

# Volt VAR Summary Report Generator: Manual

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# Program Overview

[illegible]

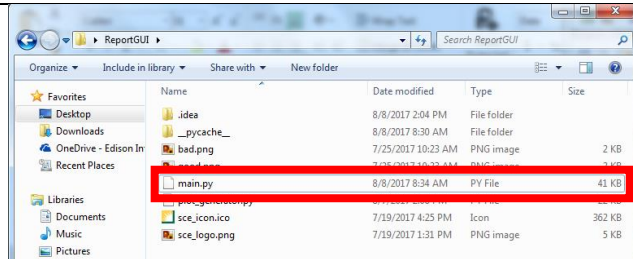
**See Appendix:**



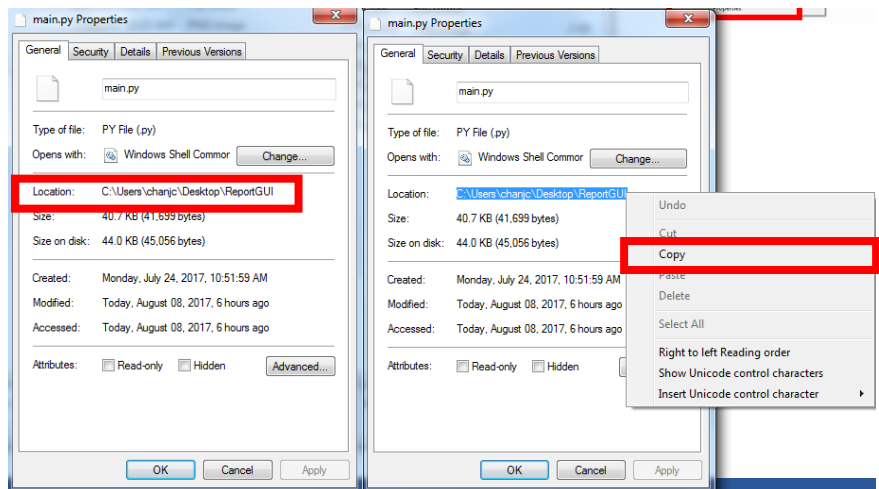
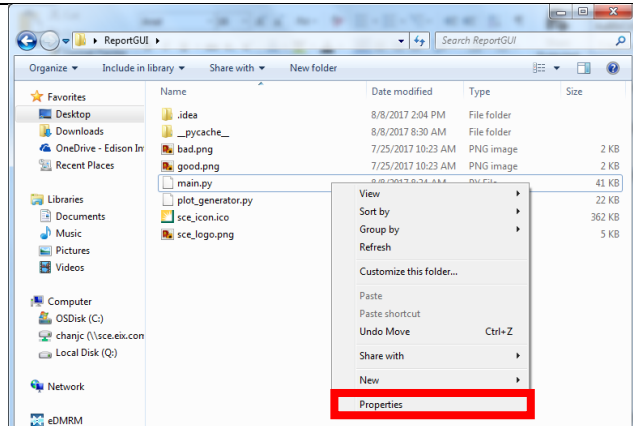
# How to Run the Program

(IMPORTANT: User must have Python 3.3+ installed and added to the system PATH environment variable. If Python installed using the Anaconda distribution, everything should work smoothly.)

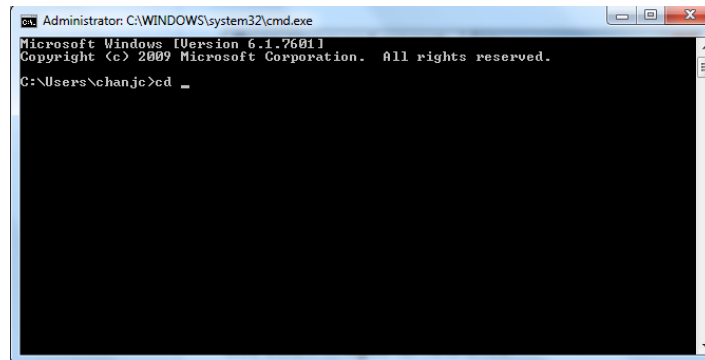
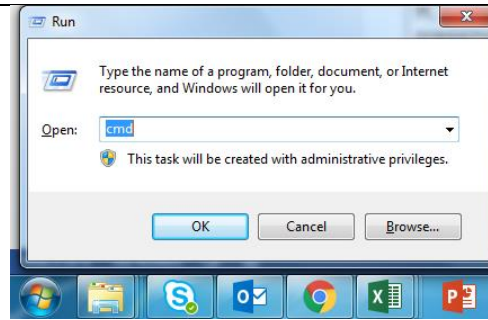
1. Locate the file called *main.py*



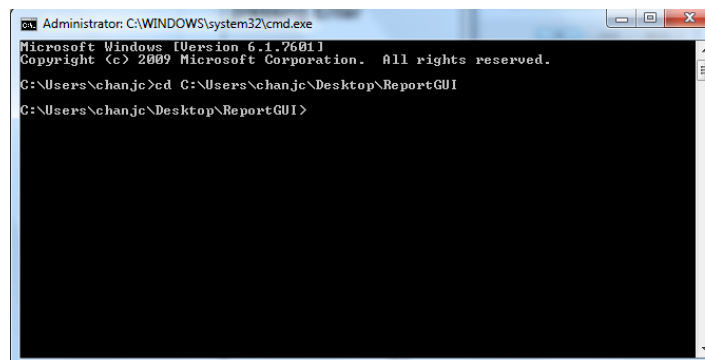
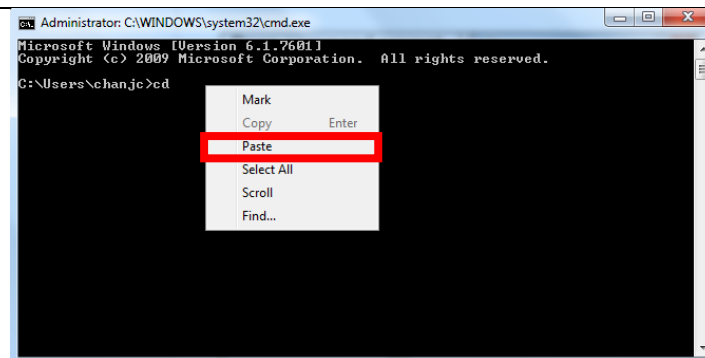
2. Right-click the file → Properties → General → Location → Copy the entire path



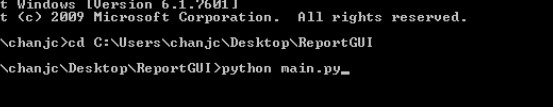
3. Open command prompt by pressing Windows + R, typing “cmd”, and pressing Enter



4. On the command line, type “cd “ and then Right-click → Paste to paste the entire path of the *main.py* file



5. On the command line, type “python main.py” and the GUI will start up



```
Administrator: C:\WINDOWS\system32\cmd.exe
Microsoft Windows [Version 6.1.7601]
Copyright (c) 2009 Microsoft Corporation. All rights reserved.

C:\Users\chanjc>cd C:\Users\chanjc\Desktop\ReportGUI

C:\Users\chanjc\Desktop\ReportGUI>python main.py_
```

[illegible]

## Appendix 1: Formatting the Data File Input

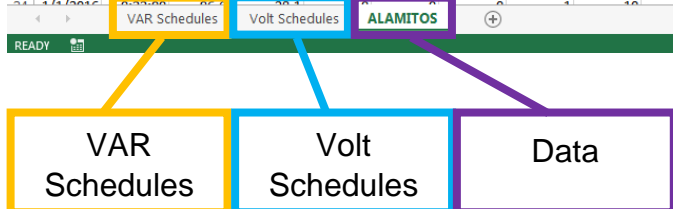
- Ensure that the file is a Microsoft Excel (extension .xls, .xlsx, .xlsm) file
- The program assumes that the data is arranged in columns and properly labeled
  - Required columns and labels (exactly as shown here): Date, Time, MW, MVAR, kV
  - The columns need not be consecutive; they just need to be labeled as above

	A	B	C	D	E
1	Date	Time	MW	MVAR	kV
2					
3					
4					
5					

- The program assumes that in the same Excel file, in addition to the data, there be 2 other worksheets named:
  - “VAR Schedules” (currently for 66kV only)
  - “Volt Schedules” (for 66kV and 500kV)

and **must be in the exact order shown below.**

1	Date	Time	MW	MVAR	In Range	> -10 MVA	> -20 MVA	<= -20 MV	Upper VA	Lower VA	Actual Dif kV	Reference	Difference	In Range	Above Range	Below Range		In Range	> -10 f	
2	1/1/2016	0:00:00	99.4	-27.8	0	0	0	1	10	-5	-22.8	67.42833	[66.15, 68.	0	1	0	0	Q1 2016 Tr	2609	40
3	1/1/2016	0:01:00	99.43	-27.8	0	0	0	1	10	-5	-22.8	67.43666	[66.15, 68.	0	1	0	0	Q1 2016 Pr	1.99%	30.1
4	1/1/2016	0:02:00	99.14	-27.8	0	0	0	1	10	-5	-22.8	67.40166	[66.15, 68.	0	1	0	0	Q2 2016 Tr	5045	34
5	1/1/2016	0:03:00	98.47	-28.4	0	0	0	1	10	-5	-23.4	67.445	[66.15, 68.	0	1	0	0	Q2 2016 Pr	3.85%	26.1
6	1/1/2016	0:04:00	98.77	-28.4	0	0	0	1	10	-5	-23.4	67.46	[66.15, 68.	0	1	0	0	Q3 2016 Tr	38805	49
7	1/1/2016	0:05:00	98.48	-28.4	0	0	0	1	10	-5	-23.4	67.48	[66.15, 68.	0	1	0	0	Q3 2016 Pr	29.29%	37.4
8	1/1/2016	0:06:00	98.39	-28.1	0	0	0	1	10	-5	-23.1	67.46333	[66.15, 68.	0	1	0	0	Q4 2016 Tr	8600	38
9	1/1/2016	0:07:00	98.51	-28.1	0	0	0	1	10	-5	-23.1	67.45833	[66.15, 68.	0	1	0	0	Q4 2016 Pr	6.49%	29.1
10	1/1/2016	0:08:00	98.21	-28.4	0	0	0	1	10	-5	-23.4	67.47834	[66.15, 68.	0	1	0	0	Q1 2017 Tr	3773	32
11	1/1/2016	0:09:00	98.13	-28.4	0	0	0	1	10	-5	-23.4	67.48667	[66.15, 68.	0	1	0	0	Q1 2017 Pr	2.91%	24.1
12	1/1/2016	0:10:00	97.59	-28.4	0	0	0	1	10	-5	-23.4	67.485	[66.15, 68.	0	1	0	0	Q2 2017 Tr	2466	20
13	1/1/2016	0:11:00	97.8	-28.4	0	0	0	1	10	-5	-23.4	67.49999	[66.15, 68.	0	1	0	0	Q2 2017 Pr	2.88%	24.1
14	1/1/2016	0:12:00	97.43	-28.4	0	0	0	1	10	-5	-23.4	67.51	[66.15, 68.	0	1	0	0			
15	1/1/2016	0:13:00	97.58	-28.4	0	0	0	1	10	-5	-23.4	67.52334	[66.15, 68.	0	1	0	0		# in Quart	# In R
16	1/1/2016	0:14:00	97.17	-28.4	0	0	0	1	10	-5	-23.4	67.52334	[66.15, 68.	0	1	0	0	Q1 2016	130978	130
17	1/1/2016	0:15:00	97.37	-28.4	0	0	0	1	10	-5	-23.4	67.54667	[66.15, 68.	0	1	0	0	Q2 2016	131040	131
18	1/1/2016	0:16:00	97.06	-28.4	0	0	0	1	10	-5	-23.4	67.49833	[66.15, 68.	0	1	0	0	Q3 2016	132480	132
19	1/1/2016	0:17:00	97.2	-28.4	0	0	0	1	10	-5	-23.4	67.50333	[66.15, 68.	0	1	0	0	Q4 2016	132540	132
20	1/1/2016	0:18:00	97.29	-28.4	0	0	0	1	10	-5	-23.4	67.50833	[66.15, 68.	0	1	0	0	Q1 2017	129540	129
21	1/1/2016	0:19:00	96.86	-28.1	0	0	0	1	10	-5	-23.1	67.535	[66.15, 68.	0	1	0	0	Q2 2017	131040	130
22	1/1/2016	0:20:00	97.13	-28.1	0	0	0	1	10	-5	-23.1	67.51334	[66.15, 68.	0	1	0	0			
23	1/1/2016	0:21:00	96.69	-28.1	0	0	0	1	10	-5	-23.1	67.54667	[66.15, 68.	0	1	0	0			
24	1/1/2016	0:22:00	96.69	-28.1	0	0	0	1	10	-5	-23.1	67.54667	[66.15, 68.	0	1	0	0			
VAR Schedules    Volt Schedules    ALAMITOS    +    100%																				



## **Appendix : Usage of the Substation Name**

- The substation name is not checked for correctness
- The name entered here will be the name that is used in the title of the plots

## **Appendix : Choosing the Bound Type**

- Refer to the System Operating Bulletin, Number 17 (SOB-17) for corresponding Voltage and VAR Schedules
  - At the time of creation of this program, the SOB-17 was used for 500 kV, 115 kV, and 66 kV substations
  - For future expansion to other voltage levels, the types of bounds might change and the program does not support these different bounds
- The 4 bound types apply only to Voltages; the VAR schedule is always in the following format:
  - Low MW – High MW                      Low MVAR – High MVAR
- See the next page for examples of the different types of bounds and how they appear in the SOB-17

## All Times

SYSTEM OPERATING BULLETIN  
Revised: July 8, 2002

No. 17  
Appendix

### ALAMITOS 66 KV VOLTAGE SCHEDULE

<u>Time</u>	<u>66 kV Bus Voltage</u>
0001 - 2400	67.5 kV

If the voltage schedule cannot be maintained, contact the Grid Control Center.

### ALAMITOS 66 KV VAR SCHEDULE

<u>Station Megawatt Load *</u>	<u>Station Megavar Load</u>
0 - 100	+ 10 to -5
101 - 200	- 5 to -25
Above 200	-25 to -40

\* Station Megawatt Load includes both the Alamos Peaker output plus the flow through both "A" banks.

Note:     Station MVAR Load

+ indicates from the 220 kV system.  
- indicates to the 220 kV system.

## Range

Vincent Substation Voltage Schedule

SOB 17 Appendix  
Revised August 28, 2014

### **1. Introduction**

#### **1.1 Purpose**

This System Operating Bulletin (SOB) Appendix contains the Voltage Schedule for Vincent Substation.

#### **1.2 Notification**

If this Voltage schedule cannot be maintained contact the Grid Control Center (GCC) Transmission Dispatcher.

### **2. Schedule**

#### **2.1 Voltage Schedule**

<u>500 kV Schedule</u>	<u>220 kV Schedule</u>
530 kV to 540 kV	225 kV to 235 kV

**Note:** Refer to the SOB-17.

## Load Dependent

SYSTEM OPERATING BULLETIN  
Revised: May 9, 2000

No. 17  
Appendix

### EAGLE ROCK SUBSTATION

#### **Voltage Schedule**

<u>Station Megawatt Load</u>	<u>66 kV Bus Voltage</u>
0 - 150	66.5 kV
151 - 200	67.0 kV
Above 200	67.5 kV

#### **Var Schedule**

Use the Eagle Rock 66 kV capacitors to maintain the following VAR schedule.

<u>Station Megawatt Load</u>	<u>Station Megavar Load</u>
0 - 100	+20 to -20
101 - 150	0 to -40
Above 150	-20 to -60

**NOTE:**     Station Megavar Load  
+ indicates from the 220 kV system  
- indicates to the 220 kV system

## Load Dependent Range

SYSTEM OPERATING BULLETIN  
Revised: September 20, 2011

No. 17  
Appendix

### RECTOR SUBSTATION

#### **Voltage Schedule**

San Joaquin Valley Northern Grid Operations Manager, in cooperation with the Northern Hydro Region Big Creek 3 Station Chief, shall select either the "High" or "Low" voltage schedule to correlate distribution capacitor switching with the needs of the system. Changes in voltage schedule should be made gradually over a 15 minute period.

<u>Station MW Load</u>	<u>Low</u>	<u>High</u>
0 - 250	65.5 kV	66.5 kV
251 - 300	66.5 kV	67.5 kV
Above 300	67.0 kV	68.0 kV

#### **VAR Schedule**

<u>Station MW Load</u>	<u>Station MVAR Load</u>
0 - 200	+10 to -10
201 - 250	-5 to -15
251 - 300	-10 to -25
301 - 350	-20 to -30
351 - 400	-25 to -35
401 - 450	-30 to -40
451 - 500	-40 to -50
501 - 550	-50 to -60
551 - 600	-60 to -75
Above 600	-70 to -110

**Note:**     Station MVAR Load  
+ indicates from the 220 kV system  
- indicates to the 220 kV system



## Appendix : Entering the Bounds

- **IMPORTANT:** Please make sure that the High MW of the previous row is exactly equal to the Low MW of the current row
  - For example, if the VAR Schedule was:

MW	MVAR
0 – 200	+5 to -10
201 – 300	-5 to -25
Above 301	-20 to -40

You would need to enter:

Low MW	High MW	Low MVAR	High MVAR
0	200	-10	5
200	300	-25	-5
300		-40	-20

- See the next 3 pages for examples of how to fill in the bounds given the SOB-17's from Page 8

# All Times

SYSTEM OPERATING BULLETIN  
Revised: July 8, 2002

No. 17  
Appendix

## ALAMITOS 66 KV VOLTAGE SCHEDULE

<u>Time</u>	<u>66 kV Bus Voltage</u>
0001 - 2400	67.5 kV

If the voltage schedule cannot be maintained, contact the Grid Control Center.

## ALAMITOS 66 KV VAR SCHEDULE

<u>Station Megawatt Load *</u>	<u>Station Megavar Load</u>
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Above 200	-25 to -40

\* Station Megawatt Load includes both the Alamos Peaker output plus the flow through both "A" banks.

Note: Station MVAR Load

+ indicates from the 220 kV system.  
- indicates to the 220 kV system.

Low MW	High MW	Low MVAR	High MVAR				Voltage
0	100	-5	10				67.5
100	200	-25	-5				
200		-40	-25				

# Range

Vincent Substation Voltage Schedule

SOB 17 Appendix  
Revised August 28, 2014

## 1. Introduction

### 1.1 Purpose

This System Operating Bulletin (SOB) Appendix contains the Voltage Schedule for Vincent Substation.

### 1.2 Notification

If this Voltage schedule cannot be maintained contact the Grid Control Center (GCC) Transmission Dispatcher.

## 2. Schedule

### 2.1 Voltage Schedule

<u>500 kV Schedule</u>	<u>220 kV Schedule</u>
530 kV to 540 kV	225 kV to 235 kV

**Note:** Refer to the SOB-17.

530

Low MW	High MW	Low MVAR	High MVAR			Low Voltage	High Voltage
XX	XX	XX	XX			530	540
XX	XX	XX	XX				
XX	XX	XX	XX				

# Load Dependent

SYSTEM OPERATING BULLETIN  
Revised: May 9 , 2000

No. 17  
Appendix

## EAGLE ROCK SUBSTATION

### Voltage Schedule

Station Megawatt Load	66 kV Bus Voltage
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151 - 200	67.0 kV
Above 200	67.5 kV

### Var Schedule

Use the Eagle Rock 66 kV capacitors to maintain the following VAR schedule.

Station Megawatt Load	Station Megavar Load
0 - 100	+20 to -20
101 - 150	0 to -40
Above 150	-20 to -60

NOTE: Station Megavar Load  
+ indicates from the 220 kV system  
- indicates to the 220 kV system

Low MW	High MW	Low MVAR	High MVAR		Low MW	High MW	Voltage
0	100	-20	20		0	150	66.5
100	150	-40	0		150	200	67
150		-60	-20		200		67.5

# Load Dependent Range

SYSTEM OPERATING BULLETIN  
Revised: September 20, 2011

No. 17  
Appendix

## RECTOR SUBSTATION

### Voltage Schedule

San Joaquin Valley Northern Grid Operations Manager, in cooperation with the Northern Hydro Region Big Creek 3 Station Chief, shall select either the "High" or "Low" voltage schedule to correlate distribution capacitor switching with the needs of the system. Changes in voltage schedule should be made gradually over a 15 minute period.

Station MW Load	Low	High
0 - 250	65.5 kV	66.5 kV
251 - 300	66.5 kV	67.5 kV
Above 300	67.0 kV	68.0 kV

### VAR Schedule

Station MW Load	Station MVAR Load
0 - 200	+10 to -10
201 - 250	-5 to -15
251 - 300	-10 to -25
301 - 350	-20 to -30
351 - 400	-25 to -35
401 - 450	-30 to -40
451 - 500	-40 to -50
501 - 550	-50 to -60
551 - 600	-60 to -75
Above 600	-70 to -110

**Note:** Station MVAR Load

- + indicates from the 220 kV system
- indicates to the 220 kV system

Low MW	High MW	Low MVAR	High MVAR	Low MW	High MW	Low Voltage	High Voltage
0	200	-10	10	0	250	65.5	66.5
200	250	-15	-5	250	300	66.5	67.5
250	300	-25	-10	300		67	68
300	350	-30	-20				
350	400	-35	-25				
400	450	-40	-30				
450	500	-50	-40				
500	550	-60	-50				
550	600	-75	-60				
600		-110	-70				

## **Appendix : Plot Generation**

- Please make sure that all sections are thumbs up before clicking the “Generate Summary Report” button
- The plots will be saved in a PDF file located in the same directory as the Microsoft Excel file selected in Step 1 and will be named the same as the substation name entered in Step 2

### **Notes**

- Batch process currently not supported because SOB-17 ranges need to be entered manually instead of being read from an Excel file.
- This program was created to generate reports for the 500kV, 115kV, and 66kV substations. As such, usage of this program is not suitable to generate reports for other voltage levels whose operating procedures differ from the SOB-17’s format.