

**PARR HYDROELECTRIC PROJECT – FERC No. 1894**  
**PARR SHOALS DAM TURBINE VENTING – MEMORANDUM**

**TO:** Water Quality Technical Working Committee  
**FROM:** Kleinschmidt Associates  
**DATE:** August 15, 2016  
**RE:** 2016 Turbine Venting Test Results

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**INTRODUCTION**

Following the completion of the Parr Hydroelectric Project Baseline Water Quality Report, there were questions from the Water Quality TWC regarding occasional low dissolved oxygen (DO) in the tailrace downstream of Parr Shoals Dam. At a Water Quality TWC meeting on February 4, 2014, the TWC noted that the Baseline Water Quality Report identified periodic excursions of DO levels less than 4.0 mg/L in the Parr Shoals Dam tailrace, as reported by the USGS station 02160991. In an effort to understand these excursions better, SCE&G consolidated historic USGS data to examine these excursions and issued an addendum to the Baseline Water Quality Report in June 2014. At the request of the Water Quality TWC, SCE&G collected additional water quality data in the summer of 2014 in the tailrace and forebay of Parr Shoals Dam in an attempt to determine whether project operations are causing these excursions. These results were summarized in a memo issued on March 2, 2015. SCE&G followed up this effort by collecting another series of water quality data in the Parr forebay from May through mid-October 2015. The results of this data collection effort was summarized in the Parr Shoals Dam Turbine Venting Report.

In addition, SCE&G proposed to test all of the Parr turbines for their ability to self-vent and potentially increase the dissolved oxygen in the tailrace during specific periods of the year. An initial test of the turbines' capacity to vent was performed August 2014; a second test to determine which turbines had the most significant impact on increasing dissolved oxygen was performed in July 2015. The results of the testing, along with the findings published in the Baseline Water Quality Report, were used to develop a Turbine Venting Plan. At the March 2016 Water Quality TWC meeting, SCE&G proposed to test the Turbine Venting Plan during June 15<sup>th</sup> through July 31<sup>st</sup> of 2016. In addition to testing the plan during 2016, SCE&G also conducted a re-test of Unit 4 after installation of the new "air-cooled wooden bearings". The results of each of these tests are presented in this document.

## METHODOLOGY AND RESULTS

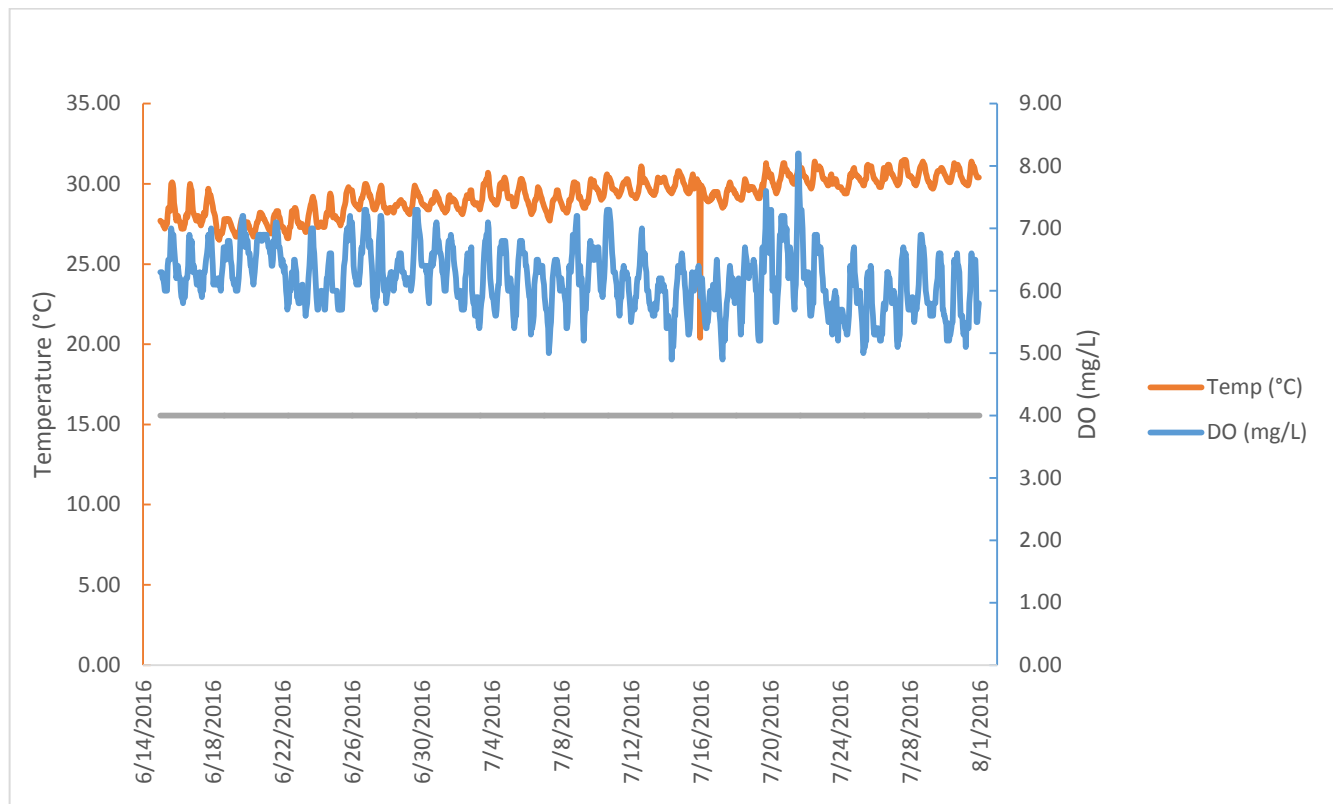
SCE&G implemented the proposed Turbine Venting Plan from June 15 through July 31, 2016. The success of turbine venting was measured at the USGS Gage No. 02160991, Broad River near Jenkinsville, SC.

Dissolved oxygen and temperatures observed in the tailrace are illustrated in Figure 1. No excursions of DO levels less than 4.0 mg/L were observed (Table 1).

**Table 1** Parr Shoals Tailrace Maximum and Minimum DO and Temperature

	June		July	
	DO (mg/L)	Temperature (°C)	DO (mg/L)	Temperature (°C)
Maximum	7.30	30.10	8.20	31.50
Minimum	5.60	26.50	4.90	20.40

**Figure 1** Parr Shoals Tailrace DO and Temperature



Turbine venting test of Unit 4 are presented in Table 2. The testing noted a DO uptake of approximately 0.20 mg/l. The testing performed during 2014 identified an uptake of 0.16, which is slightly less than the latest testing results.

**Table 2** Parr Shoals Turbine Venting Unit 4 Test – August 2016

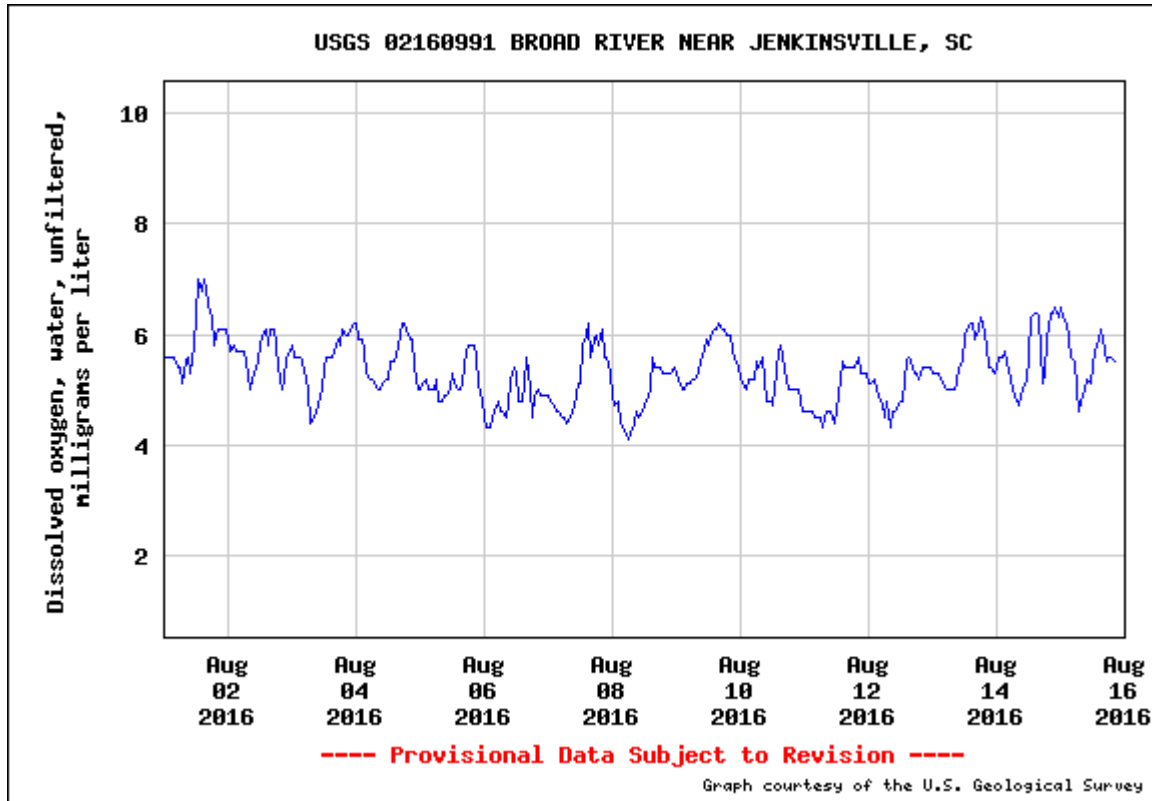
Test #	Time (DST)	Breaker Position Open/Closed	DO (mg/l)	Temp (°C)	TDG	% Sat	HP EI	TW EI	KW	Kvars Act.	Gates Act. (%)	BP
1	9:00	closed	5.08	29.42	713	67.2	257.22	220.70	1360±	150	45	759
2	9:40	open	5.3	29.48	718	70.2	257.53	220.72	1360±	151	46	759

Notes:

Requested plant/system control to have all gates up and a max. of 2 units generating by 07:00 (DST).  
 Units 4 & 6 were operating and all gates up upon arrival at the plant. Unit 6 was shutdown at 08:20 (DST).  
 Breaker valve on Unit 4 was opened at approx. 09:20 (DST).

Also of note was the general decline in DO levels recorded at the Jenkinsville gage during the first 2 weeks of August, 2016 (Figure 2). We are not sure if this is related to drops associated with the cessation of turbine venting or environmental factors.

**Figure 2** Parr Shoals Tailrace DO and Temperature – August 1 – August 16, 2016



## **CONCLUSION**

Based on the results of the 2016 Turbine Venting Plan test, turbine venting at the Parr Shoals Development was successful. Testing of Unit 4 during 2016 showed a slight increase in DO uptake. We also noted a decrease in DO levels during August.

Based on these findings, SCE&G proposes to perform turbine venting tests during 2017 and to extend the venting season to include June 15 through August 31. SCE&G will use the results of the 2016 and 2017 testing and the individual Unit test to update and modify the current Turbine Venting Plan. SCE&G plans to include the updated Turbine Venting Plan as one of the proposed protection, mitigation, and enhancement measures to be included in the Final License Application for continued operation of the Parr Hydroelectric Project (FERC No. 1894).