*Power**CET*** Corporation
3350 Scott Blvd., Bldg. 55, Unit 1
Santa Clara, CA 95054-3124
Voice: 408/988-1346
Fax: 408/988-4869
E-mail: consulting@powercet.com
URL: http://www.powercet.com

Sample Report

Consulting Report
Electrical Service Power Monitoring
IEEE Std. 519-1992 Harmonic Evaluation

Introduction

The following data is an initial review of the monitoring data collected at the Client plant in Silly Valley, California for the period 19 November to 26 November 2002.

Methodology

Main Electrical Service (5000A)

A Dranetz-BMI Model PP4300 equipped with PQ Lite TASKCard and 6000A flexible current probes was connected to the electrical service at the ELECTRIC UTILITY revenue meter.

Key Findings / Recommendations

1. Main Electrical Service (5000A)

   1.1. The initial requirement for the power monitoring was to determine if the plant was injecting excessive 5th and 7th harmonics back into the Electric Utility distribution—*non-compliance* with IEEE Std. 519-1992 as reported by the Electric Utility.

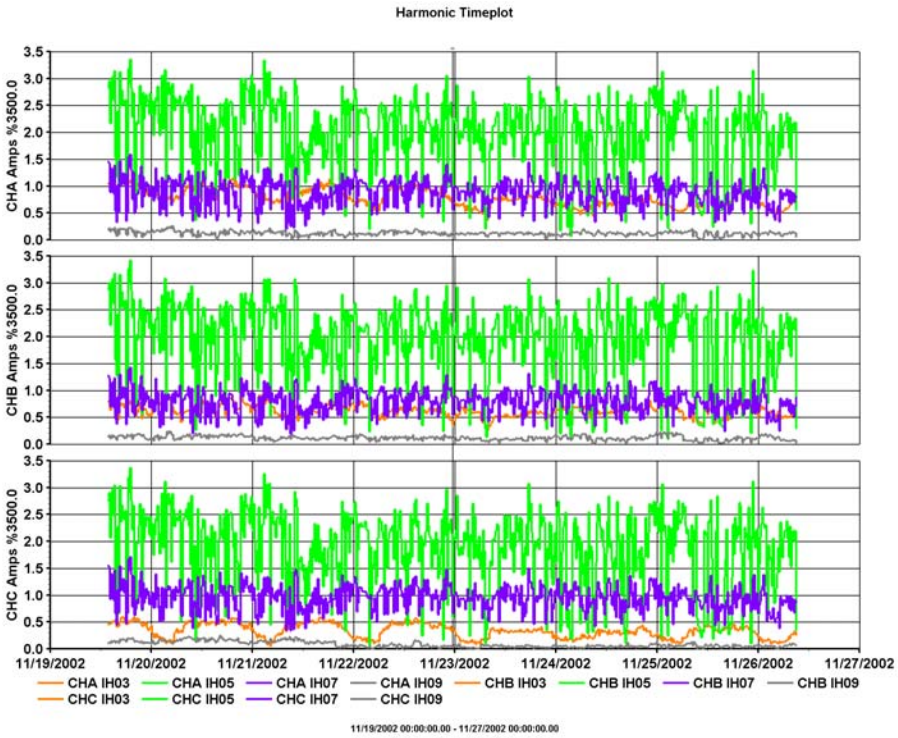
   1.2. The short circuit rating for the service transformer (secondary) is 62,500A and the transformer impedance is 7.8%. The ratio of I_{SC}/I_{LFUND} is less than 20, which allows for the following levels of individual harmonic current injection according to the IEEE Std. 519-1992.

Maximum Harmonic Current Distortion in Percent of I_{LFUND}					
<11	11≥ h ≥ 17	17 ≥ h ≥ 23	23 ≥ h≥ 35	35 ≥ h	TDD
4.0	2.0	1.5	0.6	0.3	5.0

Note: Only the table entries appropriate for this site are included. Please refer to the complete standard for the complete table.

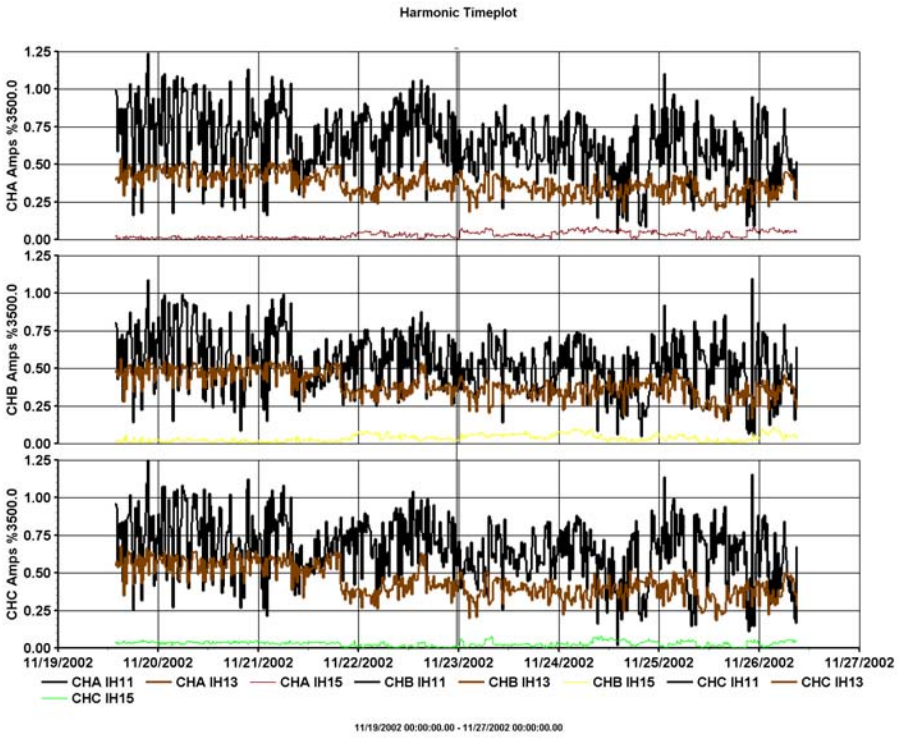
In all cases the actual harmonic measurements for the service are below the allowable levels when using the median fundamental current value as opposed to the maximum value, which would result in even lower levels. Figure 1 shows the harmonic time plots for the 3rd, 5th, 7th and 9th harmonics. Figure 2 shows the harmonic time plots for 11th, 13th and 15th harmonics. Time plots for harmonics 17 through 50 are not included as the values were extremely low—the data is available for analysis if required.

Figure 3 is the time plot for the TDD—same data as Figures 1 and 2—with approximate median values of 2.5% per phase well below the 5% level specified in the IEEE Standard.



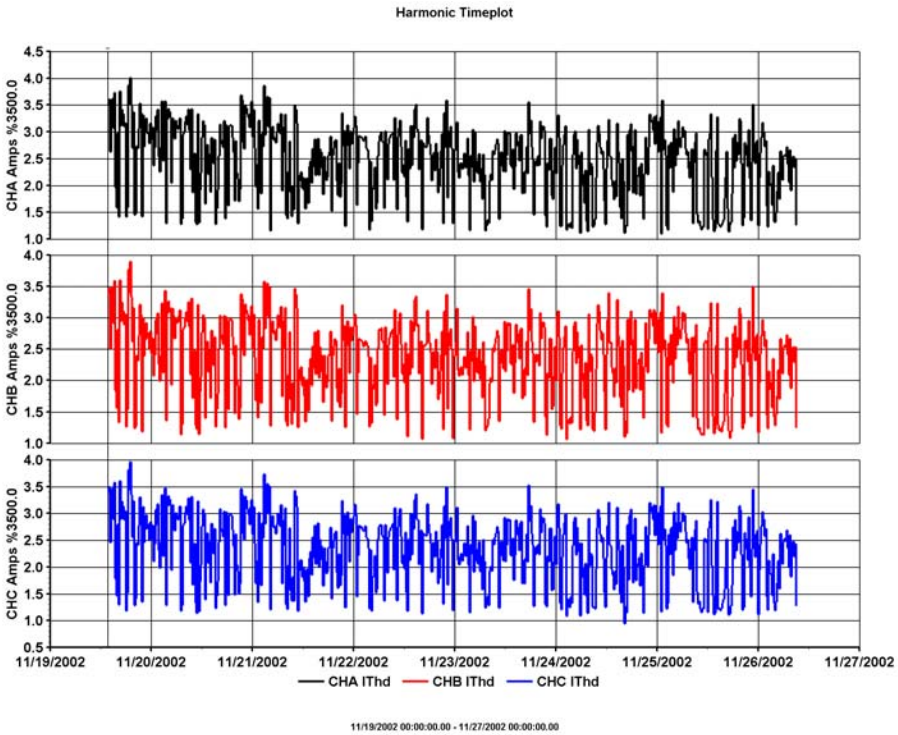
	Median
CHA IH03	0.77
CHA IH05	2.15
CHA IH07	0.89
CHA IH09	0.12
CHB IH03	0.62
CHB IH05	2.13
CHB IH07	0.81
CHB IH09	0.12
CHC IH03	0.34
CHC IH05	2.04
CHC IH07	0.96
CHC IH09	0.06

Figure 1 - Client main service harmonic time plots for 3rd, 5th, 7th and 9th harmonic calculated as a percent of the median fundamental current.



	Median
CHA IH11	0.65
CHA IH13	0.37
CHA IH15	0.03
CHB IH11	0.53
CHB IH13	0.38
CHB IH15	0.03
CHC IH11	0.66
CHC IH13	0.43
CHC IH15	0.03

Figure 2 - Client main service harmonic time plots for 11th, 13th and 15th harmonic calculated as a percent of the median fundamental current.



	Median
CHA IThd	2.60
CHB IThd	2.48
CHC IThd	2.46

Figure 3 – Client main service harmonic time plots TDD

Recommendation: No further action is required with respect to the harmonic issue. The harmonic readings (power monitoring data) will be provided to Electric Utility and reviewed with them. Unless there is some unforeseen problem Electric Utility should issue a letter indicating that the Client facility is within acceptable limits with respect to the IEEE 519 Std. 1992. (Note: In reviewing the monitoring data from Electric Utility it appears that the 5A current transformers of their monitoring equipment saturated when the secondary of the metering CT's went over 5-amps—anytime the current exceeded 5000A on the service. The resulting harmonic analysis of the waveforms, Figure 4, from the saturated 5A current transformers resulted in artificially high values of 5th and 7th power frequency harmonics.)

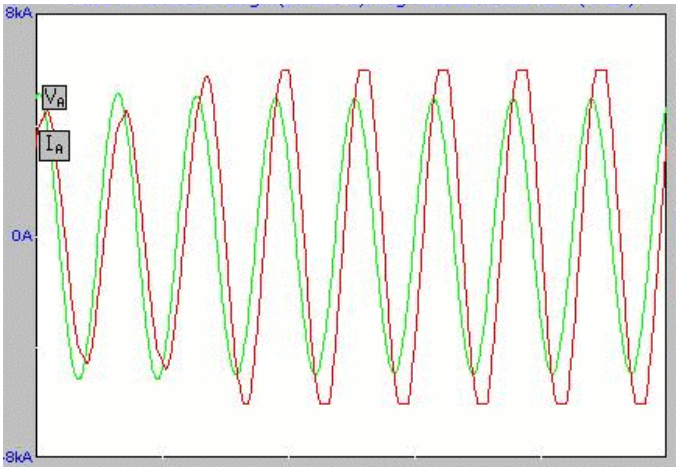


Figure 4 - Waveform showing saturation of 5A measurement current probes.

Concluding Comments

1. Harmonic distortion is not an issue at the site. Distortion levels are below recommended limits per IEEE 519. Prior distortion measurements were upset by the saturation of the measurement CTs.

Report prepared by:

Bruce Lonie

President, PowerCET Corporation

