

US EPA ARCHIVE DOCUMENT

# City of Sunnyvale Water Pollution Control Plant



Using the Guide Book  
June, 2009

# A Little About Sunnyvale WPCP

- 29.5 MGD rated capacity
  - Built in 1955
- 160 mg/L Average Influent BOD
- 10 mg/L Average Effluent BOD
- Treatment FLOW = Communiton/Primary Treatment/Oxidation Ponding (Secondary + NH<sub>3</sub> removal in Summer)/FGR (additional NH<sub>3</sub> removal in winter)/DMF and Chlorination/Dechlorination
- Produced (in 0708) 515 MGD of recycled water that was distributed throughout Sunnyvale for irrigation purposes
- During recycled water production, oxidation ponds are used as equalization basins, and discharge to SF Bay ceases

# A Little About Sunnyvale WPCP

- Power Generation capability of 1600 KWH/day
- “Tri-gas blend” = natural, digester and landfill gases
- Currently producing all of our own electrical power (1300 KWH/day) using generators, while operating in synch with PG & E
  - Due to new air quality emissions standards, the Engine/Generators are currently operated in an extremely narrow “bandwidth” – there is little tolerance for large additions, or losses of amperage
- Generators will drop off causing us to go completely to PG&E power, if only until we can re-start them (20-30 minutes maximum)

# Using the Guidebook

- Step 1 – Benchmark Energy Efficiency Information

Data Need	Units	Frequency of Data	Source
Wastewater Flow	MGD	Daily	Flows Rpt
Recycled Water Flow	MGD	Monthly	Flows Rpt
Electricity Consumption	kWh	Hourly	PG & E
Peak Demand	kWh	Monthly	DGS
Methane Capture	SCF	Monthly	Gas Rpt
Natural Gas Consumed	Therms	Monthly	DGS
Design Specifications			
Operating Schedules			

# Using the Guidebook

- Step 2 – Track Monthly and Annual Energy Use

# 0607 Electrical Use Data

06/07 Energy Consumption	Monthly Consumption (kWh)	Peak Demand (kW)	Cost (\$/kWh)	Monthly Flow, MGD
06/20/06 to 07/19/06	16,846	922	\$5,603.12	425
7/20/06 to 08/17/06	45,110	1138	\$11,571.91	416
8/18/06 to 9/18/06	22,018	648	\$6,673.20	410
9/19/06 to 10/17/06	4,747	379	\$3,312.32	407
10/18/06 to 11/15/06	6,252	211	\$4,704.10	401
11/16/06 to 12/17/06	6,048	0	\$9,013.81	406
12/18/06 to 01/17/07	4,130	0	\$12,283.12	408
01/18/07 to 02/15/07	9,421	0	\$8,216.74	422
02/16/07 to 03/19/07	5,496	0	\$10,326.78	479
03/20/07 to 04/17/07	8,495	0	\$13,460.29	426
04/18/07 to 05/17/07	77,266	950	\$20,534.56	422
05/18/07 to 06/18/07	46,854	413	\$12,023.16	402

# 0708 Electrical Use Data

Added Recycled Water 0708

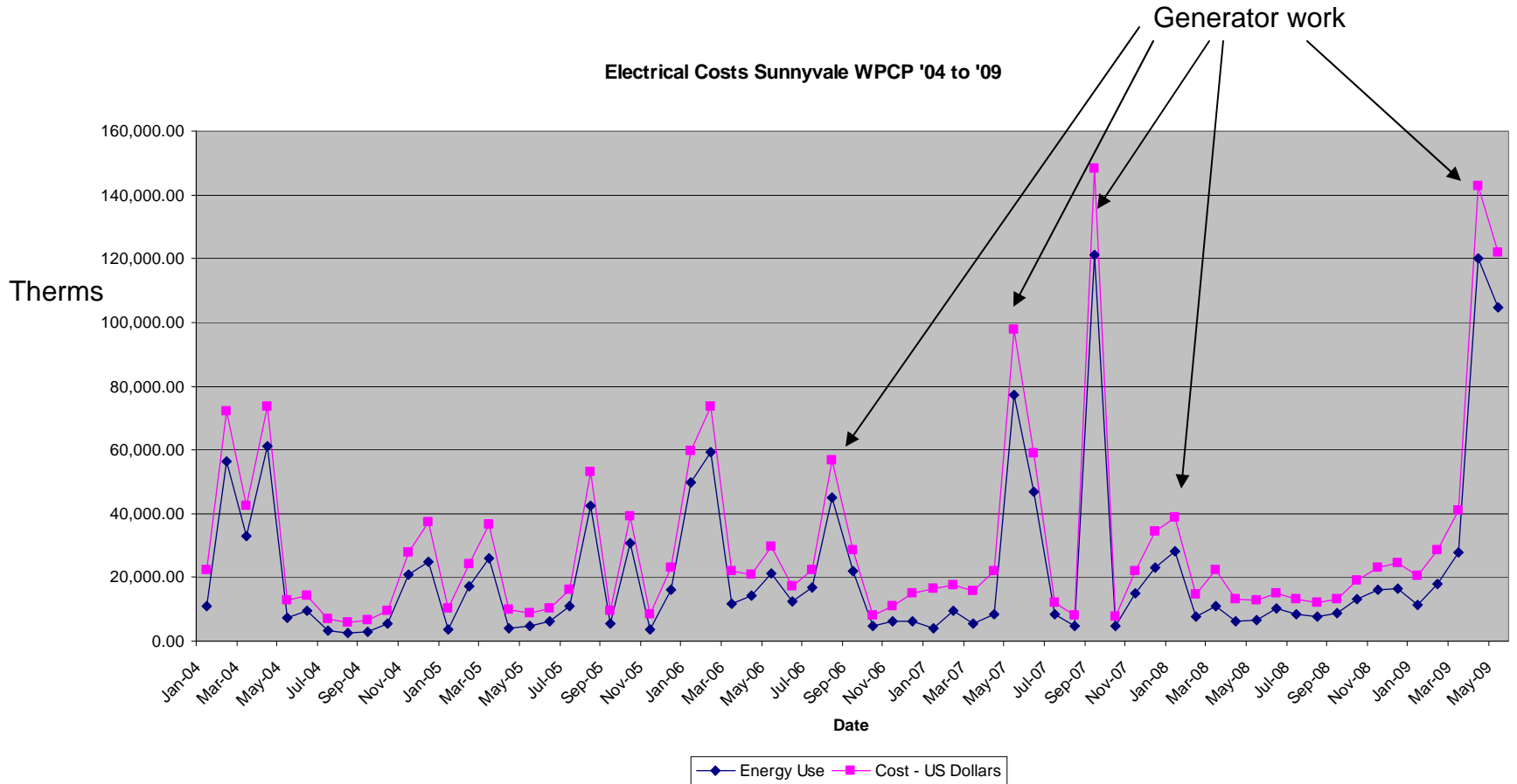
07/08 Energy Consumption	Monthly Consumption (kWh)	Peak Demand (kW)	Total Cost	Monthly Flow, MGD	Monthly Recycled Water Flow, MG
6/9/07 to 7/18/07	8,244	25	\$ 4,002.11	394	41
7/19/07 to 8/16/07	4,930	212	\$ 3,299.63	391	57
8/17/07 to 9/17/07	121,055	14,960	\$ 27,249.25	384	36
9/18/07 to 10/16/07	4,762	1,012	\$ 2,940.30	416	33
10/17/07 to 11/14/07	14,830	77	\$ 7,301.76	413	15
11/15/07 to 12/16/07	23,177	0	\$ 11,306.99	410	18
12/17/07 to 1/15/08	28,188	0	\$ 10,520.24	438	4
1/16/08 to 2/13/08	7,618	0	\$ 6,950.48	504	0
2/14/08 to 3/16/08	10,884	0	\$ 11,302.92	458	16
3/17/08 to 4/15/08	6,210	0	\$ 6,971.15	425	28
4/16/08 to 5/14/08	6,744	0	\$ 6,006.72	409	17
5/15/08 to 6/15/08	10,247	216	\$ 4,871.44	391	0



# The Electrical Side of the Energy Equation

- The Summer Season begins April 1 and ends on October 31.
- The Winter Season begins November 1 and ends on March 31.

# Electrical Use FY04-09



# The Electrical Side of the Energy Equation

- Electrical use tracks generator maintenance scheduling or emergency generator work fairly closely
- Demand charges are a key contributor to high overall electrical charges

## Definition of Maximum Demand:

Demand will be averaged over 15-minute intervals.

“Maximum demand” will be the highest of all the 15-minute averages for the billing month. If the customer’s use of electricity is intermittent or subject to severe fluctuations, a 5-minute interval may be used.

Schedule E-20 has three **demand charges**, a maximum-peak-period demand charge, a maximum-part-peak-period demand charge, and a maximum-demand charge.

The maximum-peak-period-demand charge per kilowatt applies to the maximum demand during the month’s peak hours, the maximum-part-peak-demand charge per kilowatt applies to the maximum demand during the month’s part-peak hours, and the maximum-demand charge per kilowatt applies to the maximum demand at any time during the month.

The bill will include all of these demand charges.

# The Natural Gas Side of the Energy Equation

- Prior to April, 2008, Natural Gas was one of the 3 gases used as a fuel source to the generators only (removed boilers, de minimus use in laboratory, water heaters)
- Main Engines were run on Digas fuel source only
- Beginning in April, 2008, Natural Gas became the sole fuel source for Main Engines, and continued to be 1 of the 3 gases used on the generators

# The Natural Gas Side of the Energy Equation

07/08 Energy Consumption	Monthly Consumption (Therm)	Total Cost	Monthly Flow, MGD	Monthly Recycled Water Flow, MG
July-07	29,268	\$23,090.35	394	41
August-07	19,064	\$14,010.94	391	57
September-07	20,269	\$14,583.18	384	36
October-07	33,246	\$23,748.43	416	33
November-07	35,245	\$28,544.27	413	15
December-07	24,198	\$23,679.10	410	18
January-08	32,795	\$30,543.82	438	4
February-08	35,037	\$33,971.75	504	0
March-08	35,550	\$34,962.19	458	16
April-08	31,222	\$30,412.41	425	28
May-08	33,071	\$34,525.15	409	17
June-08	32,394	\$34,492.76	391	0

# The Natural Gas Side of the Energy Equation

08/09 Energy Consumption	Monthly Consumption (Therm)	Total Cost	Monthly Flow, MGD	Monthly Recycled Water Flow, MG
July-08	41,973	\$53,895.19	358	30
August-08	42,576	\$48,106.26	386	58
September-08	34,408	\$38,560.83	382	27
October-08	42,176	\$43,690.78	381	23
November-08	35,682	\$35,914.92	395	26
December-08	33,065	\$31,938.36	389	10
January-09	33,923	\$31,260.02	388	0
February-09	37,621	\$30,576.56	398	14
March-09	37,697	\$30,576.56	476	5
April-09	18,650	\$15,160.49	407	11
May-09				
June-09				

Generator OOS

# The Natural Gas Side of the Equation

- Customers may procure gas supply from a party other than PG&E by taking service on this schedule in conjunction with Schedule G-CT—Core Gas Aggregation Service.
- Customers who procure their own gas supply will not pay the Procurement Charge component of this rate schedule, and will be subject to the applicable rates specified in Schedule G-CT.
- Service under this schedule may also be taken in conjunction with procurement service from a party other than PG&E if the Customer executes a Natural Gas Service Agreement (Form No. 79-756) with PG&E. Service will be provided in increments of one (1) year.
- If there is a difference between actual deliveries and actual usage, such differences will be subject to the terms and conditions of Schedule G-BAL. Customers who procure their own gas supply will not pay the Procurement Charge component of this schedule.
- Transportation volumes will be subject to a shrinkage allowance in accordance with Rule 21.
- The Customer may, at its option, receive firm interstate capacity directly assigned by PG&E as provided in Rule 21.1.

# The Natural Gas Side of the Equation

Facility  
 Customer Account  
 Premise ID

**CITY Sunnyvale** CITY Sunnyvale  
**220504465** 220504465  
**2899459** 2899459

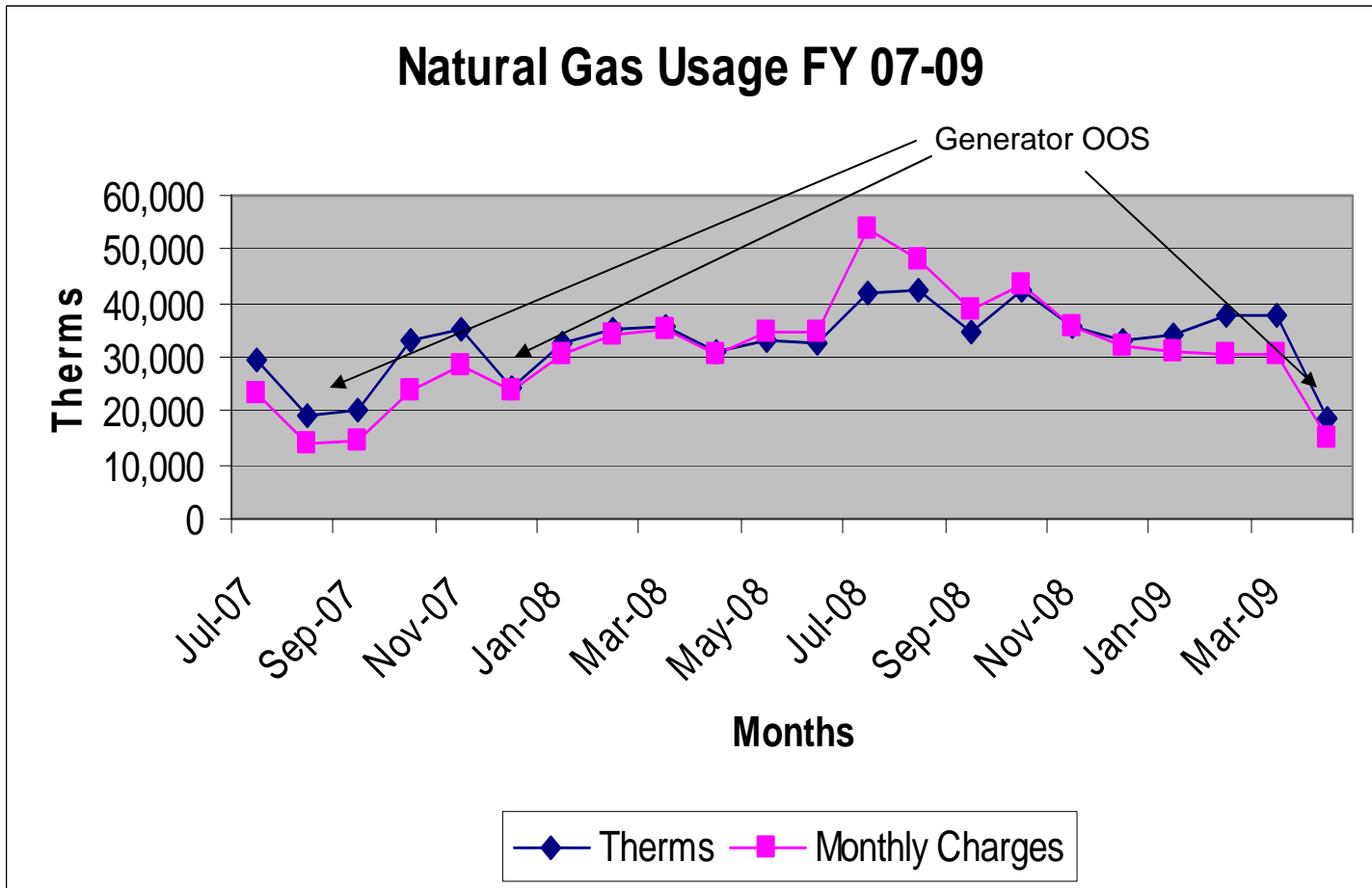
Date Generated: 04/03/2009

	Jul-08	Aug-08	Sep-08	Oct-08	Nov-08	Dec-08	Jan-09	Feb-09	Mar-09	Apr-09
Projections - Therms	20,000	35,000	35,000	30,000	20,000	45,000	45,000	4,000	35,000	25,000
Usage- Therms	41,973	42,576	34,408	42,176	35,682	33,065	33,923	37,621	35,000	25,000
Variance	21,973	7,576	(592)	12,176	15,682	(11,935)	(11,077)	33,621	0	0
Percent of Variance	110%	22%	-2%	41%	78%	-27%	-25%	841%	0%	0%
<b>Usage (therms)</b>	<b>41,973</b>	<b>42,576</b>	<b>34,408</b>	<b>42,176</b>	<b>35,682</b>	<b>33,065</b>	<b>33,923</b>	<b>37,621</b>	<b>35,000</b>	<b>25,000</b>
Unit Cost/Therm	\$ 1.250749	\$ 1.096717	\$ 1.085859	\$ 1.002661	\$ 0.972053	\$ 0.930334	\$ 0.885650	\$ 0.778861	\$ 0.668643	\$ 0.681981
Total Commodity	\$ 52,497.67	\$ 46,693.81	\$ 37,362.25	\$ 42,288.23	\$ 34,684.78	\$ 30,761.49	\$ 29,616.80	\$ 29,301.53	\$ 23,402.50	\$ 17,049.52
Adjustment							\$ 427.12			
<b>Gas Supply</b>	<b>\$ 52,497.67</b>	<b>\$ 46,693.81</b>	<b>\$ 37,362.25</b>	<b>\$ 42,288.23</b>	<b>\$ 34,684.78</b>	<b>\$ 30,761.49</b>	<b>\$ 30,043.92</b>	<b>\$ 29,301.53</b>	<b>\$ 23,402.50</b>	<b>\$ 17,049.52</b>
							out of tolerance			
<b>DGS</b>										
DGS Rate	\$ 0.00650	\$ 0.00650	\$ 0.00650	\$ 0.00650	\$ 0.00650	\$ 0.00650	\$ 0.00650	\$ 0.00650	\$ 0.00650	\$ 0.00650
<b>DGS Fees</b>	<b>\$ 272.82</b>	<b>\$ 276.74</b>	<b>\$ 223.65</b>	<b>\$ 274.14</b>	<b>\$ 231.93</b>	<b>\$ 214.92</b>	<b>\$ 220.50</b>	<b>\$ 244.54</b>	<b>\$ 227.50</b>	<b>\$ 162.50</b>
Cumulative DGS Fees	\$ 272.82	\$ 549.57	\$ 773.22	\$ 1,047.36	\$ 1,279.30	\$ 1,494.22	\$ 1,714.72	\$ 1,959.26	\$ 2,186.76	\$ 2,349.26
<b>Transportation</b>	<b>\$ 1,124.70</b>	<b>\$ 1,135.71</b>	<b>\$ 974.93</b>	<b>\$ 1,128.41</b>	<b>\$ 998.21</b>	<b>\$ 961.95</b>	<b>\$ 995.60</b>	<b>\$ 1,030.49</b>	<b>\$ 2,794.00</b>	<b>\$ 2,094.00</b>
Burnertip Dollars	\$ 53,895.19	\$ 48,106.26	\$ 38,560.83	\$ 43,690.79	\$ 35,914.92	\$ 31,938.36	\$ 31,260.02	\$ 30,576.56	\$ 26,424.00	\$ 19,306.02
<b>Burnertip Rate</b>	<b>\$ 1.28404</b>	<b>\$ 1.12989</b>	<b>\$ 1.12069</b>	<b>\$ 1.03592</b>	<b>\$ 1.00653</b>	<b>\$ 0.96593</b>	<b>\$ 0.92150</b>	<b>\$ 0.81275</b>	<b>\$ 0.75497</b>	<b>\$ 0.77224</b>

Total Usage  
 Total Dollars  
 Burnertip Rate



# The Natural Gas Side of the Equation



# The Natural Gas Side of the Equation

- Natural Gas use tracks generator maintenance scheduling or emergency generator work fairly closely
- Additional Charges can be confusing, however, when looked at in this manner, can easily be discussed and evaluated

# Using the Guidebook

- “Consider a metric that allows you to combine both electrical and natural gas usage into a single measurement”

- Any IDEAS?



# Next Steps

- Create a Team of Energy Watchers
- Have an Energy Audit done – planned for July, 2009
- Energy Policy – What it takes to have a well-run WPCP is Safety, Compliance and Effectiveness in every aspect
  - make this REAL on daily operational basis
  - Monitor Power Projects in place and planned:
    - MCC power metering in Tertiary
    - Lighting retrofit
  - Monitor Performance Indicators that relate to energy use, reuse in Facility
    - Electricity purchased during planned,unplanned Generator Down Time to Meet Plant Needs, kWh
    - Natural Gas purchased to supplement LFG, Digas for Power Production, CF Purchased
    - Produce electrical power using Digas and LFG, kWh produced

# Next Steps

- Determine our energy priorities
  - Currently in planning for Strategic Infrastructure Plan (Master Plan) that could change the way we treat wastewater at the plant
  - ID drivers and constraints
    - Environment
    - Reliability
    - ?
- Keep using the Guidebook!