SOUTH CAROLINA ELECTRIC & GAS COMPANY

COLUMBIA, SOUTH CAROLINA

SALUDA HYDROELECTRIC PROJECT

FERC PROJECT NO. 516

DESCRIPTION OF SALUDA HYRDOELECTRIC PROJECT

EXHIBIT A

AUGUST 2008

Prepared by:

Kleinschmidt

Energy & Water Resource Consultants

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DESCRIPTION OF THE SALUDA HYDROELECTRIC PROJECT

The Saluda Hydroelectric Project is located on the Saluda River in Richland, Lexington, Saluda, and Newberry Counties of South Carolina, approximately 10 miles west of the city of Columbia , and near the towns of Irmo, Lexington, and Chapin. The 2,420 square mile watershed area, drained by the Saluda River and its tributaries above Saluda Dam, provides water for Lake Murray and the Saluda Hydroelectric Plant.

Exhibit A-1 provides a location map of the Project, and Exhibit A-2 is a table of project standard numbers.

1.0 PROJECT STRUCTURES

The Saluda Hydroelectric Project structures consist of a 7,800 foot long earth fill embankment dam (Saluda Dam), a backup dam, an emergency spillway with six Tainter gates, a powerhouse, five concrete intake towers and associated penstocks. Descriptions of individual Project components are provided below.

1.1 Saluda Dam, Spillway, and Spillway Gates

The original Saluda Dam is an earth fill dam with an additional steel sheet pile wall on the upstream edge of the crest, 213 feet high and nearly a mile and a half long. The maximum width of the dam at the bottom is 1,210 feet, and the minimum width at the crest is 50 feet (increased from 36 feet by the South Carolina Department of Transportation (SCDOT) in 2007). A state highway, SC Route 6, is built along the top of the dam. A dike constructed of various combinations of earthen berm, concrete walls, and sheet pile sections extends northwest from the north end of the dam approximately 2,550 feet alongside SC Highway 6. The top of the dike meets or exceeds the elevation of the sheet pile wall on the Saluda Dam with the exception of a park entrance; in the event of extreme flooding, sandbags would be used to raise this section to meet or exceed the Saluda Dam sheet pile wall.

In 2005, a seismic remediation of the Saluda Dam was completed consisting of a new backup dam immediately downstream of and adjacent to the original dam. The

backup dam consists of a combination roller compacted concrete (RCC) gravity section and rock fill embankment sections along the downstream toe of the existing dam. The RCC gravity section is founded on bedrock and the rock fill embankments are founded on residual soil. The backup dam is constructed of 1.3 million cubic yards of RCC and 3.5 million cubic yards of rock fill. The backup dam is 213 feet high, with the RCC gravity section (located between the two rock fill embankment sections) being approximately 2,300 feet long and the rock fill berm sections on the north and south ends having a combined length of approximately 5,700 feet. The maximum width of the foundation of the back-up berm is approximately 150 feet for the RCC section and 425 feet for the rock fill embankment sections. The crest elevation of the backup dam is El. 372' NAVD88[1], and the maximum crest width is 40 feet for the RCC section and 20 feet for the rock fill sections. During the seismic remediation, additional rock fill was also added to the downstream slope of the original Saluda Dam to provide a base for two additional northbound traffic lanes for SC Route 6. During 2006 through 2008, the South Carolina Department of Transportation (SCDOT) added pavement and guardrail to this area to complete the highway. Also during this time, the SCDOT widened the crest of the original dam by approximately 14 feet to accommodate two additional traffic lanes, a bicycle lane, and a walking path.

The emergency spillway is 500 feet from the south end of the dam and is a concrete structure equipped with six steel Tainter gates. Four gates are 37' 6" wide and 25' 0" high with sill elevations of 338.5'; the other two gates are 44' 0" wide and 32' 0" high with sill elevations of 328.5'. The 2,900-foot long spillway channel was excavated in bedrock, and reconnects with the Saluda River approximately three quarters of a mile downstream of the powerhouse. The spillway gates are operated when the reservoir level reaches or is predicted to exceed El. 358.5' to pass flood inflows. At a flood elevation of 368.5', the spillway capacity is approximately 154,000 CFS. Under Probable Maximum Flood (PMF) conditions, the spillway is rated to pass 197,000 CFS with the reservoir at El. 374.4'.

[1] Unless otherwise indicated, all elevation references in Exhibit A are given in North American Vertical Datum 1988 (NAVD 88); conversion to traditional plant datum (PD, used in numerous supporting studies for this license application and often erroneously referred to as MSL) requires the addition of 1.50 feet.

1.2 Intake Towers and Penstocks

Water is supplied to the powerhouse through five 223-foot high intake towers, four of which are 30 feet in diameter, and the fifth 60 feet in diameter. An aerial cable tramway runs between the crest of the dam and the intake towers. The 30' diameter intake towers for Units 1, 2, 3, and 4 each have two 9' wide x 14’ high Broome Roller Gates. The 60’ diameter intake tower for Unit 5 contains six Broome Roller Gates, each 10’ wide x 10’ high.

At the bottom of each of the four smaller-diameter towers, a 16-foot diameter penstock 1091 feet long supplies water to Units 1 – 4; at the turbine inlet of each is a 16-foot diameter S. Morgan Smith electrically operated butterfly value. Water entering the Unit 5 Intake Tower passes first through a 491-foot section of open concrete arch conduit, then through a 227-foot divided section of arch conduit containing two 14-foot diameter penstocks followed by a 42 foot long bifurcation, and finally through a 364-foot section of single, 20-foot diameter penstock to the Unit 5 scroll case.

1.3 Powerhouse

The Saluda Hydro Powerhouse is constructed of a reinforced concrete foundation with a steel-framed brick superstructure. The original structure (which contains the turbines and generators for Units 1 through 4) is 91 feet wide, 254 feet long and has a total structural height of 121 feet. A reinforced concrete extension, 89 feet wide and 77 feet long with a structural height of 70 feet, was constructed to house the turbine for Unit No. 5. The original brick superstructure houses generators and auxiliary equipment for Units 1 through 4, but was not extended to house the generator for Unit No. 5, which is enclosed in a weather-tight housing on an open deck. Auxiliary equipment for Unit 5 is located inside the concrete extension, on the turbine floor.

Three of the four original generators are rated at 32.5 MW and the fourth (Unit 3) has been rewound to a rating of 42.3 MW. The original four turbines are each rated at 55,000 HP at 180 feet of head. The generator for Unit 5 is rated at 67.5 MW, and the turbine is rated at 98,300 HP at 156’ head. The total rated generator capacity for the

station is 207.3 MW.[2] At optimum gate openings, the hydraulic capacity of each of the Units 1 to 4 is 3,000 CFS, and for Unit No. 5 is 6,000 CFS, yielding a total station hydraulic capacity of 18,000 CFS.

The intake towers for Unit Nos. 1 to 4 draw water from near the bottom of the reservoir at a depth of about 175 feet, while Unit No. 5 takes water from a depth of about 55 feet. All five turbine runners are equipped with hub baffles and vent pipes through the head covers to improve dissolved oxygen (DO) concentrations downstream of the Project.

Discharges of once-through non-contact cooling water, floor drains, penstock leakage and storm water runoff from transformer containments into the lower Saluda River from Saluda Hydro are permitted under National Pollutant Discharge Elimination System (NPDES) permit No. SC0002071.

1.4 Tailrace

The tailrace of the Project is made up of a portion of the original riverbed, along with an excavated section approximately 150 feet long immediately downstream of the powerhouse, both consisting of mostly bedrock. Water levels in the tailrace typically fluctuate between El. 171.0' and 183.4' depending on the magnitude and duration of plant operation. The normal tailwater level at minimum gate operation is El. 171.0', corresponding to a total gross head of 185.5 feet during the normal summer maximum pool and 177.5 feet during the normal winter drawdown. Under flood conditions in June 1965, the tailwater reportedly rose to an elevation of approximately 197.5 feet, with four spillway gates operating.

1.5 Bypass Reach

There is no bypass reach associated with this Project.

[2] The currently effective license gives the station capacity as 202.6 MW. This value was based on a power factor of 0.8 for the original four generators. When Unit 3 generator was rewound, its power factor changed to 0.9, and this change was not taken into account in the application for the current license.

2.0 PROJECT IMPOUNDMENTS

2.1 Reservoir

Lake Murray covers a normal maximum operating water surface area of 75 square miles or approximately 48,000 acres. The normal maximum operating water surface elevation is 356.5' during the summer months, although the current license permits a maximum operating level (full pool) of El. 358.5'. At full pool, the reservoir is 41 miles long and about 14 miles wide at its widest point, with 691 miles of shoreline, including islands. Water surface area at full pool is 79.5 square miles or approximately 50,900 acres, with total or gross storage of approximately 2,000,000 acre-feet (650 billion gallons) of water. Usable storage is approximately 635,000 acre-feet (207 billion gallons) of water between full pool and El. 343.5', corresponding to the minimum operating level as observed under the current license.

The reservoir shoreline is irregular, due to many creek beds and drainage ways cut through the terrain. Inflow is generally cooler than the reservoir water, but often carries high sediment loads. The reservoir undergoes thermal stratification annually, typically July though November, with the thermocline occurring between 20 and 40 feet deep. Four municipal water intakes have been constructed in the reservoir to date to serve the Cities of Columbia, West Columbia, Newberry, and Newberry County. Saluda County was granted approval for a municipal water withdrawal by FERC order dated June 9, 2006 (revised by FERC order dated March 22, 2007). See Exhibit C for more detailed information regarding the approved municipal water withdrawals from the Project.

3.0 PROJECT GENERATING EQUIPMENT

The Project generating equipment consists of the following:

3.1 Turbines

Units one, two, three, and four are S. Morgan Smith vertical Francis-type turbines each rated at 55,000 HP at 180' head. Synchronous speed is 138.5 RPM.

Unit five is a Baldwin-Lima-Hamilton (BLH) vertical Francis-type turbine rated at 98,300 HP at 156' head. Synchronous speed is 128.6 RPM.

3.2 Generators

Units 1 through 4 have original Westinghouse 3-phase, 60-cycle, 13,800 V generators. The generators for units 1, 2, and 4 have the original rating of 40,625 KVA at 0.8 power factor (32.5 MW); Unit 3 generator has been rewound to a rating of 47,000 KVA at 0.9 power factor (42.3 MW). These four generators are housed on the generator floor inside the original brick superstructure.

Unit five has a 3-phase, 60-cycle, 13,800 V General Electric generator rated at 75,000 KVA with a 0.9 power factor (67.5 MW). The generator for unit 5 is enclosed in a weather-tight housing on an open deck adjacent to the original powerhouse superstructure.

The total rated capacity for all five generators is 207.3 MW.

3.3 Exciters

Units one through four are each equipped with an exciter and a Permanent Magnet Generator (PMG), both direct connected above the generator rotor.

Unit five is equipped with an AC exciter and rotating rectifier.

3.4 Governors

Units 1 through 4 have Woodward Type A actuator governors that are interconnected in pairs. Unit 5 has its own BLH “Pelton” type actuator governor and pressure tank.

3.5 Power Transformers

Units one, three, and four power transformers are 3-phase, 41,667/46,667 KVA with 55°/65° C temperature rise, type F.O.W. (Forced Oil Water Cooled), 115/13.2 KV. The Unit two power transformer is 3-phase, 40,000 KVA with 55° C temperature rise, type F.O.W., 115/13.2 KV.

The power transformer for Unit five is 3-phase, 76,785/86,000 KVA, type F.O.A. (Forced Oil Air Cooled), 115/13.2 KV with 55°/65° C temperature rise.

3.6 Miscellaneous Equipment

Miscellaneous equipment includes a 175-ton, traveling Bedford bridge crane and all accessory electrical equipment, including instrumentation, batteries, switchgear, etc.

4.0 PROJECT TRANSMISSION LINE

There is no transmission line associated with the Saluda Hydroelectric Project. The electric power is generated at 13,200 volts and is transformed to 115 KV. The power enters the Applicant's transmission system through the nearby Saluda Substation, which is not a part of the Project.

5.0 PROJECT FEDERAL LANDS

There are no Federal lands which are a part of the Saluda Hydroelectric Project.

6.0 MCMEEKIN STATION

McMeekin Station is a 252 MW, coal fired base load power plant located adjacent to the hydro powerhouse on the north side of the Saluda River. It is owned and operated by South Carolina Electric & Gas Company (SCE&G), but is not part of the Project. Ash disposal facilities for McMeekin Station are within the Saluda Project boundary, and approximately 250 CFS (113,000 GPM) of cooling water for the McMeekin condensers is taken from and returned to two of the Saluda Hydro penstocks. Under normal operation, McMeekin Station's cooling water is supplied from Saluda Hydro's Unit 4 penstock, pumped through the condensers, and returned to the Unit 2 penstock. If Saluda Hydro Unit 2 is not operating, the returned cooling water enters the reservoir (Lake Murray) through the intake tower. If Saluda Hydro Unit 2 is operating, the returned cooling water is discharged through the hydro unit into the Saluda River. McMeekin Station's National Pollutant Discharge Elimination System (NPDES) permit No. SC0002046 requires that a minimum of 2,500 CFS be discharged into the Saluda River from Saluda Hydro when Saluda Hydro Unit 2 operates with McMeekin Station operational, for mitigation of potential thermal impacts to the river. This discharge value is based on a 10:1 dilution of the 250 CFS heated discharge from McMeekin Station. A system of valves is provided in the McMeekin cooling water piping to allow supply to be taken from Saluda Hydro Unit 2 penstock instead of Unit 4, and when this occurs the cooling water is discharged directly to the Saluda River using a free discharge valve to provide back pressure and to dissipate the energy of the flow. In this "bypass" mode of operation, McMeekin Station's NPDES permit again requires that 2,500 CFS be discharged from Saluda Hydro for thermal mitigation. McMeekin Station also withdraws approximately 0.5 MGD (0.8 CFS) from the circulating water system for boiler makeup, house service cooling, and ash conditioning use. Most of this water is collected in the plant sumps and is treated in an NPDES permitted treatment system and discharged to the lower Saluda River through NPDES Outfall 003. Discharges from Outfall 003 average approximately 0.3 MGD (0.5 CFS) in dry weather (no runoff). The remaining 0.2 MGD (0.3 CFS) is released to the atmosphere as water vapor from process equipment or is added to the bottom ash to reduce dust during truck transport to the on-site landfill.

The McMeekin Station ash landfill is located on the south side of the Saluda River, about 500 feet downstream of the Saluda backup dam. The ash disposal area is approximately 48

acres. A five acre runoff treatment pond removes solids and allows pH adjustment of ash landfill runoff. The pond discharges intermittently to the lower Saluda River at NPDES Outfall 002.