

# **EROSION MONITORING PLAN**

## **PARR HYDROELECTRIC PROJECT** (FERC No. 1894)

*Prepared for:*

**South Carolina Electric & Gas Company**  
**Cayce, South Carolina**

*Prepared by:*

**Kleinschmidt**

Lexington, South Carolina  
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September 2017

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## EROSION MONITORING PLAN

### 1.0 INTRODUCTION

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South Carolina Electric & Gas Company (SCE&G) is the Licensee for the Parr Hydroelectric Project (FERC No. 1894) (Project). The Project consists of the Parr Shoals Development (Parr Development) and the Fairfield Pumped Storage Development (Fairfield Development). Both developments are located along the Broad River in Fairfield and Newberry Counties, South Carolina. The current license for the Project is due to expire on June 30, 2020. Therefore, SCE&G will file for a new license with the Federal Energy Regulatory Commission (FERC) on or before June 30, 2018.

The Project developments form two separate Project reservoirs. Parr Reservoir is formed by Parr Shoals Dam and serves as the lower reservoir for the Fairfield Development. Parr Reservoir has a surface area of 4,400 acres and approximately 88 miles of shoreline<sup>1</sup> within the Project boundary. Monticello Reservoir is formed by a series of four earthen dams and serves as the upper reservoir for the Fairfield Development. Monticello Reservoir has a surface area of 6,800 acres and approximately 57 miles of shoreline<sup>2</sup>. An active storage of up to 29,000 acre-feet is transferred between the two reservoirs by the pumped storage operations of the Fairfield Development. Fairfield Development's alternate cycles of generation and pumping results in daily fluctuations in the water levels of both Parr and Monticello reservoirs. These daily fluctuations, along with unavoidable wind and wave action, have the potential to create erosion along the reservoir shorelines.

SCE&G currently monitors the extent of shoreline erosion at Parr Reservoir annually and Monticello Reservoir biannually. This document describes SCE&G's current shoreline erosion

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<sup>1</sup> Parr Reservoir shoreline miles is based on a full pool elevation of 266'. Shoreline inspections are done intentionally when the reservoir is at an elevation lower than full pool in order to visually see erosion areas.

<sup>2</sup> Monticello Reservoir shoreline miles is based on a full pool elevation of 425' and includes the Recreation Lake. Shoreline inspections are done intentionally when the reservoir is at an elevation lower than full pool in order to visually see erosion areas. The Recreation Lake shoreline is not inspected since it has a more stable water level and is not subject to the erosion found in the main reservoir.

monitoring plan, which SCE&G proposes to continue throughout the term of the new Project license.

## **2.0 CONSULTATION**

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As part of the relicensing process for the Project, SCE&G formed Resource Conservation Groups (RCGs) and Technical Working Committees (TWCs) with various stakeholders, including federal and state agencies, non-governmental organizations (NGOs) and interested individuals. These RCGs and TWCs met on a frequent basis throughout relicensing to discuss and address issues related to Project operations. Prior to filing the Pre-Application Document (PAD) with FERC, SCE&G distributed its draft PAD to the RCGs and TWCs for review and comment. During this review, the USFWS requested additional information be included in the PAD regarding erosion within the Project boundary. SCE&G informed the stakeholders that, although it was not a requirement under the current license, they did perform internal erosion studies around the shorelines of Parr and Monticello reservoirs on a regular basis. SCE&G revised the PAD to include the most recent erosion studies that had been completed to date. Later in the relicensing process, during the development of protection, mitigation and enhancement (PM&E) measures to be included in the Draft License Application (DLA) and Final License Application (FLA), SCE&G shared their process for studying erosion at the Project with the RCGs and TWCs during the PM&E meeting held on March 30, 2017. Stakeholders reviewed the information and provided no comments or revisions.

SCE&G recognizes the importance of continuing erosion monitoring at the Project and has developed this Erosion Monitoring Plan for inclusion in the new operating license.

### 3.0 MONITORING PLAN

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#### 3.1 RESPONSIBLE PARTY

The SCE&G Dam Safety Group, in coordination with plant personnel, conducts all inspection activities for both the Parr and Monticello shoreline inspections.

#### 3.2 DATA COLLECTION METHODS

The SCE&G Dam Safety Group employs several methods when completing the shoreline erosion monitoring. Shorelines are visually monitored from a boat and then tracked using a GPS-enabled data collector. Inspectors then classify the level of erosion into one of four categories, listed in Table 3-1.

**TABLE 3-1 EROSION CATEGORIES**

<b>EROSION CATEGORY</b>	<b>DESCRIPTION</b>
Slight	Persistent woody vegetation, no recent downed trees, little to no active erosion evident.
Moderate	Some persistent woody vegetation, few recent downed trees, presence of active vertical or sloped erosion.
Severe	Little or no persistent woody vegetation, recent downed trees, active erosion undercutting the shoreline.
Rip-Rap	Shoreline with armoring

As the inspector travels the edge of the shoreline, the classification of the shoreline is entered into the GPS. Each section of shoreline is classified into one of the erosion categories listed above. This information is then transferred and overlain onto an aerial map and each classification is totaled for comparison to previous inspections. Areas of erosion which are deemed to be significantly close to affecting the Project boundary, regardless of their actual severity, are always classified as severe and their location is marked for reference.

While efforts are made to be as consistent as possible with the classification of erosion, some variability is expected. This variability can be attributed to the objectivity of the inspector, the time of year and reservoir levels at the time of inspection.

### **3.3 EROSION REPAIR**

Reasons to initiate shoreline erosion repair include: potential encroachment of the Project boundary, protection of infrastructure, protection of significant natural or cultural resources.

When an area of active shoreline erosion is identified with one or more of the above impacts, the management process is initiated as follows:

- Verification – Take measurements or install reference pins and evaluate rate and severity of active erosion quantitatively.
- Plan – Meet with SCE&G management to determine the extent of repairs. Develop plan to repair. Acquire cost estimates.
- Notification – Notify FERC of SCE&G’s intent to repair.
- Budget – The Plant budgets money and time frame to perform the work.
- Permit – Determine what permits are required and prepare applications. Coordinate access with landowners if there is no SCE&G or public access to gain entry to the site.
- Repair – Mobilize workforce, material and equipment to make the repairs. Dam Safety personnel will monitor the work.
- Prepare a close out report and notify all necessary agencies of project completion.

### **3.4 MONITORING SCHEDULE**

The Parr Reservoir shoreline is inspected for erosion on an annual basis, usually during the second quarter of each year. The Monticello Reservoir is inspected for erosion on a bi-annual basis, usually during the second and fourth quarters of each year.

## **4.0 DOCUMENTATION AND REPORTING**

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Following each inspection, a report is prepared that includes the details of the inspection and the amount of erosion by category for the entire shoreline. An aerial map is prepared and the shoreline segments are overlain, visually detailing each area of erosion. Totals for each classification group are also calculated and shown on the inspection form. An example inspection form and map are included in Appendix A.

Reports are filed with the FERC Atlanta Regional Office as part of the annual Dam Safety Surveillance and Monitoring Report. When a repair is necessary, SCE&G notifies FERC and any other appropriate government agencies.

**APPENDIX A**

**SAMPLE INSPECTION REPORT FORM AND MAP**



## Attachment 1: Sample Inspection Report Form and Map

Subject: FERC Project No. 1894  
Fairfield Pumped Storage Facility  
Monticello Reservoir Routine  
Shoreline Surveillance

Date: June 3, 2016

To: Tim Miller

From: Chad Stoudemire

On May 10, 2016 the shoreline of Monticello Reservoir was inspected to determine the extent of erosion. The inspection was conducted by Chad Stoudemire, with assistance from Lawrence Youmans. The areas of erosion are classified in one of three Categories: Severe, Moderate, or Slight. Additionally, the amount of riprap armoring is tracked.

The inspection was performed using the standards of the erosion monitoring program. Shorelines along the Project Boundary Line (PBL) are visually inspected and GPS tracked. During GPS tracking the inspector classifies the area into one of the three categories.

When compared to the inspection of October 2015, conditions remain much the same as reported. Two areas of concern were found to be encroaching along the PBL line and as such, these areas should be closely monitored until such time as a repair plan has been developed.

Overall, the calculations for each category indicate a slight change in the class and percentage of erosion around the lake. The method used for inspection of the shoreline assumes that after more than 35 years of operation all of the shoreline that has not been riprapped has some degree of erosion. The calculations are based on the length of shoreline. The classifications are 64.8% slightly eroded, 16.8% moderately eroded and 3.6% severely eroded.

The erosion (isolated sections around the shoreline) that has occurred along the shoreline has been in depth, slowly advancing in the direction of the PBL. This condition may lead to additional repairs, in the future, as these areas approach and/or encroach onto the PBL.

The noted concern for this inspection is to clearly identify the areas of severe erosion that should have repair plans developed and be scheduled for repair. Furthermore, it is my recommendation that the areas that have been classified as "severe" that are missing their PBL markers have the markers reestablished so that accurate evaluation of repairs can occur. We are still evaluating eroded areas and different repair methods.

Below are the calculations for the inspection of May 10, 2016 and a map showing the shoreline and areas of each classification. The lake elevation was approximately 422.8' during this inspection.

Attachments

cc: F.H.File	R.R. Ammarell
Joey Bouknight	J.K.Todd
J.C. Knight	G. Delk
T.C. Boozer	W. Argentieri

**EROSION CALCULATIONS  
MONTICELLO RESERVOIR  
May 10, 2016**

TOTAL SHORELINE	=	224,665 FT	
SLIGHT EROSION	=	145,633 FT	
MODERATE EROSION	=	37,779 FT	
SEVERE EROSION	=	8,140 FT	
TOTAL EROSION	=	191,552 FT	
RIP RAP	=	33,113 FT	
% OF SHORELINE THAT SHOWS SOME SIGN OF EROSION	=	$\frac{191,552 \text{ FT}}{224,665 \text{ FT}}$	= 85.3%
% OF SLIGHT EROSION	=	$\frac{146,663 \text{ FT}}{224,665 \text{ FT}}$	= 64.8%
% OF MODERATE EROSION	=	$\frac{37,779 \text{ FT}}{224,665 \text{ FT}}$	= 16.8%
% OF SEVERE EROSION	=	$\frac{8,140 \text{ FT}}{224,665 \text{ FT}}$	= 3.6%



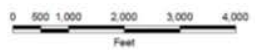


**Legend**

Total Shoreline - 224,665 ft.

**Classification**

- Slight - 145,633 ft.
- Moderate - 37,779 ft.
- Severe - 8,140 ft.
- Riprap - 33,113 ft.



**LAKE MONTICELLO**  
Shoreline Inspection  
May 2016

