MEETING NOTES

SOUTH CAROLINA ELECTRIC & GAS COMPANY
SALUDA HYDRO PROJECT RELICENSING
OPERATIONS RESOURCE GROUP

SCE&G Training Center
December 6, 2005

Final 2-17 ACG

ATTENDEES:

Alan Stuart, Kleinschmidt Associates
Alison Guth, Kleinschmidt Associates
Ray Ammarell, SCE&G
Bill Argentieri, SCE&G
Gina Kirkland, SCDHEC
Mike Summer, SCE&G
Randy Mahan, SCANA Services
Kristina Massey, Kleinschmidt Associates
Steve Bell, Lake Murray Watch
Amanda Hill, USFWS
Joy Downs, LMA
Tom Ruple, LMA
Bud Badr, SCDNR
Parkin Hunter, Columbia Audubon
George Duke, LMHOC
Bill Hulslander, Congaree National Park
Patrick Moore, SCCCL\Am. Rivers
Jeff Duncan, NPS
Michael Waddell, TU
Bill Cutler, Lake Watch

DATE: December 6, 2005

ACTION ITEMS:

- Hydrologic Model Presentation
  SCE&G\Kleinschmidt Associates

HOMEWORK ITEMS:

- Think about what information needs to be presented in this group for educational purposes

AGENDA TOPICS FOR NEXT MEETING:

- Presentation on Hydrologic Models
- Discussion

DATE OF NEXT MEETING: **January 26, 2006 at 9:30 a.m.**

Located at the Saluda Shoals Park Rivers Center

DISCUSSION

These notes serve to be a summary of the major points presented during the meeting and are not intended to be a transcript or analysis of the meeting.

Alan opened the meeting and introduced Bill Argentieri as the speaker for the presentation on the "Nuts and Bolts of Saluda Operations." Bill began his presentation, and several questions about definitions came up during the course of the discussion. After a cross-section of a general hydropower plant was shown, several questions arose about the penstocks and the towers. It was noted that the penstocks are the pipes that let the water from the lake flow through the turbines, and the penstocks are inspected on a periodic basis. A question arose on whether or not the towers require maintenance and Bill replied that most of the maintenance on the towers has to do with the mechanical components such as the gates.

Mike Waddell asked how Saluda Hydro efficiency is affected by lake levels. Kristina replied that as the Lake drops the efficiency drops as well. There was some discussion on the water intake from the towers and the restrictions associated with Unit 5, including those restrictions caused by the congregation of blueback herring around the Unit 5 tower during certain times of the year. It was noted that SCE&G has hydro-acoustic equipment that monitor the presence of fish in the vicinity of the intake, including the blueback herring.

Bill began to give the group some background on the Project and some of the specifics about the plant were noted. He pointed out that first four units can generate 3000 cfs of water flow per unit at full load and Unit 5, being about twice the size, can generate 6000 cfs at full load. George Duke asked how old the generators were, to which Bill replied that they are 75 years old. From a maintenance standpoint, Mike Summer added that a few of the units have been rewound.

Discussions then turned to turbine venting. Patrick Moore asked if the hub baffles allowed all of the units to be equally effective at venting. Alan Stuart explained that all of the units vent at different efficiencies, with a major contributor to this being the condition of the seals on the units.

The group briefly discussed the maintenance on the units. It was noted that the units are frequently inspected and electrical testing is performed routinely. When asked if there was a life span on the units, Mike Summer noted that it is more cost effective to maintain a unit over a period of time as opposed to replacing the whole unit. Kristina Massey added that units 1-4 had major overhauls in the late 70's to early 80's. Bill noted that SCE&G is looking at the potential for upgrading the units

and KA is doing a study to provide SCE&G with some options for upgrading. Bill added that this study takes into account many issues, including the environmental issues.

Bill began to discuss Unit 5 and noted that because it does not have an isolation valve on the unit itself, the gate has to be closed at the tower. He added that Unit 5 was "bought off of the shelf" in the late 60's, as opposed to being specifically designed for the location, water flows, head, etc. where it is. It went into operation in '71.

The group then began to discuss the emergency spillway. Bill explained that in the event that the dam were in danger of being overtopped, the spillway gates could be opened for the emergency release of water, hence the name "emergency spillway." This is the only operational function of the emergency spillway. Bill pointed out that the spillway channel is not the original Saluda River channel but rather a manmade channel. Amanda Hill asked if the natural streambed was where the powerhouse is now. Bill replied that it was between the towers and the spillway. There was some discussion on the Probable Maximum Flood and also on the black start capabilities of the plant. Bill noted that if there were a blackout, Saluda was one of the few plants on SCE&G's system that could start from scratch. The group also briefly discussed the Flow Forecasting Model.

Mike Waddell asked what SCE&G uses for reserves if they were running Saluda due to rainfall. Bill replied that they either use another plant, such as the Monticello Pumped Storage Project, or they buy power from another system. One group member inquired as to whether SCE&G anticipated Lake Murray being required to operate as a flood control lake and how that might impact inundation at the Congaree National Park. Randy noted that he believed it was imprudent for anyone to count on Saluda for flood control when 2/3 of the flow into the Congaree comes from the Broad rather than the Saluda.

The group began to discuss the operational warning sirens on the LSR, as well as the sirens that are activated in the event of a dam failure. Bill noted that emergency action brochures that explain what people should do should they be alerted to a potential dam failure are mailed out to those individuals who reside in the zip code areas below the dam and drills are preformed on a regular basis.

Discussions began to center around the maintenance work on the dam and the upcoming placement of rip-rap on the upstream face of the dam. Bill noted that they were waiting until the north bound lanes were complete so that traffic could be re-routed, otherwise the existing south bound lane section of Hwy 6 would have to be shut down.

Bill concluded his presentation and the group began to discuss the mission statement. It was agreed that the goal of the group would be to develop a hydrologic operations model.

The group began to discuss what they would like to see come out of a model. It was discussed that the model needs to be user friendly. There were several models that were mentioned, including Hec 5 and Oasis. Bill Hulslander noted that it was important to make sure the model was able to take inputs or outputs from other RCGs. Bud Badr explained his view that the model would actually be a water allocation model that would take into account how much water was in the Lake, how much water was coming into the Lake and how much water was flowing out of the Lake. He noted that it would look at what the interests would be upstream, as well as downstream interests and SCE&G's interests. Bud continued to explain that each interest would be converted into a number value and while the system is being run it will show how many times a certain interest is infringed upon during different scenarios. He noted that the model can be worked to show how many interests "violations" will occur over a span of time. Bud mentioned that everyone is given equal consideration in the model.

Patrick Moore noted that a few years ago American Rivers and the National Heritage Institute started to model the entire Santee Basin. He added that this model would be ready in the next few months. Bud noted that it was a very good model but that it did not substitute for the model that was needed here.

Parkin Hunter asked if the model would be stochastic. Bud replied that it would be deterministic because it is going to use actual measurements and limitations from the Lake.

In a further explanation of his expectations for the model, Bud noted that the first step would be to get the inflows for an extended period of time. He then explained that you need such data as daily rainfall and the daily capacity to develop the baseline. He pointed out that the modeler has to establish relationships between certain demands and interests and lake level elevations. Bud added that evaporation also has to be considered. With respect to downstream interests, he noted that water quality can be reflected in terms of a certain flow or height. He added that the same idea applies to fisheries and navigation. He explained that the modeler will run the scenario and the baseflow for the last fifty years or so. Bud noted that once the model has been built, it will be a tool to mimic the real system, and can be calibrated for high flow, average flow and low flow.

There was some discussion on how floods and droughts would be incorporated into the model. It was noted that the model was going to be calibrated to the last 30 years of climate data. Bud noted that in 2002 there was a very extreme drought and added that he did not believe that extreme drought events, such as that one, should drive the allocations of the model. He pointed out that that event should probably be excluded and put under a low flow protocol. George Duke inquired that if the model was going to exclude the extreme drought cases, then shouldn't it exclude the extreme flooding cases as well. Bud replied that problems arose when there was not enough water in the

Lake, such as in drought situations, and too much water was not a worry in regards to water allocations.

The group decided that at the next meeting SCE&G would give a presentation on potential models that could be used for Lake Murray and that also could interface into SCE&G's computer system. George Duke suggested that it may be good to show the presentation to the other groups as well so that they will know what is needed from them. Alan agreed.

Bud noted that it would be beneficial to the state agencies to have access to the model and noted that they could sign a contract stating that they would not share it with any outside groups.

Through an interactive discussion the group gave suggestions as to what they would like the model outputs to be; they are listed below:

Outputs of the model
Lake Levels
LSR Flows
Inflows
Generation
Lake Capacity, storage
Frequency, magnitude and duration of demand satisfaction
Graphic Ability
Interactive Model Front

The group then agreed on the mission statement, which is listed below.

> "The Mission of the Operations Resource Conservation Group (ORCG) is to oversee the development of a robust hydrologic model for the Saluda Project which will establish a baseline of current hydrologic, hydraulic, and operational conditions, and aid in analyzing and understanding the potential upstream and downstream effects of potential changes to project operations, in support of the missions and goals of all other Saluda Hydroelectric Relicensing RCGs. The objective is to fairly consider those impacts, to include low-flow conditions as a part of developing consensus-based, operations focused recommendations for the FERC license application. Model results are to be presented in readily understandable terms and format. A key measure of success in achieving the mission and goals will be a published Protection, Mitigation, and Enhancement (PM&E) Agreement."

The group decided that the next meeting would occur on January 26 at 9:30. The training center was booked for that date but after the meeting Alison was able to secure a room at the Saluda Shoals Park Rivers Center for the meeting location.