. I.	M. G.	11 JUL 94
0	PRELIMINARY PLOT PLAN ISSUE	R. C.	—	—
NO.	REVISION DESCRIPTION	BY	CHK.	DATE
ENGINEERED	JOHN R. CLAYTON	SCALE	1/8" = 1'-0"	
DRAWN	JOHN J. ENGLISH	ISSUED FOR	FAB	
DESIGNED	JAMES R. HUNT	ISSUED FOR	CONSTR	
BY CHARGE	DATE 3 SEP 94			

TRACY POWER STATION - UNIT No. 4
PINON PINE POWER PROJECT, RENO, NV

GASIFIER ISLAND PLOT PLAN
PLAN AT EL. 137'-0" TO EL. 177'-0"

M	CLIENT 15-4141	ISS
	7514	61-05
		3

FILE VII-7411-245, 11316106, ACT. 1
 DATE 21-OCT-84 TIME 13:51:49
 BOX J13D
 ISSUE BY CLAYDEN

PLAN AT EL. 177'-0" TO EL. 197'-0"

PLAN AT EL. 197'-0" AND ABOVE

NOTE:

1. FOR LOWER ELEVATIONS SEE DRAWINGS 61-02 THRU 61-05.

3	ISSUED FOR PLANT LAYOUT REDRAWN - PLANS ORIGINALLY SHOWN ON DWG. 61-05	R. C.	J. L.	M. G.	11/1/94
2	ISSUED FOR APPROVAL	R. C.	J. L.	M. G.	8 SEP 94
1	ISSUED FOR F.C.E.	R. C.	J. L.	M. G.	11 JUL 94
0	PRELIMINARY PLOT PLAN ISSUE	R. C.	---	---	---
NO	REVISION DESCRIPTION	BY	CHK	APP	DATE
ENGINEER	DRAWN R. CLAYDEN	SCALE	1/8" = 1'-0"		
CHECK	J. ENGLISH	ISSUED FOR	FAB		
DESIGNED	WMA 2.6.94	ISSUED FOR	CONST		
R. CLAYDEN	DATE 9 SEP 94				
<p>TRACY POWER STATION - UNIT No. 4 PINON PINE POWER PROJECT, RENO, NV</p> <p>GASIFIER ISLAND PLOT PLAN PLAN AT EL. 177'-0" AND ABOVE</p>					
M	CLIENT 15-4141	ISS			
	7514	61-06			
WMA CLASS	JOB NUMBER	DRAWING NUMBER	REV		
			3		

FILE VII, ZJI, C 246, 1133 NORTH, ACT, 2
 DATE 21-OCT-94 TIME 13:59:01
 ISSUE BY CLAYDEN BOX J13D

VIEW LOOKING NORTH

3	ISSUED FOR PLANT LAYOUT	R. C.	J. L.	M. G.	9 SEP 84
2	ISSUED FOR APPROVAL	R. C.	J. L.	M. G.	9 SEP 84
1	ISSUED FOR F.C.E.	R. C.	J. L.	M. G.	11 AUG 84
0	PRELIMINARY PLOT PLAN ISSUE	R. C.	—	—	—
NO	REVISION DESCRIPTION	BY	CHK.	APP.	DATE
DESIGNED	DR. R. CLAYDEN	SCALE	1/4" = 1'-0"		
CHECKED	J. INGLISH	ISSUED FOR	FAB		
DESIGNED	DATE 9 SEP 84	ISSUED FOR	CONST		
A. CLAYDEN					
<p>TRACY POWER STATION - UNIT No. 4 PIÑON PINE POWER PROJECT, RENO, NV</p> <p>GASIFIER ISLAND PLOT PLAN SOUTH ELEVATION</p>					
M	CLIENT 15-4141			ISS	
	7514	61-07		3	

FILE VII: ZJ: [246, 113] ISO. ACT: 1
DATE 21-OCT-94 TIME 14:14:20
ISSUE BY CLAYDEN BOX J13D

61-D8

22X34

3	ISSUED FOR PLANT LAYOUT	R. C. J. T.	M. G.	28. 31 54
2	ISSUED FOR APPROVAL	R. C. J. T.	M. G.	28. 31 54
1	ISSUED FOR F. C. E.	R. C. J. T.	M. G.	28. 31 54
C	PRELIMINARY PLOT PLAN ISSUE	R. C. J. T.	M. G.	28. 31 54
NO	REVISION DESCRIPTION	BY	CHK.	APPR. DATE
ENGINEERED	DR. P. CLAYDEN	SCALE	NONE	
CHECKED	J. ENGLISH	ISSUED FOR	FAB	
DESIGNED	APPR. R. G. HUNT	ISSUED FOR	CONST	
D. CLAYTON	DATE 9 SEP 54			
<p>TRACY POWER STATION - UNIT No. 4 PINON PINE POWER PROJECT, RENO, NV</p> <p>GASIFIER ISLAND PLOT PLAN ISOMETRIC VIEW</p>				
M	CLIENT	15-4141	ISS	
	WORK	7514	3	
WORK CLASS	JOB NUMBER	61-D8	DRAWING NUMBER REV	

22x34

61-D9

VIEW LOOKING EAST

3	ISSUED FOR PLANT LAYOUT				
2	ISSUED FOR APPROVAL	R. C. J. I.	M. G.	9 SEP 84	
1	ISSUED FOR F. C. E.	R. C. J. I.	M. G.	11 JUL 84	
0	PRELIMINARY PLOT PLAN ISSUE	R. C.			
NO	REVISION DESCRIPTION	BY	CHK.	APPR.	DATE
ENGINEERED	DRYER R. CLAYDEN			SCALE	ZONE
DESIGNED	CHECK J. INGLISH			ISSUED FOR	FAB
A. C. CLAYDEN	DATE 9 SEP 84			ISSUED FOR	COST
<p>TRACY POWER STATION - UNIT No. 4 PINON PINE POWER PROJECT, RENO, NV</p> <p>GASIFIER ISLAND PLOT PLAN WEST ELEVATION</p>					
M	CLIENT 15-4141			ISS	
	7514	61-D9		3	
WORK CLASS	JOB NUMBER	DRAWING NUMBER	REV

NOTES

1. FOR GENERAL NOTES SEE DRAWING *4142-1-51-10;

ST ACCESS ROADS

KLING TOWER

4142-1-51-100

D	10-10-81	UPGRADES FOR CLASS "11" EXISTING
C	10-10-81	UPGRADES FOR CLASS "11" EXISTING
B	10-10-81	UPGRADES FOR CLASS "11" EXISTING
A	10-10-81	UPGRADES FOR CLASS "11" EXISTING
ADL	10-10-81	UPGRADES FOR CLASS "11" EXISTING

SITE KEY PLOT PLAN

DATE	10-10-81	SCALE	1"=400'
BY	ADL	CHKD	ADL

NOTICE: C.D. 4142-1-51-101

GENERAL NOTES

- THE FOLLOWING PLOT PLANS WERE DEVELOPED WITH PRELIMINARY INFORMATION. HOLD FOR CERTIFIED EQUIPMENT DRAWINGS.

LEGEND

	EXISTING STRUCTURES
	PROPOSED STRUCTURES
	EXISTING FENCE LINE
	PROPOSED FENCE LINE
	EDGE OF WATER
	EDGE OF EXISTING RD
	EDGE OF PROPOSED RD
	EXISTING TRACKS
	PROPOSED TRACKS
	PROPOSED NEW OR FUTURE FACILITIES

4142-1-51-101

1	10-10-81	DESIGN FOR BLANK "11" SHEET
2	10-10-81	DESIGN FOR BLANK SHEET
3	10-10-81	DESIGN FOR BLANK SHEET
4	10-10-81	DESIGN FOR BLANK SHEET
5	10-10-81	DESIGN FOR BLANK SHEET
6	10-10-81	DESIGN FOR BLANK SHEET
7	10-10-81	DESIGN FOR BLANK SHEET
8	10-10-81	DESIGN FOR BLANK SHEET
9	10-10-81	DESIGN FOR BLANK SHEET
10	10-10-81	DESIGN FOR BLANK SHEET

KEY PLOT PLAN GASIFICATION ISLAND, COMBINED CYCLE POWER ISLAND & OFFSITES

DESIGN PLOT PLAN SHEET NO. 1

DATE	10-10-81	SCALE	1"=100'
BY	10-10-81	DATE	10-10-81
BY	10-10-81	DATE	10-10-81
BY	10-10-81	DATE	10-10-81
BY	10-10-81	DATE	10-10-81
BY	10-10-81	DATE	10-10-81
BY	10-10-81	DATE	10-10-81
BY	10-10-81	DATE	10-10-81
BY	10-10-81	DATE	10-10-81
BY	10-10-81	DATE	10-10-81
BY	10-10-81	DATE	10-10-81

HOLD

- SIZE OF WASTEWATER POND
- SIZE NITROGEN FACILITY
- NEW LOCATION OF FENCE

SCALE

1"=100'-0"

1" = 100' - 0"

4142-1-51-102

A	01-01-51	ISSUED FOR CLASS "11" EXEMPT
B	07-10-51	ISSUED FOR CLIENT APPROVAL
C	08-20-51	ISSUED FOR INTERNAL REVIEW
D	09-11-51	ISSUED FOR INTERNAL REVIEW
E	09-11-51	ISSUED FOR INTERNAL REVIEW
REV.	DATE	DESCRIPTION

KEY PLOT PLAN OFFSITES			
SHEET NUMBER 01/01-01/01 NO. 1			
PROJECT NAME: [REDACTED]			
DATE: 01-01-51	BY: [REDACTED]	SCALE: 1" = 100' - 0"	REV: [REDACTED]

MA

COOLING POND

DRAWING LIMITS N 716. 25'

MATCHLINE C.O.D. 41 43-1-51-4

C-20'-0" ROADWAY

3.74.
(REF)

(1381)

20' - 0'

28 - 6

⑦

ROLL
DOOR

PULL
AREA

EDGE OF FOUNDATION-

1 HIGH POINT OF FINISHED
2 SURFACE EL. 63'-8"
3 (TYPICAL)

VENDOR

E-882
GLAND CONDENSER

TG-881 - STEAM

E-881
SURFACE - CO

P-881 A/B
CONDENSATE
PUMP

6 PIPERACK - COLUMN -
S 222 88

T.O.S. EL. 90° - 8°
T.O.S. EL. 84° - 8°

S 237.00'

C 20'-0" ROADWAY

MATCHLINE C. O. D. *41 43-1-51-5

2. THE LINDENHAYN REEF CASE

4142-1-51-1

HOLD

STUDY IN JEW

5460

DRAWING LIMITS W 716.25'

DRAWING LIMITS - \$ 237.00

1. FOR GENERAL NOTES SEE DRAWING
*4142-1-51-101

1. MAINT OPENING AT SECOND FLOOR
2. PLATF EL (CRANE MAINT AREA)
3. D-1287 LOCATION
4. CRANE DRAWING

4142-1-51-2

C	20-07-01	ISSUED FOR CLASS "A" SERVICE
B	07-08-01	ISSUED FOR ALBERT SERVICE
A	01-11-01	ISSUED FOR GENERAL SERVICE
REV.	DATE	REVISION

PLOT PLAN
STEAM TURBINE AT UPPER LEVEL

DRAWING LIMITS W 376.00'

S 97.00'

NEW EXTENSION - CONTROL ROOM

EXISTING CONTROL ROOM

DRAWING LIMITS W 345.50'

NOTES

1. FOR GENERAL NOTES SEE DRAWING
4142-1-51-101

REFERENCE DRAWINGS

GENERAL ELECTRIC DRAWINGS:

DWG. # M805 - EQUIPMENT ARRANGEMENT
GAS TURBINE
SECTION 700

DWG. # 17207529 - OUTLINE AIR
PRODUCT UNIT

DWG. # 18109388 - WATER WASH SKID
(SHT. 1 AND 2) OUTLINE

DWG. # 189E9434 - OUTLINE HYDRAULIC
POWER UNIT

DWG. # 01-848-8972G - 6 TON STORAGE
UNIT-1 HAZARD
/ 3 ZONE
(CO2 SKID)

KEY PLAN

NOT TO SCALE

HOLD

1. STEEL LOCATION OF AIR INLET DUCT
2. DWG. 50-001 (BY VENDOR)
3. ELEV OF ALL EQUIPMENT

4142-1-51-3

C	DATE	REVISION
1	01-11-81	ISSUED FOR BLAD "IT" EXCHANGE
2	01-11-81	ISSUED FOR BLAD "IT" EXCHANGE
3	01-11-81	ISSUED FOR BLAD "IT" EXCHANGE
 
70	01-11-81	ISSUED FOR BLAD "IT" EXCHANGE
71	01-11-81	ISSUED FOR BLAD "IT" EXCHANGE
72	01-11-81	ISSUED FOR BLAD "IT" EXCHANGE
73	01-11-81	ISSUED FOR BLAD "IT" EXCHANGE
74	01-11-81	ISSUED FOR BLAD "IT" EXCHANGE
75	01-11-81	ISSUED FOR BLAD "IT" EXCHANGE
76	01-11-81	ISSUED FOR BLAD "IT" EXCHANGE
77	01-11-81	ISSUED FOR BLAD "IT" EXCHANGE
78	01-11-81	ISSUED FOR BLAD "IT" EXCHANGE
79	01-11-81	ISSUED FOR BLAD "IT" EXCHANGE
80	01-11-81	ISSUED FOR BLAD "IT" EXCHANGE
81	01-11-81	ISSUED FOR BLAD "IT" EXCHANGE
82	01-11-81	ISSUED FOR BLAD "IT" EXCHANGE
83	01-11-81	ISSUED FOR BLAD "IT" EXCHANGE
84	01-11-81	ISSUED FOR BLAD "IT" EXCHANGE
85	01-11-81	ISSUED FOR BLAD "IT" EXCHANGE
86	01-11-81	ISSUED FOR BLAD "IT" EXCHANGE
87	01-11-81	ISSUED FOR BLAD "IT" EXCHANGE
88	01-11-81	ISSUED FOR BLAD "IT" EXCHANGE
89	01-11-81	ISSUED FOR BLAD "IT" EXCHANGE
90	01-11-81	ISSUED FOR BLAD "IT" EXCHANGE
91	01-11-81	ISSUED FOR BLAD "IT" EXCHANGE
92	01-11-81	ISSUED FOR BLAD "IT" EXCHANGE
93	01-11-81	ISSUED FOR BLAD "IT" EXCHANGE
94	01-11-81	ISSUED FOR BLAD "IT" EXCHANGE
95	01-11-81	ISSUED FOR BLAD "IT" EXCHANGE
96	01-11-81	ISSUED FOR BLAD "IT" EXCHANGE
97	01-11-81	ISSUED FOR BLAD "IT" EXCHANGE
98	01-11-81	ISSUED FOR BLAD "IT" EXCHANGE
99	01-11-81	ISSUED FOR BLAD "IT" EXCHANGE
100	01-11-81	ISSUED FOR BLAD "IT" EXCHANGE

PLOT PLAN
GAS TURBINE

 

28'-0" ROADWAY
-5- W 376.00'

MATCHLINE C.O.D. #4143-1-51-7 W 376.00'

1. FOR GENERAL NOTES SEE DRAWING
#4142-1-51-191

KEY PLAN
NOT TO SCALE

HOLD

1. MMK - HEATER (H-381)
2. SO-801 - NO INFO
3. ST-801 - NO INFO
4. D-883 / D-884 LOCATION
5. MONITORING SHELTER - LOCATION

4142-1-51-4

REV.	DATE	DESCRIPTION
1	10-10-01	ISSUED FOR BLANK "H" SHEET
2	10-10-01	ISSUED FOR BLANK SHEET
3	10-11-01	ISSUED FOR GENERAL COMMENTS
PLOT PLAN HRSG AT GRADE

MATCHLINE C.O.D. #4142-1-51-2

DRAWING LIMITS

W 521.00'

W 521.00'

DRAWING LIMITS

S 155.00'

PLATF EL. HOLD

PLATF EL. HOLD

50-881
S 452.00'

ST-881
S 287.00'

DRAWING LIMITS

S 362.00'

ASBRY

1. FOR GENERAL NOTES SEE DRAWING
#4142-1-51-101

HOLD

1. LOCATION OF H-201 - NO INFO
2. SO-801 (BY VENDOR) - NO INFO

4142-1-51-5

REV.	DATE	DESCRIPTION
1	01-01-01	ISSUED FOR BLVD "11" SURVEY
2	01-01-01	ISSUED FOR BLVD "11" SURVEY
3	01-01-01	ISSUED FOR BLVD "11" SURVEY
4	01-01-01	ISSUED FOR BLVD "11" SURVEY
5	01-01-01	ISSUED FOR BLVD "11" SURVEY
6	01-01-01	ISSUED FOR BLVD "11" SURVEY
7	01-01-01	ISSUED FOR BLVD "11" SURVEY
8	01-01-01	ISSUED FOR BLVD "11" SURVEY
9	01-01-01	ISSUED FOR BLVD "11" SURVEY
10	01-01-01	ISSUED FOR BLVD "11" SURVEY

PLOT PLAN
HRSG AT UPPER LEVEL

THIS PLAN IS NOT TO BE USED FOR CONSTRUCTION

DRAWING LIMITS W 376.00'

HOLD

1. CRANE SPAN - LOCATION OF RAIL/ELECTRICAL LINES
2. EQUIPMENT VENDOR DWGS (ALL)
3. BUILDING DIMENSIONS
4. CRANE ELECTRICAL SUPPLY
5. LIFTING PLAY
6. RAIL ELEVATION
7. DIKE CAPACITY

4142-1-51-6

REV.	DATE	DESCRIPTION
1	07-01-01	ISSUED FOR BLUE PRINT REVIEW
2	07-01-01	ISSUED FOR BLUE PRINT REVIEW
3	07-01-01	ISSUED FOR BLUE PRINT REVIEW
4	07-01-01	ISSUED FOR BLUE PRINT REVIEW
5	07-01-01	ISSUED FOR BLUE PRINT REVIEW
6	07-01-01	ISSUED FOR BLUE PRINT REVIEW
7	07-01-01	ISSUED FOR BLUE PRINT REVIEW
 
16	07-01-01	ISSUED FOR BLUE PRINT REVIEW
17	07-01-01	ISSUED FOR BLUE PRINT REVIEW
18	07-01-01	ISSUED FOR BLUE PRINT REVIEW
19	07-01-01	ISSUED FOR BLUE PRINT REVIEW
20	07-01-01	ISSUED FOR BLUE PRINT REVIEW

EQUIPMENT ARRANGEMENT
SECTION 808 / 1200
(PER D1-51-3)

 

MATCHLINE C. O. D. *4143-1-51-4

CRUSHER AND EMERGENCY SURGE
HOPPER BUILDING (BY VENDOR)

MATCHLINE C. O. D. *4143-1-51-3 W 928.00'

CR-105

V 650.00'

S 305.00'

CR-117

BY 100
ST 100.00'

HOLD

HIGH POINT OF FINISHED SURFACE EL. 67'-8"

V 629.00'

MATCHLINE C. O. D. *4143-1-51-9

C 28'-8" ROADWAY

28'-8" ROADWAY
V 710.00'

4143-1-51-1

1. FOR GENERAL NOTES SEE DRAWING
*41-42-1-51-101

HOLD

1. LOCATION OF STAIRS
2. PLATFORM ELEVATION
3. VENDOR'S DRAWINGS
4. POWERHOUSE #2 INFORMATION

4143-1-51-1

C	04-04-01	UPPER FBI CLASS "IT" EXTEND
B	07-05-01	LOWER FBI CLASS "IT" EXTEND
A	01-11-01	LOWER FBI CLASS "IT" EXTEND
REV.	04-04-01	RECOMPEN

PLOT PLAN
SECTION 100 AND 1100 AT GRADE

BỘ CÔNG AN VIỆT NAM

 

DRAWING LIMITS S 237.00'

W 928.00'

DRAWING LIMITS

CRUSHER AND EMERGENCY SURGE
HOPPER BUILDING (BY VENDOR)

CR-115

CR-117

CR-105

CR-105

S 318.00'

W 828.00'

HOLD

HOLD

DRAWING LIMITS S 442.00'

ARCH

1. FOR GENERAL NOTES SEE DRAWING
"4142-1-51-181"

HOLD

1. LADDER & PLATFORM (ELEV/LOCATION)
2. EQUIPMENT NUMBERS
3. BUILDING SIZE (CRUSHER BLDG)
4. EQUIPMENT LOCATION : F-182
: F-183
: F-1101

4143-1-51-2

REV.	DATE	DESCRIPTION
C	01-01-01	ISSUED FOR BLANK "11" SHEET
B	01-01-01	ISSUED FOR BLANK SHEET
A	01-01-01	ISSUED FOR INITIAL CONSTRUCTION
REV.	DATE	DESCRIPTION
PLOT PLAN SECTION 100 AND 1100 AT UPPER LEVEL		
END OF SHEET SET NO. 1		
PLOT PLAN SHEET NO. 1		

NOTES

1. FOR GENERAL, SEE THE DRAWING
#4143-1-51-101

HOLD

1. CONVEYOR SUPPORT (BY VENDOR)
2. F-187 (DUST FILTER)
3. LOCATION OF P-183 A/B

4143-1-51-3

REV.	DATE	DESCRIPTION
1	10-10-61	ISSUED FOR GLASS TIT. REPORT
2	10-10-61	ISSUED FOR GLASS TIT. REPORT
3	10-11-61	ISSUED FOR GENERAL, GENERAL
REV.	DATE	DESCRIPTION
<p>FLAT PLAN</p> <p>CONV. STORAGE BAY</p> <p>END OF SHEET - SEE PL. 1</p>

1. FOR GENERAL NOTES SEE DRAWING
"4142-1-51-181

1. FLARE SIZE

4143-1-51-4

C	07-07-01	ISSUED FOR CLASS "C" AIRCRAFT
B	07-08-01	ISSUED FOR CLASS AIRCRAFT
A	07-11-01	ISSUED FOR AIRCRAFT, AIRCRAFT
REF.	ONE	EXCEPTION
<p style="text-align: center;">1. AIRCRAFT</p>		
<p style="text-align: center;">PLOT PLAN FLARE STACK</p>		
<p style="text-align: center;">BICYCLES AND OTHERS, 1</p>		
<p style="text-align: center;">BICYCLES AND OTHERS, 1</p>

1. FOR GENERAL NOTES SEE DRAWING
*4142-1-51-101

1. MAX BATTERY LIFE
2. LOCATION OF: BH-301 (BY MAX)
: BH-505 (BY MAX)

C	14-01-01	UPPER RIG CLAM "1" SYSTEM
D	01-01-01	LOWER RIG CLAM SYSTEM
E	01-11-01	LOWER RIG BRIDGE, BRIDGE
REV.	DATE	DESCRIPTION
<p style="text-align: center;">PLOT PLAN GASIFICATION AREA (RACK ONLY)</p> <p style="text-align: center;">BATCH NUMBER-DIST NO. 1</p> <p> PAPER FINE PAPER PROJECT HALL, ATHER </p>		

DRAWING LIMITS N 207.00'
NEW FENCE

EXISTING FENCE

NEW SWITCHYARD
HIGH POINT OF FINISHED SURFACE EL. "HOLD"

DRAWING LIMITS W 582.00'

EXISTING ROADWAY

C 28'-6" ROADWAY
MATCHLINE C. O. D. #4142-1-51-3

W 521.00'

MATCHLINE C. O. D. #4142-1-51-1 S 17.00'

4143-1-51-6

N 15.56'

NO.	DATE	REVISION
1	10/10/01	ISSUED FOR BIDDING
2	10/10/01	ISSUED FOR BIDDING
3	10/10/01	ISSUED FOR BIDDING
4	10/10/01	ISSUED FOR BIDDING
5	10/10/01	ISSUED FOR BIDDING
6	10/10/01	ISSUED FOR BIDDING
7	10/10/01	ISSUED FOR BIDDING
8	10/10/01	ISSUED FOR BIDDING
9	10/10/01	ISSUED FOR BIDDING
10	10/10/01	ISSUED FOR BIDDING
11	10/10/01	ISSUED FOR BIDDING
12	10/10/01	ISSUED FOR BIDDING
13	10/10/01	ISSUED FOR BIDDING
14	10/10/01	ISSUED FOR BIDDING
15	10/10/01	ISSUED FOR BIDDING
16	10/10/01	ISSUED FOR BIDDING
17	10/10/01	ISSUED FOR BIDDING
18	10/10/01	ISSUED FOR BIDDING
19	10/10/01	ISSUED FOR BIDDING
20	10/10/01	ISSUED FOR BIDDING
21	10/10/01	ISSUED FOR BIDDING
22	10/10/01	ISSUED FOR BIDDING
23	10/10/01	ISSUED FOR BIDDING
24	10/10/01	ISSUED FOR BIDDING
 

NOTES

1. FOR GENERAL NOTES SEE DRAWING
#41 42-1-51-101

MM
(EXISTING)

MM
(EXISTING)

STING)

DRAWING LIMITS W 245.00'

HOLD

1. LOCATION OF P-1202 A/B

4143-1-51-7

C	10-11-01	UPPER FOR CLAY "1" EXISTING
D	10-11-01	UPPER FOR CLAY "1" EXISTING
E	10-11-01	UPPER FOR CLAY "1" EXISTING
F	10-11-01	UPPER FOR CLAY "1" EXISTING
G	10-11-01	UPPER FOR CLAY "1" EXISTING
H	10-11-01	UPPER FOR CLAY "1" EXISTING
I	10-11-01	UPPER FOR CLAY "1" EXISTING
J	10-11-01	UPPER FOR CLAY "1" EXISTING
K	10-11-01	UPPER FOR CLAY "1" EXISTING
L	10-11-01	UPPER FOR CLAY "1" EXISTING
M	10-11-01	UPPER FOR CLAY "1" EXISTING
N	10-11-01	UPPER FOR CLAY "1" EXISTING
O	10-11-01	UPPER FOR CLAY "1" EXISTING
P	10-11-01	UPPER FOR CLAY "1" EXISTING
Q	10-11-01	UPPER FOR CLAY "1" EXISTING
R	10-11-01	UPPER FOR CLAY "1" EXISTING
S	10-11-01	UPPER FOR CLAY "1" EXISTING
T	10-11-01	UPPER FOR CLAY "1" EXISTING
U	10-11-01	UPPER FOR CLAY "1" EXISTING
V	10-11-01	UPPER FOR CLAY "1" EXISTING
W	10-11-01	UPPER FOR CLAY "1" EXISTING
X	10-11-01	UPPER FOR CLAY "1" EXISTING
Y	10-11-01	UPPER FOR CLAY "1" EXISTING
Z	10-11-01	UPPER FOR CLAY "1" EXISTING

PLOT PLAN
TRANSFER SUMP

DRAWING LIMITS
W 510.00'
C 28'-8" ROADWAY

DRAWING LIMITS S 485.00'

PROPOSED NITROGEN FACILITY

S 628.00'
(REF)

N 475.00'
(REF)

C 28'-8" ROADWAY
DRAWING LIMITS S 665.00'

AFRIS

1. FOR GENERAL NOTES SEE DRAWING
#4142-1-51-181

DRAWING LIMITS W 486.00'

KEY PLAN
NOT TO SCALE

HOLD

1. EQUIPMENT NUMBER/INFORMATION

4143-1-51-8

REVISIONS		
NO.	DATE	DESCRIPTION
1	10-10-54	ISSUED FOR CLASS "1" DEFENSE
2	10-10-54	ISSUED FOR BLAST DEFENSE
3	10-11-54	ISSUED FOR DEFENSE DEFENSE
PLOT PLAN NITROGEN FACILITY

NOTES

1. FOR GENERAL NOTES SEE DRAWING
#4142-1-51-101

D. #4143-1-51-1

HOLD

1. COOLING TOWER-DETAIL
2. BLDG SIZE - NO INFO
 - A. MCC COOLING TOWER
 - B. ACID/INHIBITOR AREA
3. ELEV OF COOLING TOWER AND ROUGH GRADING
4. DIKE SIZE FOR D-1209
5. PLATFORM ELEVATION
6. D-1209 AND D-1208 SIZES

4143-1-51-9

C	REV	DESCRIPTION
1	01-01-01	ISSUED FOR BLANK "11" SHEET
2	01-01-02	ISSUED FOR BLANK SHEET
3	01-01-03	ISSUED FOR BLANK SHEET
4	01-01-04	ISSUED FOR BLANK SHEET
5	01-01-05	ISSUED FOR BLANK SHEET
6	01-01-06	ISSUED FOR BLANK SHEET
7	01-01-07	ISSUED FOR BLANK SHEET
8	01-01-08	ISSUED FOR BLANK SHEET
9	01-01-09	ISSUED FOR BLANK SHEET
10	01-01-10	ISSUED FOR BLANK SHEET
11	01-01-11	ISSUED FOR BLANK SHEET
12	01-01-12	ISSUED FOR BLANK SHEET
13	01-01-13	ISSUED FOR BLANK SHEET
14	01-01-14	ISSUED FOR BLANK SHEET
 
73	01-01-73	ISSUED FOR BLANK SHEET
74	01-01-74	ISSUED FOR BLANK SHEET
75	01-01-75	ISSUED FOR BLANK SHEET
76	01-01-76	ISSUED FOR BLANK SHEET
77	01-01-77	ISSUED FOR BLANK SHEET
78	01-01-78	ISSUED FOR BLANK SHEET
79	01-01-79	ISSUED FOR BLANK SHEET
80	01-01-80	ISSUED FOR BLANK SHEET
81	01-01-81	ISSUED FOR BLANK SHEET
82	01-01-82	ISSUED FOR BLANK SHEET
83	01-01-83	ISSUED FOR BLANK SHEET
84	01-01-84	ISSUED FOR BLANK SHEET
85	01-01-85	ISSUED FOR BLANK SHEET
86	01-01-86	ISSUED FOR BLANK SHEET
87	01-01-87	ISSUED FOR BLANK SHEET
88	01-01-88	ISSUED FOR BLANK SHEET
89	01-01-89	ISSUED FOR BLANK SHEET
90	01-01-90	ISSUED FOR BLANK SHEET
91	01-01-91	ISSUED FOR BLANK SHEET
92	01-01-92	ISSUED FOR BLANK SHEET
93	01-01-93	ISSUED FOR BLANK SHEET
94	01-01-94	ISSUED FOR BLANK SHEET
95	01-01-95	ISSUED FOR BLANK SHEET
96	01-01-96	ISSUED FOR BLANK SHEET
97	01-01-97	ISSUED FOR BLANK SHEET
98	01-01-98	ISSUED FOR BLANK SHEET
99	01-01-99	ISSUED FOR BLANK SHEET
100	01-01-100	ISSUED FOR BLANK SHEET

PLOT PLAN
COOLING TOWER

NOTES

1. FOR GENERAL NOTE SEE DRAWING
4143-1-51-10

HOLD

1. LOCATION OF CONVEYOR SUPPORT (BY VENDOR)
2. DETAIL OF UNLOADING (BY CIVIL)
3. LOCATION OF P-181 A/B (SUMP PUMP)
4. F-186 INFO (DUST COLLECTOR)

D.D. #4143-1-51-9 S 710.00'

4143-1-51-10

REV.	DATE	REVISION
C	10-10-54	UPPER END BLIND "11" BENT
B	10-10-54	CHANG FOR JOURNAL, REMOTE
A	10-11-54	CHANG FOR JOURNAL, REMOTE
1		
PLAN PLAN		
UNLOADING STATION		
END OF DRAWING		
DRAWING NO. 4143-1-51-10		
DRAWN BY: [Signature]		
CHECKED BY: [Signature]		

MWK J-7514
1 OF 20
09 DEC 94
REV. 3

SIERRA PACIFIC POWER COMPANY
TRACY 4 - PIÑON PROJECT
RENO, NEVADA

HEAT AND MATERIAL BALANCE - BASE CASE

THE M. W. KELLOGG COMPANY

JOB 7514

DATE	REV #	PREP'D	CHECKED	CTE APPR
27 JUL 93	0	FC	GKM	GBH
11 APR 94	1	SN	GKM	GBH
08 JUN 94	2	SN	GKM	GBH
09 DEC 94	3	SN	JOD / <i>[Signature]</i>	JH

HEAT AND MATERIAL BALANCE - BASE CASE
UNDRIED SUFCO COAL WITH TRANSPORT DESULFURIZER

IDENTIFICATION	Molecular Weight	1 Prepared Coal Feedstock		2 Limestone Feedstock		3 Ash Withdrawal From Gasifier		4 Coal Transport Air	
		Wt%	Lb/Hr	Wt%	Lb/Hr	Wt%	Lb/Hr	Vol%	Lb/Hr
GASES:									
Carbon Monoxide	28.01							0.00	0
Hydrogen	2.02							0.00	0
Carbon Dioxide	44.01							0.00	0
Methane	16.04							0.00	0
Nitrogen	28.01							78.00	14,645
Argon	39.95							0.90	240
Oxygen	32.00							20.82	4,466
Ammonia	17.03							0.00	0
Hydrogen Sulfide	34.08							0.00	0
Carbonyl Sulfide	60.08							0.00	0
Sulfur Dioxide	64.06							0.00	0
Water Vapor	18.02							0.29	35
Hydrogen Chloride	36.46							0.00	0
TOTAL GASES								100.00	19,385
Gas Flow, Lb Moles/Hr									670.3
Molecular Weight, Gases									28.92
Gas Volume, ACFM									193.0
Gas Volume, SCFM									4,238
LIQUIDS:									
Water	18.02								
SOLIDS:									
Carbon	12.01	64.24	47,249			27.19	1,685		
Hydrogen	1.01	4.33	3,187			0.07	5		
Oxygen	16.00	10.94	8,043			0.35	22		
Nitrogen	14.01	1.08	798			0.22	14		
Sulfur	32.06	0.41	298			0.17	10		
Chlorides	35.45	0.00	0			0.00	0		
Ash		9.00	6,620			72.00	4,463		
Moisture	18.02	10.00	7,355			0.00	0		
TOTAL SOLIDS		100.00	73,550			100.00	6,199		
SORBENT:									
CaO	56.08			0.00	0	74.50	1,305		
CaCO3	100.09			90.04	3,720	0.00	0		
CaS	72.14			0.00	0	12.44	218		
CaSO4	136.14			0.00	0	0.00	0		
MgO	40.31			0.00	0	3.26	57		
MgCO3	84.32			4.09	169	0.00	0		
Inerts				5.87	242	9.79	172		
TOTAL SORBENT				100.00	4,131	100.00	1,752		
TOTAL FLOW, Lb/Hr			73,550		4,131		7,951		19,385
HEATING VALUE:									
Gas LHV, Btu/SCF									
Gaseous Fuel LHV, MMBtu/hr									
TEMPERATURE, F									
PRESSURE, PSIA									
		50		50		500		120	
		13		13		310		360

HEAT AND MATERIAL BALANCE - BASE CASE
UNDRIED SUFCO COAL WITH TRANSPORT DESULFURIZER

IDENTIFICATION	Molecular Weight	5		6		7		8		<div>3</div>
		Process Air To Gasifier		Product Gas From Gasifier		Product Gas From Cyclone		Total Air From Gas Turbine		
		Vol%	Lb/Hr	Vol%	Lb/Hr	Vol%	Lb/Hr	Vol%	Lb/Hr	
GASES:										
Carbon Monoxide	28.01	0.00	0	23.89	82,996	23.89	82,996	0.00	0	
Hydrogen	2.02	0.00	0	14.57	3,643	14.57	3,643	0.00	0	
Carbon Dioxide	44.01	0.00	0	5.44	29,708	5.44	29,708	0.00	0	
Methane	16.04	0.00	0	1.35	2,679	1.35	2,679	0.00	0	
Nitrogen	28.01	78.00	145,063	48.65	169,052	48.65	169,052	78.00	164,042	
Argon	39.95	0.90	2,379	0.56	2,760	0.56	2,760	0.90	2,690	
Oxygen	32.00	20.82	44,235	0.00	0	0.00	0	20.82	50,022	
Ammonia	17.03	0.00	0	0.02	40	0.02	40	0.00	0	
Hydrogen Sulfide	34.08	0.00	0	0.03	127	0.03	127	0.00	0	
Carbonyl Sulfide	60.08	0.00	0	0.00	30	0.00	30	0.00	0	
Sulfur Dioxide	64.06	0.00	0	0.00	0	0.00	0	0.00	0	
Water Vapor	18.02	0.29	342	5.50	12,284	5.50	12,284	0.29	387	
Hydrogen Chloride	36.46	0.00	0	0.00	0	0.00	0	0.00	0	
TOTAL GASES		100.00	192,019	100.00	303,319	100.00	303,319	100.00	217,141	
Gas Flow, Lb Moles/Hr			6639.3		12404.2		12404.2		7,508.0	
Molecular Weight, Gases			28.92		24.45		24.45		28.92	
Gas Volume, ACFM			3660.0		16992.1		17166.6		10067.6	
Gas Volume, SCFM			41,977		78,425		78,425		47,469	
LIQUIDS:										
Water	18.02									
SOLIDS:										
				Wt%		Wt%				
Carbon	12.01			54.20	45,794	54.20	2,656			
Hydrogen	1.01			0.33	275	0.33	16			
Oxygen	16.00			0.70	591	0.70	34			
Nitrogen	14.01			0.41	345	0.41	20			
Sulfur	32.06			0.36	308	0.36	18			
Chlorides	35.45			0.00	0	0.00	0			
Ash				44.00	37,174	44.00	2,156			
Moisture	18.02			0.00	0	0.00	0			
TOTAL SOLIDS				100.00	84,487	100.00	4,900			
SORBENT:										
CaO	56.08			74.50	26,976	74.50	539			
CaCO3	100.09			0.00	0	0.00	0			
CaS	72.14			12.44	4,505	12.44	90			
CaSO4	136.14			0.00	0	0.00	0			
MgO	40.31			3.26	1,181	3.26	24			
MgCO3	84.32			0.00	0	0.00	0			
Inerts				9.79	3,546	9.79	71			
TOTAL SORBENT				100.00	36,209	100.00	724			
TOTAL FLOW, Lb/Hr			192,019		424,015		308,943		217,141	
HEATING VALUE:										
Gas LHV, Btu/SCF					129		129		-	
Gaseous Fuel LHV, MMBtu/hr					607.4		607.4			
TEMPERATURE, F										
			650		1,800		1,800			752
PRESSURE, PSIA										
			360		295		292		<div>3</div>	162

HEAT AND MATERIAL BALANCE - BASE CASE
UNDRIED SUFCA COAL WITH TRANSPORT DESULFURIZER

IDENTIFICATION	Molecular Weight	9		10		11		12		3
		Recycle Gas To Grid		Steam to Gasifier		Recycle Gas to Annulus		Product Gas From Desulfurizer		
		Vol%	Lb/Hr	Vol%	Lb/Hr	Vol%	Lb/Hr	Vol%	Lb/Hr	
GASES:										
Carbon Monoxide	28.01	23.91	736			23.91	2,864	23.89	86,604	
Hydrogen	2.02	14.58	32			14.58	126	14.57	3,802	
Carbon Dioxide	44.01	5.45	264			5.45	1,026	5.45	31,022	
Methane	16.04	1.35	24			1.35	92	1.35	2,795	
Nitrogen	28.01	48.70	1,500			48.70	5,833	48.66	176,400	
Argon	39.95	0.56	24			0.56	95	0.56	2,880	
Oxygen	32.00	0.00	0			0.00	0	0.00	0	
Ammonia	17.03	0.02	0			0.02	1	0.02	42	
Hydrogen Sulfide	34.08	0.00	0			0.00	0	0.00	9	
Carbonyl Sulfide	60.08	0.00	0			0.00	0	0.00	0	
Sulfur Dioxide	64.06	0.00	0			0.00	0	0.00	0	
Water Vapor	18.02	5.43	108	100.00	12,356	5.43	419	5.51	12,836	
Hydrogen Chloride	36.46	0.00	0			0.00	0	0.00	0	
TOTAL GASES		100.00	2,689	100.00	12,356	100.00	10,455	100.00	316,389	
Gas Flow, Lb Moles/Hr			109.9	685.9			427.6	12,941		
Molecular Weight, Gases			24.45	18.02			24.45	24.45		
Gas Volume, ACFM			47.5	312.8			184.8	12,462		
Gas Volume, SCFM			695	4,336			2,703	81,819		
LIQUIDS:										
Water	18.02									
SOLIDS:										
		Wt%								
Carbon	12.01	54.20								2,531
Hydrogen	1.01	0.33								15
Oxygen	16.00	0.70								33
Nitrogen	14.01	0.41								19
Sulfur	32.06	0.36								17
Chlorides	35.45	0.00								0
Ash		44.00								2,054
Moisture	18.02	0.00								0
TOTAL SOLIDS		100.00								4,669
SORBENT:										
CaO	56.08	74.50								514
CaCO3	100.09	0.00								0
CaS	72.14	12.44								86
CaSO4	136.14	0.00								0
MgO	40.31	3.26								23
MgCO3	84.32	0.00								0
Inerts		9.79								68
TOTAL SORBENT		100.00								690
TOTAL FLOW, Lb/Hr			2,689	12,356			10,455	321,748		
HEATING VALUE:										
Gas LHV, Btu/SCF			129	-			129	129		
Gaseous Fuel LHV, MMBtu/hr			5.4				20.9	632.7		
TEMPERATURE, F										
PRESSURE, PSIA			350	3	700			350	3	1,013
			335		433			335		274

HEAT AND MATERIAL BALANCE - BASE CASE
UNDRIED SUFCO COAL WITH TRANSPORT DESULFURIZER

IDENTIFICATION	Molecular Weight	13 Condensate From Recycle Gas		14 (Note 1) Blowback Gas to Filter		15 Recycle Gas To RG Booster Comp.		16 (Note 1) Pressurization Recycle Gas	
		Wt%	Lb/Hr	Vol%	Lb/Hr	Vol%	Lb/Hr	Vol%	Lb/Hr
GASES:									
Carbon Monoxide	28.01			25.21	1266	25.21	1,444	25.21	177
Hydrogen	2.02			15.37	56	15.37	63	15.37	8
Carbon Dioxide	44.01			5.75	454	5.75	517	5.75	63
Methane	16.04			1.42	41	1.42	47	1.42	6
Nitrogen	28.01			51.34	2579	51.34	2,940	51.34	361
Argon	39.95			0.59	42	0.59	48	0.59	6
Oxygen	32.00			0.00	0	0.00	0	0.00	0
Ammonia	17.03			0.02	1	0.02	1	0.02	0
Hydrogen Sulfide	34.08			0.00	0	0.00	0	0.00	0
Carbonyl Sulfide	60.08			0.00	0	0.00	0	0.00	0
Sulfur Dioxide	64.06			0.00	0	0.00	0	0.00	0
Water Vapor	18.02			0.30	10	0.30	11	0.30	1
Hydrogen Chloride	36.46			0.00	0	0.00	0	0.00	0
TOTAL GASES				100.00	4,448	100.00	5,071	100.00	622
Gas Flow, Lb Moles/Hr					179.3	204.4		25.1	
Molecular Weight, Gases					24.80	24.80		24.80	
Gas Volume, ACFM					18.4	80.5		5.5	
Gas Volume, SCFM					1,134	1,293		159	
LIQUIDS:									
Water	18.02	100.00	200						
SOLIDS:									
Carbon	12.01								
Hydrogen	1.01								
Oxygen	16.00								
Nitrogen	14.01								
Sulfur	32.06								
Chlorides	35.45								
Ash									
Moisture	18.02								
TOTAL SOLIDS									
SORBENT:									
CaO	56.08								
CaCO3	100.09								
CaS	72.14								
CaSO4	136.14								
MgO	40.31								
MgCO3	84.32								
Inerts									
TOTAL SORBENT									
TOTAL FLOW, Lb/Hr			200	4,448		5,071		622	
HEATING VALUE:									
Gas LHV, Btu/SCF					136	136		136	
Gaseous Fuel LHV, MMBtu/hr					9.3	10.5		1.3	
TEMPERATURE, F									
			90	230		90		230	
PRESSURE, PSIA									
			250	1,200		250		565	

Note 1: Streams 14 and 16 are time averaged flow rates.
Stream 14 also includes 1200 lb/hr instrument purge flow.

HEAT AND MATERIAL BALANCE - BASE CASE
UNDRIED SUFCO COAL WITH TRANSPORT DESULFURIZER

IDENTIFICATION	Molecular Weight	17		18		19 (Note 1)		20
		Sorbent Regeneration		Cooled		Pressurization		Hot	
		Gas To Sulfator		Recycle Gas		Air		Recycle Gas	
		Vol%	Lb/Hr	Vol%	Lb/Hr	Vol%	Lb/Hr	Vol%	Lb/Hr
GASES:									
Carbon Monoxide	28.01	0.00	0	23.91	10,566	0.00	0	23.91	10,565
Hydrogen	2.02	0.00	0	14.58	464	0.00	0	14.58	464
Carbon Dioxide	44.01	0.00	0	5.45	3,785	0.00	0	5.45	3,785
Methane	16.04	0.00	0	1.35	341	0.00	0	1.35	341
Nitrogen	28.01	83.81	626	48.70	21,521	78.00	2,970	48.70	21,520
Argon	39.95	0.96	10	0.56	351	0.90	49	0.56	351
Oxygen	32.00	0.00	0	0.00	0	20.82	906	0.00	0
Ammonia	17.03	0.00	0	0.02	5	0.00	0	0.02	5
Hydrogen Sulfide	34.08	0.00	0	0.00	1	0.00	0	0.00	1
Carbonyl Sulfide	60.08	0.00	0	0.00	0	0.00	0	0.00	0
Sulfur Dioxide	64.06	14.91	255	0.00	0	0.00	0	0.00	0
Water Vapor	18.02	0.31	1	5.43	1,545	0.29	7	5.43	1,545
Hydrogen Chloride	36.46	0.00	0	0.00	0	0.00	0	0.00	0
TOTAL GASES		99.99	892	100.00	38,578	100.00	3,932	100.00	38,577
Gas Flow, Lb Moles/Hr			26.6		1,577.6		136.0		1,577.6
Molecular Weight, Gases			33.47		24.45		28.92		24.45
Gas Volume, ACFM			219.6		801.7		23.5		1567.0
Gas Volume, SCFM			168		9,974		860		9,974
LIQUIDS:									
Water	18.02								
SOLIDS:									
Carbon	12.01								
Hydrogen	1.01								
Oxygen	16.00								
Nitrogen	14.01								
Sulfur	32.06								
Chlorides	35.45								
Ash									
Moisture	18.02								
TOTAL SOLIDS									
SORBENT:									
CaO	56.08								
CaCO3	100.09								
CaS	72.14								
CaSO4	136.14								
MgO	40.31								
MgCO3	84.32								
Inerts									
TOTAL SORBENT									
TOTAL FLOW, Lb/Hr			892		38,578		3,932		38,577
HEATING VALUE:									
Gas LHV, Btu/SCF					129				129
Gaseous Fuel LHV, MMBtu/hr					77.2				77.2
TEMPERATURE, F									
PRESSURE, PSIA			600		270		120		1,000
			23		257		600		263

Note 1: Stream 19 is a time averaged flow rate.

HEAT AND MATERIAL BALANCE - BASE CASE
UNDRIED SUFCO COAL WITH TRANSPORT DESULFURIZER

IDENTIFICATION	Molecular Weight	21 Limestone To Sulfator		22 Sulfator System Flue Gas To Vent		23 Solids From Sulfator		24 (Note 1) Total Solids to Disposal	
		Wt%	Lb/Hr	Vol%	Lb/Hr	Wt%	Lb/Hr	Wt%	Lb/Hr
GASES:									
Carbon Monoxide	28.01			0.00	0				
Hydrogen	2.02			0.00	0				
Carbon Dioxide	44.01			9.65	18,033				
Methane	16.04			0.00	0				
Nitrogen	28.01			77.23	91,879				
Argon	39.95			0.89	1,507				
Oxygen	32.00			10.33	14,044				
Ammonia	17.03			0.00	1				
Hydrogen Sulfide	34.08			0.00	0				
Carbonyl Sulfide	60.08			0.00	0				
Sulfur Dioxide	64.06			0.01	37				
Water Vapor	18.02			1.88	1,438				
Hydrogen Chloride	36.46			0.00	0				
TOTAL GASES				100.00	126,939				
Gas Flow, Lb Moles/Hr					4,246.7				
Molecular Weight, Gases					29.89				
Gas Volume, ACFM					47301.8				
Gas Volume, SCFM					26,849				
LIQUIDS:									
Water	18.02								
SOLIDS:									
Carbon	12.01					0.74	34	1.28	87
Hydrogen	1.01					0.00	0	0.00	0
Oxygen	16.00					0.48	22	0.82	56
Nitrogen	14.01					0.30	14	0.50	34
Sulfur	32.06					0.00	0	0.01	0
Chlorides	35.45					0.00	0	0.00	0
Ash						98.47	4,463	97.40	6,619
Moisture	18.02					0.00	0	0.00	0
TOTAL SOLIDS						100.00	4,533	100.00	6,796
SORBENT:									
CaO	56.08	0.00	0			52.94	1,305	57.84	1,844
CaCO3	100.09	90.04	426			0.00	0	0.00	0
CaS	72.14	0.00	0			4.42	109	6.24	199
CaSO4	136.14	0.00	0			31.85	785	24.62	785
MgO	40.31	0.00	0			2.69	66	2.82	90
MgCO3	84.32	4.09	19			0.00	0	0.00	0
Inerts		5.87	28			8.09	199	8.47	270
TOTAL SORBENT		100.00	473			100.00	2,465	100.00	3,189
TOTAL FLOW, Lb/Hr			473	126,939		6,998		9,985	
HEATING VALUE:									
Gas LHV, Btu/SCF									
Gaseous Fuel LHV, MMBtu/hr									

TEMPERATURE, F
PRESSURE, PSIA

50
20

350
13

1,600
17

210
13

Note 1: Temperature of stream 24 is calculated by blending stream 64 with the cooled sulfator solids stream.

HEAT AND MATERIAL BALANCE - BASE CASE
UNDRIED SUFCO COAL WITH TRANSPORT DESULFURIZER

IDENTIFICATION	Molecular Weight	25 Cyclone Fines to Gasifier		26 Desulfurized Product Gas From Hot Gas Filter		27 Hot Regen. Air to Transp. Regenerator		28 Regeneration Air to Transp. Regenerator		
		Wt%	Lb/Hr	Vol%	Lb/Hr	Vol%	Lb/Hr	Vol%	Lb/Hr	
GASES:										
Carbon Monoxide	28.01			23.91	88,418	0.00	0	0.00	0	
Hydrogen	2.02			14.58	3,881	0.00	0	0.00	0	
Carbon Dioxide	44.01			5.45	31,672	0.00	0	0.00	0	
Methane	16.04			1.35	2,853	0.00	0	0.00	0	
Nitrogen	28.01			48.70	180,095	78.00	626	78.00	626	
Argon	39.95			0.56	2,940	0.90	10	0.90	10	
Oxygen	32.00			0.00	0	20.82	191	20.82	191	
Ammonia	17.03			0.02	43	0.00	0	0.00	0	
Hydrogen Sulfide	34.08			0.00	9	0.00	0	0.00	0	
Carbonyl Sulfide	60.08			0.00	0	0.00	0	0.00	0	
Sulfur Dioxide	64.06			0.00	0	0.00	0	0.00	0	
Water Vapor	18.02			5.43	12,926	0.29	1	0.29	1	
Hydrogen Chloride	36.46			0.00	0	0.00	0	0.00	0	
TOTAL GASES					100.00	322,837	100.00	828	100.00	828
Gas Flow, Lb Moles/Hr					13,202.1		28.6		28.6	
Molecular Weight, Gases					24.45		28.92		28.92	
Gas Volume, ACFM					13113.8		23.5		15.8	
Gas Volume, SCFM					83,469		181		181	
LIQUIDS:										
Water	18.02									
SOLIDS:										
Carbon	12.01	54.20	43,138							
Hydrogen	1.01	0.33	259							
Oxygen	16.00	0.70	557							
Nitrogen	14.01	0.41	325							
Sulfur	32.06	0.36	290							
Chlorides	35.45	0.00	0							
Ash		44.00	35,018							
Moisture	18.02	0.00	0							
TOTAL SOLIDS		100.00	79,587							
SORBENT:										
CaO	56.08	74.50	26,437							
CaCO3	100.09	0.00	0							
CaS	72.14	12.44	4,415							
CaSO4	136.14	0.00	0							
MgO	40.31	3.26	1,158							
MgCO3	84.32	0.00	0							
Inerts		9.79	3,475							
TOTAL SORBENT		100.00	35,485							
TOTAL FLOW, Lb/Hr			115,072	322,837		828		828		
HEATING VALUE:										
Gas LHV, Btu/SCF					129					
Gaseous Fuel LHV, MMBtu/hr					646.1					
TEMPERATURE, F										
PRESSURE, PSIA
		1,790	1,000		1,100		650		
			292	263		340		360		

HEAT AND MATERIAL BALANCE - BASE CASE
UNDRIED SUFCO COAL WITH TRANSPORT DESULFURIZER

IDENTIFICATION	Molecular Weight	29 Desulf. Feed Cyc. Fines Transport Gas		30 Ash Transport Gas		31 Fines Transport Gas		32 Product Gas to Gas Turbine	
		Vol%	Lb/Hr	Vol%	Lb/Hr	Vol%	Lb/Hr	Vol%	Lb/Hr
GASES:									
Carbon Monoxide	28.01	23.91	82	23.91	436	23.91	308	23.91	77,852
Hydrogen	2.02	14.58	4	14.58	19	14.58	14	14.58	3,417
Carbon Dioxide	44.01	5.45	29	5.45	156	5.45	110	5.45	27,887
Methane	16.04	1.35	3	1.35	14	1.35	10	1.35	2,512
Nitrogen	28.01	48.70	167	48.70	887	48.70	627	48.70	158,575
Argon	39.95	0.56	3	0.56	14	0.56	10	0.56	2,589
Oxygen	32.00	0.00	0	0.00	0	0.00	0	0.00	0
Ammonia	17.03	0.02	0	0.02	0	0.02	0	0.02	38
Hydrogen Sulfide	34.08	0.00	0	0.00	0	0.00	0	0.00	8
Carbonyl Sulfide	60.08	0.00	0	0.00	0	0.00	0	0.00	0
Sulfur Dioxide	64.06	0.00	0	0.00	0	0.00	0	0.00	0
Water Vapor	18.02	5.43	12	5.43	64	5.43	45	5.43	11,381
Hydrogen Chloride	36.46	0.00	0	0.00	0	0.00	0	0.00	0
TOTAL GASES		100.00	300	100.00	1,590	100.00	1,125	100.00	284,260
Gas Flow, Lb Moles/Hr			12.3		65.0		46.0		11,624.5
Molecular Weight, Gases			24.45		24.45		24.45		24.45
Gas Volume, ACFM			5.3		33.0		23.4		11546.8
Gas Volume, SCFM			78		411		291		73,495
LIQUIDS:									
Water	18.02								
SOLIDS:									
Carbon	12.01								
Hydrogen	1.01								
Oxygen	16.00								
Nitrogen	14.01								
Sulfur	32.06								
Chlorides	35.45								
Ash									
Moisture	18.02								
TOTAL SOLIDS									
SORBENT:									
CaO	56.08								
CaCO3	100.09								
CaS	72.14								
CaSO4	136.14								
MgO	40.31								
MgCO3	84.32								
Inerts									
TOTAL SORBENT									
TOTAL FLOW, Lb/Hr			300		1,590		1,125		284,260
HEATING VALUE:									
Gas LHV, Btu/SCF			129		129		129		129
Gaseous Fuel LHV, MMBtu/hr			0.6		3.2		2.3		568.9
TEMPERATURE, F									
PRESSURE, PSIA			350		270		270		1,000
			335		257		257		263

HEAT AND MATERIAL BALANCE - BASE CASE
UNDRIED SUFCO COAL WITH TRANSPORT DESULFURIZER

IDENTIFICATION	Molecular Weight	33 Low Pressure Transport Gas		34 High Pressure Transport Gas		35 SFW Blowdown From Sulfator Steam Drum		36 Desulf. Feed Cyc. Fines to HGF	
		Vol%	Lb/Hr	Vol%	Lb/Hr	Wt%	Lb/Hr	Wt%	Lb/Hr
GASES:									
Carbon Monoxide	28.01	23.91	744	23.91	520			23.91	82
Hydrogen	2.02	14.58	33	14.58	23			14.58	4
Carbon Dioxide	44.01	5.45	266	5.45	186			5.45	29
Methane	16.04	1.35	24	1.35	17			1.35	3
Nitrogen	28.01	48.70	1,515	48.70	1,060			48.70	167
Argon	39.95	0.56	25	0.56	17			0.56	3
Oxygen	32.00	0.00	0	0.00	0			0.00	0
Ammonia	17.03	0.02	0	0.02	0			0.02	0
Hydrogen Sulfide	34.08	0.00	0	0.00	0			0.00	0
Carbonyl Sulfide	60.08	0.00	0	0.00	0			0.00	0
Sulfur Dioxide	64.06	0.00	0	0.00	0			0.00	0
Water Vapor	18.02	5.43	109	5.43	76			5.43	12
Hydrogen Chloride	36.46	0.00	0	0.00	0			0.00	0
TOTAL GASES		100.00	2,715	100.00	1,900			100.00	300
Gas Flow, Lb Moles/Hr			111.0		77.7				12.3
Molecular Weight, Gases			24.45		24.45				24.45
Gas Volume, ACFM			56.4		33.6				9.0
Gas Volume, SCFM			702		491				78
LIQUIDS:									
Water	18.02					100.00	854		
SOLIDS:									
Carbon	12.01							54.20	125
Hydrogen	1.01							0.33	1
Oxygen	16.00							0.70	2
Nitrogen	14.01							0.41	1
Sulfur	32.06							0.36	1
Chlorides	35.45							0.00	0
Ash								44.00	102
Moisture	18.02							0.00	0
TOTAL SOLIDS								100.00	231
SORBENT:									
CaO	56.08							74.50	25
CaCO3	100.09							0.00	0
CaS	72.14							12.44	4
CaSO4	136.14							0.00	0
MgO	40.31							3.26	1
MgCO3	84.32							0.00	0
Inerts								9.79	3
TOTAL SORBENT								100.00	34
TOTAL FLOW, Lb/Hr			2,715		1,900		854		565
HEATING VALUE:									
Gas LHV, Btu/SCF			129		129				129
Gaseous Fuel LHV, MMBtu/hr			5.4		3.8				0.6
TEMPERATURE, F									
PRESSURE, PSIA			270		350		553		670
			257		335		1,075		276

HEAT AND MATERIAL BALANCE - BASE CASE
UNDRIED SUFCO COAL WITH TRANSPORT DESULFURIZER

IDENTIFICATION	Molecular Weight	37 Filter Solids From Screw Cooler		38 Gas From Sulfator Cyclone		39 Flue Gas to BH Filter		40 (Note 1) Pressurization Air Vent							
		Wt%	Lb/Hr	Vol%	Lb/Hr	Vol%	Lb/Hr	Vol%	Lb/Hr						
GASES:															
Carbon Monoxide	28.01			0.00	0	0.00	0	0.00	0						
Hydrogen	2.02			0.00	0	0.00	0	0.00	0						
Carbon Dioxide	44.01			15.65	7,484	9.65	18,033	0.00	0						
Methane	16.04			0.00	0	0.00	0	0.00	0						
Nitrogen	28.01			76.52	23,292	77.23	91,879	78.00	2,970						
Argon	39.95			0.88	382	0.89	1,507	0.90	49						
Oxygen	32.00			3.67	1,276	10.33	14,044	20.82	906						
Ammonia	17.03			0.00	1	0.00	1	0.00	0						
Hydrogen Sulfide	34.08			0.00	0	0.00	0	0.00	0						
Carbonyl Sulfide	60.08			0.00	0	0.00	0	0.00	0						
Sulfur Dioxide	64.06			0.00	2	0.01	37	0.00	0						
Water Vapor	18.02			3.28	641	1.88	1,438	0.29	7						
Hydrogen Chloride	36.46			0.00	0	0.00	0	0.00	0						
TOTAL GASES					100.00		33,078		100.00		126,939		100.00		3,932
Gas Flow, Lb Moles/Hr							1,086.6				4,246.7				136.0
Molecular Weight, Gases							30.44				29.89				28.92
Gas Volume, ACFM							27413.7				45215.0				1084.2
Gas Volume, SCFM							6,870				26,849				860
LIQUIDS:															
Water	18.02														
SOLIDS:															
								Wt%							
Carbon	12.01	54.20	2,656					2.35	53						
Hydrogen	1.01	0.33	16					0.00	0						
Oxygen	16.00	0.70	34					1.52	34						
Nitrogen	14.01	0.41	20					0.88	20						
Sulfur	32.06	0.36	18					0.01	0						
Chlorides	35.45	0.00	0					0.00	0						
Ash		44.00	2,156					95.24	2,156						
Moisture	18.02	0.00	0					0.00	0						
TOTAL SOLIDS		100.00	4900					100	2,264						
SORBENT:															
CaO	56.08	74.50	539					74.50	539						
CaCO3	100.09	0.00	0					0.00	0						
CaS	72.14	12.44	90					12.44	90						
CaSO4	136.14	0.00	0					0.00	0						
MgO	40.31	3.26	24					3.26	24						
MgCO3	84.32	0.00	0					0.00	0						
Inerts		9.79	71					9.79	71						
TOTAL SORBENT		100	724					100	724						
TOTAL FLOW, Lb/Hr			5,624			33,078			129,926						3,932
HEATING VALUE:															
Gas LHV, Btu/SCF															
Gaseous Fuel LHV, MMBtu/hr															

TEMPERATURE, F
PRESSURE, PSIA

500
263

1,600
15

350
14

120
13

Note 1 : Time averaged flow.

HEAT AND MATERIAL BALANCE - BASE CASE
UNDRIED SUFCO COAL WITH TRANSPORT DESULFURIZER

IDENTIFICATION	Molecular Weight	41		42		43 (Note 1)		44 (Note 1)
		Total BFW From Sec. 800		Recycle Gas To Gasifier		Ash Hopper Vent Gas		Fines Hopper Vent Gas	
		Wt%	Lb/Hr	Vol%	Lb/Hr	Vol%	Lb/Hr	Vol%	Lb/Hr
GASES:									
Carbon Monoxide	28.01			23.91	4,231	25.21	50	25.21	127
Hydrogen	2.02			14.58	186	15.37	2	15.37	6
Carbon Dioxide	44.01			5.45	1,516	5.75	18	5.75	45
Methane	16.04			1.35	137	1.42	2	1.42	4
Nitrogen	28.01			48.70	8,618	51.34	102	51.34	259
Argon	39.95			0.56	141	0.59	2	0.59	4
Oxygen	32.00			0.00	0	0.00	0	0.00	0
Ammonia	17.03			0.02	2	0.02	0	0.02	0
Hydrogen Sulfide	34.08			0.00	0	0.00	0	0.00	0
Carbonyl Sulfide	60.08			0.00	0	0.00	0	0.00	0
Sulfur Dioxide	64.06			0.00	0	0.00	0	0.00	0
Water Vapor	18.02			5.43	619	0.30	0	0.30	1
Hydrogen Chloride	36.46			0.00	0	0.00	0	0.00	0
TOTAL GASES				100.00	15,448	100.00	176	100.00	446
Gas Flow, Lb Moles/Hr					631.7		7.1		18.0
Molecular Weight, Gases					24.45		24.80		24.80
Gas Volume, ACFM					273.1		2.8		8.4
Gas Volume, SCFM					3,994		45		114
LIQUIDS:									
Water	18.02	100.00	157,995						
SOLIDS:									
Carbon	12.01								
Hydrogen	1.01								
Oxygen	16.00								
Nitrogen	14.01								
Sulfur	32.06								
Chlorides	35.45								
Ash									
Moisture	18.02								
TOTAL SOLIDS									
SORBENT:									
CaO	56.08								
CaCO3	100.09								
CaS	72.14								
CaSO4	136.14								
MgO	40.31								
MgCO3	84.32								
Inerts									
TOTAL SORBENT									
TOTAL FLOW, Lb/Hr			157,995		15,448		176		446
HEATING VALUE:									
Gas LHV, Btu/SCF					129		136		136
Gaseous Fuel LHV, MMBtu/hr					30.9		0.4		0.9
TEMPERATURE, F									
			240				230		230
PRESSURE, PSIA									
			1,075			350 335		310	263

Note: 1. Streams 43 and 44 are time averaged flow rates.

HEAT AND MATERIAL BALANCE - BASE CASE
UNDRIED SUFCO COAL WITH TRANSPORT DESULFURIZER

IDENTIFICATION	Molecular Weight	45 3 BFW to Air Precooler		46 3 Ash To Collection Hopper		47 3 BFW to Recycle Gas Cooler		48 3 Recycle Gas To Filter		
		Wt%	Lb/Hr	Wt%	Lb/Hr	Wt%	Lb/Hr	Vol%	Lb/Hr	
GASES:										
Carbon Monoxide	28.01			23.91	438			23.91	438	
Hydrogen	2.02			14.58	19			14.58	19	
Carbon Dioxide	44.01			5.45	157			5.45	157	
Methane	16.04			1.35	14			1.35	14	
Nitrogen	28.01			48.70	893			48.70	893	
Argon	39.95			0.56	15			0.56	15	
Oxygen	32.00			0.00	0			0.00	0	
Ammonia	17.03			0.02	0			0.02	0	
Hydrogen Sulfide	34.08			0.00	0			0.00	0	
Carbonyl Sulfide	60.08			0.00	0			0.00	0	
Sulfur Dioxide	64.06			0.00	0			0.00	0	
Water Vapor	18.02			5.43	64			5.43	64	
Hydrogen Chloride	36.46			0.00	0			0.00	0	
TOTAL GASES				100.00	1,600			100.00	1600	
Gas Flow, Lb Moles/Hr					65.4	65.4				
Molecular Weight, Gases					24.45	24.45				
Gas Volume, ACFM					36.2	36.2				
Gas Volume, SCFM					414	414				
LIQUIDS:										
Water	18.02	100.00	51,550			100.00	62,887			
SOLIDS:										
Carbon	12.01			27.19	1,685					
Hydrogen	1.01			0.07	5					
Oxygen	16.00			0.35	22					
Nitrogen	14.01			0.22	14					
Sulfur	32.06			0.17	10					
Chlorides	35.45			0.00	0					
Ash				72.00	4,463					
Moisture	18.02			0.00	0					
TOTAL SOLIDS				100.00	6,199					
SORBENT:										
CaO	56.08			74.50	1305.26					
CaCO3	100.09			0.00	0.00					
CaS	72.14			12.44	217.98					
CaSO4	136.14			0.00	0.00					
MgO	40.31			3.26	57.17					
MgCO3	84.32			0.00	0.00					
Inerts				9.79	171.59					
TOTAL SORBENT				100.00	1752.00					
TOTAL FLOW, Lb/Hr			51,550	9,551		62,887		1,600		
HEATING VALUE:										
Gas LHV, Btu/SCF										
Gaseous Fuel LHV, MMBtu/hr										
TEMPERATURE, F										
PRESSURE, PSIA			240	500		240		500		
			1,075	310		1,075		310		

HEAT AND MATERIAL BALANCE - BASE CASE
UNDRIED SUFCO COAL WITH TRANSPORT DESULFURIZER

IDENTIFICATION	Molecular Weight	49 Air To Sulfator		50 Steam From Product Gas Trim Cooler		51 Net Steam From Sulfator Steam Drum		52 Steam From Product Gas Cooler	
		Vol%	Lb/Hr	Vol%	Lb/Hr	Vol%	Lb/Hr	Vol%	Lb/Hr
GASES:									
Carbon Monoxide	28.01	0.00	0						
Hydrogen	2.02	0.00	0						
Carbon Dioxide	44.01	0.00	0						
Methane	16.04	0.00	0						
Nitrogen	28.01	78.00	20,677						
Argon	39.95	0.90	339						
Oxygen	32.00	20.82	6,305						
Ammonia	17.03	0.00	0						
Hydrogen Sulfide	34.08	0.00	0						
Carbonyl Sulfide	60.08	0.00	0						
Sulfur Dioxide	64.06	0.00	0						
Water Vapor	18.02	0.29	49	100.00	34,182	100.00	42,704	100.00	59,297
Hydrogen Chloride	36.46	0.00	0						
TOTAL GASES		100.00	27,370	100.00	34,182	100.00	42,704	100.00	59,297
Gas Flow, Lb Moles/Hr			946.4		1,897.4		2,370.5		3,291.5
Molecular Weight, Gases			28.92		18.02		18.02		18.02
Gas Volume, ACFM			4486.3		239.8		299.6		416.0
Gas Volume, SCFM			5,983		11,998		14,989		20,813
LIQUIDS:									
Water	18.02								
SOLIDS:									
Carbon	12.01								
Hydrogen	1.01								
Oxygen	16.00								
Nitrogen	14.01								
Sulfur	32.06								
Chlorides	35.45								
Ash									
Moisture	18.02								
TOTAL SOLIDS									
SORBENT:									
CaO	56.08								
CaCO3	100.09								
CaS	72.14								
CaSO4	136.14								
MgO	40.31								
MgCO3	84.32								
Inerts									
TOTAL SORBENT									
TOTAL FLOW, Lb/Hr			27,370		34,182		42,704		59,297
HEATING VALUE:									
Gas LHV, Btu/SCF									
Gaseous Fuel LHV, MMBtu/hr									
TEMPERATURE, F									
			150		553		553		553
PRESSURE, PSIA									
			23		1,075		1,075		1,075

HEAT AND MATERIAL BALANCE - BASE CASE
UNDRIED SUFCO COAL WITH TRANSPORT DESULFURIZER

IDENTIFICATION	Molecular Weight	53 <div>3</div> Total Blowdown to Sec. 800		54 <div>3</div> Steam From Gasifier Steam Drum		55 <div>3</div> Total Gas Flow To HGF		56 <div>3</div> Pri. Solids Cooler Fluidization Air	
		Wt%	Lb/Hr	Vol%	Lb/Hr	Vol%	Lb/Hr	Vol%	Lb/Hr
GASES:									
Carbon Monoxide	28.01					23.89	87,124	0.00	0
Hydrogen	2.02					14.57	3,824	0.00	0
Carbon Dioxide	44.01					5.45	31,209	0.00	0
Methane	16.04					1.35	2,812	0.00	0
Nitrogen	28.01					48.66	177,460	78.00	738
Argon	39.95					0.56	2,897	0.90	12
Oxygen	32.00					0.00	0	20.82	225
Ammonia	17.03					0.02	42	0.00	0
Hydrogen Sulfide	34.08					0.00	9	0.00	0
Carbonyl Sulfide	60.08					0.00	0	0.00	0
Sulfur Dioxide	64.06					0.00	0	0.00	0
Water Vapor	18.02			100.00	112,193	5.51	12,912	0.29	2
Hydrogen Chloride	36.46					0.00	0	0.00	0
TOTAL GASES					100.00	112,193	100.00	318,289	977
Gas Flow, Lb Moles/Hr						6,227.8		13018.7	33.8
Molecular Weight, Gases						18.02		24.45	28.92
Gas Volume, ACFM						787.1		12597.7	
Gas Volume, SCFM						39,380		82,310	
LIQUIDS:									
Water	18.02	100.00	3,098						
SOLIDS:									
Carbon	12.01					54.20	2,656		
Hydrogen	1.01					0.33	16		
Oxygen	16.00					0.70	34		
Nitrogen	14.01					0.41	20		
Sulfur	32.06					0.36	18		
Chlorides	35.45					0.00	0		
Ash						44.00	2,156		
Moisture	18.02					0.00	0		
TOTAL SOLIDS						100.00	4,900		
SORBENT:									
CaO	56.08					74.50	539		
CaCO3	100.09					0.00	0		
CaS	72.14					12.44	90		
CaSO4	136.14					0.00	0		
MgO	40.31					3.26	24		
MgCO3	84.32					0.00	0		
Inerts						9.79	71		
TOTAL SORBENT						100.00	724		
TOTAL FLOW, Lb/Hr			3,098		112,193		323,913		977
HEATING VALUE:									
Gas LHV, Btu/SCF							129		
Gaseous Fuel LHV, MMBtu/hr							637.0		
TEMPERATURE, F									
PRESSURE, PSIA			553		553		1,011		110
			1.075		1.075		272		155

HEAT AND MATERIAL BALANCE - BASE CASE
UNDRIED SUFCA COAL WITH TRANSPORT DESULFURIZER

IDENTIFICATION	Molecular Weight	57		58		59		60
		Total BFW To Sulfator HRS		Total Steam Export to Sec. 800		Air To Fines Combustor		Fines Combustor Effluents To HRS		
		Wt%	Lb/Hr	Vol%	Lb/Hr	Vol%	Lb/Hr	Vol%	Lb/Hr	
GASES:										
Carbon Monoxide	28.01					0.00	0	0.00	0	
Hydrogen	2.02					0.00	0	0.00	0	
Carbon Dioxide	44.01					0.00	0	9.65	18,033	
Methane	16.04					0.00	0	0.00	0	
Nitrogen	28.01					78.00	67,957	77.23	91,879	
Argon	39.95					0.90	1,115	0.89	1,507	
Oxygen	32.00					20.82	20,722	10.33	14,044	
Ammonia	17.03					0.00	0	0.00	1	
Hydrogen Sulfide	34.08					0.00	0	0.00	0	
Carbonyl Sulfide	60.08					0.00	0	0.00	0	
Sulfur Dioxide	64.06					0.00	0	0.01	37	
Water Vapor	18.02			100.00	154,897	0.29	160	1.88	1,438	
Hydrogen Chloride	36.46					0.00	0	0.00	0	
TOTAL GASES					100.00	154,897	100.00	89,954	100.00	126,939
Gas Flow, Lb Moles/Hr						8,598.2		3,110.3		4,246.7
Molecular Weight, Gases						18.02		28.92		29.89
Gas Volume, ACFM						1,294.2		19268.7		117542.6
Gas Volume, SCFM						54,369		19,665		26,849
LIQUIDS:										
Water	18.02	100.00	43,558							
SOLIDS:										
								Wt%		
Carbon	12.01							2.35		53
Hydrogen	1.01							0.00		0
Oxygen	16.00							1.52		34
Nitrogen	14.01							0.88		20
Sulfur	32.06							0.01		0
Chlorides	35.45							0.00		0
Ash								95.24		2,156
Moisture	18.02							0.00		0
TOTAL SOLIDS								100.00		2,264
SORBENT:										
CaO	56.08							74.50		539
CaCO3	100.09							0.00		0
CaS	72.14							12.44		90
CaSO4	136.14							0.00		0
MgO	40.31							3.26		24
MgCO3	84.32							0.00		0
Inerts								9.79		71
TOTAL SORBENT								100.00		724.00
TOTAL FLOW, Lb/Hr			43,558		154,897		89,954			129,926
HEATING VALUE:										
Gas LHV, Btu/SCF										
Gaseous Fuel LHV, MMBtu/hr										
TEMPERATURE, F										
			240		600		150			1,800
PRESSURE, PSIA										
			1,075		1,020		18			15

HEAT AND MATERIAL BALANCE - BASE CASE
UNDRIED SUFCO COAL WITH TRANSPORT DESULFURIZER

IDENTIFICATION	Molecular Weight	61 Cooled Extraction Air To C201		62 BFW/Steam From E607 To SG401		63 Total Desulfurizer Aeration Gas		64 Sulfator Fines From BH Filter	
		Vol%	Lb/Hr	Vol%	Lb/Hr	Vol%	Lb/Hr	Wt%	Lb/Hr
GASES:									
Carbon Monoxide	28.01	0.00	0			23.91	3,600		
Hydrogen	2.02	0.00	0			14.58	158		
Carbon Dioxide	44.01	0.00	0			5.45	1,289		
Methane	16.04	0.00	0			1.35	116		
Nitrogen	28.01	78.00	163,304			48.70	7,332		
Argon	39.95	0.90	2,678			0.56	120		
Oxygen	32.00	20.82	49,797			0.00	0		
Ammonia	17.03	0.00	0			0.02	2		
Hydrogen Sulfide	34.08	0.00	0			0.00	0		
Carbonyl Sulfide	60.08	0.00	0			0.00	0		
Sulfur Dioxide	64.06	0.00	0			0.00	0		
Water Vapor	18.02	0.29	385	100.00	196	5.43	526		
Hydrogen Chloride	36.46	0.00	0			0.00	0		
TOTAL GASES		100.00	216,164	100.00	196	100	13,144		
Gas Flow, Lb Moles/Hr			7,474		11		538		
Molecular Weight, Gases			28.92		18.02		24.45		
Gas Volume, ACFM			4912.8		1.4		232.3		
Gas Volume, SCFM			47,255		69		3,398		
LIQUIDS:									
Water	18.02								
SOLIDS:									
Carbon	12.01							2.35	53
Hydrogen	1.01							0.00	0
Oxygen	16.00							1.52	34
Nitrogen	14.01							0.88	20
Sulfur	32.06							0.01	0
Chlorides	35.45							0.00	0
Ash								95.24	2,156
Moisture	18.02							0.00	0
TOTAL SOLIDS								100	2,264
SORBENT:									
CaO	56.08							74.50	539
CaCO3	100.09							0.00	0
CaS	72.14							12.44	90
CaSO4	136.14							0.00	0
MgO	40.31							3.26	24
MgCO3	84.32							0.00	0
Inerts								9.79	71
TOTAL SORBENT								100	724
TOTAL FLOW, Lb/Hr			216,164		196		13,144		2,988
HEATING VALUE:									
Gas LHV, Btu/SCF							129		
Gaseous Fuel LHV, MMBtu/hr							26.3		
TEMPERATURE, F									
PRESSURE, PSIA			110		553		350		350
			155		1,075		335		14

HEAT AND MATERIAL BALANCE - BASE CASE
UNDRIED SUFCO COAL WITH TRANSPORT DESULFURIZER

IDENTIFICATION	Molecular Weight	65 <div>3</div> Cooled Product Gas To Desulfurizer		66 (Note 1) <div>3</div> Sorbent Recirculation to Desulfurizer		67 <div>3</div> Spent Sorbent To Regenerator		68 <div>3</div> Sorbent Regenerant Gas	
		Vol%	Lb/Hr	Wt%	Lb/Hr	Wt%	Lb/Hr	Vol%	Lb/Hr
GASES:									
Carbon Monoxide	28.01	23.89	82,996					0.00	0
Hydrogen	2.02	14.57	3,643					0.00	0
Carbon Dioxide	44.01	5.44	29,708					0.00	0
Methane	16.04	1.35	2,679					0.00	0
Nitrogen	28.01	48.65	169,052					83.81	626
Argon	39.95	0.56	2,760					0.96	10
Oxygen	32.00	0.00	0					0.00	0
Ammonia	17.03	0.02	40					0.00	0
Hydrogen Sulfide	34.08	0.03	127					0.00	0
Carbonyl Sulfide	60.08	0.00	30					0.00	0
Sulfur Dioxide	64.06	0.00	0					14.91	255
Water Vapor	18.02	5.50	12,284					0.31	1
Hydrogen Chloride	36.46	0.00	0					0.00	0
TOTAL GASES		100.00	303,319					99.99	892
Gas Flow, Lb Moles/Hr			12,404						26.65
Molecular Weight, Gases			24						33.47
Gas Volume, ACFM			11989.2						32.1
Gas Volume, SCFM			78,425						168
LIQUIDS:									
Water	18.02								
SOLIDS:									
		Wt%							
Carbon	12.01	54.20	2,531						
Hydrogen	1.01	0.33	15						
Oxygen	16.00	0.70	33						
Nitrogen	14.01	0.41	19						
Sulfur	32.06	0.36	17						
Chlorides	35.45	0.00	0						
Ash		44.00	2,054						
Moisture	18.02	0.00	0						
TOTAL SOLIDS		100.00	4,669						
SORBENT:									
CaO	56.08	74.50	514						
CaCO3	100.09	0.00	0						
CaS	72.14	12.44	86						
CaSO4	136.14	0.00	0						
MgO	40.31	3.26	23						
MgCO3	84.32	0.00	0						
Inerts		9.79	68						
TOTAL SORBENT		100.00	690		694,000		9,064		
TOTAL FLOW, Lb/Hr			308,678		694,000		9,064		892
HEATING VALUE:									
Gas LHV, Btu/SCF			129						
Gaseous Fuel LHV, MMBtu/hr			607.4						
TEMPERATURE, F									
PRESSURE, PSIA		1,032		1,013		1,013			1,368
		276		274		278			272

Note 1: Sorbent referred to in streams 66, 67, and 69 is the external desulfurizer sorbent.

HEAT AND MATERIAL BALANCE - BASE CASE
UNDRIED SUFCO COAL WITH TRANSPORT DESULFURIZER

IDENTIFICATION	Molecular Weight	69 Regenerated Sorbent To Desulfurizer		70 Desulf Standpipe Aeration Gas		71 Natural Gas To Fines Combustor		72 Steam From Pri. Solids Cooler	
		Wt%	Lb/Hr	Vol%	Lb/Hr	Vol%	Lb/Hr	Vol%	Lb/Hr
GASES:									
Carbon Monoxide	28.01			23.91	644				
Hydrogen	2.02			14.58	28				
Carbon Dioxide	44.01			5.45	231				
Methane	16.04			1.35	21				
Nitrogen	28.01			48.70	1,312				
Argon	39.95			0.56	21				
Oxygen	32.00			0.00	0				
Ammonia	17.03			0.02	0				
Hydrogen Sulfide	34.08			0.00	0				
Carbonyl Sulfide	60.08			0.00	0				
Sulfur Dioxide	64.06			0.00	0				
Water Vapor	18.02			5.43	94			100.00	18,518
Hydrogen Chloride	36.46			0.00	0				
TOTAL GASES		--		100.00	2,352		146	100.00	18,518
Gas Flow, Lb Moles/Hr					96		8		1,028
Molecular Weight, Gases					24.45		17.20		18.02
Gas Volume, ACFM					41.6		10.71		129.9
Gas Volume, SCFM					608		54		6,500
LIQUIDS:									
Water	18.02								
SOLIDS:									
Carbon	12.01								
Hydrogen	1.01								
Oxygen	16.00								
Nitrogen	14.01								
Sulfur	32.06								
Chlorides	35.45								
Ash									
Moisture	18.02								
TOTAL SOLIDS									
SORBENT:									
CaO	56.08								
CaCO3	100.09								
CaS	72.14								
CaSO4	136.14								
MgO	40.31								
MgCO3	84.32								
Inerts									
TOTAL SORBENT			9,000						
TOTAL FLOW, Lb/Hr			9,000		2,352		146		18,518
HEATING VALUE:									
Gas LHV, Btu/SCF					129		936		
Gaseous Fuel LHV, MMBtu/hr					4.7		3.0		
TEMPERATURE, F									
			1,368		350		52		553
PRESSURE, PSIA									
			277		335		73		1,075

HEAT AND MATERIAL BALANCE - BASE CASE
UNDRIED SUFCO COAL WITH TRANSPORT DESULFURIZER

IDENTIFICATION	Molecular Weight	73 Aeration Rec. Gas to HGF Bottom Cone		74 Desulfurizer J-leg Aeration Gas	
		Vol%	Lb/Hr	Vol%	Lb/Hr
GASES:					
Carbon Monoxide	28.01	23.91	27	23.91	1,833
Hydrogen	2.02	14.58	1	14.58	80
Carbon Dioxide	44.01	5.45	10	5.45	657
Methane	16.04	1.35	1	1.35	59
Nitrogen	28.01	48.70	56	48.70	3,733
Argon	39.95	0.56	1	0.56	61
Oxygen	32.00	0.00	0	0.00	0
Ammonia	17.03	0.02	0	0.02	1
Hydrogen Sulfide	34.08	0.00	0	0.00	0
Carbonyl Sulfide	60.08	0.00	0	0.00	0
Sulfur Dioxide	64.06	0.00	0	0.00	0
Water Vapor	18.02	5.43	4	5.43	268
Hydrogen Chloride	36.46	0.00	0	0.00	0
TOTAL GASES		100	100	100.00	6,692
Gas Flow, Lb Moles/Hr		4.09		274	
Molecular Weight, Gases		24.45		24.45	
Gas Volume, ACFM		1.77		118.3	
Gas Volume, SCFM		25.85		1,730	
LIQUIDS:					
Water	18.02				
SOLIDS:					
Carbon	12.01				
Hydrogen	1.01				
Oxygen	16.00				
Nitrogen	14.01				
Sulfur	32.06				
Chlorides	35.45				
Ash					
Moisture	18.02				
TOTAL SOLIDS					
SORBENT:					
CaO	56.08				
CaCO3	100.09				
CaS	72.14				
CaSO4	136.14				
MgO	40.31				
MgCO3	84.32				
Inerts					
TOTAL SORBENT					
TOTAL FLOW, Lb/Hr		100		6,692	
HEATING VALUE:					
Gas LHV, Btu/SCF		129		129	
Gaseous Fuel LHV, MMBtu/hr		0.2		13.4	
TEMPERATURE, F					
PRESSURE, PSIA		350		350	
		335		335	