



Calculation Cover Sheet

Subject Transient Stability Calculations
 Discipline Electrical

Project KARSTO
 Job No. 25474-000
 Calc. No. 25474-000-E0C-ES-00003
 Sheet 1 of 11

Calculation Status Designation	Preliminary <input checked="" type="checkbox"/>	Confirmed with Preliminary Information <input type="checkbox"/>	Confirmed <input type="checkbox"/>	Superseded <input type="checkbox"/>	Voided <input type="checkbox"/>
Computer Program/Type	SCP <input checked="" type="checkbox"/>	Program Name. ETAP	Version/Release 6.0.0	Operating System Windows XP	
Nuclear Quality Classification	Safety-Related <input type="checkbox"/>	Augmented Quality <input type="checkbox"/>	Nonsafety-Related <input type="checkbox"/>		

Use of these calculations by person, without access to pertinent factors and without proper regard for their purpose, could lead to erroneous conclusions.

Should it become necessary to use these calculations in your work in the future, it is suggested that the calculations be reviewed with authorized Bechtel personnel to ensure that the purposes, assumptions, judgments and limitations are thoroughly understood. Bechtel cannot assume responsibility for the use of these calculations not under our direct control.

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Rev. No.	Reason for Revision	Total No. of Sheets	Last Sheet No.	By	Checked	Approved/ Accepted	Date
0	Issued for Comments	108	Attachment 13, Page 4 of 4	VS	WK	<i>SMS</i>	<i>11/21/08</i>

Record of Revisions



CALCULATION SHEET

Project: Karsto

Subject: Transient Stability Calculations

Job Number: 25474

Calculation No.: 25474-000-E0C-ES-00003

By: Victor Skavittine

Date: 11/21/08

Sheet No. : 2

Sheet Rev. 0

Contents

<u>Section</u>	<u>Page</u>
1.0 Scope	3
2.0 Methodology	4
3.0 Assumptions and Settings	5
4.0 Calculations	6
5.0 Conclusions	9
6.0 List of Attachments	9



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Sheet No. : 3

Sheet Rev. 0

Transient Stability Calculations

1.0 SCOPE

The scope of this Report includes a review and analysis of the electrical power system for the CO₂ Capture and Compression (CCC) facility adjacent to the gas-fired Combined Cycle Power Plant (CCPP) at Kårstø in the South-West of Norway. An electrical model was developed and various studies were conducted as a preliminary investigation of the power system performance to determine sizes and ratings of the major electrical equipment based on the system information available at this stage of the project. In order to complete these calculations some assumptions were made which are explained later in this report.

The 22kV Substation located in CCC facility is supplied with 20kV (Feeder A) and 6.6kV (Feeder B) in-feeds from the CCPP 20kV Generator Isophase Bus and 6.6kV Switchgear 10BBE through power transformers CCC FACILITY XFMR 1ESETP01 (50MVA, 20-23kV) located in CCPP facility and DEAD TIME XFMR 1ESETP02 (3MVA, 6.6-23Kv) located outdoor in CCC facility. The 22kV Switchgear (1ESESIO1) 22kV-SWGR is indoor switchgear with manual bus transfer arrangement. The voltage is further stepped down to 6.6kV and 400V distribution levels to feed various loads. Additionally, three large motors (compressor and blowers) are supplied from 22kV-switchgear (1ESESIO1) via isolation transformers and controlled through adjustable speed drive systems (ASDS).

The purpose of Transient Stability (TS) Calculations is to:

- Determine maximum voltage drops at motor terminals and other buses when the largest motor is started on a particular bus.
- Determine power system response in case of short-circuited feeders or bus-bars.
- Size power transformers rating and base impedance for motor starting.
- Identify system buses where severe voltage dips are experienced due to largest motor starting
- Establish motor starting constraints of the largest motors required during normal conditions
- Determine motor starting methods for the largest motors started during normal and emergency situations.

Calculations reflect the most unfavorable operation and the pessimistic equipment parameter assumption.



CALCULATION SHEET

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Calculation No.: 25474-000-E0C-ES-00003

By: Victor Skavitine

Date: 11/21/08

Sheet No. : 4

Sheet Rev. 0

2.0 METHODOLOGY

The electrical model was developed using ETAP PowerStation (Version 6.0.0) software based on Load List and Single Line Diagrams (SLD) as available at time of calculations and the system information provided by GASSNOVA as Owner and FICHTNER as Owner's Engineer.

The ETAP Transient Stability Analysis program is designed to investigate the system dynamic responses and stability limits of a power system before, during, and after system changes or disturbances. The program models dynamic characteristics of a power system, implements the user-defined events and actions, solves the system network equation and machine differential equations interactively to find out system and machine responses in time domain.

Motor Starting calculations are based on the Static and Dynamic Motor models and Transient Stability Calculations are based on Dynamic equipment models. Equipment mathematical models for Dynamic calculations were based on typical ETAP library data for particular equipment. It is a preliminary calculation and is based on assumed (typical) data.

For all calculations, Normal system configuration is when Feeder A in-feed breaker is closed and Feeder B in-feed breaker is open and Low Voltage Switchgear 400V-LdCntr (1ECEKL01/02) tie-breaker is open and in-feeds breakers closed. Alternate configurations are when Feeder A in-feed breaker is open and Feeder B in-feed breaker is closed (Stand by Mode) and for 400V-LdCntr in-feed breaker B is open and tie-breaker and in-feed breaker A are closed. For reference the SLDs are listed in Section 6.0

For Normal Mode two cases for the largest motors on 6.6kV and 400V buses were considered based on the system configuration.

For Stand by Mode one case for Sea Water Booster pump motor (220kW) on 400V-LdCntr (0.4kV) was calculated.

One case was calculated for Air Compressor Motor (55kW) started from the Stand by Diesel Generator.

For Normal Mode two cases for short-circuited feeder were calculated with fault clearing time of 0.1 second and 0.3 second. All motors above 299kW were dynamically modeled.

One case investigated trip of the largest DOL starting motor during the run-up.

All 11kV motors are controlled by ASDS and aren't considered in Motor Starting Study as possible causes for Bus or Cables voltage drops during the starts, since motor currents will not exceed 1.0 p.u. during the starts. By the same reason there is no investigation in the fault conditions and re-accelerations of those motors. ASDS system can handle all transient faults and restore the process conditions.



CALCULATION SHEET

Project: Karsto

Subject: Transient Stability Calculations

Job Number: 25474

Calculation No.: 25474-000-E0C-ES-00003

By: Victor Skaviline

Date: 11/21/08

Sheet No. : 5

Sheet Rev. 0

Calculation cases comprise various scenarios to evaluate options and limitations pertaining to operation of the distribution system under different conditions.

3.0 ASSUMPTIONS AND SETTINGS

The following are detailed descriptions of connections, conditions and equipment assumed for the calculations. Single Line Diagrams using ETAP PowerStation are listed in Section 6.0 ATTACHMENTS.

- 50 MVA Power Transformer Data and 22kV switchgear data was provided by FICHTNER as follows:
 - Power transformer connected to the external grid, 50 MVA , 20/23kV, 12.5% impedance, provided by others
 - 22kV switchgear shall be designed for $I_b(\text{sym})=31.5\text{kA}$, $I_p=80\text{kA}$
- The estimated available short circuit currents at CCPP switchgear 10BBE were provided by FICHTNER as follows:
 - Minimum available SC is 8kA
 - Maximum available SC is 25kA
- Assumed X/R ratio for Min/Max SC on CCPP switchgear 10BBE is 50.
- The estimated available short circuit currents at the primary side of the 50 MVA transformer were provided by FICHTNER as follows:
 - Minimum available SC is 60kA
 - Maximum available SC is 130kA
- Assumed X/R ratio for Min/Max SC on the primary side of the 50 MVA transformer is 95.
- Transformers sizes were considered as shown on the single line diagrams. Actual data was used for transformer impedances where known, otherwise typical data used where unknown.
- Transformer Impedance tolerance is considered in calculations as + 7.5%
- Transformer sizing was checked by ETAP based on IEC standard, connected loads, operating load and ambient temperature 40° C.
- Symbols for two-winding VFD transformers (T1, T2, and T3 on SLD) only for reference purpose and will be defined later by ASDS (VFD) Vendor.
- Voltage tolerance of the 20kV and 6.6kV upstream Owner provided utility systems is estimated as +/- 2%.
- All loads are based on Load List and Single Line Diagram.



CALCULATION SHEET

Project: Karsto

Subject: Transient Stability Calculations

Job Number: 25474

Calculation No.: 25474-000-E0C-ES-00003

By: Victor Skavitine

Date: 11/21/08

Sheet No. : 6

Sheet Rev. 0

- 50MVA CCC Facility transformer tap set to 0% and all other power transformer taps set to +2.5% on primary.
- Ambient temperature for above ground (A/G) trays is 40° C and for under ground (U/G) ducts is 20° C. Cables temperature range is from 20° C to 80° C.
- Cable conductor resistances adjusted for the temperature of 80° C.
- Power factor compensation capacitors adjusted to approximately p.f. =1.0 at the HV side of the 50MVA and 3 MVA Utility interfacing transformers for all cases run.
- Basis for p.f. = 1.0 correction is 0.98 lag to 0.98 lead.
- Required rating for power factor compensation capacitors was calculated by ETAP for Normal Mode (Full Production, Power from feeder A) and Stand by Mode (Power from Feeder A or B).
- Cable Loading factors are from 1 to 1.35 for different loads according to IEC.
- Maximum Voltage Drops for Busses and Cables are as per Exhibit E5.7- Cabling and Cable Trays.
- Cable grouping was assumed as per Exhibit E5.7- Cabling and Cable Trays.
- Cable sizing was verified by ETAP based on ICEA P-54-440 standard for above ground tray installations and IEEE 399 standard for under ground duct installations.
- Load category is "design" and assumed 100% of nameplate rating for pessimistic results.
- Cable Sizes are as shown on the SLD. Cable impedance values are typical as listed in the ETAP PowerStation cable library.
- Motor and Load data used in calculations are based on typical ETAP PowerStation library values for particular equipment.
- Normal Mode assumed Utility Voltage equal to 1.02 p.u. and Utility includes Generator and GSU in parallel (maximum system contribution).

4.0 CALCULATIONS

4.1 CASE 1: NORMAL OPERATION. START CO2 PRODUCT SENDOUT PUMP (1850KW) ON 6.6KV-SWGR:

- System SC contribution at maximum available, supply voltage set to 1.02 p.u.
- 22kV-SWGR Feeder A available and in-feed breaker is closed
- 22kV-SWGR Feeder B unavailable and in-feed breaker open
- 400V-LdCntr Tie-Breaker open and both in-feed breakers closed



CALCULATION SHEET

Project: Karsto

Subject: Transient Stability Calculations

Job Number: 25474

Calculation No.: 25474-000-E0C-ES-00003

By: Victor Skavitine

Date: 11/21/08

Sheet No. : 7

Sheet Rev. 0

- All loads are running on normal plus the largest stand by motor for CO2 Product Sendout Pump B is starting.

4.2 CASE 2: STAND BY MODE. START SEA WATER BOOSTER PUMP (220KW) ON 400V-LDCNTR-1:

- System SC contribution at maximum available, supply voltage set to 1.02 p.u.
- 22kV-SWGR Feeder A unavailable and in-feed breaker open
- 22kV-SWGR Feeder B available and in-feed breaker is closed
- 400V-LdCntr Tie-Breaker open and both in-feed breakers closed
- Only Maintenance Loads are running on normal

4.3 CASE 3: START AIR COMPRESSOR (55KW) FROM STAND BY DIESEL GENERATOR ON 400V-MCC-1:

- 22kV-SWGR Feeder A unavailable and in-feed breaker open
- 22kV-SWGR Feeder B unavailable and in-feed breaker open
- Sea Water Boosting pump is off and its circuit breaker (CB38) is open
- Feeder to 400V-MCC-1 is off and feeder to 400V-EssMCC is on for 400V-LdCntr-1
- Stand by Diesel Generator StandbyDG in Swing bus mode and feeds 400V-EssMCC
- 400V-EssMCC feeder to 400V-LdCntr-1 is on and its CB is closed.
- Essential Loads are running on 400V-LdCntr-1 and 400V-EssMCC

4.4 CASE 4: SHORT-CIRCUITED 22KV TRANSFORMER CABLE C-BLWRTR2 WITH FAULT ON 50% CABLE LENGTH AND FAULT CLEARING TIME 0.1 SECOND

- System SC contribution at maximum available, supply voltage set to 1.02 p.u.
- 22kV-SWGR Feeder A available and in-feed breaker is closed
- 22kV-SWGR Feeder B unavailable and in-feed breaker open
- 400V-LdCntr Tie-Breaker open and both in-feed breakers closed
- All loads are running on normal

4.5 CASE 5: SHORT-CIRCUITED 22KV TRANSFORMER CABLE C-BLWRTR2 WITH FAULT ON 50% CABLE LENGTH AND FAULT CLEARING TIME 0.3 SECOND

- System SC contribution at maximum available, supply voltage set to 1.02 p.u.
- 22kV-SWGR Feeder A available and in-feed breaker is closed



CALCULATION SHEET

Project: Karsto

Job Number: 25474

Subject: Transient Stability Calculations

Calculation No.: 25474-000-E0C-ES-00003

By: Victor Skavitine

Date: 11/21/08

Sheet No. : 8

Sheet Rev. 0

- 22kV-SWGR Feeder B unavailable and in-feed breaker open
- 400V-LdCntr Tie-Breaker open and both in-feed breakers closed
- All loads are running on normal

4.6 CASE 6: TRIP OF THE STARTING CO2 PRODUCT SENDOUT PUMP B (1850KW) ON 6.6KV-SWGR DURING RUN-UP TIME IN 0.3 SECOND AFTER START:

- System SC contribution at maximum available, supply voltage set to 1.02 p.u.
- 22kV-SWGR Feeder A available and in-feed breaker is closed
- 22kV-SWGR Feeder B unavailable and in-feed breaker open
- 400V-LdCntr Tie-Breaker open and both in-feed breakers closed
- All loads are running on normal plus the largest stand by motor for CO2 Product Sendout Pump B is starting in 0.2 second and tripping in 0.5 second.

4.7 RESULTS OF THE MOTOR STARTING CALCULATIONS:

- Reports and SLDs with Calculations Results are in the Attachments.
- The Summary of results of each case is listed in the following table:

Motor Starting Study Results

Bus Name	Bus Voltage	MS Study Case 1	MS Study Case 2	MS Study Case 3
	kV	Bus %Voltage	Bus %Voltage	Bus %Voltage
22kV-SWGR	22	100.91	106.06	N/A
6.6kV-SWGR	6.6	93.84	N/A	N/A
400V-LdCntr-1	0.4	101.47	104.41	88.24
400V-LdCntr-2	0.4	101.67	105.13	N/A
400V-MCC-1	0.4	101.19	104.14	N/A
400V-MCC-2	0.4	101.47	104.93	N/A
400V-EssMCC	0.4	101.51	104.69	88.4
Bus 43 (CO2PrSnd.B)	6.6	93.22	N/A	N/A
Bus 46 (SeaWtBst.A)	0.4	N/A	96.64	N/A
Bus 27 (ArCmp. A)	0.4	N/A	N/A	84.28

Motor Starting Voltage Drop acceptance criteria:

- Voltage drop shall not exceed 10% of nominal voltage at 22kV bus voltage.
- Voltage drop shall not exceed 18% of nominal voltage at motor terminals.



CALCULATION SHEET

Project: Karsto

Subject: Transient Stability Calculations

Job Number: 25474

Calculation No.: 25474-000-E0C-ES-00003

By: Victor Skavitine

Date: 11/21/08

Sheet No. : 9

Sheet Rev. 0

- Time to recovery of the starting voltage drop to 0.9 p.u. shall be less than 1.5 seconds

Complete reports of calculations are in the 6.0 List of Attachments.

Duration of the voltage drop on the 400V-LdCntr-1 and 400V-EssMCC buses is less than 1 second according to the report results for Case 3. (Attachments)

4.8 RESULTS OF THE TRANSIENT STABILITY CALCULATIONS

For the cases considered the calculations showed Power System recovery up to 96% Bus Voltage in 0.4 second and 2.5 seconds respectively for Case 4 and Case 5.

Trip of the large motor during run up in Case 6 showed system stability and recovery. Complete reports of actions, calculations and plots for the largest motor on the 6.6kV-SWGR (as a sample) are in the Attachments.

5.0 CONCLUSIONS

The calculations in this Report are based on assumed data and therefore it is considered as preliminary calculations only. At this stage, the results are adequate for equipment sizing. For the next phase of the project these calculations should be revisited when more information on equipment and the system is available.

- For all motor start cases under consideration bus and motor terminals voltage levels meet the acceptance criteria.
- Transient Stability Calculations showed full recovery of the system after clearing fault on the 22kV feeder with successful re-acceleration of all motor loads.
- Tripping of the largest motor on 6.6kV-SWGR during run up does not increase bus voltage.

6.0 LIST OF ATTACHMENTS

6.1 INPUT DATA

- Attachment 1, Input Data, SLD, 1 page.

6.2 TRANSIENT STABILITY CALCULATIONS REPORTS AND SINGLE LINE DIAGRAM

- Attachment 2, TS Case 1 - Results on SLD, 1 page; Summary Report, 1 page.
- Attachment 3, TS Case 2 - Results on SLD, 1 page; Summary Report, 1 page.
- Attachment 4, TS Case 3 - Results on SLD, 1 page; Summary Report, 2 page.
- Attachment 5, TS Case 4 - Action Summary (AS), 1 page.
- Attachment 6, TS Case 4 - Dynamic Stability Report (DSR), 22 pages.
- Attachment 7, TS Case 4 - Transient Stability Plots for largest 6.6kV Motor, 3 pages.



CALCULATION SHEET

Project: Karsto

Subject: Transient Stability Calculations

Job Number: 25474

Calculation No.: 25474-000-E0C-ES-00003

By: Victor Skavtine

Date: 11/21/08

Sheet No. : 10

Sheet Rev. 0

- Attachment 8, TS Case 5 -Action Summary, 1 page.
- Attachment 9, TS Case 5 - Dynamic Stability Report, 35 pages.
- Attachment 10, TS Case 5 -Transient Stability Plots for largest 6.6kV Motor, 3 pages.
- Attachment 11, TS Case 6 -Action Summary, 1 page.
- Attachment 12, TS Case 6 - Dynamic Stability Report, 19 pages.
- Attachment 13, TS Case 6 -Transient Stability Plots for largest 6.6kV Motor, 4 pages.



CALCULATION SHEET

Project: Karsto

Subject: Transient Stability Calculations

Job Number: 25474

Calculation No.: 25474-000-E0C-ES-00003

By: Victor Skavitine

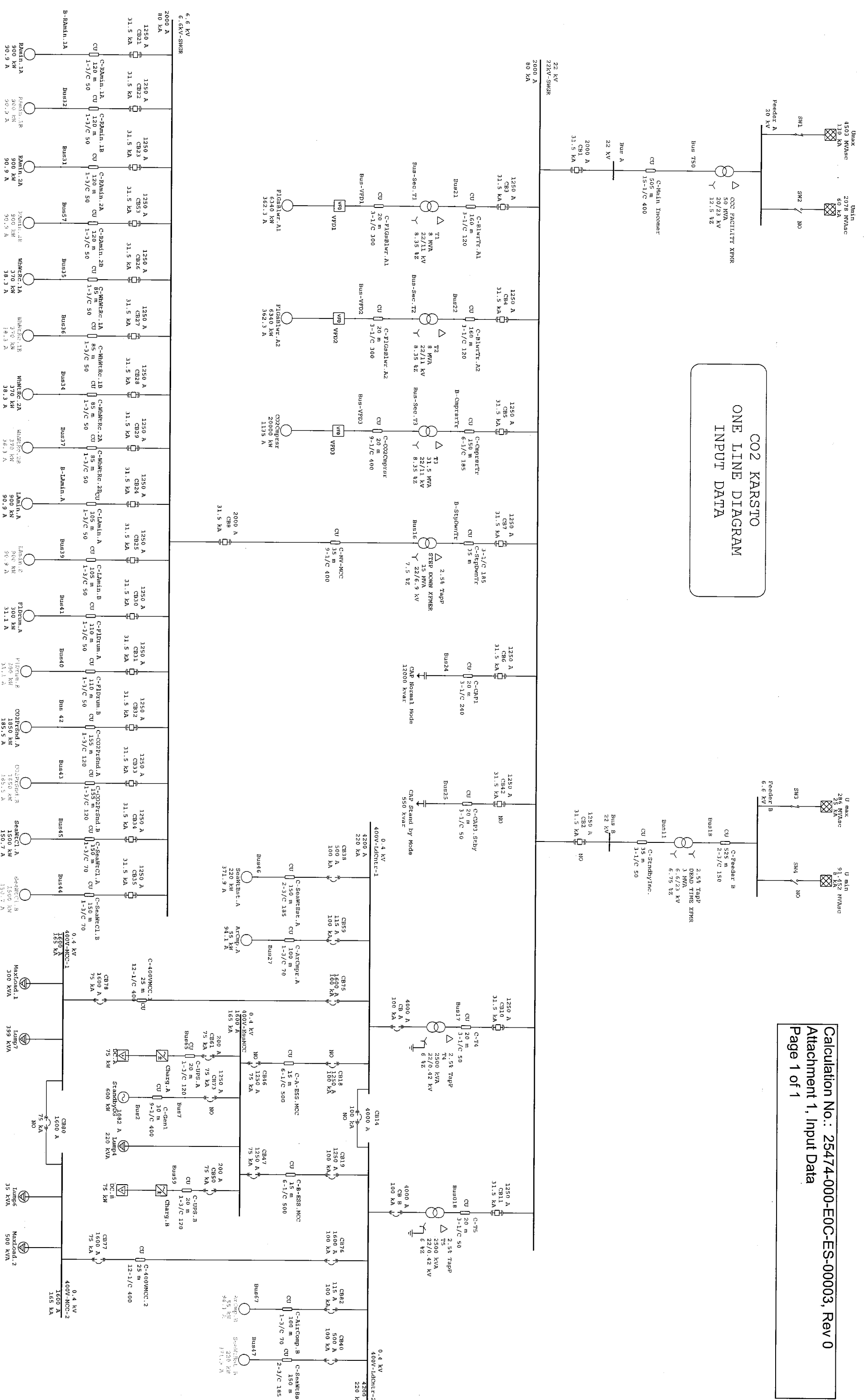
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Sheet No. : 11

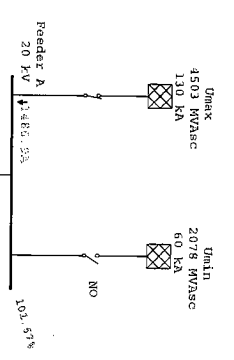
Sheet Rev. 0

ATTACHMENTS

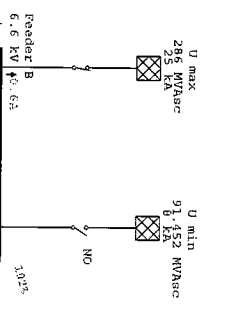
CO2 KARSTO ONE LINE DIAGRAM INPUT DATA



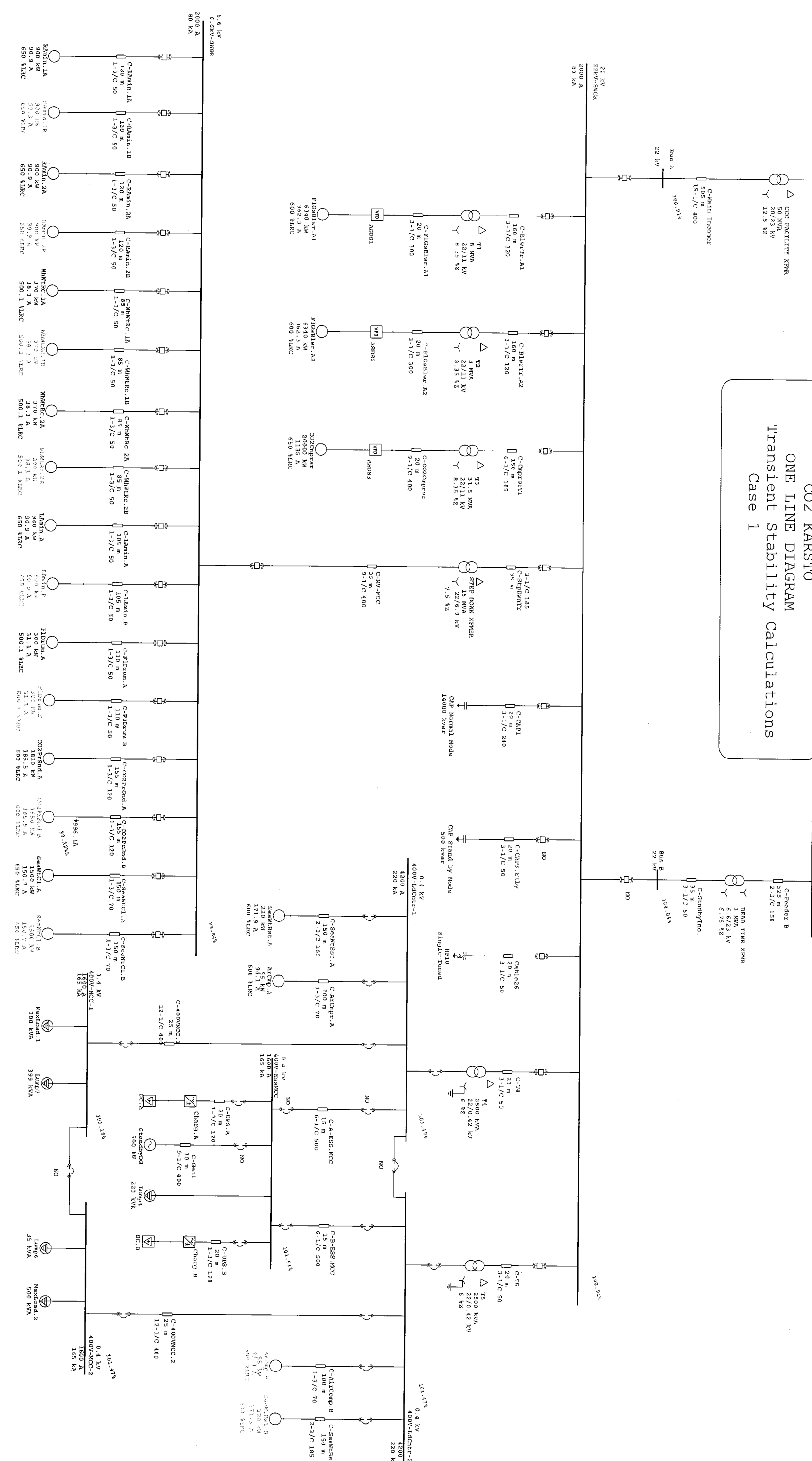
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Attachment 1, Input Data
Page 1 of 1



CO2 KARSTO
ONE LINE DIAGRAM
 Transient Stability Calculations
 Case 1

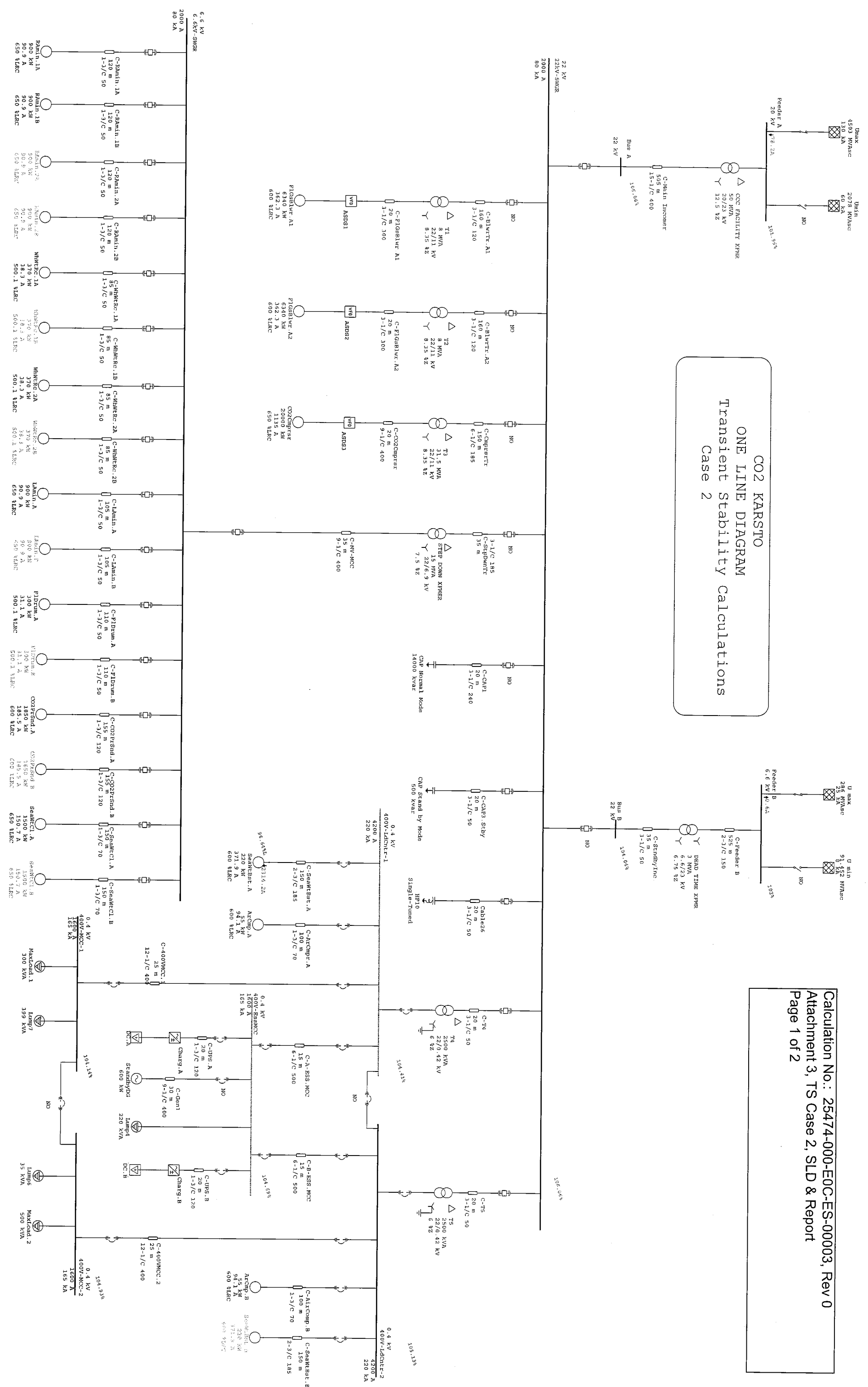


Calculation No.: 25474-000-E0C-ES-00003, Rev 0
 Attachment 2, TS Case 1, SLD & Report
 Page 1 of 2



CO2 KARSTO
ONE LINE DIAGRAM
 Transient Stability Calculations
 Case 2

Calculation No.: 25474-000-EOC-ES-00003, Rev 0
 Attachment 3, TS Case 2, SLD & Report
 Page 1 of 2



Project: CO2 Karsto
 Location: Karsto, South-West of Norway
 Contract: Bechtel 25474
 Engineer: Victor Skavitine
 Filename: KARSTO

ETAP
 6.0.0C

Study Case: TS Case1RevA

Page: 1
 Date: 20-11-2008
 SN: BANTRELENG
 Revision: Base
 Config.: UmaxLnrnV102

Preliminary Design

% Alert Settings

	<u>Critical</u>	<u>Marginal</u>	
<u>Starting Motors/MOV</u>			
MOV Terminal Voltage	≤ 80.00	90.00	(Vmtr, rate)
Motor Terminal Voltage	≤ 80.00	90.00	(Vmtr, rate)
Failed to Start, Slip Kept	≥ 5.00		
<u>Generator/Engine/Exciter Rating</u>			<u>Min. Span (Sec.)</u>
Generator Rating	100.00	95.00	0.00
Engine Continuous Rating	100.00	95.00	0.00
Engine Peak Rating	100.00	95.00	0.00
Exciter Peak Rating	100.00	95.00	0.00
<u>Bus Voltage Group</u>			<u>Min. Dip Width (Sec.)</u>
Starting Motor Bus	VBus ≤ 85.00	90.00	0.00
Grid/Generator Bus	VBus ≤ 85.00	90.00	1.50
HV Bus, kV ≥ 10.00	VBus ≤ 90.00	95.00	0.00
MV Bus, 10.00 > kV > 1.00	VBus ≤ 85.00	90.00	0.00
LV Bus, kV ≤ 1.00	VBus ≤ 85.00	90.00	0.00

Project: CO2 Karsto
 Location: Karsto, South-West of Norway
 Contract: Bechtel 25474
 Engineer: Victor Skavitine
 Filename: KARSTO

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 6.0.0C

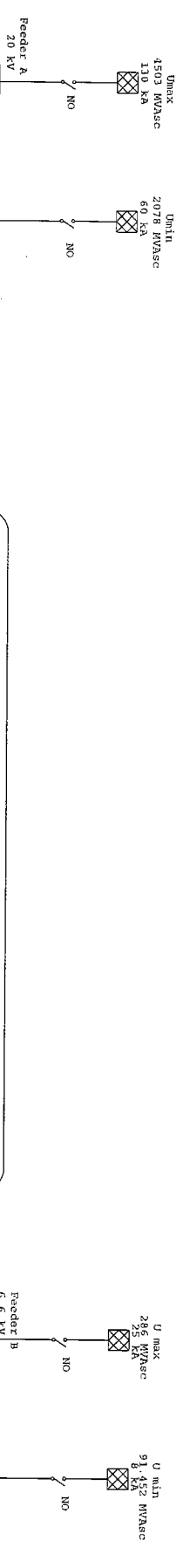
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Page: 1
 Date: 20-11-2008
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 Revision: Base
 Config.: UmaxLminV102

Preliminary Design

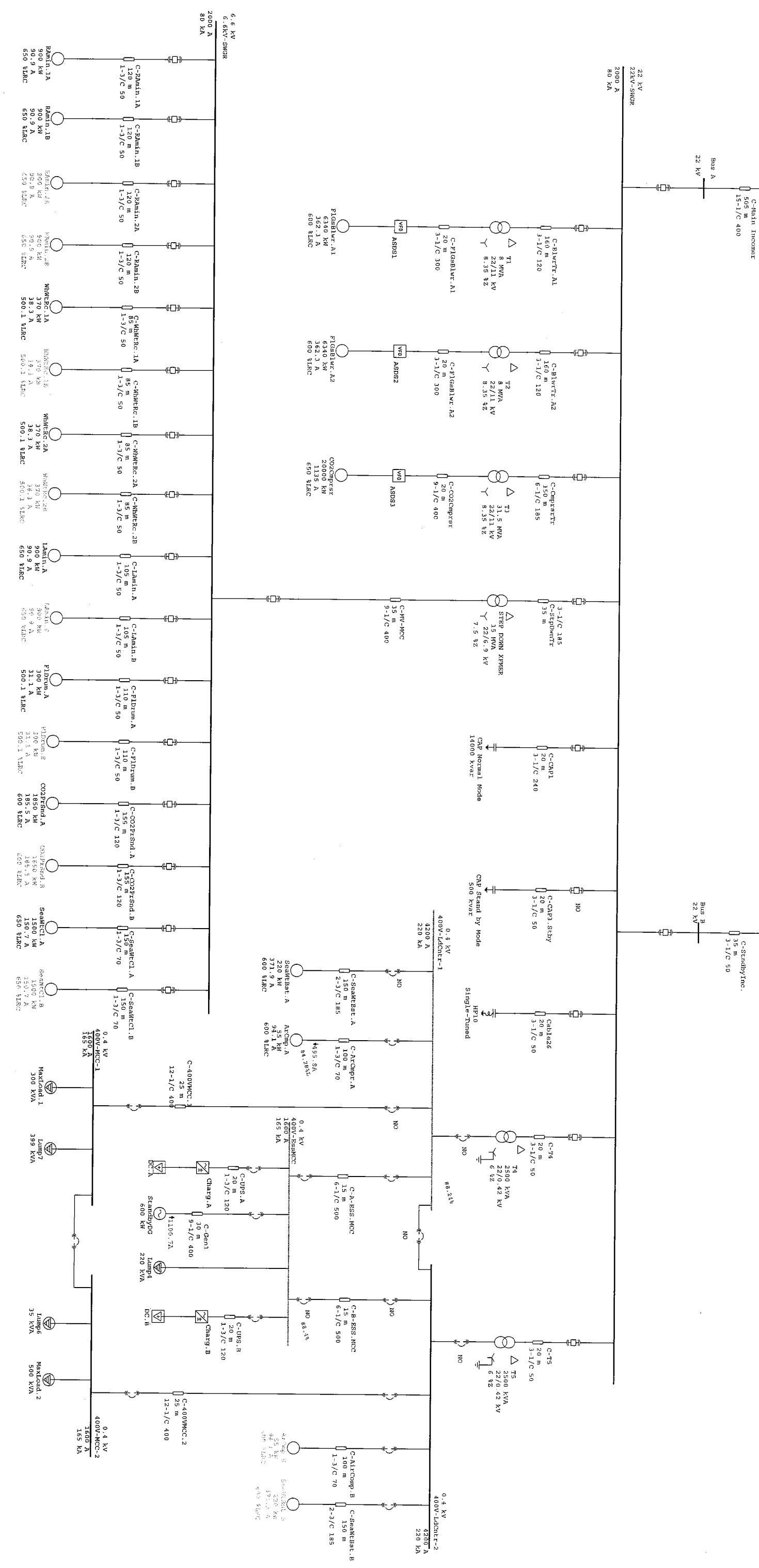
% Alert Settings

	<u>Critical</u>	<u>Marginal</u>	
<u>Starting Motors/MOV</u>			
MOV Terminal Voltage	≤ 82.00	90.00 (Vmtr, rate)	
Motor Terminal Voltage	≤ 82.00	90.00 (Vmtr, rate)	
Failed to Start, Slip Kept	≥ 5.00		
<u>Generator/Engine/Exciter Rating</u>			
			<u>Min. Span (Sec.)</u>
Generator Rating	100.00	95.00	0.00
Engine Continuous Rating	100.00	95.00	0.00
Engine Peak Rating	100.00	95.00	0.00
Exciter Peak Rating	100.00	95.00	0.00
<u>Bus Voltage Group</u>			
			<u>Min. Dip Width (Sec.)</u>
Starting Motor Bus	VBus ≤ 82.00	90.00	0.00
Grid/Generator Bus	VBus ≤ 90.00	95.00	0.00
HV Bus, kV ≥ 10.00	VBus ≤ 90.00	95.00	0.00
MV Bus, 10.00 > kV > 1.00	VBus ≤ 85.00	90.00	0.00
LV Bus, kV ≤ 1.00	VBus ≤ 85.00	90.00	0.00



CO2 KARSTO ONE LINE DIAGRAM Transient Stability Calculations Case 3

Calculation No.: 25474-000-E0C-ES-00003, Rev 0
Attachment 4, TS Case 3, SLD & Report
Page 1 of 3



Project: CO2 Karsto
 Location: Karsto, South-West of Norway
 Contract: Bechtel 25474
 Engineer: Victor Skavitine
 Filename: KARSTO

ETAP
 6.0.0C

Study Case: TS Case3RevA

Page: 1
 Date: 20-11-2008
 SN: BANTRELENG
 Revision: Base
 Config.: StandByGen

Preliminary Design

% Alert Settings

	<u>Critical</u>	<u>Marginal</u>	
<u>Starting Motors/MOV</u>			
MOV Terminal Voltage	≤ 82.00	90.00 (Vmtr, rate)	
Motor Terminal Voltage	≤ 82.00	90.00 (Vmtr, rate)	
Failed to Start, Slip Kept	≥ 5.00		
<u>Generator/Engine/Exciter Rating</u>			<u>Min. Span (Sec.)</u>
Generator Rating	100.00	95.00	0.00
Engine Continuous Rating	100.00	95.00	0.00
Engine Peak Rating	100.00	95.00	0.00
Exciter Peak Rating	100.00	95.00	0.00
<u>Bus Voltage Group</u>			<u>Min. Dip Width (Sec.)</u>
Starting Motor Bus	VBus ≤ 82.00	90.00	0.00
Grid/Generator Bus	VBus ≤ 85.00	95.00	0.00
HV Bus, kV ≥ 10.00	VBus ≤ 90.00	95.00	0.00
MV Bus, 10.00 > kV > 1.00	VBus ≤ 85.00	90.00	0.00
LV Bus, kV ≤ 1.00	VBus ≤ 85.00	90.00	0.00

Critical Report

DeviceID	Type	Alert	Condition	Rating/Limit	Unit	Operating	% Operating	T Begin	Duration
StandbyDG	Generator	Exciter Peak Rating	Over Rating	0.400	Mvar	0.483	120.7	0.000	0.640
Bus27	LV Bus	Bus Voltage	Under Voltage	0.400	kV	0.337	84.3	0.000	0.020

Marginal Report

DeviceID	Type	Alert	Condition	Rating/Limit	Unit	Operating	% Operating	T Begin	Duration
ArCmp A	Motor	Motor Voltage	Under Voltage	0.400	kV	0.337	84.3	0.000	0.760
StandbyDG	Generator	Engine Rating	Over Rating	0.500	MW	0.476	95.2	0.000	0.000
StandbyDG	Generator	Engine Peak Rating	Over Rating	0.500	MW	0.476	95.2	0.000	0.000
StandbyDG	Generator	Exciter Peak Rating	Over Rating	0.400	Mvar	0.400	99.9	0.660	0.100
400V-EssMCC	LV Bus	Bus Voltage	Under Voltage	0.400	kV	0.354	88.4	0.000	0.120
400V-LdCntr-1	LV Bus	Bus Voltage	Under Voltage	0.400	kV	0.353	88.2	0.000	0.140
Bus2	Generator Bus	Bus Voltage	Under Voltage	0.400	kV	0.356	88.9	0.000	0.800
Bus2	LV Bus	Bus Voltage	Under Voltage	0.400	kV	0.356	88.9	0.000	0.080
Bus7	LV Bus	Bus Voltage	Under Voltage	0.400	kV	0.354	88.4	0.000	0.120
Bus27	Motor Bus	Bus Voltage	Under Voltage	0.400	kV	0.337	84.3	0.000	0.760
Bus27	LV Bus	Bus Voltage	Under Voltage	0.400	kV	0.340	85.1	0.040	0.720
Bus59	LV Bus	Bus Voltage	Under Voltage	0.400	kV	0.352	88.1	0.000	0.160

Project: CO2 Karsto
 Location: Karsto, South-West of Norway
 Contract: Bechtel 25474
 Engineer: Victor Skavitine
 Filename: KARSTO

ETAP
 6.0.0C

Study Case: TS Case3RevA

Page: 2
 Date: 20-11-2008
 SN: BANTRELENG
 Revision: Base
 Config.: StandByGen

Preliminary Design

Marginal Report

DeviceID	Type	Alert	Condition	Rating/Limit	Unit	Operating	% Operating	T Begin	Duration
Bus65	LV Bus	Bus Voltage	Under Voltage	0.400	kV	0.352	88.1	0.000	0.160

Project: CO2 Karsto
Location: Karsto, South-West of Norway
Contract: Bechtel 25474
Engineer: Victor Skavitine
Filename: KARSTO

ETAP
6.0.0C

Study Case: TS Case4RevA

Page: 1
Date: 20-11-2008
SN: BANTRELENG
Revision: Base
Config.: UmaxLnrmV102

Preliminary Design

Action Summary

Event ID	Time (Sec.)	Device Type	Device ID	Action
Event 1	0.100	Cable	C-B1wrTr.A2	Fault @ 50.00%
Clean Fault	0.200	Protective Device	CB4	Open

Project: CO2 Karsto
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ETAP
 6.0.0C

Study Case: TS Case4RevA

Page: 1
 Date: 20-11-2008
 SN: BANTRELENG
 Revision: Base
 Config.: UmaxLnrnV102

Preliminary Design

Dynamic Stability

Device ID: CO2PrSnd.A
 Device Type: Ind. Motor

Time (Sec.)	Slip (%)	Mech. MW	Elec. MW	Amp	Term. V (% Bus Nom.)	% Z	Time (Sec.)	Slip (%)	Mech. MW	Elec. MW	Amp	Term. V (% Bus Nom.)	% Z
0.000	0.89	1.931	1.967	181.6	102.06	104.30	0.020	0.89	1.931	1.967	181.6	102.06	104.30
0.040	0.89	1.931	1.967	181.6	102.06	104.30	0.060	0.89	1.931	1.967	181.6	102.06	104.30
0.080	0.89	1.931	1.967	181.6	102.06	104.31	0.100	0.89	1.931	1.967	181.6	102.07	104.31
0.101	0.89	1.931	0.055	587.5	29.13	9.20	0.121	3.11	1.831	0.020	494.8	22.38	8.39
0.141	5.21	1.734	0.043	409.6	17.10	7.74	0.161	7.19	1.645	0.070	335.6	12.81	7.08
0.181	9.05	1.563	0.079	274.0	9.20	6.23	0.200	10.74	1.489	0.069	226.1	6.20	5.09
0.201	10.92	1.481	1.869	734.3	62.22	15.72	0.221	11.48	1.456	1.055	667.8	68.97	19.16
0.241	12.44	1.415	1.024	588.0	74.73	23.58	0.261	12.99	1.391	1.630	548.4	77.47	26.21
0.281	12.77	1.399	2.325	572.7	77.89	25.23	0.301	12.01	1.431	2.684	617.1	77.63	23.34
0.321	11.10	1.470	2.713	642.6	77.72	22.44	0.341	10.27	1.506	2.618	644.3	78.30	22.55
0.361	9.57	1.537	2.550	632.0	79.13	23.23	0.381	8.91	1.566	2.559	615.8	80.00	24.11
0.401	8.21	1.597	2.633	600.7	80.83	24.97	0.421	7.42	1.631	2.736	587.4	81.64	25.79
0.441	6.54	1.670	2.837	573.7	82.51	26.68	0.461	5.58	1.713	2.915	556.9	83.49	27.82
0.481	4.57	1.759	2.956	534.6	84.66	29.38	0.501	3.56	1.806	2.948	505.7	86.04	31.57
0.521	2.59	1.850	2.877	469.6	87.62	34.62	0.541	1.74	1.890	2.731	427.2	89.39	38.82
0.561	1.09	1.920	2.515	380.8	91.25	44.46	0.581	0.69	1.939	2.257	334.5	93.12	51.66
0.601	0.56	1.946	2.008	292.7	94.88	60.14	0.621	0.65	1.942	1.828	259.6	96.45	68.95
0.641	0.87	1.932	1.758	237.0	97.78	76.55	0.661	1.09	1.921	1.795	224.9	98.86	81.57
0.681	1.23	1.915	1.898	220.7	99.69	83.83	0.701	1.25	1.914	2.010	220.1	100.32	84.59
0.721	1.16	1.918	2.082	218.8	100.79	85.49	0.741	1.02	1.924	2.098	214.5	101.17	87.50
0.761	0.90	1.930	2.066	207.6	101.50	90.72	0.781	0.83	1.933	2.012	199.7	101.79	94.59
0.801	0.81	1.934	1.964	192.7	102.05	98.23	0.821	0.83	1.933	1.937	188.1	102.28	100.92
0.841	0.87	1.931	1.934	185.7	102.48	102.39	0.861	0.90	1.930	1.946	185.0	102.64	102.94
0.881	0.92	1.929	1.963	185.0	102.77	103.07	0.901	0.91	1.929	1.975	185.0	102.86	103.18
0.921	0.90	1.930	1.981	184.6	102.93	103.48	0.941	0.89	1.931	1.981	183.8	102.98	103.94
0.961	0.87	1.931	1.978	183.0	103.03	104.47	0.981	0.86	1.932	1.974	182.2	103.07	104.96
1.001	0.86	1.932	1.970	181.5	103.10	105.38	1.021	0.86	1.932	1.968	181.0	103.14	105.73
1.041	0.86	1.932	1.965	180.6	103.17	106.02	1.061	0.86	1.932	1.964	180.2	103.19	106.25
1.081	0.87	1.932	1.963	180.0	103.21	106.40	1.101	0.87	1.931	1.964	179.9	103.23	106.47

Project: CO2 Karsto
 Location: Karsto, South-West of Norway
 Contract: Bechtel 25474
 Engineer: Victor Skavitine
 Filename: KARSTO

ETAP
 6.0.0C

Study Case: TS Case4RevA

Page: 2
 Date: 20-11-2008
 SN: BANTRELENG
 Revision: Base
 Config.: UmaxLrnmV102

Preliminary Design

Device ID: CO2PrSnd.A
 Device Type: Ind. Motor

Time (Sec.)	Slip (%)	Mech. MW	Elec. MW	Amp	Term. V (% Bus Nom.)	% Z	Time (Sec.)	Slip (%)	Mech. MW	Elec. MW	Amp	Term. V (% Bus Nom.)	% Z
1.121	0.87	1.931	1.967	179.9	103.24	106.46	1.141	0.87	1.931	1.969	180.0	103.24	106.41
1.161	0.87	1.931	1.970	180.1	103.25	106.38	1.181	0.86	1.932	1.971	180.0	103.25	106.41
1.201	0.86	1.932	1.970	179.9	103.26	106.49	1.221	0.86	1.932	1.968	179.7	103.27	106.61
1.241	0.86	1.932	1.966	179.5	103.27	106.73	1.261	0.86	1.932	1.965	179.4	103.28	106.80
1.281	0.86	1.932	1.965	179.4	103.28	106.82	1.301	0.86	1.932	1.966	179.4	103.28	106.80
1.321	0.87	1.932	1.967	179.5	103.28	106.76	1.341	0.86	1.932	1.968	179.6	103.28	106.72
1.361	0.86	1.932	1.968	179.6	103.28	106.71	1.381	0.86	1.932	1.968	179.6	103.28	106.73
1.401	0.86	1.932	1.968	179.5	103.28	106.76	1.421	0.86	1.932	1.967	179.4	103.29	106.79
1.441	0.86	1.932	1.967	179.4	103.29	106.82	1.461	0.86	1.932	1.967	179.4	103.29	106.83
1.481	0.86	1.932	1.967	179.4	103.29	106.82	1.501	0.86	1.932	1.967	179.4	103.29	106.81
1.521	0.86	1.932	1.967	179.4	103.29	106.80	1.541	0.86	1.932	1.967	179.4	103.29	106.80
1.561	0.86	1.932	1.967	179.5	103.29	106.79	1.581	0.86	1.932	1.967	179.4	103.29	106.80
1.601	0.86	1.932	1.967	179.4	103.29	106.81	1.621	0.86	1.932	1.967	179.4	103.29	106.81
1.641	0.86	1.932	1.967	179.4	103.29	106.82	1.661	0.86	1.932	1.967	179.4	103.29	106.82
1.681	0.86	1.932	1.967	179.4	103.29	106.82	1.701	0.86	1.932	1.967	179.4	103.29	106.81
1.721	0.86	1.932	1.967	179.4	103.29	106.81	1.741	0.86	1.932	1.967	179.4	103.29	106.81
1.761	0.86	1.932	1.967	179.4	103.29	106.81	1.781	0.86	1.932	1.967	179.4	103.29	106.81
1.801	0.86	1.932	1.967	179.4	103.29	106.81	1.821	0.86	1.932	1.967	179.4	103.29	106.81
1.841	0.86	1.932	1.967	179.4	103.29	106.81	1.861	0.86	1.932	1.967	179.4	103.29	106.81
1.881	0.86	1.932	1.967	179.4	103.29	106.81	1.901	0.86	1.932	1.967	179.4	103.29	106.81
1.921	0.86	1.932	1.967	179.4	103.29	106.81	1.941	0.86	1.932	1.967	179.4	103.29	106.81
1.961	0.86	1.932	1.967	179.4	103.29	106.81	1.981	0.86	1.932	1.967	179.4	103.29	106.81
2.000	0.86	1.932	1.967	179.4	103.29	106.81							

Device ID: FIDrum.A
 Device Type: Ind. Motor

Time (Sec.)	Slip (%)	Mech. MW	Elec. MW	Amp	Term. V (% Bus Nom.)	% Z	Time (Sec.)	Slip (%)	Mech. MW	Elec. MW	Amp	Term. V (% Bus Nom.)	% Z
0.000	1.48	0.302	0.319	30.5	102.18	104.29	0.020	1.48	0.302	0.319	30.5	102.18	104.29
0.040	1.48	0.302	0.319	30.5	102.18	104.29	0.060	1.48	0.302	0.319	30.5	102.18	104.29
0.080	1.48	0.302	0.319	30.5	102.18	104.29	0.100	1.48	0.302	0.319	30.5	102.18	104.29
0.101	1.48	0.302	-0.024	86.6	28.91	10.38	0.121	4.94	0.277	0.012	64.0	22.18	10.77
0.141	7.71	0.257	0.031	48.5	16.92	10.85	0.161	10.10	0.241	0.033	37.8	12.67	10.42

Project: CO2 Karsto
 Location: Karsto, South-West of Norway
 Contract: Bechtel 25474
 Engineer: Victor Skavifine
 Filename: KARSTO

ETAP
 6.0.0C

Study Case: TS Case4RevA

Page: 3
 Date: 20-11-2008
 SN: BANTRELENG
 Revision: Base
 Config.: UmaxLarmV102

Preliminary Design

Device ID: FIDrum.A
 Device Type: Ind. Motor

Time (Sec.)	Slip (%)	Mech. MW	Elec. MW	Amp	Term. V (% Bus Nom.)	% Z	Time (Sec.)	Slip (%)	Mech. MW	Elec. MW	Amp	Term. V (% Bus Nom.)	% Z
0.181	12.33	0.225	0.026	30.1	9.10	9.39	0.200	14.39	0.212	0.016	24.1	6.15	7.94
0.201	14.60	0.210	0.190	112.8	62.68	17.28	0.221	16.90	0.195	0.105	82.3	69.34	26.18
0.241	18.08	0.188	0.295	75.8	75.02	30.76	0.261	17.50	0.191	0.475	92.7	77.76	26.07
0.281	16.37	0.198	0.496	102.3	78.23	23.77	0.301	15.59	0.203	0.448	101.4	78.02	23.92
0.321	15.13	0.206	0.420	97.4	78.13	24.94	0.341	14.70	0.209	0.428	95.1	78.70	25.73
0.361	14.12	0.213	0.450	94.9	79.52	26.04	0.381	13.38	0.218	0.469	95.2	80.38	26.25
0.401	12.52	0.223	0.482	94.9	81.20	26.62	0.421	11.58	0.230	0.493	93.7	82.01	27.21
0.441	10.57	0.237	0.502	92.0	82.87	28.02	0.461	9.46	0.244	0.511	89.7	83.85	29.06
0.481	8.27	0.253	0.519	86.8	85.00	30.43	0.501	7.01	0.261	0.522	83.2	86.36	32.29
0.521	5.71	0.271	0.518	78.5	87.93	34.84	0.541	4.45	0.280	0.503	72.6	89.66	38.39
0.561	3.30	0.288	0.476	65.7	91.50	43.32	0.581	2.37	0.295	0.435	58.0	93.33	50.04
0.601	1.76	0.299	0.389	50.3	95.07	58.71	0.621	1.48	0.302	0.345	43.6	96.62	68.86
0.641	1.48	0.302	0.316	38.6	97.94	78.94	0.661	1.63	0.301	0.306	35.5	99.01	86.72
0.681	1.76	0.300	0.311	34.1	99.84	90.92	0.701	1.81	0.299	0.322	33.8	100.47	92.36
0.721	1.75	0.300	0.331	33.7	100.95	93.00	0.741	1.64	0.300	0.334	33.4	101.32	94.22
0.761	1.53	0.301	0.331	32.8	101.64	96.27	0.781	1.46	0.302	0.326	32.1	101.92	98.70
0.801	1.43	0.302	0.321	31.5	102.18	100.92	0.821	1.43	0.302	0.319	31.0	102.41	102.55
0.841	1.45	0.302	0.318	30.8	102.61	103.60	0.861	1.46	0.302	0.318	30.7	102.77	104.25
0.881	1.47	0.302	0.319	30.6	102.89	104.66	0.901	1.48	0.302	0.319	30.5	102.99	104.94
0.921	1.47	0.302	0.320	30.5	103.05	105.12	0.941	1.47	0.302	0.320	30.5	103.11	105.23
0.961	1.46	0.302	0.321	30.4	103.15	105.34	0.981	1.45	0.302	0.321	30.4	103.19	105.51
1.001	1.44	0.302	0.320	30.3	103.22	105.75	1.021	1.43	0.302	0.319	30.3	103.26	106.03
1.041	1.43	0.302	0.319	30.2	103.29	106.29	1.061	1.44	0.302	0.319	30.2	103.31	106.47
1.081	1.44	0.302	0.319	30.2	103.33	106.56	1.101	1.44	0.302	0.319	30.2	103.35	106.56
1.121	1.45	0.302	0.319	30.2	103.36	106.53	1.141	1.44	0.302	0.319	30.2	103.36	106.50
1.161	1.44	0.302	0.319	30.2	103.37	106.50	1.181	1.44	0.302	0.319	30.2	103.37	106.53
1.201	1.44	0.302	0.319	30.2	103.38	106.58	1.221	1.44	0.302	0.319	30.1	103.38	106.63
1.241	1.44	0.302	0.319	30.1	103.39	106.68	1.261	1.44	0.302	0.319	30.1	103.39	106.72
1.281	1.44	0.302	0.319	30.1	103.40	106.73	1.301	1.44	0.302	0.319	30.1	103.40	106.73
1.321	1.44	0.302	0.319	30.1	103.40	106.72	1.341	1.44	0.302	0.319	30.1	103.40	106.71
1.361	1.44	0.302	0.319	30.1	103.40	106.70	1.381	1.44	0.302	0.319	30.1	103.40	106.70
1.401	1.44	0.302	0.319	30.1	103.40	106.71	1.421	1.44	0.302	0.319	30.1	103.40	106.72

Project: CO2 Karsto
Location: Karsto, South-West of Norway
Contract: Bechtel 25474
Engineer: Victor Skavitine
Filename: KARSTO

ETAP
6.0.0C
Study Case: TS Case4RevA

Page: 4
Date: 20-11-2008
SN: BANTRELENG
Revision: Base
Config.: UmaxLrnmV102

Preliminary Design

Device ID: FIDrum.A
Device Type: Ind. Motor

Time (Sec.)	Slip (%)	Mech. MW	Elec. MW	Amp	Term. V (% Bus Nom.)	% Z	Time (Sec.)	Slip (%)	Mech. MW	Elec. MW	Amp	Term. V (% Bus Nom.)	% Z
1.441	1.44	0.302	0.319	30.1	103.40	106.74	1.461	1.44	0.302	0.319	30.1	103.41	106.75
1.481	1.44	0.302	0.319	30.1	103.41	106.75	1.501	1.44	0.302	0.319	30.1	103.41	106.75
1.521	1.44	0.302	0.319	30.1	103.41	106.74	1.541	1.44	0.302	0.319	30.1	103.41	106.74
1.561	1.44	0.302	0.319	30.1	103.41	106.74	1.581	1.44	0.302	0.319	30.1	103.41	106.74
1.601	1.44	0.302	0.319	30.1	103.41	106.74	1.621	1.44	0.302	0.319	30.1	103.41	106.74
1.641	1.44	0.302	0.319	30.1	103.41	106.74	1.661	1.44	0.302	0.319	30.1	103.41	106.75
1.681	1.44	0.302	0.319	30.1	103.41	106.75	1.701	1.44	0.302	0.319	30.1	103.41	106.75
1.721	1.44	0.302	0.319	30.1	103.41	106.74	1.741	1.44	0.302	0.319	30.1	103.41	106.74
1.761	1.44	0.302	0.319	30.1	103.41	106.74	1.781	1.44	0.302	0.319	30.1	103.41	106.74
1.801	1.44	0.302	0.319	30.1	103.41	106.74	1.821	1.44	0.302	0.319	30.1	103.41	106.74
1.841	1.44	0.302	0.319	30.1	103.41	106.74	1.861	1.44	0.302	0.319	30.1	103.41	106.74
1.881	1.44	0.302	0.319	30.1	103.41	106.75	1.901	1.44	0.302	0.319	30.1	103.41	106.74
1.921	1.44	0.302	0.319	30.1	103.41	106.74	1.941	1.44	0.302	0.319	30.1	103.41	106.74
1.961	1.44	0.302	0.319	30.1	103.41	106.74	1.981	1.44	0.302	0.319	30.1	103.41	106.74
2.000	1.44	0.302	0.319	30.1	103.41	106.74							

Device ID: 22kV-SWGR
Device Type: Bus

Time (Sec.)	V Ang. (Deg.)	Freq. (Hz)	MW	Mvar	V/Hz (%)	Bus V (% Nom.)	Time (Sec.)	V Ang. (Deg.)	Freq. (Hz)	MW	Mvar	V/Hz (%)	Bus V (% Nom.)
0.000	22.15	50.00	0.000	0.000	104.21	104.21	0.020	22.15	50.00	0.000	0.000	104.21	104.21
0.040	22.15	50.00	0.000	0.000	104.21	104.21	0.060	22.15	50.00	0.000	0.000	104.21	104.21
0.080	22.15	50.00	0.000	0.000	104.21	104.21	0.100	22.15	50.00	0.000	0.000	104.21	104.21
0.101	-23.53	50.00	0.000	0.000	1.46	1.46	0.121	-23.84	50.00	0.000	0.000	1.41	1.41
0.141	-24.25	50.00	0.000	0.000	1.37	1.37	0.161	-24.37	50.00	0.000	0.000	1.32	1.32
0.181	-23.98	50.00	0.000	0.000	1.29	1.29	0.200	-23.14	50.00	0.000	0.000	1.27	1.27
0.201	22.35	50.00	0.000	0.000	90.02	90.02	0.221	23.00	50.00	0.000	0.000	92.47	92.47
0.241	22.99	50.00	0.000	0.000	94.64	94.64	0.261	22.59	50.00	0.000	0.000	95.60	95.60
0.281	22.27	50.00	0.000	0.000	95.71	95.71	0.301	22.20	50.00	0.000	0.000	95.61	95.61
0.321	22.28	50.00	0.000	0.000	95.67	95.67	0.341	22.36	50.00	0.000	0.000	95.90	95.90
0.361	22.39	50.00	0.000	0.000	96.22	96.22	0.381	22.36	50.00	0.000	0.000	96.54	96.54
0.401	22.29	50.00	0.000	0.000	96.84	96.84	0.421	22.23	50.00	0.000	0.000	97.12	97.12
0.441	22.17	50.00	0.000	0.000	97.43	97.43	0.461	22.14	50.00	0.000	0.000	97.79	97.79
0.481	22.14	50.00	0.000	0.000	98.23	98.23	0.501	22.18	50.00	0.000	0.000	98.75	98.75
0.521	22.25	50.00	0.000	0.000	99.35	99.35	0.541	22.39	50.00	0.000	0.000	100.04	100.04

Project: CO2 Karsto
 Location: Karsto, South-West of Norway
 Contract: Bechtel 25474
 Engineer: Victor Skavitine
 Filename: KARSTO

ETAP
 6.0.0C

Study Case: TS Case4RevA

Page: 5
 Date: 20-11-2008
 SN: BANTRELENG
 Revision: Base
 Config.: UmaxLnrmV102

Preliminary Design

Device ID: 22kV-SWGR
 Device Type: Bus

Time (Sec.)	V Ang. (Deg.)	Freq. (Hz)	MW	Mvar	V/Hz (%)	Bus V (% Nom.)	Time (Sec.)	V Ang. (Deg.)	Freq. (Hz)	MW	Mvar	V/Hz (%)	Bus V (% Nom.)
0.561	22.56	50.00	0.000	0.000	100.76	100.76	0.581	22.78	50.00	0.000	0.000	101.50	101.50
0.601	23.00	50.00	0.000	0.000	102.19	102.19	0.621	23.20	50.00	0.000	0.000	102.81	102.81
0.641	23.35	50.00	0.000	0.000	103.33	103.33	0.661	23.42	50.00	0.000	0.000	103.74	103.74
0.681	23.42	50.00	0.000	0.000	104.06	104.06	0.701	23.37	50.00	0.000	0.000	104.28	104.28
0.721	23.31	50.00	0.000	0.000	104.45	104.45	0.741	23.27	50.00	0.000	0.000	104.58	104.58
0.761	23.26	50.00	0.000	0.000	104.70	104.70	0.781	23.27	50.00	0.000	0.000	104.81	104.81
0.801	23.31	50.00	0.000	0.000	104.91	104.91	0.821	23.36	50.00	0.000	0.000	105.01	105.01
0.841	23.39	50.00	0.000	0.000	105.09	105.09	0.861	23.41	50.00	0.000	0.000	105.15	105.15
0.881	23.41	50.00	0.000	0.000	105.20	105.20	0.901	23.39	50.00	0.000	0.000	105.23	105.23
0.921	23.38	50.00	0.000	0.000	105.25	105.25	0.941	23.37	50.00	0.000	0.000	105.27	105.27
0.961	23.36	50.00	0.000	0.000	105.28	105.28	0.981	23.37	50.00	0.000	0.000	105.30	105.30
1.001	23.37	50.00	0.000	0.000	105.31	105.31	1.021	23.38	50.00	0.000	0.000	105.33	105.33
1.041	23.39	50.00	0.000	0.000	105.34	105.34	1.061	23.39	50.00	0.000	0.000	105.35	105.35
1.081	23.39	50.00	0.000	0.000	105.36	105.36	1.101	23.39	50.00	0.000	0.000	105.36	105.36
1.121	23.38	50.00	0.000	0.000	105.37	105.37	1.141	23.38	50.00	0.000	0.000	105.37	105.37
1.161	23.38	50.00	0.000	0.000	105.37	105.37	1.181	23.38	50.00	0.000	0.000	105.37	105.37
1.201	23.38	50.00	0.000	0.000	105.37	105.37	1.221	23.38	50.00	0.000	0.000	105.38	105.38
1.241	23.39	50.00	0.000	0.000	105.38	105.38	1.261	23.39	50.00	0.000	0.000	105.38	105.38
1.281	23.39	50.00	0.000	0.000	105.38	105.38	1.301	23.39	50.00	0.000	0.000	105.38	105.38
1.321	23.39	50.00	0.000	0.000	105.38	105.38	1.341	23.38	50.00	0.000	0.000	105.38	105.38
1.361	23.38	50.00	0.000	0.000	105.38	105.38	1.381	23.38	50.00	0.000	0.000	105.38	105.38
1.401	23.38	50.00	0.000	0.000	105.38	105.38	1.421	23.39	50.00	0.000	0.000	105.38	105.38
1.441	23.39	50.00	0.000	0.000	105.38	105.38	1.461	23.39	50.00	0.000	0.000	105.38	105.38
1.481	23.39	50.00	0.000	0.000	105.38	105.38	1.501	23.39	50.00	0.000	0.000	105.38	105.38
1.521	23.39	50.00	0.000	0.000	105.38	105.38	1.541	23.39	50.00	0.000	0.000	105.38	105.38
1.561	23.39	50.00	0.000	0.000	105.38	105.38	1.581	23.39	50.00	0.000	0.000	105.38	105.38
1.601	23.39	50.00	0.000	0.000	105.38	105.38	1.621	23.39	50.00	0.000	0.000	105.39	105.39
1.641	23.39	50.00	0.000	0.000	105.39	105.39	1.661	23.39	50.00	0.000	0.000	105.39	105.39
1.681	23.39	50.00	0.000	0.000	105.39	105.39	1.701	23.39	50.00	0.000	0.000	105.39	105.39
1.721	23.39	50.00	0.000	0.000	105.39	105.39	1.741	23.39	50.00	0.000	0.000	105.39	105.39
1.761	23.39	50.00	0.000	0.000	105.39	105.39	1.781	23.39	50.00	0.000	0.000	105.39	105.39
1.801	23.39	50.00	0.000	0.000	105.39	105.39	1.821	23.39	50.00	0.000	0.000	105.39	105.39
1.841	23.39	50.00	0.000	0.000	105.39	105.39	1.861	23.39	50.00	0.000	0.000	105.39	105.39
1.881	23.39	50.00	0.000	0.000	105.39	105.39	1.901	23.39	50.00	0.000	0.000	105.39	105.39
1.921	23.39	50.00	0.000	0.000	105.39	105.39	1.941	23.39	50.00	0.000	0.000	105.39	105.39
1.961	23.39	50.00	0.000	0.000	105.39	105.39	1.981	23.39	50.00	0.000	0.000	105.39	105.39
2.000	23.39	50.00	0.000	0.000	105.39	105.39							

Project: CO2 Karsto
 Location: Karsto, South-West of Norway
 Contract: Bechtel 25474
 Engineer: Victor Skavitine
 Filename: KARSTO

ETAP
 6.0.0C
 Study Case: TS Case4RevA

Page: 6
 Date: 20-11-2008
 SN: BANTRELENG
 Revision: Base
 Config.: UmaxLrnmV102

Preliminary Design

Device ID: 400V-EssMCC
 Device Type: Bus

Time (Sec.)	V Ang. (Deg.)	Freq. (Hz)	MW	Mvar	V/Hz (%)	Bus V (% Nom.)	Time (Sec.)	V Ang. (Deg.)	Freq. (Hz)	MW	Mvar	V/Hz (%)	Bus V (% Nom.)
0.000	-9.00	50.00	0.190	0.118	104.92	104.92	0.020	-9.00	50.00	0.190	0.118	104.92	104.92
0.040	-9.00	50.00	0.190	0.118	104.92	104.92	0.060	-9.00	50.00	0.190	0.118	104.92	104.92
0.080	-9.00	50.00	0.190	0.118	104.92	104.92	0.100	-9.00	50.00	0.190	0.118	104.92	104.92
0.101	-54.68	50.00	0.000	0.000	1.47	1.47	0.121	-54.91	50.00	0.000	0.000	1.42	1.42
0.141	-55.32	50.00	0.000	0.000	1.38	1.38	0.161	-55.45	50.00	0.000	0.000	1.33	1.33
0.181	-55.05	50.00	0.000	0.000	1.30	1.30	0.200	-54.21	50.00	0.000	0.000	1.28	1.28
0.201	-9.10	50.00	0.180	0.111	90.25	90.25	0.221	-8.42	50.00	0.181	0.112	92.73	92.73
0.241	-8.37	50.00	0.183	0.113	94.98	94.98	0.261	-8.75	50.00	0.184	0.114	95.99	95.99
0.281	-9.06	50.00	0.184	0.114	96.10	96.10	0.301	-9.13	50.00	0.184	0.114	96.00	96.00
0.321	-9.06	50.00	0.184	0.114	96.06	96.06	0.341	-8.97	50.00	0.184	0.114	96.30	96.30
0.361	-8.94	50.00	0.184	0.114	96.63	96.63	0.381	-8.96	50.00	0.184	0.114	96.96	96.96
0.401	-9.01	50.00	0.185	0.114	97.27	97.27	0.421	-9.07	50.00	0.185	0.114	97.57	97.57
0.441	-9.12	50.00	0.185	0.114	97.89	97.89	0.461	-9.14	50.00	0.185	0.115	98.27	98.27
0.481	-9.13	50.00	0.186	0.115	98.72	98.72	0.501	-9.09	50.00	0.186	0.115	99.26	99.26
0.521	-9.00	50.00	0.186	0.115	99.89	99.89	0.541	-8.85	50.00	0.187	0.116	100.59	100.59
0.561	-8.66	50.00	0.188	0.116	101.35	101.35	0.581	-8.43	50.00	0.188	0.116	102.11	102.11
0.601	-8.19	50.00	0.189	0.117	102.83	102.83	0.621	-7.98	50.00	0.189	0.117	103.48	103.48
0.641	-7.82	50.00	0.190	0.117	104.01	104.01	0.661	-7.74	50.00	0.190	0.118	104.44	104.44
0.681	-7.73	50.00	0.190	0.118	104.77	104.77	0.701	-7.78	50.00	0.190	0.118	105.00	105.00
0.721	-7.84	50.00	0.191	0.118	105.18	105.18	0.741	-7.88	50.00	0.191	0.118	105.31	105.31
0.761	-7.88	50.00	0.191	0.118	105.43	105.43	0.781	-7.87	50.00	0.191	0.118	105.55	105.55
0.801	-7.82	50.00	0.191	0.118	105.65	105.65	0.821	-7.78	50.00	0.191	0.118	105.75	105.75
0.841	-7.74	50.00	0.191	0.118	105.83	105.83	0.861	-7.73	50.00	0.191	0.118	105.90	105.90
0.881	-7.73	50.00	0.191	0.118	105.95	105.95	0.901	-7.74	50.00	0.191	0.118	105.98	105.98
0.921	-7.76	50.00	0.191	0.118	106.01	106.01	0.941	-7.77	50.00	0.191	0.118	106.02	106.02
0.961	-7.77	50.00	0.191	0.118	106.04	106.04	0.981	-7.77	50.00	0.191	0.118	106.05	106.05
1.001	-7.76	50.00	0.191	0.118	106.07	106.07	1.021	-7.75	50.00	0.191	0.118	106.08	106.08
1.041	-7.74	50.00	0.191	0.118	106.10	106.10	1.061	-7.74	50.00	0.191	0.118	106.11	106.11
1.081	-7.74	50.00	0.191	0.118	106.12	106.12	1.101	-7.74	50.00	0.191	0.118	106.12	106.12
1.121	-7.75	50.00	0.191	0.118	106.12	106.12	1.141	-7.75	50.00	0.191	0.118	106.13	106.13
1.161	-7.75	50.00	0.191	0.118	106.13	106.13	1.181	-7.75	50.00	0.191	0.118	106.13	106.13
1.201	-7.75	50.00	0.191	0.118	106.13	106.13	1.221	-7.75	50.00	0.191	0.118	106.13	106.13
1.241	-7.75	50.00	0.191	0.118	106.14	106.14	1.261	-7.74	50.00	0.191	0.118	106.14	106.14
1.281	-7.74	50.00	0.191	0.118	106.14	106.14	1.301	-7.74	50.00	0.191	0.118	106.14	106.14
1.321	-7.75	50.00	0.191	0.118	106.14	106.14	1.341	-7.75	50.00	0.191	0.118	106.14	106.14
1.361	-7.75	50.00	0.191	0.118	106.14	106.14	1.381	-7.75	50.00	0.191	0.118	106.14	106.14
1.401	-7.75	50.00	0.191	0.118	106.14	106.14	1.421	-7.75	50.00	0.191	0.118	106.14	106.14
1.441	-7.75	50.00	0.191	0.118	106.14	106.14	1.461	-7.75	50.00	0.191	0.118	106.14	106.14
1.481	-7.75	50.00	0.191	0.118	106.14	106.14	1.501	-7.75	50.00	0.191	0.118	106.14	106.14

Project: CO2 Karsto
 Location: Karsto, South-West of Norway
 Contract: Bechtel 25474
 Engineer: Victor Skavitine
 Filename: KARSTO

ETAP
 6.0.0C
 Study Case: TS Case4RevA

Page: 7
 Date: 20-11-2008
 SN: BANTRELENG
 Revision: Base
 Config.: UmaxLnrnV102

Preliminary Design

Device ID: 400V-EssMCC
 Device Type: Bus

Time (Sec.)	V Ang. (Deg.)	Freq. (Hz)	MW	Mvar	V/Hz (%)	Bus V (% Nom.)	Time (Sec.)	V Ang. (Deg.)	Freq. (Hz)	MW	Mvar	V/Hz (%)	Bus V (% Nom.)
1.521	-7.75	50.00	0.191	0.118	106.14	106.14	1.541	-7.75	50.00	0.191	0.118	106.14	106.14
1.561	-7.75	50.00	0.191	0.118	106.14	106.14	1.581	-7.75	50.00	0.191	0.118	106.14	106.14
1.601	-7.75	50.00	0.191	0.118	106.14	106.14	1.621	-7.75	50.00	0.191	0.118	106.14	106.14
1.641	-7.75	50.00	0.191	0.118	106.14	106.14	1.661	-7.75	50.00	0.191	0.118	106.14	106.14
1.681	-7.75	50.00	0.191	0.118	106.14	106.14	1.701	-7.75	50.00	0.191	0.118	106.14	106.14
1.721	-7.75	50.00	0.191	0.118	106.14	106.14	1.741	-7.75	50.00	0.191	0.118	106.14	106.14
1.761	-7.75	50.00	0.191	0.118	106.14	106.14	1.781	-7.75	50.00	0.191	0.118	106.14	106.14
1.801	-7.75	50.00	0.191	0.118	106.14	106.14	1.821	-7.75	50.00	0.191	0.118	106.14	106.14
1.841	-7.75	50.00	0.191	0.118	106.14	106.14	1.861	-7.75	50.00	0.191	0.118	106.14	106.14
1.881	-7.75	50.00	0.191	0.118	106.14	106.14	1.901	-7.75	50.00	0.191	0.118	106.14	106.14
1.921	-7.75	50.00	0.191	0.118	106.14	106.14	1.941	-7.75	50.00	0.191	0.118	106.14	106.14
1.961	-7.75	50.00	0.191	0.118	106.14	106.14	1.981	-7.75	50.00	0.191	0.118	106.14	106.14
2.000	-7.75	50.00	0.191	0.118	106.14	106.14							

Device ID: 400V-LdCntr-1
 Device Type: Bus

Time (Sec.)	V Ang. (Deg.)	Freq. (Hz)	MW	Mvar	V/Hz (%)	Bus V (% Nom.)	Time (Sec.)	V Ang. (Deg.)	Freq. (Hz)	MW	Mvar	V/Hz (%)	Bus V (% Nom.)
0.000	-8.98	50.00	0.000	0.000	104.89	104.89	0.020	-8.98	50.00	0.000	0.000	104.89	104.89
0.040	-8.98	50.00	0.000	0.000	104.89	104.89	0.060	-8.98	50.00	0.000	0.000	104.89	104.89
0.080	-8.98	50.00	0.000	0.000	104.89	104.89	0.100	-8.98	50.00	0.000	0.000	104.89	104.89
0.101	-54.66	50.00	0.000	0.000	1.47	1.47	0.121	-54.87	50.00	0.000	0.000	1.42	1.42
0.141	-55.29	50.00	0.000	0.000	1.38	1.38	0.161	-55.42	50.00	0.000	0.000	1.33	1.33
0.181	-55.02	50.00	0.000	0.000	1.30	1.30	0.200	-54.17	50.00	0.000	0.000	1.28	1.28
0.201	-9.09	50.00	0.000	0.000	90.21	90.21	0.221	-8.41	50.00	0.000	0.000	92.68	92.68
0.241	-8.35	50.00	0.000	0.000	94.94	94.94	0.261	-8.73	50.00	0.000	0.000	95.95	95.95
0.281	-9.04	50.00	0.000	0.000	96.06	96.06	0.301	-9.12	50.00	0.000	0.000	95.96	95.96
0.321	-9.04	50.00	0.000	0.000	96.02	96.02	0.341	-8.96	50.00	0.000	0.000	96.26	96.26
0.361	-8.92	50.00	0.000	0.000	96.59	96.59	0.381	-8.94	50.00	0.000	0.000	96.92	96.92
0.401	-9.00	50.00	0.000	0.000	97.23	97.23	0.421	-9.05	50.00	0.000	0.000	97.53	97.53
0.441	-9.10	50.00	0.000	0.000	97.85	97.85	0.461	-9.12	50.00	0.000	0.000	98.23	98.23
0.481	-9.12	50.00	0.000	0.000	98.68	98.68	0.501	-9.07	50.00	0.000	0.000	99.22	99.22
0.521	-8.97	50.00	0.000	0.000	99.85	99.85	0.541	-8.83	50.00	0.000	0.000	100.56	100.56
0.561	-8.63	50.00	0.000	0.000	101.31	101.31	0.581	-8.41	50.00	0.000	0.000	102.08	102.08
0.601	-8.16	50.00	0.000	0.000	102.80	102.80	0.621	-7.95	50.00	0.000	0.000	103.44	103.44
0.641	-7.80	50.00	0.000	0.000	103.98	103.98	0.661	-7.72	50.00	0.000	0.000	104.41	104.41
0.681	-7.72	50.00	0.000	0.000	104.73	104.73	0.701	-7.76	50.00	0.000	0.000	104.97	104.97
0.721	-7.82	50.00	0.000	0.000	105.14	105.14	0.741	-7.86	50.00	0.000	0.000	105.28	105.28

