

APPENDIX H
TRANSMISSION SYSTEM ENGINEERING

**APPENDIX H1
TRANSMISSION INTERCONNECTION REQUEST**

Mirant Delta, LLC
696 West 10th Street, PO Box 192, Pittsburg, CA 94565
T 925 427 3500 F 925 427 3518 U www.mirant.com



March 14, 2008

Ms. Judy Brown
New Resource Interconnection
California ISO
151 Blue Ravine Road
Folsom, CA 95630

Re: LGIP Interconnection Request
Pittsburg Power Plant
Combined Cycle Units

Dear Ms. Brown,

Enclosed please find the LGIP Interconnection Request by Mirant Delta, LLC for the Pittsburg Power Plant – Combined Cycle Units. Also enclosed is a check to California ISO for the applicable deposit amount. Regarding evidence of site control, Mirant Delta, LLC (formerly known as Southern Energy Delta, L.L.C.) owns the site as evidenced by the Grant Deed dated as of April 15, 1999. The Grant Deed was transmitted to California ISO on March 7, 2008; Linda Wright is holding it to add to this Interconnection Request.

Please contact Chuck Hicklin (contact information noted on the application form) or call me at (925) 427-3560 if you have any questions or require additional information in order to process our application. Mirant looks forward to working with California ISO to develop this project.

Sincerely,

A handwritten signature in blue ink, appearing to read "John Chillemi".

John Chillemi
President

Enclosures

MIRANT

Mirant Delta, LLC
1155 Perimeter Center West
Atlanta, GA 30338

BANK OF AMERICA N A

7012248

CHECK DATE	CHECK NUMBER	CHECK AMOUNT
13-MAR-08	7012248	*****10,000.00

PAY Ten Thousand Dollars And 00 Cents*****

TO THE ORDER OF CALIFORNIA INDEPENDENT SYSTEM OPERATOR
151 BLUE RAVINE ROAD
FOLSOM, CA 95746
United States



⑈007012248⑈ ⑆111000012⑆ 3751795166⑈

YOUR INVOICE NUMBER	INVOICE DATE	DESCRIPTION	DISCOUNT TAKEN	NET CHECK AMOUNT
100000011MAR20	11-MAR-08	Deposit for interconnect applic	0.00	10,000.00

Totals: 0.00 10,000.00

RECEIVED

**APPENDIX 1 to LGIP
INTERCONNECTION REQUEST**

1/17/2008

Provide **three copies** of this completed form pursuant to Section 6 below.

1. The undersigned Interconnection Customer submits this request to interconnect its Large Generating Facility with the ISO Controlled Grid pursuant to the ISO Tariff.

2. This Interconnection Request is for (check one):

- A proposed new Large Generating Facility.
 An increase in the generating capacity or a Material Modification of an existing Generating Facility.

3. The Interconnection Customer provides the following information:

a. Address or location, including the county, of the proposed new Large Generating Facility site or, in the case of an existing Generating Facility, the name and specific location, including the county, of the existing Generating Facility.

Project Name: **Pittsburg Power Plant – Combined Cycle Units**

Project Location:

Street Address: **696 West Tenth Street**
City, State: **Pittsburg, CA**
County: **Contra Costa (Unincorporated)**
Zip Code: **94565**

b. Maximum megawatt electrical output of the proposed new Large Generating Facility or the amount of megawatt increase in the generating capacity of an existing Generating Facility:

Maximum megawatt electrical output (Net MW): **611** or
Megawatt increase (Net MW):

c. Type of project (i.e., gas turbine, hydro, wind, etc.) and general description of the equipment configuration:

- | | |
|--|---|
| <input type="checkbox"/> Cogeneration | <input type="checkbox"/> Reciprocating Engine |
| <input type="checkbox"/> Biomass | <input type="checkbox"/> Steam Turbine |
| <input type="checkbox"/> Gas Turbine | <input type="checkbox"/> Wind |
| <input type="checkbox"/> Hydro | <input type="checkbox"/> Photovoltaic |
| <input checked="" type="checkbox"/> Combined Cycle | |

Other (please describe):

General description of the equipment configuration:

Two one on one combined cycle generators

CALIFORNIA INDEPENDENT SYSTEM OPERATOR CORPORATION
FERC ELECTRIC TARIFF
FIRST REPLACEMENT VOLUME NO. I

- d. Proposed In-Service Date, Trial Operation date and Commercial Operation Date by month, day, and year and term of service.

Proposed In-Service date: **12 / 30 / 2011**
Proposed Trial Operation date: **06 / 30 / 2012 (first of two units)**
Proposed Commercial Operation date: **09 / 30 / 2012 (first of two units)**
Proposed Term of Service: **30 years**

- e. Name, address, telephone number, and e-mail address of the Interconnection Customer's contact person.

Name: **Chuck Hicklin**
Title: **Engineering Manager**
Company Name: **Mirant Delta, LLC**
Street Address: **696 West Tenth Street**
City, State: **Pittsburg, CA**
Zip Code: **94565**
Phone Number: **(925) 779-6512**
Fax Number: **(925) 779-6509**
Email Address: **chuck.hicklin@mirant.com**

- f. Approximate location of the proposed Point of Interconnection (i.e., specify interconnection point(s) and the location of interconnection):

Pittsburg 230 kV switchyard.

- g. Interconnection Customer Data (set forth in Attachment A).

On, or before, the return of the executed Interconnection Feasibility Study Agreement to the ISO, the Interconnection Customer shall provide to the ISO the technical data called for in LGIP Appendix 1, Attachment A. Three (3) copies are required.

4. Applicable deposit amount as specified in the Interim LGIP made payable to California ISO. Send check to CAISO with Appendix 1 to LGIP Interconnection Request for processing.
5. Evidence of Site Control as specified in the LGIP and name(s), address(es) and contact information of site owner(s) (check one):

- Is attached to this Interconnection Request
 Will be provided at a later date in accordance with this LGIP

Mirant Delta, LLC (formerly known as Southern Energy Delta, L.L.C.) owns the site as evidenced by the Grant Deed dated as of April 15, 1999. Grant Deed transmitted to California ISO on March 7, 2008; Linda Wright is holding it to add to this Interconnection Request.

6. This Interconnection Request shall be submitted to the representative indicated below:
Judy Brown
New Resource Interconnection
California ISO
P.O. Box 639014
Folsom, CA 95763-9014
Overnight address: 151 Blue Ravine Road, Folsom, CA 95630

CALIFORNIA INDEPENDENT SYSTEM OPERATOR CORPORATION
FERC ELECTRIC TARIFF
FIRST REPLACEMENT VOLUME NO. I

7. Representative of the Interconnection Customer to contact [To be completed by the Interconnection Customer].

Name: **Chuck Hicklin**
Title: **Engineering Manager**
Company Name: **Mirant Delta, LLC**
Street Address: **696 West Tenth Street**
City, State: **Pittsburg, CA**
Zip Code: **94565**
Phone Number: **(925) 779-6512**
Fax Number: **(925) 779-6509**
Email Address: **chuck.hicklin@mirant.com**

9. This Interconnection Request is submitted by: **Chuck Hicklin**

Name of the Interconnection Customer: **Mirant Delta, LLC**

By (signature):



Name (type or print): **John Chillemi**

Title: **President**

Date: **March 14, 2008**

**Attachment A
To Part 1
Interconnection Request**

LARGE GENERATING FACILITY DATA

Provide three copies of this completed form pursuant to Section 7 of Part 1.

1. Provide two original prints and one reproducible copy (no larger than 36" x 24") of the following:

- A. Site drawing to scale, showing generator location and point of interconnection with the ISO Controlled Grid. (See Attachment A-1.)
- B. Single-line diagram showing applicable equipment such as generating units, step-up transformers, auxiliary transformers, switches/disconnects of the proposed interconnection, including the required protection devices and circuit breakers. For wind generator farms, the one line diagram should include the distribution lines connecting the various groups of generating units, the generator capacitor banks, the step up transformers, the distribution lines, and the substation transformers and capacitor banks at the point of interconnection with the utility. (See Attachment A-2.)

2. Generating Facility Information

- A) Total Generating Facility rated output (kW): 626,000 kW
- B) Generating Facility auxiliary load (kW): 15,000 kW
- C) Project net capacity (kW): 611,000 kW
- D) Standby load when Generating Facility is off-line (kW): TBD (< 15,000 kW)
- E) Number of Generating Units: four (two 285 MVA GTs and two 83 MVA STs operated in 1 on 1 combined cycle mode)
(Please repeat the following items for each generator)

285 MVA Units

- F) Individual generator rated output (kW for each unit): 242,000 kW
- G) Manufacturer: Siemens
- H) Year Manufactured: TBD
- I) Nominal Terminal Voltage: 16.5 kV
- J) Rated Power Factor (%): 85%
- K) Type (Induction, Synchronous, D.C. with Inverter): Synchronous
- L) Phase (3 phase or single phase): 3-phase
- M) Connection (Delta, Grounded WYE, Ungrounded WYE, impedance grounded): Delta (secondary) – Grounded WYE (Primary)
- N) Generator Voltage Regulation Range: 0.94 to 1.06 p.u.
- O) Generator Power Factor Regulation Range: N/A

83 MVA Units

- F) Individual generator rated output (kW for each unit): 71,000 kW
- G) Manufacturer: Siemens
- H) Year Manufactured: TBD
- I) Nominal Terminal Voltage: 13.8 kV
- J) Rated Power Factor (%): 85%
- K) Type (Induction, Synchronous, D.C. with Inverter): Synchronous
- L) Phase (3 phase or single phase): 3-phase

- M) Connection (Delta, Grounded WYE, Ungrounded WYE, impedance grounded): Delta (secondary) – Grounded WYE (Primary)
- N) Generator Voltage Regulation Range: 0.94 to 1.06 p.u.
- O) Generator Power Factor Regulation Range: N/A

P) For combined cycle plants, specify the plant output for an outage of the steam turbine or an outage of a single combustion turbine:

Outage of one ST: 540,000 kW (net)

Outage of one CT: 305,500 kW (net)

3. Synchronous Generator – General Information:

(Please repeat the following for each generator)

285 MVA Units

- A. Rated Generator speed (rpm): 3600 rpm
- B. Rated MVA: 285 MVA
- C. Rated Generator Power Factor: 0.85
- D. Generator Efficiency at Rated Load (%): 98.75% (including excitation and bearing losses)
- E. Moment of Inertia (including prime mover): 496,446 lb_r-ft²
- F. Inertia Time Constant (on machine base) H: 5.21 sec.
- G. SCR (Short-Circuit Ratio - the ratio of the field current required for rated open-circuit voltage to the field current required for rated short-circuit current): 0.45
- H. Please attach generator reactive capability curves. See Attachment A-2.
- I. Rated Hydrogen Cooling Pressure in psig (Steam Units only): N/A
- J. Please attach a plot of generator terminal voltage versus field current that shows the air gap line, the open-circuit saturation curve, and the saturation curve at full load and rated power factor. See Attachment A-2.

83 MVA Units

- A. Rated Generator speed (rpm): 3600 rpm
- B. Rated MVA: 83 MVA
- C. Rated Generator Power Factor: 0.85
- D. Generator Efficiency at Rated Load (%): 98.22% (including excitation and bearing losses)
- E. Moment of Inertia (including prime mover): 65,429 lb_r-ft²
- F. Inertia Time Constant (on machine base) H: 2.36 sec.
- G. SCR (Short-Circuit Ratio - the ratio of the field current required for rated open-circuit voltage to the field current required for rated short-circuit current): 0.51
- H. Please attach generator reactive capability curves. See Attachment A-2.
- I. Rated Hydrogen Cooling Pressure in psig (Steam Units only): N/A – Air Cooled
- J. Please attach a plot of generator terminal voltage versus field current that shows the air gap line, the open-circuit saturation curve, and the saturation curve at full load and rated power factor. See Attachment A-2.

4. Excitation System Information

(Please repeat the following for each generator)

285 MVA Units

A. Indicate the Manufacturer SIEMENS and Type 7 of excitation system used for the generator. For exciter type, please choose from 1 to 8 below or describe the specific excitation system.

- 1) Rotating DC commutator exciter with continuously acting regulator. The regulator power source is independent of the generator terminal voltage and current.
- 2) Rotating DC commutator exciter with continuously acting regulator. The regulator power source is bus fed from the generator terminal voltage.
- 3) Rotating DC commutator exciter with non-continuously acting regulator (i.e., regulator adjustments are made in discrete increments).
- 4) Rotating AC Alternator Exciter with non-controlled (diode) rectifiers. The regulator power source is independent of the generator terminal voltage and current (not bus-fed).
- 5) Rotating AC Alternator Exciter with controlled (thyristor) rectifiers. The regulator power source is fed from the exciter output voltage.
- 6) Rotating AC Alternator Exciter with controlled (thyristor) rectifiers.
- 7) Static Exciter with controlled (thyristor) rectifiers. The regulator power source is bus-fed from the generator terminal voltage.
- 8) Static Exciter with controlled (thyristor) rectifiers. The regulator power source is bus-fed from a combination of generator terminal voltage and current (compound-source controlled rectifiers system).

B. Attach a copy of the block diagram of the excitation system from its instruction manual. The diagram should show the input, output, and all feedback loops of the excitation system. See Attachment A-2.

C. Excitation system response ratio (ASA): 3.5 (for 200% ceiling voltage factor)

D. Full load rated exciter output voltage: 447.6 V

E. Maximum exciter output voltage (ceiling voltage): 895 V

F. Other comments regarding the excitation system?

83 MVA Units

A. Indicate the Manufacturer SIEMENS and Type 4 of excitation system used for the generator. For exciter type, please choose from 1 to 8 below or describe the specific excitation system.

- 1) Rotating DC commutator exciter with continuously acting regulator. The regulator power source is independent of the generator terminal voltage and

current.

- 2) Rotating DC commutator exciter with continuously acting regulator. The regulator power source is bus fed from the generator terminal voltage.
 - 3) Rotating DC commutator exciter with non-continuously acting regulator (i.e., regulator adjustments are made in discrete increments).
 - 4) Rotating AC Alternator Exciter with non-controlled (diode) rectifiers. The regulator power source is independent of the generator terminal voltage and current (not bus-fed).
 - 5) Rotating AC Alternator Exciter with controlled (thyristor) rectifiers. The regulator power source is fed from the exciter output voltage.
 - 6) Rotating AC Alternator Exciter with controlled (thyristor) rectifiers.
 - 7) Static Exciter with controlled (thyristor) rectifiers. The regulator power source is bus-fed from the generator terminal voltage.
 - 8) Static Exciter with controlled (thyristor) rectifiers. The regulator power source is bus-fed from a combination of generator terminal voltage and current (compound-source controlled rectifiers system).
- B.** Attach a copy of the block diagram of the excitation system from its instruction manual. The diagram should show the input, output, and all feedback loops of the excitation system. See Attachment A-2.
- C.** Excitation system response ratio (ASA): 1.24
- D.** Full load rated exciter output voltage: 163 V
- E.** Maximum exciter output voltage (ceiling voltage): 228 V
- F.** Other comments regarding the excitation system?

5. Power System Stabilizer Information.

(Please repeat the following for each generator. All new generators are required to install PSS unless an exemption has been obtained from WECC. Such an exemption can be obtained for units that do not have suitable excitation systems.)

285 MVA Units

- A. Manufacturer: Siemens
B. Is the PSS digital or analog? Digital
C. Note the input signal source for the PSS?
X Bus frequency _____ Shaft speed _____ Bus Voltage
X – Generator Electrical Power Other (specify source)
D. Please attach a copy of a block diagram of the PSS from the PSS Instruction Manual and the correspondence between dial settings and the time constants or PSS gain. See Attachment A-2.
E: Other comments regarding the PSS?

83 MVA Units

- A. Manufacturer: Siemens
B. Is the PSS digital or analog? Digital
C. Note the input signal source for the PSS?
X Bus frequency _____ Shaft speed _____ Bus Voltage
X – Generator Electrical Power Other (specify source)
D. Please attach a copy of a block diagram of the PSS from the PSS Instruction Manual and the correspondence between dial settings and the time constants or PSS gain. See Attachment A-2.
E: Other comments regarding the PSS?

6. Turbine-Governor Information

(Please repeat the following for each generator)

Please complete Part A for steam, gas or combined-cycle turbines, Part B for hydro turbines, and Part C for both.

285 MVA Units

- A. Steam, gas or combined-cycle turbines:
- 1.) List type of unit (Steam, Gas, or Combined-cycle): Gas
 - 2.) If steam or combined-cycle, does the turbine system have a reheat process (i.e., both high and low pressure turbines)? N/A
 - 3.) If steam with reheat process, or if combined-cycle, indicate in the space provided, the percent of full load power produced by each turbine:
Low pressure turbine or gas turbine: N/A%
High pressure turbine or steam turbine: N/A%
- B. Hydro turbines:

- 1.) Turbine efficiency at rated load: _____%
- 2.) Length of penstock: _____ft
- 3.) Average cross-sectional area of the penstock: _____ft²
- 4.) Typical maximum head (vertical distance from the bottom of the penstock, at the gate, to the water level): _____ft
- 5.) Is the water supply run-of-the-river or reservoir: _____
- 6.) Water flow rate at the typical maximum head: _____ft³/sec
- 7.) Average energy rate: _____kW-hrs/acre-ft
- 8.) Estimated yearly energy production: _____kW-hrs

C. Complete this section for each machine, independent of the turbine type.

- 1.) Turbine manufacturer: Siemens
- 2.) Maximum turbine power output: 231 MW
- 3.) Minimum turbine power output (while on line): 120 MW
- 4.) Governor information:
 - a: Droop setting (speed regulation): 4%
 - b: Is the governor mechanical-hydraulic or electro-hydraulic (Electro-hydraulic governors have an electronic speed sensor and transducer.)? Electro-hydraulic
 - c: Other comments regarding the turbine governor system?

83 MVA Units

A. Steam, gas or combined-cycle turbines:

- 1.) List type of unit (Steam, Gas, or Combined-cycle): Steam
- 2.) If steam or combined-cycle, does the turbine system have a reheat process (i.e., both high and low pressure turbines)? No
- 3.) If steam with reheat process, or if combined-cycle, indicate in the space provided, the percent of full load power produced by each turbine:
Low pressure turbine or gas turbine: 47%
High pressure turbine or steam turbine: 53%

B. Hydro turbines:

- 1.) Turbine efficiency at rated load: _____%
- 2.) Length of penstock: _____ft
- 3.) Average cross-sectional area of the penstock: _____ft²
- 4.) Typical maximum head (vertical distance from the bottom of the penstock, at the gate, to the water level): _____ft
- 5.) Is the water supply run-of-the-river or reservoir: _____
- 6.) Water flow rate at the typical maximum head: _____ft³/sec
- 7.) Average energy rate: _____kW-hrs/acre-ft
- 8.) Estimated yearly energy production: _____kW-hrs

C. Complete this section for each machine, independent of the turbine type.

- 1.) Turbine manufacturer: Siemens
- 2.) Maximum turbine power output: 68 MW
- 3.) Minimum turbine power output (while on line): 10 MW

- 4.) Governor information:
- a: Droop setting (speed regulation): 5%
 - b: Is the governor mechanical-hydraulic or electro-hydraulic (Electro-hydraulic governors have an electronic speed sensor and transducer.)? Electro-hydraulic
 - c: Other comments regarding the turbine governor system?

7. Synchronous Generator and Associated Equipment – Dynamic Models:

For each generator, governor, exciter and power system stabilizer, select the appropriate dynamic model from the General Electric PSLF Program Manual and provide the required input data. The manual is available on the GE website at www.gepower.com. Select the following links within the website: 1) Our Businesses, 2) GE Power Systems, 3) Energy Consulting, 4) GE PSLF Software, 5) GE PSLF User's Manual.

There are links within the GE PSLF User's Manual to detailed descriptions of specific models, a definition of each parameter, a list of the output channels, explanatory notes, and a control system block diagram. The block diagrams are also available on the Ca-ISO website.

If you require assistance in developing the models, we suggest you contact General Electric. Accurate models are important to obtain accurate study results. Costs associated with any changes in facility requirements that are due to differences between model data provided by the generation developer and the actual generator test data, may be the responsibility of the generation developer.

See Attachment A-3.

8. Induction Generator Data:

- A. Rated Generator Power Factor at rated load: _____
- B. Moment of Inertia (including prime mover): _____
- C. Do you wish reclose blocking? Yes ____, No ____
Note: Sufficient capacitance may be on the line now, or in the future, and the generator may self-excite unexpectedly.

9. Generator Short Circuit Data

For each generator, provide the following reactances expressed in p.u. on the generator base:

285 MVA Units

- X"1 – positive sequence subtransient reactance: 0.1931
- X"2 – negative sequence subtransient reactance: 0.1931
- X"0 – zero sequence subtransient reactance: 0.1162

Generator Grounding:

- A. _____ Solidly grounded
- B. X Grounded through an impedance

Impedance value in p.u on generator base. R: TBD p.u.
X: 0 p.u.
C. Ungrounded

83 MVA Units

- X"1 – positive sequence subtransient reactance: 0.156
- X"2 – negative sequence subtransient reactance: 0.156
- X"0 – zero sequence subtransient reactance: 0.098

Generator Grounding:

- A. Solidly grounded
B. X Grounded through an impedance

Impedance value in p.u on generator base. R: TBD p.u.
X: 0 p.u.
C. Ungrounded

10. Step-Up Transformer Data

For each step-up transformer, fill out the data form provided in Table 1.

11. Line Data

There is no need to provide data for new lines that are to be planned by the Participating TO. However, for transmission lines that are to be planned by the generation developer, please provide the following information:

Nominal Voltage: 230 kV
Line Length (miles): 0.572 miles (each circuit)
Line termination Points: Power Plant 230 kV bus and Pittsburg "D" 230 kV Bus
Conductor Type: ACSR Size: 1590 kcmil (Falcon)
If bundled. Number per phase: N/A, Bundle spacing: N/A in.
Phase Configuration. Vertical: X, Horizontal:
Phase Spacing (ft): A-B: 17 feet, B-C: 17 feet, C-A: 34 feet
Distance of lowest conductor to Ground: 49 ft
Ground Wire Type: EHS Size: 0.5 inch dia. Distance to Ground: 100 ft
Attach Tower Configuration Diagram
Summer line ratings in amperes (normal and emergency) 1354 A Normal; 1547 A Emergency
Resistance (R): 0.000075 p.u**
Reactance: (X): 0.000789 p.u**
Line Charging (B/2): 0.001758 p.u**
** On 100-MVA and nominal line voltage (kV) Base

See Attachment A-4 for a tower configuration drawing.

12. Wind Generators

Number of generators to be interconnected pursuant to this Interconnection Request: _____

Elevation: _____ _____ Single Phase _____ Three Phase

Inverter manufacturer, model name, number, and version:

List of adjustable setpoints for the protective equipment or software:

Field Volts: _____

Field Amperes: _____

Motoring Power (kW): _____

Neutral Grounding Resistor (If Applicable): _____

I_2^2t or K (Heating Time Constant): _____

Rotor Resistance: _____

Stator Resistance: _____

Stator Reactance: _____

Rotor Reactance: _____

Magnetizing Reactance: _____

Short Circuit Reactance: _____

Exciting Current: _____

Temperature Rise: _____

Frame Size: _____

Design Letter: _____

Reactive Power Required In Vars (No Load): _____

Reactive Power Required In Vars (Full Load): _____

Total Rotating Inertia, H: _____ Per Unit on KVA Base

Note: A completed General Electric Company Power Systems Load Flow (PSLF) data sheet must be supplied with the Interconnection Request. If other data sheets are more appropriate to the proposed device then they shall be provided and discussed at Scoping Meeting.

TABLE 1-1

TRANSFORMER DATA

UNIT	<u>285 MVA Units</u>		
NUMBER OF TRANSFORMERS	<u>1 per unit</u>	PHASE	<u>3 Phase</u>
RATED KVA	H Winding	X Winding	Y Winding
Connection (Delta, Wye, Gnd.)	<u>Grounded-Wye</u>	<u>Delta</u>	<u>N/A</u>
55 C Rise	<u>280 MVA</u>	<u>280 MVA</u>	<u>N/A</u>
65 C Rise			
RATED VOLTAGE (kV)	<u>230</u>	<u>16.5</u>	<u>N/A</u>
BIL (kV)	<u>750</u>	<u>150</u>	<u>N/A</u>
AVAILABLE TAPS (planned or existing)	<u>+/- 5% (2.5% each step)</u>	<u>None</u>	<u>N/A</u>
LOAD TAP CHANGER?	<u>No</u>	<u>No</u>	<u>N/A</u>
TAP SETTINGS	<u>1.0</u>	<u>1.0</u>	
COOLING TYPE :	OA _____	OA/FA _____	OA/FA/FA <u>X</u> OA/FOA _____
IMPEDANCE	H-X	H-Y	X-Y
Percent	<u>9%</u>	<u>N/A</u>	<u>N/A</u>
MVA Base	<u>168</u>	<u>N/A</u>	<u>N/A</u>
Tested Taps	<u>1.0</u>	<u>N/A</u>	<u>N/A</u>
WINDING RESISTANCE	H	X	Y
Ohms	<u>TBD (0.5 – 1.0 Ohm)</u>	<u>TBD (0.005 – 0.010 Ohm)</u>	<u>N/A</u>
CURRENT TRANSFORMER RATIOS			
H	<u>1200:5</u>	X	<u>12000:5</u>
Y			<u>N/A</u>
N			<u>N/A</u>

PERCENT EXCITING CURRENT 100 % Voltage: TBD 110% Voltage: TBD

Supply copy of nameplate and manufacture's test report when available.

TABLE 1-2

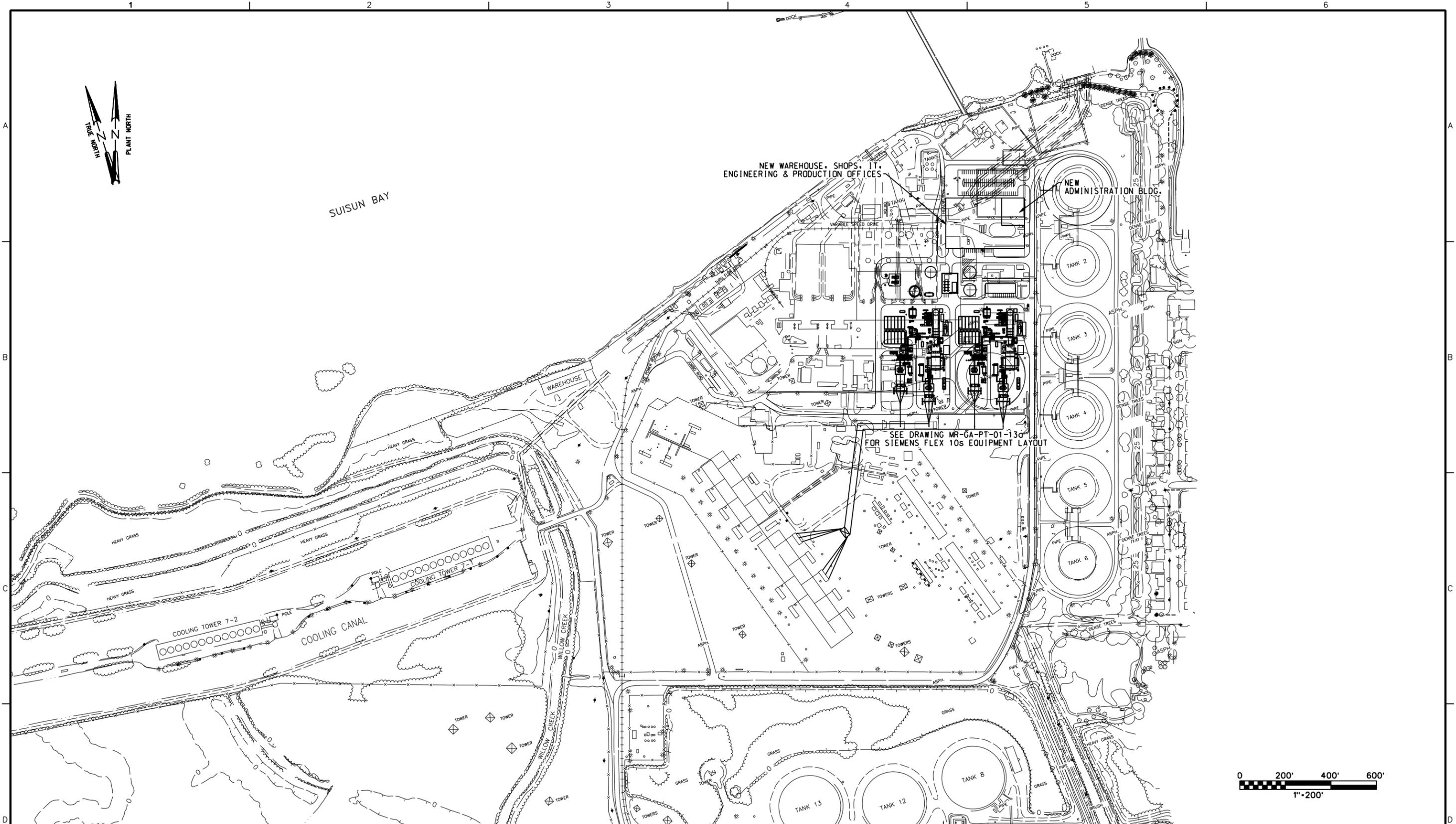
TRANSFORMER DATA

UNIT	<u>83 MVA Units</u>		
NUMBER OF TRANSFORMERS	<u>1 per unit</u>	PHASE	<u>3 Phase</u>
RATED KVA	H Winding	X Winding	Y Winding
Connection (Delta, Wye, Gnd.)	<u>Grounded-Wye</u>	<u>Delta</u>	<u>N/A</u>
55 C Rise	<u>90 MVA</u>	<u>90 MVA</u>	<u>N/A</u>
65 C Rise			
RATED VOLTAGE (kV)	<u>230</u>	<u>13.8</u>	<u>N/A</u>
BIL (kV)	<u>750</u>	<u>150</u>	<u>N/A</u>
AVAILABLE TAPS (planned or existing)	<u>+/- 5% (2.5% each step)</u>	<u>None</u>	<u>N/A</u>
LOAD TAP CHANGER?	<u>No</u>	<u>No</u>	<u>N/A</u>
TAP SETTINGS	<u>1.0</u>	<u>1.0</u>	
COOLING TYPE :	OA _____	OA/FA _____	OA/FA/FA <u>X</u> OA/FOA _____
IMPEDANCE	H-X	H-Y	X-Y
Percent	<u>9%</u>	<u>N/A</u>	<u>N/A</u>
MVA Base	<u>54</u>	<u>N/A</u>	<u>N/A</u>
Tested Taps	<u>1.0</u>	<u>N/A</u>	<u>N/A</u>
WINDING RESISTANCE	H	X	Y
Ohms	<u>TBD (0.5 – 1.0 Ohm)</u>	<u>TBD (0.005 – 0.010 Ohm)</u>	<u>N/A</u>
CURRENT TRANSFORMER RATIOS			
H	<u>300:5</u>	X	<u>4000:5</u>
		Y	<u>N/A</u>
		N	<u>N/A</u>

PERCENT EXCITING CURRENT 100 % Voltage: TBD 110% Voltage: TBD

Supply copy of nameplate and manufacture's test report when available.

Attachment A-1

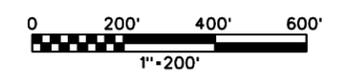


SUISUN BAY

NEW WAREHOUSE, SHOPS, IT,
ENGINEERING & PRODUCTION OFFICES

NEW ADMINISTRATION BLDG.

SEE DRAWING MR-GA-PT-01-13
FOR SIEMENS FLEX 10s EQUIPMENT LAYOUT



NO	DATE	REVISION	BY	CHK	REVISION APPROVAL		REV A	DATE 03/13/08	STATUS						
					DISCIPLINE	REVIEWED			DISCIPLINE	REVIEWED	ISSUED	REV	DATE	DM	SDE
A	03/13/08	ISSUED FOR REVIEW	SR		DISCIPLINE	XXX	ELECTRICAL	XXX	PRELIMINARY	P1					
					STRUCTURAL	XXX	INST & CONTROL	XXX	FOR REVIEW AND APPROVAL	A	03/13/08				
					MECHANICAL	XXX	ARCHITECTURAL	XXX	APPROVED FOR CONSTRUCTION						
					PROCESS	XXX	ENVIRONMENTAL	XXX	REVISED & APPROVED FOR CONSTRUCTION						
					PIPING	XXX	GEN. ARRANG.	XXX							

MIRANT CALIFORNIA
NEW GENERATION PROJECTS

PROJECT NO. 361690

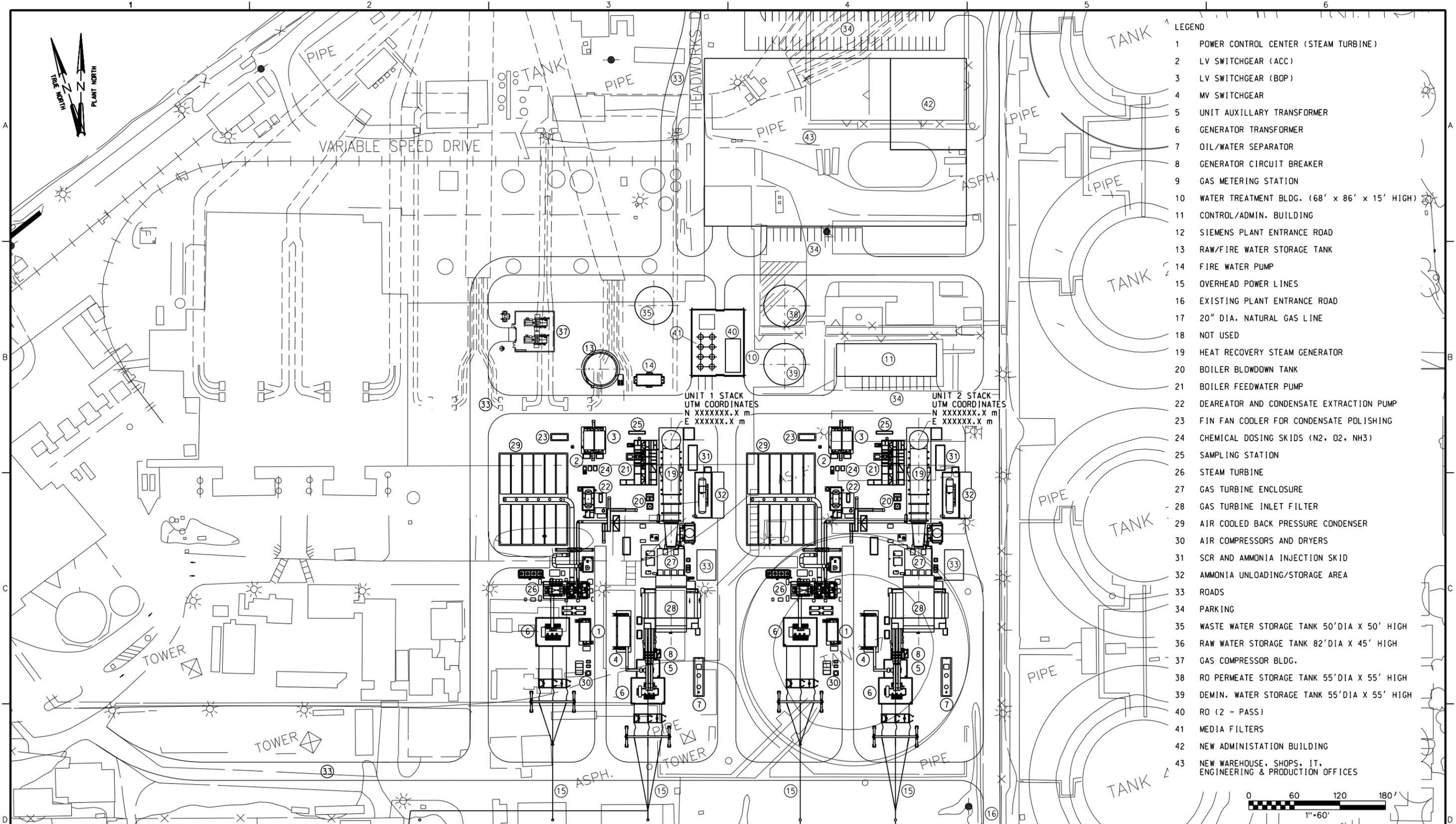
CH2MHILL
Lockwood Greene

GENERAL ARRANGEMENT
PITTSBURG PLOT PLAN
COMBINED CYCLE
SIEMENS FLEX 10s

DWG NO MR-GA-PT-01-12 REV A

BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"

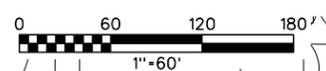
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- LEGEND
- 1 POWER CONTROL CENTER (STEAM TURBINE)
 - 2 LV SWITCHGEAR (ACC)
 - 3 LV SWITCHGEAR (BOP)
 - 4 MV SWITCHGEAR
 - 5 UNIT AUXILIARY TRANSFORMER
 - 6 GENERATOR TRANSFORMER
 - 7 OIL/WATER SEPARATOR
 - 8 GENERATOR CIRCUIT BREAKER
 - 9 GAS METERING STATION
 - 10 WATER TREATMENT BLDG. (68' x 86' x 15' HIGH)
 - 11 CONTROL/ADMIN. BUILDING
 - 12 SIEMENS PLANT ENTRANCE ROAD
 - 13 RAW/FIRE WATER STORAGE TANK
 - 14 FIRE WATER PUMP
 - 15 OVERHEAD POWER LINES
 - 16 EXISTING PLANT ENTRANCE ROAD
 - 17 20" DIA. NATURAL GAS LINE
 - 18 NOT USED
 - 19 HEAT RECOVERY STEAM GENERATOR
 - 20 BOILER BLOWDOWN TANK
 - 21 BOILER FEEDWATER PUMP
 - 22 DEAREATOR AND CONDENSATE EXTRACTION PUMP
 - 23 FIN FAN COOLER FOR CONDENSATE POLISHING
 - 24 CHEMICAL DOSING SKIDS (N2, O2, NH3)
 - 25 SAMPLING STATION
 - 26 STEAM TURBINE
 - 27 GAS TURBINE ENCLOSURE
 - 28 GAS TURBINE INLET FILTER
 - 29 AIR COOLED BACK PRESSURE CONDENSER
 - 30 AIR COMPRESSORS AND DRYERS
 - 31 SCR AND AMMONIA INJECTION SKID
 - 32 AMMONIA UNLOADING/STORAGE AREA
 - 33 ROADS
 - 34 PARKING
 - 35 WASTE WATER STORAGE TANK 50'DIA X 50' HIGH
 - 36 RAW WATER STORAGE TANK 82'DIA X 45' HIGH
 - 37 GAS COMPRESSOR BLDG.
 - 38 RO PERMEATE STORAGE TANK 55'DIA X 55' HIGH
 - 39 DEMIN. WATER STORAGE TANK 55'DIA X 55' HIGH
 - 40 RO (2 - PASS)
 - 41 MEDIA FILTERS
 - 42 NEW ADMINISTRATION BUILDING
 - 43 NEW WAREHOUSE, SHOPS, IT, ENGINEERING & PRODUCTION OFFICES

UNIT 1 STACK
UTM COORDINATES
N XXXXXX.X m
E XXXXXX.X m

UNIT 2 STACK
UTM COORDINATES
N XXXXXX.X m
E XXXXXX.X m



NO	DATE	REVISION	BY	CHK	REVISION APPROVAL		REV A	DATE 03/13/08	STATUS					
					DISCIPLINE	REVIEWED			DISCIPLINE	REVIEWED	ISSUED	REV	DATE	DM
A	03/13/08	ISSUED FOR REVIEW	SR		DISCIPLINE	REVIEWED	DISCIPLINE	REVIEWED	ISSUED	REV	DATE	DM	SDE	PEM
					CIVIL	XXX	ELECTRICAL	XXX	PRELIMINARY	P1				
					STRUCTURAL	XXX	INST & CONTROL	XXX	FOR REVIEW AND APPROVAL	A	03/13/08			
					MECHANICAL	XXX	ARCHITECTURAL	XXX	APPROVED FOR CONSTRUCTION					
					PROCESS	XXX	ENVIRONMENTAL	XXX	REVISED & APPROVED FOR CONSTRUCTION					
					PIPING	XXX	GEN. ARRANG.	XXX						

SCALE 1" = 60'-0"

MIRANT CALIFORNIA
NEW GENERATION PROJECTS

PROJECT NO. 361690

CH2MHILL
Lockwood Greene

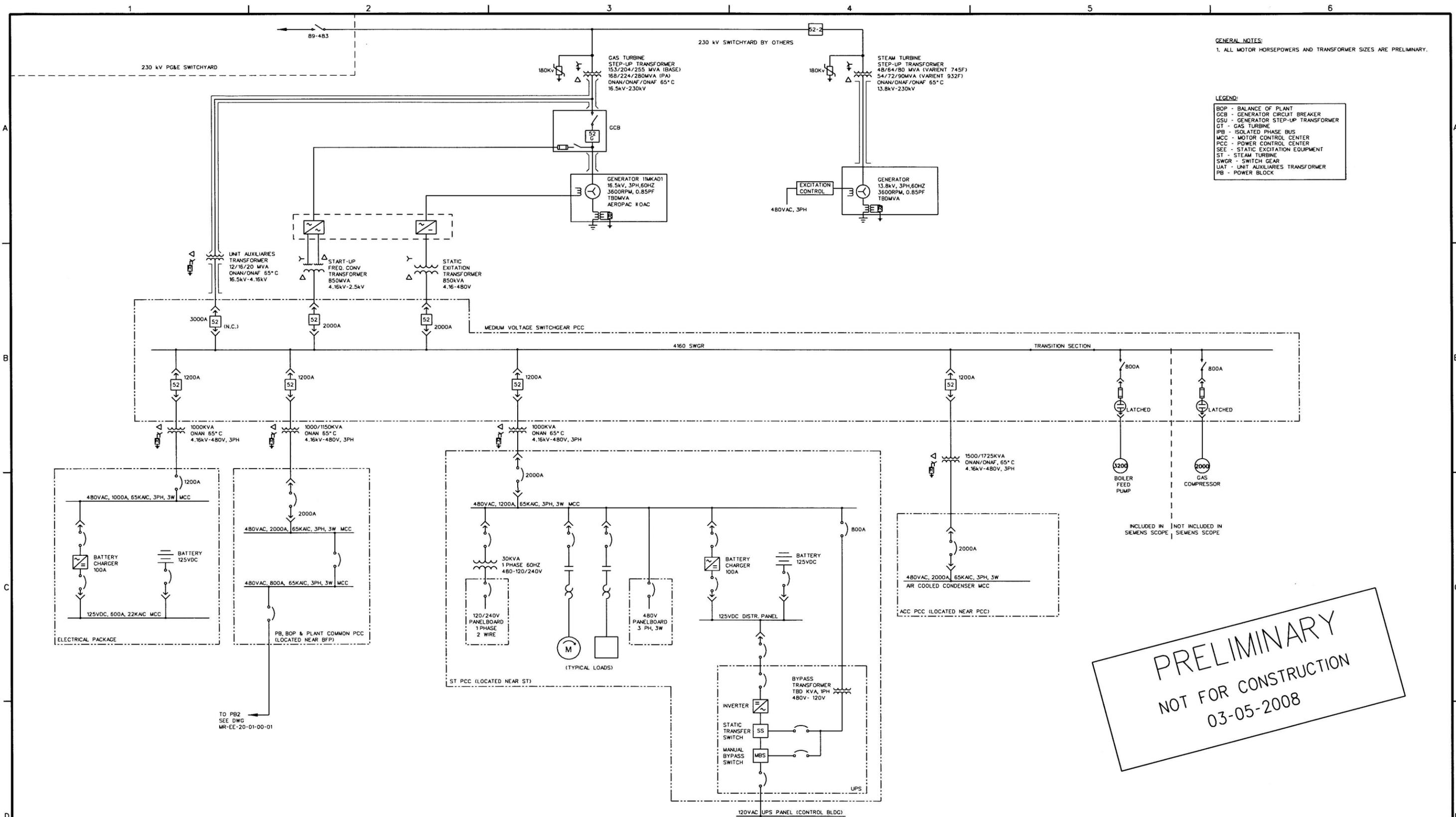
GENERAL ARRANGEMENT
PITTSBURG GENERATING STATION
SIEMENS FLEX 10s
EQUIPMENT LAYOUT

DWG NO MR-GA-PT-01-13a REV A

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Attachment A-2



PRELIMINARY
 NOT FOR CONSTRUCTION
 03-05-2008

NO	DATE	REVISION	BY	CHK	REVISION APPROVAL		REV P1		STATUS						
					DISCIPLINE	REVIEWED	DISCIPLINE	REVIEWED	ISSUED	REV	DATE	DM	SDE	PEM	
P1	/ /	ISSUED FOR REVIEW	XXX	YYY					ISSUED	P1					
					CIVIL				PRELIMINARY						
					STRUCTURAL				FOR REVIEW AND APPROVAL						
					MECHANICAL				APPROVED FOR CONSTRUCTION						
					PROCESS				REVISED & APPROVED FOR CONSTRUCTION						
					PIPING										

MIRANT CALIFORNIA
 NEW GENERATION PROJECTS

ELECTRICAL
 PITTSBURG
 COMBINED CYCLE PB2
 OVERALL SINGLE-LINE DIAGRAM

PROJECT NO. 361690

DWG NO MR-EE-PT-00-02
REV P1

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GENERATOR STABILITY MODEL DATA AT RATED MVA & kV

Customer: SGT6-5000F(4) Turbine

Unit(s): REFERENCE SGen6-1000A

Ratings: MVA: 285 kV: 16.5
RPM: 3600 pf: 0.85

Frequency (Hz): 60 SCR: 0.45
PSIG: N/A Type: AIR-Cooled

Reactances [per unit] Saturated Unsaturated

Direct axis

• Synchronous	(X_d)	2.1215	2.3635
• Transient	(X'_d)	0.2640	0.3001
• Sub-transient	(X''_d)	0.1944	0.2255

Quadrature axis

• Synchronous	(X_q)	2.0665	2.3022
• Transient	(X'_q)	0.4323	0.4913
• Sub-transient	(X''_q)	0.1917	0.2225
Armature leakage, steady- state	(X_l)	0.1820	0.1916
Zero sequence	(X_0)	0.1162	0.1224
Negative sequence	(X_2)	0.1931	0.2240
Potier Reactance	(X_P)	----	0.2555

Resistance and Capacitance

Armature

• Zero Seq. Res. [p.u.]	(R_0)	0.00145
• Positive Seq. Res. [p.u.]	(R_1)	0.00216
• Negative Seq. Res. [p.u.]	(R_2)	0.02039
• DC Res., per phase @ 75°C [Ω]	(R_a)	0.00072
• Capacitance to ground [μ F/phase]		0.427

Field

• DC Res. @ 75°C [Ω]	(R_F)	0.163
-------------------------------	-----------	-------

Excitation/Field Data

Generator field voltage [V]	318.1
Exciter power [kW]	640.0
Field current at rated pf [A]	1710
Field current required to put flux across air gap [A]	498
Exciter voltage [V]	350
Field current, no load. [A]	554
Saturation factor at 1.0 x (rated kV) [%]	11.4
Saturation factor at 1.2 x (rated kV) [%]	48.9

Engineer

Document Number _____

Time Constants [s]

Direct axis

• Transient, open circuit.	(T'_{do})	10.480
• Sub-transient, open circuit.	(T''_{do})	0.048
• Transient, L-N short-circuit.	(T'_{d1})	2.248
• Sub-transient, L-N short-circuit	(T''_{d1})	0.042
• Transient, L-L short-circuit	(T'_{d2})	1.874
• Sub transient, L-L short-circuit	(T''_{d2})	0.040
• Transient, 3-phase short-circuit	(T'_{d3})	1.171
• Sub transient, 3-phase short-circuit	(T''_{d3})	0.035

Quadrature axis

• Transient, open-circuit.	(T'_{q0})	1.164
• Sub-transient, open-circuit.	(T''_{q0})	0.079
• Transient, L-N, short-circuit	(T'_{q1})	0.331
• Sub-transient, L-N, short-circuit	(T''_{q1})	0.053
• Transient, L-L, short-circuit	(T'_{q2})	0.292
• Sub-transient, L-L short-circuit	(T''_{q2})	0.049
• Transient, 3-phase short-circuit	(T'_{q3})	0.219
• Sub-transient, 3 phase short-circuit	(T''_{q3})	0.035

DC component of SC current	(T_{A3})	0.685
DC component of L-N fault	(T_{A1})	0.594
DC component of L-L fault	(T_{A2})	0.685

Inertia Constants

Turbine, Generator and Exciter, WR^2 [lbf-ft ²]	496446
Turbine, Generator and Exciter, H Constant [kW-sec/kVA]	5.22

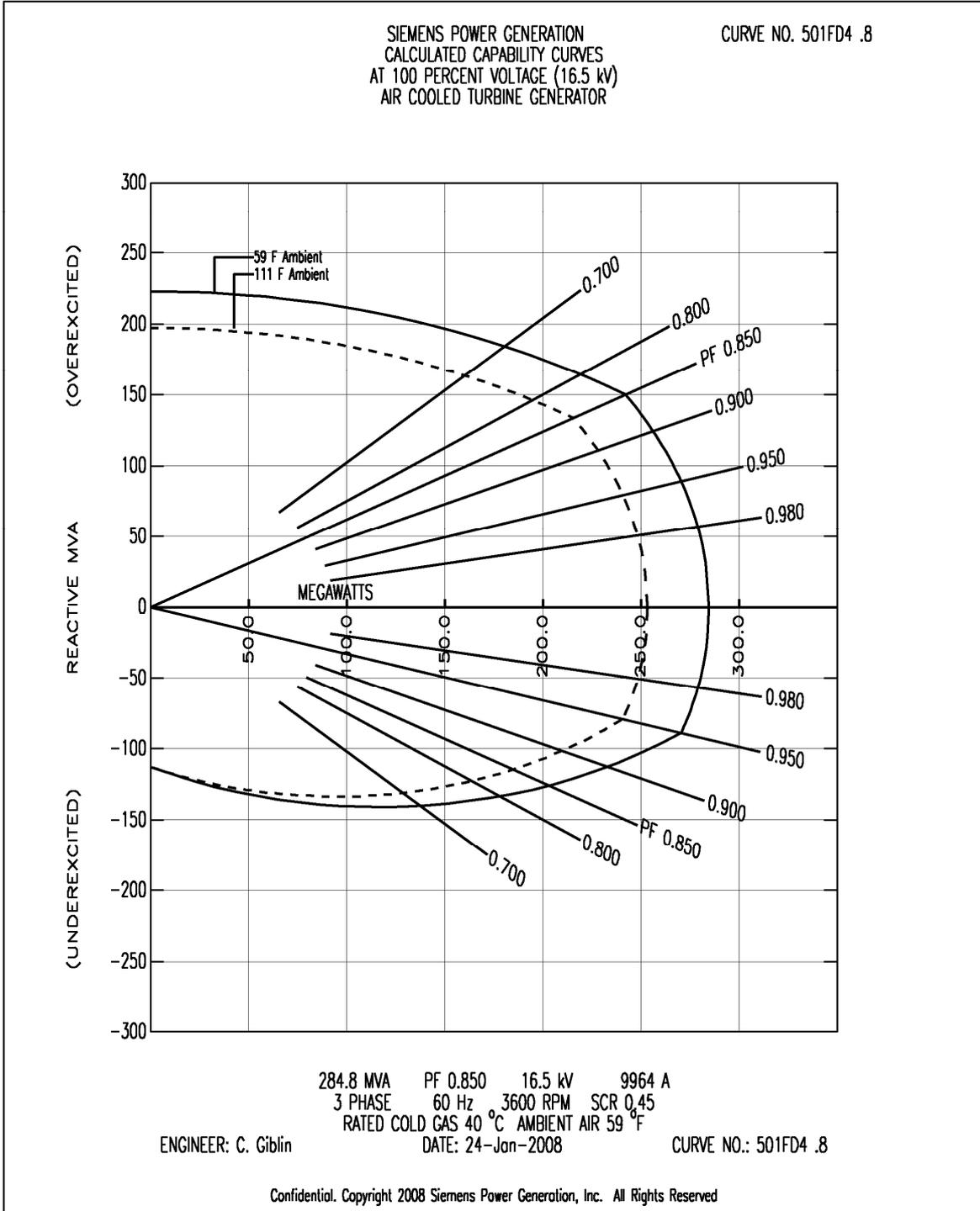
Short-circuit Torque Data

$T_{sc} = (MVA)[-pf+(Ae^{-at}\sin(\omega t)-Be^{-bt}\sin(2\omega t)+Ce^{-ct})]$	
$T_1=A=6.798$	$\alpha=a=3.012$
$T_2=B=3.399$	$\beta=b=3.103$
$T_3=C=0.593$	$\gamma=c=2.715$

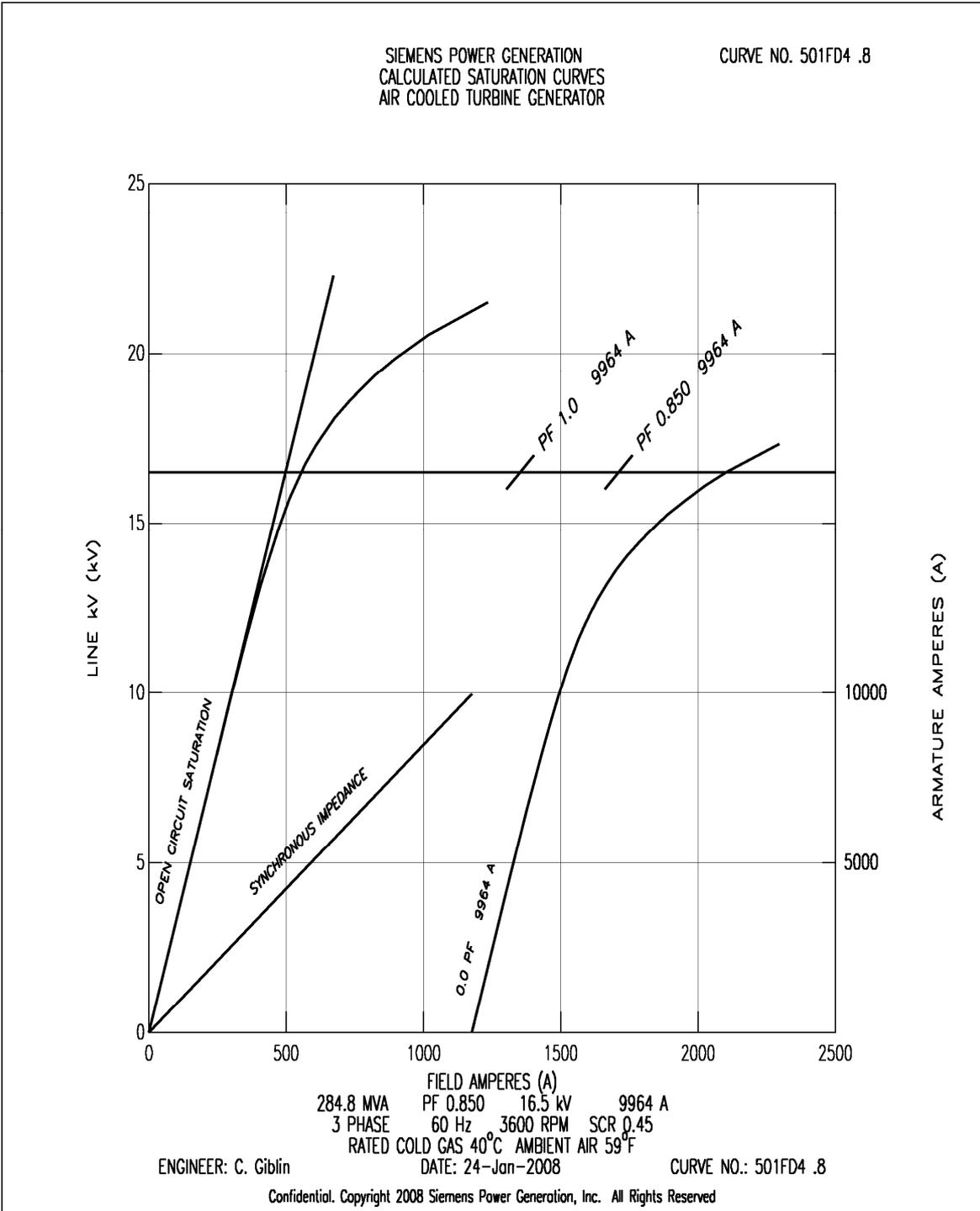
Date

Rev. _____

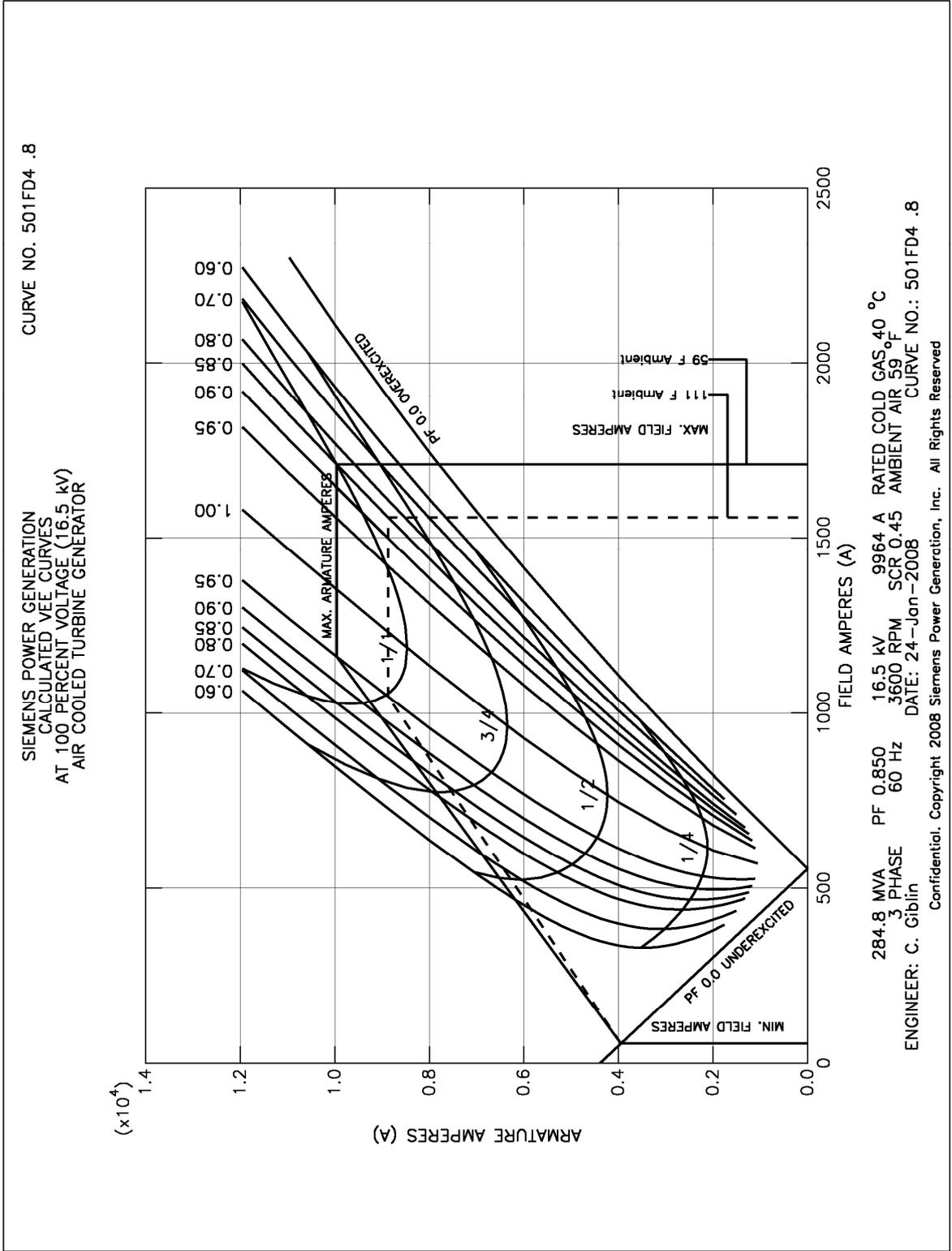
**CUSTOMER: SGT6-5000F(4) GT UNIT: REFERENCE SGen6-1000A
MISCELLANEOUS CURVES**



**CUSTOMER: SGT6-5000F(4) GT UNIT: REFERENCE SGen6-1000A
MISCELLANEOUS CURVES**



**CUSTOMER: SGT6-5000F(4) GT UNIT: REFERENCE SGen6-1000A
MISCELLANEOUS CURVES**



CUSTOMER: SGT6-5000F(4) GT UNIT: REFERENCE SGen6-1000A
EFFICIENCY

Efficiency is defined for the Generator (EFF), the Generator and Exciter (EFFE) and for the Generator, Exciter and Bearings (EFFEB).

Generator efficiency, excluding exciter and bearings.	EFF	98.91%
Generator efficiency, including excitation losses.	EFFE	98.89%
Generator efficiency, including excitation and bearing losses.	EFFEB	98.75%

GENERATOR

Electrical Data, Losses and Efficiencies

WE06056T

Generator Type: SGen6-100A-2P 086-23

Load Point						N		A		B				
Standard						IEEE C50.13		IEEE C50.13		IEEE C50.13				
Thermal Classification: Design / Using						F / B		F / B		F / B				
Power				MVA		70,00		96,00		86,50				
Cold Air Temperature				°C		49,0		15,0		30,0				
Voltage				kV		13,80		13,80		13,80				
Voltage Deviation				%		5,0 10,0		5,0 10,0		5,0 10,0				
Armature Current				kA		2,929		4,016		3,619				
Frequency		Speed		Hz rpm		60 3600		60 3600		60 3600				
Power Factor				-		0,85		0,85		0,85				
Excitation		No load	I_{f0}	U_{f0}	A	V	379	57	379	57	379	57		
Requirements		4/4-load	I_{fN}	U_{fN}	A	V	1034	154	1336	201	1223	184		
		5/4-load	$I_{f5/4}$	$U_{f5/4}$	A	V	1235	184	1638	246	1484	223		
Cooling Air				Losses		kW		1029		1400		1251		
		Air flow	Temp. rise	m^3/s	K	26,0	37,9	26,0	51,5	26,0	46,0			
Sudden-SCC at No-Load and Nominal Voltage				I_S : 3-phase (peak)		kA		50		50		50		
				I_{K3} : 3-ph. (sustained at I_{fN})		kA		4,1		5,3		4,9		
				I_{K2} : 2-ph. (sustained at I_{fN})		kA		6,5		8,4		7,7		
Short Circuit Ratio				-		0,51		0,37		0,42				
Reactances				x''_d	unsat.	sat.	%	%	18,4	14,9	25,2	20,4	22,7	18,4
				x'_d	unsat.	sat.	%	%	26,1	23,5	35,8	32,2	32,2	29,0
calculated values,				x_d	unsat.	sat.	%	%	207	195	284	267	256	241
tolerance +/-15%				x''_q	unsat.	sat.	%	%	20,2	16,4	27,7	22,5	25,0	20,2
acc. IEC 60034-3				x'_q	unsat.	sat.	%	%	46,0	41,6	62,0	56,1	57,1	51,7
				x_q	unsat.	sat.	%	%	197	167	270	229	243	207
				x_2	unsat.	sat.	%	%	19,3	15,6	26,5	21,4	23,9	19,3
				x_0	unsat.		%		9,8		13,4		12,1	
				x_{leak}	unsat.		%		14,7		20,2		18,2	
Time constants at 95 °C				T''_d		s		0,029		0,029		0,029		
winding				T'_d		s		0,712		0,712		0,712		
temperature				T'_{d0}		s		6,085		6,085		6,085		
				T''_{d0}		s		0,042		0,042		0,042		
				T_a		s		0,254		0,254		0,254		
Resistance at 20°C				Stator winding / phase		mΩ		3,23		3,23		3,23		
				Rotor winding		mΩ		109,56		109,56		109,56		
Voltage regulation				PF = rated P.F.		%		38,5		46,0		43,3		
				PF = 1,00		%		32,5		40,0		37,4		
Max. unbalanced load				Continuous		%		8		8		8		
				Short time $i_2^2 * t$		s		10		10		10		
Power at PF = 0				Underexcited		Mvar		31,2		31,2		31,2		
				Overexcited		Mvar		54,7		76,3		68,5		
Winding temp. rise				Stator (RTD)		K °C		62 111		91 106		80 110		
Winding temp.				Rotor (average)		K °C		63 112		100 115		85 115		
Losses				Bearing losses		kW		82		82		82		
				Windage losses		kW		374		374		374		
				Core losses		kW		164		164		164		
				Short circuit losses		kW		300		564		458		
				Rotor I^2R losses		kW		159		265		222		
				Total losses		kW		1079		1449		1300		
Efficiencies with tolerance at brushless excitation and rated P.F. (incl. bearing losses)				4/4-load		%		98,22		98,25		98,26		
				3/4-load		%		98,04		98,23		98,18		
				2/4-load		%		97,51		97,95		97,82		
				1/4-load		%		95,65		96,67		96,37		

SIEMENS

Hait

Rev. 004

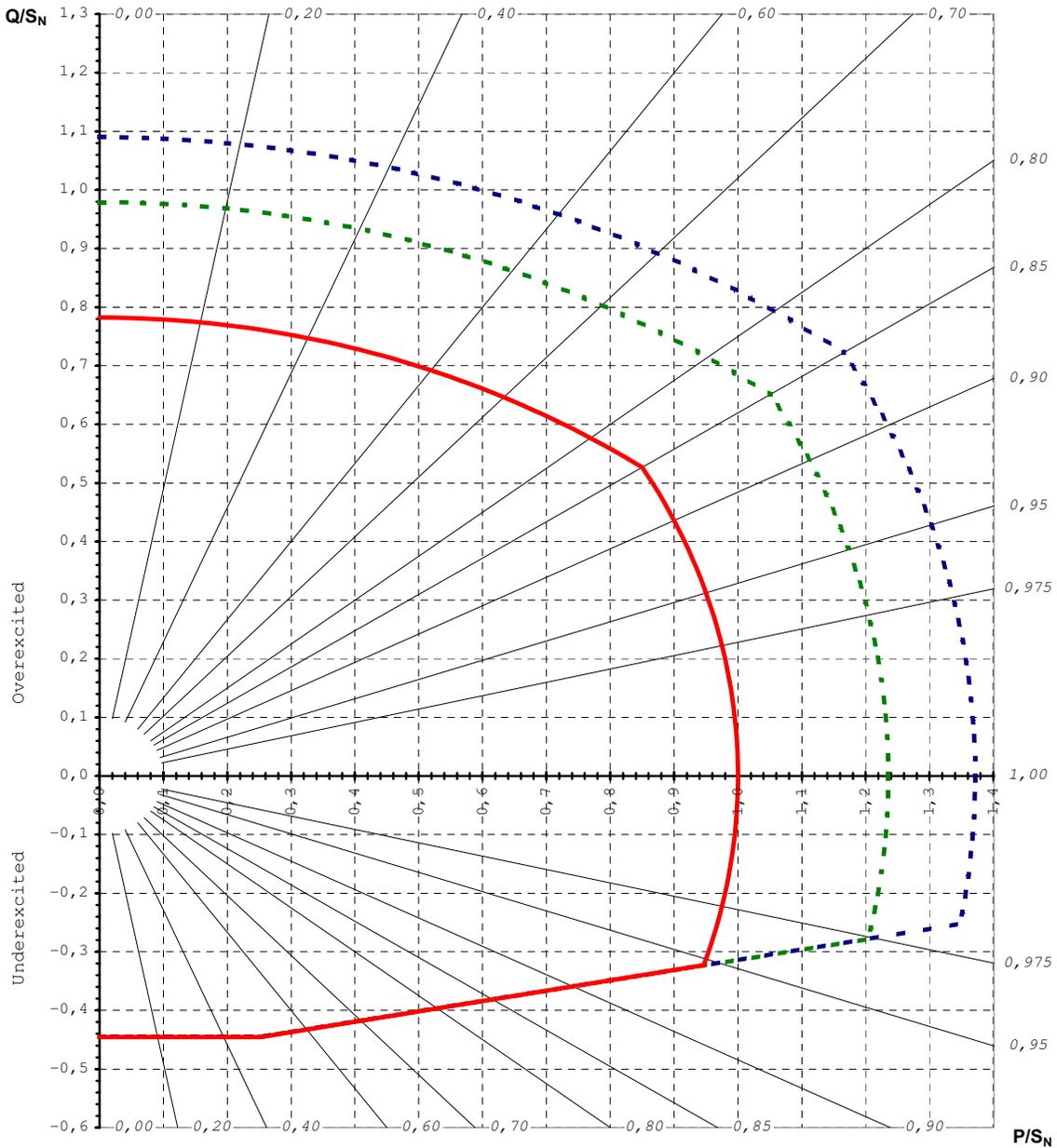
GENERATOR

Reactive Capability Curve

WE06056T

Generator - Type: **SGen6-100A-2P 086-23**

Load Point	Rated	A	B
S_N	70,00 MVA	96,00 MVA	86,50 MVA
U_N	13,80 kV	13,80 kV	13,80 kV
I_N	2,929 kA	4,016 kA	3,619 kA
f_N	60 Hz	60 Hz	60 Hz
PF	0,85	0,85	0,85
T_{Cold}	49,0 °C	15,0 °C	30,0 °C



SIEMENS

Power Generation (PG) - Erfurt Plant

RBS2000 Revision 2.6.2

P251 G3

Hait

Rev. 004

2007-07-26

GENERATOR

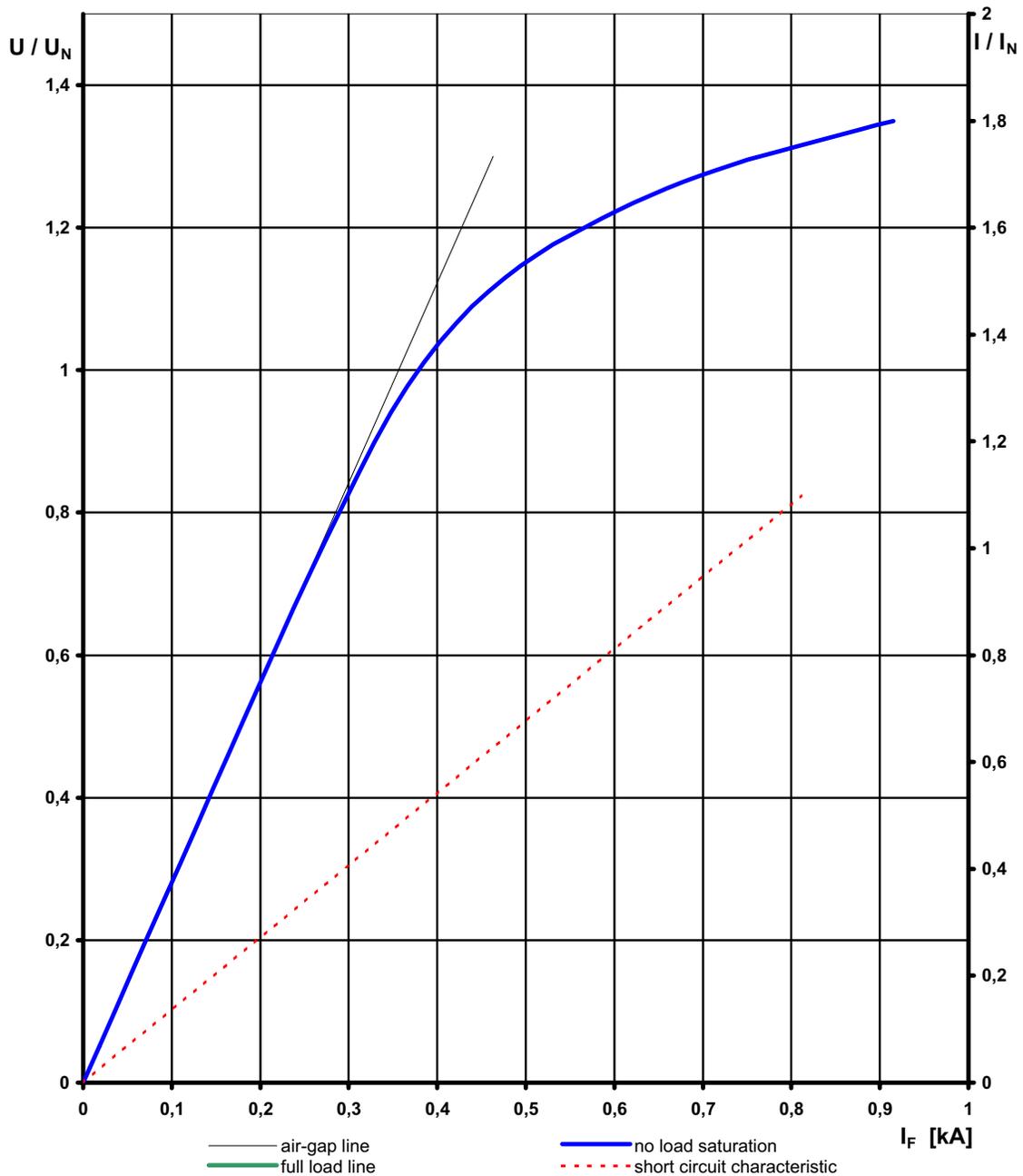
No Load Saturation and Short-Circuit Characteristic

WE06056T

Generator - Typ:

SGen6-100A-2P 086-23

$S_N =$	70,00 MVA	$PF =$	0,85	$S(1,0) =$	6,3 %
$U_N =$	13,80 kV	$SCR =$	0,51	$S(1,2) =$	32,6 %
$I_N =$	2,929 kA	$I_{f0} =$	379 A		
$f_N =$	60 Hz	$I_{fN} =$	1034 A		



SIEMENS

Power Generation (PG) - Erfurt Plant

RBS2000 Revision 2.6.2

P251 G3

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Rev. 004

2007-07-26

GENERATOR

V-Curves at Rated Voltage

WE06056T

Generator - Typ:

SGen6-100A-2P 086-23

$S_N = 70,00 \text{ MVA}$

PF = 0,85

$I_{f0} = 379 \text{ A}$

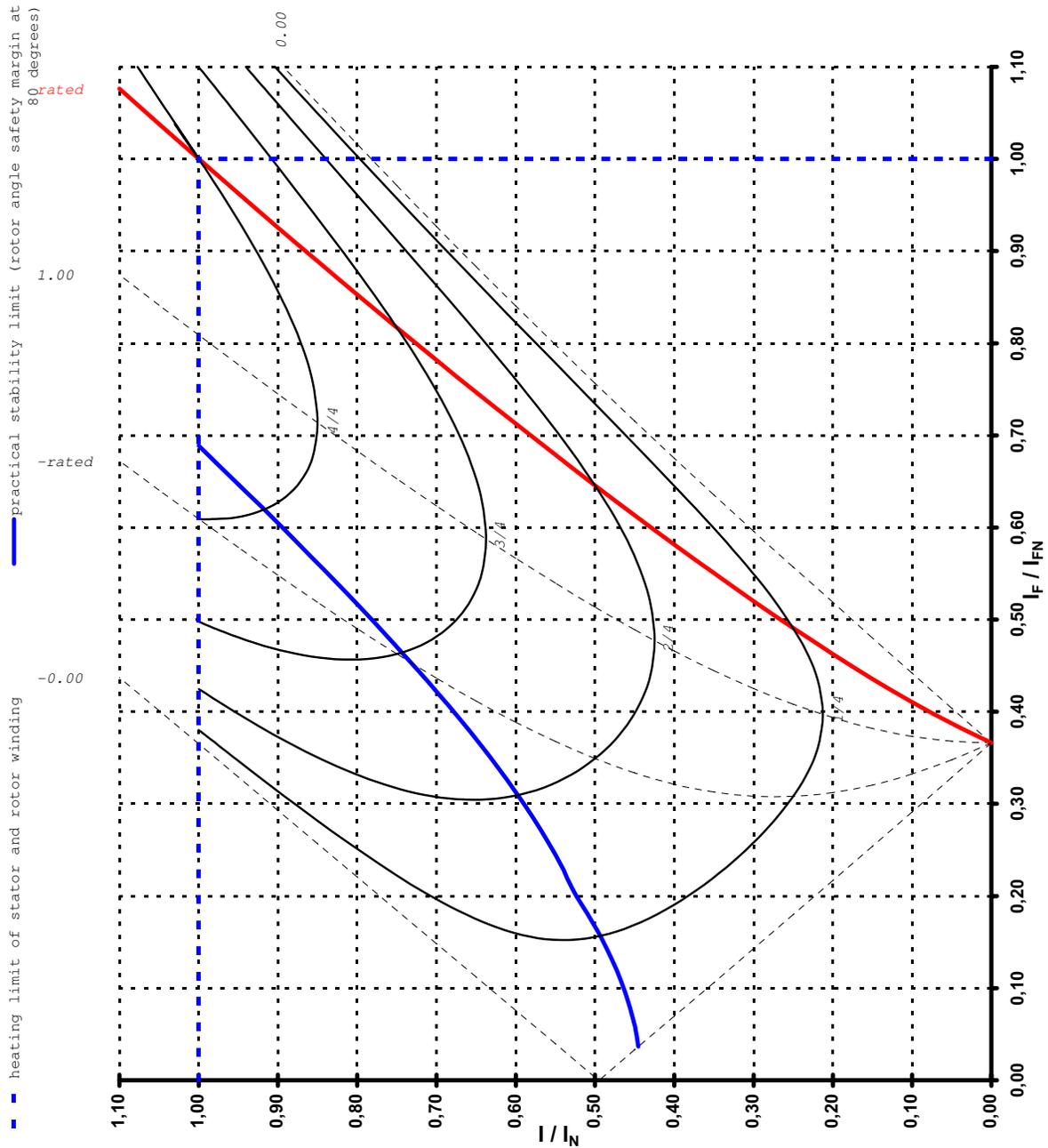
$U_N = 13,80 \text{ kV}$

$f_N = 60 \text{ Hz}$

$I_{fN} = 1034 \text{ A}$

$I_N = 2,929 \text{ kA}$

$T_{\text{Cold Air}} = 49,0 \text{ }^\circ\text{C}$



V-Curves Refer to Apparent Power

GENERATOR

Unbalanced Load-Time-Curve

WE06056T

Generator - Typ:

SGen6-100A-2P 086-23

$S_N = 70,00$ MVA

PF = 0,85

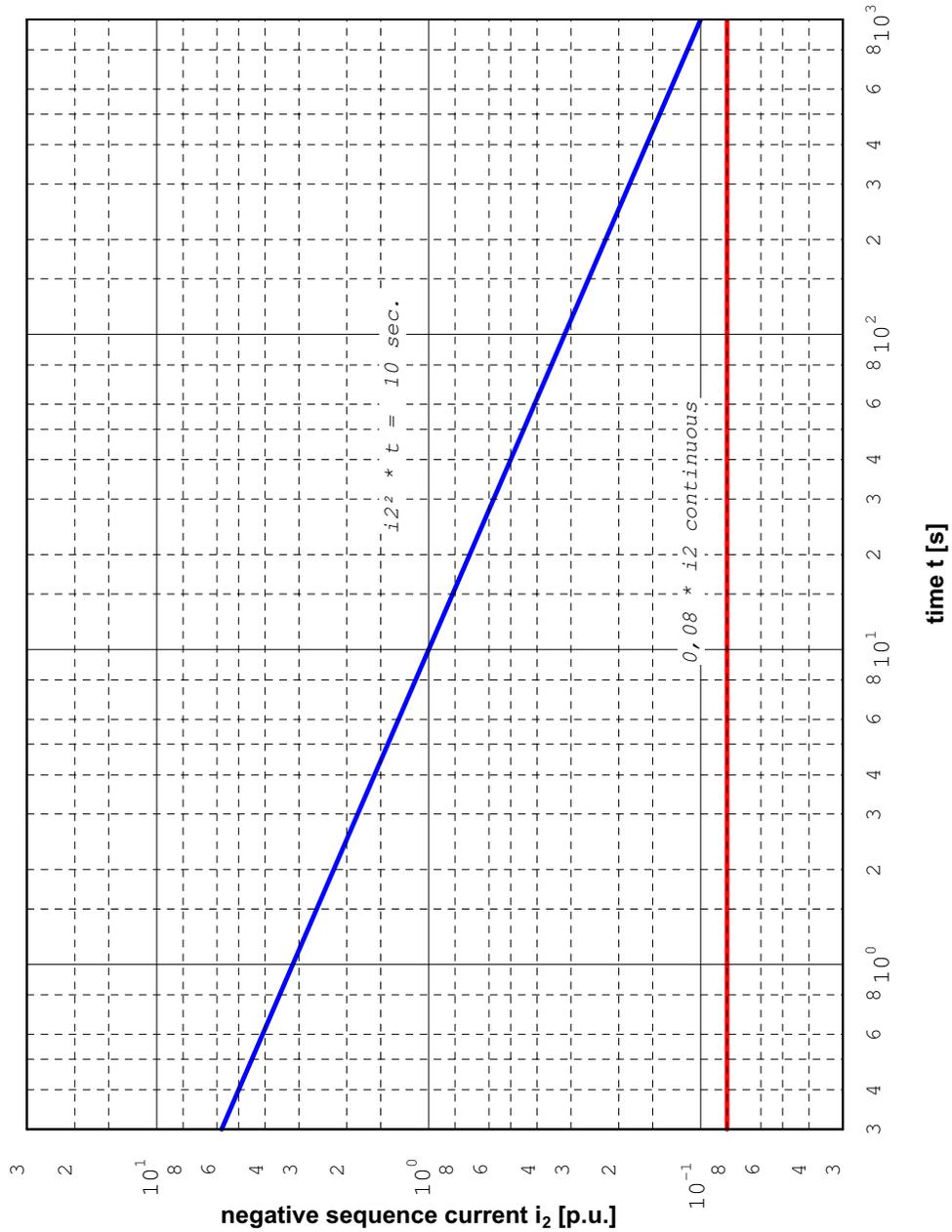
$T_{\text{Cold Air}} = 49,0$ °C

$U_N = 13,80$ kV

$f_N = 60$ Hz

$I_N = 2,929$ kA

$n_N = 3600$ rpm

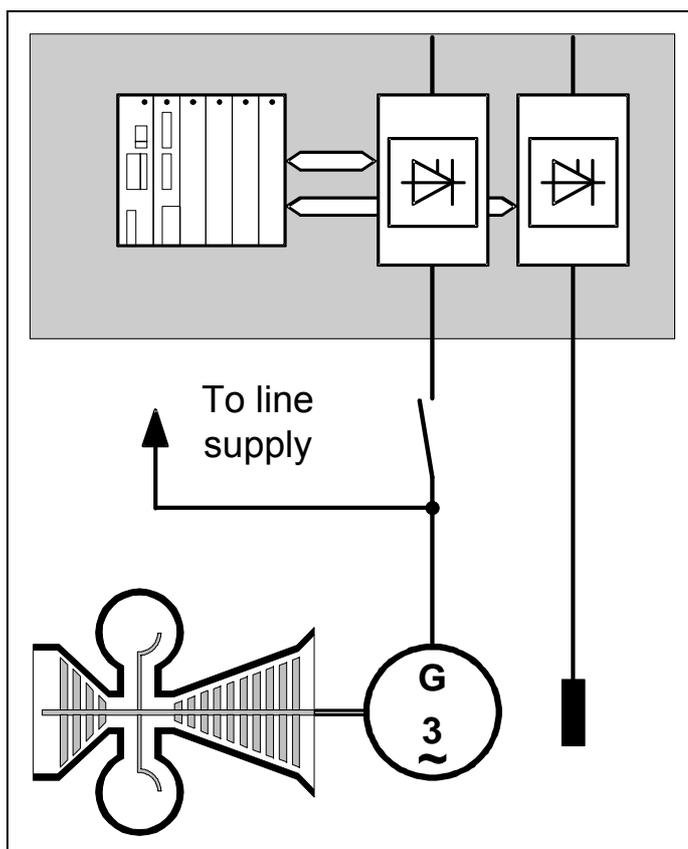


Compact Unit for Gas Turbine Sets

Description

02.2007

Static Excitation Equipment with Starting Frequency Converter 6RV...



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Exclusion of liability

We have checked that the content of this document corresponds with the hardware and software described. Nonetheless, differences cannot be ruled out and we cannot, therefore, guarantee that they are completely identical. The information contained in this documentation, however, is checked regularly for errors. Any corrections needing to be made to the text appear in later editions. Suggestions for improvement are welcome.

Safety information

This manual contains information that must be observed to ensure your personal safety and to prevent property damage. Notices referring to your personal safety are highlighted in the manual by a safety alert symbol; notices referring to property damage only have no safety alert symbol, these notices are highlighted by the following symbols depending on the relevant level of risk:



Danger

indicates the **immediate** risk of death, severe injury or significant damage to property if proper precautions are not taken.



Warning

indicates the **potential** risk of severe physical injury or even death if proper precautions are not taken.



Caution

(with a safety alert symbol) indicates the risk of slight physical injury if proper precautions are not taken.

Caution

(without a safety alert symbol) indicates the potential risk of property damage if proper precautions are not taken.

Notice

indicates the possibility of an undesirable result or condition if the corresponding information is not observed.

Qualified personnel

For the purpose of these operating instructions and the product warning labels, “qualified personnel” are those who are familiar with the installation, mounting, startup, operation, and maintenance of the product. They must have the following qualifications:

- Trained or authorized to energize, de-energize, ground, and tag circuits and equipment in accordance with established safety procedures.
- Trained in the proper care and use of protective equipment in accordance with established safety procedures.
- First aid training.

Use as prescribed

Please note the following:



Warning

When electrical equipment is in operation, certain parts of this equipment are inevitably under dangerous voltage.

Incorrect handling of this equipment, i.e., failure to observe warning information can, therefore, lead to death, severe bodily injury or significant damage to property.

Only qualified personnel should work on or around the equipment.

These personnel must be thoroughly familiar with all warnings and maintenance procedures described in these operating instructions.

Professional transport, storage, mounting, and installation, as well as careful operation and service, are essential for the error-free, safe and reliable operation of the equipment.

Observance of national safety guidelines is mandatory.

ESD-sensitive components

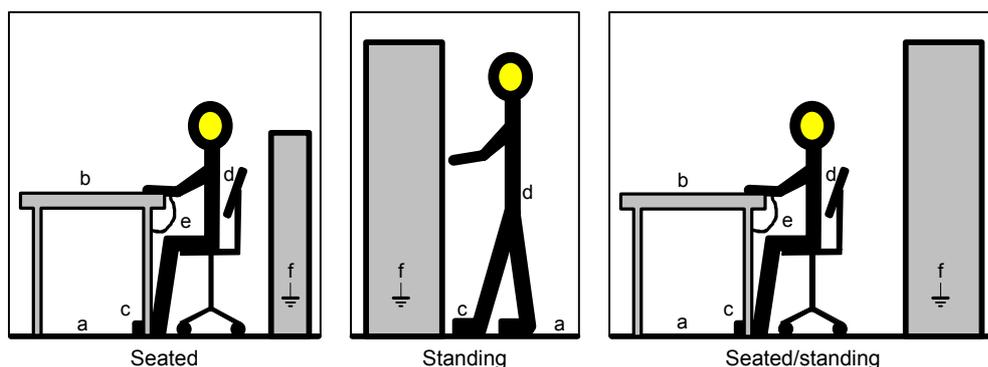


Caution

The electronic modules contain components susceptible to electrostatic discharge. These components can be easily destroyed if not handled properly. If you have to work with electronic modules, please note:

- You should only touch electronic modules if absolutely necessary.
- If you do have to touch modules, your body must be electrically discharged first.
- Modules must not come into contact with highly insulating materials (such as plastic parts, insulated desktops, articles of clothing manufactured from man-made fibers).
- Modules must only be set down on conductive surfaces.
- Modules and components should only be stored and transported in conductive packaging (such as metalized plastic boxes or metal containers).
- If the packaging material is not conductive, the modules must be wrapped with a conductive packaging material (such as conductive foam rubber or household aluminum foil).

The necessary ESD protection measures are elucidated once again in the following illustration:



a = conductive floor surface
b = ESD table
c = ESD shoes

d = ESD overall
e = ESD wristband
f = cabinet ground connection

Contents

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Note

For clarity, these operating instructions do not contain every item of information in detail and, therefore, cannot consider every conceivable application.

If you need further information or encounter special problems that are not dealt with in sufficient detail in the operating instructions, please contact your local Siemens branch.

We would also like to point out that the content of these operating instructions is neither part of nor modifies any prior or existing agreement, commitment or contractual relationship. All obligations entered into by Siemens result from the respective contract of sale that contains the complete and sole valid warranty arrangements. These contractual guarantee provisions are neither broadened nor restricted by the text in these operating instructions.

1 Description of the compact unit

1.1 Standard scope of supply

The standard scope of supply of the compact unit consists of the following function units:

Static excitation equipment (SEE)

- Power section:
- Line-side converter with 6 thyristors in three-phase bridge configuration with semiconductor fuses, up to 3 bridges in parallel
 - Line-side AC circuit breaker
 - DC-side overvoltage protection at DC output
 - Redundant fans (standard for single bridges)

Open-loop and closed-loop control section:

Hardware

- Open-loop section:
2 SIMATIC S7 racks (for redundant open-loop control configuration)
- Closed-loop section:
2 automatic channels (for redundant closed-loop control configuration), implemented in SIMOREG control modules with T400 technology module (can be switched over to manual operation)
- Operator control and display panel (OP177B)
- Power supply for open-loop control, signaling and monitoring
- Interface modules, circuit breakers, socket

Software

- Higher-level open-loop control, monitoring and communication to the 2nd automatic channel and the starting frequency converter
- Redundant link between the PROFIBUS DP bus and instrumentation and control
- Redundancy monitoring, channel changeover
- Actual-value calculation, closed-loop limiting control
- Gating unit
- Closed-loop field current control I_f
- Generator voltage control U_g

Starting frequency converter (SFC)

Power section:

- Line-side converter LSC, 6-pulse or 12-pulse (standard for 9.0 MW converters) in a three-phase bridge configuration with direct connection to an SFC transformer
- DC link reactor
- Generator-side converter GSC, 6-pulse three-phase bridge configuration
- Fuseless design for the line-side and generator-side converter (although the external starting disconnecter features fuses, they are not part of the scope of supply of the starting frequency converter)
- Line-side and generator-side overvoltage protection

Open-loop and closed-loop control section:

Hardware

- 1 Control Unit (CU320) with interface modules
- Power supply for open-loop control, signaling and monitoring
- Interface modules, circuit breakers

Software

- Converter-based open-loop and closed-loop speed control
- Open-loop and closed-loop control of line-side and generator-side converters
- Higher-level open-loop control, monitoring functions and communication to the static excitation equipment's open-loop and closed-loop control (SIMATIC S7)

Options

- Signal connection to the higher-level control stations via hardware terminals
- Closed-loop reactive power/power-factor control (standard)
- Power system stabilizer PSS
- Redundant three-phase bridges (2 x 100%, 3 x 50%)
- 12-pulse LSC for SFC with two three-phase bridges
- Changeover device for the starting frequency converter: Bus interface coupler and cable for bus interface, 3-pole outgoing isolator, monitoring and open-loop control
- Initial excitation
- Can be repaired while in operation, only with 2x100% three-phase bridge configuration with stack design and SITOP technology
- Activation of tapped transformer (unit transformer)
- Redundant fans for redundant power sections

- MV transformer temperature monitoring PT100
- Anti-condensation heating with thermostat
- Cabinet lighting
- Additional cooling for ambient temperatures > 40°C to 45°C
- Attenuator for starting frequency converter (only necessary in the absence of a generator circuit breaker)
- Earthquake-proof cabinet design

1.2 Application

Compact units for gas turbine sets are power electronic devices comprising a static generator excitation unit (SEE) and a starting frequency converter (SFC) (current-source DC link converter).

The turbine requires assistance to accelerate the gas turbine set up to its operating speed, as it can only generate the torque required for continued acceleration once it has reached approx. 50% of its rated speed.

The generator is supplied with power from the starting frequency converter during this initial starting phase and is operated as a frequency-controlled synchronous motor. The converters shut down at approx. 70% of the rated speed; after this, the generator set is accelerated by the turbine alone.

It is possible to use a single starting frequency converter to accelerate a number of turbine sets one after the other.

For reasons of availability, a maximum of 6 gas turbine sets can be combined with 3 compact units and 3 individual static excitation units. By combining the switchgear appropriately, each of the turbine sets can be operated with each of the converters (refer to Chapter 4 "Description of the changeover device").

In terms of their dimensions, although the units have been designed specifically for compact installation and use in pre-fabricated containers, they are also suitable for use in conventional electrical switchgear rooms or machine halls, with upgraded cabinet degree of protection.

The compact units have been designed as a standard series and are optimized for operation with Siemens/PG gas turbine sets to ensure the required starting times and duty cycles (refer to the overviews in Sections 1.4 and 1.5).

1.3 Features

- Compact units and individual static excitation units are factory-mounted, wired and checked in cabinets from the 8MF system. They are supplied as ready-to-use units. This significantly reduces startup time and costs at customer sites.
- Primary components such as power sections, DC-link smoothing reactor and subracks for open-loop and closed-loop control are installed in separate cabinets.
- Integrated radial fans dissipate heat; the fans are redundant for the static excitation equipment (single bridges only).
- Line stressing during starting remains low. The starting frequency converter does not influence the short-circuit rating of the station service (auxiliaries, etc.).
- The optional changeover device can be used to make it possible to start additional gas turbine sets using the same starting frequency converter. As part of this process, the control signals are transferred between the SFC and SEE open-loop control via a serial bus connection.
- The starting and static excitation equipment is able to exchange signals with the instrumentation and control for the purpose of operator control and monitoring as well as for error signaling.
- Digital SIMATIC S7 and SIMOREG CM (SEE) or SINAMICS (SFC) are used for all open-loop and closed-loop control tasks; these are 3 well-proven systems for fast open-loop and closed-loop control and arithmetic tasks in drive and power engineering with the following characteristics and features:
 - Modular design and subdivision into clear, transparent function diagrams using the STEP 7 and CFC graphics-based configuration languages, with correspondingly transparent documentation
 - Option to connect a PC or PG
 - Suitable software packages are available to make parameter adaptation easy.
 - Self-test routines
 - Intelligent operator control and display unit for local control with plain-text messages and time stamp
 - Trace memory for recording fast sequences for diagnostics and troubleshooting (complete fault history before and after the event), read out using option to connect PC or PG
- The medium-voltage converter for gating and monitoring the optocoupler and fiber-optic cable power semiconductors.
- Mechanical encoders are not required on the rotor for open-loop and closed-loop control and monitoring of the SFC. The information required is derived from the electrical generator stator actual values CT and VT (current and voltage).
- The generator-side converter can be optimally gated using voltage clocking of the starting frequency converter. Throughout the run-up phase the firing angle is kept close to the inverter stability limit, thereby permitting the converter output to be fully utilized.

- The turbine set is accelerated from the lowest speed range, where the generator is not yet able to provide sufficient commutating voltage, by means of DC-link pulsing of the SFC's line-side converter.
- Where startup and fault-finding service and support are concerned, the compact unit provides a whole series of resources which can be ordered as optional extras, e.g., fault recorder and remote diagnostics.

1.4 Overview and technical data of static excitation equipment (SEE)

1.4.1 Single bridges without redundancy

Type	SEE 780/1500	SEE 750/2400	SEE 550/2900	SEE 900/4500	SEE 900/6000
	SITOR modules			Stack design	
Rated excitation current $I_{E \text{ rated}}$	1,365 A	2,182 A	2,636 A	4,090 A	5,455 A
Max. continuous current $I_{E \text{ max}}$ (= 1.1 x $I_{E \text{ rated}}$)	1,500 A	2,400 A	2,900 A	4,500 A	6,000 A
Impulse test current I_p (10 s)	2,250 A	3,600 A	4,350 A	6,000 A	7,640 A
$I_p/I_{E \text{ rated}}$	1.65	1.65	1.65	1.40	1.40
Max. input voltage	780 V	750 V	550 V	900 V	900 V
Thyristor type	T1219 N25	T2101 N25	T2551 N18	T3801 N36	T3801 N36
Voltage rating factor*	2.27	2.36	2.31	2.83	2.83
Redundancy	1 x 100%	1 x 100%	1 x 100%	1 x 100%	2 x 50%
Rated losses	7.5 kW	10 kW	11 kW	26 kW	35.5 kW
Required cooling air (2 fans)	3,200 m ³ /h	3,200 m ³ /h	3,200 m ³ /h	5,760 m ³ /h	11,520 m ³ /h
Sound pressure level					
50 Hz power supply	70 dB(A)	70 dB(A)	70 dB(A)	73 dB(A)	74 dB(A)
60 Hz power supply	73 dB(A)	73 dB(A)	73 dB(A)	76 dB(A)	77 dB(A)
Weight	1,200 kg	1,300 kg	1,300 kg	1,660 kg	2,750 kg
Dimensions	Refer to dimension drawings				

*) based on rated input voltage

1.4.2 Bridges with redundancy

Type	SEE 780/1500R	SEE 750/2400R	SEE 550/2900R	SEE 900/4500R	SEE 900/6000R
	SITOR modules			Stack design	
Rated excitation current $I_{E \text{ rated}}$	1,365 A	2,182 A	2,636 A	4,090 A	5,455 A
Max. continuous current $I_{E \text{ max}}$ (= 1.1 x $I_{E \text{ rated}}$)	1,500 A	2,400 A	2,900 A	4,500 A	6,000 A
Impulse test current I_p (10 s)	2,250 A	3,600 A	4,350 A	6,000 A	7,640 A
$I_p/I_{E \text{ rated}}$	1.65	1.65	1.65	1.40	1.40
Max. input voltage	780 V	750 V	550 V	900 V	900 V
Thyristor type	T1219 N25	T2101 N25	T2551 N18	T3801 N36	T3801 N36
Voltage rating factor*	2.27	2.36	2.31	2.83	2.83
Redundancy	2 x 100%	2 x 100%	2 x 100%	2 x 100%	3 x 50%
Rated losses	7.5 kW	10 kW	11 kW	30 kW	38 kW
Required cooling air (3 to 4 fans)	3,200 m ³ /h	3,200 m ³ /h	3,200 m ³ /h	11,520 m ³ /h	17,280 m ³ /h
Sound pressure level 50 Hz power supply 60 Hz power supply	70 dB(A) 73 dB(A)	70 dB(A) 73 dB(A)	70 dB(A) 73 dB(A)	85 dB(A) 87 dB(A)	87 dB(A) 89 dB(A)
Weight	1,740 kg	2,000 kg	2,000 kg	3,100 kg	5,000 kg
Dimensions	Refer to dimension drawings				

*) based on rated input voltage

The data is valid when using an excitation transformer with the following data:

- $u_k \leq 6\%$
- Rated power corresponding to the relevant rated excitation current and selected input voltage \leq rated voltage

Control data:

- Control accuracy $\leq \pm 0.5\%$
- Control range 85 ... 110% U_{rated}
- Setting range (manual) 0 ... 110% I_{rated}
- Controller dead band $\leq \pm 0.1\%$
- Mean excitation response $\geq 3 \text{ s}^{-1}$ (dependent on surge factor)
- Surge factor ≥ 1.8 (dependent on input voltage in relation to rated field data)
- Initial excitation time $\leq 10 \text{ ms}$

1.4.3 Thyristor types for static excitation equipment

EUPEC or SIEMENS	T1219 N25 R66 L166	T2101 N25 T66 166	T2551 N18 T65 120	T3801 N36
Recurring peak off-state voltage	2,500 V	2,500 V	1,800 V	3,600 V
Max. continuous current $\lambda = 180^\circ$ el, sine $T_c = 85^\circ\text{C}$, Eupec	1,050 A	2,100 A	2,550 A	3,810 A
Wafer size	2 "	3 "	3 "	4 "

1.5 Overview and technical data of starting frequency converters (SFC)

Type	SFC			
	2.9	4.0	5.0	9.0
Device version	Stack design			
Rated power	3.7 MVA	5.1 MVA	6.25 MVA	2 x 5.7 MVA
Rated input voltage	1.4 kV	2.5 kV	2.5 kV	2 x 2.3 kV
DC-link power	2.9 MW	4.0 MW	5.0 MW	9.0 MW
DC-link current	1,850 A	1,430 A	1,770 A	1,750 A
DC-link voltage	1,560 V	2,800 V	2,800 V	5,140 V
Thyristor type LSC Thyr. connected in series	T1551 N52 1	T1851 N70 1	T1851 N70 1	T1851 N70 2 x 1
Thyristor type GSC Thyr. connected in series	T1551 N52 1	T1851 N70 1	T1851 N70 1	T1851 N70 2
Voltage rating factor	2.12	2.03	2.03	2.21
Rated losses	36 kW	45 kW	53 kW	76 kW
Required cooling air	7,200 m ³ /h	7,200 m ³ /h	7,200 m ³ /h	14,400 m ³ /h
Sound pressure level*) 50 Hz power supply 60 Hz power supply	83 dB(A) 85 dB(A)	83 dB(A) 85 dB(A)	83 dB(A) 85 dB(A)	88 dB(A)
Weight*)	2,400 kg	3,000 kg	3,300 kg	4,500 kg
Dimensions	Refer to dimension drawings			
DC-link reactor Rated current Starting current Inductance Insulating voltage	1,120 A 1,850 A 2.0 mH 2.5 kV	885 A 1,430 A 4.1 mH 4.0 kV	1,000 A 1,770 A 3.2 mH 5.0 kV	925 A 1,750 A 5.2 mH 8.0 kV

*) SFC power sections only with reactor but no static excitation equipment

1.5.1 SFC thyristor types

EUPEC or SIEMENS	T1551 N52	T1851 N70	T2251 N80
Recurring peak off-state voltage	5,000 V	7,200 V	8,200 V
Max. continuous current $T_c = 85^\circ\text{C}$, eupec	1,830 A	1,850 A	2,250 A
Wafer size	3.5 "	3.5 "	4 "

The data is valid when using a converter transformer with the following data:

- $u_k > 12\%$ referred to the starting frequency converter apparent power output

Duty cycle

Power dimensioning for the starting frequency converters is based on the following duty cycle:

- 4 starts, each 240 s under load with a no-load interval of 150 s, followed by a 2 hour no-load period
- Maximum ambient temperature 40°C
- Thermal monitoring of the duty cycle

Please ask about other duty cycles.

1.6 General technical data

Max. input voltage Tolerance	Refer to overview $\pm 10\%$
Rated line frequency Tolerance	50 Hz or 60 Hz $\pm 2\%$
EMC immunity	In conformity with DIN VDE 0843, corresponding to IEC 801
Device version	In conformity with DIN EN 60146 (VDE 0558), corresponding to IEC 146 According to DIN EN 50178 the unit must be designated as "conditionally short-circuit-proof".
Insulation	Overvoltage category II, degree of pollution 2, insulating material class III, non-homogenous field in conformity with DIN EN 50178 (VDE 0160) using the tables acc. to DIN VDE 0110 (1/89), corresponding to IEC 664

Environmental conditions	Application classes in conformity with DIN EN 60721, corresponding to IEC 721		
Climatic conditions	Storage	Transport	Operation
Lower limit temperature	- 20°C	- 20°C	- 0°C
Upper limit temperature	+60°C	+60°C	+40°C
Relative air humidity	≤ 85% (1K2)	≤ 85% (2K2)	≤ 85% (3K3)
	no moisture condensation	light moisture condensation	no moisture condensation
	For ambient temperatures above 40°C the rated output or rated current should be derated by 10% per 5°C.		
Mechanical conditions			
Storage	1M2	In acc. with IEC 60721-3-1	
Transport	2M2	In acc. with IEC 60721-3-2	
Operation	3M1	In acc. with IEC 60721-3-3	
Site altitude	Max. 1,000 m above sea level		
	For altitudes exceeding 1,000 m above sea level the SFC DC-link power or SEE rated current $I_{E \text{ rated}}$ should be reduced by 5% per 300 m.		
	The voltage must be reduced at and above 2,000 m above sea level.		
Degree of protection	IP32 in conformity with DIN VDE 0470, Part 1, corresponding to IEC 60529		
Cabinet paint finish			
Standard	RAL 7035		
On request (option)	Other RAL colors		
Front panel	SN 30920 - A615 - B14 (turquoise, Siemens standard)		



Warning

The unit is not designed to be arc-resistant.

It is intended for installation in closed electrical operating areas. However, if the unit is installed in a freely accessible electrical operating area, the area around it must be clearly demarcated and appropriate warning notices displayed by its operator.

Non-observance of the warnings can result in serious injury to persons or damage to property.

1.7 Standards and regulations

The following standards and regulations have been applied as relevant:

IEC 62103 (DIN EN 50178/VDE 0160)	Electronic equipment for use in power installations
IEC 60146--1--1 (DIN EN 60146--1--1/VDE 0558 Part 11; without revision of 08/01/2003)	Semiconductor converters - General requirements and line commutated converters – Part 1--1: Specifications of basic requirements
IEC 61800-3 (DIN EN 61800-3/VDE 0160 Part 100; covered by DIN EN 50178)	Adjustable speed electrical power drive systems – Part 3: EMC requirements and specific test methods
DIN EN 60204-1 of 11/01/1998	Equipment of machines *)
DIN EN 60204-11 of 05/01/2001	Equipment of machines > 1 kV

*) The converter complies with the Low-Voltage Directive and the Machinery Directive. It should be noted that the EMC Directive applies only to installations and not to products. The converter is designed to comply with European legislation.

1.8 Dimension drawings of the starting frequency converter with static excitation equipment

1.8.1 Starting frequency converter and static excitation equipment without redundancy

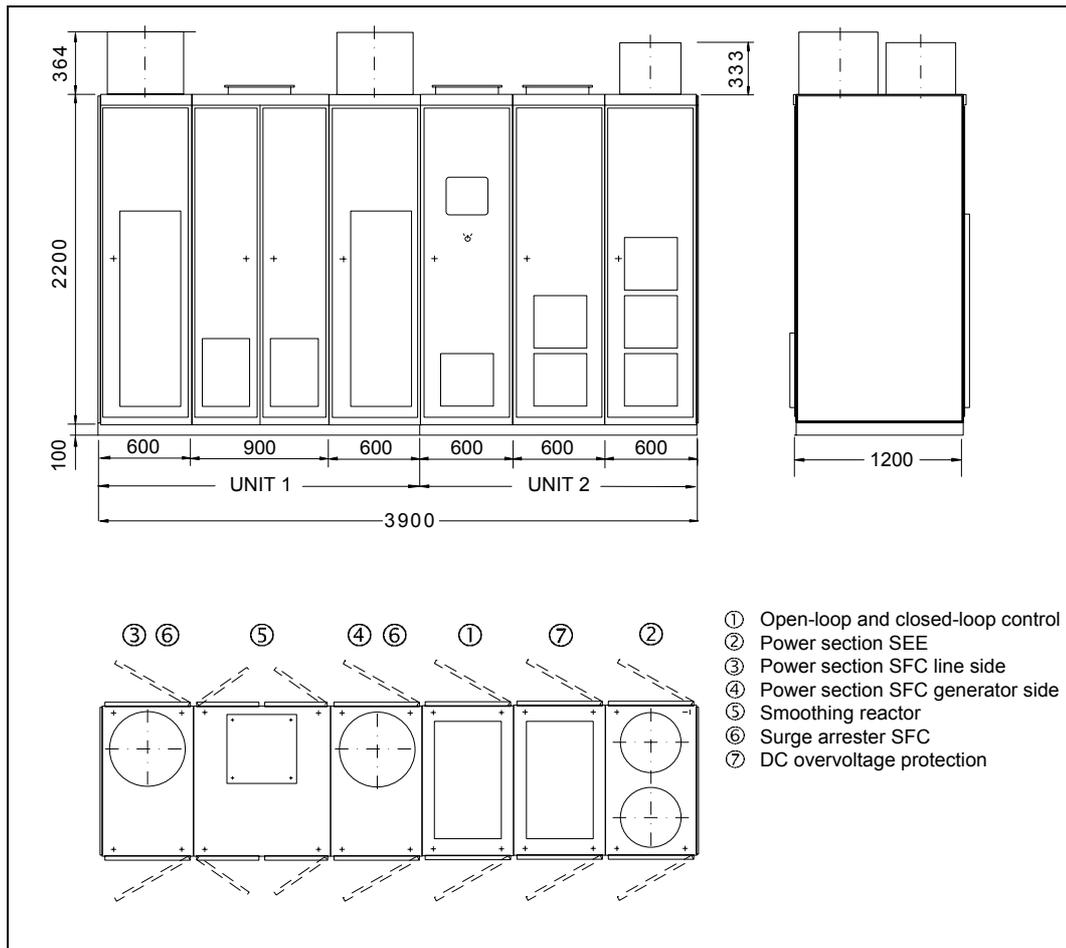


Fig. 1.1 Compact unit SFC 2.9 MW with static excitation equipment (1x100% SITOR modules)

1.8.2 Starting frequency converter and static excitation equipment with redundancy

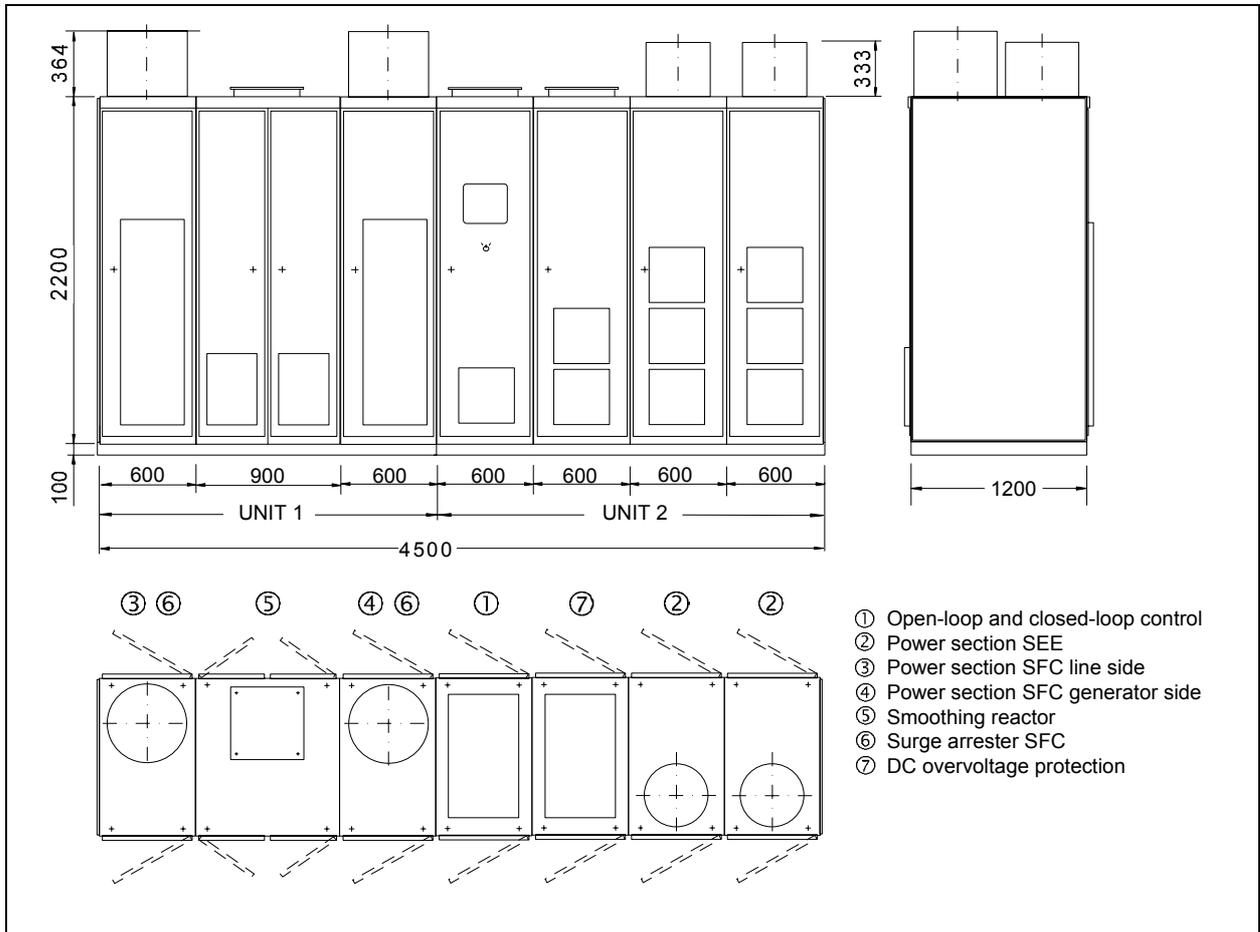


Fig. 1.2 Compact unit SFC 2.9 with static excitation equipment (2x100% SITOR modules)

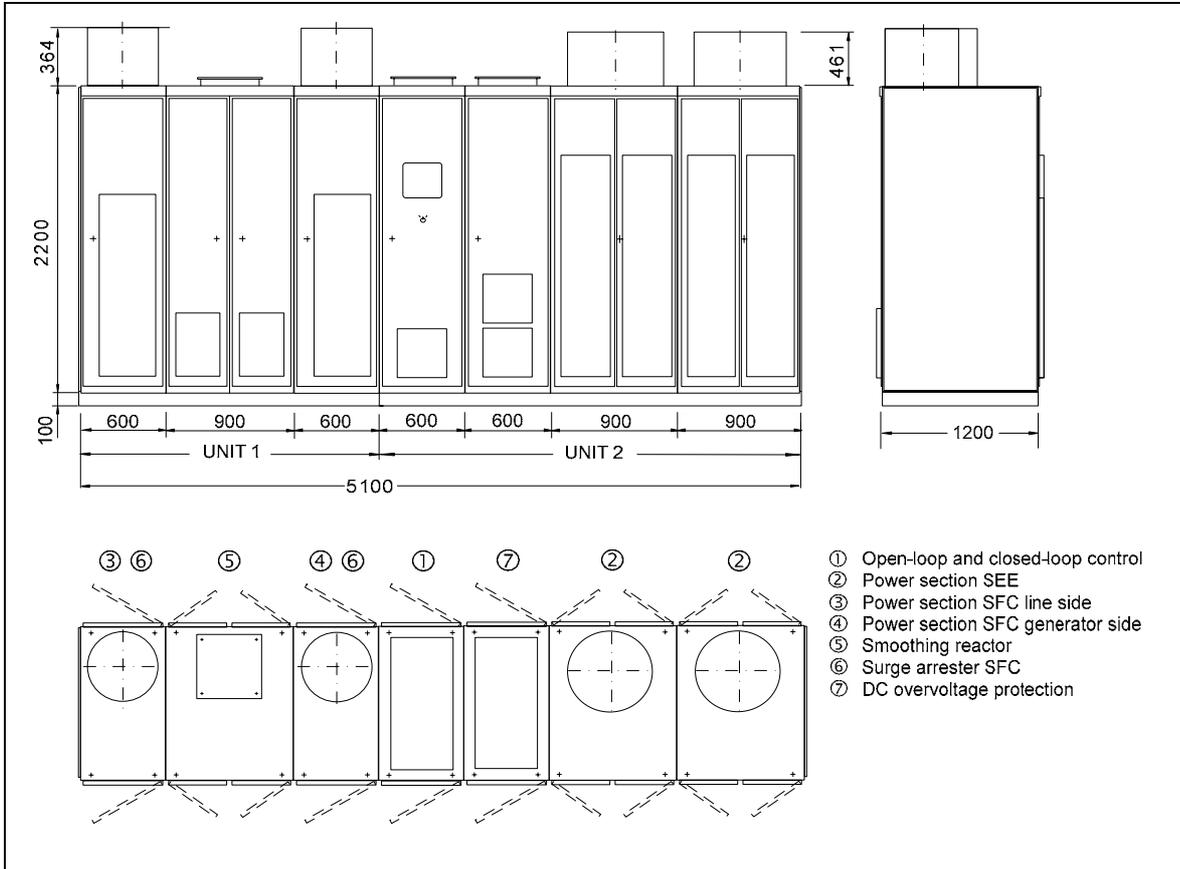


Fig. 1.3 Compact unit SFC 4.0/5.0 with static excitation equipment (2x100% stack design)

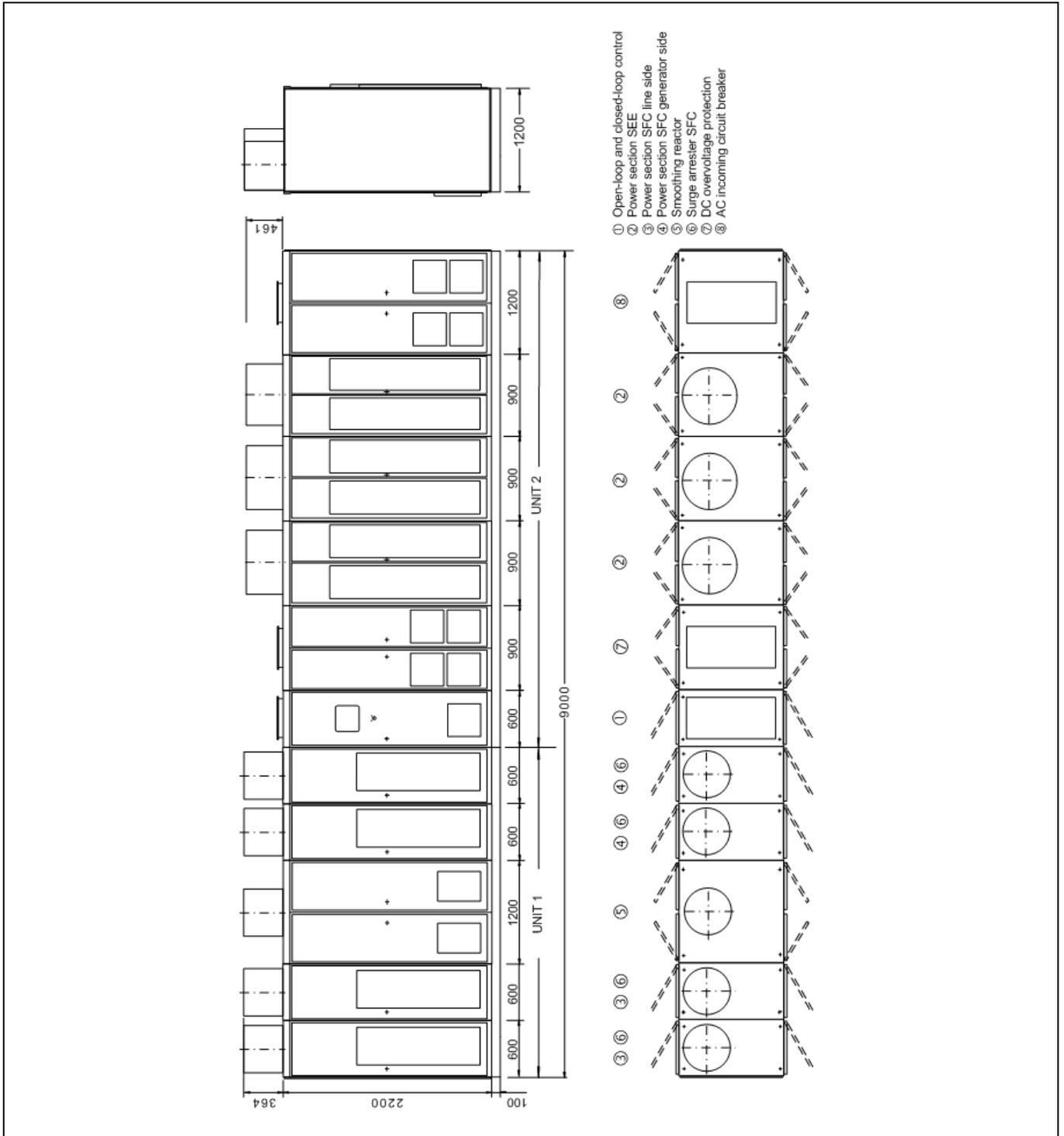


Fig. 1.4 Compact unit SFC 9.0 with static excitation equipment (3x50% stack design)

1.9 Dimension drawings of individual static excitation units

1.9.1 Static excitation equipment without/with redundancy (SITOR modules)

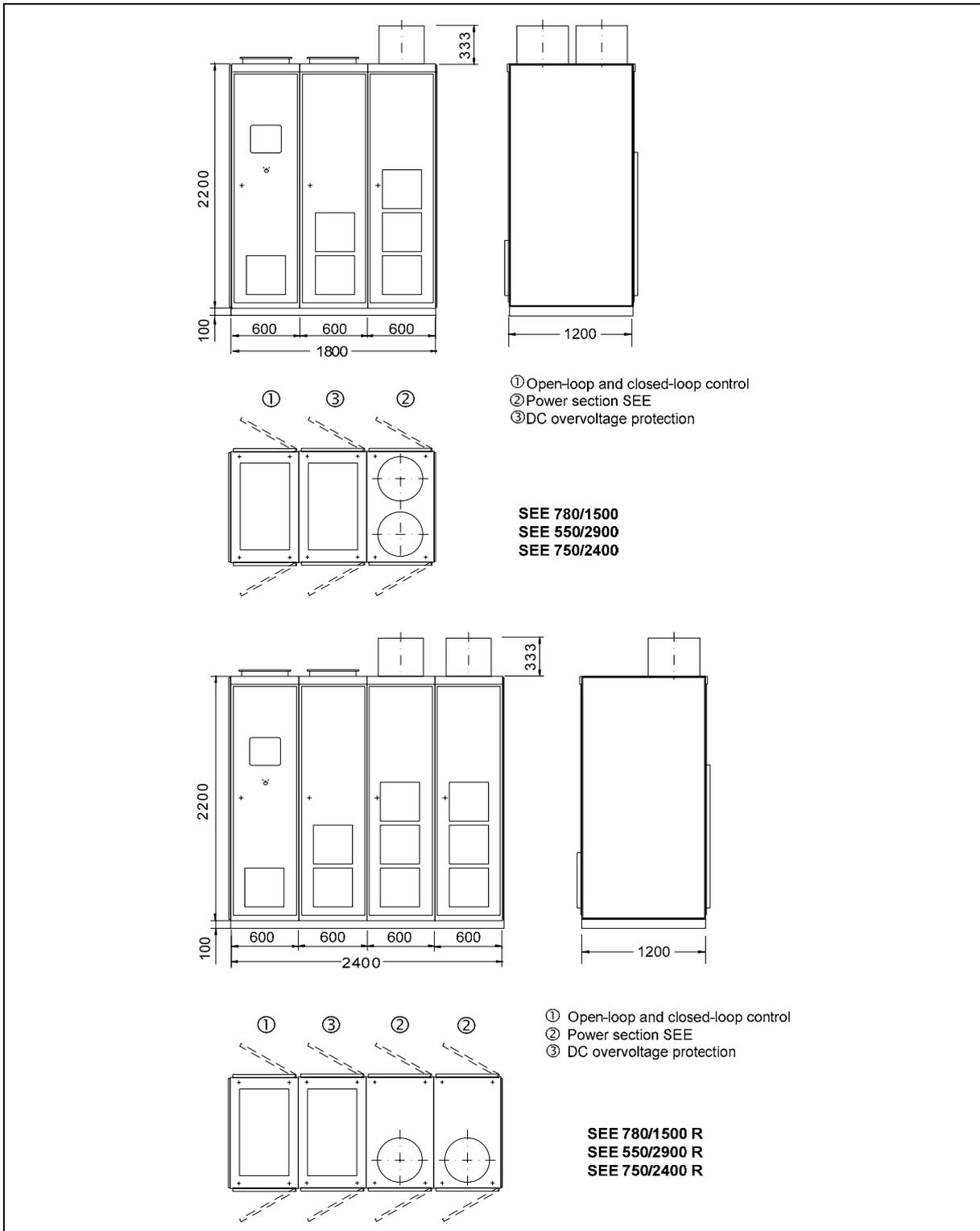


Fig. 1.5: Individual static excitation unit (SITOR module)

1.9.2 Static excitation equipment without redundancy (stack design)

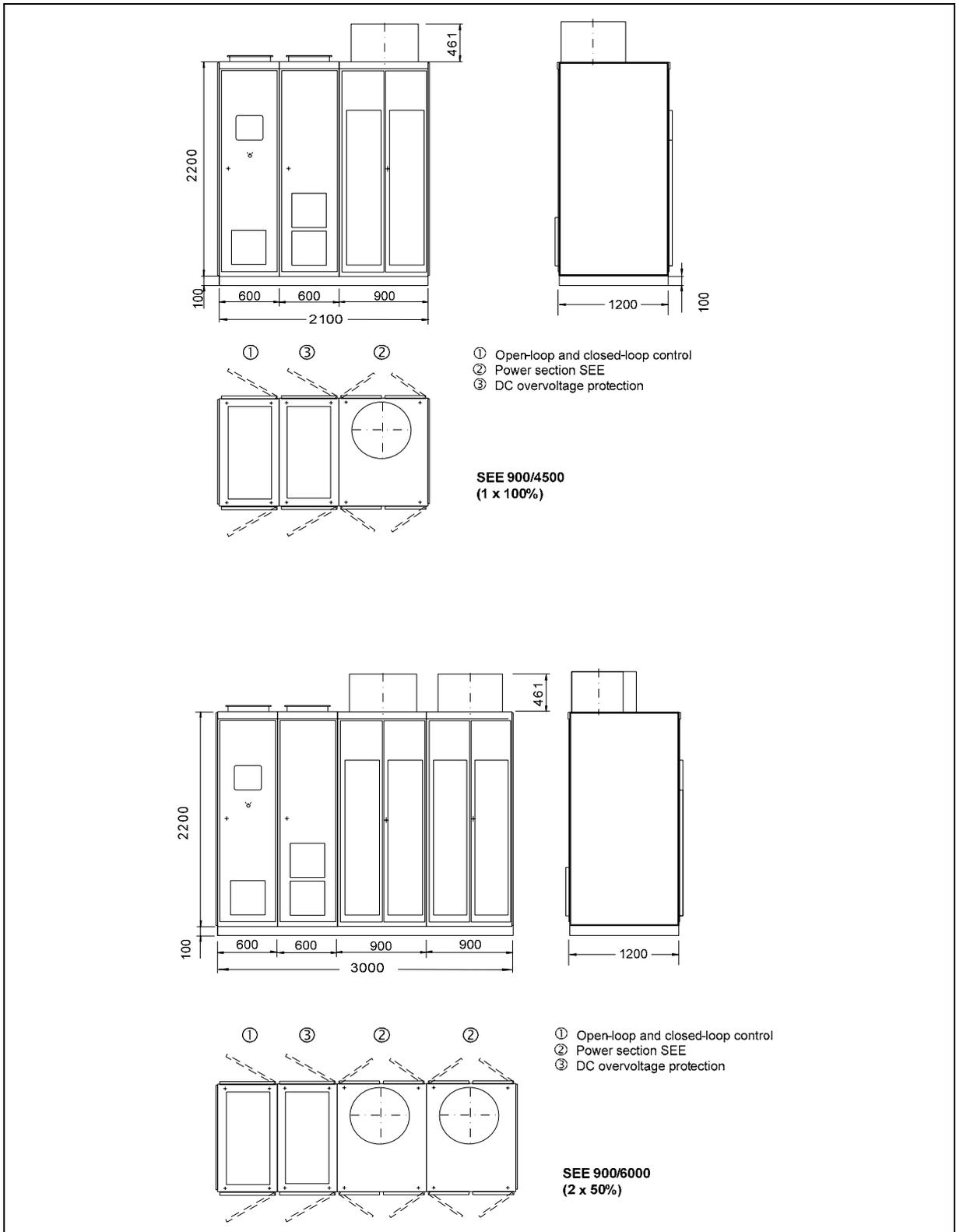


Fig. 1.6: Individual static excitation unit (stack design)

1.9.3 Static excitation equipment with redundancy (stack design)

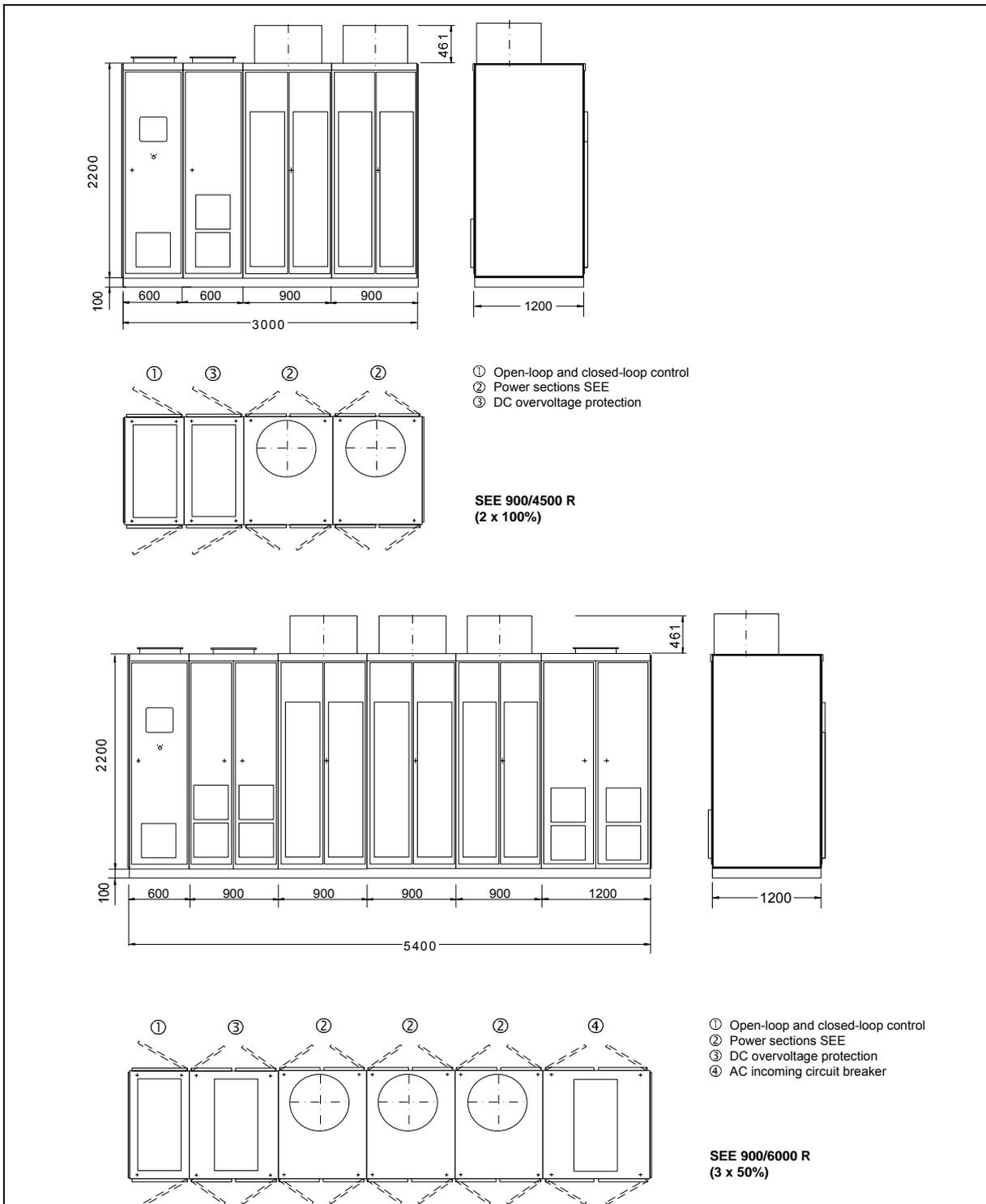


Fig. 1.7: Individual static excitation unit (stack design)

2 Description of the static excitation equipment (SEE)

The operating ranges and limit values specified in association with the static excitation equipment should be regarded as non-binding guide values. The limits and rated values of the static excitation equipment are adapted to the generator dimensions during commissioning.

2.1 SEE power sections

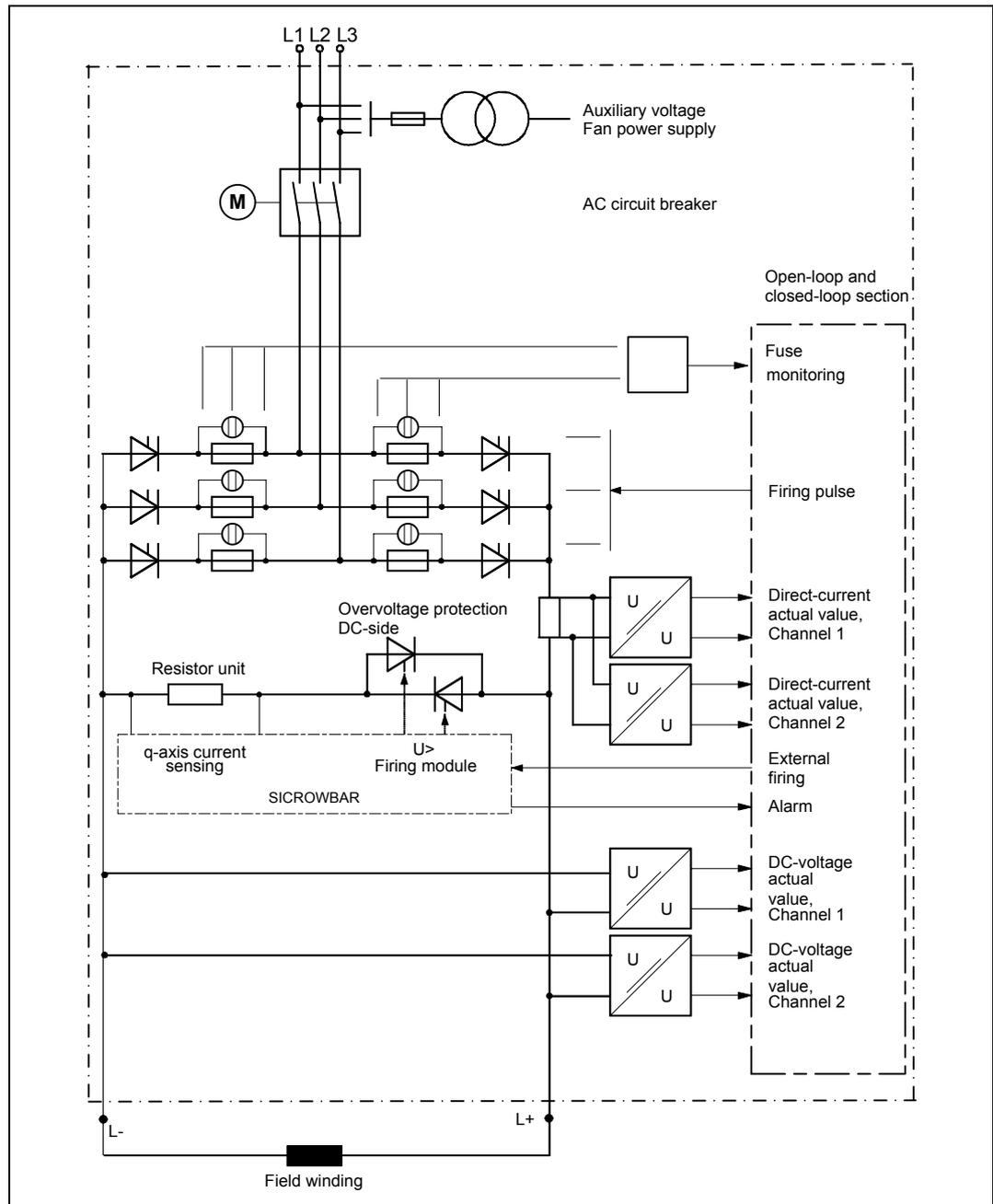


Fig. 2.1 Circuit diagram of a static excitation unit's power section with 1 bridge (1x100%), SITOR modules or stack design; fuse monitoring identical for configuration with 2 bridges (2x100%)

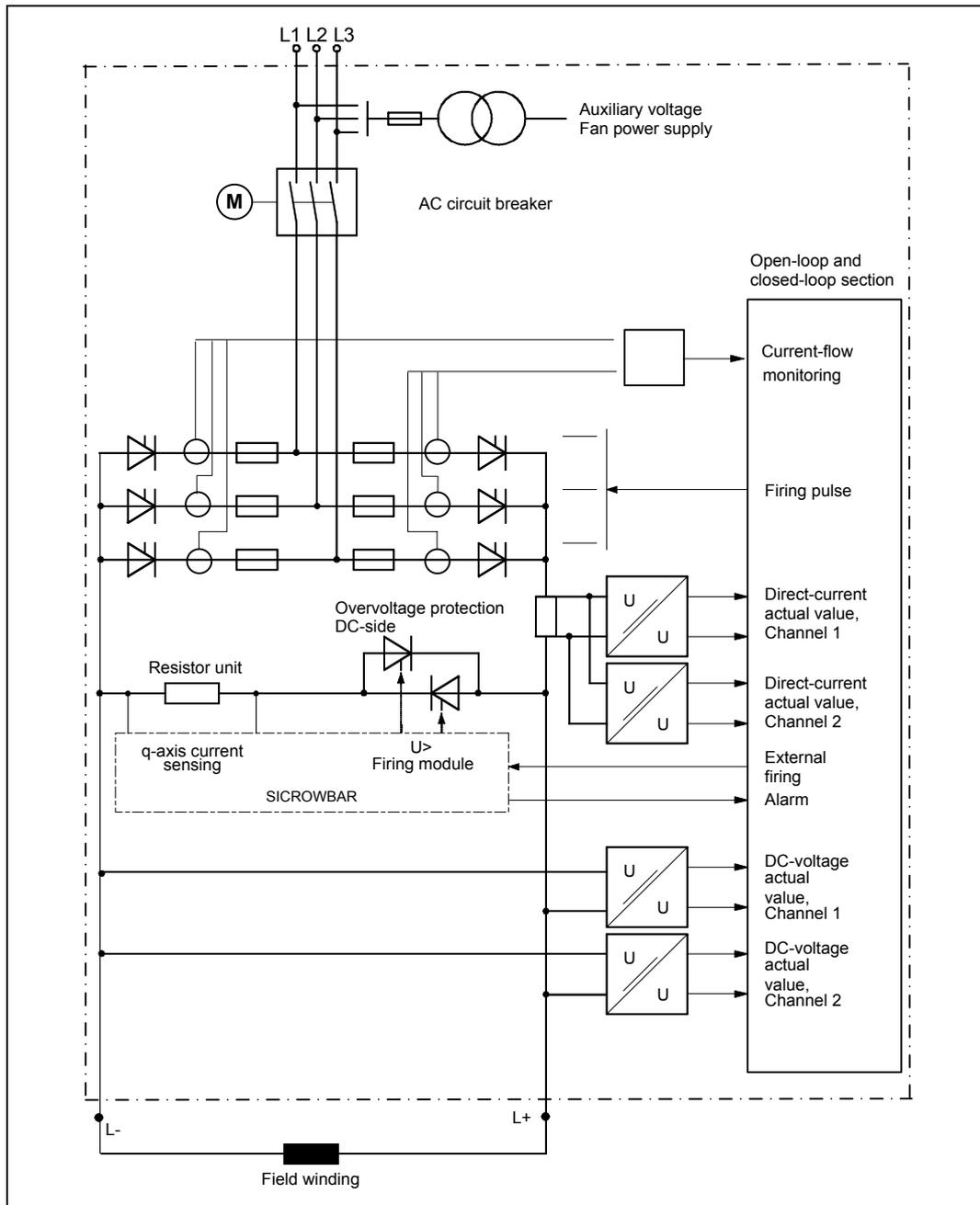


Fig. 2.2 Circuit diagram of a bridge for a static excitation unit's power section configured with 3 bridges (3x50%), stack design

2.1.1 Single bridges

A static excitation unit's power section (Fig. 2.1 and 2.2) essentially comprises the following components:

- Line-side AC circuit breaker
- Fully-controlled three-phase bridge connection consisting of 6 force-cooled 6QA50 SITOR thyristor modules or 6 thyristors in a force-cooled stack design
- Thyristor branch fuses are monitored via fuse monitoring.
- Current and voltage sensing in the DC field circuit
- DC-side overvoltage protection for rotor and thyristors

The power section's power losses are dissipated using 2 redundant radial fans (can be switched over). The controller channels can be switched over to the single bridges, see Fig. 2.3.

2.1.2 Double bridges (two power sections)

In the event of a fault on a bridge, the faulty bridge can be switched over to the redundant bridge virtually bumplessly by shifting and enabling the corresponding gate trigger pulses. The ON-status of the redundant bridge is such that the pulses simply need to be enabled. The thyristor branch fuses are monitored via fuse monitoring.

The controller channels are permanently assigned to the bridges, see Fig. 2.4.

2.1.3 Triple bridges (three power sections)

During normal operation, all three bridges operate in parallel. In the event of a fault on a bridge, the affected bridge is switched off (the gate trigger pulses are disabled by disconnecting the power supply to the gate trigger pulse module). The remaining bridges take over the current. Unlike in the case of single and double bridges, where fuse monitoring is used, a conduction monitor monitors the current in the bridges and fuses connected in parallel, see Fig. 2.5.

2.2 Open and closed-loop control

The digital SIMATIC S7 control system and SIMOREG CMs with T400 are used for all open-loop and closed-loop control functions, see Fig. 2.3, 2.4 and 2.5.

The components for the static excitation equipment are combined in a single cabinet panel and essentially comprise:

In the front of the cabinet:

- 2 SIMATIC S7 racks (redundant open-loop and closed-loop control)
- 2 SIMOREG control modules with T400 (redundant open-loop and closed-loop control)
- Actual-value interposing current transformer (for U_g and I_g)

- Pulse switching relays and interface modules

In the rear of the cabinet:

- SINAMICS GL150 open-loop and closed-loop control
- Interface modules, terminals for the power supply and spring terminal modules, as well as customer terminal strips
- 24 V DC power supply and miniature circuit breakers
- Optional: DC/DC converter 220 V/24 V

In the cabinet doors (see Fig. 2.6):

- 1 operator control panel OP177B (Fig. 2.7)
- 1 key-operated switch for selecting "standard operation" and "local operation" modes

Optional:

- Pointer instruments, e.g., for generator voltage U_g , generator current I_g and frequency f_g , as well as field voltage U_f and field current I_f
- 4 to 8 indicator lights

2.2.1 Versions

The open-loop and closed-loop control equipment is available in 3 versions, which are fundamentally different in terms of design and mode of operation.

- Version 1 – Non-redundant design (see Fig. 2.2.1.1)
- Version 2 – Semi-redundant design (see Fig. 2.2.1.2)
- Version 3 – Fully redundant design (see Fig. 2.2.1.3)

2.2.1.1 Version 1

Version 1 comprises 1 SIMATIC S7 rack and 1 SIMOREG control module with T400 (with 1 manual and 1 automatic channel); this version does not support redundancy. It has 2 Profibus DP links with instrumentation and control.

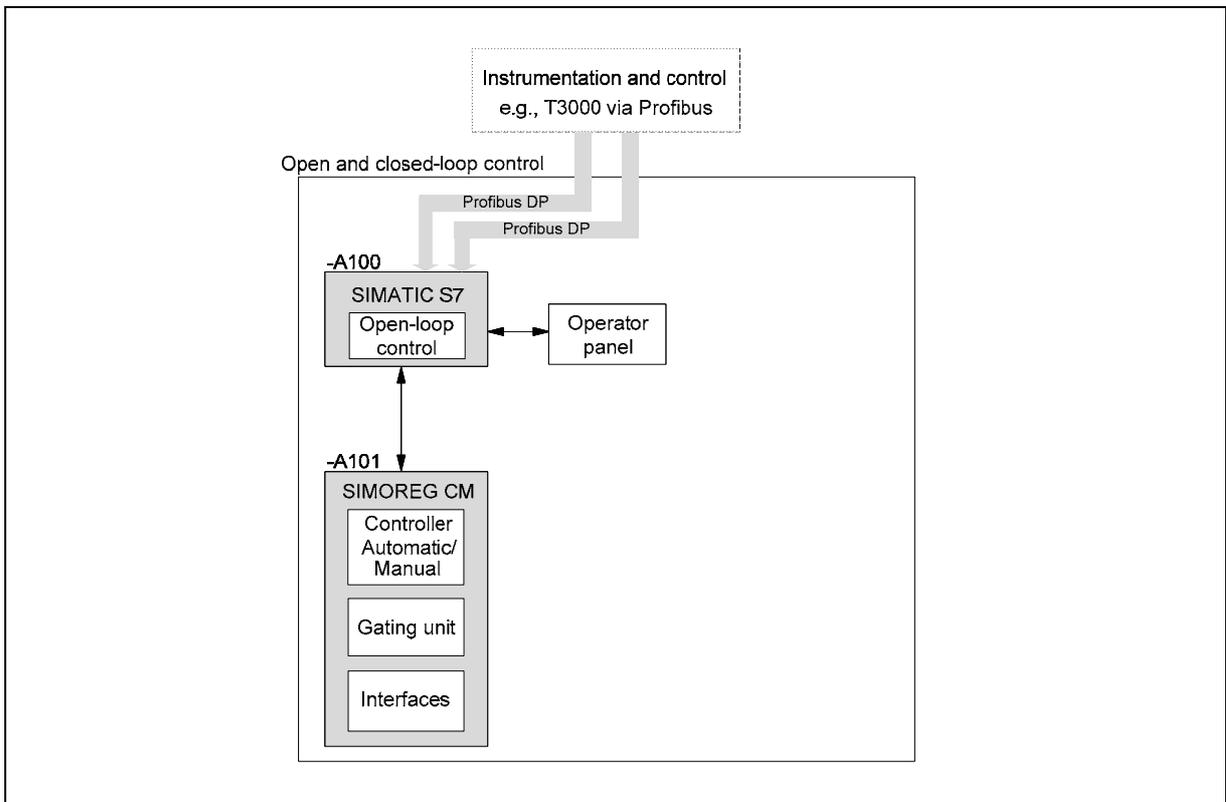


Fig. 2.2.1.1 Version 1 - Non-redundant design

2.2.1.2 Version 2

Version 2 comprises 1 SIMATIC S7 rack and 2 SIMOREG control modules with T400 (each with 1 manual and 1 automatic channel); this version supports redundancy on the closed-loop control side (SIMOREG CM). It has 2 Profibus DP links with instrumentation and control.

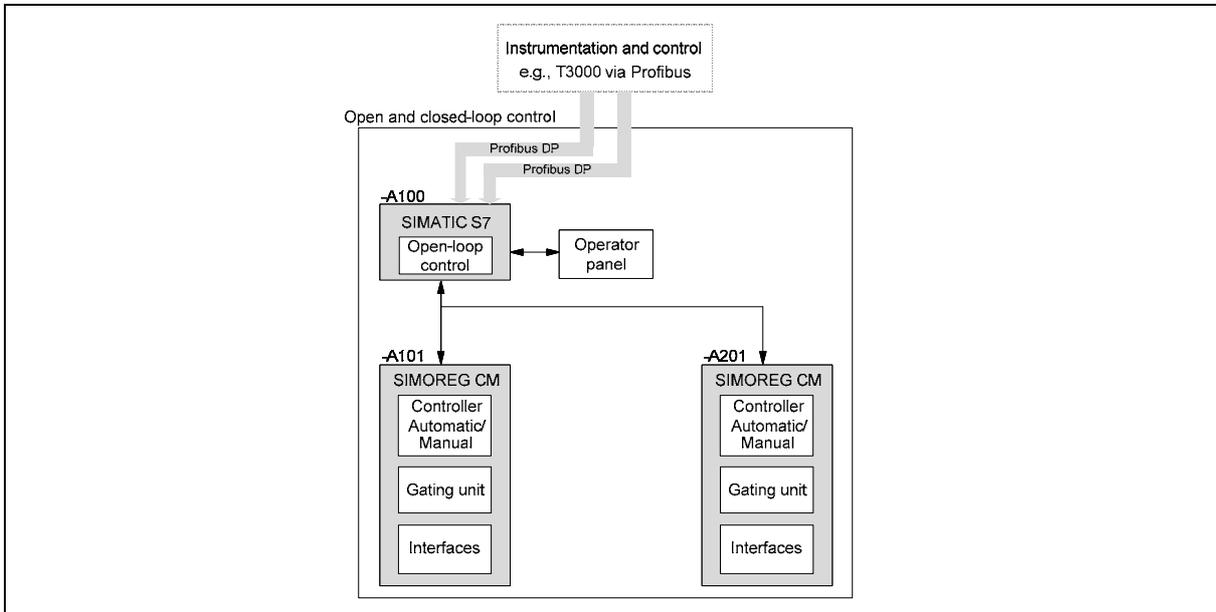


Fig. 2.2.1.2 Version 2 – Semi-redundant design

2.2.1.3 Version 3

Version 3 comprises 2 SIMATIC S7 racks and 2 SIMOREG control modules with T400 (each with 1 manual and 1 automatic channel); this version supports full redundancy, both on the open-loop (SIMATIC S7) and closed-loop (SIMOREG CM) control sides.

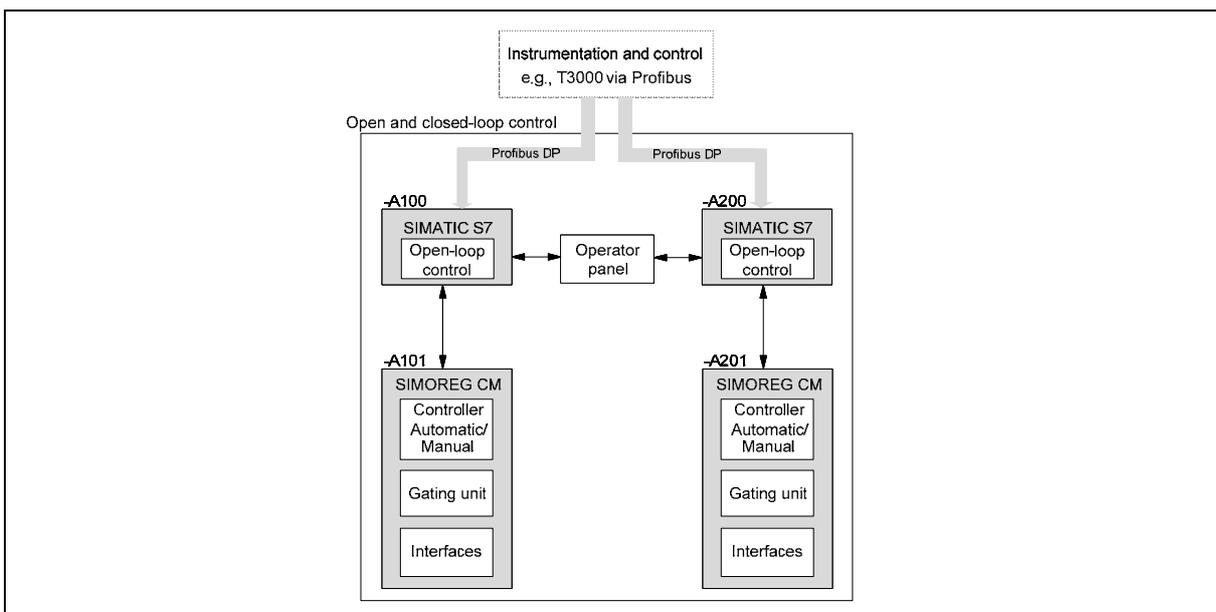


Fig. 2.2.1.3 Version 3 – Fully redundant design

The 3 circuit diagrams below are mapped in Version 3 (with full redundancy).

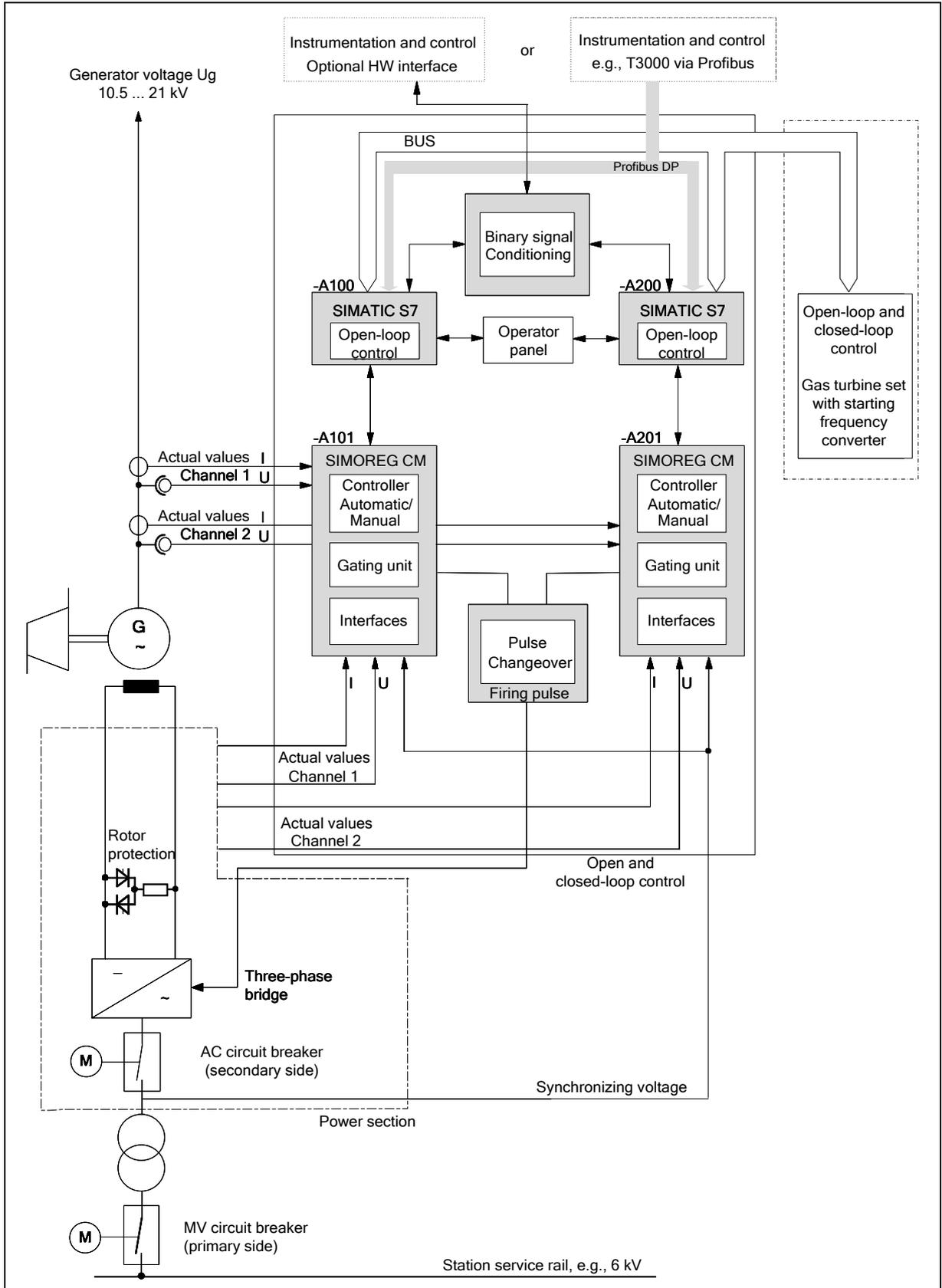


Fig. 2.3 Circuit diagram of open-loop and closed-loop control for the static excitation equipment with single bridge

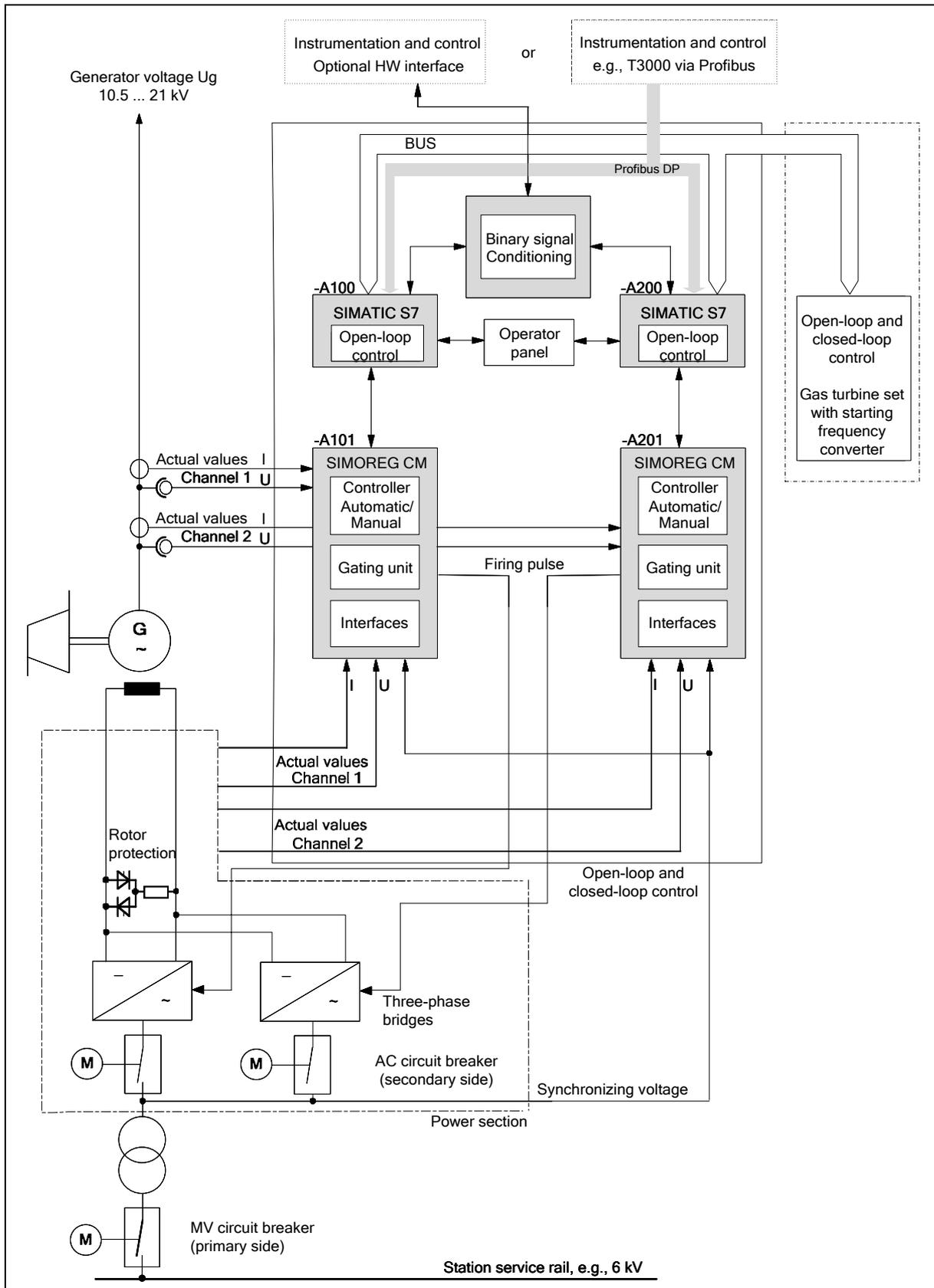


Fig. 2.4 Circuit diagram of open-loop and closed-loop control for the static excitation equipment with 2 "standby" bridges

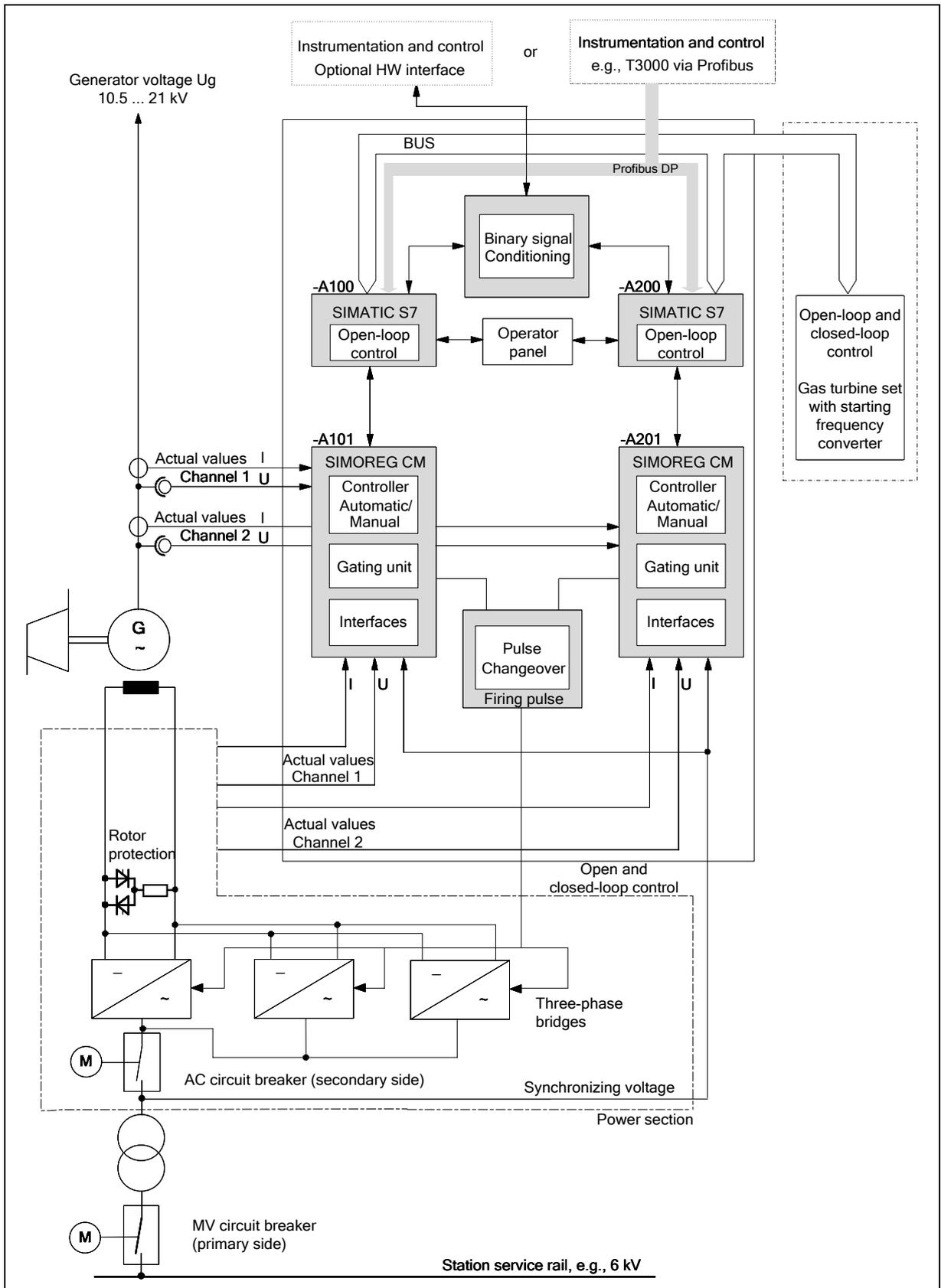


Fig. 2.5 Circuit diagram of open-loop and closed-loop control for the static excitation equipment with 3 bridges

2.2.2 Starting mode (compact units only)

During starting using the starting frequency converter, the static excitation equipment adapts the generator terminal voltage in line with the SFC.

In the lowest speed range, the voltage increases linearly with the speed ($V/f = \text{constant}$). Above the transition speed, where the generator reaches the starting frequency converter rated voltage, the generator voltage is kept constant ($V = \text{constant}$) by the SEE reducing the field current (field weakening).

Once the starting frequency converter has been disconnected and a speed of approximately 90% of the synchronous speed has been reached, standard excitation mode is enabled.

2.2.3 De-excitation

The generator is de-excited by gating the SEE converter in inverter mode and feeding back the energy into the line. In the event of a fault on the line, the overvoltage protection on the DC side is triggered, the converter pulses are cancelled and the secondary circuit breaker trips. The excitation current decays in free-wheeling via the field discharge resistor

2.2.4 Operator control and operating modes

The compact unit has interfaces permitting operator control from 2 different locations:

- OM user interface (Profibus DP link, optional: HW interface)
- Local operator control via the operator panel (selection via key-operated switch)

2.2.4.1 Local operator control on the control cabinet

The control system modes (generator voltage control and field current control) can be selected locally on the control cabinet.

Operator control and the display of setpoints and actual values take place via the operator panel located inside the cabinet doors (and optionally the pointer instruments), see Fig. 2.6.

The operator panels consist of a touch-screen display for displaying setpoints, actual values and messages and a series of function keys and LEDs for system control and status display, see Fig. 2.7.

"Standard operation" and "local operation" can be selected using a key-operated switch located underneath the operator panel.

Standard operation

When the key-operated switch is in this position, it is only possible to display messages and measured values locally. Control is exclusively from the main control room.

The standard operating range of 94% to 106% of the rated generator voltage can be set.

The operator panel can also be used to display certain setpoints and actual values during operation by means of selection via function keys, e.g.:

- Generator voltage setpoint and actual value
- Generator current actual value
- Field current setpoint and actual value
- Field voltage actual value
- Active power, reactive power, power factor, etc.

Fault messages are also output and acknowledged.

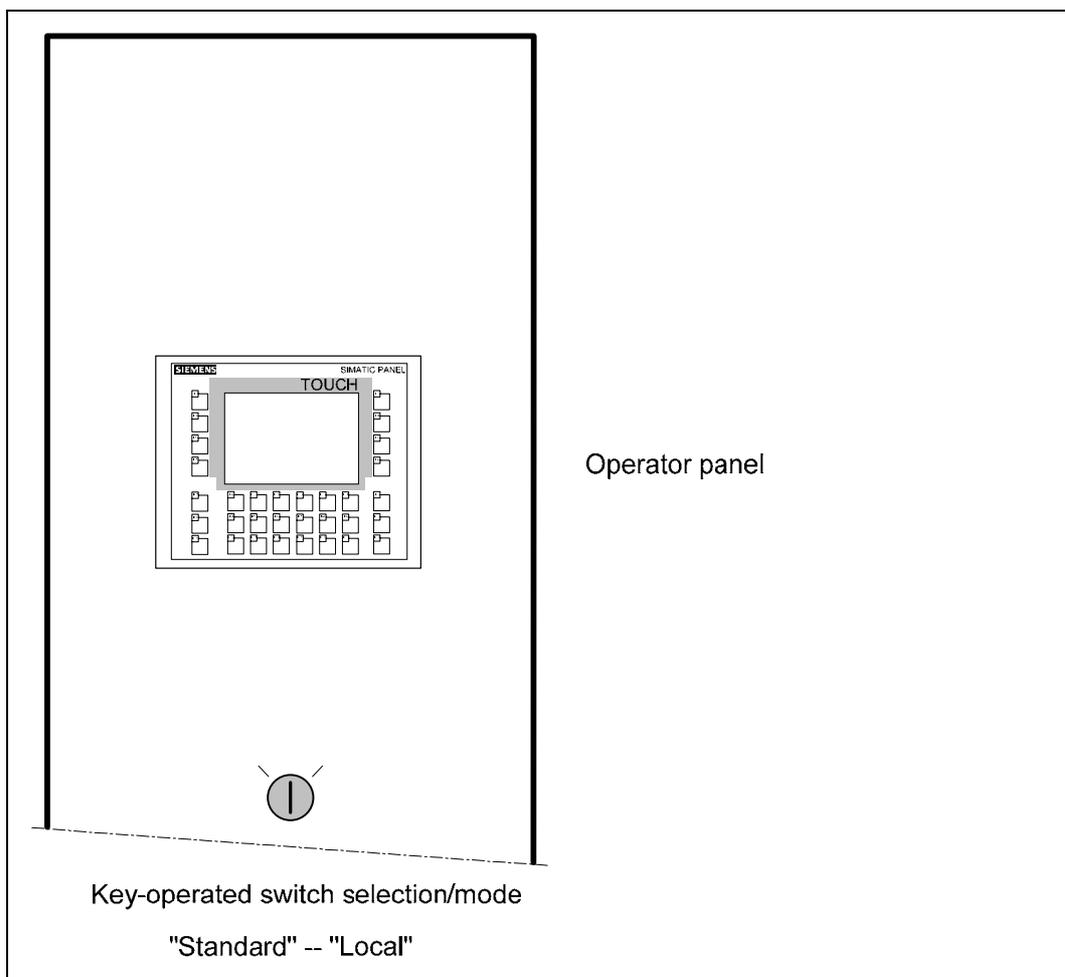


Fig. 2.6 OCM panel on the compact unit's control cabinet

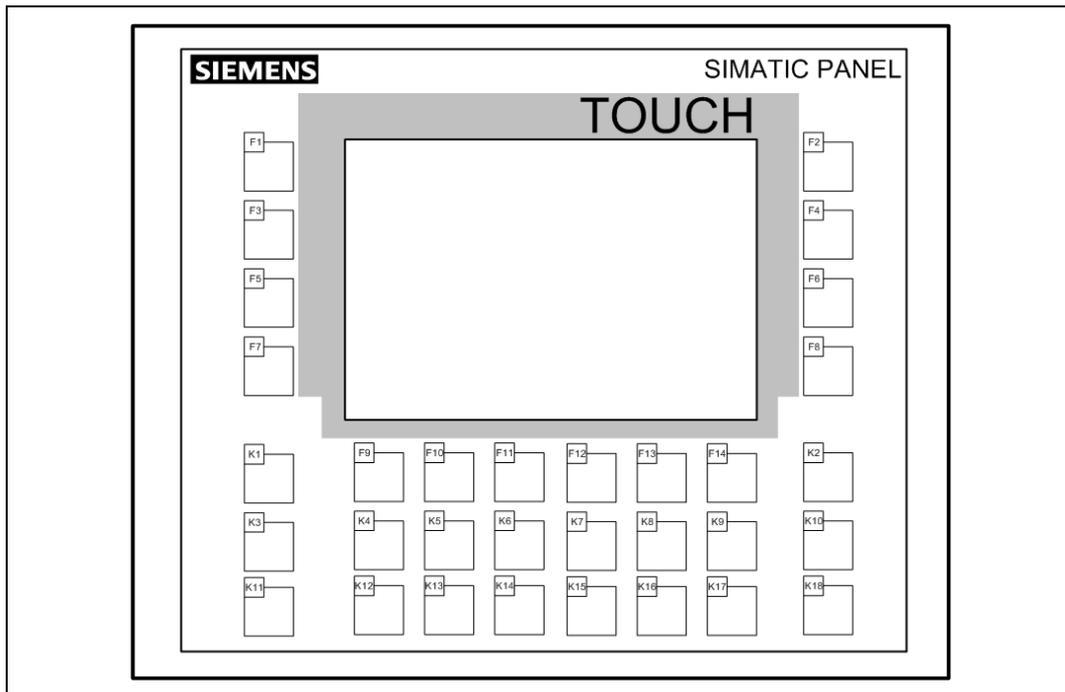


Fig. 2.7 OP177B operator panel

Local operation

Turn the key-operated switch to "local operation" to enable the following control functions:

- Change the setpoint for the generator voltage (in automatic mode) or excitation current (in manual mode) in stages (using up/down commands, or by entering a numerical value directly)
- Define the active channel
- Inhibit the passive channel (block channel switching)
- Automatic/manual changeover (entry of excitation current setpoint)
Changeover from manual to automatic control outside the standard setpoint limits (94% to 106%) is inhibited.
- Switch the power system stabilizer PSS in and out

Operation with certain monitoring functions disabled

Operation with certain monitoring functions disabled is only permissible for "safe runs" or in the event of revisions and is possible in both manual and automatic modes. Operation with certain monitoring functions disabled is password-protected and is selected on the OP in a special screen form.

Note

Operation with certain monitoring functions disabled can only be used by trained specialist personnel!

In operation with certain monitoring functions disabled, the following safety-related functions are either cancelled or modified:

- "Excitation ON" is possible, even if the speed $n < 95\%$.
- "Excitation OFF" is also possible using the button on the operator panel (local). This is only valid if the generator is not connected to the line supply.
- The protective function to prevent current being fed into a stationary rotor is not active.
- The generator voltage control range is expanded from 0% to 125% in AUTOMATIC mode.
- V/f limiting is disabled.
- In MANUAL mode, the field-current setpoint generator is set to zero as soon as the generator is disconnected from the line supply or a change is made between no-load and station service.
- In MANUAL mode, the limiting to no-load excitation is cancelled. This is only valid if the generator is in a no-load condition.

Furthermore:

- When switching back from operation with certain monitoring functions disabled to local/standard operation, "excitation OFF" will follow if the actual value is outside the standard range 95% to 105%.
- It is not possible to change over from MANUAL to AUTOMATIC outside the standard setpoint limits of 94% to 106%.
- In the event of a changeover from AUTOMATIC to MANUAL, the field-current setpoint is set to zero.
- In AUTOMATIC mode, "excitation ON" changes the ramp-function generator setting value from 100% to 0%.

2.2.4.2 Operator control from the main control room

Turn the key-operated switch to "standard operation" for operation from the main control room. It is also possible to make operator-control interventions in operation with certain monitoring functions disabled, which is designed for extraordinary circumstances. Both manual and automatic operation are possible in these two modes.

The following can be controlled from the main control room:

- Excitation ON/OFF
- Automatic/manual changeover (with change from setpoint-value specification of the generator-voltage setpoint to excitation-current setpoint)
- Changeover from manual to automatic control outside the standard setpoint limits (94% to 106%) is inhibited.
- Voltage setpoint and/or up/down (automatic mode)
- Field-current setpoint and/or up/down (manual mode)
- Reactive-power controller/power-factor controller ON/OFF
- Reactive-power setpoint/power-factor setpoint and/or up/down

In addition to the "excitation ON/OFF" checkback signals, there are also the checkback signals "local operation is ON", "manual operation is ON" and "reactive-power controller/power-factor controller ON/OFF".

Voltage setpoint (automatic mode), field-current setpoint (manual mode) and reactive-power setpoint as well as the field-current actual value are available as analog signals (or transferred in the message sent to instrumentation and control).

2.3 The digital voltage controller

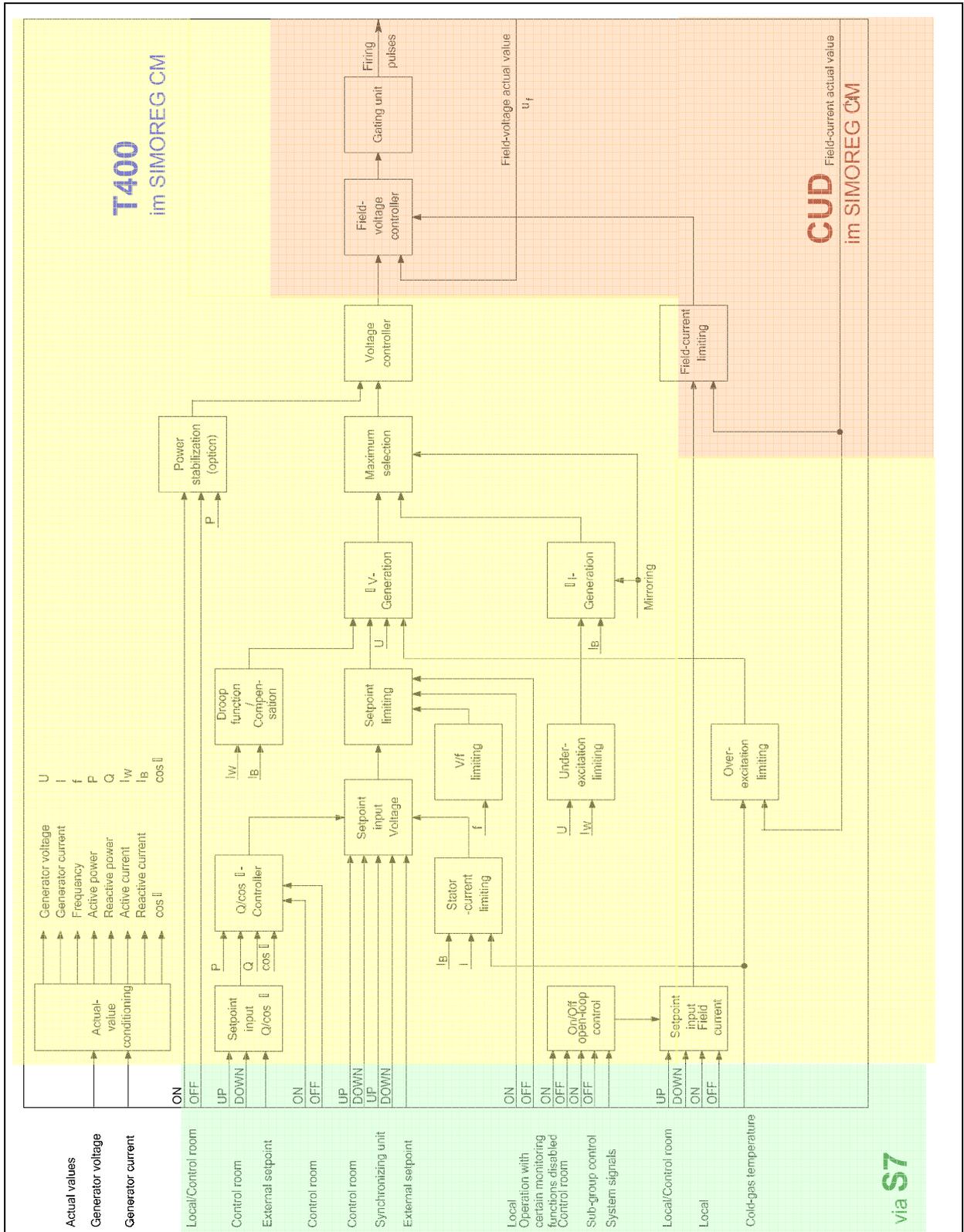


Fig. 2.8 Block diagram of the digital voltage controller

The digital voltage controller (Fig. 2.3 and Fig. 2.8) is designed for the open-loop and closed-loop control of static excitation equipment for generators. It is used both in individual excitation units and in compact units with starting frequency converters.

The digital voltage controller can be set up with 2 channels if required (Fig. 2.2.1.3). Both channels are identical and under normal operating conditions operate as closed-loop voltage controllers in automatic mode. If required (in the context of commissioning, service or in special cases) they can be switched over to field-current-controlled operation (manual mode).

The channels are electrically isolated and have their own power supplies, so that it is possible to disable one channel, for example, when servicing or repairing equipment. Either channel 1 or channel 2 is only ever active for controlling the excitation power section; the active channel is selected via the operator control panel. When the channel is selected, the associated firing pulses and the field-circuit actual values are also switched over at the channel outputs. The passive channel is tracked in all modes, thus ensuring a smooth transition on channel changeover (at all operating points).

For the purpose of communication with instrumentation and control, bus interfaces are provided or all corresponding binary inputs and outputs are connected to both channels via interface modules (HW link option).

Data transfer between the channels and the starting frequency converter's open-loop and closed-loop control is implemented via a Profibus DP link.

If starting frequency converters are used to start up several generators, communication between the compact units and the individual excitation units is implemented via a bus system. The starting frequency converter is then prompted to start up the turbine set associated with a particular static excitation unit by means of a message sent via the bus system.

2.3.1 Actual-value sensing and conditioning

The generator voltage and generator current are read in as two-phase or three-phase values via converters by the T400 technology module. α -, β -, and zero-system calculations are then used to define the values V , I , P , Q , f , i_w , i_B , and the power factor in software-based vector-calculation modules (Fig. 2.9).

By normalizing v and i to the rated values, active and reactive quantities are automatically normalized to the rated data; normalization is not necessary for operation under load. The quantities of the vector sum v (zero system) are used for monitoring the actual-value generator.

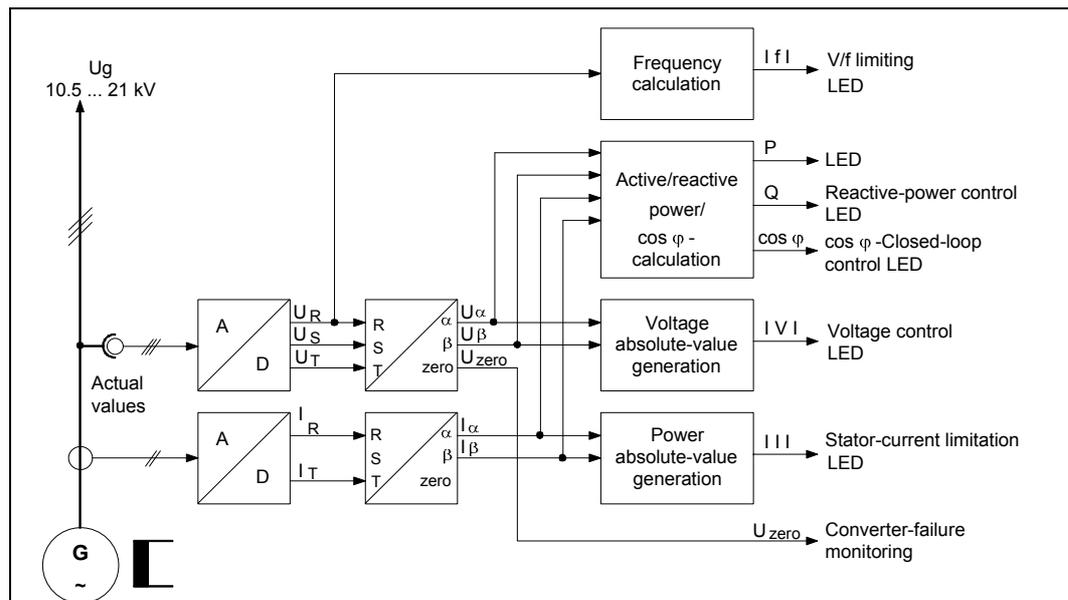


Fig. 2.9 Generator-voltage control actual-value conditioning channel

2.3.2 Voltage control

The voltage setpoint consists of the setpoint generator value and the stator-current-limit signals. The summed signal is compared with the voltage actual value at a P controller. A signal, proportional to the active or reactive current, can be added to the voltage actual value (droop).

The differential signal passes through a maximum selection circuit (refer to the under-excitation limit) and is fed to a PI controller. The controlled variable of the passive channel tracks the controlled variable of the active channel. The controller-output value is fed to the field-voltage controller as a voltage setpoint; the controller then calculates the firing angle for the gating unit. The firing pulses for the three-phase bridge are output from the gating unit.

The signal from the power system stabilizer is added at the voltage controller's integral component.

In normal operation, the generator voltage is controlled to a setpoint in the range from 94% to 106%. These limits are removed in operation with certain monitoring functions disabled, when the voltage can be controlled in the range 0% to 125%.

The upper voltage setpoint limit is reduced by the V/f limit, as a function of the frequency.

The voltage setpoint generator can be set to specific initial values as long as a pulse inhibit is available:

- When starting the generator set:
 - To a fixed value of 100%
 - To an external line-voltage actual value (which must be greater than 90%)
- In operation with certain monitoring functions disabled:
 - To 0%
- When switching a channel back in:
 - To the setpoint of the active channel

The voltage setpoint generator is also controlled from the synchronizing unit via up/down signals.

2.3.2.1 Reactive-power and power-factor control

The voltage controller can be made subordinate to a reactive-power or power-factor controller (software-based parameterization).

- The conditions for this are as follows:
 - Generator connected to the line
 - Voltage control (automatic) ON

Switching-in is implemented bumplessly from the main control room; the instantaneous actual value is applied as the setpoint. The setpoint can be changed subsequently from the main control room by pressing the up/down keys.

The dead band of this control is $\pm 1\%$. If the dead band is exceeded, correcting pulses are fed to the voltage setpoint generator.

When reactive-power or power-factor control is active, the voltage setpoint cannot be adjusted directly. This control is disabled both when manual mode is selected and when the generator is disconnected from the line.

It is also switched out and back in bumplessly for the period during which the generator current falls below a value of 20%. On each occasion, switching-in is delayed for approx. 8 seconds.

2.3.2.2 Power stabilization

The power system stabilizer PSS generates a supplementary signal from the active power and/or the compensated frequency. This is switched-in at the voltage controller's integral component if the power system stabilizer is active and if the active power is $> 20\%$.

The power system stabilizer parameters must be set specifically for each installation.

Under steady-state operating conditions, power stabilization has no effect.

Only in the event of oscillations in the active power will the device start to operate and intervene in voltage control.

In terms of the phase position and gain, the intervention signal is dimensioned so that active-power oscillations between the generator and the line are significantly damped. The extent to which the PSS is able to intervene is limited so that a voltage deviation from the setpoint of $\pm 10\%$, measured in relation to the actual operating point, cannot be exceeded.

2.3.3 Closed-loop current control

The field-current controller is a high-gain P controller. A setpoint generator which serves as a ramp-function generator when the field is being established after the excitation-ON command, as a limit for the maximum superexcitation value (field flashing) and as an excitation-current setpoint generator for manual operation (e.g., for commissioning purposes or when automatic mode is faulty) is connected upstream of it.

Automatic mode

The current controller acts as a field-current limit controller for the upper limit of the field-voltage controller. As soon as the field current reaches the value specified by the setpoint generator, it is limited to this value. Generally, a limit value of 140% is permitted.

The current setpoint generator can be set to specific initial values:

- At pulse inhibit and normal switch-on, to 0%
- At pulse inhibit and when the channel is switched back in, to the setpoint of the other channel
- When the generator is isolated from the line, to the no-load excitation current (approx. 30% $I_{F \text{ rated}}$)
- To 140% $I_{F \text{ rated}}$, as soon as the voltage controller goes into operation on completion of startup

Manual mode

In this mode, the current controller acts simultaneously on the upper and lower limit of the field-voltage controller, so that this is no longer active. Thus, the field current is controlled to the value specified by the setpoint generator, i.e., the voltage is no longer controlled.

In standard operation, the field current can be controlled to a setpoint in the range from 0% to 110% via the up/down key. If the generator is not connected to the line, the upper limit is reduced to a value corresponding to V_{rated} . In operation with certain monitoring functions disabled, this limit is reset to 110%.

When changing over to manual mode, the setpoint generator is set to the field-current actual value in order for the transition to be bumpless.

It is only possible to change over from manual to automatic mode within the specified automatic-mode limits.

2.3.4 Limiting mechanisms

All limiting mechanisms only have an effect in generator-voltage control mode (automatic mode).

2.3.4.1 Stator-current limitation

The stator current required for the max. apparent power of the generator forms the response value for stator-current limiting. This consists of one control circuit for each of the overexcited and underexcited ranges. This limit is disabled in a dead band equal to $\pm 10\%$ of the reactive current. This limit is activated with delay (more specifically, a delay which is inversely proportional to the absolute value of the overcurrent in relation to the response value), when the response value is exceeded. Intervention takes place after no less than 10 seconds, taking superexcitation limiting into account. The intervention signal acts like a positive or negative supplementary setpoint.

2.3.4.2 V/f limiting

This limiting mechanism is designed to protect the unit transformer from becoming saturated and should switch in before any V/f protection mechanism is able to respond.

V/f limiting reduces the voltage setpoint linearly so that the setpoint (90%) is reached at approx. 41 Hz.

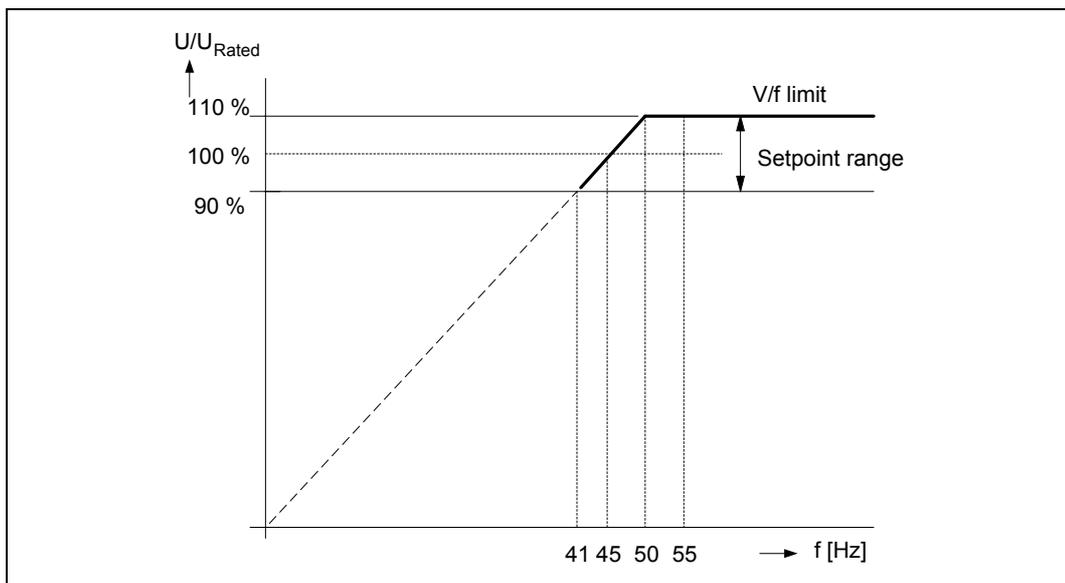


Fig. 2.10 V/f limiting

2.3.4.3 Underexcitation limiting

In the underexcited range, underexcitation limiting is designed to ensure the minimum excitation required for stable parallel operation of the generator with the line supply, and to limit the reactive power accordingly.

When underexcitation limiting responds, voltage control is deactivated via a maximum selection circuit and rendered ineffective.

The limiting characteristic C in the power diagram (Fig. 2.11) is stored in a software characteristic module, which outputs the appropriate reactive-current value as a function of the active current. The characteristic shifts in the direction of the underexcited range as the voltage increases. It can be adjusted in line with the requirements of the generator and line-supply data.

The reactive-current value of the characteristic corresponding to the active current is compared with the actual operational reactive-current value. The difference is fed to a P amplifier.

When the characteristic is exceeded, the differential signal generates an increase in the excitation current. A corresponding message will appear in the main control room.

For commissioning purposes, the characteristic can be reflected in the overexcited range, so that the direction of influence of the intervention signal as well as the setpoint generator blocking can be changed over.

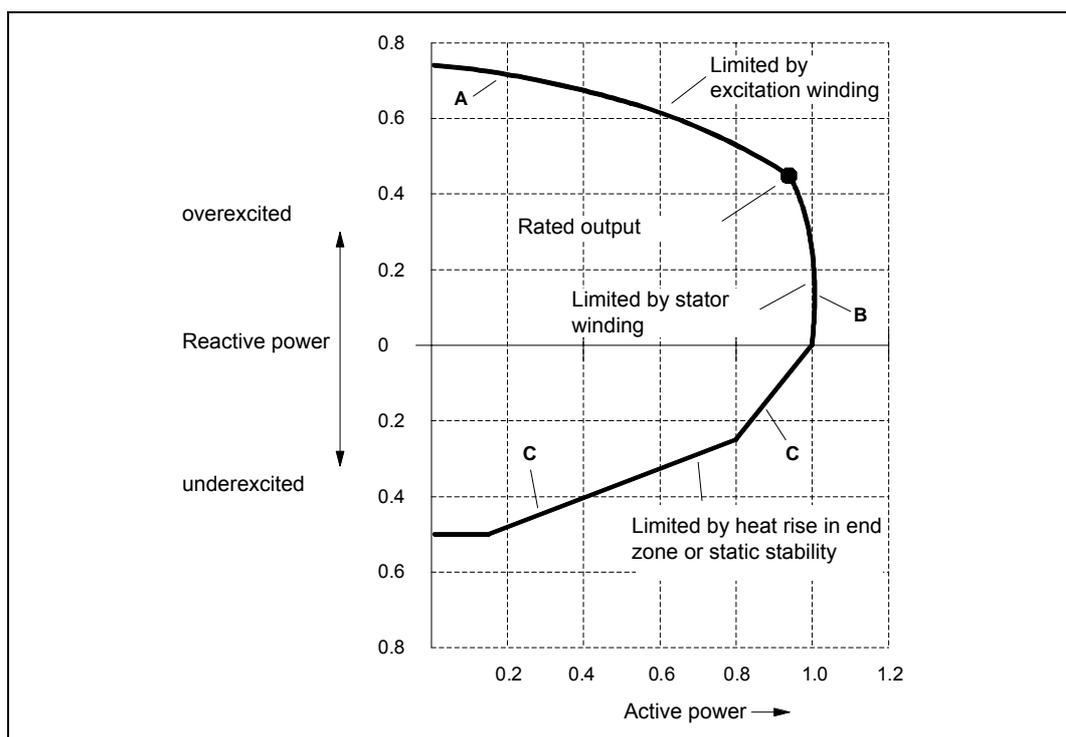


Fig. 2.11 Typical power diagram in conformity with VDE 0530, Part 3

2.3.4.4 Overexcitation limiting

Surge-excitation limiting limits the field current almost instantaneously to the maximum permissible value, approximately 140%.

The duration of overexcitation and the subsequent reduction to a value which excludes thermal overload of the field winding can be achieved using a rigid, characteristic-controlled overexcitation-limiting mechanism.

Characteristic-controlled overexcitation limiting

At a field current $> 110\% I_{F \text{ rated}}$, overexcitation limiting becomes active after a delay and reduces the field current accordingly.

The higher the overexcitation, the earlier reduction will switch in (Fig. 2.12).

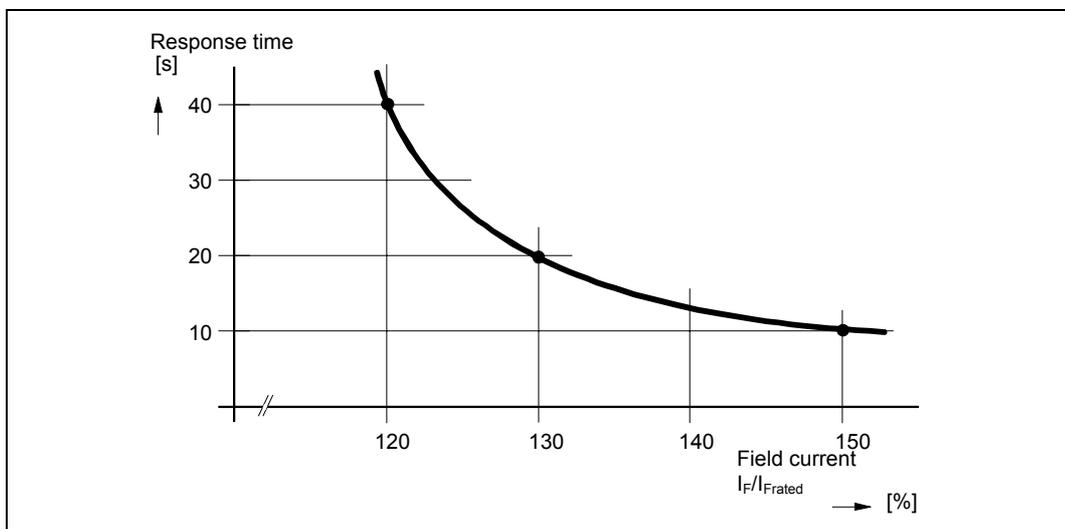


Fig. 2.12 Time-delayed overexcitation limiting

After the field current has fallen below the response threshold, the surge-excitation value is released inversely proportional to the deviation, up to a max. of 140%, i.e., once overexcitation limiting has responded, the full surge-excitation value will not be available again immediately.

3 Description of the starting frequency converter (SFC)

The starting frequency converters' operating modes have been designed in line with SIEMENS gas turbines. Different types of gas turbine require different starting frequency converter power ratings and speed setpoints.

3.1 Operating modes

Normal start (standard)

The starting frequency converter accelerates the gas turbine set from zero speed, or from the turning speed, before shutting down at approx. 70% of rated speed. Above this speed, the gas turbine accelerates the turbine set up to synchronization speed.

Washing (standard)

To clean the turbine blades, the starting frequency converter is used to accelerate the turbine set once to between 600 and 800 rpm, depending on turbine type.

Purging (option)

"Purging" mode is provided to ensure that there is no combustible gas in the turbine following an aborted start. Purging is performed in the SFC's duty cycle prior to starting.

Black start (option)

When the line supply is down, the starting power is provided by a diesel generator, whereby the starting frequency converter's power can be reduced in line with the diesel rating.

Start for condenser operation (option)

The generator, decoupled from the gas turbine, is accelerated by the starting frequency converter to a speed just above the synchronous speed. After it has been disconnected from the starting frequency converter, it is excited at rated voltage and, as it coasts down, is synchronized with the line.

Braking (option)

The generator is disconnected from the line, controlled down to the starting-frequency-converter voltage and then braked to standstill via the converter. The braking power is fed back into the line. This type of braking is only intended for use in conjunction with phase-modifier operation.

3.2 Design

Power section

The power section includes the following main components (for circuit diagram refer to Fig. 3.1 and Fig. 3.2):

- 2.9, 4.0 and 5.0 MW
Two fully-controlled three-phase bridges with thyristor stacks:
 1. Line-side converter LSC (fuseless)
 2. Generator-side converter GSC (fuseless), both with indirect fiber-optic thyristor gating and checkback signals from individual thyristors
- 9.0 MW
Two fully-controlled three-phase bridges with thyristor stacks:
 1. 2 line-side converter bridges LSC connected in series (fuseless)
 2. 1 generator-side converter GSC (fuseless), both with indirect fiber-optic thyristor gating and checkback signals from individual thyristors
- Generator-side actual-value sensing by means of DC current transformers with high accuracy throughout the frequency range
- DC-link reactor with sufficient inductivity for low current ripple and current rate of rise limiting for protective trips
- Line-side and generator-side overvoltage limiter
- Mounted radial fan to dissipate heat loss

Open and closed-loop control

The open-loop and closed-loop control of the starting frequency converter and the static excitation equipment are housed in a cabinet panel as described above in Section 2.2.

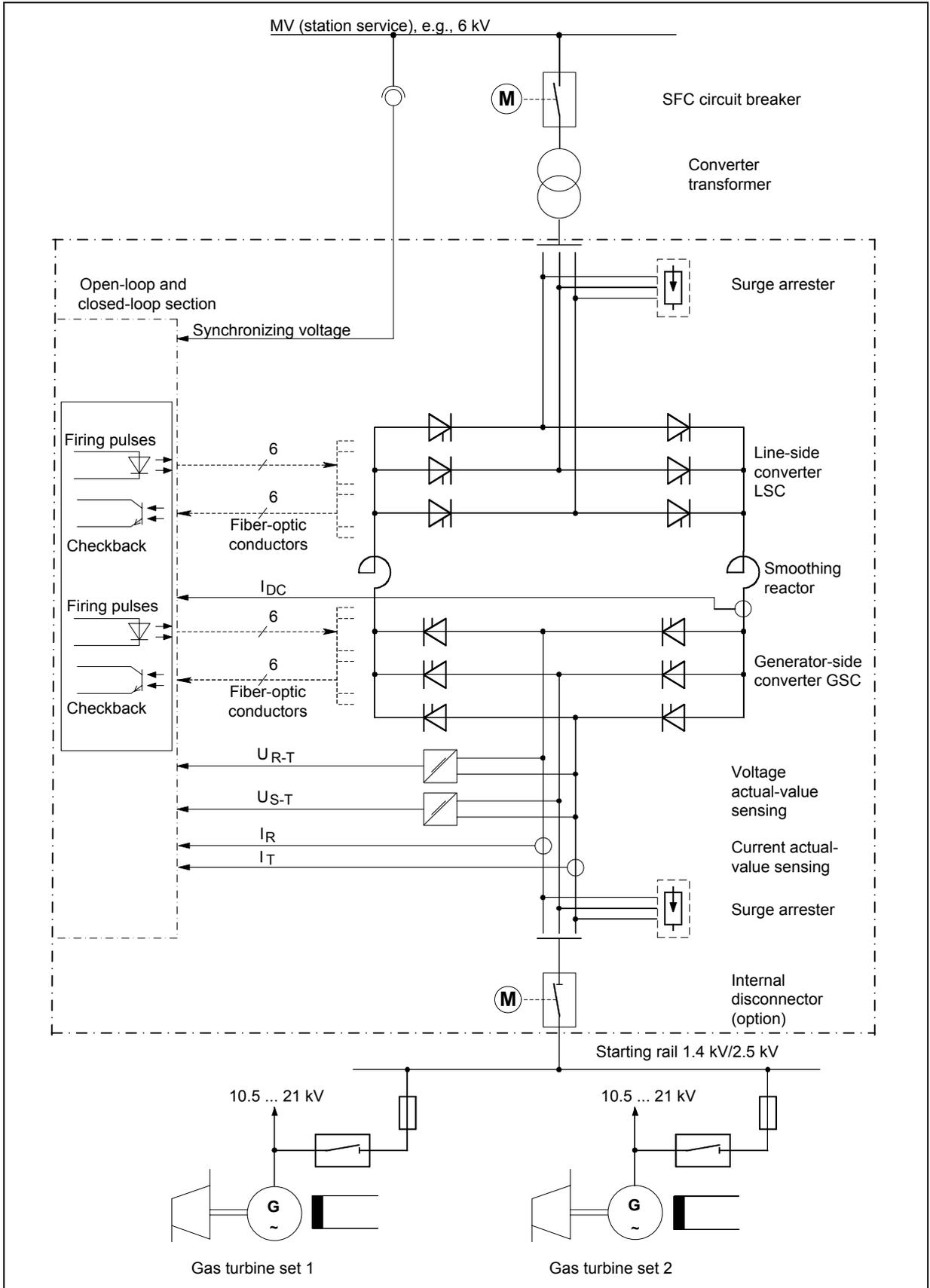


Fig. 3.1 Circuit diagram of the starting frequency converter's power section (2.9 MW, 4.0 MW and 5.0 MW converters)

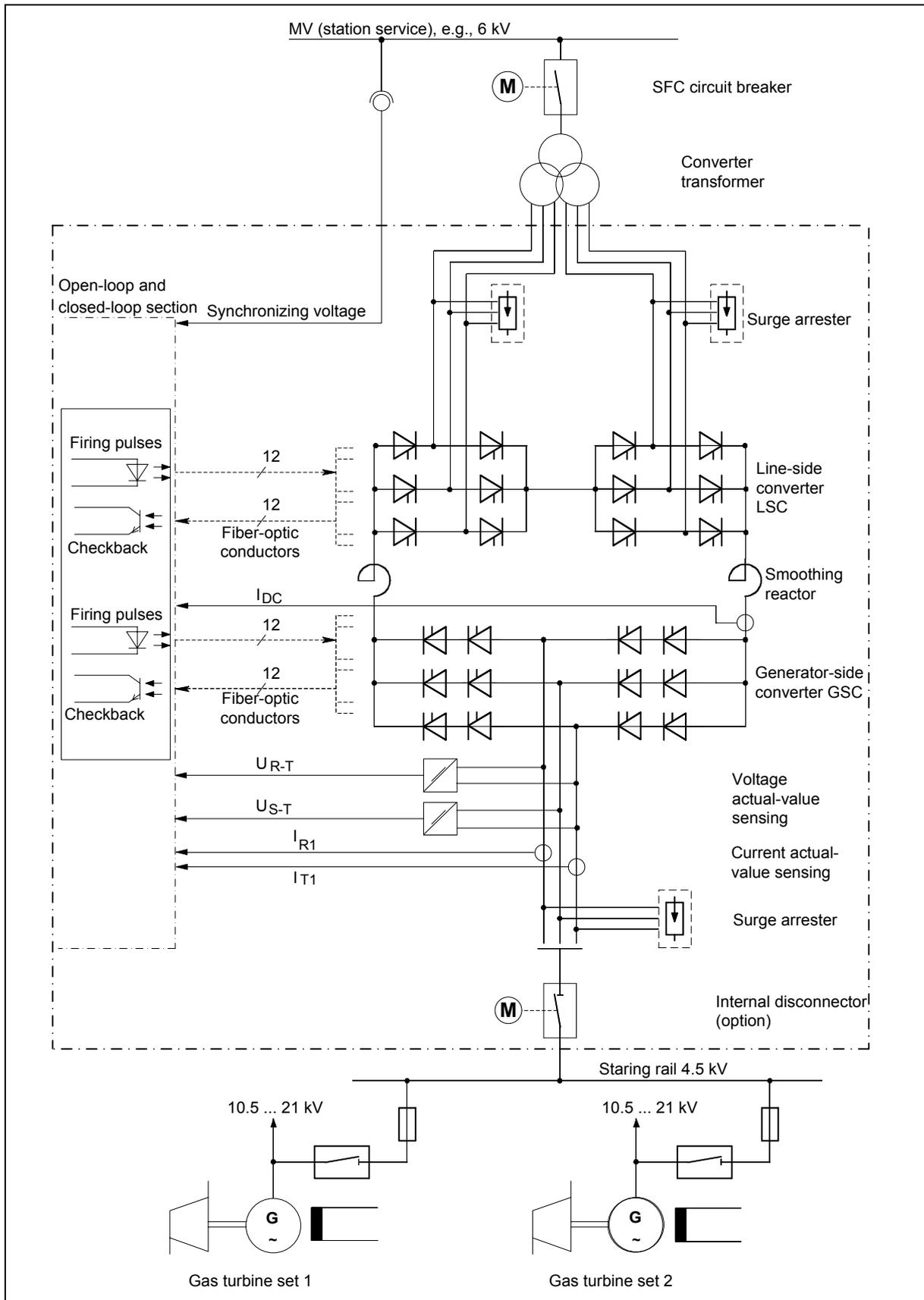


Fig. 3.2 Circuit diagram of the starting frequency converter's power section (9.0 MW converter, 12-pulse LSC)

Principle of operation

The line-side converter is commutated and clocked by the secondary three-phase output of the converter transformer.

The generator-side converter is load-commutated and is clocked from the generator terminal voltage.

The generator-side converter switches the DC-link current from one stator coil to the next so that a rotating field is generated in the generator stator which is induced in the generator rotor in phase synchronism. The DC-link current is switched to the individual winding phases using voltage clocking in synchronism with the instantaneous frequency, and more specifically, when the continually rotating rotor, and thus also the continually rotating flux, has rotated by a further 60° electrical.

Thus, the generator-side converter fulfils the function of an electronic commutator, with a principle of operation similar to the mechanical commutator on DC motors, which assigns the armature ampere-turn to the magnetic flux, and induces switching in accordance with rotor rotation. With this control technique, oscillations and out-of-step operation cannot occur as is the case with synchronous machines which are operated with a direct connection to the line supply.

By orienting the armature ampere-turns to the magnetic flux, the effect of the rotor load angle on commutation, which occurs with rotor-position-encoder clocking, is automatically eliminated.

The elimination of the rotor position encoder and cable connection rules out these potential fault sources.

3.3 Open and closed-loop control

In contrast to the synchronous motor connected directly to the line supply, the machine connected to the starting frequency converter has operating characteristics similar to that of a separately-excited, converter-fed DC motor, which is operated with constant voltage (field weakening) from approx. 15% to 20% of the rated speed.

Thus, the open-loop and closed-loop control (see block diagram 3.2) of the line-side converter is designed as closed-loop speed control with secondary closed-loop current control with downstream gating set which generates the required firing pulses for gating the converter (this is similar to the technique used for converter-fed DC motors). The synchronizing voltage required to generate the firing pulses is acquired on the high-voltage side using transformers.

To control the generator-side converter, the firing pulses for gating the thyristors are derived from the generator terminal voltage. As this is significantly distorted due to the ohmic and inductive voltage drops as a result of converter operation, the generator current is also sensed and an approximately sinusoidal "synchronizing voltage" independent of the generator frequency (inner generator voltage) is generated via a compensation circuit.

The generator variables are sensed using DC-voltage and DC-current transformers (CTs and PTs) due to the wide frequency range of 0 Hz to max. 60 Hz.

The generator voltage for commutating the generator-side converter is not sufficient below a minimum speed due to the ohmic voltage drops. DC-link pulsing is used to switch the DC-link current to the next valve branch in this lowest speed range.

By controlling the line-side converter to the inverter stability limit the DC-link current is brought briefly to a zero-current condition. During this de-energized period, the thyristor valves which previously conducted current regain their blocking capability. Subsequently the next valve branch can be fired and the DC-link current is restored by controlling the line-side converter appropriately. This sequence is repeated at six times the generator frequency.

For DC-link pulsing, unlike in load-commutated mode, the inverter stability limit for the generator-side converter need not be taken into account. Thus, this is operated with a firing angle $\alpha = 180^\circ$ el and an improved power factor is possible compared with load-commutated mode. Torque reduction, generally caused by current gaps, can be compensated in this fashion.

4 Description of the changeover device (option)

As already explained, one of the main advantages of the static starting frequency converter is that various gas turbine sets can be started one after another using one converter.

An application example from a combined-cycle power station, where two compact units and two additional static excitation units are used for four gas turbine sets, is illustrated in Fig. 4.1

The gas turbine sets' generators are each permanently assigned a static excitation unit while the starting frequency converter is first switched to a starting bus via an output isolator, which is subdivided by up to 2 changeover isolators. The changeover isolators can only be switched in manually from the main control room if there are no SFCs in operation.

The unit known as the changeover device is charged with coordinating the assignment between the starting frequency converters and the relevant gas turbine sets and their static excitation equipment.

The open-loop and closed-loop control signals within a compact unit are transferred between the SFC and SEE via the internal serial bus link.

Signals are transferred between the static excitation equipment associated with various compact units and/or individual static excitation units for gas-turbine generators via a bus link.

The static excitation unit associated with the turbine set to be started has the "master" function and controls the changeover device by:

- Controlling the isolator on the generator side in the BAB cells and the primary circuit breaker of the excitation transformer (which is also the case without a changeover device)
- Selecting the available starting frequency converter via the bus link, which also provides the operating status ("ready" or "faulted").

The control associated with the selected SFC in turn controls:

- The internal SFC output isolator
- The SFC circuit breaker (which is also the case without a changeover device)

In the event of a fault on the bus link, the turbine sets to which a compact unit has been assigned can continue to be started.

All circuit breakers are also mutually interlocked using auxiliary contacts to prevent erroneous switching.

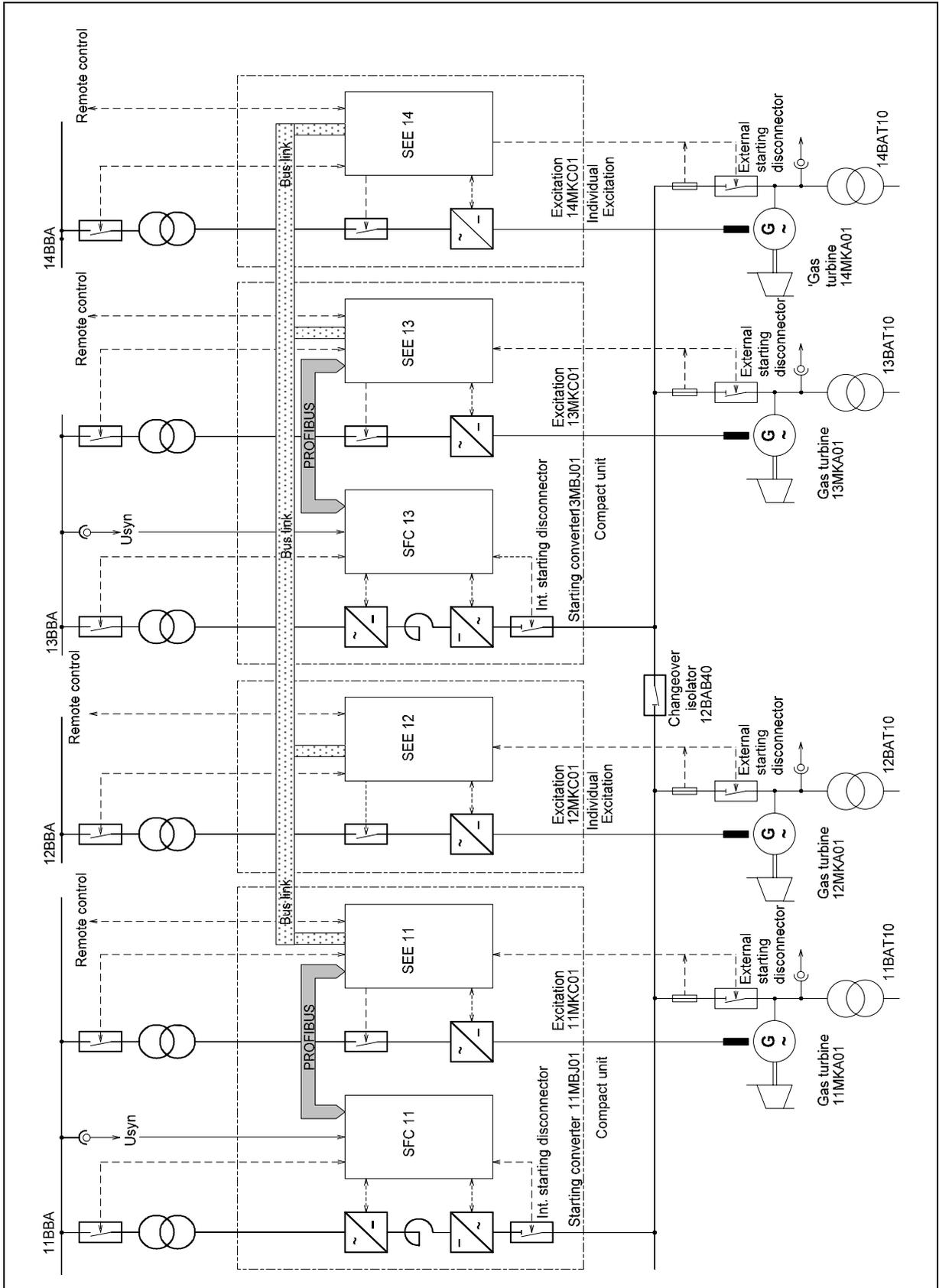


Fig. 4.1 Circuit diagram for starting frequency converters with changeover device (4 gas turbines with 2 starting frequency converters)

Previous editions are listed below:

Edition	Internal item number
07.2005	A5E00493996B_AA
01.2006	A5E00493996B_AB
02.2007	A5E00493996B_AC

Edition 02.2007 consists of the following chapters:

Chapter		Changes	Date of edition
1	Description of the compact unit	2nd revision	02.2007
2	Description of the static excitation equipment (SEE)	2nd revision	02.2007
3	Description of the starting frequency converter (SFC)	2nd revision	02.2007
4	Description of the changeover device	2nd revision	02.2007

Attachment A-3

WESTERN ELECTRICITY COORDINATING COUNCIL
2011 HS1B APPROVED BASE CASE

Model	Record	Bus	ID	Bus	CK	Se
genrou	14921	99991 MIR_CT1	16.50	1	1	1

ld	2.364000	Mbase	285.0
lpd	0.300000	Pgen	231.0
lppd	0.224000	Qgen	54.4
lq	2.302000	Terminal voltage	0.000000
lpq	0.491000	Field voltage	0.0000
lppq	0.224000		
ll	0.192000		
ra	0.002160		
tpdo	10.480000		
tppdo	0.048000		
tpqo	1.164000		
tppqo	0.079000		
s1	0.114000		
s12	0.489000		
h	5.210000		
d	1.000000		
rcomp	0.000000		
xcomp	0.000000		
accel	0.000000		
pdf	0.000000		
pkd	0.000000		
pfq	0.000000		
pkq	0.000000		
speed	0.000000		
angle	0.000000		
dpdf	0.000000		
dpkd	0.000000		
dpfq	0.000000		
dpkq	0.000000		
dspeed	0.000000		
dangle	0.000000		

WESTERN ELECTRICITY COORDINATING COUNCIL
2011 HS1B APPROVED BASE CASE

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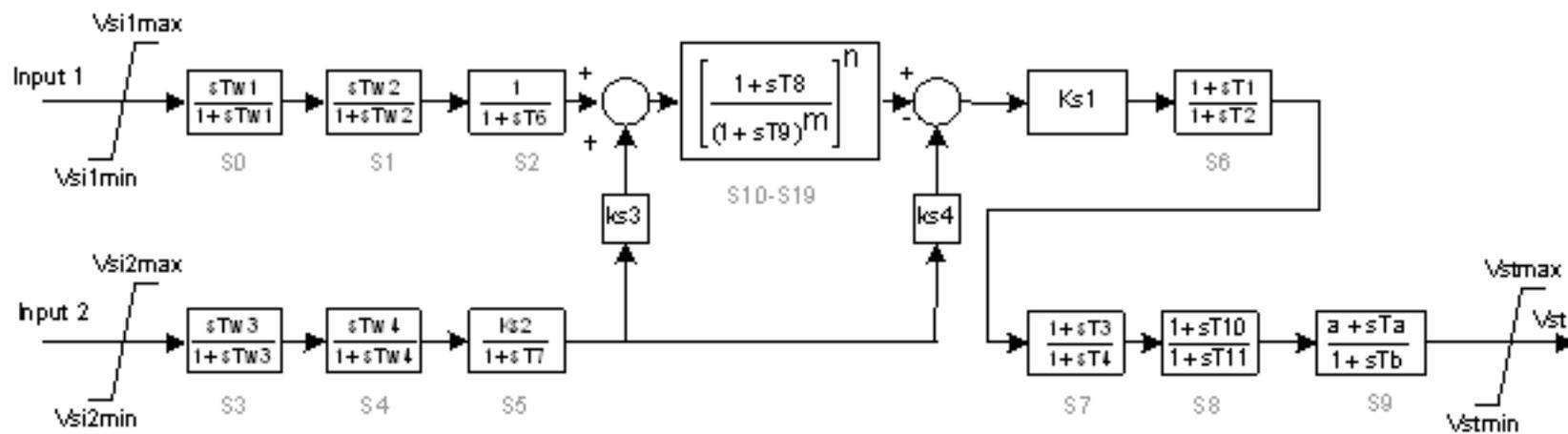
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klr	30.000000
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s0	0.000000
s1	0.000000
s2	0.000000
s3	0.000000
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ds1	0.000000
ds2	0.000000
ds3	0.000000

WESTERN ELECTRICITY COORDINATING COUNCIL
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Model	Record	Bus	ID	Bus	CK	Se
pss2b	14923	99991 MIR_CT1	16.50	1	1	1

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k2	0.000000
vsilmax	0.500000
vsilmin	-0.500000
tw1	10.000000
tw2	10.000000
vsi2max	2.000000
vsi2min	-2.000000
tw3	10.000000
tw4	0.000000
t6	0.000000
t7	10.000000
ks2	0.960000
ks3	1.000000
t8	0.600000
t9	0.120000
n	1.000000
m	5.000000
ks1	20.000000
t1	0.140000
t2	0.014000
t3	0.140000
t4	0.014000
t10	0.000000
t11	0.000000
vstmax	0.100000
vstmin	-0.100000
a	1.000000
ta	0.000000
tb	0.000000
ks4	1.000000
s0	0.000000
s1	0.000000
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s4	0.000000
s5	0.000000
s6	0.000000
s7	0.000000
s8	0.000000
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s10	0.000000
s11	0.000000
s12	0.000000
s13	0.000000
s14	0.000000
s15	0.000000

s17	0.000000
s18	0.000000
s19	0.000000
d0	0.000000
d1	0.000000
d2	0.000000
d3	0.000000
d4	0.000000
d5	0.000000
d6	0.000000
d7	0.000000
d8	0.000000
d9	0.000000
d10	0.000000
d11	0.000000
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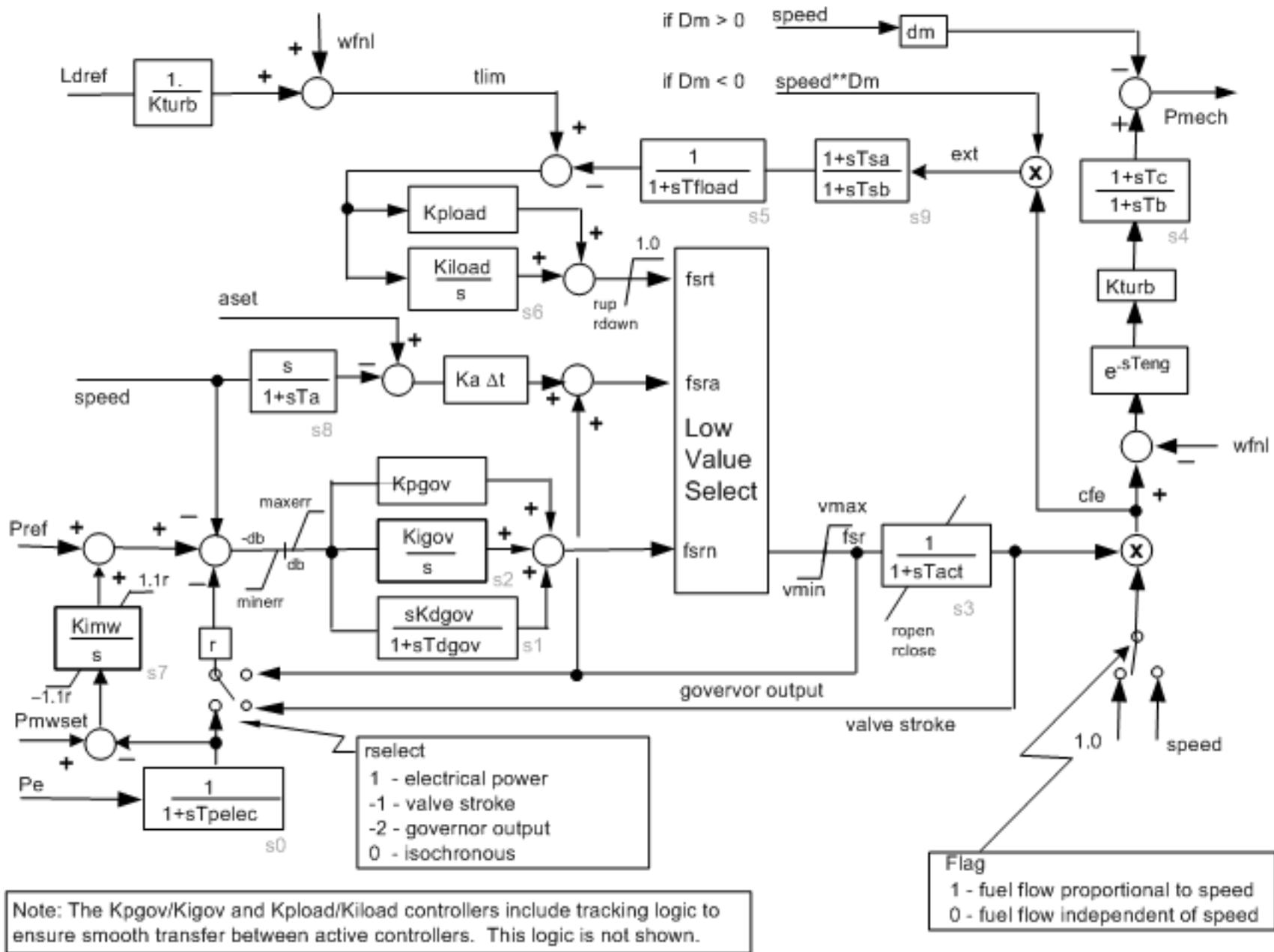


WESTERN ELECTRICITY COORDINATING COUNCIL
2011 HS1B APPROVED BASE CASE

Model	Record	Bus	ID	Bus	CK	Se
ggov1	14924	99991 MIR_CT1	16.50	1	1	1

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rselect	1.000000
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maxerr	0.050000
minerr	-0.050000
kpgov	18.400000
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kdgov	0.000000
tdgov	1.000000
vmax	1.000000
vmin	0.100000
tact	0.300000
kturb	1.240000
wfnl	0.196000
tb	0.590000
tc	0.000000
flag	0.000000
teng	0.000000
tflod	3.000000
kpload	2.000000
kiload	0.670000
ldref	10.000000
dm	0.000000
ropen	0.100000
rclose	-0.100000
kimw	0.000000
pmwset	0.000000
aset	9999.000000
ka	100.000000
ta	0.000000
db	0.000000
tsa	1.000000
tsb	1.000000
rup	99.000000
rdown	-99.000000
s0	0.000000
s1	0.000000
s2	0.000000
s3	0.000000
s4	0.000000
s5	0.000000
s6	0.000000
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s8	0.000000
s9	0.000000
ds0	0.000000
ds1	0.000000
ds2	0.000000
ds3	0.000000

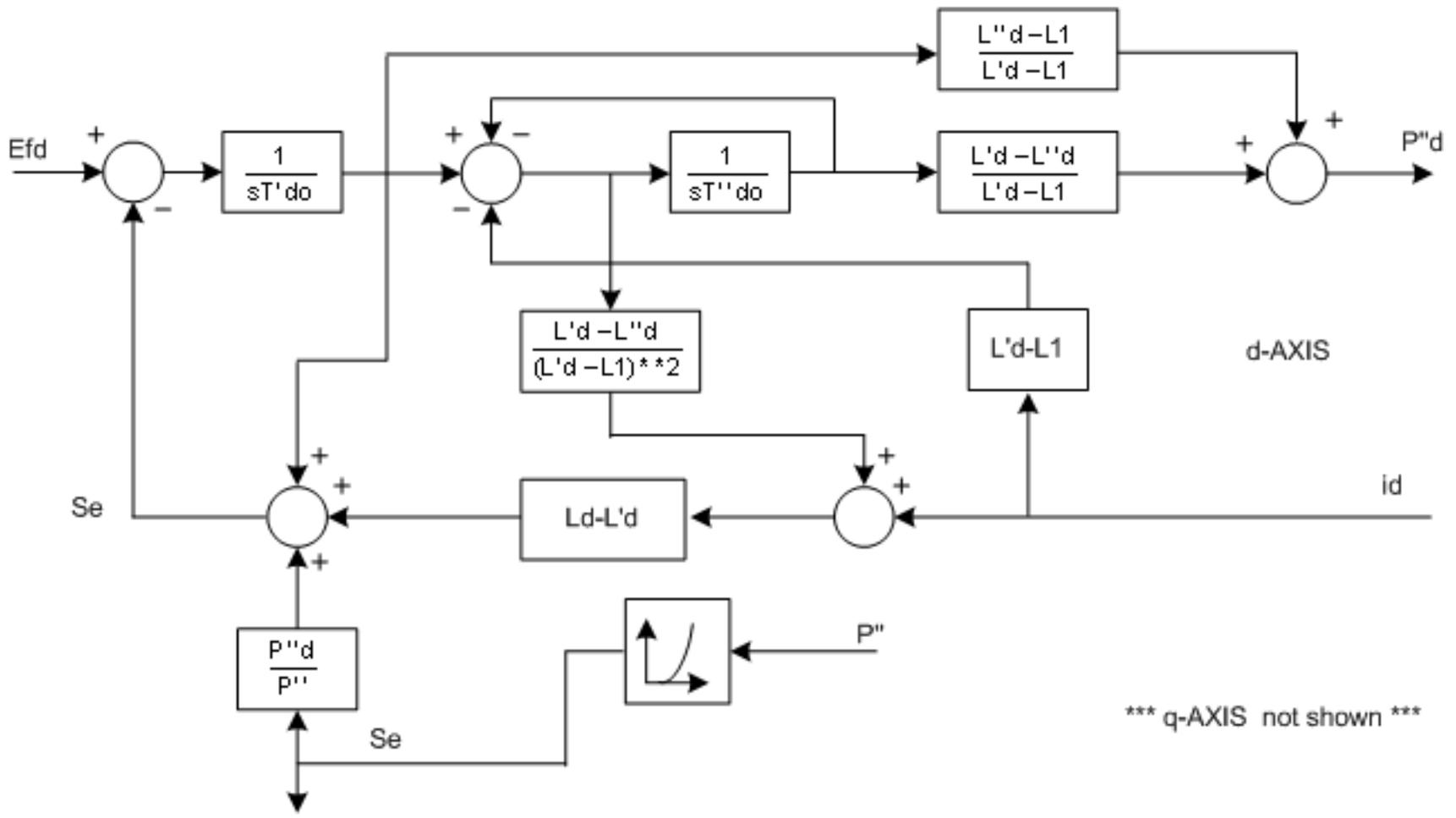
ds5	0.000000
ds6	0.000000
ds7	0.000000
ds8	0.000000
ds9	0.000000



WESTERN ELECTRICITY COORDINATING COUNCIL
2011 HS1B APPROVED BASE CASE

Model	Record	Bus	ID	Bus	CK	Se
genrou	14925	99992 MIR_ST1	13.80	2	1	1

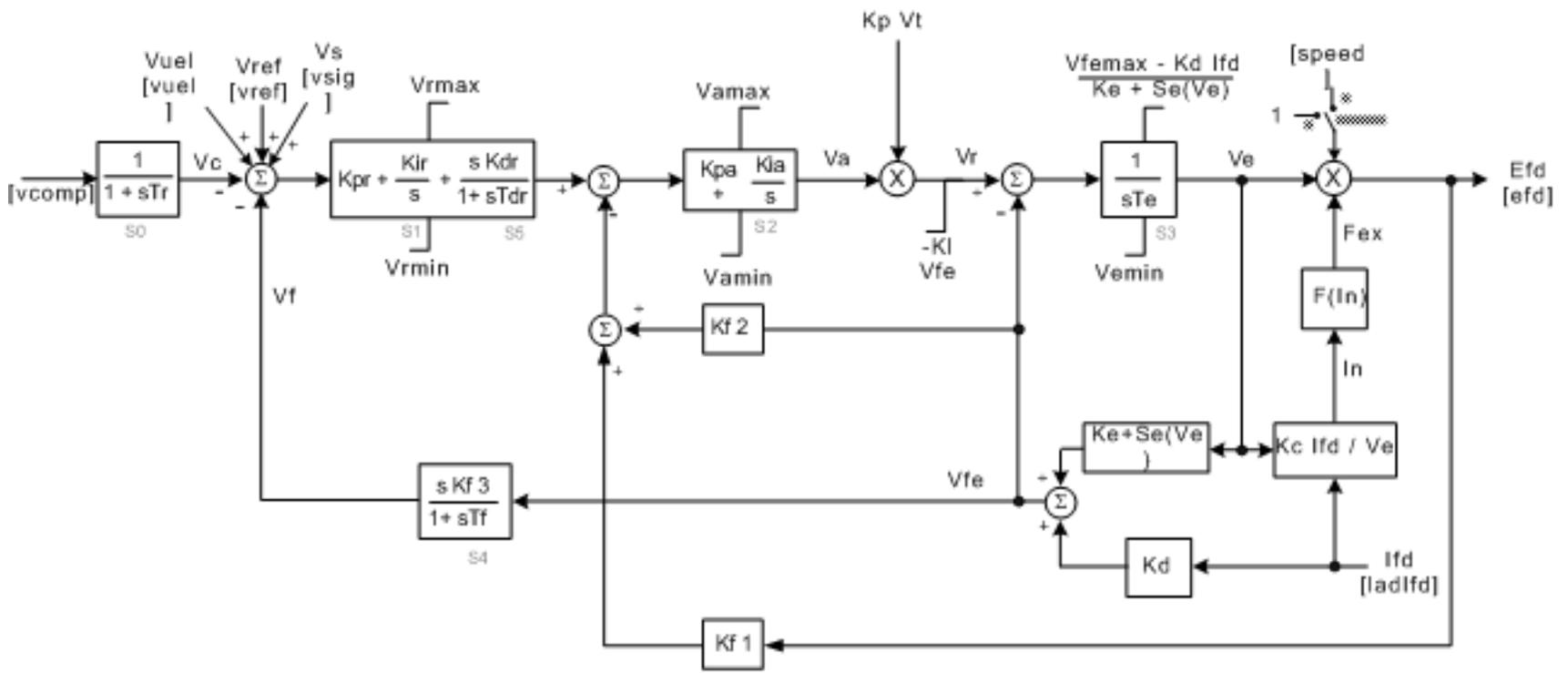
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lppd	0.209000	Qgen	15.2
lq	2.560000	Terminal voltage	0.000000
lpq	0.541000	Field voltage	0.0000
lppq	0.209000		
ll	0.166000		
ra	0.003900		
tpdo	6.720000		
tppdo	0.043000		
tpqo	2.500000		
tppqo	0.150000		
s1	0.059000		
s12	0.285000		
h	2.360000		
d	1.000000		
rcomp	0.000000		
xcomp	0.000000		
accel	0.000000		
pdf	0.000000		
pkd	0.000000		
pfq	0.000000		
pkq	0.000000		
speed	0.000000		
angle	0.000000		
dpdf	0.000000		
dpkd	0.000000		
dpfq	0.000000		
dpkq	0.000000		
dspeed	0.000000		
dangle	0.000000		



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2011 HS1B APPROVED BASE CASE

Model	Record	Bus	ID	Bus	CK	Se
esac7b	14926	99992 MIR_ST1	13.80	2	1	1

tr	0.000000
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kir	66.599998
kdr	0.000000
tdr	1.000000
vrmax	15.750000
vrmin	-15.750000
kpa	2.000000
kia	10.000000
vamax	35.299999
vamin	-28.200001
kp	0.000000
kl	10.000000
te	0.950000
vfemax	15.750000
vemin	0.000000
ke	1.000000
kc	0.710000
kd	1.780000
kf1	0.000000
kf2	1.000000
kf3	0.000000
tf	1.000000
e1	14.800000
se1	0.060000
e2	12.900000
se2	0.009000
spdmlt	0.000000
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s1	0.000000
s2	0.000000
s3	0.000000
s4	0.000000
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ds3	0.000000
ds4	0.000000
ds5	0.000000

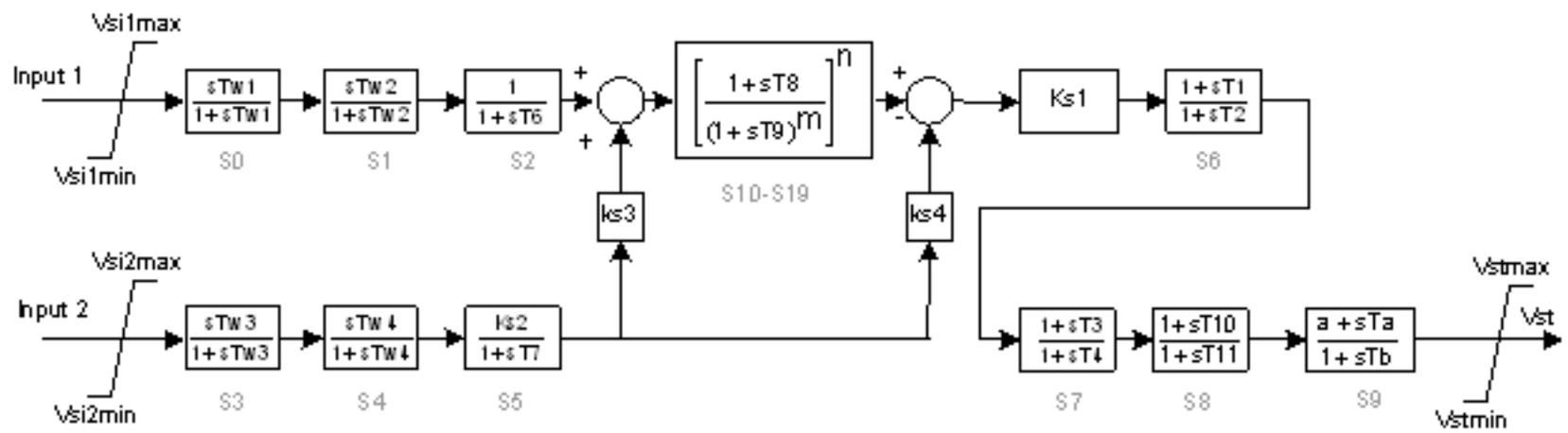


WESTERN ELECTRICITY COORDINATING COUNCIL
2011 HS1B APPROVED BASE CASE

Model	Record	Bus	ID	Bus	CK	Se
pss2b	14927	99992 MIR_ST1	13.80	2	1	1

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vsilmin	-0.500000
tw1	10.000000
tw2	10.000000
vsi2max	2.000000
vsi2min	-2.000000
tw3	10.000000
tw4	0.000000
t6	0.000000
t7	10.000000
ks2	2.120000
ks3	1.000000
t8	0.600000
t9	0.120000
n	1.000000
m	5.000000
ks1	5.000000
t1	0.250000
t2	0.040000
t3	0.250000
t4	0.040000
t10	0.180000
t11	0.030000
vstmax	0.100000
vstmin	-0.100000
a	1.000000
ta	0.000000
tb	0.000000
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s1	0.000000
s2	0.000000
s3	0.000000
s4	0.000000
s5	0.000000
s6	0.000000
s7	0.000000
s8	0.000000
s9	0.000000
s10	0.000000
s11	0.000000
s12	0.000000
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s14	0.000000
s15	0.000000

s17	0.000000
s18	0.000000
s19	0.000000
d0	0.000000
d1	0.000000
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d8	0.000000
d9	0.000000
d10	0.000000
d11	0.000000
d12	0.000000
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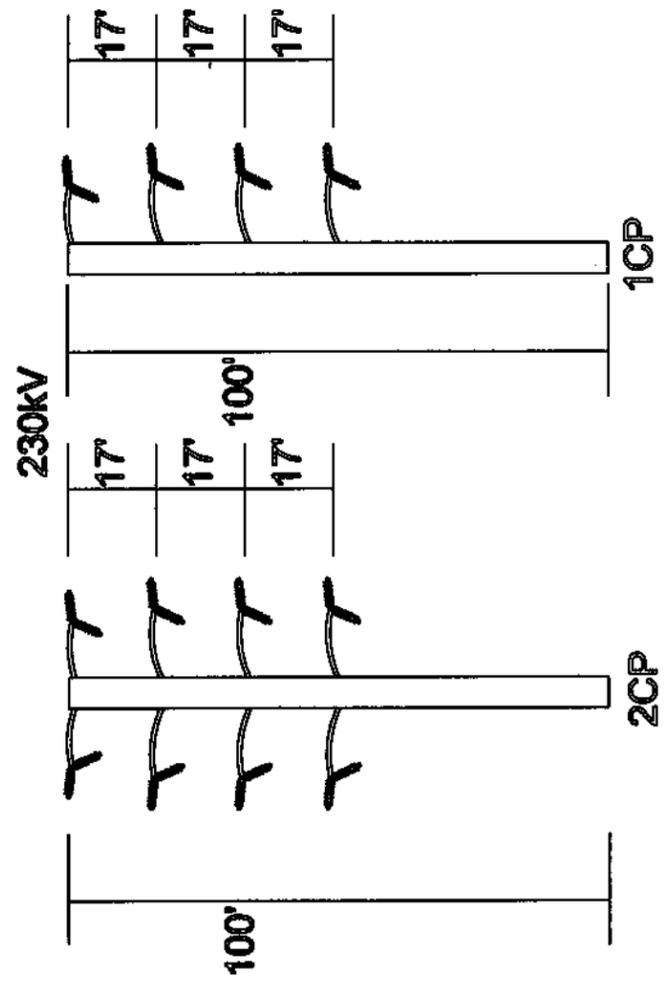
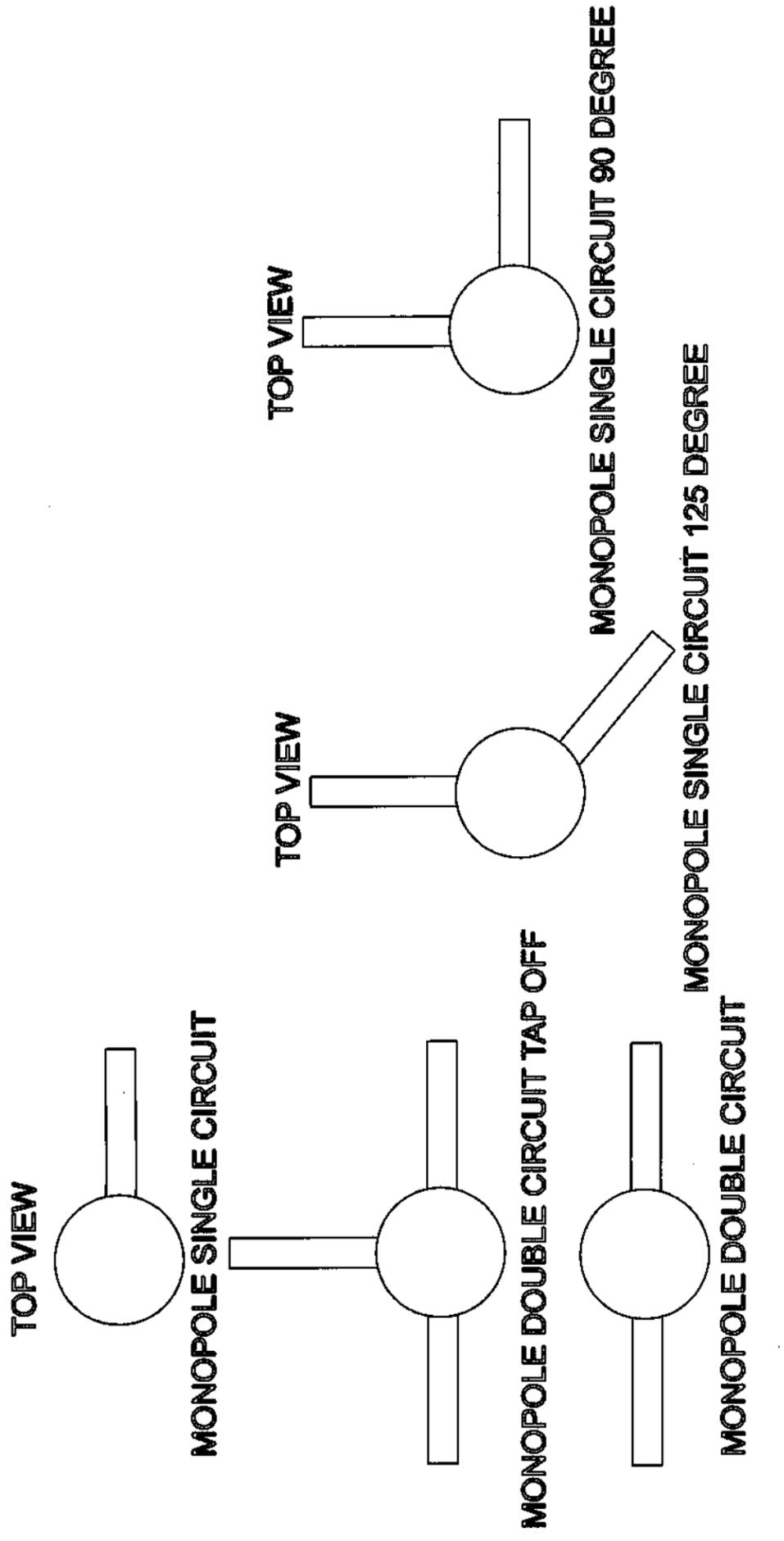


WESTERN ELECTRICITY COORDINATING COUNCIL
2011 HS1B APPROVED BASE CASE

Model	Record	Bus	ID	Bus	CK	Se
ieeeg1	14928	99992 MIR_ST1	13.80	2	1	1

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t2	2.000000
t3	0.939000
uo	0.100000
uc	-0.100000
pmax	1.000000
pmin	0.000000
t4	0.100000
k1	0.530000
k2	0.000000
t5	0.110000
k3	0.470000
k4	0.000000
t6	0.000000
k5	0.000000
k6	0.000000
t7	0.000000
k7	0.000000
k8	0.000000
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eps	0.000000
db2	0.000000
gv1	0.000000
pgv1	0.000000
gv2	0.000000
pgv2	0.000000
gv3	0.000000
pgv3	0.000000
gv4	0.000000
pgv4	0.000000
gv5	0.000000
pgv5	0.000000
gv6	0.000000
pgv6	0.000000
s0	0.000000
s1	0.000000
s2	0.000000
s3	0.000000
s4	0.000000
s5	0.000000
ds0	0.000000
ds1	0.000000
ds2	0.000000
ds3	0.000000
ds4	0.000000
ds5	0.000000

Attachment A-4



Evidence Of Site Control

Mirant Delta, LLC (formerly known as Southern Energy Delta, L.L.C.) owns the site as evidenced by the Grant Deed dated as of April 15, 1999. Grant Deed transmitted to California ISO on March 7, 2008; Linda Wright is holding it to add to this Interconnection Request.

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LD 2402-01-_____

CONTRA COSTA Co Recorder Office
STEPHEN L. WEIR, Clerk-Recorder 103318

RECORDING REQUESTED BY
AND WHEN RECORDED MAIL TO:

DOC - 99-0103318-00
Check Number
Friday, APR 16, 1999 11:20:07
SUR \$10.00;MIC \$1.00;MOD \$75.00
REC \$79.00;ICF \$74.00;
Ttl Pd \$239.00 Nbr-0000505947
lrc/R9/1-75

Stephen G. Gillis
Chief Financial Officer
Southern Energy California, L.L.C.
50 California Street, Suite 3220
San Francisco, CA 94111

GRANT DEED

The undersigned grantor requests that the Documentary Transfer Tax not be made a part of the public records.

This **GRANT DEED** (this "Deed") is made this 15th day of April, 1999, by **PACIFIC GAS AND ELECTRIC COMPANY**, a California corporation, ("**PG&E**"), in favor of **SOUTHERN ENERGY DELTA, L.L.C.**, a Delaware limited liability company, ("**Grantee**").

FOR A VALUABLE CONSIDERATION, receipt of which is hereby acknowledged, **PG&E** hereby **GRANTS** unto Grantee, the following described real property (the "**Property**") which is located in Contra Costa County, California:

- (APN # 85-010-006, 007, 008 (portion), & 009)
- (APN # 85-280-005)
- (APN # 96-100--001, 004, 015, 016, & 020[portion])

Refer to Exhibit "A" attached hereto and made a part hereof.

PG&E further grants to Grantee a non-exclusive easement and right of ingress to and egress from said real property, over the following described road:

A strip of land described as Access Road 1 in Exhibit B attached hereto and made a part hereof and the strip of land described as Access Road 2 in Exhibit B. Construction, reconstruction, maintenance and repair of said roads to maintain such roads in a good condition shall be the responsibility of Grantee, the costs of which shall be borne solely by Grantee.

PG&E further grants to Grantee its existing pipe line and appurtenant facilities for transmission of gas together with the right to replace (of the initial or any other size), maintain and use the same for the transmission of gas, and also the right to excavate for, install, replace (of the initial or any other size), maintain and use such additional pipe lines and appurtenant facilities, as Grantee shall from time to time elect for the transmission of gas, with proper valves and other appliances and fittings, and devices for controlling electrolysis for use in connection with said pipe line and appurtenant facilities, together with adequate protection therefor, and also

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a right of way and easement, within Easement Area One described in Exhibit C attached hereto and made a part hereof.

Reserving to PG&E, a non-exclusive easement and right to construct, reconstruct, maintain and use a road for ingress to and egress from the area being described as Lot 2 of the Lot Line Adjustment described in Exhibit A and identified as the "Switchyard Property" (the "Switchyard Property"), together with access to any of PG&E's property, easements and facilities, whether located on the Switchyard Property or the Property or any real property adjacent thereto, and for ingress to and egress from all hereinafter described easement areas, lying within the strip of land described as follows:

A strip of land described as Access Road 3 in Exhibit D attached hereto and made a part hereof.

Construction, reconstruction, maintenance and repair of said road described in Exhibit "D" to maintain such road(s) in a good condition shall be the responsibility of Grantee, the costs of which shall be borne solely by Grantee.

Reserving to PG&E its existing facilities (excluding, those facilities that have been conveyed to Grantee pursuant to Section 2.1 of the Purchase and Sale Agreement) for the transformation, transmission and distribution of electric energy and for communication purposes (including fiber optic cable) and easements to reconstruct, replace, remove, maintain and use the same as PG&E shall at any time and from time to time deem necessary, together with easements to excavate for, construct, install, repair, reconstruct, replace, remove, maintain and use, at any time and from time to time, additional facilities for the transformation, transmission and distribution of electric energy and for communication purposes (including fiber optic cable), consisting of such devices and equipment with suitable concrete pads and adequate protection therefor necessary for transforming electric energy, one or more lines of underground wires and cables (enclosed at PG&E's option within conduits), and one or more lines of towers, poles and/or other structures, wires and cables, including both underground and overhead ground wires, and all necessary and proper foundations, footings, crossarms and other appliances and fixtures for use in connection with said towers, poles and/or other structures, wires and cables; and also for a right of way and easement, all to be on, along and in the easement areas described as follows:

The parcel of land described as Easement Area Two in Exhibit E attached hereto and made a part hereof.

A strip of land described as Easement Area Three in Exhibit E attached hereto and made a part hereof.

The strip of land described as Easement Area Four in Exhibit E attached hereto and made a part hereof.

A strip of land described as Easement Area Five in Exhibit E attached hereto and made a part hereof.

Reserving to PG&E its existing pipe lines and appurtenant facilities for transmission and distribution of gas together with the right to replace (of the initial or any other size), maintain and use the same for the transmission and distribution of gas, and also the right to excavate for, install, replace (of the initial or any other size), maintain and use such additional pipe lines and appurtenant facilities, as PG&E shall from time to time elect for the transmission and distribution of gas, with proper valves and other appliances and fittings, and devices for controlling electrolysis for use in connection with said pipe lines and appurtenant facilities, together with adequate protection therefor, and also a right of way and easement, within the easement area described as follows:

The parcel of land described as Easement Area Six in Exhibit F attached hereto and made a part hereof.

Reserving to PG&E, its existing gas metering and regulating devices, pipelines and equipment, together with an easement and right of way for said metering and regulating devices, pipelines and equipment, and the right to construct, install, replace (of the initial or any other size), maintain and use such valves and other devices, pipelines and equipment as PG&E shall from time to time deem necessary for metering, regulating and discharging gas into the atmosphere within, to install concrete curbing on, to cover with bitumastic pavement and to enclose with a fence (within which fenceline Grantee shall have no right of entry), the hereinafter described easement area:

The parcel of land described as Easement Area Seven in Exhibit G attached hereto and made a part hereof.

Reserving to PG&E a non-exclusive easement and right of ingress and egress over and across the Property by means of any and all existing and future roads and lanes thereon, if such there be, otherwise by such route or routes as shall occasion the least practicable damage and inconvenience to Grantee and to use said roads, lanes, or routes to provide access to any of PG&E's property, easements and facilities. Construction, reconstruction, maintenance and repair of said roads and lanes to maintain such roads and lanes in good condition shall be the responsibility of Grantee, the costs of which shall be borne solely by Grantee.

Reserving to PG&E a non-exclusive easement and right for drainage, discharge, retention and/or percolation of storm water runoff from said Switchyard Property into the storm water system located on the Property, including the right to use existing trench drains, pipelines, inlets, leachfields, valves, oily water separators, and other fixtures and equipment deemed necessary to capture, transport and dispose of storm water runoff emanating on said Switchyard Property. Construction, reconstruction, maintenance and repair of said storm water system located on the Property to maintain such storm water system in good condition shall be the responsibility of Grantee, the costs of which shall be borne solely by Grantee.

Reserving to PG&E a non-exclusive easement and right to excavate for, install, construct, replace (of the initial or any other size), remove, maintain, and use such pipelines as PG&E shall from time to time elect for conveying petroleum and petroleum products, with necessary and proper valves and other appliances and fittings, including underground concrete

anchor blocks, and devices for controlling electrolysis for use in connection with said pipelines, together with adequate protection therefore, and also a right-of-way within the easement area described as follows:

Refer to Easement Area Eight in Exhibit H attached hereto and made a part hereof.

Reserving to PG&E an easement for the transformation, transmission and distribution of electric energy and for communication purposes (including fiber optic cable) and easements to reconstruct, replace, remove, maintain and use the same as PG&E shall at any time and from time to time deem necessary, together with easements to excavate for, construct, install, repair, reconstruct, replace, remove, maintain and use, at any time and from time to time, additional facilities for the transformation, transmission and distribution of electric energy and for communication purposes (including fiber optic cable), consisting of such devices and equipment with suitable concrete pads and adequate protection therefor necessary for transforming electric energy, one or more lines of underground wires and cables (enclosed at PG&E's option within conduits), and one or more lines of towers, poles and/or other structures, wires and cables, including both underground and overhead ground wires, and all necessary and proper foundations, footings, crossarms and other appliances and fixtures for use in connection with said towers, poles and/or other structures, wires and cables and easements for pipe lines and appurtenant facilities for transmission and distribution of gas together with the right to replace (of the initial or any other size), maintain and use the same for the transmission and distribution of gas, and also the right to excavate for, install, replace (of the initial or any other size), maintain and use such additional pipe lines and appurtenant facilities, as PG&E shall from time to time elect for the transmission and distribution of gas, with proper valves and other appliances and fittings, and devices for controlling electrolysis for use in connection with said pipe lines and appurtenant facilities, together with adequate protection therefor, and also a right of way and easement, within the easement area described as follows:

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The parcel of land described as Easement Area Nine in Exhibit I attached hereto and made a part hereof.

PG&E hereby reserves an easement to enter the Property, or any portion thereof, to do the following:

(a) undertake remediation work, including the installation and monitoring of groundwater and vadose zone monitoring, extraction and/or infiltration wells; the installation, operation and maintenance of soil and/or groundwater treatment systems, including wells and other equipment needed for biosparging and/or air sparging; the implementation of soil excavation and treatment activities; the installation, maintenance and periodic replacement of an asphalt cap or other capping material; the containment of soil and groundwater with a physical barrier; the removal and replacement of underground or aboveground structures or utilities as part of a remediation work plan; or like activities;

(b) use groundwater and/or vadose zone monitoring wells and treatment systems located on the Property, or any portion thereof, in conducting remediation work;

(c) manage treated water from PG&E's current or future groundwater remediation treatment system located on the Property, or any portion thereof, in the same manner as Grantee manages its waste water, if and to the extent permitted under environmental laws;

(d) conduct temporary (less than 90 days) onsite waste storage for materials generated through remediation work; and

(e) undertake system demolition and well abandonment work when remediation system components are no longer needed.

Further reserving to PG&E the easements and rights:

(a) of ingress to and egress from said easement areas over and across the Property by means of any and all existing and future roads and lanes thereon, if such there be, otherwise by such route or routes as shall occasion the least practicable damage and inconvenience to Grantee and to use said roads, lanes, or routes to provide access to any of PG&E's property, easements and facilities; construction, reconstruction, maintenance and repair of said roads and lanes to maintain such roads and lanes in a good condition shall be the responsibility of Grantee, the costs of which shall be borne solely by Grantee;

(b) from time to time to trim and to cut down and clear away any and all trees and brush now or hereafter on said easement areas and the further right from time to time to trim and to cut down and clear away any trees on the Property adjacent to said easement areas which in the opinion of PG&E may be a hazard to any of PG&E's facilities by reason of the danger of falling thereon, or may interfere with the exercise of PG&E's rights reserved herein; provided, however, that all trees which PG&E is hereby authorized to cut and remove, if valuable for timber or wood, shall be the property of Grantee, but all tops, lops, brush and refuse wood shall be burned or removed by PG&E;

(c) from time to time to enlarge, improve, reconstruct, relocate and replace PG&E's existing facilities and additional facilities with any other number, size, or type of transformers, poles, towers or other structures, or underground wires, cables and conduits, or pipelines, valves, fittings, metering and regulating devices, or other devices and equipment either in the original location or at any alternate location or locations within said easement areas;

(d) to install, maintain and use gates in all fences which now cross or shall hereafter cross said easement areas;

(e) to mark the location of said easement areas by suitable markers set in the ground; provided that said markers shall be placed in fences or other locations which will not interfere with any reasonable use Grantee shall make of said easement areas; and

(f) to use such portion of the Property contiguous to said easement areas as may be reasonably necessary in connection with the installation, repair, reconstruction and replacement of PG&E's facilities.

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Grantee shall have the right to use said easement areas for purposes which will not interfere with PG&E's full enjoyment of the rights hereby reserved; provided that:

(a) Grantee shall submit to PG&E, for approval, plans for any development, demolition, removal or use of said easement areas. Said plans shall be sent to: Pacific Gas and Electric Company, Attention: Land Agent, 1030 Detroit Ave., Concord, CA 94518-2497, or such other address as PG&E shall designate in writing;

(b) Grantee shall not erect or construct any building or other structure, including but not limited to fences, sheds, tool houses or any storage facilities, or drill or operate any well, or construct any reservoir or other obstruction or diminish or substantially add to the ground level in said easement areas, without the written consent of PG&E;

(c) Grantee shall not deposit, or permit or allow to be deposited, earth, rubbish, debris, or any other substance or material, whether combustible or noncombustible, on said easement areas, or so near thereto as to constitute, in the opinion of PG&E, a hazard to any of PG&E's facilities.

Pursuant to certain terms and conditions contained in the hereinafter referenced permits issued to PG&E by the Department of the Army, Corps of Engineers, PG&E is hereby referencing said terms and conditions contained therein and attaching copies of said permits for recording with this Grant Deed as Exhibits J-1, J-2, J-3, J-4 and J-5, such Exhibits J-1, J-2, J-3, J-4 and J-5, attached hereto and made a part hereof:

1. Department of Army Permit dated June 8, 1953, attached hereto as Exhibit J-1;
2. Department of the Army Permit dated November 3, 1958, attached hereto as Exhibit J-2;
3. Department of the Army Permit No. 3666 dated September 30, 1963, attached hereto as Exhibit J-3;
4. Department of the Army Permit Application No. PN 74-129-99(a) dated November 5, 1974, attached hereto as Exhibit J-4; and
5. Department of the Army Permit Application No. 13459-59 dated January 11, 1984, attached hereto as Exhibit J-5.

PG&E hereby assigns to Grantee its right, title and interest, as set forth below, in the following documents:

All of the interest, rights and obligations for a recreation area granted to the City of Pittsburg in the unrecorded Cooperative Recreation Area Agreement dated August 9, 1973, attached hereto as Exhibit K, and hereby made a part hereof.

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All of the rights for installation, maintenance and use of a water line within a strip of land 10 feet in width, granted to PG&E in the Deed from Stewart Memorial Christian Methodist Episcopal Church to PG&E dated March 12, 1982, and recorded March 31, 1982, in Book 10728, Page 94, Official Records of Contra Costa County, subject to all conditions and restrictions regarding said easement rights contained in said deed dated March 12, 1982.

All of the rights for a non-exclusive easement for the installation, maintenance and use of a road to access a fuel oil line granted in the Deed from Leona Cheek to PG&E, dated January 24, 1974 and recorded February 11, 1974, in Book 7153, Page 545, Official Records of Contra Costa County, subject to all conditions and restrictions regarding said easement rights contained in said deed dated January 24, 1974.

All of the rights for a non-exclusive easement for the installation, maintenance and use of a road to access a fuel oil line granted in the Deed from Helena Richardson to PG&E, dated January 24, 1974 and recorded February 11, 1974, in Book 7153, Page 547, Official Records of Contra Costa County, subject to all conditions and restrictions regarding said easement rights contained in said deed dated January 24, 1974.

All of the rights for a non-exclusive easement for the installation, maintenance and use of a fuel oil line granted in the Deed from Continental Can Company to PG&E, dated April 4, 1975 and recorded May 7, 1975, in Book 7499, Page 680, Official Records of Contra Costa County, subject to all conditions and restrictions regarding said easement rights contained in said deed dated April 4, 1975.

All of the rights for a non-exclusive easement for the installation, maintenance and use of a fuel oil line granted in the Deed from Signode Corporation to PG&E, dated October 10, 1974 and recorded May 16, 1975, in Book 7508, Page 948, Official Records of Contra Costa County, subject to all conditions and restrictions regarding said easement rights contained in said deed dated October 10, 1974.

All of the rights for a non-exclusive easement for the installation, maintenance and use of a fuel oil line granted in the Deed from Leroy Lilley to PG&E, dated April 10, 1974 and recorded April 26, 1974, in Book 7210, Page 817, Official Records of Contra Costa County, subject to all conditions and restrictions regarding said easement rights contained in said deed dated April 10, 1974.

All of the rights for a non-exclusive easement for the installation, maintenance and use of a fuel oil line granted in the Deed from Mary Evangelho to PG&E, dated January 13, 1975 and recorded January 31, 1975, in Book 7422, Page 635, Official Records of Contra Costa County, subject to all conditions and restrictions regarding said easement rights contained in said deed dated January 13, 1975.

All of the rights, interest and obligations for a non-exclusive easement for the installation, maintenance and use of a fuel oil line in the Consent to Common Use Agreement between Standard Oil Company of California and PG&E, dated July 24, 1975 and recorded August 28, 1975, in Book 7605, Page 835, Official Records of Contra Costa

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County, subject to all conditions and restrictions regarding said easement rights contained in said agreement dated July 24, 1975.

This grant is made subject to all existing contracts, leases, licenses, easements, and encumbrances, whether recorded or unrecorded, which may affect the Property and the word "grant" as used herein shall not be construed as a covenant against the existence of any thereof.

Except as may be set forth in that certain Purchase and Sale Agreement dated as of November 24, 1998, between PG&E and Grantee, this Grant Deed is made without any representation or warranty (express or implied) or recourse against PG&E.

The provisions hereof shall inure to the benefit of and bind the successors and assigns of the respective parties hereto, and all covenants shall apply to and run with the Property.

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IN WITNESS WHEREOF, PG&E has caused its duly authorized representative to execute this Grant Deed as of the date first above written.

PACIFIC GAS AND ELECTRIC COMPANY,
a California corporation

By: Leslie Everett
Leslie Everett
Vice President and Corporate Secretary

Accepted:

SOUTHERN ENERGY DELTA, L.L.C.,
a Delaware limited liability company

By: Randall E. Harrison
Randall E. Harrison
President

AREA TWO, DIABLO DIVISION

AUTH: 3000221

T2N, R1W, SEC 1, S2

T2N, R1W, SEC 12E

T2N, R1E, SEC 7E

T2N, R1E, SEC 6, S2

T2N, R1E, SEC 8, W2 of SW4
NW4

T2N, R1E, SEC 5, SW4

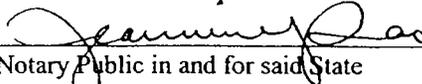
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STATE OF CALIFORNIA)
) ss.
COUNTY OF SAN FRANCISCO)

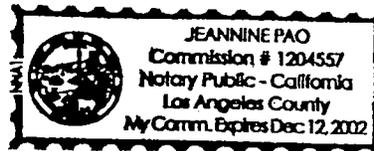
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On April 15, 1999, before me, Jeannine Pao, a Notary Public in and for said state, personally appeared LESLIE H. EVERETT, ~~personally known to me~~ (or proved to me on the basis of satisfactory evidence) to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/its authorized capacity(ies), and that by his/her/its signature(s) on the instrument, the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

WITNESS my hand and official seal.


Notary Public in and for said State

STATE OF CALIFORNIA)
) ss.
COUNTY OF SAN FRANCISCO)



On April 15, 1999, before me, Jeannine Pao, a Notary Public in and for said state, personally appeared RANDALL E. HARRISON, ~~personally known to me~~ (or proved to me on the basis of satisfactory evidence) to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/its authorized capacity(ies), and that by his/her/its signature(s) on the instrument, the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

WITNESS my hand and official seal.

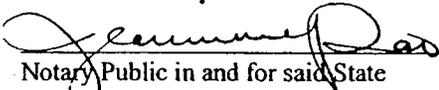

Notary Public in and for said State



EXHIBIT A

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PARCEL 1:

Location No. 3471 Swamp and Overflowed Lands, in Contra Costa County, Township No. 2 North, Range No. 1 West and 1 East, Mount Diablo Base and Meridian; Sections No. 1, 2, 6, 7 and 12, and more particularly described in the field notes of said location, as follows:

BEGINNING at southwest corner of Section 12, Township 2 North, Range 1 West, Mount Diablo Base and Meridian, in center of Bay Point County Road; thence North 1° 23' East, at 20 feet leave road and run along fence between Sections 11 and 12, 27.30 chains to station fence post in gate in northerly line of the right of way of the Atchison, Topeka & Santa Fe Railway Company; thence North 4° 52' West, 53.94 chains to station in center of bridge and on northerly bank of Mallard Slough, the point of beginning of Swamp Land Survey; thence meandering along the northerly and easterly banks of Mallard Slough, as follows: variation 17-1/4° East; thence North 21-1/4° West, 6.60 chains to station; North 14-1/2° East, 5.60 chains to station; North 39-3/4° East, 3.70 chains to station; North 48-3/4° East, 4.85 chains to station at mouth of slough on southerly shore of Suisun Bay; thence running along shore of Suisun Bay and mean high water line, as follows: South 74-1/2° East, 13.20 chains to station; South 80° East, 5.81 chains to station; North 84-3/4° East, 7.02 chains to station; South 86-3/4° East, 5.08 chains to station; South 70° 50' East, 6.35 chains to station; South 81° 10' East, 6.90 chains to station; South 72-1/2° East, 5.24 chains to station; South 55-3/4° East, 5.45 chains to station; South 89° East, 10.56 chains to station; South 65-1/4° East, 6.53 chains to station; North 18-1/2° East, 2.43 chains to station; South 83-3/4° East, 3.14 chains to station; South 72-1/4° East, 7.09 chains to station; South 77-1/4° East, 6.31 chains to station; South 82° East, 8.25 chains to station at mouth of Mallard Slough; thence running along westerly bank of Mallard Slough, as follows: South 2-3/4° West, 42 links to station; South 61-3/4° West, 11.10 chains to station; South 74° West, 6.30 chains to station; North 64-3/4° West, 13.05 chains to station; North 75-1/2° West, 9.35 chains to station; North 72° West, 5.80 chains to station; North 76° West, 10.40 chains to station; South 82° West, 4.30 chains to station; South 76° West, 8.70 chains to station; South 64-1/4° West, 17.65 chains to station; South 80-1/4° West, 3.50 chains to station, North 88-1/4° West, 5.00 chains to station; North 73-1/2° West, 3.30 chains to station; North 63-1/2° West, 3.15 chains to station, North 50° West, 4.70 chains to **PLACE OF BEGINNING**.

EXCEPTING THEREFROM: Parcel "40" as described in deed from California Water Service Company, a California corporation, to Contra Costa County Water District, a public corporation of the State of California, by deed and bill of sale, dated February 15, 1961 and recorded February 17, 1961, in Book 3807, Page 369, Official Records of said Contra Costa County, more particularly described as follows:

That certain parcel of land described as Parcel C in the deed from Santa Fe Land Improvement Company, a California corporation, to California Water Service Company, a California corporation, recorded December 27, 1929, in Book 209 of Official Records, Page 128, described as follows:

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(Pittsburg)

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"also all that portion of Tormey Island included between the west boundary of Rancho Los Medanos extended north and a parallel line 500 feet east therefrom; said island being Location 3471 of S. & O. Lands in Contra Costa County."

ALSO EXCEPTING THEREFROM: that portion conveyed in the deed from Santa Fe Land Improvement Company, a California corporation, to Douglas Oil Company of California, dated July 28, 1961, recorded August 8, 1961, in Book 3926, Page 290, Official Records of Contra Costa County.

PARCEL 2

All that portion of that certain 103.16 acre parcel of land commonly known as "Tormey Island" (also, sometimes referred to "Mallard Island"), described in deed dated April 4, 1907, from A. H. Payson, trustee, to Santa Fe Land Improvement Company, and recorded August 17, 1907, in Book 127 of Deeds, Page 46, records of said County, lying easterly of the easterly line of that certain parcel of land described in deed dated February 1, 1915, from Santa Fe Land Improvement Company to Oakland, Antioch and Eastern Railway, and recorded October 5, 1916, in Book 277 of Deeds, Page 217, records of said County.

EXCEPT: any portion of the above described parcel lying below the mean low water mark.

ALSO EXCEPTING THEREFROM: that portion of said land, all oil, gas and other hydrocarbon and mineral substances lying not less than five hundred (500) feet below the surface of said land, provided that grantor, its successors and assigns, shall not have the right to go upon the surface of land for the purpose of extracting said oil, gas or other hydrocarbon and mineral substances, nor for any purpose in connection therewith, but shall have the right to extract "and remove said oil, gas and other hydrocarbon and mineral substances by means of slant-drilled wells located on adjacent or nearby land, or by any other means which shall not require entry upon the surface of said land," as reserved in the deed from Santa Fe Land Improvement Company, a California corporation, recorded September 8, 1961, in Book 3926, Page 290, Official Records of said County.

PARCEL 3:

The tract of land known as Survey Number 77, Swamp and Overflowed Lands of Contra Costa County, Township 2 North, Range 1 West, Mount Diablo Base and Meridian, Section 12, being the fractional west 1/2 of said section and more particularly described in the field notes of said survey, as follows: **BEGINNING** at a point which is 37.75 chains north from the corner of Sections 11, 12, 13 and 14, in Township 2 North, Range 1 West, Mount Diablo Base and Meridian as station No. 1; thence East 18.77 chains to station on the west boundary of New York Rancho; thence North 40 chains following the boundary line of the New York Rancho to a slough; thence West 18.77 chains along the slough to a station on section line between Sections 11 and 12; thence South 40 chains along section line to **POINT OF BEGINNING**, running by the true meridian magnetic variation 16° East.

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EXCEPTING from said Parcel 3 all that portion thereof lying within a strip of land conveyed to Dow Chemical Company, a Delaware corporation, by deed dated August 31, 1949, recorded November 7, 1949, in Book 1458, Page 506, Official Records of Contra Costa County.

ALSO EXCEPTING from said Parcel 3, that portion, if any, lying within Location 3471 Swamp and Overflowed Lands in Contra Costa County, described in the Patent dated August 10, 1905, recorded April 1, 1908, in Book 4 of Patents, Page 487, Contra Costa County records.

PARCEL 4

The parcel of land shown as Lot 1 of that certain Lot Line Adjustment No. LL98-0040 and recorded as Instrument No. 99-0097770-00, Official Records of Contra Costa County, more particularly described as follows: All that property being a portion of projected Sections 1 and 12, Township 2 North, Range 1 West, Mount Diablo Base and Meridian, a portion of projected Sections 7 and 8, Township 2 North, Range 1 East, Mount Diablo Base and Meridian, in the Rancho Los Medanos, County of Contra Costa, State of California, described as follows:

BEGINNING at a point on the northerly right of way line of Willow Pass Road, being 60.00 feet wide, said point being the easterly terminus of that certain course labeled as "S 88°51'42" E 5125.45' ", and as evidenced by a 3-1/2" brass disk stamped "PGE LS 3322", said course and disk being shown on that certain Record of Survey filed October 13, 1977 in Book 63 of Licensed Survey Maps at Pages 15 through 27 in the office of the Recorder of said County, said point also being the southeasterly corner of the parcel of land described as Parcel 2 in the deed from C. A. Hooper and Company to Pacific Gas and Electric Company recorded December 31, 1951 in Book 1872 at Page 189, Official Records of said County; thence westerly along said right of way line North 88°51'32" West 5125.81 feet to the beginning of a curve concave southerly having a radius of 439.28 feet; thence continuing westerly along said right of way line through a central angle of 28°51'13" an arc distance of 221.22 feet to an angle point in the southerly boundary line of the parcel of land described in the deed from Douglas Oil Company of California to Pacific Gas and Electric Company, recorded April 27, 1971 in Book 6368 at Page 120, Official Records of said County; thence leaving said right of way line and along said southerly boundary line the following four (4) courses; (1) North 27°42'45" West 15.10 feet; (2) North 71°18'02" West 1487.64 feet; (3) South 15°49'25" West 671.01 feet; and (4) North 71°17'46" West 1831.72 feet to the westerly boundary line of said Rancho Los Medanos; thence along said westerly boundary line North 00°02'38" East 1698.17 feet to the southwesterly corner of the parcel of land described as Parcel 38 in the deed from California Water Service Company to Contra Costa County Water District recorded February 16, 1961 in Book 3807 at Page 369, Official Records of said County; thence along the southerly boundary lines of said Parcel 38 and Parcel 39 of last said deed South 82°49'16" East 603.86 feet to the southeasterly corner of said Parcel 39; thence along the easterly boundary lines of said Parcels 38 and 39 North 00°02'38" East 2264.61 feet to a meander line which represents the southerly waters edge of Suisun Bay as established by a land survey on November 9, 1998; thence along said meander line the following 23 courses; (1) North 69°21'01" East 465.83 feet; (2) North 83°22'58" East 358.62 feet; (3)

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South 77°53'18" East 792.45 feet; (4) South 69°20'52" East 440.37 feet; (5) North 88°18'22" East 224.90 feet; (6) South 63°46'54" East 316.48 feet; (7) South 59°07'51" East 135.66 feet; (8) South 67°11'40" East 280.74 feet; (9) South 71°40'32" East 457.25 feet; (10) South 84°58'23" East 452.22 feet; (11) North 72°36'26" East 702.63 feet; (12) North 89°43'58" East 236.34 feet; (13) South 78°31'46" East 126.60 feet; (14) South 44°28'36" East 86.96 feet; (15) South 49°13'34" East 257.84 feet; (16) South 68°01'36" East 325.24 feet; (17) North 50°01'12" East 197.80 feet; (18) North 58°10'48" East 256.74 feet; (19) North 88°20'14" East 47.60 feet; (20) South 46°43'58" East 176.09 feet; (21) South 75°55'12" East 271.01 feet; (22) North 82°22'52" East 172.66 feet; and (23) South 86°56'54" East 62.96 feet to the northerly prolongation of the westerly boundary line of the parcel of land described in the quitclaim deed from C. A. Hooper and Company to Pacific Gas and Electric Company recorded October 28, 1952 in Book 2015 at Page 530, Official Records of said County; thence along said westerly boundary line and its prolongation South 12°20'44" West 1944.93 feet to the northwesterly corner of the parcel of land described as Parcel 1 in said deed recorded in Book 1872 at Page 189; thence along the northerly and easterly boundary lines of last said parcel the following two (2) courses; (1) North 71°57'48" East 121.38 feet; and (2) South 13°55'18" West 720.00 feet to the northerly boundary line of the strip of land described and designated Tract A in the deed from C. A. Hooper and Company to the Oakland, Antioch and Eastern Railway, recorded August 24, 1912 in Book 183 at Page 224 of Deeds, in the Records Office of said County; thence along last said boundary line the following two (2) courses; (1) South 82°48'42" East 3830.77 feet to the beginning of a curve concave southerly having a radius of 5799.65 feet; and (2) easterly along said curve through a central angle of 05°23'37" an arc distance of 545.96 feet to the westerly right of way line of Bay Side Drive (formerly Montezuma Avenue), being 50.00 feet wide; thence along last said right of way line South 17°32'26" West 100.38 feet to the southerly boundary line of said Tract A and the beginning of a non-tangent curve concave southerly having a radius of 5699.65 feet and to which beginning point a radial line bears North 12°29'41" East; thence westerly along said curve and last said southerly boundary line through a central angle of 05°18'23" an arc distance of 527.87 feet; thence continuing along said line North 82°48'42" West 1617.23 feet to the northeasterly corner of said Parcel 2 in deed recorded in Book 1872 at Page 189; thence along the easterly boundary line thereof the following three (3) courses; (1) South 07°15'32" West 1.04 feet to the beginning of a non-tangent curve concave easterly having a radius of 537.00 feet and to which beginning point a radial line bears North 82°40'05" West; (2) southerly along said curve through a central angle of 06°04'08" an arc distance of 56.88 feet; and (3) South 01°11'30" West 695.82 feet to the **POINT OF BEGINNING**.

TOGETHER WITH: the strip or strips of land, if any, lying northerly of said meander line and southerly of the last natural ordinary mean high water mark of said Suisun Bay.

EXCEPTING THEREFROM: the strip or strips of land, if any, lying southerly of said meander line and northerly of the last natural ordinary mean high water mark of said Suisun Bay.

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(Pittsburg)

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PARCEL 5

The parcel of land shown as Lot 1 of that certain Lot Line Adjustment No. LL98-0039 and recorded as Instrument No. 99-0097769-00, Official Records of Contra Costa County, more particularly described as follows: All that property being a portion of projected Sections 7 and 8, Township 2 North, Range 1 East, Mount Diablo Base and Meridian, in the Rancho Los Medanos, County of Contra Costa, State of California, described as follows:

BEGINNING at the intersection of the westerly boundary line of Bayside Knolls Unit No. 2, filed in Book 41 of Maps at Page 16 in the Office of the Recorder of said County, with the northerly boundary line of the parcel of land described in the deed from C. A. Hooper and Company to the Roman Catholic Archbishop of San Francisco, dated August 1, 1947 and recorded in Book 1120 at Page 76, Official Records of said County, said intersection also being an angle point in the easterly boundary line of the parcel of land described in the deed from C. A. Hooper and Company to Pacific Gas and Electric Company recorded September 26, 1951 in Book 1826 at Page 478, Official Records of said County; thence along said easterly boundary line the following four (4) courses; (1) North 72°22'45" West 552.59 feet; (2) South 04°12'24" East 888.29 feet to the beginning of a curve concave westerly having a radius of 1248.57 feet; (3) southerly along said curve through a central angle of 21°47'00" an arc distance of 474.69 feet; and (4) South 17°34'36" West 9.17 feet to the northerly boundary line of the strip of land described and designated Tract A in the deed from C. A. Hooper & Co. to the Oakland, Antioch and Eastern Railway, recorded August 24, 1912 in Book 183 at Page 224 of Deeds, in the Records Office of said County; thence along said northerly boundary line North 82°48'42" West 3630.00 feet to the southwesterly corner of the parcel of land described as Parcel 1 in the deed from C. A. Hooper and Company to Pacific Gas and Electric Company recorded December 31, 1951 in Book 1872 at Page 189, Official Records of said County; thence along the easterly and northerly boundary lines of last said parcel the following two (2) courses; (1) North 13°55'18" East 720.00 feet; and (2) South 71°57'48" West 121.38 feet to the westerly boundary line of the parcel of land described in the deed from C. A. Hooper & Co. to Pacific Gas and Electric Company recorded October 28, 1952 in Book 2015 at Page 530, Official Records of said County; thence along said westerly boundary line North 12°20'44" East 1922.58 feet to westerly terminus of the true boundary line of the ordinary high water mark as established in that certain agreement dated October 24, 1961, by and between the State of California and Pacific Gas and Electric Company, recorded September 20, 1962 in Book 4206 at Page 55, Official Records of said County; thence along said true boundary line the following four (4) courses; (1) North 87°34'56" East 1686.64 feet; (2) North 70°38'14" East 1113.96 feet; (3) North 72°16'36" East 527.06 feet; and (4) South 88°52'52" East 585.40 feet to the westerly boundary line of the parcel of land described in the deed from C. A. Hooper and Company to Pacific Gas and Electric Company recorded October 31, 1952 in Book 2018 at Page 234, Official Records of said County; thence along the westerly and southerly boundary lines of last said parcel the following two (2) courses; (1) South 17°34'00" West 614.46 feet; and (2) South 72°26'00" East 558.46 feet to the easterly boundary line of said parcel of land described in said deed recorded in Book 1826 at page 478; thence along last said easterly boundary line South 17°37'15" West 1713.16 feet to the **POINT OF BEGINNING**.

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EXCEPTING THEREFROM: the following described property:

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COMMENCING at the intersection of the westerly boundary line of Bayside Knolls Unit No. 2, filed in Book 41 of Maps at Page 16 in the Office of the Recorder of said County, with the northerly boundary line of the parcel of land described in the deed from C. A. Hooper and Company to the Roman Catholic Archbishop of San Francisco, dated August 1, 1947 and recorded in Book 1120 at Page 76, Official Records of said County, said intersection also being an angle point in the easterly boundary line of the parcel of land described in the deed from C. A. Hooper and Company to Pacific Gas and Electric Company recorded September 26, 1951 in Book 1826 at Page 478, Official Records of said County; thence along said easterly boundary line North $72^{\circ}22'45''$ West 552.59 feet; thence leaving said boundary line South $55^{\circ}30'59''$ West 254.01 feet to the **POINT OF BEGINNING**; thence North $72^{\circ}23'30''$ West 1552.22 feet; thence North $17^{\circ}36'30''$ East 1003.18 feet; thence North $41^{\circ}49'25''$ East 269.93 feet; thence South $47^{\circ}31'19''$ East 399.86 feet; thence South $72^{\circ}21'00''$ East 603.53 feet; thence South $17^{\circ}39'00''$ West 73.61 feet; thence South $72^{\circ}21'00''$ East 172.21 feet; thence South $18^{\circ}03'41''$ East 795.05 feet to the beginning of a non-tangent curve concave northwesterly having a radius of 948.71 feet and to which beginning point a radial line bears South $60^{\circ}26'30''$ East; thence southwesterly along said curve through a central angle of $24^{\circ}02'40''$ an arc distance of 398.13 feet to the **POINT OF BEGINNING**.

PARCEL 6

All that certain real property described in the deed from C. A. Hooper and Company to Pacific Gas and Electric Company recorded October 31, 1952 in Book 2018 at Page 234, Official Records of the County of Contra Costa, in the Rancho Los Medanos, County of Contra Costa, State of California, lying southerly of the true boundary line of the ordinary high water mark as established in that certain agreement dated October 24, 1961, by and between the State of California and Pacific Gas and Electric Company, recorded September 20, 1962 in Book 4206 at Page 55, Official Records of said County, said property being more particularly described as follows:

COMMENCING at the intersection of the westerly boundary line of Bayside Knolls Unit No. 2, filed in Book 41 of Maps at Page 16 in the Office of the Recorder of said County, with the northerly boundary line of the parcel of land described in the deed from C. A. Hooper and Company to the Roman Catholic Archbishop of San Francisco, dated August 1, 1947 and recorded in Book 1120 at Page 76, Official Records of said County; thence northerly along said westerly boundary line and the northerly prolongation thereof North $17^{\circ}37'15''$ East 1713.16 feet to the southerly boundary line of the parcel of land described in said deed recorded in Book 2018 at Page 234; thence easterly along last said line South $72^{\circ}26'00''$ East 26.94 feet to the southeasterly corner of last said parcel and the **POINT OF BEGINNING**; thence along the southerly and westerly boundary lines of last said parcel the following two (2) courses; (1) North $72^{\circ}26'00''$ West 585.40 feet; and (2) North $17^{\circ}34'00''$ East 614.46 feet to said true boundary line; thence easterly along last said line the following two (2) courses; (1) South $88^{\circ}52'52''$ East

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515.51 feet; and (2) South 72°22'21" East 91.94 feet to the easterly boundary line of the parcel of land described in said deed recorded in Book 2018 at Page 234; thence southerly along last said boundary line South 17°38'18" West 760.32 feet to the **POINT OF BEGINNING**.

PARCEL 7

All that certain real property being a portion of the parcel of land described in the deed from C. A. Hooper and Company to Atchison, Topeka and Santa Fe Railway Company recorded January 27, 1923 in Book 428 at Page 480, of Deeds of the County of Contra Costa, in the Rancho Los Medanos, County of Contra Costa, State of California, more particularly described as follows:

COMMENCING at the intersection of the westerly boundary line of Bayside Knolls Unit No. 2, filed in Book 41 of Maps at Page 16 in the Office of the Recorder of said County, with the northerly boundary line of the parcel of land described in the deed from C. A. Hooper and Company to the Roman Catholic Archbishop of San Francisco, dated August 1, 1947 and recorded in Book 1120 at Page 76, Official Records of said County; thence westerly along said northerly boundary line North 72°22'45" West 498.73 feet to the northwesterly corner of said parcel, said corner also being a point on the easterly boundary line of the parcel of land described in said deed recorded in Book 428, at page 480, said point also being the **POINT OF BEGINNING**; thence along said easterly boundary line of said parcel the following two (2) courses; (1) South 04°12'24" East 868.26 feet to the beginning of a curve concave westerly having a radius of 1298.57 feet; and (2) southerly along said curve through a central angle of 21°47'00" an arc distance of 493.70 feet to the northerly boundary line of the strip of land described and designated Tract A in the deed from C. A. Hooper & Co. to the Oakland, Antioch and Eastern Railway, recorded August 24, 1912 in Book 183 at Page 224 of Deeds, in the Recorders Office of said County; thence along last said boundary line North 82°48'42" West 50.83 feet to the westerly boundary line of last said parcel; thence northerly along last said westerly boundary line the following three (3) courses; (1) North 17°34'36" East 9.17 feet to the beginning of a curve concave westerly having a radius of 1248.57 feet; (2) northerly along said curve through a central angle of 21°47'00" an arc distance of 474.69 feet; and (3) North 04°12'24" West 888.29 feet to the westerly prolongation of the northerly boundary line of said deed recorded in Book 1120 at Page 76; thence easterly along said prolongation South 72°22'45" East 53.86 feet to the **POINT OF BEGINNING**.

PARCEL 8

All that certain real property being a portion of the parcel of land described in the deed from Douglas Oil Company of California to Pacific Gas and Electric Company, recorded April 27, 1971 in Book 6368 at Page 120, Official Records of the County of Contra Costa, also a portion of Tract B firstly described, in the deed from C. A. Hooper & Co. to the Oakland, Antioch and Eastern Railway, recorded August 24, 1912 in Book 183 at Page 224 of Deeds of said County; and also a portion of the parcel of land described in the deed from Allied Properties, a corporation, V. P. Baker, Karl B. Rodi and A. J. West to Pacific Gas and Electric Company recorded July 26, 1972 in Book 6708 at Page 381, Official Records of said County, said real

EXHIBIT A-7

(Pittsburg)

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property lying in Section 12, Township 2 North, Range 1 West, Mount Diablo Base and Meridian in said County, State of California, more particularly described as follows:

BEGINNING at the intersection of the westerly line of said Section 12 with the northerly right of way line of the Atchison, Topeka and Santa Fe Railway; thence along said westerly line North $02^{\circ}04'26''$ East 576.44 feet to the southerly boundary line of the parcel of land described as Parcel 37 in the deed from the California Water Service Company to Contra Costa County Water District recorded February 16, 1961 in Book 3807 at Page 369, Official Records of said County; thence along the southerly boundary line of said Parcel 37 North $84^{\circ}26'28''$ East 882.88 feet to the southeasterly corner of last said parcel and the beginning of a non-tangent curve concave southeasterly having a radius of 1005.37 feet and to which beginning a radial line bears North $46^{\circ}40'34''$ West; thence northeasterly along the southeasterly boundary line of last said parcel and said curve through a central angle of $03^{\circ}18'26''$ an arc distance of 58.03 feet to the southerly boundary line of the tract of land known as Survey Number 77, Swamp and Overflowed Lands of Contra Costa County, last said tract being also described as Parcel 2 in the deed from Santa Fe Land Improvement Company to Pacific Gas and Electric Company recorded in Book 6756 at Page 639, Official Records of said County; thence along said southerly boundary line South $87^{\circ}48'19''$ East 266.26 feet to the westerly boundary line of the Rancho Los Medanos; thence along last said westerly boundary line South $00^{\circ}02'38''$ West 1100.68 feet to said northerly right of way line; thence along said right of way line North $71^{\circ}17'46''$ West 1273.06 feet to the **POINT OF BEGINNING.**



EXHIBIT A-8

(Pittsburg)

EXHIBIT B

103318

Granting a strip of land for ingress and egress through Switchyard Property.

Access Road 1:

An easement for road purposes lying in Lot 2 of Lot Line Adjustment No. LL98-0039 and recorded as Instrument No. 99-0097769-00, Official Records of Contra Costa County, said Lot being a portion of the Rancho Los Medanos, Township 2 North, Range 1 East, Mount Diablo Base and Meridian, County of Contra Costa, State of California, more particularly described as follows:

BEGINNING at an angle point in the northerly boundary line of said Lot 2, said point being the northerly terminus of that certain course cited as "North 16°46'45" West 73.61 feet" in said Lot Line Adjustment; thence southerly along last said line South 17°39'00" West 73.61 feet; thence leaving said last said line at a right angle North 72°21'00" West 25.00 feet; thence at a right angle North 17°39'00" East 73.61 feet to said northerly boundary line; thence easterly along last said line South 72°21'00" East 25.00 feet to the **POINT OF BEGINNING**.

The Basis of Bearings used for this description is California Coordinate System of 1983, Zone 3.

Access Road 2:

A 40.00 foot wide easement for road purposes lying in Lot 2 of Lot Line Adjustment No. LL98-0039 and recorded as Instrument No. 99-0097769-00, Official Records of Contra Costa County, said Lot being a portion of the Rancho Los Medanos, Township 2 North, Range 1 East, Mount Diablo Base and Meridian, County of Contra Costa, State of California, the centerline of which is described as follows:

COMMENCING at the most westerly corner of Lot 2 of said Lot Line Adjustment; thence easterly along the southerly boundary line of said Lot 2 South 72°23'30" East 360.93 feet to the **POINT OF BEGINNING**; thence leaving said southerly boundary line North 06°27'00" East 25.37 feet; thence North 01°11'46" East 733.20 feet; thence North 17°21'54" West 28.60 feet; thence North 38°20'38" West 44.21 feet; thence North 47°10'08" West 105.94 feet to the westerly boundary of said Lot 2.

The side lines of said easement are to be lengthened or shortened so as to begin at said southerly boundary line of Lot 2 and terminate at said westerly boundary of Lot 2.

The Basis of Bearings used for this description is California Coordinate System of 1983, Zone 3.

(Pittsburg)

EXHIBIT B-1



EXHIBIT C

103318

Granting a strip of land for gas transmission through Switchyard Property described as follows:

Easement Area 1

A 50.00 foot wide easement for gas line purposes lying in Lot 2 of Lot Line Adjustment No. LL98-0039 and recorded as Instrument No. 99-0097769-00, Official Records of Contra Costa County, said Lot being a portion of the Rancho Los Medanos, Township 2 North, Range 1 East, Mount Diablo Base and Meridian, County of Contra Costa, State of California, the centerline of which is described as follows:

COMMENCING at the most westerly corner of Lot 2 of said Lot Line Adjustment; thence easterly along the southerly boundary line of said Lot 2, South 72°23'30" East 78.05 feet to the **POINT OF BEGINNING**; thence North 17°31'26" East 699.40 feet; thence North 08°06'05" West 149.15 feet; thence North 72°23'30" West 12.32 feet to the westerly boundary of said Lot 2.

The side lines of said easement are to be lengthened or shortened so as to begin at said southerly boundary line of Lot 2 and terminate at the westerly boundary of said Lot 2.

The Basis of Bearings used for this description is California Coordinate System of 1983, Zone 3.



EXHIBIT C-1

(Pittsburg)

EXHIBIT D

Reserving to PG&E a strip of land for ingress and egress further described as follows:

Access Road 3:

An easement for road purposes lying in a portion of the Rancho Los Medanos, Township 2 North, Range 1 East, Mount Diablo Base and Meridian, County of Contra Costa, State of California, more particularly described as follows:

BEGINNING at the most westerly corner of Lot 2 of Lot Line Adjustment No. LL98-0039 and recorded as Instrument No. 99-0097769-00, Official Records of Contra Costa County; thence easterly along the southerly line of said Lot 2 South 72°23'30" East 1552.22 feet to the southeasterly line of said Lot 2 and the beginning of a non-tangent curve concave northwesterly having a radius of 948.71 feet, to which beginning a radial line bears South 36°23'50" East; thence along said southeasterly line and said curve through a central angle of 24°02'40" an arc distance of 398.13 feet to the northeasterly line of said Lot 2; thence along said northeasterly line North 18°08'09" West 16.89 feet; thence leaving last said line North 26°10'01" East 142.21 feet; thence North 17°39'53" East 491.21 feet; thence North 72°21'00" West 475.39 feet to the intersection of said northeasterly line with the northerly boundary of said Lot; thence along said northerly boundary the following 3 courses; (1) North 72°21'00" West 172.21 feet; (2) North 17°39'00" East 73.61 feet; and (3) North 72°21'00" West 25.00 feet; thence leaving last said boundary North 17°39'00" East 12.59 feet; thence North 72°21'00" West 60.35 feet; thence North 66°11'54" West 62.11 feet; thence North 69°50'33" West 275.98 feet; thence North 37°31'06" West 102.18 feet; thence North 72°29'35" West 117.14 feet; thence North 60°27'22" West 103.65 feet; thence North 19°20'58" West 222.67 feet; thence North 65°53'56" West 15.31 feet; thence South 80°53'50" West 93.26 feet; thence South 66°29'14" West 30.63 feet; thence South 41°49'25" West 371.66 feet; thence South 20°03'28" West 44.63 feet; thence South 34.67 feet; thence South 16°05'02" East 37.62 feet; thence South 47°10'08" East 29.42 feet to a point on the westerly line of said Lot 2, said point distant thereon North 17°36'30" East 821.55 feet from the Point of Beginning of this description; thence along said westerly line South 17°36'30" West 55.27 feet; thence leaving last said line North 47°10'08" West 66.88 feet; thence North 16°05'02" West 58.59 feet; thence North 50.58 feet; thence North 20°03'28" East 63.09 feet; thence North 41°49'25" East 392.21 feet; thence North 66°29'14" East 47.88 feet; thence North 80°53'50" East 114.49 feet; thence South 65°53'56" East 51.73 feet; thence South 19°20'58" East 225.43 feet; thence South 60°27'22" East 79.63 feet; thence South 72°29'35" East 127.63 feet; thence South 37°31'06" East 103.44 feet; thence South 69°50'33" East 263.08 feet; thence South 66°11'54" East 61.01 feet; thence South 72°21'00" East 107.67 feet; thence South 17°39'00" West 86.19 feet; thence South 72°21'00" East 639.11 feet; thence South 64°12'47" East 14.94 feet; thence South 26°24'34" East 26.89 feet; thence South 17°39'53" West 573.03 feet; thence South 29°33'30" West 111.53 feet to the beginning of a curve concave to the northwest having a radius of 987.71 feet; thence southwesterly along said curve through a central angle of 22°58'11" an arc distance of 395.97 feet;

EXHIBIT D-1

(Pittsburg)

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thence South 52°31'41" West 63.51 feet; thence North 72°23'30" West 1528.75 feet to the beginning of a curve concave southeasterly having a radius of 70.00 feet; thence southwesterly along said curve through a central angle of 90°34'55" an arc distance of 110.67 feet; thence South 17°01'35" West 391.31 feet to the beginning of a curve concave easterly having a radius of 500.00 feet; thence southeasterly along said curve through a central angle of 62°19'05" an arc distance of 543.83 feet; thence South 45°17'30" East 249.11 feet; thence South 36°43'12" East 85.39 feet; thence South 24°41'53" East 183.71 feet; thence South 16°06'04" East 93.44 feet; thence South 04°25'33" East 76.90 feet; thence South 03°22'16" West 287.32 feet; thence South 01°08'05" West 512.15 feet to a point on the northerly right of way line of Willow Pass Road, being 60.00 feet wide, said point distant thereon North 88°51'32" West 16.41 feet from the easterly terminus of that certain course labeled as "S 88°51'42" E 5125.45' ", and as evidenced by a 3-1/2" brass disk stamped "PGE LS 3322", said course and disk being shown on that certain Record of Survey filed October 13, 1977 in Book 63 of Licensed Survey Maps at Pages 15 through 27 in the office of the Recorder of said County; thence along said northerly right of way line North 88°51'32" West 50.00 feet; thence leaving last said line North 01°08'05" East 513.12 feet; thence North 03°22'16" East 284.89 feet; thence North 04°25'33" West 68.38 feet; thence North 16°06'04" West 84.57 feet; thence North 24°41'53" West 174.68 feet; thence North 36°43'12" West 76.38 feet; thence North 45°17'30" West 245.36 feet to the beginning of a curve concave easterly having a radius of 550.00 feet; thence northwesterly along said curve through a central angle of 62°19'05" an arc distance of 598.21 feet; thence North 17°01'35" East 383.21 feet to the beginning of a curve concave southeasterly having a radius of 150.00 feet; thence northeasterly along said curve through a central angle of 67°12'49" an arc distance of 175.96 feet to the **POINT OF BEGINNING**.

The Basis of Bearings used for this description is California Coordinate System of 1983, Zone 3.



EXHIBIT D-2

(Pittsburg)

EXHIBIT E

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Easement Area Two:

Reserving to PG&E a parcel of land south of switchyard for electrical/communication transmission, described as follows:

An easement for utility purposes lying in a portion of the Rancho Los Medanos, Township 2 North, Range 1 East, Mount Diablo Base and Meridian, County of Contra Costa, State of California, more particularly described as follows:

BEGINNING at the southeasterly corner of Lot 2 of Lot Line Adjustment No. LL98-0039 and recorded as Instrument No. 99-0097769-00, Official Records of Contra Costa County, said corner being the southeasterly terminus of that certain course of Lot 2 labeled as "North 72°23'30" West 1552.22 feet" in said Lot Line Adjustment; thence South 79°38'58" West 900.00 feet; thence South 72°15'50" West 1613.66 feet; thence South 41°48'39" West 313.32 feet; thence South 12°35'50" West 999.62 feet to a point on the northerly right of way line of Willow Pass Road, being 60.00 feet wide, said point distant thereon North 88°51'32" West 1629.67 feet from the easterly terminus of that certain course on said right of way line labeled as "S 88°51'42" E 5125.45' ", and as evidenced by a 3-1/2" brass disk stamped "PGE LS 3322", said course and disk being shown on that certain Record of Survey filed October 13, 1977 in Book 63 of Licensed Survey Maps at Pages 15 through 27 in the office of the Recorder of said County; thence along said right of way line North 88°51'32" West 1093.79 feet; thence leaving last said line North 12°21'35" East 1927.91 feet; thence North 62°04'26" East 1279.03 feet; thence North 57°19'20" East 1026.37 feet; thence North 40°34'04" East 683.05 feet; thence South 47°31'19" East 129.99 feet to the most northerly corner of said Lot 2; thence along the westerly and southerly boundary lines of last said Lot the following 3 courses; (1) South 41°49'25" West 269.93 feet; (2) South 17°36'30" West 1003.18 feet; and (3) South 72°23'30" East 1552.22 feet to the **POINT OF BEGINNING**.

The Basis of Bearings used for this description is California Coordinate System of 1983, Zone 3.

Easement Area Three

Strip of land reserved to PG&E for electrical /communication transmission described as follows:

A 20.00 foot wide easement lying within the County of Contra Costa, State of California, being a portion of the Rancho Los Medanos, in Township 2 North, Range 1 East, Mount Diablo Base and Meridian, the centerline of which is described as follows:

COMMENCING at a point on the northerly right of way line of Willow Pass Road, being 60.00 feet wide, said point being the easterly terminus of that certain course labeled as "S 88°51'42" E 5125.45' ", and as evidenced by a 3-1/2" brass disk stamped "PGE LS 3322", said course and disk being shown on that certain Record of Survey filed

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October 13, 1977 in Book 63 of Licensed Survey Maps at Pages 15 through 27 in the office of the Recorder of said County; thence westerly along said right of way line North $88^{\circ}51'32''$ West 10.00 feet to the **POINT OF BEGINNING**; thence leaving last said line North $01^{\circ}11'30''$ East 710.24 feet to a point hereinafter referred to as Point A; thence continuing North $01^{\circ}11'30''$ East 14.01 feet; thence North $07^{\circ}16'52''$ East 30.12 feet; thence North $01^{\circ}39'55''$ East 102.01 feet to a point hereinafter referred to as Point B; thence North $30^{\circ}24'27''$ West 271.86 feet; thence North $42^{\circ}14'16''$ West 451.77 feet; thence North $23^{\circ}09'50''$ West 182.67 feet; thence North $05^{\circ}11'17''$ West 220.62 feet; thence North $08^{\circ}36'23''$ East 220.49 feet to a point hereinafter referred to as Point C; thence North $08^{\circ}36'23''$ East 270.83 feet to a point hereinafter referred to as Point D; thence North $09^{\circ}48'53''$ West 526.97 feet to the end of said easement.

TOGETHER WITH: a 20.00 feet wide easement, the centerline of which begins at the hereinabove described Point A; thence South $63^{\circ}38'36''$ West 91.42 feet.

ALSO TOGETHER WITH: a 20.00 feet wide easement, the centerline of which begins at the hereinabove described Point B; thence North $81^{\circ}04'01''$ West 203.08 feet; thence North $83^{\circ}09'13''$ West 485.69 feet.

ALSO TOGETHER WITH: a 20.00 feet wide easement, the centerline of which begins at the hereinabove described Point C; thence South $73^{\circ}32'18''$ East 114.84 feet; thence South $72^{\circ}01'19''$ East 158.14 feet.

ALSO TOGETHER WITH: a 20.00 feet wide easement, the centerline of which begins at the hereinabove described Point D; thence North $57^{\circ}12'29''$ East 168.27 feet; thence South $72^{\circ}23'30''$ East 52.10 feet.

The sidelines of said easement are to be lengthened or shortened so as to begin at said northerly right of way line of Willow Pass Road, and to meet at angle points and at intersections of separate strips.

The basis of bearings for this description is the California Coordinate System of 1983, Zone 3.

Easement Area Four:

Strip of land reserved to PG&E for electrical distribution/communication described as follows:

A 20.00 foot wide easement lying within the County of Contra Costa, State of California, lying within a portion of Section 12, Township 2 North, Range 1 West, Mount Diablo Base and Meridian, and within a portion of the Rancho Los Medanos, Township 2 North, Range 1 East, Mount Diablo Base and Meridian, the centerline of which is described as follows:

EXHIBIT E-2

(Pittsburg)

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COMMENCING at the intersection of the west line of said Section 12 with the northerly right of way line of the Atchison, Topeka and Santa Fe Railway; thence easterly along said northerly right of way line South 71°17'46" East 21.89 feet to the **POINT OF BEGINNING**; thence leaving last said line North 02°20'07" East 620.79 feet; thence North 84°16'26" East 868.21 feet; thence North 52°26'39" East 140.74 feet; thence North 36°50'33" East 385.49 feet; thence North 01°21'21" East 194.52 feet; thence South 83°10'54" East 1615.76 feet; thence North 43°00'23" East 353.34 feet; thence North 39°44'20" East 1070.03 feet; thence North 35°22'24" East 422.15 feet; thence North 73°24'00" West 1149.74 feet; thence North 11°40'08" West 309.10 feet; thence North 00°20'25" West 423.69 feet; thence South 73°55'14" East 1415.52 feet; thence South 06°35'40" East 37.02 feet to the end of said easement.

EXCEPTING THEREFROM: any portion thereof lying within that portion of land described in the Deed to the Dow Chemical Company, recorded in Volume 1458, Page 506, Official Records of said County, and in the Deed to the Contra Costa County Water District recorded in Volume 3807, Page 369, Official Records of said County.

The sidelines of said easement are to be lengthened or shortened so as to begin at said northerly right of way line of the Atchison, Topeka and Santa Fe Railway.

The Basis of Bearings used for this description is California Coordinate System of 1983, Zone 3.

Easement Area Five:

Strip of land reserved to PG&E for an electrical distribution anchor described as follows:

A 20.00 foot wide easement lying within the County of Contra Costa, State of California, being a portion of the Rancho Los Medanos, in Township 2 North, Range 1 East, Mount Diablo Base and Meridian, the centerline of which is described as follows:

COMMENCING at a point on the northerly right of way line of Willow Pass Road, being 60.00 feet wide, said point being the easterly terminus of that certain course labeled as "S 88°51'42" E 5125.45' ", and as evidenced by a 3-1/2" brass disk stamped "PGE LS 3322", said course and disk being shown on that certain Record of Survey filed October 13, 1977 in Book 63 of Licensed Survey Maps at Pages 15 through 27 in the office of the Recorder of said County; thence westerly along said right of way line North 88°51'32" West 98.68 feet to the **POINT OF BEGINNING**; thence leaving last said line North 01°08'28" East 45.00 feet to the end of said easement.

The sidelines of said easement are to be lengthened or shortened so as to begin at said northerly right of way line of Willow Pass Road.

The basis of bearings for this description is the California Coordinate System of 1983, Zone 3.



EXHIBIT E-3

(Pittsburg)

EXHIBIT F

Reserving to PG&E a parcel of land for gas lines described as follows:

Easement Area Six:

An easement for gas utility purposes lying in a portion of the Rancho Los Medanos, Township 2 North, Range 1 East, Mount Diablo Base and Meridian, County of Contra Costa, State of California, more particularly described as follows:

BEGINNING at the southeasterly corner of Lot 2 of Lot Line Adjustment No. LL98-0039 and recorded as Instrument No. 99-0097769-00, Official Records of Contra Costa County, said corner being the southeasterly terminus of that certain course of Lot 2 labeled as "North 72°23'30" West 1552.22 feet" in said Lot Line Adjustment; thence South 79°38'58" West 900.00 feet; thence South 72°15'50" West 1613.66 feet; thence South 41°48'39" West 313.32 feet; thence South 12°35'50" West 999.62 feet to a point on the northerly right of way line of Willow Pass Road, being 60.00 feet wide, said point distant thereon North 88°51'32" West 1629.67 feet from the easterly terminus of that certain course on said right of way line labeled as "S 88°51'42" E 5125.45' ", and as evidenced by a 3-1/2" brass disk stamped "PGE LS 3322", said course and disk being shown on that certain Record of Survey filed October 13, 1977 in Book 63 of Licensed Survey Maps at Pages 15 through 27 in the office of the Recorder of said County; thence along said right of way line North 88°51'32" West 1093.79 feet; thence leaving last said line North 12°21'35" East 1927.91 feet; thence North 62°04'26" East 1279.03 feet; thence North 57°19'20" East 1026.37 feet; thence North 40°34'04" East 683.05 feet; thence South 47°31'19" East 129.99 feet to the most northerly corner of said Lot 2; thence along the westerly and southerly boundary lines of last said Lot the following 3 courses; (1) South 41°49'25" West 269.93 feet; (2) South 17°36'30" West 1003.18 feet; and (3) South 72°23'30" East 1552.22 feet to the **POINT OF BEGINNING**.

The Basis of Bearings used for this description is California Coordinate System of 1983, Zone 3.



EXHIBIT F-1

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EXHIBIT G

Reserving to PG&E a parcel of land for a gas metering site described as follows:

Easement Area Seven:

An easement for gas utility purposes lying in Lot 1 of Lot Line Adjustment No. LL98-0039 and recorded as Instrument No. 99-0097769-00, Official Records of Contra Costa County, said Lot being a portion of the Rancho Los Medanos, Township 2 North, Range 1 East, Mount Diablo Base and Meridian, County of Contra Costa, State of California, said easement more particularly described as follows:

COMMENCING at the most westerly corner of Lot 2 of said Lot Line Adjustment; thence easterly along the southerly boundary line of said Lot 2 South 72°23'30" East 174.25 feet; thence leaving said southerly boundary line South 17°36'30" West 60.02 feet to the **POINT OF BEGINNING**; thence South 18°46'21" West 358.35 feet; thence North 71°46'04" West 195.68 feet; thence North 17°01'35" East 319.94 feet to the beginning of a non-tangent curve concave southerly having a radius of 70.00 feet and to which beginning a radial line bears North 43°38'33" West; thence northeasterly along said curve through a central angle of 61°15'03" an arc distance of 74.83 feet; thence South 72°20'44" East 144.83 feet to the **POINT OF BEGINNING**.

The Basis of Bearings used for this description is California Coordinate System of 1983, Zone 3.



EXHIBIT G-1

(Pittsburg)

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EXHIBIT "H"

Easement Area Eight

All that portion of the Parcels 3, 4 and 8 hereinbefore described in EXHIBIT "A", situate in the County of Contra Costa, State of California, described as follows:

A strip of land of the uniform width of 12 feet lying 6 feet on each side of the line described as follows:

Commencing at the found 3 inch brass cap marked "Pac. Gas & Elec. Co Prop. Cor. LS 3322" accepted as marking the northerly terminus of a course in the westerly boundary line of Pittsburg City Limits line as shown on Sheet 13 of 13 Sheets upon the record of survey map filed for record October 13, 1977 in Book 63 of Land Survey Maps at page 15, which course as shown upon said map has a bearing of north 1° 11' 20" east and a length of 695.73, and running

(a) north 79° 35' 25" west 628.95 feet to a point within the boundary lines of said Parcel 4, being also the TRUE POINT OF BEGINNING of this description, and running thence across said Parcels 3, 4 and 8 the following courses

- (1) north 82° 55' 24" west 7441.49 feet; thence
- (2) south 88° 27' 44" west 116.93 feet; thence
- (3) south 85° 09' 50" west 242.60 feet; thence
- (4) south 79° 18' 42" west 134.04 feet; thence
- (5) south 63° 22' 18" west 92.86 feet; thence
- (6) south 59° 41' 03" west 735.73 feet; thence
- (7) south 50° 26' 49" west 100.72 feet; thence
- (8) south 39° 45' 50" west 485.94 feet; thence
- (9) south 75° 20' 25" west 51.24 feet; thence
- (10) north 70° 27' 53" west approximately 252 feet to a point in the westerly boundary line of said Parcel 8; the side lines of said strip of land shall be lengthened or shortened at the westerly terminus thereof so as to terminate in said westerly boundary line.



APPROVED AS TO DESCRIPTION
[Signature]
PIERRE W. HURTER
L.S. 6728

EXHIBIT I

Reserving to PG&E an easement area for gas and electrical transmission and distribution described as follows:

Easement Area Nine:

An easement for utility purposes lying partially within a portion of the Rancho Los Medanos, Township 2 North, Range 1 East, and Township 2 North, Range 1 West, Mount Diablo Base and Meridian, and partially within a portion of Section 12, Township 2 North, Range 1 West, Mount Diablo Base and Meridian, in the County of Contra Costa, State of California more particularly described as follows:

COMMENCING at the intersection of the west line of said Section 12 with the northerly right of way line of the Atchison, Topeka, Santa Fe Railroad as shown on that certain Record of Survey filed October 13, 1977 in Book 63 of Licensed Survey Maps at Pages 15 through 27 in the office of the Recorder of said County; thence easterly along said northerly right of way line South $71^{\circ}17'46''$ East 393.14 feet to a 2 inch iron pipe with cap stamped "RCE 7546" as shown on said record of survey, said pipe being the **POINT OF BEGINNING** for this description; thence proceeding along said right of way line North $71^{\circ}17'46''$ West 107.13 feet; thence leaving last said line North $39^{\circ}43'37''$ East 915.44 feet to the beginning of a non-tangent curve concave southeasterly having a radius of 1005.37 feet and to which beginning a radial line bears North $50^{\circ}25'23''$ West; thence northeasterly along said curve through a central angle of $03^{\circ}44'49''$ an arc distance of 65.75 feet to the southeasterly corner of Parcel 37 as described in the deed from California Water Service Company to Contra Costa County Water District recorded February 17, 1961 in Book 3807, Page 369 Official Records of said County, said corner being the easterly terminus of that certain course labeled as "S. $84^{\circ}26'23''$ W. 882.83'" on said record of survey, said corner also being a point on the northerly boundary line of that certain property shown on said record of survey; thence along last said boundary line the following three courses; (1) continuing northeasterly along last said curve through a central angle of $03^{\circ}18'26''$ an arc distance of 58.03 feet; (2) North $87^{\circ}48'19''$ West 15.20 feet; and (3) North $40^{\circ}09'04''$ East 67.35 feet to the beginning of a non-tangent curve concave southerly having a radius of 1025.37 feet and to which beginning a radial line bears North $40^{\circ}13'21''$ West; thence leaving last said line easterly along said curve through a central angle of $45^{\circ}15'35''$ an arc distance of 809.97 feet; thence South $82^{\circ}48'42''$ East 9720.26 feet to an angle point in the easterly boundary line of the property shown on said record of survey, said angle point being the westerly terminus of that certain course labeled "N. $82^{\circ}48'54''$ W. 149.86'" on said record of survey; thence along last said boundary line the following five courses; (1) South $82^{\circ}48'42''$ East 149.93 feet to the beginning of a curve concave southerly having a radius of 5799.65 feet; (2) easterly along said curve through a central angle of $05^{\circ}23'37''$ an arc distance of 545.96 feet; (3) South $17^{\circ}32'26''$

EXHIBIT I-1

103318

West 100.38 feet the beginning of a non-tangent curve concave southerly having a radius of 5699.65 feet and to which beginning a radial line bears North 12°29'41" East; (4) westerly along said curve through a central angle of 05°18'23" an arc distance of 527.87 feet; and (5) North 82°48'42" West 1617.23 feet; thence leaving last said boundary North 82°48'42" West 8216.15 feet; thence South 07°11'18" West 19.28 feet to the beginning of a non-tangent curve concave southerly having a radius of 905.37 feet and to which beginning a radial line bears North 07°04'55" East; thence westerly along said curve through a central angle of 57°30'47" an arc distance of 908.80 feet; thence South 39°43'37" West 877.14 feet to the **POINT OF BEGINNING**.

The basis of bearings for this description is the California Coordinate System of 1983, Zone 3.



EXHIBIT I-2

(Pittsburg)

EXHIBIT "J"

103318

Department of the Army and Army Corps of Engineer Permits

1. Department of Army Permit dated June 8, 1953, attached hereto as Exhibit J-1;
2. Department of the Army Permit dated November 3, 1958, attached hereto as Exhibit J-2;
3. Department of the Army Permit No. 3666 dated September 30, 1963, attached hereto as Exhibit J-3;
4. Department of the Army Permit Application No. PN 74-129-99(a) dated November 5, 1974, attached hereto as Exhibit J-4; and
5. Department of the Army Permit Application No. 13459-59 dated January 11, 1984, attached hereto as Exhibit J-5.

EXHIBIT J

Document No. 156-171
DEPARTMENT OF THE ARMY

303-277

NOTE.—It is to be understood that this instrument does not give any property rights either in real estate or material, or any exclusive privileges; and that it does not authorize any injury to private property or invasion of private rights, or any infringement of Federal, State, or local laws or regulations, nor does it obviate the necessity of obtaining State assent to the work authorized. IT MERELY EXPRESSES THE ASSENT OF THE FEDERAL GOVERNMENT SO FAR AS CONCERNS THE PUBLIC RIGHTS OF NAVIGATION. (See *Cummings v. Chicago*, 188 U. S., 410.)

PERMIT **2102-01-0340**
Sacramento District
U. S. Army, Corps of Engineers.
Wright Bldg., Sacramento, Calif.
8 June, 1953.

Pacific Gas and Electric Company
245 Market Street
San Francisco 6, California

103318

Gentlemen:

Referring to written request dated 26 March 1953, _____

I have to inform you that, upon the recommendation of the Chief of Engineers, and under the provisions of Section 10 of the Act of Congress approved March 3, 1899, entitled "An act making appropriations for the construction, repair, and preservation of certain public works on rivers and harbors, and for other purposes," you are hereby authorized by the Secretary of the Army.

to construct a pier and two dolphins, _____
(Here describe the proposed structure or work.)

in Suisun Bay, _____
(Here to be named the river, harbor, or waterway concerned.)

at Pittsburg, Contra Costa County, California, _____
(Here to be named the nearest well-known locality—preferably a town or city—and the distance in miles and tenths from some definite point in the same, stating whether above or below or giving direction by points of compass.)

in accordance with the plans shown on the drawing attached hereto marked:
(Or drawings: give file number or other definite identification marks.)
"Proposed Pier in Suisun Bay, Pittsburg, California, Contra Costa County,"

subject to the following conditions:

103318

(a) That the work shall be subject to the supervision and approval of the District Engineer, Corps of Engineers, in charge of the locality, who may temporarily suspend the work at any time, if in his judgment the interests of navigation so require.

(b) That any material dredged in the prosecution of the work herein authorized shall be removed evenly and no large refuse piles, ridges across the bed of the waterway, or deep holes that may have a tendency to cause injury to navigable channels or to the banks of the waterway shall be left. If any pipe, wire, or cable hereby authorized is laid in a trench, the formation of permanent ridges across the bed of the waterway shall be avoided and the back filling shall be so done as not to increase the cost of future dredging for navigation. Any material to be deposited or dumped under this authorization, either in the waterway or on shore above high-water mark, shall be deposited or dumped at the locality shown on the drawing hereto attached, and, if so prescribed thereon, within or behind a good and substantial bulkhead or bulkheads, such as will prevent escape of the material in the waterway. If the material is to be deposited in the harbor of New York, or in its adjacent or tributary waters, or in Long Island Sound, a permit therefor must be previously obtained from the Supervisor of New York Harbor, Whitehall Building, New York City.

(c) That there shall be no unreasonable interference with navigation by the work herein authorized.

(d) That if inspections or any other operations by the United States are necessary in the interest of navigation all expenses connected therewith shall be borne by the permittee.

(e) That no attempt shall be made by the permittee or the owner to forbid the full and free use by the public of all navigable waters at or adjacent to the work or structure.

(f) That if future operations by the United States require an alteration in the position of the structure or work herein authorized, or if, in the opinion of the Secretary of the Army, it shall cause unreasonable obstruction to the free navigation of said water, the owner will be required upon due notice from the Secretary of the Army, to remove or alter the structural work or obstructions caused thereby without expense to the United States, so as to render navigation reasonably free, easy, and unobstructed; and if, upon the expiration or revocation of this permit, the structure, fill, excavation, or other modification of the watercourse hereby authorized shall not be completed, the owners shall, without expense to the United States, and to such extent and in such time and manner as the Secretary of the Army may require, remove all or any portion of the uncompleted structure or fill and restore to its former condition the navigable capacity of the watercourse. No claim shall be made against the United States on account of any such removal or alteration.

(g) That the United States shall in no case be liable for any damage or injury to the structure or work herein authorized which may be caused by or result from future operations undertaken by the Government for the conservation or improvement of navigation, or for other purposes, and no claim or right to compensation shall accrue from any such damage.

(h) That if the display of lights and signals on any work hereby authorized is not otherwise provided for by law, such lights and signals as may be prescribed by the U. S. Coast Guard, shall be installed and maintained by and at the expense of the owner.

(i) That the permittee shall notify the said district engineer at what time the work will be commenced, and as far in advance of the time of commencement as the said district engineer may specify, and shall also notify him promptly, in writing, of the commencement of work, suspension of work, if for a period of more than one week, resumption of work, and its completion.

(j) That if the structure or work herein authorized is not completed on or before the 31st day of December, 1956, this permit, if not previously revoked or specifically extended, shall cease and be null and void.

By authority of the Secretary of the Army:



C. C. HAUG
Colonel, Corps of Engineers
District Engineer

DEPARTMENT OF THE ARMY

2102-01-0341

COPY SENT TO DIVISION

NOTE.—It is to be understood that this instrument does not give any property rights either in real estate or material, or any exclusive privileges; and that it does not authorize any injury to private property or invasion of private rights, or any infringement of Federal, State, or local laws or regulations, nor does it obviate the necessity of obtaining State assent to the work authorized. IT MERELY EXPRESSES THE ASSENT OF THE FEDERAL GOVERNMENT SO FAR AS CONCERNS THE PUBLIC RIGHTS OF NAVIGATION. (See Cummings v. Chicago, 188 U. S., 410.)

16-12168-2

PERMIT

Sacramento District
U.S. Army, Corps of Engineers,
Wright Bldg., Sacramento, Calif.
3 November 1958

103318

Pacific Gas and Electric Company
245 Market Street
San Francisco 6, California

Gentlemen:

Referring to written request dated 5 September 1958,

I have to inform you that, upon the recommendation of the Chief of Engineers, and under the provisions of Section 10 of the Act of Congress approved March 3, 1899, entitled "An act making appropriations for the construction, repair, and preservation of certain public works on rivers and harbors, and for other purposes," you are hereby authorized by the Secretary of the Army, to construct timber barriers for existing pier and discharge outlet, and to dredge at two locations,

(Here describe the proposed structure or work.)

in Suisun Bay,

(Here to be named the river, harbor, or waterway concerned.)

at Pittsburg, California,

(Here to be named the nearest well-known locality—preferably a town or city—and the distance in miles and tenths from some definite point in the same, stating whether above or below or giving direction by points of compass.)

in accordance with the plans shown on the drawing attached hereto marked: "Proposed Barrier Wall to Pier, Dredging and Discharge Safety Barrier in Suisun Bay at Pittsburg, Contra Costa County, California,"

subject to the following conditions:

(a) That the work shall be subject to the supervision and approval of the District Engineer, Corps of Engineers, in charge of the locality, who may temporarily suspend the work at any time, if in his judgment the interests of navigation so require.

(b) That any material dredged in the prosecution of the work herein authorized shall be removed evenly and no large refuse piles, ridges across the bed of the waterway, or deep holes that may have a tendency to cause injury to navigable channels or to the banks of the waterway shall be left. If any pipe, wire, or cable hereby authorized is laid in a trench, the formation of permanent ridges across the bed of the waterway shall be avoided and the back filling shall be so done as not to increase the cost of future dredging for navigation. Any material to be deposited or dumped under this authorization, either in the waterway or on shore above high-water mark, shall be deposited or dumped at the locality shown on the drawing hereto attached, and, if so prescribed thereon, within or behind a good and substantial bulkhead or bulkheads, such as will prevent escape of the material in the waterway. If the material is to be deposited in the harbor of New York, or in its adjacent or tributary waters, or in Long Island Sound, a permit therefor must be previously obtained from the Supervisor of New York Harbor, New York City.

(c) That there shall be no unreasonable interference with navigation by the work herein authorized.

(d) That if inspections or any other operations by the United States are necessary in the interest of navigation, all expenses connected therewith shall be borne by the permittee.

(e) That no attempt shall be made by the permittee or the owner to forbid the full and free use by the public of all navigable waters at or adjacent to the work or structure.

(f) That if future operations by the United States require an alteration in the position of the structure or work herein authorized, or if, in the opinion of the Secretary of the Army, it shall cause unreasonable obstruction to the free navigation of said water, the owner will be required upon due notice from the Secretary of the Army, to remove or alter the structural work or obstructions caused thereby without expense to the United States, so as to render navigation reasonably free, easy, and unobstructed; and if, upon the expiration or revocation of this permit, the structure, fill, excavation, or other modification of the watercourse hereby authorized shall not be completed, the owners shall, without expense to the United States, and to such extent and in such time and manner as the Secretary of the Army may require, remove all or any portion of the uncompleted structure or fill and restore to its former condition the navigable capacity of the watercourse. No claim shall be made against the United States on account of any such removal or alteration.

(g) That the United States shall in no case be liable for any damage or injury to the structure or work herein authorized which may be caused by or result from future operations undertaken by the Government for the conservation or improvement of navigation, or for other purposes, and no claim or right to compensation shall accrue from any such damage.

(h) That if the display of lights and signals on any work hereby authorized is not otherwise provided for by law, such lights and signals as may be prescribed by the U. S. Coast Guard, shall be installed and maintained by and at the expense of the owner.

(i) That the permittee shall notify the said district engineer at what time the work will be commenced, and as far in advance of the time of commencement as the said district engineer may specify, and shall also notify him promptly, in writing, of the commencement of work, suspension of work, if for a period of more than one week, resumption of work, and its completion.

(j) That if the structure or work herein authorized is not completed on or before the 31st day of December, 1961, this permit, if not previously revoked or specifically extended, shall cease and be null and void.

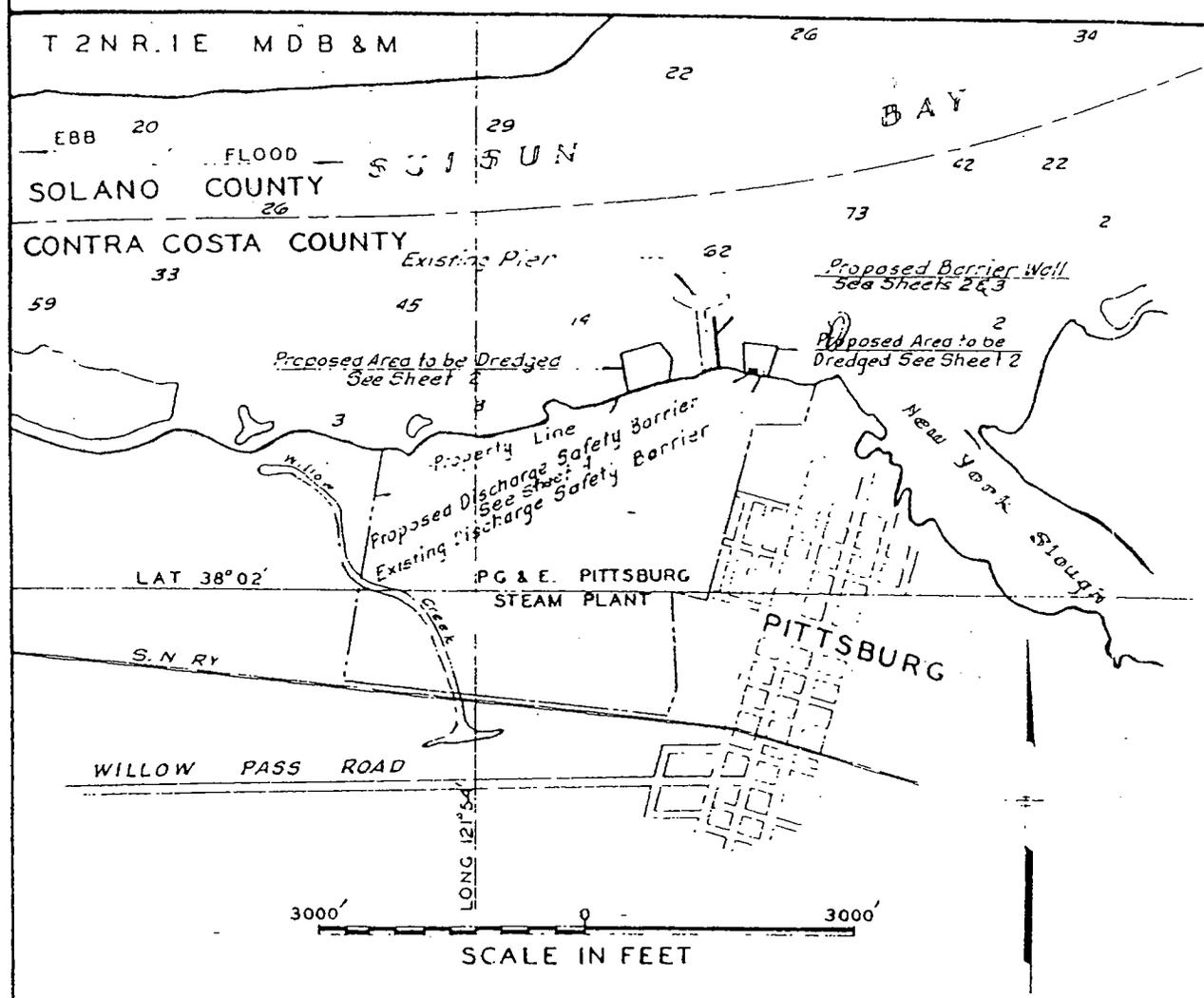
By authority of the Secretary of the Army:



A. E. McCOLLAM
Colonel, CE
District Engineer

103318

103318



Soundings are in feet and refer to mean sea level.

Harbor lines are not established

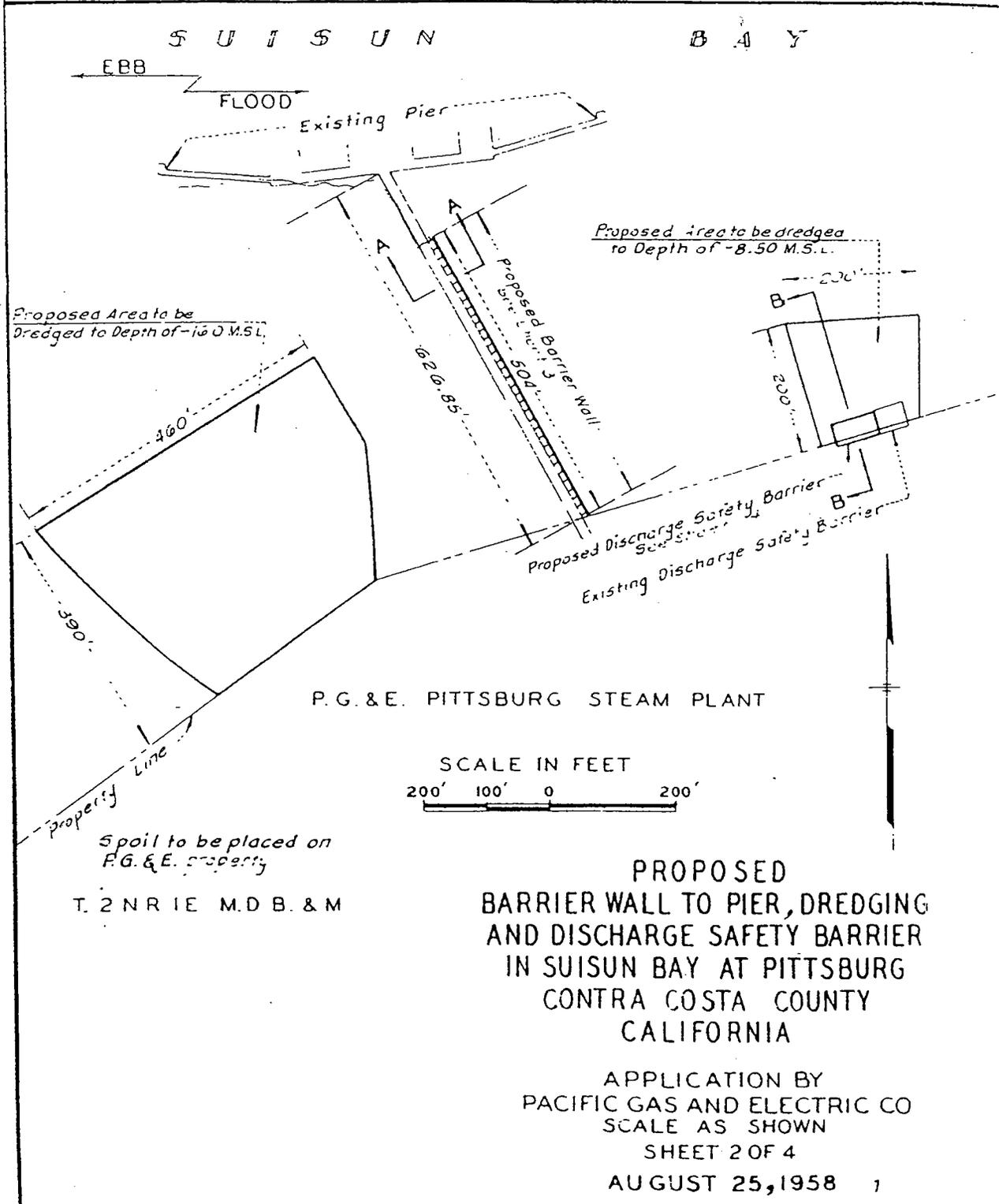
Site of work not within corporate limits of any municipality.

**PROPOSED
BARRIER WALL TO PIER, DREDGING
AND DISCHARGE SAFETY BARRIER
IN SUISUN BAY AT PITTSBURG
CONTRA COSTA COUNTY
CALIFORNIA**

APPLICATION BY
PACIFIC GAS AND ELECTRIC CO.
SCALE AS SHOWN

SHEET 1 OF 4
AUGUST 25, 1958

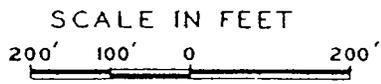
103318



Proposed Area to be Dredged to Depth of -10.0 M.S.L.

Proposed Area to be dredged to Depth of -8.50 M.S.L.

P.G. & E. PITTSBURG STEAM PLANT

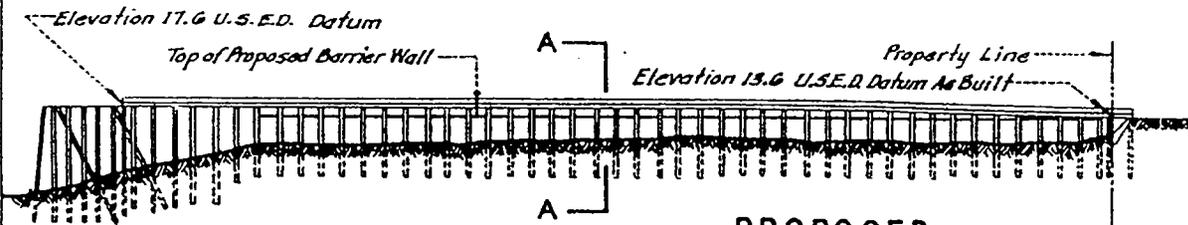
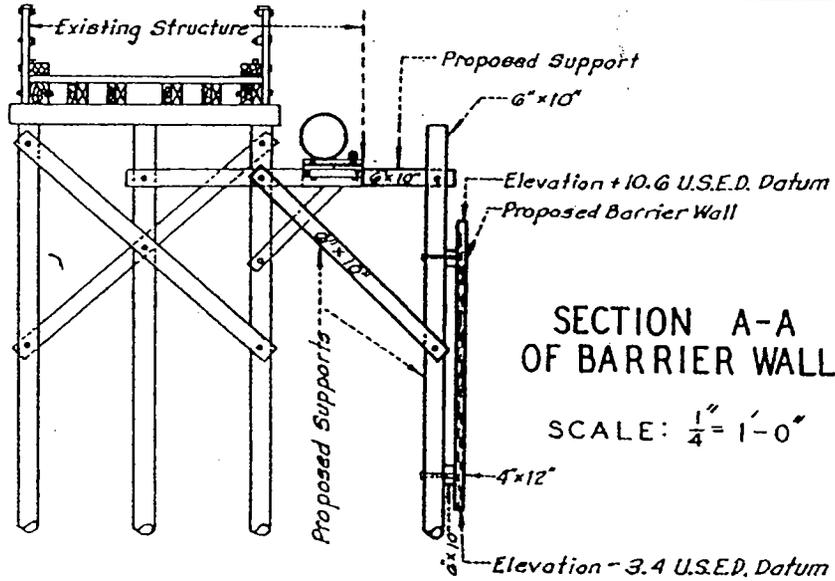


Spoil to be placed on P.G. & E. property
T. 2 N R 1 E M. D B. & M

PROPOSED
BARRIER WALL TO PIER, DREDGING
AND DISCHARGE SAFETY BARRIER
IN SUISUN BAY AT PITTSBURG
CONTRA COSTA COUNTY
CALIFORNIA

APPLICATION BY
PACIFIC GAS AND ELECTRIC CO
SCALE AS SHOWN
SHEET 2 OF 4
AUGUST 25, 1958

103318



ELEVATION OF PROPOSED
BARRIER WALL

100 50 0 100
SCALE: 1" = 100'

PROPOSED
BARRIER WALL TO PIER, DREDGING
AND DISCHARGE SAFETY BARRIER
IN SUISUN BAY AT PITTSBURG
CONTRA COSTA COUNTY
CALIFORNIA

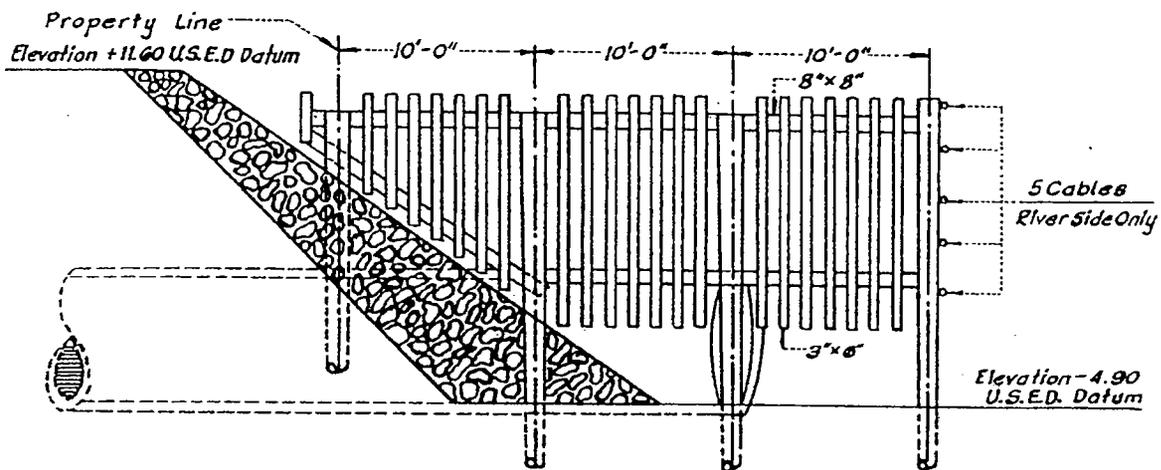
APPLICATION BY
PACIFIC GAS AND ELECTRIC CO.
SCALE AS SHOWN

SHEET 3 OF 4

AUGUST 25, 1958

103318

SECTION B-B
OF PROPOSED DISCHARGE
SAFETY BARRIER



SCALE $\frac{1}{8}'' = 1'-0''$

PROPOSED
BARRIER WALL TO PIER, DREDGING
AND DISCHARGE SAFETY BARRIER
IN SUISUN BAY AT PITTSBURG
CONTRA COSTA COUNTY
CALIFORNIA

APPLICATION BY
PACIFIC GAS AND ELECTRIC CO.
SCALE AS SHOWN

SHEET 4 OF 4

AUGUST 25, 1958

DEPARTMENT OF THE ARMY

303-331 A

NOTE.—It is to be understood that this instrument does not give any property rights either in real estate or material, or any exclusive privileges; and that it does not authorize any injury to private property or invasion of private rights, or any infringement of Federal, State, or local laws or regulations, nor does it obviate the necessity of obtaining State assent to the work authorized. It MERELY EXPRESSES THE ASSENT OF THE FEDERAL GOVERNMENT SO FAR AS CONCERNS THE PUBLIC RIGHTS OF NAVIGATION. (See *Cummings v. Chicago*, 188 U. S., 410.)

PERMIT
No. 3666

103318

Sacramento District
U. S. Army Corps of Engineers.
P.O. Box 1739, Sacramento, Calif.
30 September, 19 63

✓ Pacific Gas & Electric Company
245 Market Street
San Francisco, California

2102-01-0342

Gentlemen:

Referring to written request dated 29 August 1963,

I have to inform you that, upon the recommendation of the Chief of Engineers, and under the provisions of Section 10 of the Act of Congress approved March 3, 1899, entitled "An act making appropriations for the construction, repair, and preservation of certain public works on rivers and harbors, and for other purposes," you are hereby authorized by the Secretary of the Army.

to construct a timber barrier wall addition to existing pier and a timber guard wall addition to intake structure,

in Suisun Bay,

at Pittsburg, California,

in accordance with the plans shown on the drawing attached hereto marked:

"Barrier Wall Addition to Existing Pier and Modification to Existing Intake Structure in Suisun Bay at Pittsburg, Contra Costa County, Calif."

subject to the following conditions:

103318

(a) That the work shall be subject to the supervision and approval of the District Engineer, Corps of Engineers, in charge of the locality, who may temporarily suspend the work at any time, if in his judgment the interests of navigation so require.

(b) That any material dredged in the prosecution of the work herein authorized shall be removed evenly and no large refuse piles, ridges across the bed of the waterway, or deep holes that may have a tendency to cause injury to navigable channels or to the banks of the waterway shall be left. If any pipe, wire, or cable hereby authorized is laid in a trench, the formation of permanent ridges across the bed of the waterway shall be avoided and the back filling shall be so done as not to increase the cost of future dredging for navigation. Any material to be deposited or dumped under this authorization, either in the waterway or on shore above high-water mark, shall be deposited or dumped at the locality shown on the drawing hereto attached, and, if so prescribed thereon, within or behind a good and substantial bulkhead or bulkheads, such as will prevent escape of the material in the waterway. If the material is to be deposited in the harbor of New York, or in its adjacent or tributary waters, or in Long Island Sound, a permit therefor must be previously obtained from the Supervisor of New York Harbor, New York City.

(c) That there shall be no unreasonable interference with navigation by the work herein authorized.

(d) That if inspections or any other operations by the United States are necessary in the interest of navigation, all expenses connected therewith shall be borne by the permittee.

(e) That no attempt shall be made by the permittee or the owner to forbid the full and free use by the public of all navigable waters at or adjacent to the work or structure.

(f) That if future operations by the United States require an alteration in the position of the structure or work herein authorized, or if, in the opinion of the Secretary of the Army, it shall cause unreasonable obstruction to the free navigation of said water, the owner will be required upon due notice from the Secretary of the Army, to remove or alter the structural work or obstructions caused thereby without expense to the United States, so as to render navigation reasonably free, easy, and unobstructed; and if, upon the expiration or revocation of this permit, the structure, fill, excavation, or other modification of the watercourse hereby authorized shall not be completed, the owners shall, without expense to the United States, and to such extent and in such time and manner as the Secretary of the Army may require, remove all or any portion of the uncompleted structure or fill and restore to its former condition the navigable capacity of the watercourse. No claim shall be made against the United States on account of any such removal or alteration.

(g) That the United States shall in no case be liable for any damage or injury to the structure or work herein authorized which may be caused by or result from future operations undertaken by the Government for the conservation or improvement of navigation, or for other purposes, and no claim or right to compensation shall accrue from any such damage.

(h) That if the display of lights and signals on any work hereby authorized is not otherwise provided for by law, such lights and signals as may be prescribed by the U. S. Coast Guard, shall be installed and maintained by and at the expense of the owner.

(i) That the permittee shall notify the said district engineer at what time the work will be commenced, and as far in advance of the time of commencement as the said district engineer may specify, and shall also notify him promptly, in writing, of the commencement of work, suspension of work, if for a period of more than one week, resumption of work, and its completion.

(j) That if the structure or work herein authorized is not completed on or before the 31st day of December, 1966, this permit, if not previously revoked or specifically extended, shall cease and be null and void.

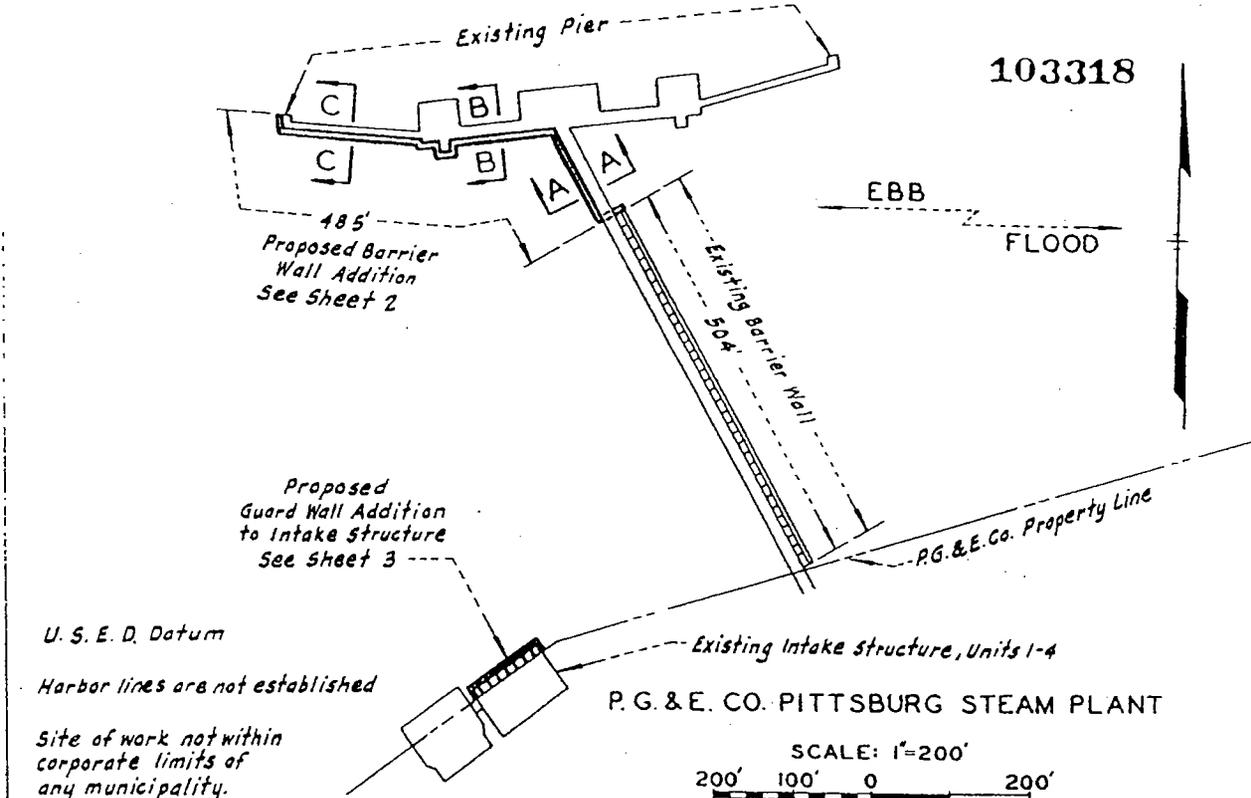
By authority of the Secretary of the Army:


C. R. TEAGLE
Lt Col, CE
Acting District Engineer

T.2 N. R.I.E. M.D.B. & M.

SUISUN BAY

103318

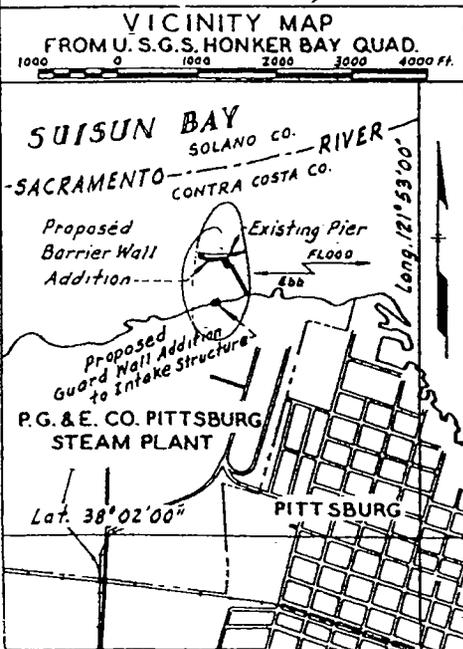
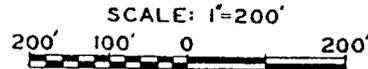


U. S. E. D. Datum

Harbor lines are not established

Site of work not within corporate limits of any municipality.

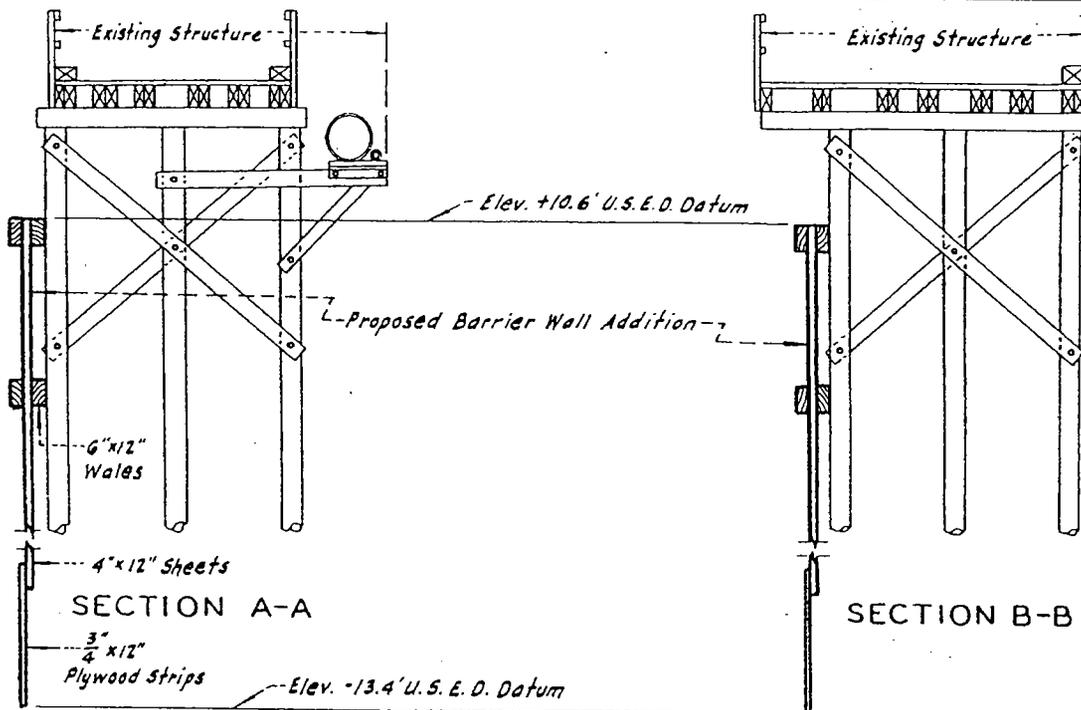
P. G. & E. CO. PITTSBURG STEAM PLANT



PROPOSED BARRIER WALL ADDITION TO EXISTING PIER AND MODIFICATION TO EXISTING INTAKE STRUCTURE IN SUISUN BAY AT PITTSBURG CONTRA COSTA COUNTY CALIFORNIA

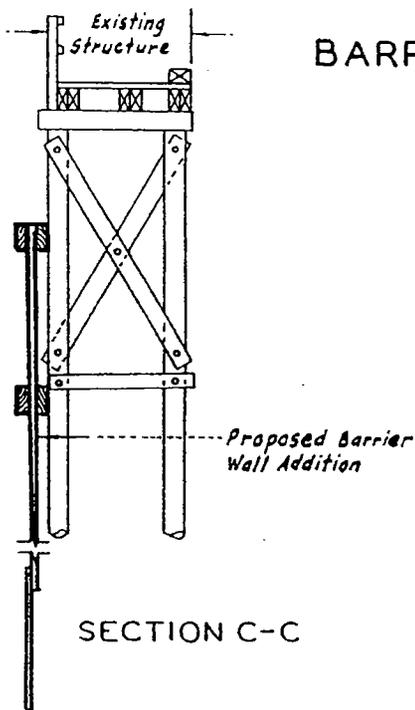
APPLICATION BY
PACIFIC GAS AND ELECTRIC CO.
SCALE AS SHOWN
SHEET 1 OF 3
AUGUST 29, 1963

103318



BARRIER WALL SECTIONS

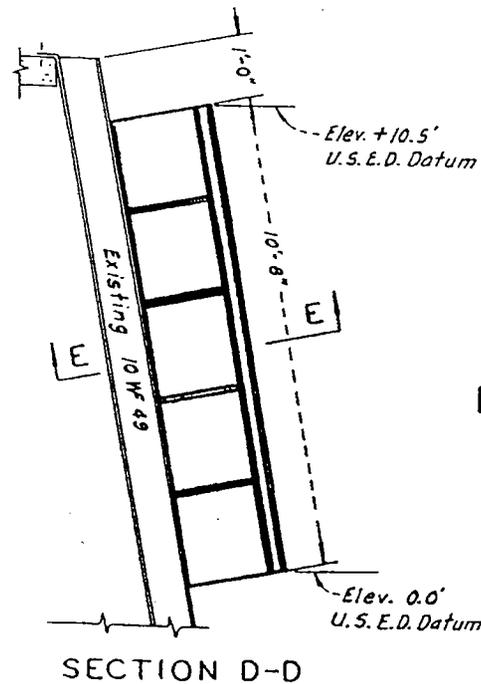
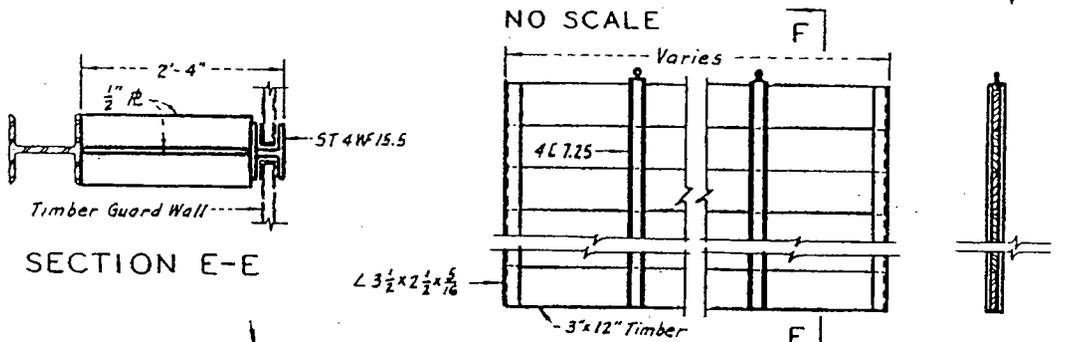
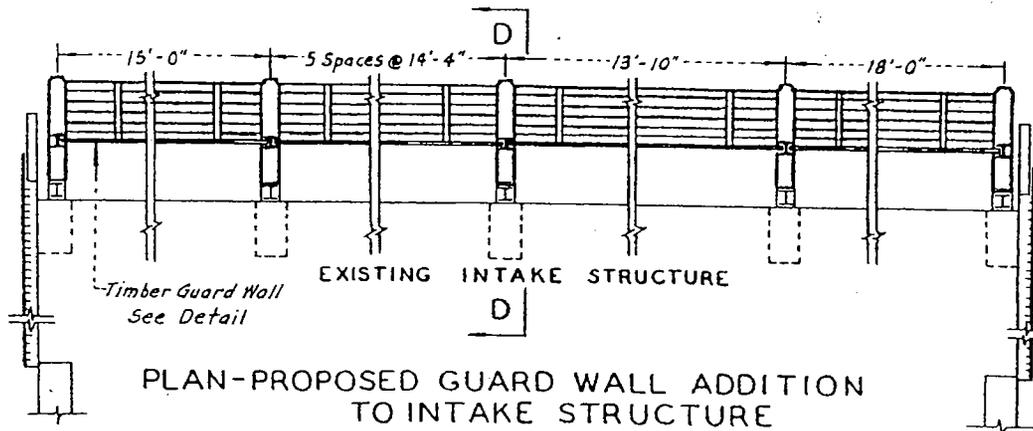
SCALE: $\frac{1}{8}'' = 1'-0''$



PROPOSED
BARRIER WALL ADDITION
TO EXISTING PIER AND
MODIFICATION TO EXISTING
INTAKE STRUCTURE
IN SUISUN BAY AT PITTSBURG
CONTRA COSTA COUNTY
CALIFORNIA

APPLICATION BY
PACIFIC GAS AND ELECTRIC CO.
SCALE AS SHOWN
SHEET 2 OF 3
AUGUST 29, 1963

103318



PROPOSED
BARRIER WALL ADDITION
TO EXISTING PIER AND
MODIFICATION TO EXISTING
INTAKE STRUCTURE
IN SUISUN BAY AT PITTSBURG
CONTRA COSTA COUNTY
CALIFORNIA

APPLICATION BY
PACIFIC GAS AND ELECTRIC CO.
SCALE AS SHOWN

SHEET 3 OF 3

AUGUST 29, 1963

2102-01-1027

Application No. <u>PN 74-129-99(a)</u>	U. S. Army Engineer District
Name of Applicant <u>Pacific Gas and Electric Company</u>	San Francisco Corps of Engineers
Effective Date _____	100 McAllister Street
Expiration Date _____	San Francisco, California 94102

Pittsburg - Fuel Dock Modifications

DEPARTMENT OF THE ARMY

103318

PERMIT

Referring to written request dated 10 July 1974 for a permit to:

(XX) Perform work in or affecting navigable waters of the United States, upon the recommendation of the Chief of Engineers, pursuant to Section 10 of the Rivers and Harbors Act of March 3, 1899 (33 U.S.C. 403);

(XX) Discharge dredged or fill material into navigable waters upon the issuance of a permit from the Secretary of the Army acting through the Chief of Engineers pursuant to Section 404 of the Federal Water Pollution Control Act (86 Stat. 816, P.L. 92-500);

() Transport dredged material for the purpose of dumping it into ocean waters upon the issuance of a permit from the Secretary of the Army acting through the Chief of Engineers pursuant to Section 103 of the Marine Protection, Research and Sanctuaries Act of 1972 (86 Stat. 1052; P.L. 92-532);

Pacific Gas and Electric Company
77 Beale Street
San Francisco, CA 94106

is hereby authorized by the Secretary of the Army: to perform hydraulic dredging of approximately 49,000 cubic yards of bottom material (all material will be transported by pipeline and deposited in a retention pond on the permittee's property), construct additional facilities at the existing fuel-unloading dock, construct new settling pond dikes, and increase the crown of existing dikes in the disposal site as needed,

in Suisun Bay

at Contra Costa County near Pittsburg, California, located approximately 0.5 statute mile westerly from the entrance to New York Slough,

in accordance with the plans and drawings attached hereto which are incorporated in and made a part of this permit, entitled: "Proposed Dredging, Barge Dock, Catwalk and Pipeline in Suisun Bay at Pittsburg, Contra Costa County, California, Application By: Pacific Gas and Electric Co., 17 June 1974" (in 8 Sheets)

Subject to the following conditions:

P. G. & E. CO.
COPY

12/1

I. General conditions:

103318

a. That all activities identified and authorized herein shall be consistent with the terms and conditions of this permit; and that any activities not specifically identified and authorized herein shall constitute a violation of the terms and conditions of this permit which may result in the modification, suspension or revocation of this permit, in whole or in part, as set forth more specifically in General Conditions j or k hereto, and in the institution of such legal proceedings as the United States Government may consider appropriate, whether or not this permit has been previously modified, suspended or revoked in whole or in part.

b. That all activities authorized herein shall, if they involve a discharge or deposit into navigable waters or ocean waters, be at all times consistent with applicable water quality standards, effluent limitations and standards of performance, prohibitions, and pretreatment standards established pursuant to Sections 301, 302, 306 and 307 of the Federal Water Pollution Control Act of 1972 (P.L. 92-500; 86 Stat. 816), or pursuant to applicable State and local law.

c. That when the activity authorized herein involves a discharge or deposit of dredged or fill material into navigable waters, the authorized activity shall, if applicable water quality standards are revised or modified during the term of this permit, be modified, if necessary, to conform with such revised or modified water quality standards within 6 months of the effective date of any revision or modification of water quality standards, or as directed by an implementation plan contained in such revised or modified standards, or within such longer period of time as the District Engineer, in consultation with the Regional Administrator of the Environmental Protection Agency, may determine to be reasonable under the circumstances.

d. That the permittee agrees to make every reasonable effort to prosecute the construction or work authorized herein in a manner so as to minimize any adverse impact of the construction or work on fish, wildlife and natural environmental values.

e. That the permittee agrees to accomplish the construction or work authorized herein in a manner so as to minimize any degradation of water quality.

f. That the permittee shall permit the District Engineer or his authorized representative(s) or designee(s) to make periodic inspections at any time deemed necessary in order to assure that the activity being performed under authority of this permit is in accordance with the terms and conditions prescribed herein.

g. That the permittee shall maintain the structure or work authorized herein in good condition and in accordance with the plans and drawings attached hereto.

h. That this permit does not convey any property rights, either in real estate or material, or any exclusive privileges; and that it does not authorize any injury to property or invasion of rights or any infringement of Federal, State, or local laws or regulations, nor does it obviate the requirement to obtain State or local assent required by law for the activity authorized herein.

103318

i. That this permit does not authorize the interference with any existing or proposed Federal project and that the permittee shall not be entitled to compensation for damage or injury to the structures or work authorized herein which may be caused by or result from existing or future operations undertaken by the United States in the public interest.

j. That this permit may be summarily suspended, in whole or in part, upon a finding by the District Engineer that immediate suspension of the activity authorized herein would be in the general public interest. Such suspension shall be effective upon receipt by the permittee of a written notice thereof which shall indicate (1) the extent of the suspension, (2) the reasons for this action, and (3) any corrective or preventative measures to be taken by the permittee which are deemed necessary by the District Engineer to abate imminent hazards to the general public interest. The permittee shall take immediate action to comply with the provisions of this notice. Within ten days following receipt of this notice of suspension, the permittee may request a hearing in order to present information relevant to a decision as to whether his permit should be reinstated, modified or revoked. If a hearing is requested, it shall be conducted pursuant to procedures prescribed by the Chief of Engineers. After completion of the hearing, or within a reasonable time after issuance of the suspension notice to the permittee if no hearing is requested, the permit will either be reinstated, modified or revoked.

k. That this permit may be either modified, suspended or revoked in whole or in part if the Secretary of the Army or his authorized representative determines that there has been a violation of any of the terms or conditions of this permit or that such action would otherwise be in the public interest. Any such modification, suspension, or revocation shall become effective 30 days after receipt by the permittee of written notice of such action which shall specify the facts or conduct warranting same unless (1) within the 30-day period the permittee is able to satisfactorily demonstrate that (a) the alleged violation of the terms and the conditions of this permit did not, in fact, occur or (b) the alleged violation was accidental, and the permittee has been operating in compliance with the terms and conditions of the permit and is able to provide satisfactory assurances that future operations shall be in full compliance with the terms and conditions of this permit; or (2) within the aforesaid 30-day period, the permittee requests that a public hearing be held to present oral and written evidence concerning the proposed modification, suspension or revocation. The conduct of this hearing and the procedures for making a final decision either to modify, suspend or revoke this permit in whole or in part shall be pursuant to procedures prescribed by the Chief of Engineers.

l. That in issuing this permit, the Government has relied on the information and data which the permittee has provided in connection with his permit application. If, subsequent to the issuance of this permit, such information and data prove to be false, incomplete or inaccurate, this permit may be modified, suspended or revoked, in whole or in part, and/or the Government may, in addition, institute appropriate legal proceedings.

103318

m. That any modification, suspension, or revocation of this permit shall not be the basis for any claim for damages against the United States.

n. That the permittee shall notify the District Engineer at what time the activity authorized herein will be commenced, as far in advance of the time of commencement as the District Engineer may specify, and of any suspension of work, if for a period of more than one week, resumption of work and its completion.

o. That if the activity authorized herein is not started on or before 31st day of October 1975, (one year from the date of issuance of this permit unless otherwise specified) and is not completed on or before 31st day of October 1977, (three years from the date of issuance of this permit unless otherwise specified) this permit, if not previously revoked or specifically extended, shall automatically expire.

p. That no attempt shall be made by the permittee to prevent the full and free use by the public of all navigable waters at or adjacent to the activity authorized by this permit.

q. That if the display of lights and signals on any structure or work authorized herein is not otherwise provided for by law, such lights and signals as may be prescribed by the United States Coast Guard shall be installed and maintained by and at the expense of the permittee.

r. That this permit does not authorize or approve the construction of particular structures, the authorization or approval of which may require authorization by the Congress or other agencies of the Federal Government.

s. That if and when the permittee desires to abandon the activity authorized herein, unless such abandonment is part of a transfer procedure by which the permittee is transferring his interests herein to a third party pursuant to General Condition v hereof, he must restore the area to a condition satisfactory to the District Engineer.

t. That if the recording of this permit is possible under applicable State or local law, the permittee shall take such action as may be necessary to record this permit with the Register of Deeds or other appropriate official charged with the responsibility for maintaining records of title to and interests in real property.

u. That there shall be no unreasonable interference with navigation by the existence or use of the activity authorized herein.

v. That this permit may not be transferred to a third party without prior written notice to the District Engineer, either by the transferee's written agreement to comply with all terms and conditions of this permit or by the transferee subscribing to this permit in the space provided below and thereby agreeing to comply with all terms and conditions of this permit. In addition, if the permittee transfers the interests authorized herein by conveyance of realty, the deed shall reference this permit and the terms and conditions specified herein and this permit shall be recorded along with the deed with the Register of Deeds or other appropriate official.

P. G. & E. CO.
COPY

103318

II. SPECIAL CONDITIONS:

NONE

This permit shall become effective on the date of the District Engineer's signature.

Permittee hereby accepts and agrees to comply with the terms and conditions of this permit.

November 5, 1974
Date

[Signature]
Permittee R. W. O'NEILL Director of Land Acquisition

BY AUTHORITY OF THE SECRETARY OF THE ARMY:

12 Nov 74
Date

[Signature]
District Engineer
H. A. FLERTHEIM, JR.
Colonel, Corps of Engineers

Transferee hereby agrees to comply with the terms and conditions of this permit.

April 13, 1999
Date

[Signature]
Southern Energy Delta, LLC
a Delaware limited liability company
By: [Signature]
Transferee Randall E. Harrison, President

P. G. & E. CO.
COPY

103318

62-4203 2-73 (Corporation)

STATE OF CALIFORNIA
 City and County of San Francisco } ss.
 On this 5 day of November, in the year 19 74, before me, Lucille Mullen
 a Notary Public in and for the said City and County, duly commissioned and sworn, personally appeared

R. W. O'Neill
 known to me to be the Director of Land Acquisition

of the corporation that executed the within instrument, and to be the person... who executed the
 said instrument on behalf of said corporation therein named, and acknowledged to me that such
 corporation executed the within instrument pursuant to its by-laws or a resolution of its board of
 directors.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed my official seal in the
 City and County of San Francisco, the day and
 year in this certificate first above written.

Lucille Mullen

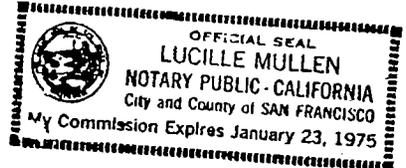


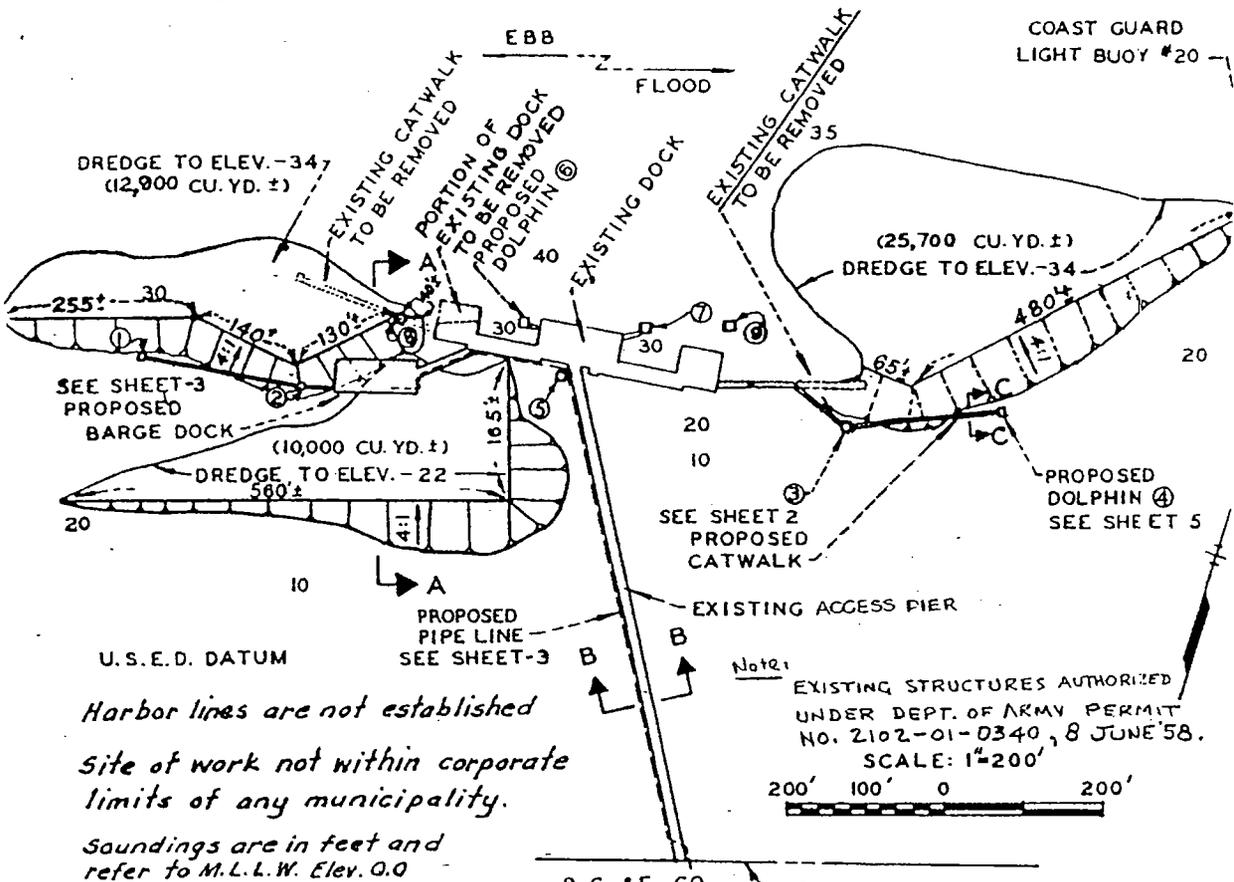
FIG. 1

103318

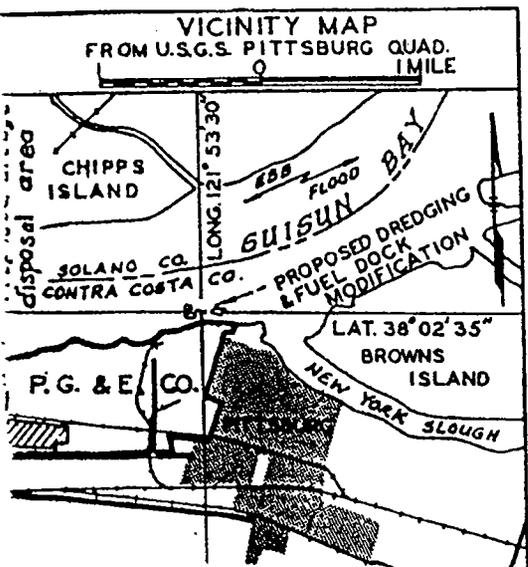
PN 74-129-99(a)

T.2N. R.1E.M.D.B.&M.
(S.W. 1/4 SEC. 5)

SUISUN BAY



Harbor lines are not established
 Site of work not within corporate limits of any municipality.
 Soundings are in feet and refer to M.L.L.W. Elev. 0.0



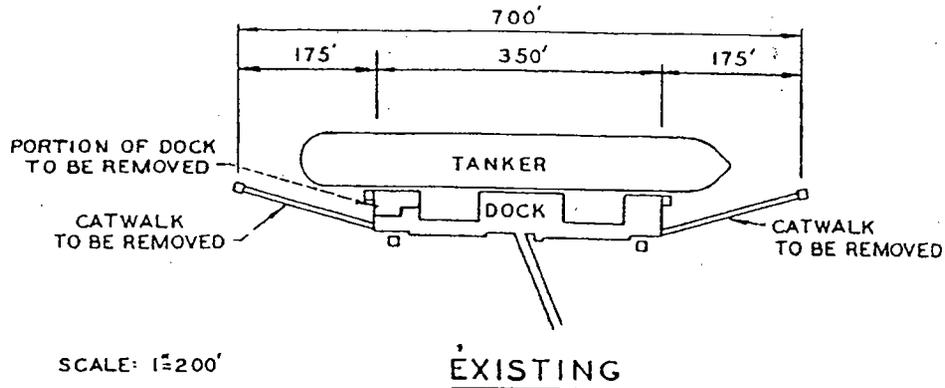
P. G. & E. CO.
 PITTSBURG
 STEAM PLANT

PROPOSED DREDGING, BARGE DOCK, CATWALK AND PIPE LINE IN SUISUN BAY AT PITTSBURG CONTRA COSTA COUNTY CALIFORNIA

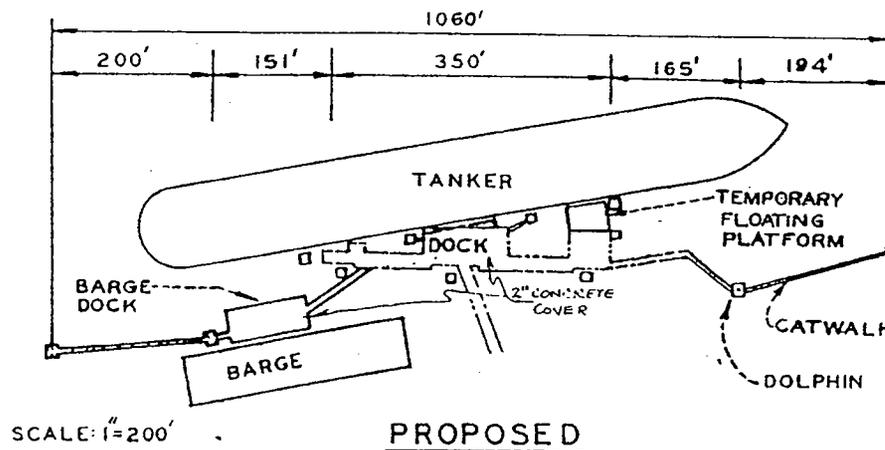
APPLICATION BY
 PACIFIC GAS AND ELECTRIC CO.
 SCALE AS SHOWN
 SHEET 1 OF 8
 JUNE 17, 1974

103318

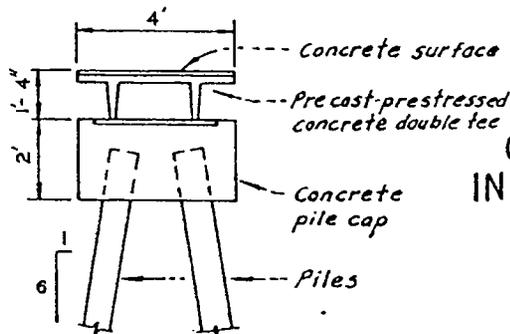
PN74-129-99(a)



EXISTING



PROPOSED



TYPICAL CATWALK-SECTION C-C

SCALE: 1/4" = 1'-0"

PROPOSED
DREDGING, BARGE DOCK,
CATWALK AND PIPE LINE
IN SUISUN BAY AT PITTSBURG
CONTRA COSTA COUNTY
CALIFORNIA

APPLICATION BY
PACIFIC GAS AND ELECTRIC CO.

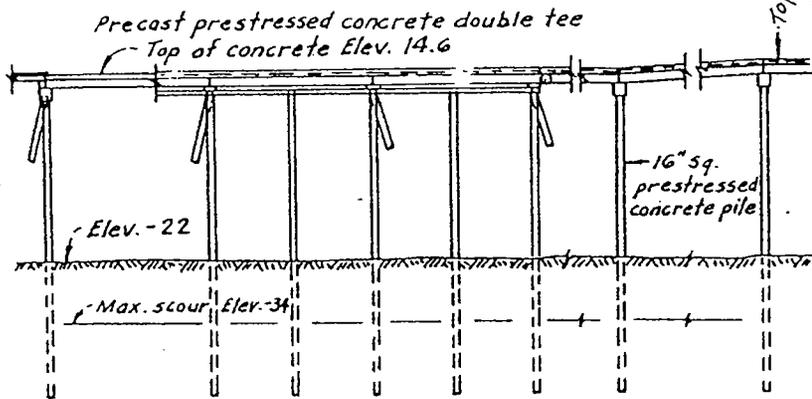
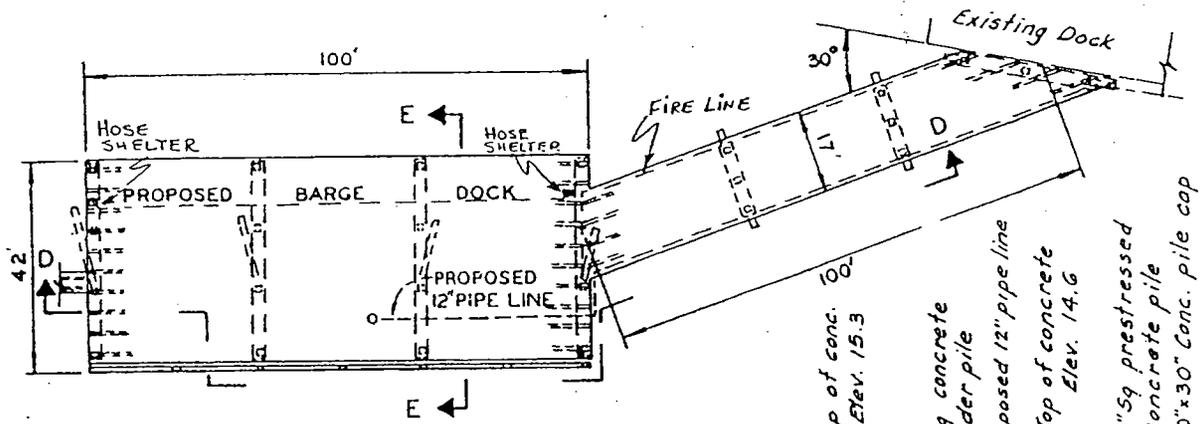
SCALE AS SHOWN

SHEET 2 OF 8

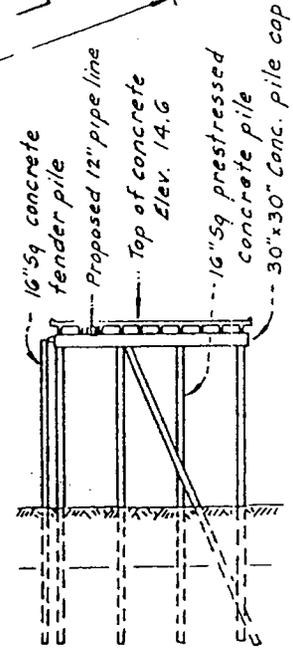
JUNE 17, 1974

103318

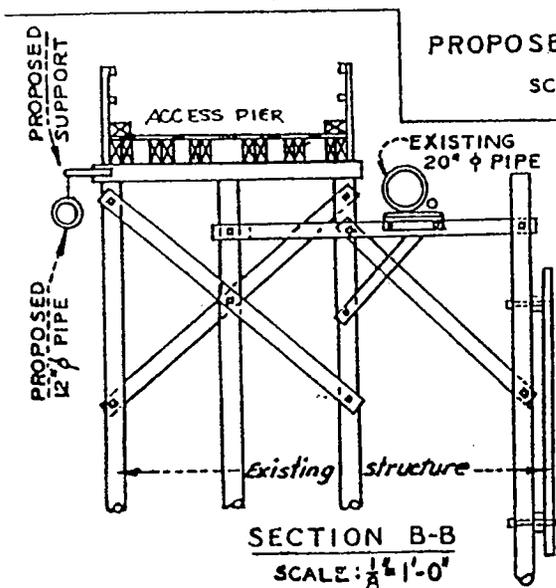
PN 74-129-99(a)



SECTION D-D



SECTION E-E



SECTION B-B
SCALE: 1/8" = 1'-0"

PROPOSED BARGE DOCK

SCALE: 1/32" = 1'-0"

PROPOSED
DREDGING, BARGE DOCK,
CATWALK AND PIPE LINE
IN SUISUN BAY AT PITTSBURG
CONTRA COSTA COUNTY
CALIFORNIA

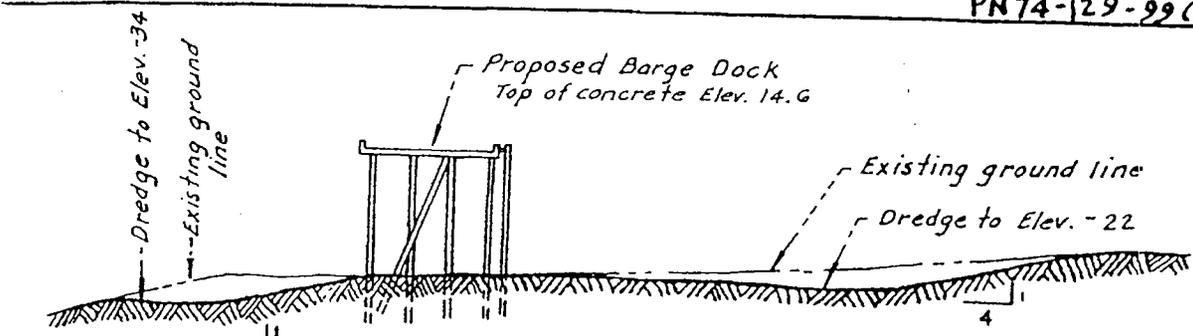
APPLICATION BY
PACIFIC GAS AND ELECTRIC CO.
SCALE AS SHOWN

SHEET 3 OF 8
JUNE 17, 1974

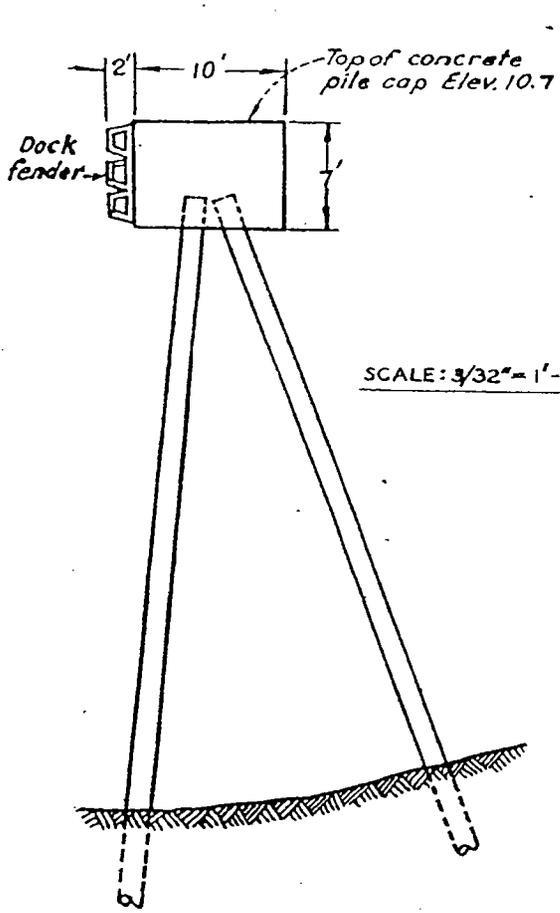
FIG. 7

103318

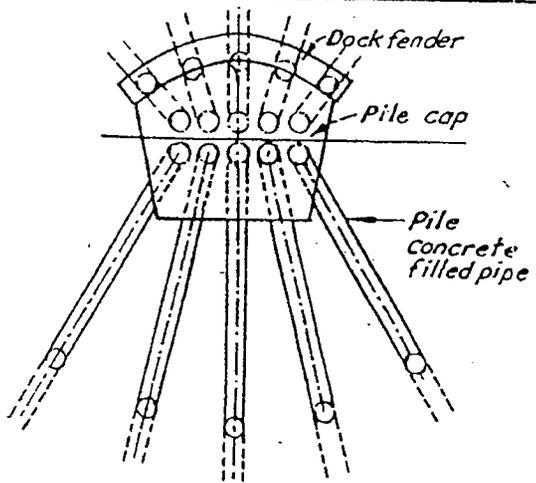
PN74-129-99(a)



SECTION A-A
SCALE: 1"=50'



ELEVATION-DOLPHIN NO. 8&9



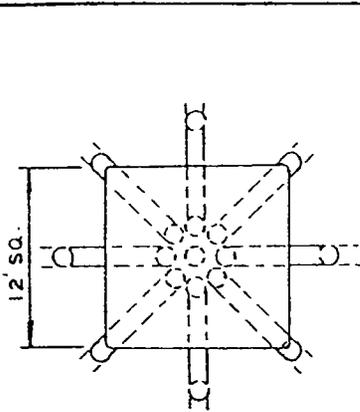
PLAN-DOLPHIN NO. 8&9

PROPOSED
DREDGING, BARGE DOCK,
CATWALK AND PIPE LINE
IN SUISUN BAY AT PITTSBURG
CONTRA COSTA COUNTY
CALIFORNIA

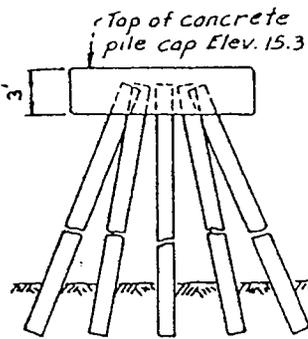
APPLICATION BY
PACIFIC GAS AND ELECTRIC CO.
SCALE AS SHOWN
SHEET 4 OF 8
JUNE 17, 1974

103318

PN 74-129-99 (a)

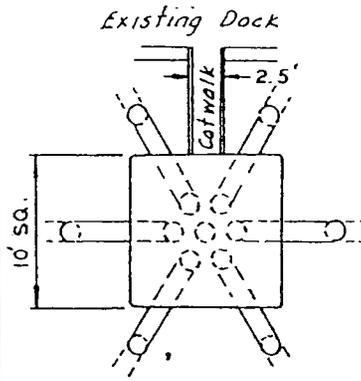


PLAN

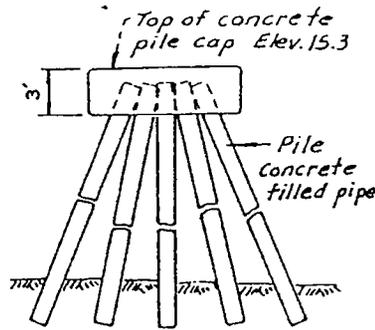


ELEVATION

TYPICAL DOLPHIN NO. 1, 3 & 4

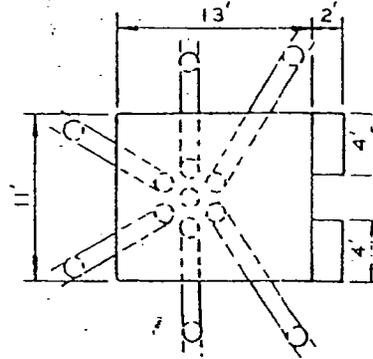


PLAN

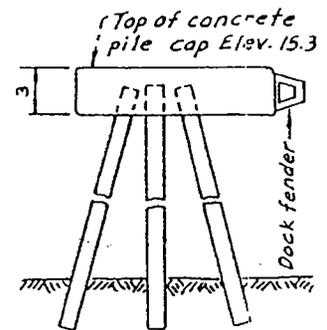


ELEVATION

DOLPHIN NO. 5



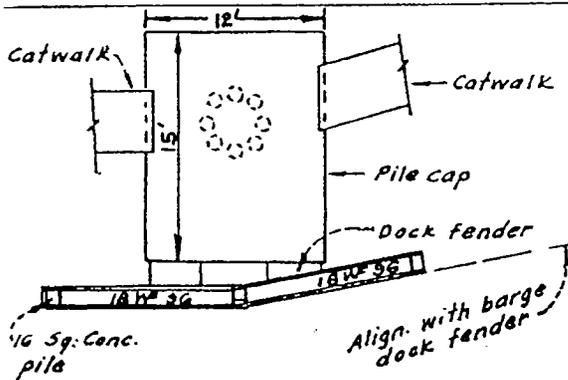
PLAN



ELEVATION

DOLPHIN NO. 6 & 7

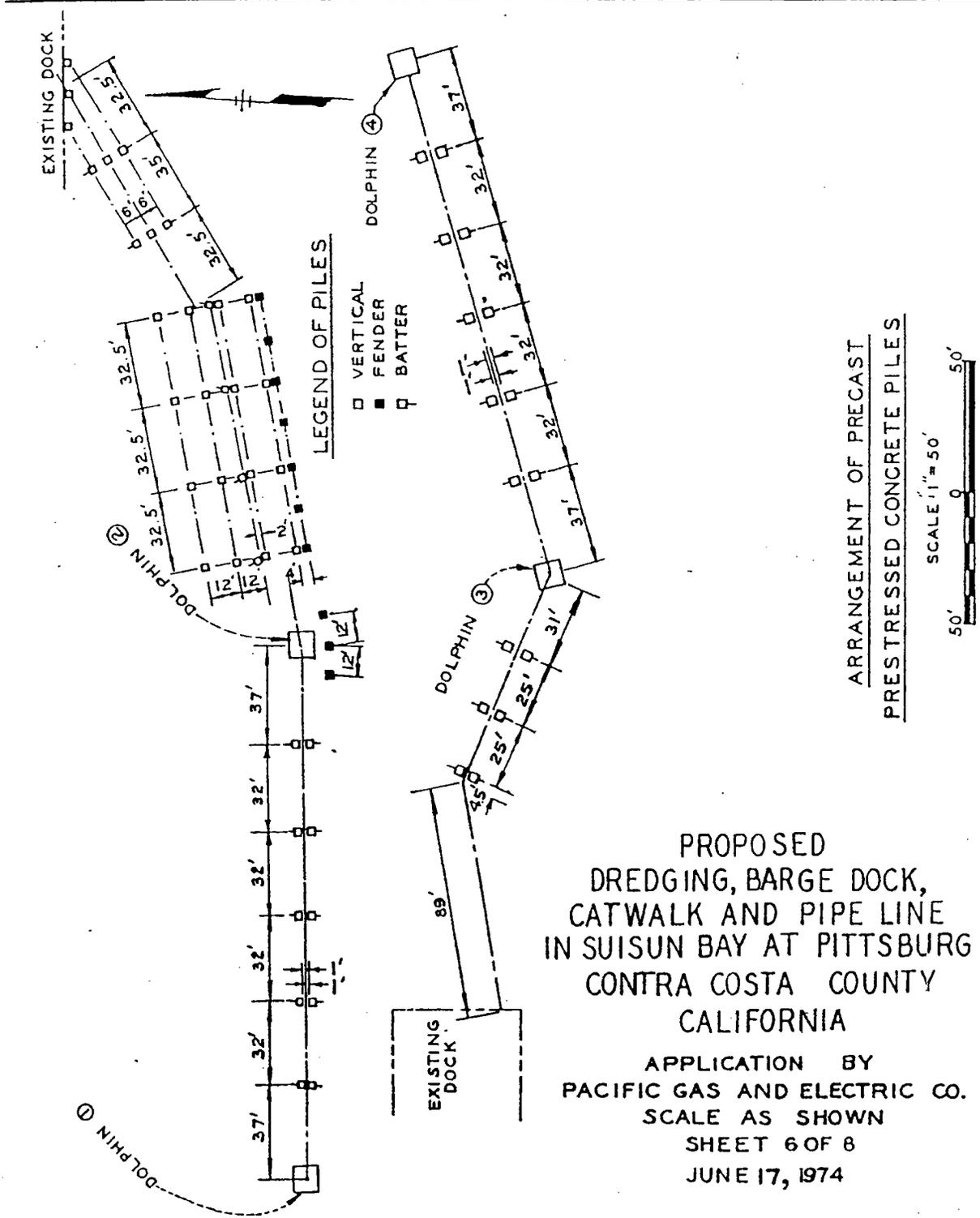
SCALE: 3/32" = 1'-0"



PLAN-DOLPHIN NO. 2

**PROPOSED
DREDGING, BARGE DOCK,
CATWALK AND PIPE LINE
IN SUISUN BAY AT PITTSBURG
CONTRA COSTA COUNTY
CALIFORNIA**

APPLICATION BY
PACIFIC GAS AND ELECTRIC CO.
SCALE AS SHOWN
SHEET 5 OF 8
JUNE 17, 1974



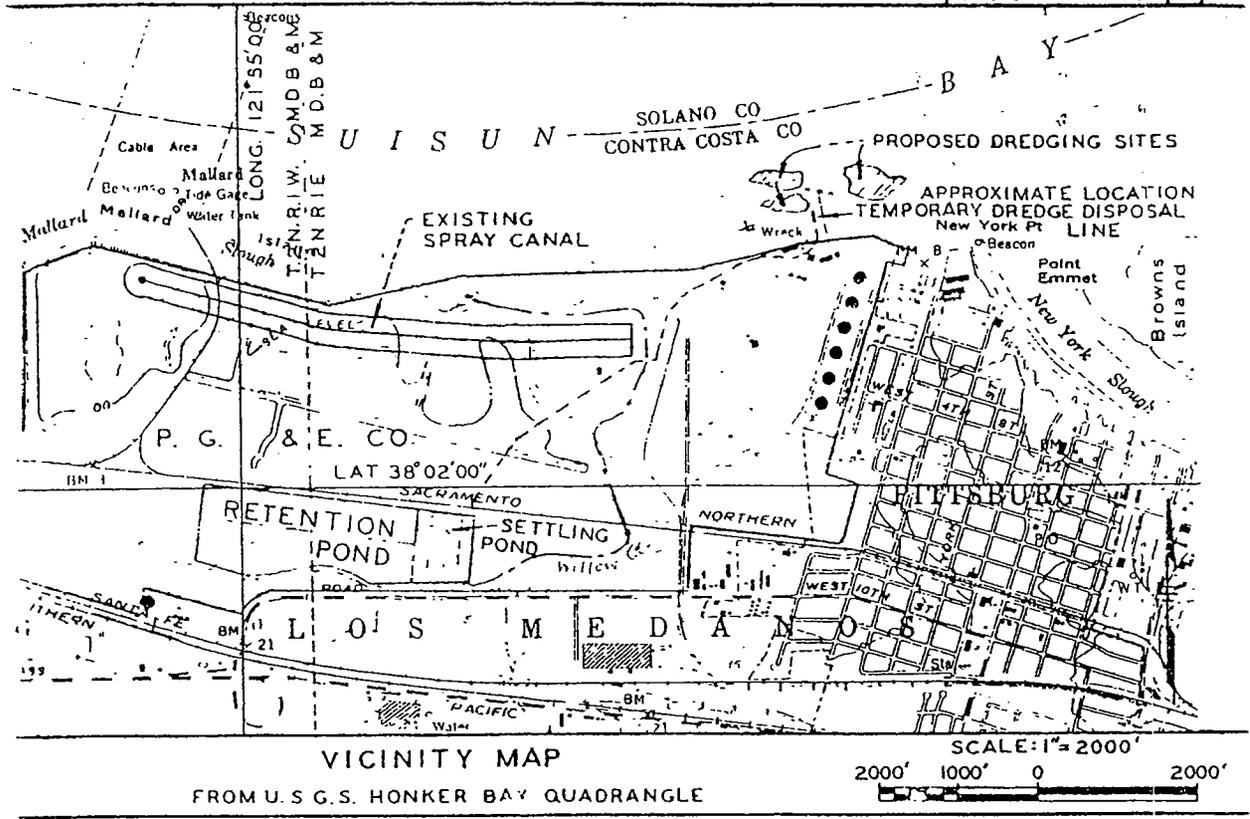
PROPOSED
 DREDGING, BARGE DOCK,
 CATWALK AND PIPE LINE
 IN SUISUN BAY AT PITTSBURG
 CONTRA COSTA COUNTY
 CALIFORNIA

APPLICATION BY
 PACIFIC GAS AND ELECTRIC CO.
 SCALE AS SHOWN
 SHEET 6 OF 8
 JUNE 17, 1974

FIG. 7

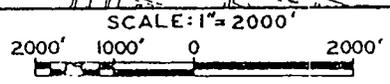
103318

PN 74-129-99(a)

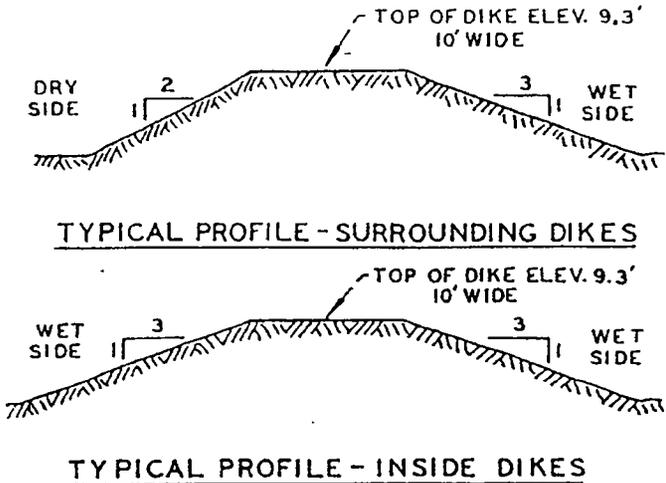


VICINITY MAP

FROM U.S.G.S. HONKER BAY QUADRANGLE



DATUM: M.L.L.W.=ELEV. 0.00'



SCALE: 1" = 10'

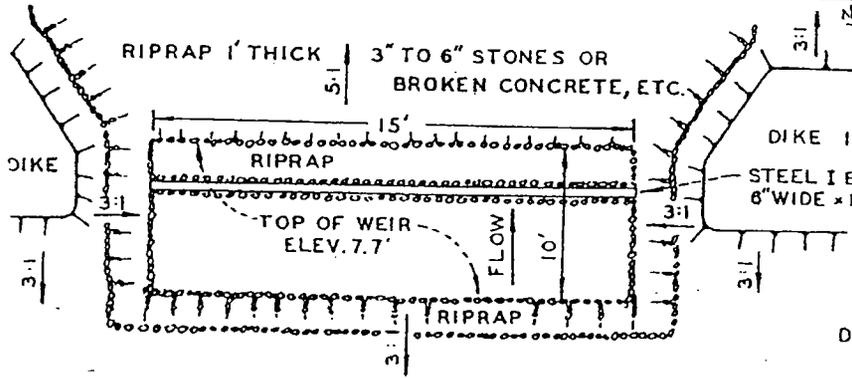
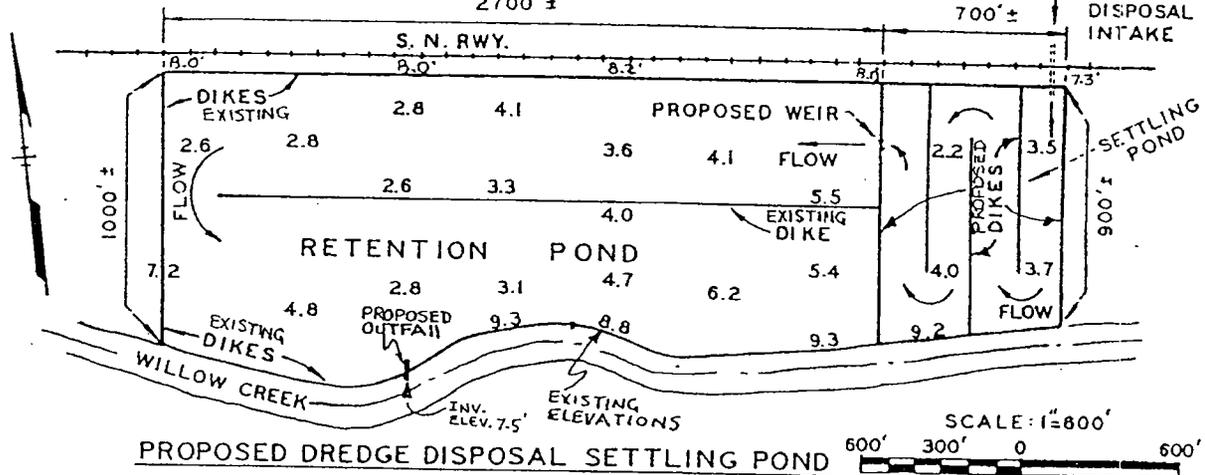
PROPOSED
 DREDGE DISPOSAL
 FOR MODIFIED DOCK
 1 MILE W. OF PITTSBURG
 CONTRA COSTA COUNTY
 CALIFORNIA
 APPLICATION BY
 PACIFIC GAS AND ELECTRIC CO.

SCALE AS SHOWN
 SHEET 7 OF 8 SHEETS
 JUNE 28, 1974

103318

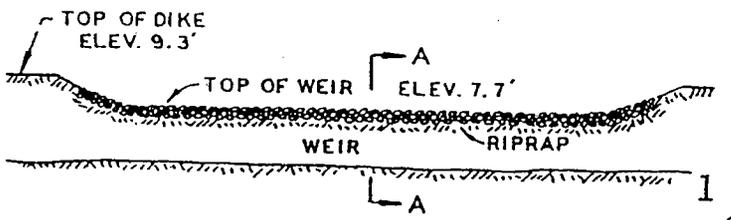
PN 74-129-99 (a)

SOUNDINGS ARE IN FEET AND TENTHS AND REFER TO M.L.L.W. = ELEV. 0.0

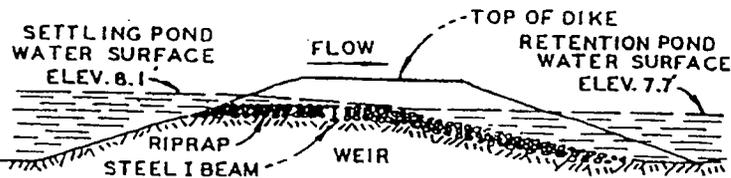


PLAN: PROPOSED WEIR

SCALE: 1" = 10'



PROFILE: LOOKING WEST



SECTION A-A
LOOKING SOUTH

PROPOSED
DREDGE DISPOSAL
FOR MODIFIED DOCK
1 MILE W. OF PITTSBURG
CONTRA COSTA COUNTY
CALIFORNIA

APPLICATION BY
PACIFIC GAS AND ELECTRIC CO.

SCALE AS SHOWN
SHEET 8 OF 8 SHEETS

JUNE 28, 1974

Application No. 13459-59
Name of Applicant Pacific Gas and Electric Company
Effective Date JAN 11 1984
Expiration Date (If applicable) _____

103318
2102-01-1202

U. S. ARMY DIST. SAN FRANCISCO
CORPS OF ENGINEERS
77 BEALE STREET
SAN FRANCISCO CALIFORNIA 94106

DEPARTMENT OF THE ARMY
PERMIT

Referring to written request ^{rec'd} ~~2024~~ Oct. 13, 1983 for a permit to:

() Perform work in or affecting navigable waters of the United States, upon the recommendation of the Chief of Engineers, pursuant to Section 10 of the Rivers and Harbors Act of March 3, 1899 (33 U.S.C. 403);

() Discharge dredged or fill material into waters of the United States upon the issuance of a permit from the Secretary of the Army acting through the Chief of Engineers pursuant to Section 404 of the Clean Water Act (33 U.S.C. 1344);

() Transport dredged material for the purpose of dumping it into ocean waters upon the issuance of a permit from the Secretary of the Army acting through the Chief of Engineers pursuant to Section 103 of the Marine Protection, Research and Sanctuaries Act of 1972 (86 Stat. 1062; P.L. 92-532);

Pacific Gas and Electric Company
77 Beale Street
San Francisco, CA 94106

is hereby authorized by the Secretary of the Army:

to rebuild and improve the Contra Costa County Water Conservation District's levee on the east side of Mallard Slough intake channel to an elevation of 7.5 feet mean sea level (MSL) by excavating an approximate total of 4,400 cubic yards of material landward of the levee and from the adjacent channel by clamshell and dragline for use as fill on the levees

in Mallard Slough

at Pittsburg, Contra Costa County, California

in accordance with the plans and drawings attached hereto which are incorporated in and made a part of this permit (on drawings, give file number or other definite identification marks.)

"PROPOSED LEVEE REPAIR AT PITTSBURG POWER PLANT 1 MILE WEST OF PITTSBURG COUNTY OF CONTRA COSTA STATE OF CALIFORNIA APPLICATION BY PACIFIC GAS & ELECTRIC CO.," in two sheets dated September 1983

subject to the following conditions:

I. General Conditions:

a. That all activities identified and authorized herein shall be consistent with the terms and conditions of this permit; and that any activities not specifically identified and authorized herein shall constitute a violation of the terms and conditions of this permit which may result in the modification, suspension or revocation of this permit, in whole or in part, as set forth more specifically in General Conditions j or k hereto, and in the institution of such legal proceedings as the United States Government may consider appropriate, whether or not this permit has been previously modified, suspended or revoked in whole or in part.

ENG FORM 1721, Sep 82

EDITION OF 1 JUL 77 IS OBSOLETE

(ER 1144-8-303)

1



2

The following Special Conditions will be applicable when appropriate:

103318

STRUCTURES IN OR AFFECTING NAVIGABLE WATERS OF THE UNITED STATES:

- a. That this permit does not authorize the interference with any existing or proposed Federal project and that the permittee shall not be entitled to compensation for damage or injury to the structures or work authorized herein which may be caused by or result from existing or future operations undertaken by the United States in the public interest.
- b. That no attempt shall be made by the permittee to prevent the full and free use by the public of all navigable waters at or adjacent to the activity authorized by this permit.
- c. That if the display of lights and signals on any structure or work authorized herein is not otherwise provided for by law, such lights and signals as may be prescribed by the United States Coast Guard shall be installed and maintained by and at the expense of the permittee.
- d. That the permittee, upon receipt of a notice of revocation of this permit or upon its expiration before completion of the authorized structure or work, shall, without expense to the United States and in such time and manner as the Secretary of the Army or his authorized representative may direct, restore the waterway to its former conditions. If the permittee fails to comply with the direction of the Secretary of the Army or his authorized representative, the Secretary or his designee may restore the waterway to its former condition, by contract or otherwise, and recover the cost thereof from the permittee.
- e. Structures for Small Boats: That permittee hereby recognizes the possibility that the structure permitted herein may be subject to damage by wave wash from passing vessels. The issuance of this permit does not relieve the permittee from taking all proper steps to insure the integrity of the structure permitted herein and the safety of boats moored thereto from damage by wave wash and the permittee shall not hold the United States liable for any such damage.

MAINTENANCE DREDGING:

- a. That when the work authorized herein includes periodic maintenance dredging, it may be performed under this permit for N/A years from the date of issuance of this permit (ten years unless otherwise indicated);
- b. That the permittee will advise the District Engineer in writing at least two weeks before he intends to undertake any maintenance dredging.

DISCHARGES OF DREDGED OR FILL MATERIAL INTO WATERS OF THE UNITED STATES:

- a. That the discharge will be carried out in conformity with the goals and objectives of the EPA Guidelines established pursuant to Section 404(b) of the Clean Water Act and published in 40 CFR 230;
- b. That the discharge will consist of suitable material free from toxic pollutants in toxic amounts.
- c. That the fill created by the discharge will be properly maintained to prevent erosion and other non-point sources of pollution.

DISPOSAL OF DREDGED MATERIAL INTO OCEAN WATERS:

- a. That the disposal will be carried out in conformity with the goals, objectives, and requirements of the EPA criteria established pursuant to Section 102 of the Marine Protection, Research and Sanctuaries Act of 1972, published in 40 CFR 220-228.
- b. That the permittee shall place a copy of this permit in a conspicuous place in the vessel to be used for the transportation and/or disposal of the dredged material as authorized herein.

This permit shall become effective on the date of the District Engineer's signature.

Permittee hereby accepts and agrees to comply with the terms and conditions of this permit.

Peter K. Willerup ;

DEC 29 1983

NEIC CAS AND ELECTRIC COMPANY PERMITTEE Director of Urban and Regional Planning

DATE

BY AUTHORITY OF THE SECRETARY OF THE ARMY:

for Edward M. Lee, Jr.

11 Jan 84

DATE

Colonel, CE
DISTRICT ENGINEER,
U.S. ARMY, CORPS OF ENGINEERS

Transferee hereby agrees to comply with the terms and conditions of this permit.
Southern Energy Delta, LLC, a Delaware limited liability company

By:

TRANSFEEE

Randall E. Harrison, President

4/15/85
DATE

T.2N.R.I.E MDBM
SW 1/4 of SW 1/4
Sec. 5

P. O. & E. CO.
COPY

103318

MALLARD SLOUGH : EAST LEVEE

MALLARD SLOUGH

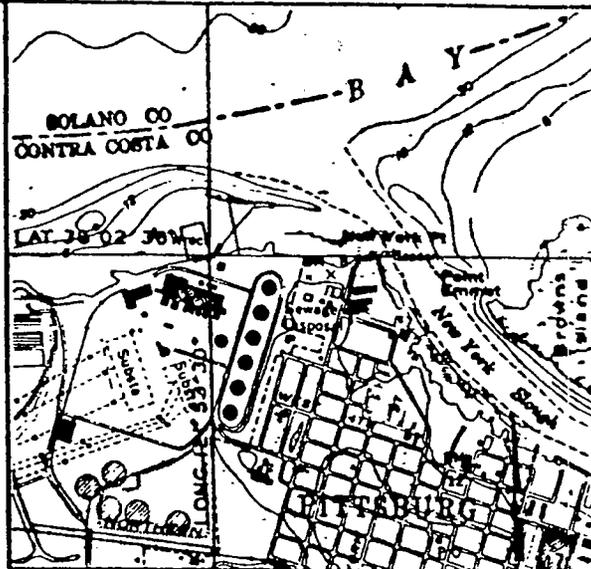
APPROXIMATE LENGTH OF LEVEE :
2440'

PUMPHOUSE

PLAN

SCALE

1" = 100'



VICINITY MAP

FROM: U.S.G.S. MONKER BAY QUADRANGLE

SCALE: 1" = 2000'

2000' 1000' 0 2000'

PROFILE

PROPOSED FIX
7'-5"

PRESENT LEVEL
5'-5"

SLOUGH

BUILD-UP OF ENTIRE LEVEE
TO MEET DESIRED ELEVATION

PROPOSED LEVEE REPAIR AT
PITTSBURG POWER PLANT
1 MILE WEST OF PITTSBURG

COUNTY OF CONTRA COSTA

STATE OF CALIFORNIA

APPLICATION BY

PACIFIC GAS & ELECTRIC CO.

September, 1983

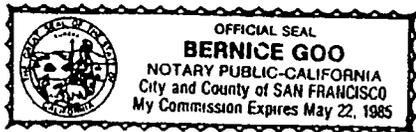
Sheet 2 of 2

103318

STATE OF CALIFORNIA)
County of San Francisco) ss.

On this 29th day of December, in the year 1983, before me,
Bernice Goo, a Notary Public for the State of California,
personally appeared Peter K. Willerup,
personally known to me (or proved to me on the basis of satisfactory evidence) to be the
person who executed the within instrument as the Director of Urban & Regional

Planning,
or on behalf of Pacific Gas and Electric Company,
a corporation, and acknowledged to me that
the corporation executed it pursuant to its by-laws
or a resolution of its board of directors.



Bernice Goo
Notary Public for the State of California

EXHIBIT "K"

103318

Cooperative Recreation Area Agreement dated August 9, 1973 by and between
PG&E and the City of Pittsburgh

[Attached Hereto]

EXHIBIT K-1

(Pittsburgh)
NB1 369897 6

No Consideration

103318

2102-01-0964

COOPERATIVE RECREATION AREA AGREEMENT
PITTSBURG POWER PLANT

RECITALS:

PACIFIC GAS AND ELECTRIC COMPANY (PACIFIC), a California corporation, owns a parcel of land suitable for recreational development within the corporate limits of the City of Pittsburg, State of California, in the eastern portion of Pacific's Pittsburg Power Plant near Montezuma Avenue, more particularly described as follows:

Beginning at the found 12 inch by 12 inch concrete monument (with pin and crossmark) accepted as marking the southwest corner of the 2.65 acre parcel of land conveyed by C. A. Hooper & Co. to Pacific Gas and Electric Company by deed dated April 15, 1952 and recorded in Book 2080 of Official Records at page 96, Records of Contra Costa County, and running thence along the southerly boundary line of said 2.65 acre parcel of land

- (1) south 72° 22' 01" east (south 73° 13' 21" east, geodetic)
573.20 feet

to the southeast corner of said 2.65 acre parcel of land; thence leaving said southerly boundary line and running along the easterly boundary line of said 2.65 acre parcel of land

- (2) north 17° 32' 52" east 159.72 feet

to the easterly terminus of the line described in the agreement between the State of California and Pacific Gas and Electric Company arbitrating and stipulating ordinary high water mark along the Sacramento River dated October 24, 1961 which said line is delineated and designated NORTH PROPERTY LINE OF P.G. & E. on the Plat of the North Property Line of P.G. & E. along the Sacramento River filed for record in Book 19 of Licensed Land Surveys at page 33, Contra Costa County Records; thence leaving the easterly boundary line of said 2.65 acre parcel of land and running along said NORTH PROPERTY LINE OF P.G. & E.

- (3) north 72° 22' 01" west 663.78 feet; thence

- (4) north 88° 52' 32" west 751.90 feet;

thence leaving said NORTH PROPERTY LINE OF P.G. & E. and running

- (5) south 17° 48' 04" east 16.97 feet; thence
(6) south 88° 51' 09" east 219.58 feet; thence
(7) south 1° 06' 18" west 25.00 feet; thence

EXHIBIT "K"

103318

(8) south 88° 53' 42" east 284.74 feet; thence
(9) south 62° 57' 24" east 315.48 feet, more or less,
to the point of beginning

The bearings and distances used in the above description (except where otherwise noted) are on the California Coordinate System, Zone III. To obtain geodetic bearings at the point of beginning adjust all California Coordinate bearings 0° 51' 20" to the left. To obtain ground distances, multiply all distances shown by 1.0000580.

PACIFIC and the CITY OF PITTSBURG (CITY), a municipal corporation, acting by and through its Recreation Commission, now desire to cooperate in the development of a recreation area (hereinafter referred to as "the recreation area") on said lands primarily for the benefit of the residents of the neighborhood in the vicinity of said lands. To provide for the development of the recreation area, and to fix their respective rights and obligations with respect to it, PACIFIC and CITY hereby agree as follows:

AGREEMENT:

1. PACIFIC hereby grants to CITY an easement for the use of the recreation area for the purposes of landscaping, developing, operating and maintaining the same, and of installing, maintaining, and using playground and other recreation facilities thereon; provided, however, that CITY shall make no entry hereunder, except for planning purposes, until CITY and PACIFIC have developed and accepted detailed plans depicting all improvements to be installed in the recreation area. If CITY desires to develop the recreation area in stages, CITY and PACIFIC shall develop and accept a tentative overall plan together with a detailed plan for the initial stages of the development and tentative plans for each of the other stages of the development with proposed dates of completion thereof.

103318

2. PACIFIC shall pay CITY, upon execution of this agreement, the sum of \$20,000, which CITY shall use solely in performing the following development work: (a) site work which will include general site cleanup, filling and rough grading, and (b) relocation of fences.

3. CITY shall commence the development of the recreation area within six months after the date funds become available from the United States Department of Housing and Urban Development (HUD).

4. PACIFIC shall, at its expense, install rip-rap to stabilize and reinforce the shore line along the recreation area, provided PACIFIC is able to obtain all the necessary permits for the installation of said rip-rap.

5. Upon completion of CITY's development of the recreation area, or any stage thereof, CITY shall, at its expense install, at a mutually satisfactory location, a permanent sign or marker containing wording developed jointly by CITY and PACIFIC, setting forth the purpose of the development and the cooperative aspects thereof.

6. CITY shall, at its expense, operate and maintain the recreation area during the life of this agreement in a manner acceptable to PACIFIC.

7. CITY's right to develop, operate, maintain and use the recreation area under this agreement shall at all times be subject to the prior and continuing right and obligation of PACIFIC to use and maintain its warm water discharge in the recreation area in the performance of its duties as a public utility, and is further subject to the right of PACIFIC, without liability or obligation to CITY, except as provided in paragraph 8 below, to replace, remove, alter, expand or reconstruct its warm water discharge in the recreation area.

103318

8. PACIFIC shall repair any damage to the recreation area, including the lawns, shrubs or trees, or the sprinkler or irrigation system, or any other improvements installed in the recreation area by CITY under this agreement, resulting from PACIFIC's operations therein.

9. CITY shall indemnify PACIFIC, its officers, agents, and employees against all loss, damage, expense, and liability resulting from injury to or death of any person, including employees or agents of PACIFIC, or injury to any property, including property of PACIFIC, arising out of the use by the public or the development, maintenance and use by CITY, its employees, agents, or contractors of the recreation area under this agreement, unless such loss, damage, expense, or liability shall be caused by the sole negligence or willful misconduct of PACIFIC. CITY shall, on PACIFIC's request, defend any suit asserting a claim covered by this indemnity. CITY shall pay any costs that may be incurred by PACIFIC in enforcing this indemnity.

10. For the purposes of this agreement, any contractors performing work hereunder for CITY shall be deemed the agents of CITY and not of PACIFIC and contractors performing work hereunder for PACIFIC shall be deemed the agents of PACIFIC and not CITY.

11. CITY acknowledges PACIFIC's title to the recreation area and agrees never to resist or assail the same for any cause arising out of CITY's occupancy of or activities in the recreation area during the life of this agreement or any renewal hereof; provided, however, that nothing in this paragraph shall be construed as an impairment of CITY's right to acquire property by proceedings in eminent domain.

103318

12. The term of this agreement shall be fifty (50) years from and after the date hereof, and thereafter for successive periods of five (5) years unless or until terminated at the end of said fifty (50) year period or at the end of any said five (5) year period by either party giving the other one (1) year's advance written notice of such termination.

13. In the event CITY shall not complete the installation of the recreation area by January 1, 1976, or by such later date as may hereafter be agreed to in writing by CITY and PACIFIC, or if CITY shall cease to operate or maintain the recreation area, then all rights granted CITY hereunder shall terminate. CITY, upon the termination of the rights hereby granted and at the written request of PACIFIC, shall execute and deliver to PACIFIC a good and sufficient quitclaim of said rights. Should CITY fail or refuse to deliver such quitclaim to PACIFIC within ninety (90) days after written demand therefore, PACIFIC may execute and record a written notice reciting such termination and CITY's failure or refusal and, after ten (10) days from the date of recordation of such notice, it shall be conclusive evidence of the termination of said rights against CITY and all persons claiming under CITY.

14. Upon termination of this agreement CITY shall remove any and all recreation equipment from the recreation area. If CITY shall fail or refuse to make such removal, then PACIFIC may at its option remove such facilities at the expense of CITY. All other improvements installed in the recreation area by CITY hereunder shall become the property of PACIFIC.

15. The foregoing grant is made subject to all liens and encumbrances which may affect the recreation area and the word "grant" as used herein shall

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not be deemed to be a covenant against the existence of any thereof.

16. Time is of the essence of the provisions hereof.

17. This agreement shall inure to the benefit of and bind the respective successors and assigns of PACIFIC and CITY.

IN WITNESS WHEREOF, PACIFIC and CITY have executed this agreement this

9th day of August, 1973.

PACIFIC GAS AND ELECTRIC COMPANY,
 a California corporation

By: Nolan H. Daines
 Nolan H. Daines
 Manager, Land Department

And By: [Signature]
 Secretary

CITY OF PITTSBURG, CALIFORNIA

RECREATION COMMISSION

APPROVED
LAND
LAW
OPER
ENG
GAS

836126-803 8/8/73

CITY OF PITTSBURG, a municipal corporation,
acting by and through its Recreation
Commission

By: [Signature]

And By: [Signature]
 Deputy City Clerk

P.G. & E. CO.
COPY

RESOLUTION NO. 5007

103318

WHEREAS, the Pacific Gas & Electric Company has presented an agreement entitled, "COOPERATIVE RECREATION AREA AGREEMENT, PITTSBURG POWER PLANT", which concerns a parcel of land suitable for recreational development within the corporate limits of the City of Pittsburg, State of California, in the eastern portion of Pacific's Pittsburg Power Plant, near Montezuma Street.

THEREFORE, be it resolved by the City Council of the City of Pittsburg that said Cooperative Recreational Area Agreement, Pittsburg Power Plant, be and the same is hereby approved and the Mayor is authorized to execute the same on behalf of the City of Pittsburg.

The foregoing Resolution was duly passed and adopted by the City Council of the City of Pittsburg, California, at an adjourned regular meeting of said Council held on the 19th day of November, 1973, by the following vote:

AYES: Councilmen Barraco, Lowy, MacIntyre & Mayor Calone

NOES: None

ABSENT: None

ABSTAINED: Councilman Downing



MAYOR

ATTEST:



CITY CLERK (DEPUTY)

END OF DOCUMENT



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Department of State: Division of Corporations

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Entity Details

File Number:	2968477	Incorporation Date / Formation Date:	11/18/1998 (mm/dd/yyyy)
Entity Name:	MIRANT DELTA, LLC		
Entity Kind:	LIMITED LIABILITY COMPANY (LLC)	Entity Type:	GENERAL
Residency:	DOMESTIC	State:	DE
Status:	GOOD STANDING	Status Date:	06/01/2004

REGISTERED AGENT INFORMATION

Name:	NATIONAL REGISTERED AGENTS, INC.		
Address:	160 GREENTREE DRIVE SUITE 101		
City:	DOVER	County:	KENT
State:	DE	Postal Code:	19904
Phone:	(302)674-4089		

Additional information is available for a fee of \$20.00. This information will include current franchise tax assessment, current filing history and more..

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State of Delaware
Office of the Secretary of State PAGE 1

I, HARRIET SMITH WINDSOR, SECRETARY OF STATE OF THE STATE OF DELAWARE, DO HEREBY CERTIFY THE ATTACHED IS A TRUE AND CORRECT COPY OF THE CERTIFICATE OF AMENDMENT OF "SOUTHERN ENERGY DELTA, L.L.C.", CHANGING ITS NAME FROM "SOUTHERN ENERGY DELTA, L.L.C." TO "MIRANT DELTA, LLC", FILED IN THIS OFFICE ON THE NINETEENTH DAY OF JANUARY, A.D. 2001, AT 5 O'CLOCK P.M.



Harriet Smith Windsor
Secretary of State

2968477 8100

010031655

AUTHENTICATION: 0926100

DATE: 01-19-01

Certificate of Amendment of Certificate of Formation

of

Southern Energy Delta, L.L.C.

It is hereby certified that:

1. The name of the limited liability company (hereinafter called the "limited liability company") is Southern Energy Delta, L.L.C.

2. The certificate of formation of the limited liability company (hereinafter called "the certificate") is hereby amended by striking out the Article pertaining to the name of the limited liability company and by substituting in lieu of said Article the following new Article:

"The name of the limited liability company is Mirant Delta, LLC."

3. The name of the limited liability company that appears in the heading of the certificate shall be replaced with the new name of the limited liability company as stated in 2. above.

The effective time of the amendments herein certified shall be 5:00 p.m. on January 19, 2001.

Executed on January 17, 2001



Michael L. Smith, Vice President

**APPENDIX H2
MIRANT MOTION TO INTERVENE AND ANSWER**

Mirant Corporation
601 13th Street, N.W., Suite 850N
Washington, DC 20005
T 202 585 3800 F 202 585 3806
U www.mirant.com



May 29, 2008

The Honorable Kimberly D. Bose
Secretary
Federal Energy Regulatory Commission
888 First Street, N.E.
Washington, D.C. 20426

RE: *California Independent System Operator Corporation*
Petition for Waiver of Tariff Provisions to Accommodate Transition to Reformed Large
Generator Interconnection Procedures, and Motion to Shorten Comment Period
Docket No. ER08-960-000

Dear Secretary Bose:

Please accept for filing in the above-referenced docket an electronically filed
“Motion to Intervene and Answer of Mirant Energy Trading, LLC, Mirant California, LLC, Mirant
Delta, LLC and Mirant Potrero, LLC.” Service has been made upon the service list as evidenced by
the attached certificate of service.

Thank you for your attention to this matter.

Sincerely,

A handwritten signature in black ink that reads "David J. Reich". The signature is written in a cursive style with a horizontal line underneath it.

David J. Reich
Director, Federal Regulatory Affairs
Mirant Corporation

Enclosures

II. INTERVENTION

MET, a Delaware limited liability company, is a power marketer primarily engaged in the business of marketing electricity and other energy commodities at wholesale throughout North America. MET is an indirect, wholly-owned subsidiary of Mirant Corporation, a publicly-traded company. Mirant California is a Delaware limited liability company authorized to engage in the marketing of electric energy and capacity and is the parent company of Mirant Delta and Mirant Potrero. Mirant Delta is a Delaware limited liability company with a direct 100-percent ownership interest in the Pittsburg and Contra Costa Power Plants, located in Pittsburg and Antioch, California, which have an aggregate generating capacity of 1,985 MW. Mirant Potrero is a Delaware limited liability company with a direct 100-percent ownership interest in the 362 MW Potrero Power Plant in San Francisco, California. All of the Mirant Parties have received Commission authority to sell power at market-based rates.¹

The Mirant Parties move to intervene in this proceeding on the grounds that, as a marketer of wholesale electricity and an owner, operator and potential developer of generating facilities within California, they possess interests that may be directly affected by the outcome of this proceeding. The Mirant Parties cannot be adequately represented by any other party in this proceeding.

III. BACKGROUND

On May 15, 2008, the California Independent System Operator Corporation (“CAISO”) filed a “Petition for Waiver of Tariff Provisions to Accommodate Transition to Reformed Large Generator Interconnection Procedures, and Motion to Shorten Comment Period” (“waiver petition”). According to the CAISO, the waiver petition is the first step in a two-step process to reform the CAISO’s current Large Generator Interconnection Procedures (“LGIP”) to allow the CAISO to more efficiently manage its queue and be consistent with the development timelines for transmission assets and California’s

¹ *Mirant Americas Energy Marketing, L.P., et al.*, 111 FERC ¶ 61,252 (2005).

renewable portfolio standard requirements. The second step will involve filing an amendment to the CASIO Tariff to incorporate the CAISO's Generator Interconnection Process Reform ("GIPR") by the end of July 2008. The CAISO contends that the details of the GIPR are not necessary for the Commission to grant the waiver petition.

The CAISO states that the requested waiver will operate to create three study groups: the Serial Study Group, the Transition Cluster, and the Initial GIPR Cluster. According to the CAISO, the waiver petition will allow the CAISO to immediately begin to expedite interconnections in the Serial Study Group under current LGIP provisions. In order to be considered in the Serial Study Group an interconnection request must meet three criteria. The interconnection request must either (1) be a late stage interconnection request (i.e., system impact study results due by May 1, 2008), (2) have a Purchase Power Agreement ("PPA") approved or pending approval by the appropriate regulatory authority; or (3) be an interconnection request, in queue order, seeking interconnection to new transmission projects that have received necessary land use approvals from local, state, or federal agencies, as applicable consistent with the transmission project's studied capacity.

The Transition Cluster would include all validated interconnection requests received prior to the opening of the CAISO's first Queue Cluster Window on June 2, 2008. The Initial GIPR Cluster will include all interconnection requests received during the Queue Cluster Window on or after June 2, 2008. The CAISO requests an immediate temporary suspension of all study activities for interconnection requests in both the Transition Cluster and the Initial GIPR Cluster to facilitate the transition to the GIPR and to allow the CAISO to concentrate its resources on processing the interconnection requests in the Serial Study Group.

IV. ANSWER

The Mirant Parties agree that the CAISO has a problem with the size of its interconnection queue and that action needs to be taken to resolve the existing backlog. However, the Mirant Parties question whether the immediate and outright suspension of all work on the majority of pending

interconnection requests is integral to accomplishing the CAISO's goal of clearing the interconnection queue backlog.

The CAISO's solution to stop all work on the Transition Cluster for at least two months while it proposes new interconnection procedures that will not be implemented until some unknown time in the future will add significant and costly delays to the projects being developed by Transition Cluster interconnection customers. At best, project developers in the Transition Cluster might know by September 29, 2008 (60 days after the July 31, 2008 GIPR filing date) when their projects might start moving in the queue. There is no justifiable excuse for stopping all work on pending interconnection requests however temporary the suspension might be and for the reasons tendered to the Commission by the CAISO.

The CAISO does provide some general timelines in its waiver petition that it will complete the initial Transition Cluster interconnection studies by July 2009, but it is not clear from the waiver petition which interconnection studies the CAISO refers to – feasibility study, system impact study, facility study or all of the above. Which studies the CAISO proposes to complete by that deadline is critical to whether a project can advance through the power plant site certification process set forth by the California Energy Commission (“CEC”). A completed application with the CEC requires that the applicant have a completed system impact study or signed system impact study agreement with the CAISO.² Thus, delays in the CAISO study process, whether created by the status quo or the waiver petition, can create serious delays in the CEC permitting process. Any needless delay in permitting power plants in California will have serious repercussions for both developers that are attempting to build in response to one of the many ongoing resource adequacy proposals tendered by load serving entities (“LSEs”) in California and the LSEs that need the capacity to meet their state mandated resource adequacy requirements.

² See <http://www.energy.ca.gov/2007publications/CEC-140-2007-003/CEC-140-2007-003.PDF> at page 84.

Without the requisite studies or the execution of a system impact study agreement with the CAISO developers cannot receive certification from the CEC to permit their generating plants, which in turn will have adverse results for resource adequacy procurement in California. LSE's will have fewer bidders to choose from, less diversity of resources, and less certainty about project viability. In addition, California will likely have far less capacity built than what is included in the CAISO queue.

The Mirant Parties believe that a simple solution exists that will avoid delaying the CEC permitting process. If the Commission grants the CAISO's waiver petition, the Commission must condition the waiver petition upon the CAISO immediately offering system impact study agreements for execution to Transition Cluster interconnection customers that have not been tendered this agreement so that they may proceed with the CEC permitting process. The Mirant Parties request that the Commission direct the CAISO to tender the system impact study agreements to Transition Cluster interconnection customers that are not currently party to a system impact study agreement within 15 days of the date of the order granting the waiver petition.

Conditioning the waiver upon the tendering of a system impact study agreement by the CAISO will not slow down the CAISO's study of the Serial Study Group as the CAISO will not be required to perform the system impact studies for the Transition Cluster group per the waiver request. Tendering a system impact study agreement to a Transition Cluster interconnection customer is a simple administrative task because the system impact study agreement in the CASIO's LGIP is a pro-forma agreement that does not require any effort on the part of the CAISO other than to fill in a few blanks.

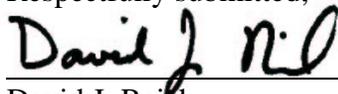
The waiver petition notes that GIPR filing will address pending Transition Cluster interconnection requests, some of which have already executed system impact study agreements, so all Transition Cluster interconnection customers that execute the system impact study agreement are on notice that their agreement may be superseded by the GIPR filing and any related deposit requirements may be increased at that time. Granting this limited condition will serve two purposes, the CAISO will still be able to proceed with its Serial Study Group analysis without disruption and Transition Cluster

projects will be able to proceed with their CEC permitting process without needless and unknown delay.

V. CONCLUSION

WHEREFORE, for the foregoing reasons, the Mirant Parties request that the Commission permit them to intervene in this proceeding and afford them all rights to participate as parties to this proceeding. In addition, the Mirant Parties request that the Commission grant the relief requested herein.

Respectfully submitted,



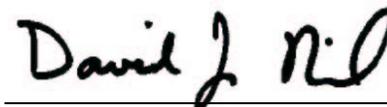
David J. Reich
Mirant Corporation
601 13th Street, N.W., Suite 850N
Washington, D.C. 20005
(202) 585-3817

Dated: May 29, 2008

CERTIFICATE OF SERVICE

I hereby certify that I have this day served a copy of the foregoing document on each party named in the official service list in this proceeding.

Dated at Washington, DC, this 29th day of May 2008.

A handwritten signature in black ink that reads "David J. Reich". The signature is written in a cursive style with a horizontal line underneath it.

David J. Reich