

PARR HYDROELECTRIC PROJECT PARR HYDRO DEVELOPMENT & FAIRFIELD PUMPED STORAGE FACILITY DEVELOPMENT FERC PROJECT No. 1894 - SC

SEPTEMBER 19, 2012

PARR AND FAIRFIELD LOCATIONS



PARR AND FAIRFIELD LOCATIONS



PARR, FAIRFIELD, & VICINITY



FAIRFIELD PUMPED STORAGE FACILITY FERC PROJECT No. 1894 Aerial



PARR HYDRO PLANT



PARR HYDROELECTRIC PLANT

- Parr Dam concrete gravity spillway, 37 ft. high, 2000 ft. long
- Earthen embankment on west end
- The concrete overflow section (wing wall) on west end approx. 35 ft high
- (10) Bottom hinged bascule crest gates, each 200 ft. long and 9 ft. high – added 1974 - 1977
- Powerhouse: Steel-framed brick building containing six vertical turbines with generators
- Non-overflow section on the east end
- Hydraulic crest gates can spill excess inflow.

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FAIRFIELD PS DEVELOPMENT



FAIRFIELD PUMPED STORAGE FACILITY

- Four earthen dams (A, B, C, and D)
- Earthen Dam Construction:

 random fill shells (u/s and d/s)
 central impervious core
 upstream impervious blanket
- Riprap slope protection on upstream slopes
- Downstream slopes are grassed
- Dam B: main dam across Frees Creek

FAIRFIELD PUMPED STORAGE FACILITY (cont'd)

 Intake structure for plant integrated into abutment of Dam "B"

 Four steel penstocks lead from the intake structure to the powerhouse

FAIRFIELD PUMPED STORAGE FACILITY FERC PROJECT No. 1894



FAIRFIELD PUMPED STORAGE FACILITY FERC PROJECT No. 1894 Dam A



FAIRFIELD PUMPED STORAGE FACILITY FERC PROJECT No. 1894 Dam B

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FAIRFIELD PUMPED STORAGE FACILITY FERC PROJECT No. 1894 Dam B



FAIRFIELD PUMPED STORAGE FACILITY FERC PROJECT No. 1894 Dam C

The Ban

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FAIRFIELD PUMPED STORAGE FACILITY FERC PROJECT No. 1894 Dam D

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FAIRFIELD PUMPED STORAGE FACILITY FERC PROJECT No. 1894 Powerhouse



PARR HYDROELECTRIC PROJECT HYDROLOGIC DATA

Parr Reservoir (full)

- 4,400 acres
- 13 miles long
- Storage capacity directly affected by FFPS Ops
- Total storage at full pool 32,000 ac-ft
- Active storage 29,000 ac-ft in 10 ft. operating range
- Reservoir Range: 256' 266' (top of Crest Gates)
- Drainage area 4,750 sq. miles
- 31 river miles downstream of Neal Shoals
- 24 river miles upstream of Columbia diversion dam

PARR HYDROELECTRIC PROJECT HYDROLOGIC DATA

Monticello Reservoir (full)

- 6,800 acres
- Total volume of water available approx. ~9.5 billion gallons of water (29,000 acre-ft)
- Affects Fairfield Pumped Storage Facility only
- Total storage at full pool 400,000 ac-ft
- Active storage 29,000 ac-ft in 4.5 ft. operating range
- Reservoir Range: 420.5' 425'
- Drainage area 9,400 sq. miles

PARR HYDROELECTRIC PROJECT OPERATIONS

Parr Development

- primarily used for base load
- licensed capacity 14.9 MW; hydraulic capacity ~6,000 CFS (6 units).
- Parr Hydro operates in modified run-of-river mode.
- March May: <u>1,000 CFS minimum flow</u>, or average daily natural inflow to Parr Reservoir (less evaporative loss from Parr and Monticello Reservoirs).

PARR HYDROELECTRIC PROJECT OPERATIONS

Parr Development

- Remainder of year: <u>800 CFS daily average flow and</u> <u>150 CFS minimum flow</u>, or average daily natural inflow (less evaporative loss from Parr and Monticello Reservoirs)
- This means that when inflow minus evaporation falls below 800 CFS (1,000 CFS March – May), we do not get to keep any water – what comes in must go out.

Parr Hydro Inflow

- Inflow to Parr Reservoir is the sum of flows at 3 USGS gauge sites:
 - Broad River near Carlisle (02156500, 5 miles below Neal Shoals)
 - Tyger River near Delta (02160105)
 - Enoree River at Whitmire (02160700)
- New USGS gage installed at Hwy. 34 bridge on Parr Reservoir
 - Broad River at Blair, SC (02160750)

Parr Hydro Evaporation

 Evaporation is estimated based on SC State Climatologist Office data, and surface areas of Parr and Monticello Reservoirs.

 Increased evaporation from VCSNS was provided by plant staff.

Parr & FFPS USGS Gage Locations



Image from: http://waterwatch.usgs.gov/uvmap/

PARR HYDROELECTRIC PROJECT OPERATIONS

Fairfield Development

- Primarily used for peaking, reserve generation when Saluda not available, and off-peak power usage (pumping to store water for generation)
- Fairfield Pumped Storage licensed capacity 511.2 MW; hydraulic capacity 50,400 CFS generating & 41,800 CFS pumping (8 units).

PARR HYDROELECTRIC PROJECT OPERATIONS

- Operate project so that "releases from lower reservoir during flood flows shall be no greater than flows which would have occurred in the absence of the project."
- Based on USGS flood study from 1970s, Fairfield should stop generating and Parr's crest gates should be completely lowered when Broad River flow reaches <u>40,000 CFS</u>.
 - Measured by adding discharge from three USGS gauges upstream of Parr Reservoir.

Parr Reservoir Operations

USGS 02160990 PARR SHOALS RESERVOIR AT PARR, SC



Parr Reservoir Operations

USGS 02160990 PARR SHOALS RESERVOIR AT PARR, SC



---- Provisional Data Subject to Revision ----

Monticello Reservoir Operations



Typical Monticello Reservoir Level Fluctuation

Safety

- Sirens at plant activate when Parr Crest Gates lower to release water into the Broad River
- Both Developments have Emergency Action Plans to notify the public if a dam failure is imminent or has occurred
- Both Developments have Public Safety Plans to identify where warning signs are located

Public Safety Plan





Questions?