

December 23, 2010 [Submitted Electronically]

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**Subject: Santa Clara Hydroelectric Project, FERC No. 9281
Section-by-Section Loss Report in Response and Quarterly Progress Report in
Response to January 2, 2008 Utah Division of Water Rights Letter**

Dear Mr. Sim:

I have attached the semi-annual update of the analysis of section-by-section loss requested in your letter of January 2, 2008. Also attached to the e-mail is the spreadsheet containing the raw data summarized in the report. Veyo Irrigation Company diversion data was not available, so no loss is calculated for the MP3 to MP4 section.

For your information, consistent with our meeting earlier this year, metal plates have been attached to the rediversion structure below the Sand Cove hydroelectric plant to allow it to function as a 10' suppressed rectangular weir. Water level measurements began November 1, 2010. The water level measurements are included in my monthly data submittal, but the weir has not yet been calibrated so the data is not used in the attached report. Pictures of the installation were previously e-mailed to Mike Silva, three of which are attached to this letter.

If you have any questions concerning any of these matters, please contact me at 801-220-4636.

Regards,



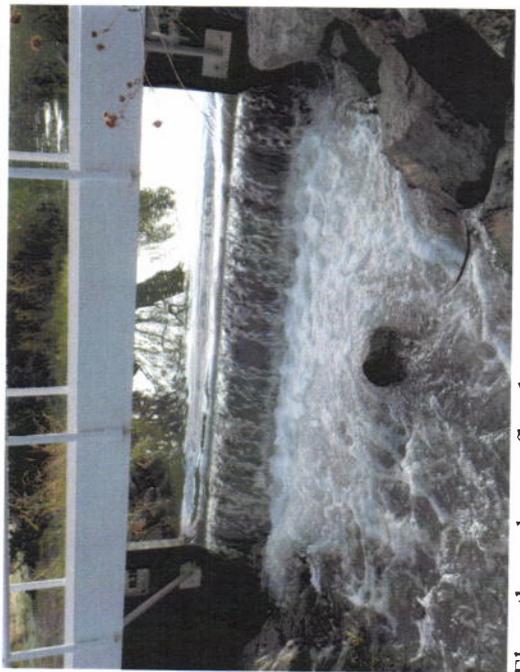
Connely Baldwin
Hydrologist



Retrofit diversion structure below Sand Cove Power Plant



Flow through retrofit structure



Flow through retrofit structure

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Mike Silva
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Santa Clara Hydroelectric Project Water Conveyance Section-by-Section Loss Analysis

PacifiCorp Energy

December 23, 2010

This report was prepared in response to the State of Utah Division of Water Rights letter dated January 2, 2008 which required a semi-annual "evaluation of system losses by canal section" originally requested in the November 14, 2007 letter. This report evaluates data from December 1, 2009 through April 15, 2010.

The Santa Clara Hydroelectric Project was installed in 1919 and uses a 16.8 mile long water conveyance system that is mostly open canal and includes two small reservoirs. Water rights for the hydroelectric project allow up to 37.77 cfs under water rights numbers 81-66, 81-80 and 81-102 and an additional 500 acre-feet under 81-134. The section below Veyo plant to the highway was originally a single-purpose irrigation canal that was expanded to convey additional water further to two additional hydroelectric plants. PacifiCorp Energy makes regular efforts to keep the water conveyance system in good repair including quarterly inspections and leak repair and continues to maintain a regular budget item for maintenance of the water conveyance system.

The primary measuring points used are:

1. *Flume near Baker Campground (daily readings)*
2. *Flume above Veyo Power Plant (daily readings)*
3. *Flume below Veyo Power Plant (daily readings)*
4. *Highway Flume (daily readings)*
5. *Flume above Upper Sand Cove Reservoir (daily readings)*
6. *Flume below Gunlock Tailrace (daily readings)*

In this report, these locations will be referred to as *measuring points* 1 through 6 using the numbering scheme above and abbreviated as MP1 through MP6 (the relative locations are shown in Figure 1). These measuring points are each equipped with a 3-foot Parshall flume and staff gage (with or without a stilling well) installed. The data are recorded as staff gage heights, using the standard 3-foot Parshall flume table to subsequently indicate the flow rate. Also recorded and reported to the Division on a monthly basis are the daily water levels at Upper and Lower Sand Cove Reservoirs.

For reference, a schematic of the Santa Clara hydroelectric project is shown in Figure 1. The majority of the water conveyance system is in open canal, with penstocks above each plant. The section between Upper Sand Cove Reservoir and the Sand Cove plant is completely piped. Baker reservoir shown on the schematic is not owned or operated by PacifiCorp Energy. There are four irrigation diversions in the section between MP3 and MP4 (collectively represented by the single arrow), only one of which has telemetry installed (Veyo Ditch). However, manual daily readings for the total of all irrigation diversions were provided and are used in this analysis.

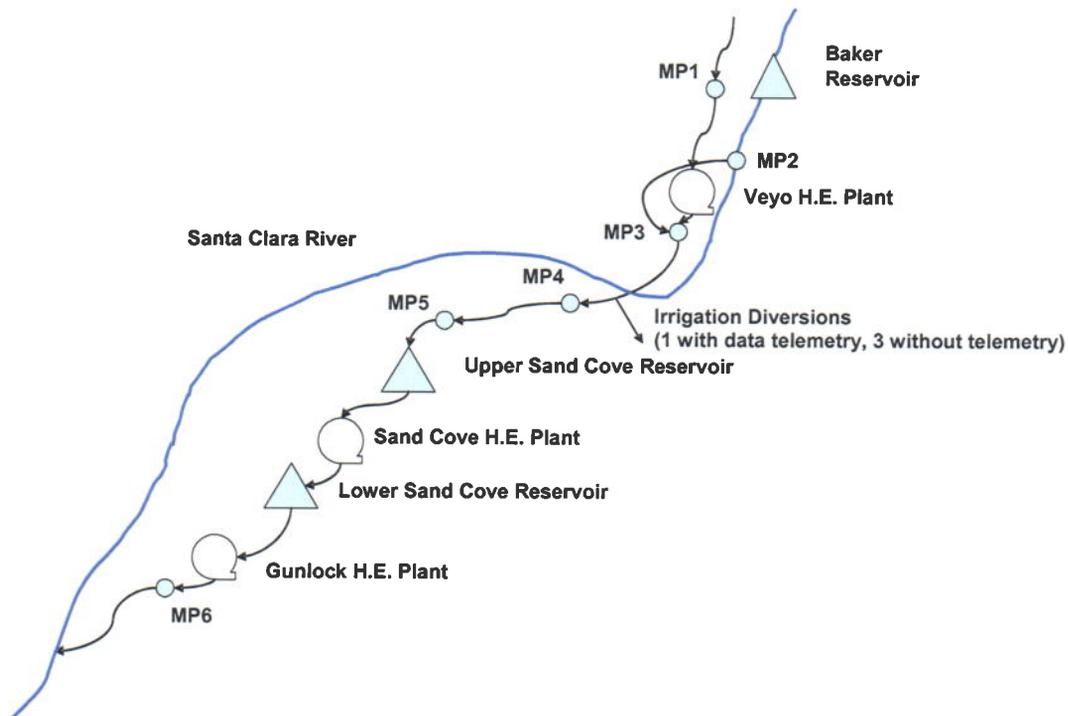


Figure 1. Schematic representation of the Santa Clara Hydroelectric (H.E.) Project showing measuring points (MP1 through MP6), hydroelectric plants and reservoirs. The Veyo Ditch has automated data telemetry since mid-July 2008. Three other irrigation diversions remain without data telemetry.

Diversion Data

In this report, complete diversion data is available for April 16, 2010 through December 15, 2010. Table 1 shows the median flume flow by month and the whole period. The upper canal was dewatered for canal maintenance from August 7th through August 26th. The canal section loss results shown in the next section of this report compare all available pairs of measurements for each canal section. Veyo Irrigation diversion data were not available, so no loss is reported for MP3 to MP4. Also, the flume at MP5 was submerged, so that location is omitted.

Table 1. Median flume flow amounts (cfs) by month and season (April 16 through Dec 15).

Month	MP1	MP2	MP3	MP4	MP5	MP6	Veyo Irrig.
Apr 15-30	15.35	7.64	22.68	17.03	NA	11.91	NA
May	16.4	12	26.34	20.81	NA	15.98	NA
Jun	15.98	12.96	27.6	22.21	NA	17.03	NA
Jul	8.96	7.48	14.34	11.44	NA	8.96	NA
Aug	0#	12.57	11.44	8.29	NA	6.85	NA
Oct	4.56	8.205	11.26	8.04	NA	5.1	NA
Nov	9.47	6.55	12.38	9.99	NA	6.85	NA
Dec 1-15	10.35	1.54	10.71	9.99	NA	7.16	NA
Apr 16- Dec 15	10.71	2.21	10.71	10.35	NA	7.48	NA

No water diverted above MP1 for power August 7th through August 26th to repair leakage.

The automated data collection and telemetry system operated by the Washington County Water Conservancy District was not active through this period. In this report, only the daily manual readings are used. A previous analysis showed good correspondence between the two sources of data.

Section-by-Section Loss

Table 2 summarizes the section-by-section loss rates and percentages for the period April 16, 2010 through December 15, 2010 by month and for the whole period. The loss calculation for MP1 to MP3 is unchanged since the April 2010 report. The median as a summary statistic was initially chosen in the January 2008 report since the analysis of the 10-year period of record available contained many missing daily readings and the median provided an accurate and convenient measure of the central tendency. In preparing the December 2009 report, I compared the percentage loss obtained by using the median daily loss to the loss percentage by volume (totals of all days) and the results were within 1% of each other.

Table 2. Monthly and seasonal (December 1 through April 15) section-by-section median loss amount (cfs) and percentage of upstream flume flow.

Month	MP1 to MP3 Loss (excludes MP2 inflow)	MP3 to MP4 Loss [@]	Veyo Irrig. Div. (cfs)	MP4 to MP5 Loss	MP5 to MP6 Loss*	MP4 to MP6 Loss*
Apr 15-30	0.4 (3%)	NA	NA	NA	NA	2.9 (20%)
May	1.9 (13%)	NA	NA	NA	NA	4.8 (23%)
Jun	2.1 (16%)	NA	NA	NA	NA	5 (23%)
Jul	2.2 (37%)	NA	NA	NA	NA	3.1 (26%)
Aug	Offline	NA	NA	NA	NA	2 (25%)
Oct	1.7 (24%)	NA	NA	NA	NA	3.2 (33%)
Nov	1.2 (13%)	NA	NA	NA	NA	3.1 (30%)
Dec 1-15	2 (24%)	NA	NA	NA	NA	3 (27%)
Apr 16-Dec 15	1.7 (19%)	NA	NA	NA	NA	3.1 (28%)

Notes:

The formula for calculating the loss in the MP1 to MP3 section has been changed to exclude the influence of MP2 inflow to MP3. MP2 flows are subtracted from MP3 flows before calculating the loss.

* NOT accounting for reservoir changes. Lower Sand Cove Reservoir is missing the staff gage. Previous reports showed the influence of the reservoir adjustment to be minimal.

No water diverted above MP1 for power March 13th through April 15th to repair leakage.

Appendix A. Documentation for Diversion Data and System Loss Calculations

The Microsoft Excel spreadsheet file attached to the e-mail that transmitted this document provides information on three worksheets:

1. The daily flows corresponding to the staff gage readings digitized from the original record of the operators.
2. The daily reservoir levels and computed change to the canal system due to reservoir operation. (Change in system – increases to flow in the system are positive)
3. The computed daily system loss rate. *Note that change in calculation for the MP1 to MP3 section. Previously MP2 was included, but since the canal between it and MP3 is so short, its flow is subtracted from MP3 before computing the loss rate between MP1 and MP3.*

The data is believed to be correct and obvious errors were corrected, such as when water level was recorded instead of the typical flow corresponding to the water level (in that case, the corresponding flow was substituted). However, there may be other errors or incorrect data entry. The text string “NA” is substituted for blank values when no reading was available for a flume or there is insufficient data to calculate a loss for a section. The month column was used to group the daily values for analysis. The “NA” values are simply omitted from the calculations.