South Carolina Surface Water Quantity Models
Monthly Summary

Invoice Date:	December 8, 2015
For Services Between:	October 31, 2015 and December 5, 2015
Invoice No.:	15

Summary of Work Completed During Invoice Period

Project Management and Related Tasks

- Continued internal project coordination and management tasks, including:
  - Weekly project team meetings
  - Monthly project meeting by teleconference
- Coordinated with ICC Global Hosting to establish a test instance of the Saluda basin model in a virtual desktop environment during training offered to DNR and DHEC.
- Training was offered for DNR and DHEC staff on December 3rd. TAC staff were invited to attend to gain exposure to the model. Two DNR staff, two DHEC staff, and eight TAC members and their guests attended. Training focused on recent model enhancements, aspects of the calibration, and model application. Access to the Saluda Baseline model and Edisto Calibration model was provided via the virtual desktop environment.

Data Collection

- Data collection in the Broad, Pee Dee, Catawba, Santee, and Salkehatchie River basins is substantially complete; however additional follow-up calls are being made as the data is analyzed and incorporated and used for unimpaired flow (UIF) development and model development. Data collection in the Saluda and Edisto is complete.
- A previously unknown withdrawal in the Broad River Basin associated with the Town of Tryon, NC was identified. The withdrawal is located near the dam of Lake Lanier, which is at the North Carolina-South Carolina border. A representative of the Town's water utility was contacted in order to collect withdrawal and reservoir operating data.

Data Analysis and Modeling

Saluda

- Additional comments were received from DNR relating to the calibration approach and reservoirs. Comments on reservoirs focused primarily on calibration periods, storage targets, and minimum releases. CDM Smith began reviewing comments, addressing where appropriate, and preparing responses.
- The draft baseline model was prepared for use at the 2nd Stakeholder Meeting and DNR/DHEC model training session.

Edisto

- The draft set of unimpaired flows (UIFs) were updated based on DNR comments.
- A draft calibration model was developed using the UIF dataset. Draft calibration results were distributed to DNR, DHEC and the TAC.
- Following completion of the draft calibration, CDM Smith began evaluating alternative UIFs for tributaries to the North and South Fork of the Edisto, in order to improve the model simulated peak flows. CDM Smith also began evaluating the inclusion of small reservoirs (where they exist) near the headwaters of certain tributaries to eliminate shortages associated with select agricultural withdrawals during the calibration period.
- A draft modeling report was prepared and provided to DNR, DHEC and the TAC.

Broad

- CDM Smith received and began addressing comments from DNR on the Broad River Basin UIF Methodology Memorandum.
- Withdrawal and discharge data which had undergone hindcasting and gap-filling was reviewed for errors and omissions.
- Development of UIF workbooks was initiated.

Pee Dee

- Work continued on the Pee Dee basin UIF Methodology Memorandum.
- Withdrawal and discharge data which had undergone hindcasting and gap-filling was reviewed for errors and omissions.
- Development of UIF workbooks was initiated.
- The Yadkin River (NC) inflow dataset develop by HDR, Inc. was obtained.

Catawba

- The Catawba River (NC) inflow dataset develop by HDR, Inc. was obtained and reviewed.
- Work was initiated on the Catawba Basin UIF Methodology Memorandum. Because an existing dataset is being used for mainstem UIFs, the methodology used to develop the entire UIF dataset will be slightly different than in other basins.

Santee

- Hindcasting and gap filling of operational records continued.

Savannah

- Existing reports dealing with basin modeling and planning were collected and reviewed.

Salkehatchie

- Hindcasting and gap filling of operational records continued.

Stakeholder Involvement

- The 2nd meeting in the Edisto Basin was conducted on December 1. CDM Smith provided a presentation on project status, calibration results, and model application. Three demonstrations were offered for breakout groups of stakeholders.
- The 2nd meeting in the Saluda Basin was conducted on December 2. CDM Smith provided a presentation on project status, calibration results, and model application. Three demonstrations were offered for breakout groups of stakeholders.

Summary of Upcoming Work

Over the next month, the project team will:

- Respond to DNR comments on the Saluda calibration and baseline models, and make any appropriate final revisions to the models and report.
- Finalize the Edisto calibration model and begin to develop the baseline model.
- Submit the final Edisto UIF dataset and Results Memorandum.
- Continue development of the Broad UIF dataset. Once the Broad dataset is complete, the Saluda Basin UIF dataset will be completed to the confluence of the Wateree River.
- Continue development of the Pee Dee UIF dataset.
- Begin development of the Santee and Salkehatchie Model Framework.
- Continue data collection in the Savannah Basin, focusing on obtaining the existing, and most recently updated inflow (UIF) dataset and model.

Issues Impacting Scope, Schedule, or Project Cost

Additional discussions were held between CDM Smith and DNR regarding how reservoir operating rules are incorporated in SWAM. DNR indicated the preference for additional flexibility in SWAM to allow the user to evaluate more complex alternative management rules. It was noted that when more complex rules (such as the Lake Murray Striped Basin release rules) were included in SWAM as “prescribed rules", user-initiated adjustments to test variations of the rule were not easily performed. CDM Smith prepared and submitted a summary of proposed model enhancements that will allow for increased flexibility with regard to reservoir operating rules. This additional work may result in a minor increase in scope and project cost.

Schedule adjustments were made to reflect the project progress and more accurately account for future deliverables. It is currently anticipated that due to delays in completion of the pilot model, the project schedule will need to be extended approximately six months, to the end of 2016. An updated schedule will be prepared in early 2016.

During the project kickoff meeting, and based on DNR and DHEC review of the draft Modeling Plan, several potential out-of-scope model enhancements were identified. These include:

- A “Current Situation Analysis” for quasi-real time operational support. This functionality would provide a probabilistic analysis of current conditions at any future point in time and how conditions are likely to change within 6 or 12 months based on projected use and management patterns.
- The ability to use near-term hydrologic flow forecasts (for example, 60-day streamflow forecasts from NOAA) for month-to-month operational planning.
- Use of HEC DSSVue and DSS files for results display and analysis.

CDM Smith has presented a scope for implementing these enhancements to DNR and DHEC, and will prepare cost prior to completion of the pilot (Saluda) model. The decision on whether to implement one or more of these enhancements will likely be made once the pilot model is completed.