Electronically Filed

Dominion Energy South Carolina, Inc.
DESC Power Generation
220 Operation Way, MC B223, Cayce SC 29033
DominionEnergySC.com

June 29, 2023

Kimberly D. Bose
Federal Energy Regulatory Commission
ATTN: OEP/Division of Hydropower Administration and Compliance
888 First Street, N. E.
Washington, D. C. 20426

Subject: Dominion Energy South Carolina, Inc.
Saluda Hydroelectric Project, FERC Project No. 516
License Article 31 Annual Report

Dear Secretary Bose:

Dominion Energy South Carolina, Inc. (DESC), Licensee for the Saluda Hydroelectric Project, FERC Project No. 516, hereby files electronically for Commission approval the 2022 Annual Operations Report and proposed Guidelines for Operation of the Saluda Project for Dissolved Oxygen Management in 2023. As required by the provisions of Article 31, DESC has developed the Guidelines in cooperation with the federal and State resource and regulatory agencies named in the Article as well as American Rivers. Correspondence is included in Attachment 1 and a copy of the June 5, 2023 meeting notes with the federal and State resource and regulatory agencies as well as American Rivers is included in Attachment 2. Comments to the report were received from SCDHEC during the meeting and from SCDNR in an email dated June 5, 2023. All comments were incorporated into the report. No other comments to the report were received.

Should the Commission or its Staff have any questions concerning the proposed Guidelines, please contact the undersigned at (803) 217-7322 or raymond.ammarell@dominionenergy.com.

Sincerely,

Raymond R. Ammarell, P.E., Manager
Dam Safety and Civil Engineering
DESC Power Generation

AIB/ab

Enclosures

c: I. N. Griffin/J. W. Miller/H. E. Delk, Jr./SH File/Corporate Records
D. L. Tucker/J.E. Brown, Jr.
W. Wenerick/B. Raybon - SCDHEC
G. Jobsis/P. Raabe – American Rivers
M. Olds – USFWS
E. Miller - SCDNR
T. Cheatwood – NMFS
E. Moore - SCCCL

Attachment 1

Agency Correspondence

From: Amy Bresnahan (DESC Generation - 8) <amy.bresnahan@dominionenergy.com>
Sent: Tuesday, May 2, 2023 2:35 PM
To: Gerrit Jobsis <gjobsis@americanrivers.org>; MillerE@dnr.sc.gov; Twyla Cheatwood <twyla.cheatwood@noaa.gov>; Pace Wilber (Pace.Wilber@noaa.gov) <pace.wilber@noaa.gov>; Melanie Olds <melanie_olds@fws.gov>; Eddy Moore <eddym@scccl.org>; Chuck Hightower (hightocw@dhec.sc.gov) <HIGHTOCW@dhec.sc.gov>; Jason Bettinger <bettingerj@dnr.sc.gov>; Rabon, Bryan <raboneb@dhec.sc.gov>; Caleb Gaston (Services - 6) <caleb.gaston@dominionenergy.com>; Paul Vidonic (Services - 6) <paul.vidonic@dominionenergy.com>; Craig E Pearson (DESC Generation - 8) <Craig.E.Pearson@dominionenergy.com>; James Miller (DESC Generation - 8) <james.miller@dominionenergy.com>; Henry Delk (DESC Generation - 8) <HENRY.DELK@dominionenergy.com>; praabe@americanrivers.org; Iris Griffin (Services - 6) <iris.griffin@dominionenergy.com>; Orville Owen (DESC Generation - 8) <ORVILLE.OWEN@dominionenergy.com>; Wenerick, William "Rusty" <weneriwr@dhec.sc.gov>
Cc: Raymond Ammarell (DESC Generation - 8) <RAYMOND.AMMARELL@dominionenergy.com>; Andy Sawyer <andysawyer@comcast.net>
Subject: Saluda Project Article 31 annual meeting request

All,
Please find the attached draft 2022 Operations Report for your agency's review to discuss at the annual Saluda Hydro Article 31 meeting. If you have any questions/comments you would like to submit prior to the meeting, please let me know so that we can address them in the meeting.

Since there have been several Doodle polls sent out for our various Projects in recent weeks, I'm going to try to keep it simple and ask that you **let me know your availability for June 5 and 6** for a MS Teams meeting. I will schedule a meeting for one of the two days that best fits the majority. Please note that this plan must be filed with the FERC no later than June 30.

Amy Bresnahan, P.E.
Power Generation, Civil Engineering
Dominion Energy South Carolina, Inc.
400 Otarre Parkway, Cayce, SC 29033
Mailing Address: 220 Operation Way, MC B223, Cayce, SC 29033
O: (803)217-9965 C: (803)206-4667

From: Elizabeth Miller <MillerE@dnr.sc.gov>
Sent: Monday, June 5, 2023 2:00 PM
To: Amy Bresnahan (DESC Generation - 8) <amy.bresnahan@dominionenergy.com>
Subject: [EXTERNAL] RE: Saluda Project Article 31 annual meeting request

Hi Amy,

I noticed one minor edit for the report. Appendix E dates SCDNR's letter on August 29, 2023, instead of 2022.

Thanks,
Elizabeth C. Miller
SCDNR
Office: 843-953-3881
Cell: 843-729-4636

From: Amy Bresnahan (DESC Generation - 8)
Sent: Tuesday, June 6, 2023 8:57 AM
To: MillerE@dnr.sc.gov; Gerrit Jobsis <gjobsis@americanrivers.org>; Twyla Cheatwood <twyla.cheatwood@noaa.gov>; 'Pace Wilber (Pace.Wilber@noaa.gov)' <pace.wilber@noaa.gov>; Melanie Olds <melanie_olds@fws.gov>; Eddy Moore (eddym@scccl.org) <eddym@scccl.org>; Chuck Hightower (hightocw@dhec.sc.gov) <HIGHTOCW@dhec.sc.gov>; Jason Bettinger <bettingerj@dnr.sc.gov>; Rabon, Bryan <raboneb@dhec.sc.gov>; Caleb Gaston (Services - 6) <caleb.gaston@dominionenergy.com>; Paul Vidonic (Services - 6) <paul.vidonic@dominionenergy.com>; Craig E Pearson (DESC Generation - 8) <Craig.E.Pearson@dominionenergy.com>; James Miller (DESC Generation - 8) <james.miller@dominionenergy.com>; Henry Delk (DESC Generation - 8) <HENRY.DELK@dominionenergy.com>; praabe@americanrivers.org; Wenerick, William "Rusty" <weneriwr@dhec.sc.gov>; Iris Griffin (Services - 6) <iris.griffin@dominionenergy.com>; Raymond Ammarell (DESC Generation - 8) <RAYMOND.AMMARELL@dominionenergy.com>; Andy Sawyer <andysawyer@comcast.net>; David Tucker (DESC Generation - 8) <DAVID.TUCKER@dominionenergy.com>
Subject: Saluda Project Article 31 2022 Operations Report meeting notes

All,
Attached are the notes from yesterday's meeting reviewing the 2022 Operations Report pertaining to Article 31 for the Saluda Hydro Project, P-516.

Amy Bresnahan, P.E.
Power Generation, Civil Engineering
Dominion Energy South Carolina, Inc.
400 Otarre Parkway, Cayce, SC 29033
Mailing Address: 220 Operation Way, MC B223, Cayce, SC 29033
O: (803)217-9965 C: (803)206-4667

From: Olds, Melanie J <melanie_olds@fws.gov>
Sent: Tuesday, June 6, 2023 9:21 AM
To: Amy Bresnahan (DESC Generation - 8) <amy.bresnahan@dominionenergy.com>; MillerE@dnr.sc.gov; Gerrit Jobsis <gjobsis@americanrivers.org>; Twyla Cheatwood <twyla.cheatwood@noaa.gov>; 'Pace Wilber (Pace.Wilber@noaa.gov)' <pace.wilber@noaa.gov>; Eddy Moore <eddym@scccl.org>; Chuck Hightower (hightocw@dhec.sc.gov) <HIGHTOCW@dhec.sc.gov>; Jason Bettinger <bettingerj@dnr.sc.gov>; Rabon, Bryan <raboneb@dhec.sc.gov>; Caleb Gaston (Services - 6) <caleb.gaston@dominionenergy.com>; Paul Vidonic (Services - 6) <paul.vidonic@dominionenergy.com>; Craig E Pearson (DESC Generation - 8) <Craig.E.Pearson@dominionenergy.com>; James Miller (DESC Generation - 8) <james.miller@dominionenergy.com>; Henry Delk (DESC Generation - 8) <HENRY.DELK@dominionenergy.com>; praabe@americanrivers.org; Wenerick, William "Rusty" <weneriwr@dhec.sc.gov>; Iris Griffin (Services - 6) <iris.griffin@dominionenergy.com>; Raymond Ammarell (DESC Generation - 8) <RAYMOND.AMMARELL@dominionenergy.com>; Andy Sawyer <andysawyer@comcast.net>; David Tucker (DESC Generation - 8) <DAVID.TUCKER@dominionenergy.com>
Subject: [EXTERNAL] Re: [EXTERNAL] Saluda Project Article 31 2022 Operations Report meeting notes

Amy,

Sorry I wasn't able to join yesterday. I don't have any questions regarding the notes.

Melanie

Melanie Olds
Acting Deputy Field Supervisor for Kentucky Field Office (May 22, 2023 - July 14, 2023)
Fish & Wildlife Biologist
Regulatory Team Lead/FERC Coordinator
U.S. Fish and Wildlife Service
South Carolina Ecological Services Field Office
176 Croghan Spur Road, Suite 200
Charleston, SC 29407
Phone: 843-300-0413

From: Gerrit Jobsis <gjobsis@americanrivers.org>
Sent: Tuesday, June 13, 2023 2:20 PM
To: Amy Bresnahan (DESC Generation - 8) <amy.bresnahan@dominionenergy.com>; MillerE@dnr.sc.gov; Twyla Cheatwood <twyla.cheatwood@noaa.gov>; 'Pace Wilber (Pace.Wilber@noaa.gov)' <pace.wilber@noaa.gov>; Melanie Olds <melanie_olds@fws.gov>; Eddy Moore <eddym@scccl.org>; Chuck Hightower (hightocw@dhec.sc.gov) <HIGHTOCW@dhec.sc.gov>; Jason Bettinger <bettingerj@dnr.sc.gov>; Rabon, Bryan <raboneb@dhec.sc.gov>; Caleb Gaston (Services - 6) <caleb.gaston@dominionenergy.com>; Paul Vidonic (Services - 6) <paul.vidonic@dominionenergy.com>; Craig E Pearson (DESC Generation - 8) <Craig.E.Pearson@dominionenergy.com>; James Miller (DESC Generation - 8) <james.miller@dominionenergy.com>; Henry Delk (DESC Generation - 8) <HENRY.DELK@dominionenergy.com>; Peter Raabe <praabe@americanrivers.org>; Wenerick, William "Rusty" <weneriwr@dhec.sc.gov>; Iris Griffin (Services - 6) <iris.griffin@dominionenergy.com>; Raymond Ammarell (DESC Generation - 8) <RAYMOND.AMMARELL@dominionenergy.com>; Andy Sawyer <andysawyer@comcast.net>; David Tucker (DESC Generation - 8) <DAVID.TUCKER@dominionenergy.com>
Subject: [EXTERNAL] RE: Saluda Project Article 31 2022 Operations Report meeting notes

Thanks Amy. The notes look good. I have no suggested edits or additions.

Gerrit

Attachment 2

Meeting Notes – June 5, 2023

Article 31 Saluda Hydroelectric Project, P-516
2022 Operations Review Meeting
June 5, 2023

ATTENDEES:

Elizabeth Miller (SCDNR)
Jason Bettinger (SCDNR)
Pace Wilber (NMFS)
Bryan Rabon (SCDHEC)
Rusty Wenerick (SCDHEC)
Andy Sawyer (REMI)
David Tucker (DESC)
Gerrit Jobsis (American Rivers)
Ray Ammarell (DESC)
Amy Bresnahan (DESC)
Caleb Gaston (DESC)
Paul Vidonic (DE)
Jim Miller (DESC)

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.

SC Coastal Conservation League was invited to the meeting but did not attend.

Dominion Energy South Carolina, Inc. (DESC), Licensee for Saluda Hydroelectric Project, FERC Project No. 516 conducted this meeting via Microsoft Teams.

Andy Sawyer reviewed the updates to the draft of the 2022 Annual Report on Water Quality and Aeration Operations at the Saluda Project. First going over section 1.1 and reviewing the graphs in section 2 highlighting the events related to pool elevation. Saluda Hydro was operated for pre-storm drawdown in advance of Hurricane Ian from September 28 through October 2 and in early October for a drawdown of Lake Murray with support of the SCDNR to target an elevation of 350 ft by December 31, 2022. Clarifying the low dissolved oxygen (DO) season started on June 22 and ended in mid-November of 2022 and he stated that the turbine vents on unit 4 were opened 100% on June 10th and remained open on all available units during the rest of the low DO period.

Next Andy reviewed the water quality figures in section 2.3 explaining how it generally followed a typical pattern of DO in Lake Murray. He reviewed the figures for the Lower Saluda River identifying the DO excursions which are explained later in the document and clarified there were no excursions for 2022 at the USGS Columbia gage further downriver from the hydro plant.

In section 3.0 he discussed the details of the excursions which occurred during periods where the hydro was operating for lake level management. For Table 1 in this section, he reviewed the additional comments in the report about the excursion periods shown. Explaining how DESC consulted with SCDNR for the pre-storm drawdown and clarifying the unit issues in mid to late October. He then ended his review with page 16 of the report stating that no additional changes were made to the section “Recommendations for 2023”. No comments were made to add items to this section.

Gerrit asked if NMFS thought sturgeon may be present in the Project area during the November excursion identified. No one had a definitive answer on the location of sturgeon and Pace suggested that Andy Herndon (NMFS), who was not on the call, would

be best to answer the question. Ray clarified that the November excursion was only the 30-day average dip from the earlier excursion that occurred October 15 – 26. Elizabeth stated that the fall is spawning for the Atlantic sturgeon and the shortnose sturgeon would be the species of concern which spawn in the spring. There was discussion as to where sturgeon are located near the Saluda Project and it was suggested to review the NMFS Biological Opinion issued in late February 2023.

Rusty pointed out an error in that the report identifies DO standards as hourly, daily and 30-day when it's instantaneous instead of hourly. DESC stated it would be reviewed to see how it can properly be addressed.

Ray gave the group an update on the turbines at Saluda Hydro. For unit 4 the head cover seal work was done again and seems to be working. Unit 1 was repaired recently but when tested it didn't produce very good DO so it will be dewatered again soon. He stated that unit 1 used to be the best aerating unit and now it doesn't seem to be aerating at all. A dive inspection was completed a recently and it was found that two of the nose cones had come off and are missing. The plant is making plans to replace the missing nose cones which were replaced in the mid 2000's when the hub baffles were done on all the units. DESC is close to getting the new runners for the turbines out for bid and is still working on the request for proposal documents. DESC is considering purchasing runners for two of the small units initially while keeping Unit 5 operational to assist with DO and provide reserve generation capacity until at least two small units have been upgraded.

There was other discussion on the concern of the high turbidity noticed in the Lower Saluda River near the hydro plant in February. There was speculation that it was related to the recent drawdown and that high inflows to Lake Murray in January and February may have moved some sediments down into the lower part of the reservoir.

Discussion wrapped up on conjecture as to when FERC would issue the Saluda license and a brief review of the recent meeting regarding the NMFS Biological Opinion document with the Saluda signatories.

2022 Annual Report on Water Quality and Aeration Operations at the Saluda Project

Saluda Hydroelectric Project

Columbia, South Carolina

Prepared by: Andy Sawyer, Reservoir Environmental Management, Inc

April 2023

2022 Annual Report on Water Quality and Aeration Operations at the Saluda Project

Saluda Hydroelectric Project

Columbia, South Carolina

Prepared by: Andy Sawyer, Reservoir Environmental Management, Inc

April 2023

2022 Annual Report on Water Quality and Aeration Operations at the Saluda Project

Saluda Hydroelectric Project

Dominion Energy South Carolina, Inc.
Cayce, South Carolina

Table of Contents

1.0 INTRODUCTION 1
1.1 Overview of 2022 Aeration Operations: 3

2.0 SUMMARY OF 2022 OPERATIONS AND WATER QUALITY MONITORING 4
2.1 Water Management and Reserve Obligations 4
2.2 Unit Operations and Aeration Systems 6
2.3 Water Quality Data 7

3.0 EVALUATION OF 2022 OPERATIONS 11
3.1 Performance of the Look-Up Tables 15
3.2 Comments on the current monitoring system 15

4.0 MONITORING OF DISSOLVED OXYGEN IN THE TAILRACE 17

List of Figures

Figure 1 2022 Lake Murray Gauged Inflows 4
Figure 2 2022 Pool Elevation of Lake Murray 5
Figure 3 2022 Forebay Temperature Profiles in Lake Murray 7
Figure 4 2022 Forebay DO Profiles in Lake Murray 8
Figure 5 Temperature and DO Monitor Data from Lake Murray Forebay 8
Figure 6 2022 Saluda Releases (USGS 02168504) Temperature, DO, and Flow 9
Figure 7 2022 Lower Saluda River (USGS 02169000) – USGS Columbia Gage 10
Figure 8 2022 Saluda Releases – Periods when Excursion Occurred 12

LIST OF TABLES

TABLE 1 SUMMARY OF EXCURSIONS OF DO LESS THAN THE SC SITE-SPECIFIC DO STANDARD (MINIMUM, DAILY, AND 30-DAY STANDARDS). PERCENT VALUES REPRESENT PERCENT OF ENTIRE YEAR.....14

LIST OF APPENDICES

APPENDIX A FINAL GUIDELINES FOR OPERATION OF THE SALUDA PROJECT FOR DISSOLVED OXYGEN MANAGEMENT IN 2023

APPENDIX B ORIGINAL LOOKUP TABLES DEVELOPED IN FEBRUARY 2008

APPENDIX C CONDENSED LOOK-UP TABLES (UPDATED JANUARY 2015)

APPENDIX D DESC (FORMERLY SCE&G) AERATION TESTING ON UNIT 1 IN COMPARISON TO UNITS 3 AND 4 FOR LOW GATE SETTINGS (SEPTEMBER 2014)

APPENDIX E AUGUST 29, 2022 LETTER FROM SCDNR – LAKE MURRAY DRAWDOWN WINTER 2022-2023 – SCDNR RECOMMENDATIONS

2022 ANNUAL REPORT ON WATER QUALITY AND AERATION OPERATIONS AT THE SALUDA PROJECT

SALUDA HYDROELECTRIC PROJECT

DOMINION ENERGY SOUTH CAROLINA, INC.
CAYCE, SOUTH CAROLINA

1.0 INTRODUCTION

As required by Section 8.5 of the Offer of Settlement on Complaint Regarding Water Quality in the Lower Saluda River ("Settlement Agreement"), submitted to the Federal Energy Regulatory Commission on May 19, 2004 and approved by the Commission in an order issued on July 15, 2004, as modified by an order issued on December 21, 2004, Dominion Energy South Carolina, Inc. ("DESC") (formerly South Carolina Electric & Gas Company ("SCE&G"), as the licensee for the Saluda Hydroelectric Project ("Saluda Project" or "Project") has prepared this annual summary of the following topics:

1. Dissolved Oxygen ("DO") and other water quality monitoring results for Lake Murray and the Lower Saluda River ("LSR").
2. A preliminary evaluation of the implementation of the prior year's Operating Plan; and
3. Preliminary recommendations for the coming year's Operating Plan.

This report will present the results of water quality monitoring, as based on data obtained from the United States Geological Survey ("USGS"),[1] for the period June 1 through November of 2022 which is the timeframe when low DO near the lake bottom can result in low DO releases to the LSR. Then, an evaluation of maintaining the goal of the water quality standard, as expressed in Sections 9.2 and 9.3 of the Settlement Agreement will be presented, subject to the conditions identified in Section 9.3.

[1] As with any *in-situ* continuous monitor, anomalous readings occur from time to time, due to equipment fouling or malfunction. If the USGS determines the data are suspect through their Quality Control/Quality Assurance Program, that data may be ignored, appropriately adjusted, or otherwise dealt with according to their final determination. It is acknowledged that the USGS data is reported initially as "provisional." DESC will use it subject to the data error issues discussed here.

The following background considerations are restated from the 2004 Operating Plan, the initial operating plan submitted in compliance with the Settlement Agreement:

- The Company is committed to complying with the DO standard for the Saluda River downstream from Saluda Project to the extent practicable. Factors affecting the ability to ensure continuous compliance include:
    - the limited capability for aeration of water released through the turbine units;
    - the requirement that SCE&G manage water levels in Lake Murray for project safety and other reasons;
    - the need to use Saluda Hydro for the special operating needs specified under Item 9.3 of the Settlement Agreement; and
    - the need to meet SCE&G's reserve obligation to maintain electric load-generation balancing and management of local voltages and system frequency in real time.
- Generators sometimes fail, and generation failures generally are unpredicted and sudden, upsetting the load-generation balance. Because electricity cannot be stored, any sudden reduction in generation cannot be handled by an inventory, as might happen in most other kinds of business. Instead, generation losses must be met by reserve generation that can be dispatched instantly, before voltage sags or frequency excursions lead to local or widespread blackouts. The Company is a member of the Virginia-Carolinas Southeastern Electric Reliability Council sub-region ("VACAR"), whose members are bound in a reserve-sharing agreement by which each has agreed to assist any other member in generation emergencies. As part of its obligations as a member of VACAR, SCE&G must employ its reserves to meet its own generation emergencies before calling on assistance from other VACAR members, and it must be constantly ready to provide reserve generation to other VACAR members. Generally, the reserves required to be maintained by SCE&G are in the range of 190-200 MW, which matches the capacity of the Saluda Project and its ability to respond quickly to any generation outage on its system.

During the low DO period of 2022, DESC implemented the operating plan summarized below, consistent with the guidelines contained in Appendix A:

- The plan addressed the limited objectives identified in the settlement agreement, i.e., doing what reasonably could be done to improve the likelihood that stream-specific DO standards would be met in the LSR, while, at the same time, not constraining in any manner DESC's ability to use the Saluda Project to meet its reserve obligations.

1.1 OVERVIEW OF 2022 AERATION OPERATIONS:

The site-specific DO standard for the LSR was maintained during most of the period June through November.

Positive aspects of the 2022 low DO period were the effort of DESC to maintain tailrace DO at or above 3 mg/L during periods of higher flow. The aeration systems currently in place reflect implementation of best attainable turbine venting systems for the original units at Saluda Hydro.

The DO measured by the water quality monitor (02168504) maintained by the USGS some 760 yards (2280 ft) downstream from the project's powerhouse was less than the minimum standard of 4 mg/L for 183 hours during the period of October 15 through October 26.

All excursions are summarized in Section 3.0 following the presentation of the excursions.

2.0 SUMMARY OF 2022 OPERATIONS AND WATER QUALITY MONITORING

2.1 WATER MANAGEMENT AND RESERVE OBLIGATIONS

The gauged inflows and pool level elevations of Lake Murray over the period of assessment are presented in Figures 1 and 2, respectively.

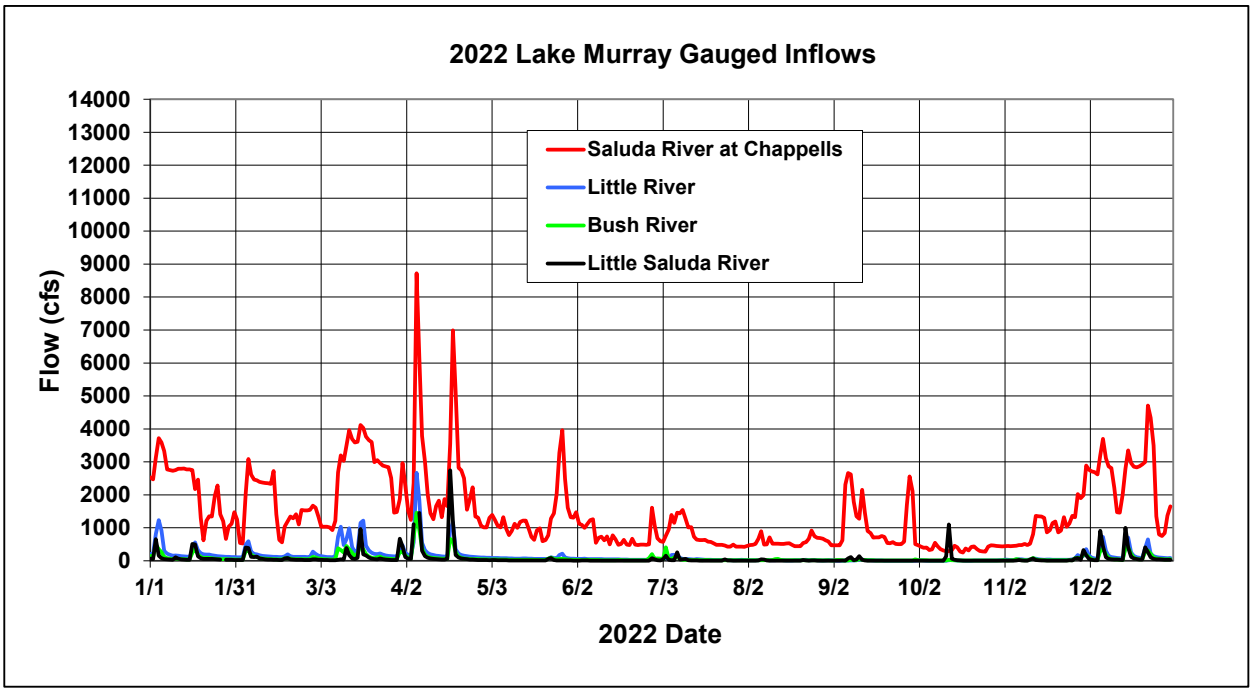


FIGURE 1 2022 LAKE MURRAY GAUGED INFLOWS

To determine the total inflow to Lake Murray, these gauged inflows are scaled to represent flow from each total watershed.

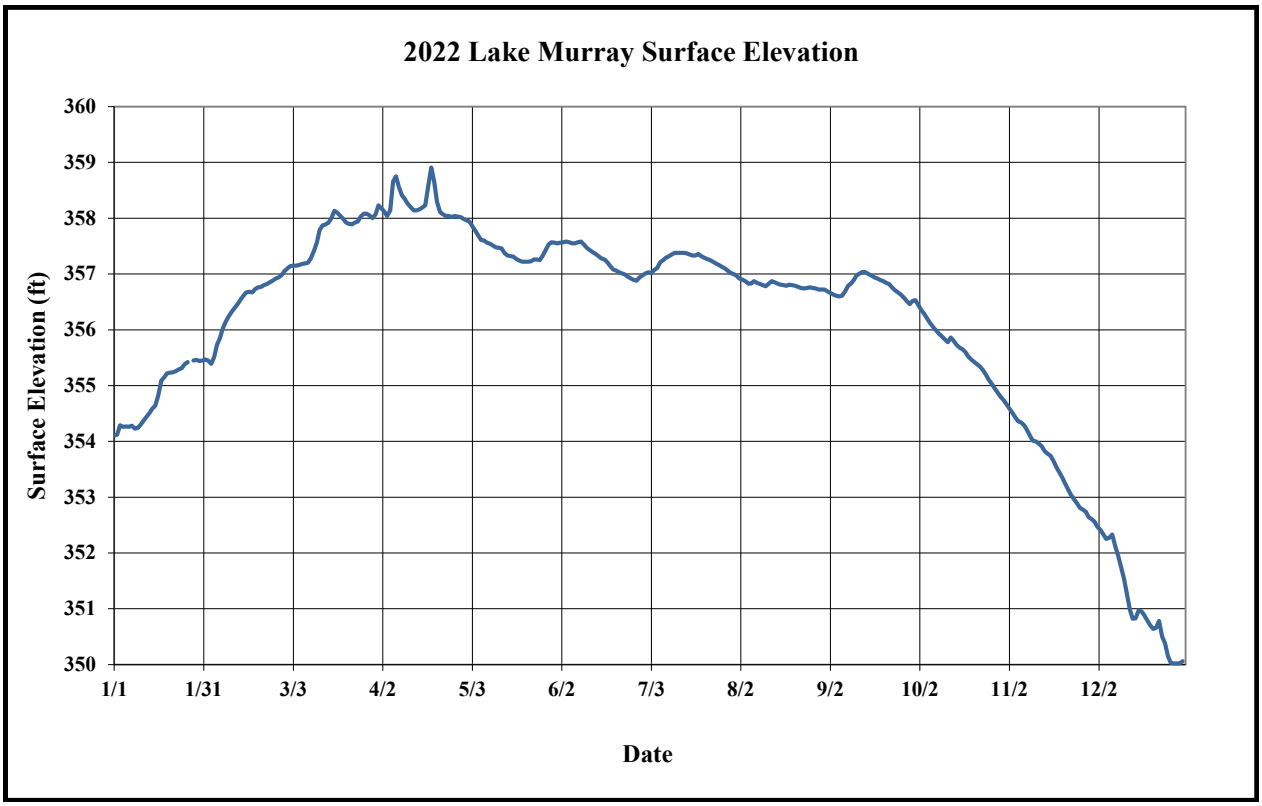


FIGURE 2 2022 POOL ELEVATION OF LAKE MURRAY

The Project was operated to maintain downstream flow and DO levels throughout the low DO season. The Saluda Project was operated for pre-storm drawdown in advance of Hurricane Ian from September 28 through October 2. In early October DESC began a drawdown of Lake Murray with support of the SCDNR to target an elevation of 350 by December 31, 2022. Saluda Hydro operated to gradually reduce the reservoir level through the end of the low DO period in November and then into December, when the target lake level was achieved. The letter from SCDNR with their recommendations is included at the end of this report as Appendix E.

The low DO season started on June 22 and ended in mid-November of 2022.

2.2 UNIT OPERATIONS AND AERATION SYSTEMS

The turbine vents on unit 4 were opened 100% on June 10. The valves remained opened on all available units during the rest of the low DO period.

Prior to 2012, aeration testing indicated that for three-unit operations, Unit 2 drew about 50% less air than Unit 1 (the best aerating unit at that time), Unit 3 drew about 67% less air than Unit 1, and Unit 4 drew about 33% less air than Unit 1. For single unit operations, Unit 2 drew about 55% less air than Unit 1 (the best aerating unit at that time), Unit 3 drew about 67% less air than Unit 1, and Unit 4 drew about 45% less air than Unit 1. Unit 5, being of different design and manufacture, drew the least air of any of the units. Larger hub baffles were installed on Unit 5 in 2007, but air flow did not increase significantly.

During August 2012, it was noted that Unit 1 had decreased in aerating effectiveness and was no longer the best aerating unit. Plant operators inspected the air vent valve and piping, and replaced a check valve spring; however, aeration did not improve. A revision to the Condensed Lookup Tables was made to reflect the lower aeration capability of Unit 1, and the revised tables were issued to the System Control operators on August 30, 2012. On May 15 and 16, 2013, Furmanite sealed the Unit 1 head cover. DESC planned to conduct tests during the 2013 low DO season to develop revised Condensed Lookup Tables; however, high inflows required operations using more than one unit most of the season, and the planned tests could not be performed. Therefore, the revised Condensed Lookup Tables used in latter 2012 also were used in 2013 and 2014.

On September 23-24, 2014, aeration tests were conducted on Units 1, 3, and 4 so that aeration results on Unit 1 could be compared to results on Units 3 and 4. These aeration tests are described in Appendix D. The results indicated that Unit 4 aerated the best followed by Unit 1 and then Unit 3 with the lowest DO increase. The data also showed that higher DO occurred at the lower gate settings with DO decreasing as the gate openings increased. The revised 2015 Condensed Lookup Tables are in Appendix C. In 2020, Unit 1 stopped venting effectively and the lookup tables were revised in 2021 to reflect this and to add Unit 5 into the unit combinations. These were used during the 2022 low DO season and revised in August 2022 based on repairs that were made during the year. The tables are included in Appendix C.

2.3 WATER QUALITY DATA

Figures 3 and 4 present the profiles of temperature and DO collected by DESC Fossil Hydro Environmental Compliance personnel in the forebay of Lake Murray in 2022. These profiles were collected using a Hydro Lab Surveyor 4A portable water quality instrument with an MS5 sonde. The profiles show that DO in front of the intakes for Units 1-4 was near zero starting in mid-August.

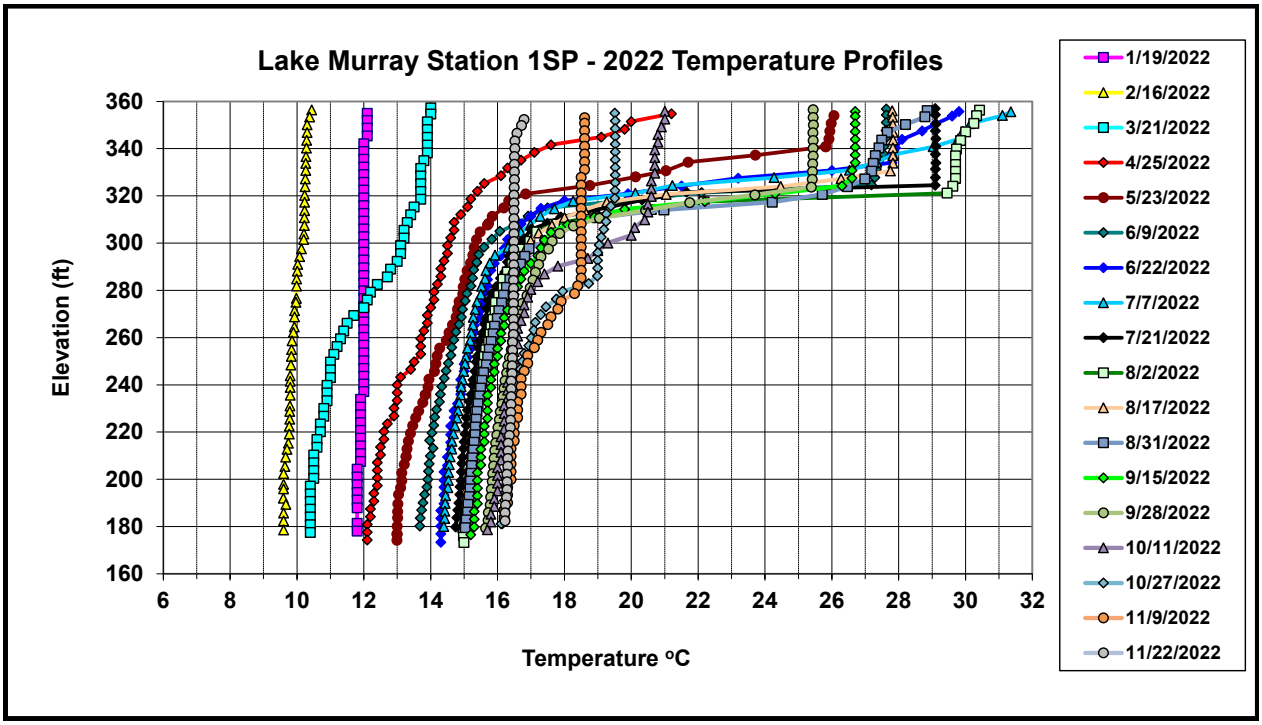


FIGURE 3 2022 FOREBAY TEMPERATURE PROFILES IN LAKE MURRAY

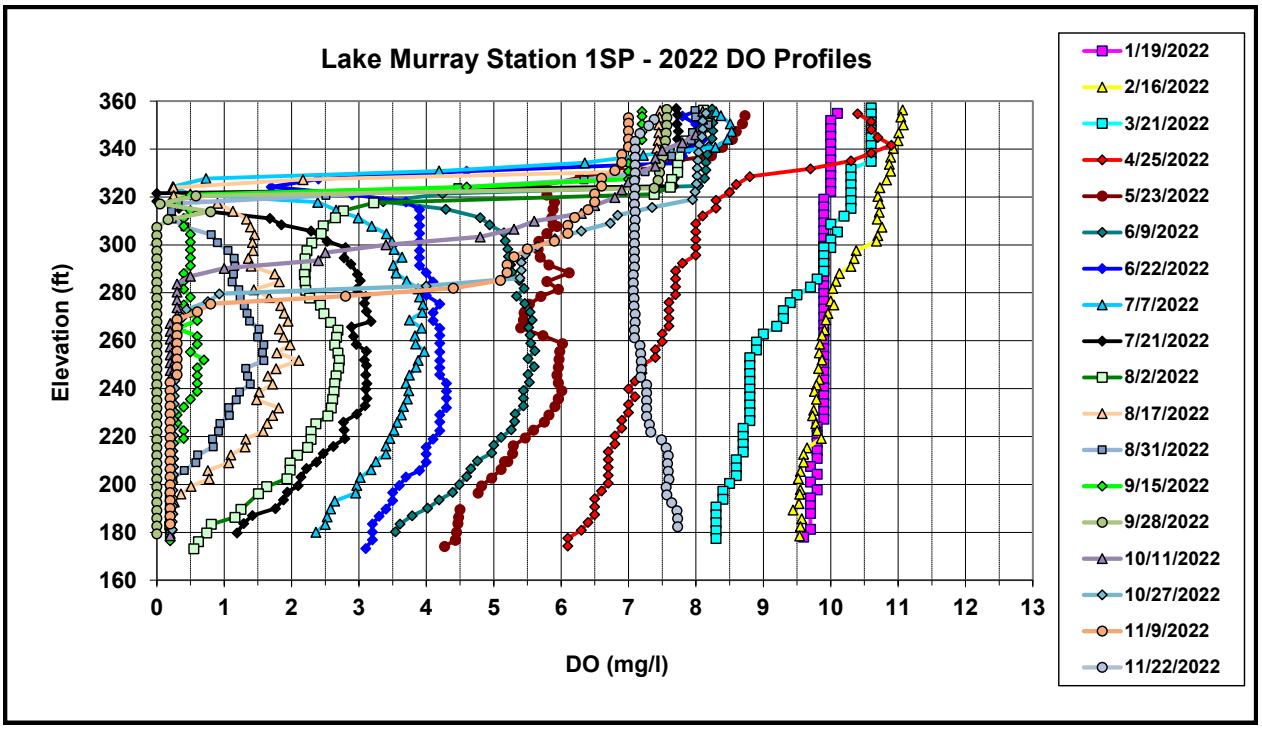


FIGURE 4 2022 FOREBAY DO PROFILES IN LAKE MURRAY

Figure 5 presents the temperature and DO results from the USGS monitors in the forebay of Lake Murray. This figure shows that the temperature and DO at the intake for Unit 5 (i.e., DO-Bottom) increased to about the same level as the surface water in early-November.

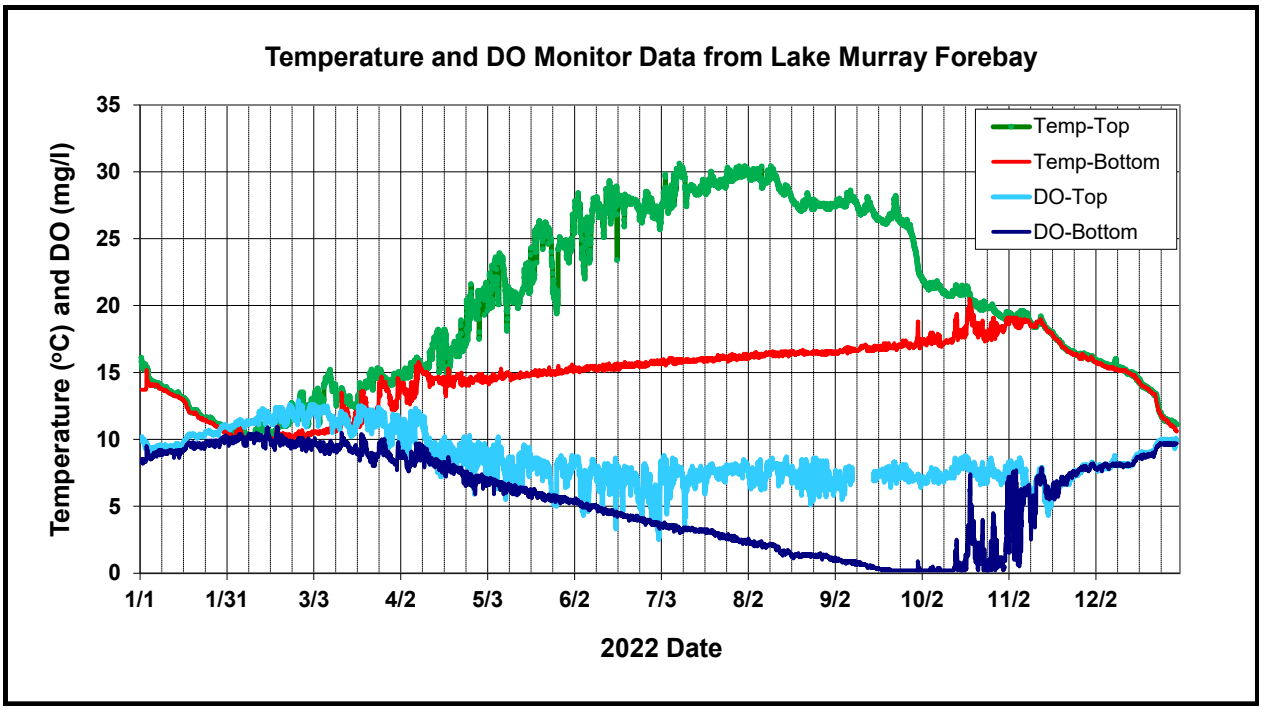


FIGURE 5 TEMPERATURE AND DO MONITOR DATA FROM LAKE MURRAY FOREBAY

Figure 6 presents the results of temperature and DO measurements at the USGS monitor (02168504) immediately downstream from the Saluda Powerhouse. The graph includes the flow measurements measured by the USGS gage as well as the daily average and the rolling 30-day average DO values.

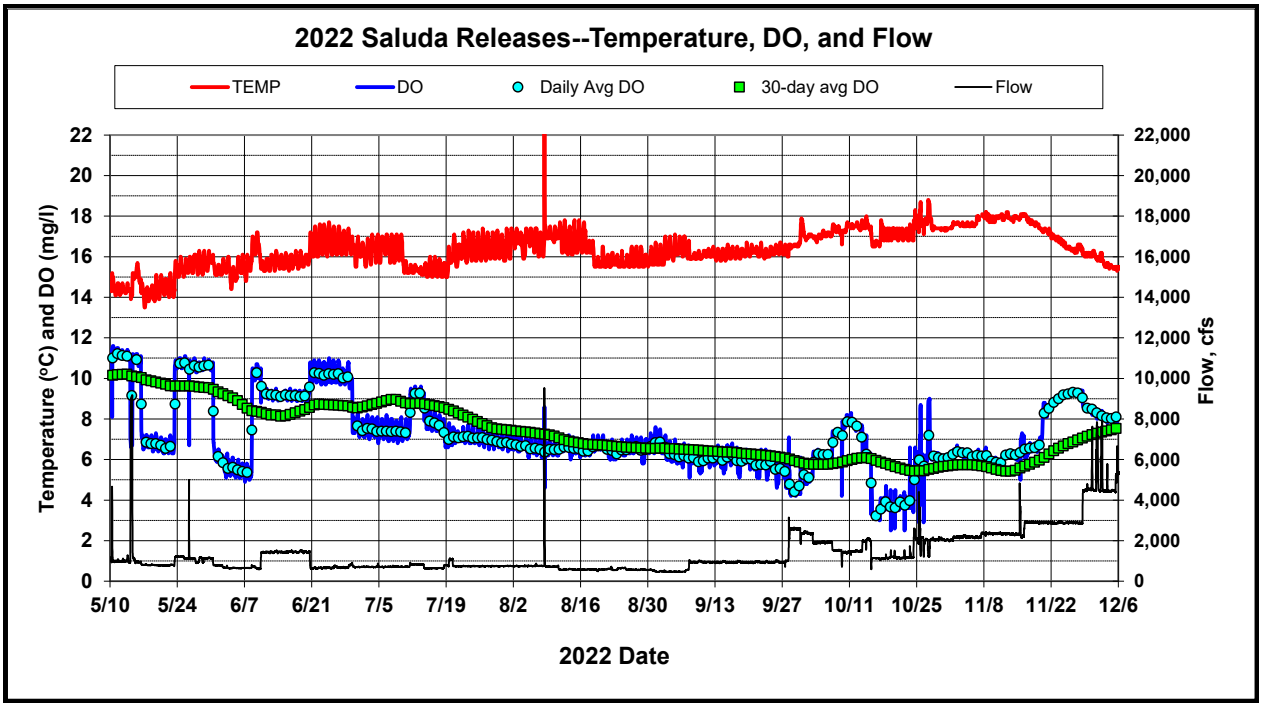


FIGURE 6 2022 SALUDA RELEASES (USGS 02168504) TEMPERATURE, DO, AND FLOW

Figure 7 presents the temperature and DO results of measurements at the USGS monitor (02169000) about eight miles downstream from the Saluda Hydro Powerhouse near the confluence of the Saluda and Broad Rivers. The graph includes the data recorded by the monitor as adjusted by USGS. It also includes the flow measurements by the USGS gage as well as the daily average DO values.

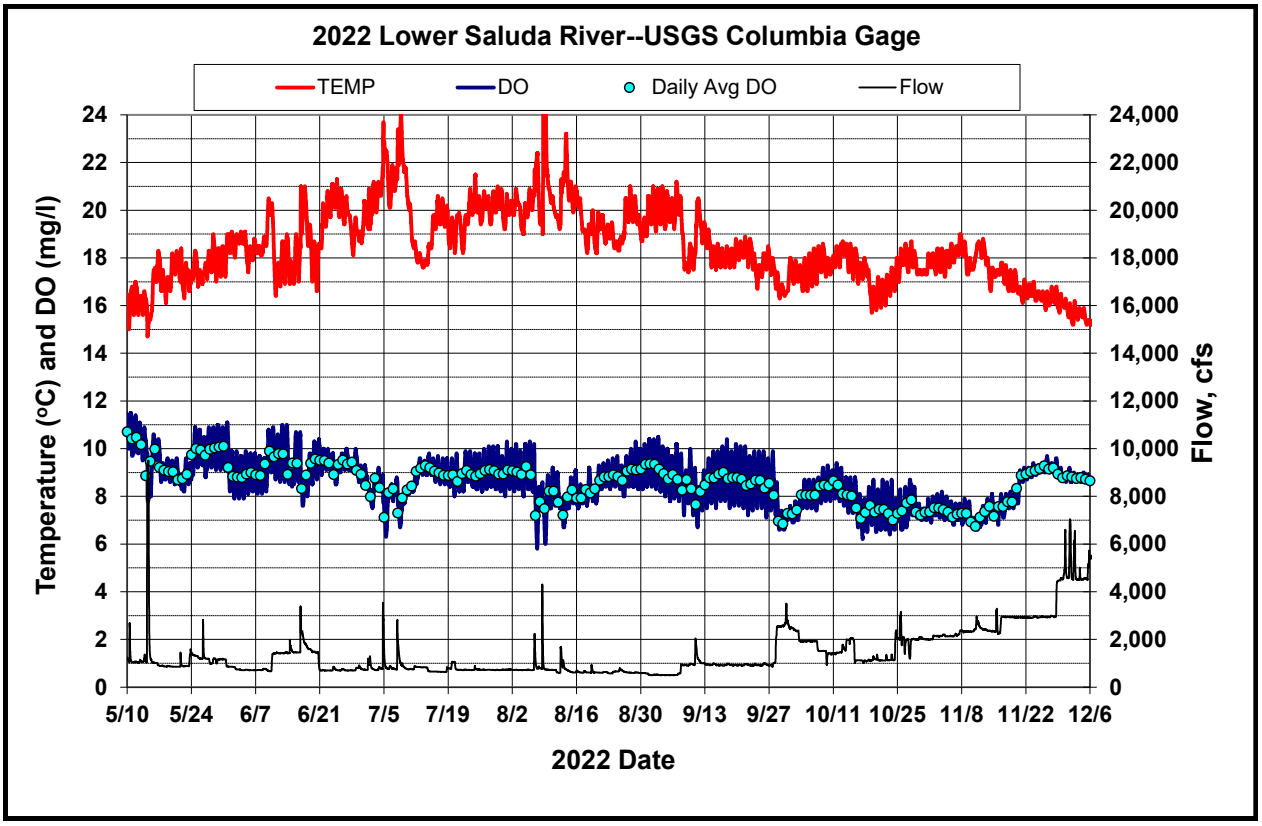


FIGURE 7 2022 LOWER SALUDA RIVER (USGS 02169000) – USGS COLUMBIA GAGE

3.0 EVALUATION OF 2022 OPERATIONS

The levels of DO in the tailrace show continued improvement compared to years prior to 2006. This is attributed primarily to the installation of the hub baffles for Units 1 through 4, the reduction of headcover leakage on Units 2 and 3, and the low flows over the years, as well as, the unit operations as guided by the operational lookup tables (see Appendices A, B, and C), especially the condensed lookup tables.

Excursions of DO less than the SCDHEC site-specific DO standard occurred during two periods of designated operations. Both periods were for lake level management. The first period was in preparation for an approaching hurricane where DESC consulted SCDNR regarding operations. The second period was during the Fall drawdown in coordination with SCDNR when mechanical issues were encountered which resulted in lower DO in the tailrace and stakeholders were notified. Figure 8 presents an enhanced view of the DO and flow conditions during the time period in which the excursions occurred, and Table 1 summarizes the cause of the excursions.

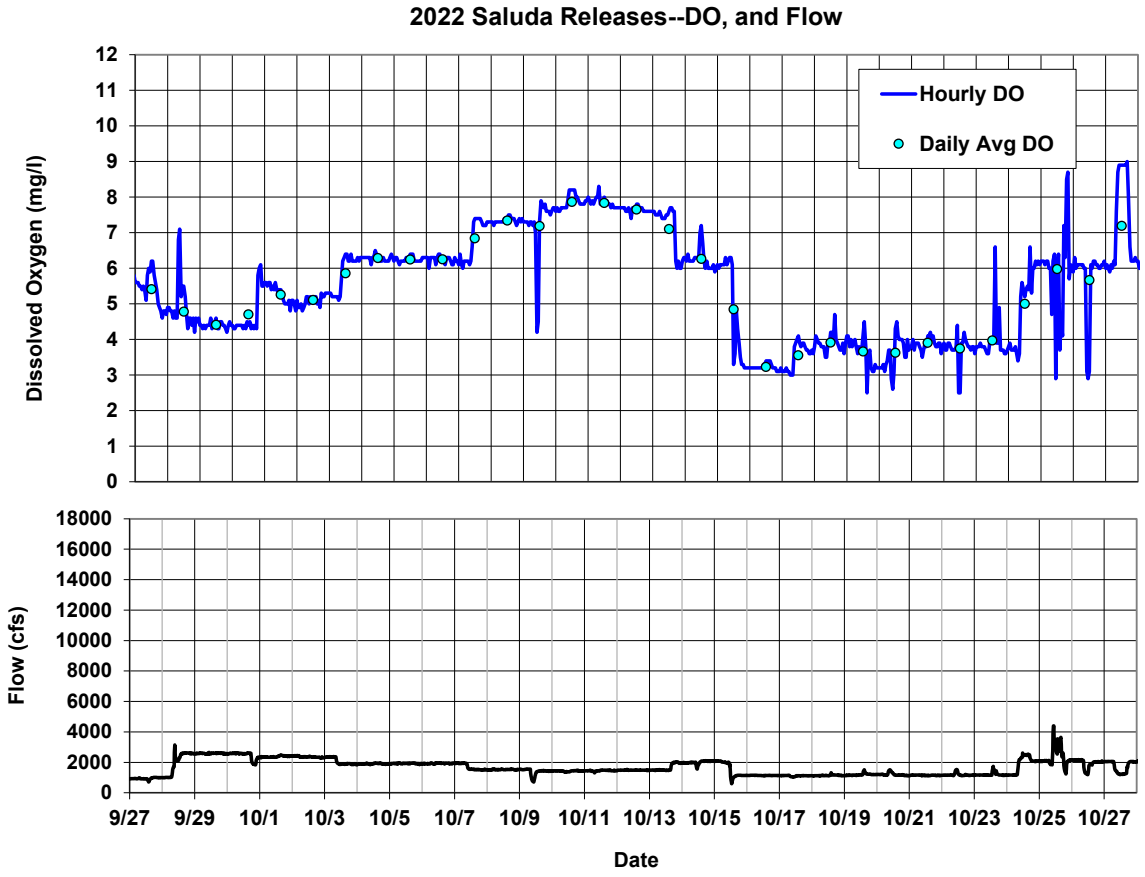


FIGURE 8 2022 SALUDA RELEASES – PERIODS WHEN EXCURSION OCCURRED

SUMMARY OF EXCURSIONS IN 2022

SALUDA RELEASES GAGE (USGS 02168504)

The summary of excursions is presented in Table 1. There were 183 hourly excursions of the minimum DO due to lake level management and maintaining downstream flow and DO levels. Dissolved oxygen levels in the LSR, measured below Saluda Hydro, met or exceeded the instantaneous minimum standard of 4.0 mg/L 97.9 % of the time in 2022. There were 12 excursions of the daily average DO of 5 mg/L and 6 excursions of the 30-day average DO of 5.5 mg/L in 2022.

COLUMBIA GAGE (USGS 20169000)

There were no excursions of the minimum DO or the daily average DO at the USGS gage near Columbia (20169000) in 2022.

TABLE 1 SUMMARY OF EXCURSIONS OF DO LESS THAN THE SC SITE-SPECIFIC DO STANDARD (MINIMUM, DAILY, AND 30-DAY STANDARDS). PERCENT VALUES REPRESENT PERCENT OF ENTIRE YEAR.

Summary of Excursions for 2022--Causes and Metrics, based on USGS indicated DO monitor readings										
Saluda Releases Gage										
Causes	**Dates**	**Number of Hours < 4 mg/L**	**% of Time < 4 mg/L**	**Average DO during Excursions**	**Minimum DO during Excursions**	**Number of Days Avg DO < 5 mg/L**	**% of Time < 5 mg/L Daily Avg**	**Number of Days 30-day Avg DO < 5.5 mg/L**	**% of Time < 5.5 mg/L 30-day Avg DO**	**Comments**
Operations	Sept 28 - Sept 30	0	0.00	4.63	2.6 [1]	3	0.8	0	0.0	Lake level management [2]
Operations	Oct 15 - Oct 26	183	2.09	3.55	2.0	9	2.5	4	1.1	Lake level management [3]
Operations	Nov 11 - Nov 14	0	0.00	6.13	5.4	0	0.0	4	1.1	Lake level management
Totals		**183**	**2.08**			**12**	**3.3**	**8**	**2.2**	
Columbia Gage										
Causes	**Dates**	**Number of Hours < 4 mg/L**	**% of Time < 4 mg/L**	**Average DO during Excursions**	**Minimum DO during Excursions**	**Number of Days Avg DO < 5 mg/L**	**% of Time < 5 mg/L Daily Avg**	**Number of Days 30-day Avg DO < 5.5 mg/L**	**% of Time < 5.5 mg/L 30-day Avg DO**	**Comments**
N/A	Jan 1 - Dec 31	0	N/A			0	N/A	0	N/A	
Totals		**0**	**0.00**				**0.0**		**0.0**	

Additional comments about excursion periods:

1. There were two separate 15-minute readings below the minimum of 4.0 mg/L on September 28, 2.6 mg/L and 3.3 mg/L.
2. Increased generation to reduce the reservoir level in anticipation of high inflow from Hurricane Ian. Consulted with SCDNR prior to increase in flow and agreed on a target of 3 mg/l during the pre-storm drawdown.
3. Unit 5 was out of service due to electrical failure. DESC notified the stakeholders by email on October 17. Units 3 and 4 were run during this period with the goal of maintaining DO at or above 3 mg/l. Unit 5 returned to service on October 26 and stakeholders were notified on October 28. Units 3, 4 and 5 were used for the remainder of the year and DO remained near 6 mg/L for the rest of the low-DO period.

3.1 PERFORMANCE OF THE LOOK-UP TABLES

The LUTs developed for 2008 reflect the effects of the hub baffles that were added to Units 1-5 and the repairs to the headcover seals for Units 1-4. As noted in Section 2.2 above, revisions to the Condensed Lookup Tables were made in August 2012 and 2015. See Appendix D regarding the 2014 aeration study. These revised Condensed Lookup Tables appeared to perform well until Unit 1 developed a venting issue in 2020. DESC revised the Condensed Lookup Tables in 2021 to put Unit 1 last in the dispatch sequence until it is repaired and to add Unit 5 to the unit combinations. In August 2022 DESC again revised the Condensed Lookup Tables based on repairs that were made to the units. DESC is performing additional work on the units in Spring 2023. DESC will be observing the venting performance of the units during 2023 and will issue revised Condensed Lookup Tables for the 2023 low DO season.

3.2 COMMENTS ON THE CURRENT MONITORING SYSTEM

Prior to 2018 the USGS had a procedure to rate the accuracy of their monitors. This rating was generally based on the amount of correction needed to the data during each inspection period, but other variables are also considered. In 2018 the USGS discontinued this rating process. All provisional temperature and dissolved oxygen data collected with the continuous monitor are analyzed and corrected as needed prior to being approved. The current monitoring system performed well during 2022.

RECOMMENDATIONS FOR 2023

1. With the installation of the new optical DO probe in the tailrace, it is recommended that the USGS continue to check the calibration of the monitor once per month.
2. Continue to coordinate the timing of restrictions on Unit 5 operations on a "last on, first off" basis with SCDNR based on fisheries and water quality profile data near the intake towers, i.e., determine when Unit 5 can be operated without restriction to enhance DO in the tailrace.
3. To better represent the current aeration characteristics of Unit 1 as experienced in 2020, use the 2022 version of the Condensed LUTs developed in early 2021 until repairs are completed on Unit 1. (See updated Condensed LUTs in Appendix C).
4. Conduct annual training within DESC so that operators are prepared to minimize DO excursions.
5. Implement the DESC water management procedure to allow sufficient aeration to meet the DO objectives in the tailrace when the pool level is being lowered for normal seasonal operations.
6. DESC will notify organizations desiring special releases from the Saluda Project that might adversely affect the level of DO in the tailwater to schedule their activities during periods of the year when low DO is not normally a concern.
7. DESC will continue to coordinate with DNR to provide DO relief throughout an extended low DO excursion and implement options for aiming to keep the DO above 2.0 mg/l during a potential high inflow event.

4.0 MONITORING OF DISSOLVED OXYGEN IN THE TAILRACE

The current USGS water quality monitor in the tailrace has served its purpose well with respect to providing information on temperature and DO conditions. In 2006, DESC relocated this USGS gage to the center of the river channel as recommended in the 2005 report on operating results to reduce fouling of the gage and improve its representation of DO in the releases from the Saluda Project. USGS use of the new optical DO probe significantly reduced fouling compared to previous probes. Also, USGS is now correcting provisional data following calibration checks, although the corrections may not be made on the web site for about one month following data collection.

APPENDIX A

FINAL GUIDELINES FOR OPERATION OF THE SALUDA PROJECT FOR DISSOLVED OXYGEN MANAGEMENT IN 2023

GUIDELINES FOR OPERATION OF THE SALUDA PROJECT FOR DISSOLVED OXYGEN MANAGEMENT IN 2023

PURPOSE

These Guidelines for Operation of the Saluda Project for Dissolved Oxygen Compliance are prepared pursuant to the *Offer of Settlement On Complaint Regarding Water Quality In Lower Saluda River* (May 19, 2004) (Settlement Agreement). Paragraph 9.3 of the Settlement Agreement provides the following:

> To the extent within SCE&G's reasonable control, each Operating Plan will seek to enhance existing water quality in the lower Saluda River and, more specifically, seek to achieve DO concentrations of 4 mg/1 minimum, 5 mg/l daily average, and 5.5 mg/1 monthly average in the lower Saluda River. In seeking to achieve this goal, each Operating Plan will preserve SCE&G's right or duty to modify operations as necessary to: (A) protect life and property, (B) respond to changed hydrologic or other circumstances not addressed in the Operating Plan, (C) maintain the use of the Project to meet system reserve obligations of 200 MW, and (D) comply with a lawful orders of the [Federal Energy Regulatory] Commission or other authorities. SCE&G will provide notice of such modification to the Conservation Groups, [South Carolina Department of Health and Environmental Control], and Other Agencies in advance of such modification if practicable, and otherwise, as soon as practicable thereafter. The Parties will then use their best efforts to modify the Operating Plan in response thereto.

DESC will implement these Guidelines consistent with paragraph 9.3.

LIMITATIONS

Paragraph 9.3 of the Settlement Agreement includes limitations, and these limitations are more fully explained here. Operation of the Saluda Project affects dissolved oxygen (DO) levels in the Saluda River downstream of the Saluda Project. Factors affecting achievement and maintenance of the DO standard include: (1) the limited capability for aeration of water released through the turbine units, (2) the requirement that DESC (formerly SCE&G) manage water levels in Lake Murray for safety and other reasons, (3) the need to use Saluda Hydro for the special operating needs specified under paragraph 9.3 of the Settlement Agreement, and (4) the need to meet

DESC's reserve obligations as a member of the Virginia-Carolinas Reserve Sharing Group (VACAR RSG).

Generating units occasionally fail, and these generation failures are not generally capable of prediction. These often-sudden failures upset the load-generation balance. Because electricity cannot be stored, any such sudden reduction in generation cannot be made up by an inventory, as would be the case in most other kinds of business. Instead, generation losses must be met by reserve generation that can be dispatched instantly before voltage sags or frequency excursions lead to local or widespread blackouts. VACAR RSG members are bound in a reserve-sharing agreement by which each has agreed to assist any other member in generation emergencies. DESC must employ its reserves to meet its own generation emergencies before calling on assistance from other VACAR RSG members, and it must be constantly ready to provide reserve generation to other VACAR RSG members. Generally, the reserves required to be maintained by DESC are in the range of 190-200 MW, which matches the capacity of the Saluda Project and its ability to respond quickly to any generation outage on its system.

As done in 2004-2022, DESC will provide via email, during 2023, a weekly report to the South Carolina Department of Health and Environmental Control, South Carolina Coastal Conservation League (SCCCL) and other stakeholders documenting the previous week's operation of the Saluda Project.

Unless otherwise specified, these guidelines will be implemented by DESC.

TURBINE VENTING OPERATIONS

Use Lookup Tables (LUTs) as Guides To Aerate the Turbine Releases From the Saluda Project. DESC will use the condensed LUTs included in Appendix C of this document titled "2022 Condensed Lookup Tables Rev 1 August 2022" (see pages C-9 and C-10) and, in part, based on "Original Lookup Tables Developed in February 2008," (Appendix B). These LUTs reflect the best practice for aeration operations based on field testing and predictive models of how the units at Saluda Hydro can be operated to enhance downstream dissolved oxygen levels and still obtain target MW outputs, given the inflow DO and temperature conditions. To simplify

use of the LUTs a condensed set of LUTs was developed, and these are in Appendix C. Use of the condensed LUTs in Appendix C results in higher than normal DO levels in the tailwater for the conditions when DO in the inflow is greater than 1 mg/L since these LUTs are based on the assumption that DO in the inflow is zero mg/L. As noted in Section 2.2 above, a revision to the condensed Lookup Tables was made in 2022 due repairs of the units and added Unit 5 to the dispatch combination and are contained in Appendix D.

Estimate Inflow DO and Temperature for Units 1-4 and Unit 5. Turbine DO and temperature from inflows change during the course of the low DO period. To track DO and temperature conditions in the turbine inflows, DESC will obtain DO and temperature profiles in the Saluda Project forebay every other week during low DO season (once per month during other times of the year) and use these profiles to predict conditions in the turbine inflows. DESC also will use data collected by the United States Geological Survey (USGS) continuous water quality monitor located near the intake of Unit 5 (U5).[2] These data will also be used to evaluate the presence of conditions that call into operation, constraints to using U5 due to the potential for fish entrainment. If needed, a withdrawal zone model may be used to predict inflow temperature and DO.

Use DO Readings in the Tailrace from the USGS Monitor. During 2023, the USGS monitor (USGS Gage No 02168504) will be used to track DO conditions in the tailrace on a daily basis, supplemented by periodic spot measurements by DESC, especially if DO, as measured at the monitor, appears erratic or is lower than expected (*e.g.*, suspected fouling, meter malfunction, *etc*.).

Conduct training of operators in System Control. The System Control Manager will conduct a training session annually with System Operators to ensure proper application of the LUTs. Training of staff includes review of current practices and procedures in the proper application of the LUTs. This training is normally conducted during a six-week period each year. Additional training will be conducted as the need arises.

[2] As with any *in-situ* continuous monitor, anomalous readings occur from time to time, due to equipment fouling or malfunction. If the USGS determines the data are suspect through their Quality Control/Quality Assurance Program, that data may be ignored, appropriately adjusted, or otherwise dealt with according to their final determination. It is acknowledged that the USGS data is reported initially as "provisional." DESC will use it subject to the data error issues discussed here and agreed to during previous meetings with interested parties.

APPENDIX B

ORIGINAL LOOKUP TABLES DEVELOPED IN FEBRUARY 2008

Note that SCE&G is now Dominion Energy South Carolina, Inc. Appendix B references SCE&G since it is from a document issued in 2008 prior to becoming Dominion Energy South Carolina, Inc.

LOOKUP TABLES FOR OPERATING THE SALUDA PROJECT TO ENHANCE DISSOLVED OXYGEN IN THE TAILRACE TO THE EXTENT PRACTICABLE FOR 2008

FEBRUARY 2008

Lookup Tables (LUTs) will be used as a tool for operating the Saluda Project during the low DO period of each year so that the DO standard in the Lower Saluda River may be met continuously, subject to the limitations contained in paragraph 9.3 of the Settlement Agreement, and to provide optimal aeration when the standard otherwise cannot be met. The LUTs will be used by SCE&G to select the turbine units that will be operated at various total project flow rates and power production levels, under varying inflow DO concentrations and temperatures. Also, the aeration system will be manually operated. It is expected that when a final turbine aeration system is installed at some point in the future, a computer-controlled automated system may be needed to adjust these operations for more optimal aeration.

The overall process used to develop the LUTs involved the following steps:

1. The aeration characteristics of units 1, 2, 3, and 4 were modeled using the discrete bubble model as described in "Saluda DO Standard Project—Lower Saluda River DO Technical Study Report, Appendix C, Prediction of Dissolved Oxygen Concentrations for Turbine Discharges from Saluda Hydro" 2003. The aeration characteristics of unit 5 were estimated based on data collected during turbine aeration testing in 2005 and 2006 (see report "Saluda Hydroelectric Project—2005-2007 Aeration Studies" June 2008.)
2. The predicted DO in the tailrace for each set of inflow DO and temperature conditions was then plotted over the range of hydro operations.
3. The LUTs were then developed using these graphs. One set of LUTs was developed assuming that the units were operated several hours per day and the other set of LUTs was developed assuming the units were operated at a constant level over the course of the entire day.
4. LUTs were developed for a range of DO conditions at the intake, but for only one temperature condition that was similar to that expected during the low DO period. Model predictions were made for other temperature conditions, but the effort was not expended to develop LUTs for all the temperature conditions modeled due to the time required to develop LUTs. The results of aeration studies and the development of aeration models for the Project have shown that temperature has insignificant effect on DO (i.e., less than 0.2 mg/L) within the range of temperature variations in the turbine intakes.

5. The LUTs were developed using mass balance equations that integrated the effects of all the units and predicted DO in the tailrace, assuming full mixing of the releases from all the units.
6. For project operations, SCE&G System Control normally dispatches Saluda Hydro by power production levels rather than water flow rates; therefore, the flow rates initially determined using the turbine aeration model were supplemented by conversion to MW levels using the results of unit tests conducted in 1997 and 1998.

The assumed conditions for the turbine aeration systems are as follows:

1. Units 1-5 have hub baffles, and aeration characteristics for Units 1 and 4 were assumed to be as modeled in 2008 based on data collected on Units 1 and 4 in 2005 and 2006, respectively. Predicted DO levels for Units 2, 3, and 5 were based on data collected during testing in 2005 and 2006.
2. Unit 2 cannot be operated unless 2500 cfs is being released by the other units. Unit 5 would normally be operated on a "last on, first off" basis.

Assumptions used in developing the LUTs:

1. SCE&G plans to operate the Saluda Project at a minimal release of approximately 500 cfs during the summer. Under this condition, DO in the release from the Saluda Project should be well over the State DO standard for Units 1 and 4. Also, inflow water quality (*i.e.*, DO and temperature) will change slowly over the course of the summer and early autumn. The use of Unit 3 for providing minimum flows during the period of low DO will be avoided unless Units 1 and 4 are not available.
2. Two sets of LUTs were prepared: one set for hourly operations where the DO target is 4 mg/L (see discussion below), and the other set for daily operations where the DO target is 5 mg/L, *i.e*., the daily operations tables will be applied when Saluda is being operated around the clock under steady state conditions, the hourly operations tables will be applied when one or more units are operated over a period of hours. An analysis of historical conditions (see the report supporting the new site-specific standard for DO for the Lower Saluda River) showed that if 4 mg/L was achieved over a period of several hours during a typical day of operations at the Saluda Project, the other requirements of the DO standard (*i.e.,* the daily average of 5 mg/L and the 30-day moving average of 5.5 mg/L) are achieved under almost all conditions. Considering the current aeration systems, the lack of computerized powerhouse controls, and the DO monitoring system, the use of these two sets of LUTs is considered to be what is practicable.
3. It was assumed that the target minimum DO would be 4 mg/L during the period of maximum release each day. This is because an analysis of historical conditions showed that if 4 mg/L was achieved during the maximum release period, the other requirements

of the DO standard (*i.e.*, the daily average of 5 mg/L and the 30-day moving average of 5.5 mg/L) are achieved under almost all conditions.

4. For days when the Saluda Project would be operated throughout the day, it was assumed that the target minimum DO would be 5 mg/L. This approach is consistent with the assumption that SCE&G plans to operate the Saluda Project at around 500 cfs during the low DO period.

Inflow water quality for Unit 5 was assumed to have the same conditions as the inflows for Units 1- 4. This is a conservative assumption in that DO in the inflow to Unit 5 is rarely less than the DO in the inflows to Units 1- 4. This is based upon an extensive review of historical reservoir profile data.

The following LUTs are proposed for the operating guides for achieving aeration objectives during the low DO period. Figures B-1 through B-6 show the predicted DO concentrations in the tailrace versus unit releases for various operating conditions (i.e., inflow water quality conditions) at the Saluda Project. These graphs were used in developing the LUTs.

LOOKUP TABLES FOR HOURLY OPERATIONS

(DO TARGET IS GREATER THAN OR EQUAL TO 4 MG/L)

(Note: DO_{min} values in the following tables are the predicted lowest DO levels that would be expected to occur for the range of stated DO and temperature inflow conditions and the project flows. These values are provided only for those operations that might not attain the 4 mg/L DO objective in the tailrace.)

Turbine Inflow Conditions: DO 3 – 3.9 mg/L; Temperature = 15°C (approximately mid-July to August 1)		
MWs desired	**Approx. flow (cfs)**	**For Hourly operations, the following is recommended:**
≤ 18	≤ 1500	U1; U3; U4; U5 (last on, first off) U2 (restricted for thermal load),
18-28	1500-2250	U1; U4; U3; U5 (last on, first off); U2 (restricted for thermal load)
28-37	2250-3150	U1; U4; U3; U5 (last on, first off); U2 (restricted for thermal load)
37-75	3150-6300	Any two units*** (except U5) **Flows from Saluda need to be ≥ 2500 cfs before Unit 2 can be run**
75-113	6300-9500	Any three units (except U5) **Flows from Saluda need to be ≥ 2500 cfs before Unit 2 can be run**
113-150	9500-12,600, limit for 4 mg/L	Any available small units with U5 as needed to supplement the small units;
≥ 150	≥ 12,600	Any units with preference to U1, U4, U2 and U3, then U5. DO_{min} = 3.7

*** unless unit-specific flows are listed, “any 2 units”, “any 3 units”, and “any 4 units” implies splitting flow approximately evenly between the units.

Turbine Inflow Conditions: DO 2 – 2.9 mg/L; Temperature = 16°C (approximately August 1 to mid-August); DO objective in tailrace is 4 mg/L		
MWs desired	**Approximate flow (cfs)**	**For <u>Hourly</u> operations, the following is recommended:**
≤ 16	≤ 1400	U1; U4; U3;
16-37	1400-3150	U1; U4; U3 DO_{min} = 3.3; U5 (last on, first off) DO_{min} = 3.0
37-75	3150-6300, limit for 4 mg/L	U1+ any unit (except U5); U4+ any unit (except U5) DO_{min} = 3.4; U3+U2 DO_{min} = 3.2; **Flows from Saluda need to be ≥ 2500 cfs before Unit 2 can be run**
75-113	6300-9500	U1+U2+U3+U4 DO_{min} = 3.8; U1+U4+(U2 or U3), DO_{min} = 3.6; U4+U2+U3 DO_{min} = 3.2; U2+U3+U5 DO_{min} = 3.0 with U5 (last on, first off) **Flows from Saluda need to be ≥ 2500 cfs before Unit 2 can be run**
113-150	9500-12,600	Four original units DO_{min} = 3.3; any available small units with U5 as needed to supplement the small units; DO_{min} = 3.0 **Flows from Saluda need to be ≥ 2500 cfs before Unit 2 can be run**
150-178	12,600-15,000	U1+U4+U2+U3+U5, DO_{min} = 3.0; U1+U2+U3+U5@72MW, DO_{min} = 2.7; U4+U2+U3+U5@72MW, DO_{min} = 2.6 **Flows from Saluda need to be ≥ 2500 cfs before Unit 2 can be run**
≥ 178	≥ 15,000	All units, DO_{min} = 2.8 **Flows from Saluda need to be ≥ 2500 cfs before Unit 2 can be run**

Turbine Inflow Conditions: DO 1 – 1.9 mg/L; Temperature = 16°C (approximately mid-August to September 1); DO objective in tailrace is 4 mg/L		
MWs desired	**Approximate flow (cfs)**	**For <u>Hourly</u> operations, the following is recommended:**
≤ 14	≤ 1250	U1, U3, U4
14-21	1250-1750	Any original unit;
21-32	1750-2750	U1; U4; U3 DO_{min} = 2.9;
32-37	2750-3150	U1; U3+U4; U4 DO_{min} = 3.5; U3 DO_{min} = 2.4
37-50	3150-4000, limit for 4 mg/L	U1+U4; U1+U3 DO_{min} = 3.6; U4+U3 DO_{min} = 3.4; (U1 or U4)+U5 (last on, first off) DO_{min} = 3.0; U3+U5 (last on, first off) DO_{min} = 2.5
50-75	4000-6300	U1+U4 DO_{min} = 3.5; U1+(U2 or U3) DO_{min} = 3.1; U4+(U2 or U3) DO_{min} = 2.5; U3+(U2 or U5) DO_{min} = 2.2 with U5 (last on, first off) **Flows from Saluda need to be ≥ 2500 cfs before Unit 2 can be run**
75-113	6300-9500	Four original units DO_{min} = 3.0; U1+U4+U2 or U3 DO_{min} = 2.7; U1+U2+U3 DO_{min} = 2.5; U4+U2+U3 DO_{min} = 2.3; any two small units with U5 (last on, first off) DO_{min} = 2.1 to 2.7 **Flows from Saluda need to be ≥ 2500 cfs before Unit 2 can be run**
113-150	9500-12,600	U1+U4+U3+U2 DO_{min} = 2.4; U1+U4+(U3 or U2)+U5 DO_{min} = 2.3; U2+U3+U4+U5 DO_{min} = 2.1; U3+U2+U5@72MW DO_{min} = 1.6 **Flows from Saluda need to be ≥ 2500 cfs before Unit 2 can be run**
150-178	12,600-15,000	U1+U4+U2+U3+U5, DO_{min} = 2.1; U1 or U4+U2+U3+U5, DO_{min} = 1.7; three small units+U5, DO_{min} = 1.4 **Flows from Saluda need to be ≥ 2500 cfs before Unit 2 can be run**
≥ 178	≥ 15,000	All units, DO_{min} = 1.8 **Flows from Saluda need to be ≥ 2500 cfs before Unit 2 can be run**

Turbine Inflow Conditions: DO 0 – 0.9 mg/L; Temperature = 16°C (approximately September 1 to mid-September and stays at 0 until lake mixing); DO objective in tailrace is 4 mg/L		
MWs desired	**Approximate flow (cfs)**	**For <u>Hourly</u> operations, the following is recommended:**
≤ 12	≤ 1100	Any unit except U2 or U5
12-19	1100-1600	U1, U3 or U4;
19-29	1600-2400	U1; any two units except U2 or U5; U4 DO_{min} = 3.4; U3 DO_{min} = 2.2;
29-38	2400-3200	U1+U4; U3+U4; U1 DO_{min} = 3.6; U4 DO_{min} = 2.7; U3 DO_{min} = 1.5;
38-57	3200-4800, limit for 4 mg/L	U1+U3+U4; U1+U4 DO_{min} = 3.2; U1+U2 DO_{min} = 2.8; U1+U3 DO_{min} = 2.8; U2+U4 DO_{min} = 2.6; U3+U4 DO_{min} = 2.4; U2+U3 DO_{min} = 2.0;
57-75	4800-6300	U1+U4 DO_{min} = 2.6; U1+U2 or U3 DO_{min} = 2.3; U4+U2 or U3 DO_{min} = 1.8; If only one small unit is operating, consider U5 (last on, first off) as follows: U1+U5 DO_{min} = 2.1; U4+U5 DO_{min} = 1.6; U2 or U3+U5 DO_{min} = 1.2 **Flows from Saluda need to be ≥ 2500 cfs before Unit 2 can be run**
75-113	6300-9500	All 4 original units DO_{min} = 2.0; U1+U4+(U2 or U3) DO_{min} = 1.8; U1+U2+U3 DO_{min} = 1.6; U4+U2+U3 DO_{min} = 1.4; any available small units supplemented by U5 as needed DO_{min} = 0.7 ; **Flows from Saluda need to be ≥ 2500 cfs before Unit 2 can be run**
113-150	9500-12,600	All 4 original units DO_{min} = 1.5; If only three small units are operating, consider U5 (last on, first off) as follows: U1+U2+U3+U5, DO_{min} = 1.3; U4+U2+U3+U5, DO_{min} = 1.1; U2+U3+U5@72MW, DO_{min} = 0.9 **Flows from Saluda need to be ≥ 2500 cfs before Unit 2 can be run**
150-178	12,600-15,000	U1+U4+U2+U3+U5 DO_{min} = 1.1; U1+U4+(U3 or U2)+U5@72MW, DO_{min} = 1.0; U1+U2+U3+U5@72MW, DO_{min} = 1.0; U4+U2+U3+U5@72MW, DO_{min} = 0.9 **Flows from Saluda need to be ≥ 2500 cfs before Unit 2 can be run**
≥ 178	≥ 15,000	All units, DO_{min} = 1.0 **Flows from Saluda need to be ≥ 2500 cfs before Unit 2 can be run**

Turbine Inflow Conditions: DO 0 – 0.9 mg/L; Temperature = 20°C (approximately September 1 to mid-September and stays at 0 until lake mixing); DO objective in tailrace is 4 mg/L		
MWs desired	**Approximate flow (cfs)**	**For <u>Hourly</u> operations, the following is recommended:**
≤ 10	≤ 1000	Any unit except U2 and U5
10-18	1000-1500	U1, U3 or U4;
18-25	1500-2000	U1; Any two units except U2 and U5; U4 DO_{min} = 3.5; U3 DO_{min} = 2.6;
25-31	2000-2500	Any two small units except U2; U1 DO_{min} = 3.7; U4 DO_{min} = 3.1; U3 DO_{min} = 2.1;
31-36	2500-3000,	Any two small units except U2; U1 DO_{min} = 3.5; U4 DO_{min} = 2.7; U3 DO_{min} = 1.5;
36-44	3000-3600, limit for 4 mg/L	U1+U4; U1+U3 DO_{min} = 3.7; U4+U3 DO_{min} = 3.3; If only one small unit is operating, consider U5 (last on, first off) as follows: U1@ ≤ 33MW + U5@ ≤ 12MW DO_{min} = 3.7; U4@ ≤ 31MW + U5@ ≤ 12MW DO_{min} = 3.4;
44-75	3600-6300	All small units DO_{min} 3.5; U1 full gate + rest split between U3+U4 DO_{min} = 3.3; U1+U4+(U2 or U3) DO_{min} = 2.7; U1+U4 DO_{min} = 2.5; U4+U2+U3 DO_{min} = 2.3; U1+(U2 or U3) DO_{min} = 2.2; If only one small unit is operating, consider U5 (last on, first off) as follows: U1+U5 DO_{min} = 2.0; U4+U5 DO_{min} = 1.5; U2+U3 DO_{min} = 1.4; (U2 or U3)+U5 DO_{min} = 1.1; **Flows from Saluda need to be ≥ 2500 cfs before Unit 2 can be run**
75-113	6300-9500	All four original units DO_{min} = 2.0; U1+U4+(U2 or U3) DO_{min} = 1.7; U1+U2+U3 DO_{min} = 1.5; U4+U2+U3 DO_{min} = 1.3; any one-two small units supplemented by U5 as needed DO_{min} = 0.7; **Flows from Saluda need to be ≥ 2500 cfs before Unit 2 can be run**
113-150	9500-12,600	All 4 original units DO_{min} = 1.4; U1+U4+U5+(U2 or U3) DO_{min} = 1.3; U1+U2+U3+U5, DO_{min} = 1.2; U4+U2+U3+U5, DO_{min} = 1.1; U2+U3+U5@72MW, DO_{min} = 0.9 **Flows from Saluda need to be ≥ 2500 cfs before Unit 2 can be run**
150-178	12,600-15,000	U1+U4+U2+U3+U5 DO_{min} = 1.1; U1+U4+(U3 or U2)+U5@72MW, DO_{min} = 1.0; U1+U2+U3+U5@72MW, DO_{min} = 1.0; U4+U2+U3+U5@72MW, DO_{min} = 0.9 **Flows from Saluda need to be ≥ 2500 cfs before Unit 2 can be run**
≥ 178	≥ 15,000	All units, DO_{min} = 1.0 **Flows from Saluda need to be ≥ 2500 cfs before Unit 2 can be run**

Lookup Tables for Daily Operations

(DO Target Is Greater Than or Equal to 5 mg/L)

(Note: DO_{min} values in the following tables are the predicted lowest DO levels that would be expected to occur for the range of stated DO and temperature inflow conditions and the project flows. These values are provided only for those operations that might not attain the 5 mg/L DO objective in the tailrace.)

Turbine Inflow Conditions: DO 4 – 4.9 mg/L; Temperature = 14°C (approximately July 1 to mid-July); DO objective in tailrace is 5 mg/L		
MWs desired	**Approximate flow (cfs)**	**For Daily operating conditions (i.e., operating ~ 24 hours per day), the following is recommended:**
≤ 25	≤ 2000	Any unit except U2 and U5
25-37	2000-3150	Any original unit(s) except U2;
37-75	3150-6300	Any 2 or more original units; **Flows from Saluda need to be ≥ 2500 cfs before Unit 2 can be run**
75-113	6300-9500	Any 3 or 4 small units; if only one original unit is available and U5 is operated up to 72MW, DO_{min} = 4.4 **Flows from Saluda need to be ≥ 2500 cfs before Unit 2 can be run**
113-150	9500-12,600, limit for 5 mg/L	Any 4 or more units; if U1 and U4 are out and U5 is operated up to 72MW DO_{min} = 4.6 **Flows from Saluda need to be ≥ 2500 cfs before Unit 2 can be run**
150-178	12,600-15,000	All 5 units DO_{min} = 4.9; if U1 or U4 is out DO_{min} 4.5; U1+U4+U5@72MW+U2 or U3 DOmin = 4.7 **Flows from Saluda need to be ≥ 2500 cfs before Unit 2 can be run**
≥ 178	≥ 15,000	All units DO_{min} = 4.8 **Flows from Saluda need to be ≥ 2500 cfs before Unit 2 can be run**

*See discussion in Appendix A on Page 1 Paragraph 1, and Items 2 and 4 on Pages 8 and 9.

Turbine Inflow Conditions: DO 3 – 3.9 mg/L; Temperature = 15ºC (approximately mid-July to August 1); DO objective in tailrace is 5 mg/L		
MWs desired	**Approximate flow (cfs)**	**For <u>Daily</u> operating conditions (i.e., operating ~ 24 hours per day), the following is recommended:**
≤ 15	≤ 1350	Any unit except U2 and U5
15-25	1350-2000	Any original unit;
25-37	2000-3150	U1; U4; Flow split between any 2 units; U3 DO_{min} = 4.3;
37-75	3150-6300, limit for 5 mg/L	U1+U4; any 3 original units; U2+U3 DO_{min} = 4.3; U2+U5 DO_{min} = 4.0 **Flows from Saluda need to be ≥ 2500 cfs before Unit 2 can be run**
75-113	6300-9500	All small units DO_{min} = 4.6; U1+U4+(U2 or U3) DO_{min} = 4.5; **Flows from Saluda need to be ≥ 2500 cfs before Unit 2 can be run**
113-150	9500-12,600	U1+U4+U2+U3 DOmin = 4.2 ; any available small units with U5 as needed to supplement the small units DO_{min} = 3.7 **Flows from Saluda need to be ≥ 2500 cfs before Unit 2 can be run**
≥ 150	≥ 12,600	Any units with preference to U1, U4, U2 and U3, then U5. DO_{min} = 3.7 **Flows from Saluda need to be ≥ 2500 cfs before Unit 2 can be run**

Turbine Inflow Conditions: DO 2 – 2.9 mg/L; Temperature = 16°C (approximately August 1 to mid-August); DO objective in tailrace is 5 mg/L		
MWs desired	**Approximate flow (cfs)**	**For <u>Daily</u> operating conditions (i.e., operating ~ 24 hours per day), the following is recommended:**
≤ 13	≤ 1200	Any unit except U2 and U5
13-21	1200-1750	Any original unit except U2 and U5;
21-28	1750-2250	U1; U4; Any 2 units except U2 and U5; U3 DO_{min} = 4.0;
28-37	2250-3150	U1; Any 2 original units; U4 DO_{min} = 4.3; U3 DO_{min} = 3.3;
37-75	3150-6300, limit for 5 mg/L	U1+U2+U3+U4; U1+U4+(U2 or U3) DO_{min} = 4.5; U1+U4 DO_{min} = 4.2; U1+(U2 or U3) DO_{min} = 3.8; U4+(U2 or U3) DO_{min} = 3.4; U2+U3 DO_{min} = 3.3; (U2 or U3)+U5 DO_{min} = 3.1 **Flows from Saluda need to be ≥ 2500 cfs before Unit 2 can be run**
75-113	6300-9500	U1+U2+U3+U4 DO_{min} = 3.8; U1+U4+(U2 or U3), DO_{min} = 3.6; U4+U2+U3 DO_{min} = 3.2; U2+U3+U5 DO_{min} = 3.0 **Flows from Saluda need to be ≥ 2500 cfs before Unit 2 can be run**
113-150	9500-12,600	Four original units DO_{min} = 3.3; any available small units with U5 as needed to supplement the small units DO_{min} = 3.0 **Flows from Saluda need to be ≥ 2500 cfs before Unit 2 can be run**
150-178	12,600-15,000	U1+U4+U2+U3+U5, DO_{min} = 3.0; U1+U2+U3+U5 at full gate, DO_{min} = 2.7; U4+U2+U3+U5 at full gate, DO_{min} = 2.6 **Flows from Saluda need to be ≥ 2500 cfs before Unit 2 can be run**
≥ 178	≥ 15,000	All units, DO_{min} = 2.8 **Flows from Saluda need to be ≥ 2500 cfs before Unit 2 can be run**

Turbine Inflow Conditions: DO 1 – 1.9 mg/L; Temperature = 16°C (approximately mid-August to September 1); DO objective in tailrace is 5 mg/L		
MWs desired	**Approximate flow (cfs)**	**For <u>Daily</u> operating conditions (i.e., operating ~ 24 hours per day), the following is recommended:**
≤ 10	≤ 1000	Any unit except U2 and U5
10-16	1000-1400	U1; U3; U4;
16-25	1400-2000	U1; Any 2 units except U2 and U5; U4 DO_{min} = 4.5; U3 DO_{min} = 3.5;
25-37	2000-3100, limit for 5 mg/L	Any 2 original units except U2 and U5; U1 DO_{min} = 4.4; U4 DO_{min} = 3.6; U3 DO_{min} = 2.5;
37-75	3100-6300	U1+U4 DO_{min} = 3.4; U1+(U2 or U3) DO_{min} = 3.1; U4+(U2 or U3) DO_{min} = 2.6; U3+(U2 or U5) DO_{min} = 2.2 with U5 (last on, first off) **Flows from Saluda need to be ≥ 2500 cfs before Unit 2 can be run**
75-113	6300-9500	Four original units DO_{min} = 3.0; U1+U4+U2 or U3 DO_{min} = 2.7; U1+U2+U3 DO_{min} = 2.5; U4+U2+U3 DO_{min} = 2.3; any two small units with U5 (last on, first off) DO_{min} = 2.1 to 2.7 **Flows from Saluda need to be ≥ 2500 cfs before Unit 2 can be run**
113-150	9500-12,600	U1+U4+U3+U2 DO_{min} = 2.4; U1+U4+(U3 or U2)+U5 DO_{min} = 2.3; U2+U3+U4+U5 DO_{min} = 2.1; U3+U2+U5@72MW DO_{min} = 1.6 **Flows from Saluda need to be ≥ 2500 cfs before Unit 2 can be run**
150-178	12,600-15,000	U1+U4+U2+U3+U5, DO_{min} = 2.1; U1 or U4+U2+U3+U5, DO_{min} = 1.7; three small units+U5, DO_{min} = 1.4 **Flows from Saluda need to be ≥ 2500 cfs before Unit 2 can be run**
≥ 178	≥ 15,000	All units, DO_{min} = 1.8 **Flows from Saluda need to be ≥ 2500 cfs before Unit 2 can be run**

Turbine Inflow Conditions: DO 0 – 0.9 mg/L; Temperature = 16°C (approximately September 1 to mid-September and stays at 0 until lake mixing); DO objective in tailrace is 5 mg/L		
MWs desired	**Approximate flow (cfs)**	**For <u>Daily</u> operating conditions (i.e., operating ~ 24 hours per day), the following is recommended:**
≤ 8	≤ 900	Any unit except U2 and U5
8-21	900-1700	U1; U3+U4; U4 DO_{min} = 4.2; U3 DO_{min} = 3.7;
21-31	1700-2500	U1+(U3 or U4); U1 DO_{min} = 4.0; U4 DO_{min} = 3.3; U3 DO_{min} = 2.0;
31-37	2500-3150, limit for 5 mg/L	U1+U3+U4; U1+ (U3 or U4) DO_{min} = 4.8; U1 DO_{min} = 3.6; U4 DO_{min} = 2.9; U3 DO_{min} = 1.6;
37-75	3150-6300	All 4 small units DO_{min} = 3.7; U1+(U3 or U2)+U4 DO_{min} = 2.9; U1+U4 DO_{min} = 2.6; U1+(U2 or U3) DO_{min} = 2.2; U4+(U2 or U3) DO_{min} = 1.6; U2+U5 DO_{min} = 1.2 with U5 (last on, first off) **Flows from Saluda need to be ≥ 2500 cfs before Unit 2 can be run**
75-113	6300-9500	All 4 original units DO_{min} = 2.0; U1+U4+(U2 or U3) DO_{min} = 1.8; U1+U2+U3 DO_{min} = 1.6; U4+U2+U3 DO_{min} = 1.4; any one-two small units supplemented by U5 as needed DO_{min} = 0.7 ; **Flows from Saluda need to be ≥ 2500 cfs before Unit 2 can be run**
113-150	9500-12,600	All 4 original units DO_{min} = 1.5; If two-three small units are operating, consider U5 (last on, first off) as follows: U1+U4+(U3 or U2)+U5, DO_{min} = 1.3; U1+U2+U3+U5, DO_{min} = 1.1; U2+U3+U5@72MW, DO_{min} = 0.9 **Flows from Saluda need to be ≥ 2500 cfs before Unit 2 can be run**
150-178	12,600-15,000	U1+U4+U2+U3+U5 DO_{min} = 1.1; U1+U4+(U3 or U2)+U5@72MW, DO_{min} = 1.0; U1+U2+U3+U5@72MW, DO_{min} = 1.0; U4+U2+U3+U5@72MW, DO_{min} = 0.9 **Flows from Saluda need to be ≥ 2500 cfs before Unit 2 can be run**
≥ 178	≥ 15,000	All units, DO_{min} = 1.0 **Flows from Saluda need to be ≥ 2500 cfs before Unit 2 can be run**

Turbine Inflow Conditions: DO 0 – 0.9 mg/L; Temperature = 20°C (approximately September 1 to mid-September and stays at 0 until lake mixing); DO objective in tailrace is 5 mg/L		
MWs desired	**Approximate flow (cfs)**	**For <u>Daily</u> operating conditions (i.e., operating ~ 24 hours per day), the following is recommended:**
≤ 8	≤ 900	Any unit except U2 and U5
8-18	900-1500	U1; U3+U4; U3 or U4, DO_{min} = 4.0;
18-25	1500-2000	U1+U3 or U4; U1 DO_{min} = 4.0; U4 DO_{min} = 3.5; U3 DO_{min} = 2.6;
25-37	2000-3150, limit for 5 mg/L	U1+U3+U4; U1+(U3 or U4) DO_{min} = 4.5; U3+U4 DO_{min} = 3.9; U1 DO_{min} = 3.4; U4 DO_{min} = 2.6; U3 DO_{min} = 1.5;
37-75	3150-6300	All small units DO_{min} 3.5; U1 full gate + rest split between U3+U4 DO_{min} = 3.3; U1+U4+(U2 or U3) DO_{min} = 2.7; U1+U4 DO_{min} = 2.5; U4+U2+U3 DO_{min} = 2.3; U1+(U2 or U3) DO_{min} = 2.2; If only one small unit is operating, consider U5 (last on, first off) as follows: U1+U5 DO_{min} = 2.0; U4+U5 DO_{min} = 1.5; U2+U3 DO_{min} = 1.4; (U2 or U3)+U5 DO_{min} = 1.1; **Flows from Saluda need to be ≥ 2500 cfs before Unit 2 can be run**
75-113	6300-9500	All four original units DO_{min} = 2.0; U1+U4+(U2 or U3) DO_{min} = 1.7; U1+U2+U3 DO_{min} = 1.5; U4+U2+U3 DO_{min} = 1.3; any one-two small units supplemented by U5 as needed DO_{min} = 0.7; **Flows from Saluda need to be ≥ 2500 cfs before Unit 2 can be run**
113-150	9500-12,600	All 4 original units DO_{min} = 1.4; If two-three small units are operating, consider U5 (last on, first off) as follows: U1+U4+(U3 or U2)+U5, DO_{min} = 1.3; U1+U2+U3+U5, DO_{min} = 1.1; U2+U3+U5@72MW, DO_{min} = 0.9 **Flows from Saluda need to be ≥ 2500 cfs before Unit 2 can be run**
150-178	12,600-15,000	U1+U4+U2+U3+U5 DO_{min} = 1.1; U1+U4+(U3 or U2)+U5@72MW, DO_{min} = 1.0; U1+U2+U3+U5@72MW, DO_{min} = 1.0; U4+U2+U3+U5@72MW, DO_{min} = 0.9 **Flows from Saluda need to be ≥ 2500 cfs before Unit 2 can be run**
≥ 178	≥ 15,000	All units, DO_{min} = 1.0 **Flows from Saluda need to be ≥ 2500 cfs before Unit 2 can be run**

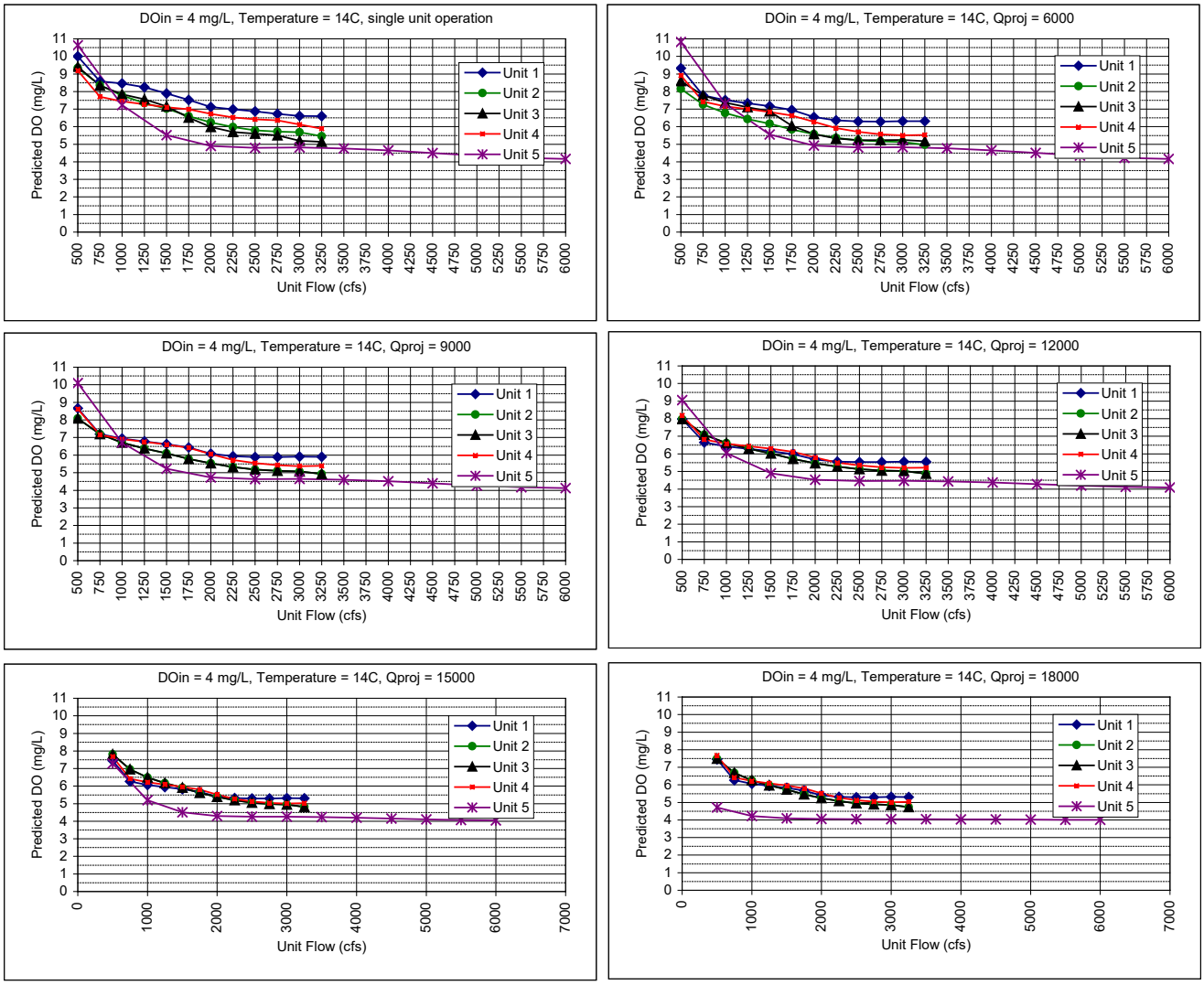


FIGURE B-1 PREDICTED DO FOR EACH UNIT VERSUS UNIT FLOWS FOR THE RANGE OF TOTAL PROJECT RELEASES FOR THE FOLLOWING WATER QUALITY CONDITIONS: DO IN = 4 MG/L AND TEMPERATURE = 14°C. THIS PLOT WAS USED TO DEVELOP THE LUTS

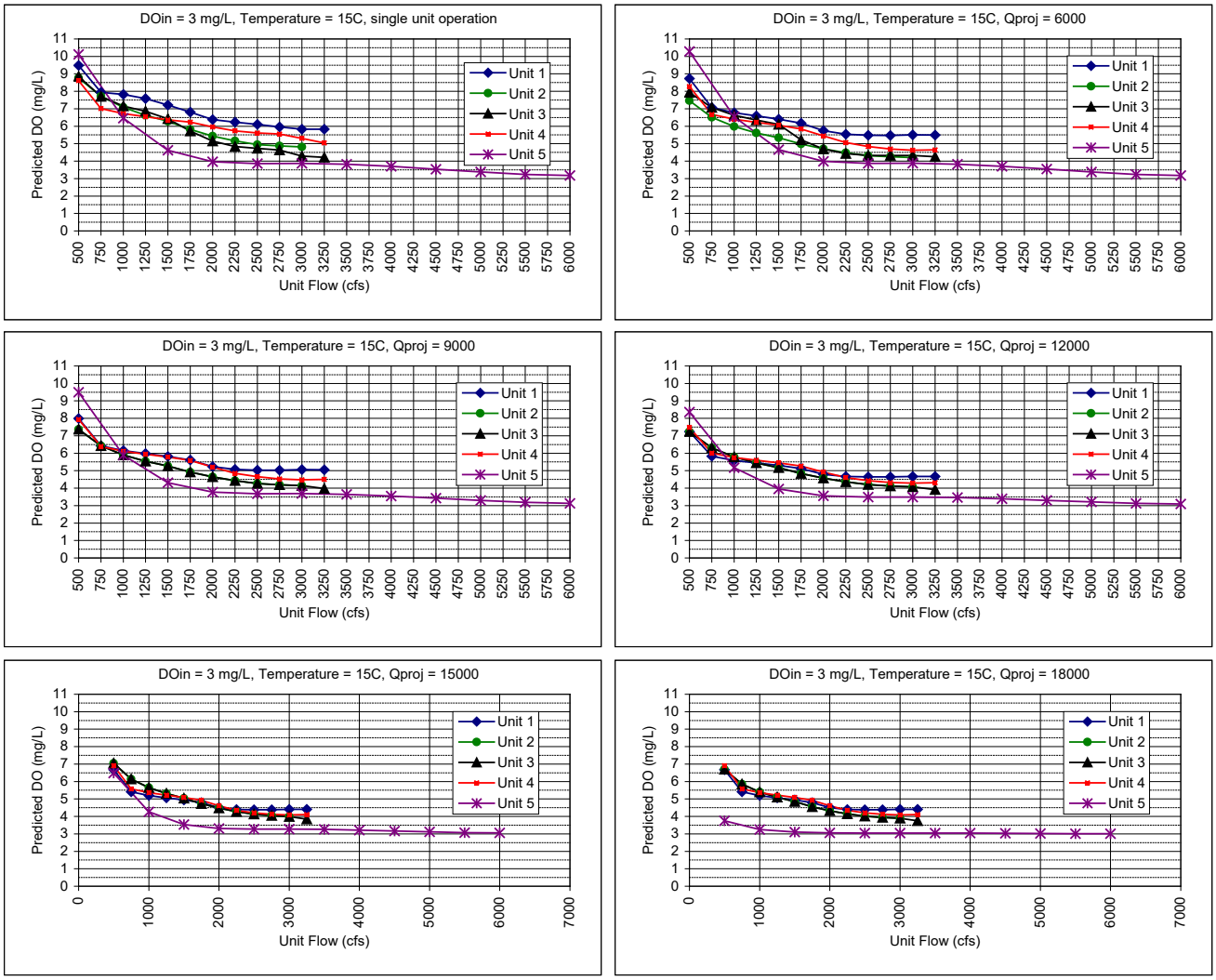


FIGURE B-2 PREDICTED DO FOR EACH UNIT VERSUS UNIT FLOWS FOR THE RANGE OF TOTAL PROJECT RELEASES FOR THE FOLLOWING WATER QUALITY CONDITIONS: DO IN = 3 MG/L AND TEMPERATURE = 15°C. THIS PLOT WAS USED TO DEVELOP THE LUTS

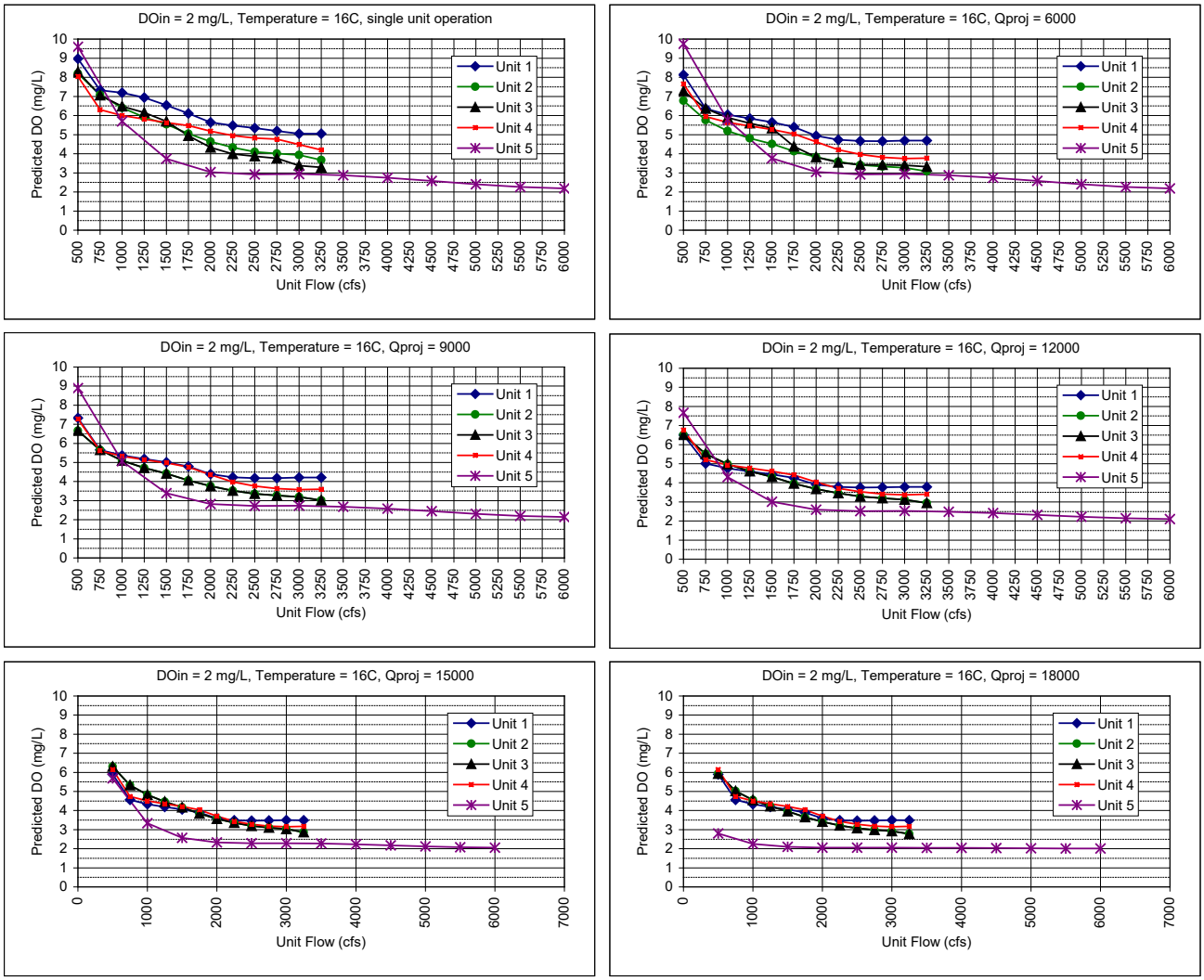


FIGURE B-3 PREDICTED DO FOR EACH UNIT VERSUS UNIT FLOWS FOR THE RANGE OF TOTAL PROJECT RELEASES FOR THE FOLLOWING WATER QUALITY CONDITIONS: DO IN = 2 MG/L AND TEMPERATURE = 16°C. THIS PLOT WAS USED TO DEVELOP THE LUTS

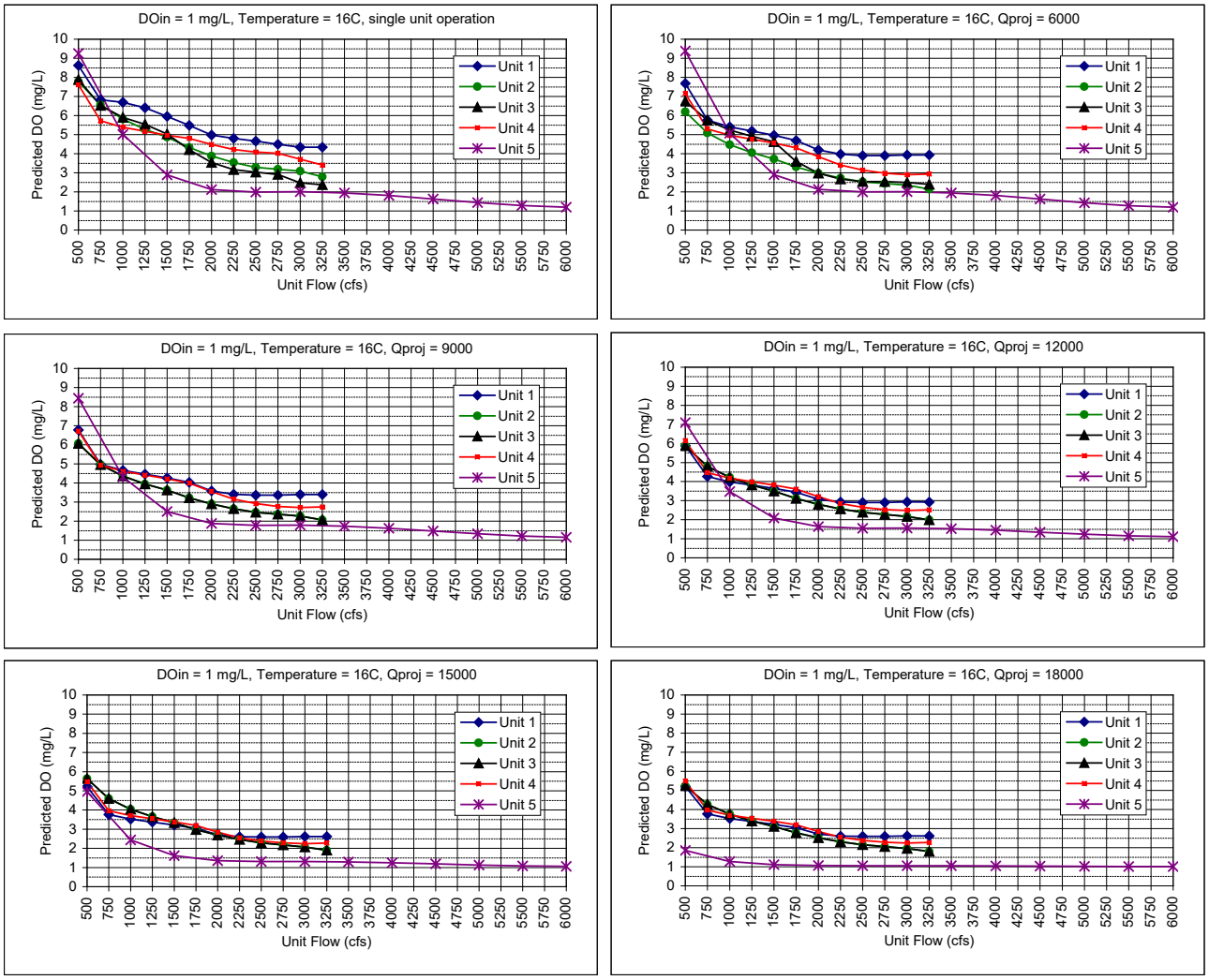


FIGURE B-4 PREDICTED DO FOR EACH UNIT VERSUS UNIT FLOWS FOR THE RANGE OF TOTAL PROJECT RELEASES FOR THE FOLLOWING WATER QUALITY CONDITIONS: DO IN = 1 MG/L AND TEMPERATURE = 16°C. THIS PLOT WAS USED TO DEVELOP THE LUTS

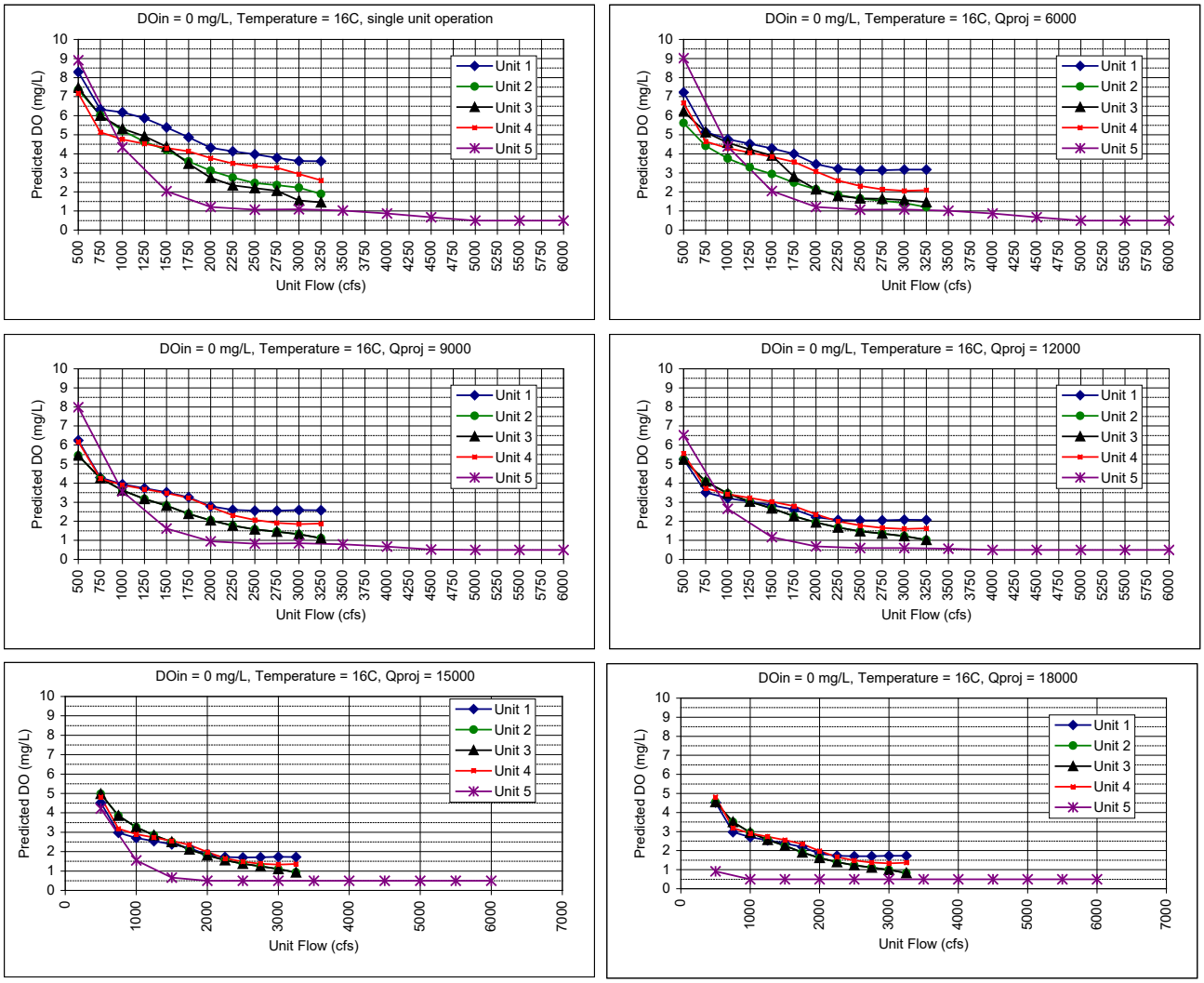


FIGURE B-5 PREDICTED DO FOR EACH UNIT VERSUS UNIT FLOWS FOR THE RANGE OF TOTAL PROJECT RELEASES FOR THE FOLLOWING WATER QUALITY CONDITIONS: DO IN = 0 MG/L AND TEMPERATURE = 16°C. THIS PLOT WAS USED TO DEVELOP THE LUTS

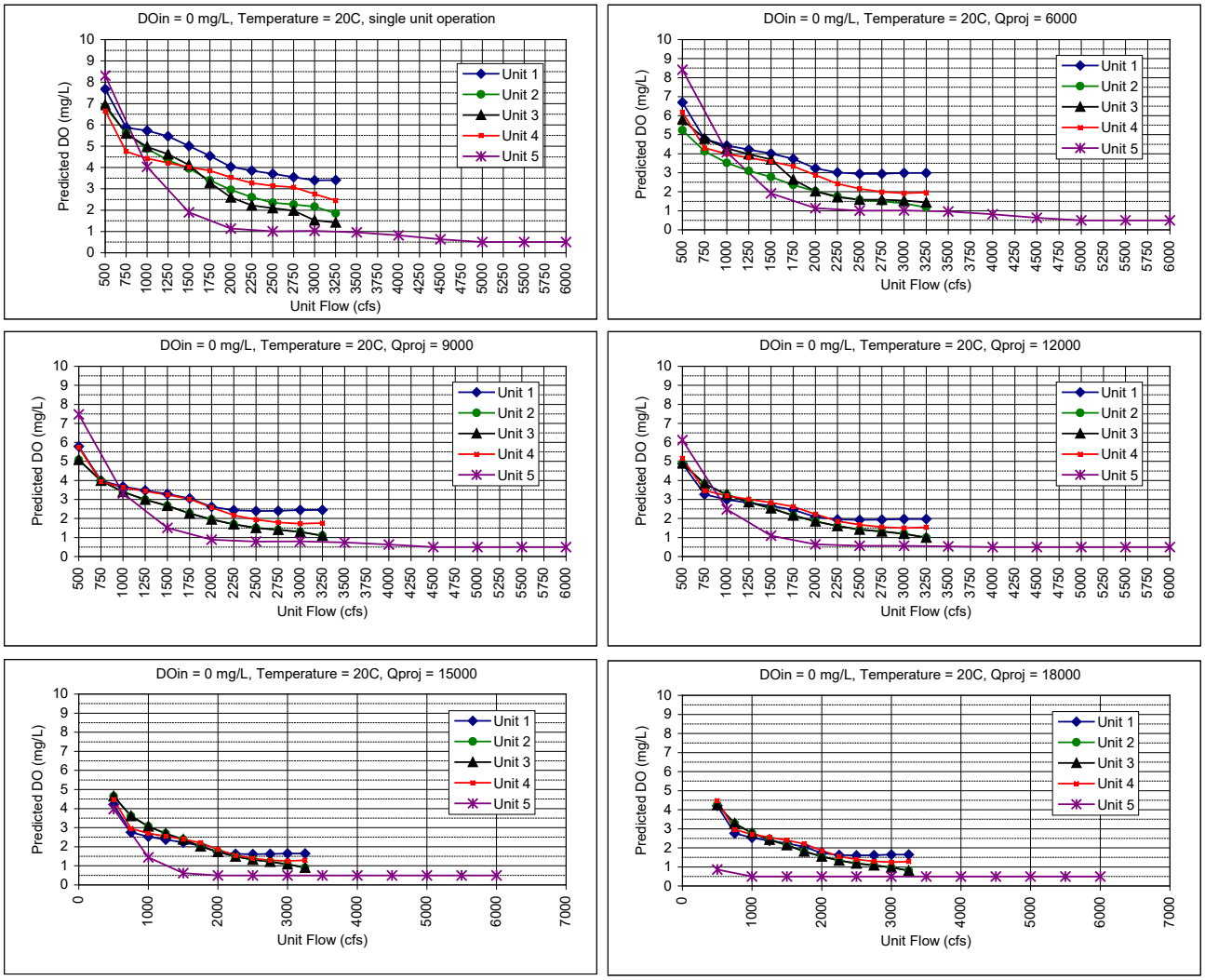


FIGURE B-6 PREDICTED DO FOR EACH UNIT VERSUS UNIT FLOWS FOR THE RANGE OF TOTAL PROJECT RELEASES FOR THE FOLLOWING WATER QUALITY CONDITIONS: DO IN = 0 MG/L AND TEMPERATURE = 20°C. THIS PLOT WAS USED TO DEVELOP THE LUTS

APPENDIX C

CONDENSED LOOKUP TABLES
(UPDATED JANUARY 2015 AND 2021)

Original Condensed Look-Up Table for Hourly Operations

Turbine Inflow Conditions: DO = 0 – 3.9 mg/L; DO objective in tailrace is 4 mg/L		
MWs desired	**Approximate flow (cfs)**	**For <u>Hourly</u> operations, the following unit operations are recommended in the order of preference (the bold, blue values should attain 4 mg/L DO):**
≤ 10	≤ 1000	**1. U1, U3, or U4**
10-18	1000-1500	**1. U1, U3 or U4; 2. Even split any 2 units (except 2 & 5);**
22-25	1500-2000	**1. U1; 2. Even split any 2 units (except 2 & 5); 3.** U4; **4.** U3;
25-31	2000-2500	**1. Even split any 2 small units (except 2); 2.** U1; **3.** U4; **4.** U3;
31-36	2500-3000	**1. Even split any 2 small units (except 2); 2.** U1; **3.** U4; **4.** U3;
36-44	3000-3600, limit for 4 mg/L	**1. U1+U4; 2.** U1+U3; **3**. U4+U3; **4**. for project flow up to 3150 cfs, use in order of preference: U1, U4, U3
44-75	3600-6300	**1.** U1+U2+U3+U4; **2.** U1 full gate + rest split between U3+U4; **3**. U1+U4+(U2 or U3); **4**. U1+U4; **5**. U4+U2+U3; **6**. U1+(U2 or U3); **7**. U2+U3; **Flows from Saluda need to be ≥ 2500 cfs before Unit 2 can be run**
75-113	6300-9500	**1.** U1+U2+U3+U4; **2.** U1+U4+(U2 or U3); **3.** U1+U2+U3; **4.** U4+U3+U2; **Flows from Saluda need to be ≥ 2500 cfs before Unit 2 can be run**
113-150	9500-12,600	**1.** U1+U4+U3+U2 **2.** any available small units with U5 as needed to supplement the small units; **Flows from Saluda need to be ≥ 2500 cfs before Unit 2 can be run**
150-178	12,600-15,000	**1.** U1+U4+U2+U3+U5; **2.** U1+U4+(U2 or U3)+U5@72MW; **3.** U4+U2+U3+U5@72MW **Flows from Saluda need to be ≥ 2500 cfs before Unit 2 can be run**
≥ 178	≥ 15,000	All units **Flows from Saluda need to be ≥ 2500 cfs before Unit 2 can be run**

Note that minimum flows during periods of low DO should be maintained at 450-500 cfs so that venting will draw air into the units

Original Condensed Look-Up Table for Daily Operations

Turbine Inflow Conditions: DO = 0 – 4.9 mg/L; DO objective in tailrace is 5 mg/L		
MWs desired	**Approximate flow (cfs)**	**For <u>Daily</u> operating conditions (i.e., operating ~ 24 hours per day), the following unit operations are recommended in the order of preference (the bold, blue values should attain 5 mg/L DO):**
≤ 8	≤ 900	**1. Any unit (except 2 & 5)**
8-18	900-1500	**1. U1; 2. Even split any 2 small units (except 2); 3.** U4; **4.** U3;
18-25	1500-2000	**1. U1+U4; 2. U1+U3; 3.** U1; **4.** U4; **5.** U3;
25-37	2000-3150, limit for 5 mg/L	**1. U1+U3+U4; 2.** U1+(U3 or U4); **3.** U3+U4; **4.** U1; **5.** U4; **6.** U3;
37-75	3150-6300	**1.** U1+U2+U3+U4; **2.** U1+U4+(U3 or U2); **3.** U1+U4; **4.** U1+(U2 or U3); **5.** U4+(U2 or U3); **Flows from Saluda need to be ≥ 2500 cfs before Unit 2 can be run**
75-113	6300-9500	**1.** U1+U2+U3+U4; **2.** U1+U4+(U2 or U3); **3.** U1+U2+U3; **4.** U4+U3+U2 **Flows from Saluda need to be ≥ 2500 cfs before Unit 2 can be run**
113-150	9500-12,600	**1.** U1+U4+U3+U2 **2.** any available small units with U5 as needed to supplement the small units; **Flows from Saluda need to be ≥ 2500 cfs before Unit 2 can be run**
150-178	12,600-15,000	**1.** U1+U4+U2+U3+U5; **2.** U1+U4+(U2 or U3)+U5@72MW; **3.** U4+U2+U3+U5@72MW **Flows from Saluda need to be ≥ 2500 cfs before Unit 2 can be run**
≥ 178	≥ 15,000	All units **Flows from Saluda need to be ≥ 2500 cfs before Unit 2 can be run**

Note that minimum flows during periods of low DO should be maintained at 450-500 cfs so that venting will draw air into the units

2012 Rev 1, 2013 and 2014 Condensed Look-up Table for Hourly Operations (4 hours or less per day)

Turbine Inflow Conditions: DO = 0 – 3.9 mg/L; DO objective in tailrace is 4 mg/L		
MWs desired	**Approximate flow (cfs)**	**For Hourly operations (operating 4 hours or less per day), the following unit operations are recommended in the order of preference (the bold, blue values should attain 4 mg/L DO):**
≤ 10	≤ 1000	**1. U3 or U4; 2. U1**
10-18	1000-1500	**1. U3+U4; 2. U1+U3+U4; 3. U1+(U3 or U4); 4. U4 5. U3 6.** U1
22-25	1500-2000	**1. U1+U3+U4; 2. U3+U4; 3.** U1+(U3 or U4); **4.** U4 **5.** U3 **6.** U1 **Option with Technical Services concurrence: U1+U2+U3+U4; Flows from Saluda need to be ≥ 2500 cfs before Unit 2 can be run**
25-31	2000-2500	**1. U1+U3+U4; 2. U3+U4; 3.** U1+(U3 or U4); **4.** U4; **5.** U3; **6.** U1; **Option with Technical Services concurrence: U1+U2+U3+U4; Flows from Saluda need to be ≥ 2500 cfs before Unit 2 can be run**
31-36	2500-3000	**1. U1+U3+U4; 2. U3+U4; 3.** U1+(U3 or U4); **4.** U4; **5.** U3; **6.** U1; **Option with Technical Services concurrence: U1+U2+U3+U4; Flows from Saluda need to be ≥ 2500 cfs before Unit 2 can be run**
36-44	3000-3600, limit for 4 mg/L	**1. U1+U3+U4; 2.** U3+U4; **3.** U1 + (U3 or U4); **4.** For project flow up to 3150 cfs, use in order of preference: U4, U3, U1;
44-75	3600-6300	**1.** U1+U2+U3+U4; **2.** U4 full gate + rest split between U1+U3; **3.** U3+U4+(U2 or U1); **4.** U3+U4; **5.** U4+U2+U3; **6.** U1+U3; **Flows from Saluda need to be ≥ 2500 cfs before Unit 2 can be run**
75-113	6300-9500	**1.** U1+U2+U3+U4; **2.** U3+U4+(U1 or U2); **Flows from Saluda need to be ≥ 2500 cfs before Unit 2 can be run**
113-150	9500-12,600	**1.** U1+U2+U3+U4 **2.** any available small units with U5 as needed to supplement the small units; **Flows from Saluda need to be ≥ 2500 cfs before Unit 2 can be run**
150-178	12,600-15,000	**1.** U1+U2+U3+U4+U5; **2.** U3+U4+(U1 or U2)+U5@72MW; **3.** U4+U3+U2+U5@72MW **Flows from Saluda need to be ≥ 2500 cfs before Unit 2 can be run**
≥ 178	≥ 15,000	All units **Flows from Saluda need to be ≥ 2500 cfs before Unit 2 can be run**

Note 1: Minimum flows during periods of low DO should be maintained at 450-500 cfs so that venting will draw air into the units.
Note 2: When running multiple units spread load evenly among them whenever possible.

2012 Rev 1, 2013 and 2014 Condensed Look-up Table for Daily Operations (greater than 4 hours per day)

Turbine Inflow Conditions: DO = 0 – 4.9 mg/L; DO objective in tailrace is 5 mg/L		
MWs desired	**Approximate flow (cfs)**	**For Daily operating conditions (operating more than 4 hours per day), the following unit operations are recommended in the order of preference (the bold, blue values should attain 5 mg/L DO):**
≤ 8	≤ 900	**1. U3 or U4; 2. U1**
8-18	900-1500	**1. U3+U4; 2. U1+U3+U4; 3. U1+(U3 or U4); 4.** U4; **5.** U3; **6.** U1
18-25	1500-2000	**1. U1+U3+U4; 2. U3+U4; 3.** U1+(U3 or U4); **4.** U4; **5.** U3; **6.** U1 **Option with Technical Services concurrence: U1+U2+U3+U4; Flows from Saluda need to be ≥ 2500 cfs before Unit 2 can be run**
25-37	2000-3150, limit for 5 mg/L	**1.** U1+U3+U4; **2.** U3+U4; **3.** U4+(U1 or U3); **4.** U4; **5.** U3; **6.** U1 **Option with Technical Services concurrence: U1+U2+U3+U4; Flows from Saluda need to be ≥ 2500 cfs before Unit 2 can be run**
37-75	3150-6300	**1.** U1+U2+U3+U4; **2.** U3+U4+(U1 or U2); **3.** U1+U4; **4.** U4+(U1 or U3); **Flows from Saluda need to be ≥ 2500 cfs before Unit 2 can be run**
75-113	6300-9500	**1.** U1+U2+U3+U4; **2.** U3+U4+(U1 or U2); **3.** U1+U3+U4; **4.** U4+U3+U2 **Flows from Saluda need to be ≥ 2500 cfs before Unit 2 can be run**
113-150	9500-12,600	**1.** U1+U4+U3+U2 **2.** any available small units with U5 as needed to supplement the small units; **Flows from Saluda need to be ≥ 2500 cfs before Unit 2 can be run**
150-178	12,600-15,000	**1.** U1+U4+U2+U3+U5; **2.** U3+U4+(U1 or U2)+U5@72MW; **3.** U4+U2+U3+U5@72MW **Flows from Saluda need to be ≥ 2500 cfs before Unit 2 can be run**
≥ 178	≥ 15,000	All units **Flows from Saluda need to be ≥ 2500 cfs before Unit 2 can be run**

Note 1: Minimum flows during periods of low DO should be maintained at 450-500 cfs so that venting will draw air into the units.
Note 2: When running multiple units spread load evenly among them whenever possible.

Condensed Lookup Tables (Updated January 2015) for Hourly Operations (4 hours or less per day)

Turbine Inflow Conditions: DO = 0 – 3.9 mg/L; DO objective in tailrace is 4 mg/L		
MWs desire	**Approximate flow (cfs)**	**For Hourly operations (operating 4 hours or less per day), the following unit operations are recommended in the order of preference (the bold, blue values should**
≤ 10	≤ 1000	**1. U4; 2. U1, 3. U3**
10-18	1000-1500	**1. U1+U4; 2. U1+U3+U4; 3. U3+(U4 or U1); 4. U4 5.** U1 6. U3
22-25	1500-2000	**1. U1+U3+U4; 2. U1+U4; 3. U3+(U1 or U4); 4.** U4 **5.** U1 **6.** U3 **Option with Technical Services concurrence: U1+U2+U3+U4; Flows from Saluda need to be > 2500 cfs before Unit 2 can be run**
25-31	2000-2500	**1. U1+U3+U4; 2. U1+U4; 3.** U3+(U1 or U4); **4.** U4; **5.** U1; **6.** U3; **Option with Technical Services concurrence: U1+U2+U3+U4; Flows from Saluda need to be > 2500 cfs before Unit 2 can be run**
31-36	2500-3000	**1. U1+U3+U4; 2. U1+U4; 3.** U3+(U1 or U4); **4.** U4; **5.** U1; **6.** U3; **Option with Technical Services concurrence: U1+U2+U3+U4; Flows from Saluda need to be > 2500 cfs before Unit 2 can be run**
36-44	3000-3600, limit for 4 mg/L	**1. U1+U3+U4; 2.** U1+U4; **3.** U3 + (U1 or U4); **4.** For project flow up to 3150 cfs, use in order of preference: U4, U1, U3;
44-75	3600-6300	**1.** U1+U2+U3+U4; **2.** U4 full gate + rest split between U1+U3; **3.** U1+U4+(U2 or U3); **4.** U1+U4; **5.** U4+U1+U2; **6.** U3+(U1 or U4); **Flows from Saluda need to be ≥ 2500 cfs before Unit 2 can be run**
75-113	6300-9500	**1.** U1+U2+U3+U4; **2.** U1+U4+(U3 or U2); **Flows from Saluda need to be ≥ 2500 cfs before Unit 2 can be run**
113-150	9500-12,600	**1.** U1+U2+U3+U4 **2.** any available small units with U5 as needed to supplement the small units;
150-178	12,600-15,000	**1.** U1+U2+U3+U4+U5; **2.** U1+U4+(U3 or U2)+U5@72MW; **3.** U4+U1+U2+U5@72MW **Flows from Saluda need to be ≥ 2500 cfs before Unit 2 can be run**
≥ 178	≥ 15,000	All units **Flows from Saluda need to be ≥ 2500 cfs before Unit 2 can be run**

Note 1: Minimum flows during periods of low DO should be maintained at 450-500 cfs so that venting will draw air into the units.
Note 2: When running multiple units spread load evenly among them whenever possible.

Condensed Lookup Tables (Updated January 2015) for Daily Operations (greater than 4 hours per day)

Turbine Inflow Conditions: DO = 0 – 4.9 mg/L; DO objective in tailrace is 5 mg/L		
MWs desired	**Approximate flow (cfs)**	**For Daily operating conditions (operating more than 4 hours per day), the following unit operations are recommended in the order of preference (the bold, blue values should attain 5 mg/L DO):**
≤ 8	≤ 900	**1. U4; 2. U1, 3. U3**
8-18	900-1500	**1. U1+U4; 2. U1+U3+U4; 3. U3+(U1 or U4); 4. U4; 5.** U1; **6.** U3
18-25	1500-2000	**1. U1+U3+U4; 2. U1+U4; 3.** U3+(U1 or U4); **4.** U4; **5.** U1; **6.** U3 **Option with Technical Services concurrence: U1+U2+U3+U4; Flows from Saluda need to be ≥ 2500 cfs before Unit 2 can be run**
25-37	2000-3150, limit for 5 mg/L	**1.** U1+U3+U4; **2.** U1+U4; **3.** U3+(U1 or U4); **4.** U4; **5.** U1; **6.** U3 **Option with Technical Services concurrence: U1+U2+U3+U4; Flows from Saluda need to be ≥ 2500 cfs before Unit 2 can be run**
37-75	3150-6300	**1.** U1+U2+U3+U4; **2.** U1+U4+(U3 or U2); **3.** U1+U4; **4.** U4+(U1 or U3); **Flows from Saluda need to be ≥ 2500 cfs before Unit 2 can be run**
75-113	6300-9500	**1.** U1+U2+U3+U4; **2.** U1+U4+(U3 or U2); **3.** U1+U3+U4; **4.** U4+U1+U2 **Flows from Saluda need to be ≥ 2500 cfs before Unit 2 can be run**
113-150	9500-12,600	**1.** U1+U2+U3+U4; **2.** any available small units with U5 as needed to supplement the small units; **Flows from Saluda need to be ≥ 2500 cfs before Unit 2 can be run**
150-178	12,600-15,000	**1.** U1+U2+U3+U4+U5; **2.** U1+U4+(U3 or U2)+U5@72MW; **3.** U4+U2+U1+U5@72MW **Flows from Saluda need to be ≥ 2500 cfs before Unit 2 can be run**
≥ 178	≥ 15,000	All units **Flows from Saluda need to be ≥ 2500 cfs before Unit 2 can be run**

Note1: Minimum flows during periods of low DO should be maintained at 450-500 cfs so that venting will draw air into the units.
Note 2: When running multiple units spread load evenly among them whenever possible.

2021 Condensed Look-up Table for Hourly Operations (4 hours or less per day)

Turbine Inflow Conditions: DO = 0 – 3.9 mg/L; DO objective in tailrace is 4 mg/L		
MWs desired	**Approximate flow (cfs)**	**For Hourly operations (operating 4 hours or less per day), the following unit operations are recommended in the order of preference (the bold, blue values should attain 4 mg/L DO):**
≤ 10	≤ 1000	**1. U4; 2. U3; 3. U3+U4; 4.** U1
10-18	1000-1500	**1. U3+U4; 2. U3+U4+U5; 3. U4+(U3 or U5); 4.** U4; **5.** U3; **6.** U1
22-25	1500-2000	**1. U3+U4+U5; 2. U4+(U3 or U5); 3.** U4; **4.** U3; **5.** U1 **Option with Technical Services concurrence: U2+U3+U4+U5; Flows from Saluda need to be ≥ 2500 cfs before Unit 2 can be run**
25-31	2000-2500	**1. U3+U4+U5; 2.** U4+(U3 or U5); **3.** U3+(U4 or U5); **4.** U4; **5.** U3; **6.** U5; **7.** U1; **Option with Technical Services concurrence: U2+U3+U4+U5; Flows from Saluda need to be ≥ 2500 cfs before Unit 2 can be run**
31-36	2500-3000	**1. U3+U4+U5; 2.** U4+(U3 or U5); **3.** U3+(U4 or U5); **4.** U4; **5.** U3; **6.** U5; **7.** U1; **Option with Technical Services concurrence: U2+U3+U4+U5; Flows from Saluda need to be ≥ 2500 cfs before Unit 2 can be run**
36-44	3000-3600, limit for 4 mg/L	**1. U2+U3+U4+U5; 2.** U3+U4; **3.** U3 + (U4 or U5); **4.** U5; **Flows from Saluda need to be ≥ 2500 cfs before Unit 2 can be run**
44-75	3600-6300	**1.** U2+U3+U4+U5; **2.** U4 full gate + rest split between U2+U3; **3.** U5+U4+(U2 or U3); **4.** U3+U4; **5.** U4+U2+U5; **6.** U3+(U4 or U5); **Flows from Saluda need to be ≥ 2500 cfs before Unit 2 can be run**
75-113	6300-9500	**1.** U2+U3+U4+U5; **2.** U5+U4+(U3 or U2); **Flows from Saluda need to be ≥ 2500 cfs before Unit 2 can be run**
113-150	9500-12,600	**1.** U2+U3+U4+U5; **2.** any available small units with U5 as needed to supplement the small units; **Flows from Saluda need to be ≥ 2500 cfs before Unit 2 can be run**
150-178	12,600-15,000	**1.** U2+U3+U4+U5; **2.** any available small units with U5 as needed to supplement the small units; **Flows from Saluda need to be ≥ 2500 cfs before Unit 2 can be run**
≥ 178	≥ 15,000	All units **Flows from Saluda need to be ≥ 2500 cfs before Unit 2 can be run**

Note1: Minimum flows during periods of low DO should be maintained at 600-700 cfs so that venting will draw air into the units.
Note 2: When running multiple units spread load evenly among them whenever possible.

2021 Condensed Look-up Table for Daily Operations (greater than 4 hours per day)

Turbine Inflow Conditions: DO = 0 – 4.9 mg/L; DO objective in tailrace is 5 mg/L		
MWs desired	**Approximate flow (cfs)**	**For Daily operating conditions (operating more than 4 hours per day), the following unit operations are recommended in the order of preference (the bold, blue values should attain 5 mg/L DO):**
≤ 8	≤ 900	**1. U3+U4; 2. U4; 3. U5;** **4.** U3; **5.** U1
8-18	900-1500	**1. U3+U4; 2. U3+U4+U5; 3. U4+(U3 or U5);** **4.** U4; **5.** U3; **6.** U5; **7.** U1
18-25	1500-2000	**1. U3+U4+U5; 2. U4+(U3 or U5); 3.** U4; **4.** U3; **5.** U5; **6.** U1 **Option with Technical Services concurrence: U2+U3+U4+U5; Flows from Saluda need to be ≥ 2500 cfs before Unit 2 can be run**
25-37	2000-3150, limit for 5 mg/L	**1.** U3+U4+U5; **2.** U3+U4; **3.** U3+(U4 or U5); **4.** U4; **5.** U3; **6.** U5; **7.** U1 **Option with Technical Services concurrence: U2+U3+U4+U5; Flows from Saluda need to be ≥ 2500 cfs before Unit 2 can be run**
37-75	3150-6300	**1.** U2+U3+U4+U5; **2.** U4+U5+(U3 or U2); **3.** U3+U4; **4.** U5+(U4 or U3); **Flows from Saluda need to be ≥ 2500 cfs before Unit 2 can be run**
75-113	6300-9500	**1.** U2+U3+U4+U5; **2.** U4+U5+(U3 or U2); **3.** any available small units with U5 as needed to supplement the small units; **Flows from Saluda need to be ≥ 2500 cfs before Unit 2 can be run**
113-150	9500-12,600	**1.** U2+U3+U4+U5; **2.** any available small units with U5 as needed to supplement the small units; **Flows from Saluda need to be ≥ 2500 cfs before Unit 2 can be run**
150-178	12,600-15,000	**1.** U2+U3+U4+U5; **2.** any available small units with U5 as needed to supplement the small units; **Flows from Saluda need to be ≥ 2500 cfs before Unit 2 can be run**
≥ 178	≥ 15,000	All available units **Flows from Saluda need to be ≥ 2500 cfs before Unit 2 can be run**

Note1: Minimum flows during periods of low DO should be maintained at 600-700 cfs so that venting will draw air into the units.
Note 2: When running multiple units spread load evenly among them whenever possible.

2022 Condensed Look-up Table for Hourly Operations (4 hours or less per day) Rev. 1 August 2022

Turbine Inflow Conditions: DO = 0 – 3.9 mg/L; DO objective in tailrace is 4 mg/L		
MWs desired	**Approximate flow (cfs)**	**For Hourly operations (operating 4 hours or less per day), the following unit operations are recommended in the order of preference (the bold, blue values should attain 4 mg/L DO):**
≤ 10	≤ 1000	**1. U4; 2. U3; 3. U5;** 4. U1
10-18	1000-1500	**1. U3+U4; 2. U5+(U3 or U4); 3. U4; 4. U3; 5. U5; 6.** U1
22-25	1500-2000	**1. U3+U4+U5; 2. U5+(U3 or U4); 3.** U4+U3; **4.** U4; **5.** U3; **6.** U1 **Option with Technical Services concurrence: U2+U3+U4+U5; Flows from Saluda need to be ≥ 2500 cfs before Unit 2 can be run**
25-31	2000-2500	**1. U3+U4+U5; 2.** U5+(U3 or U4); **3.** U4+(U3 or U1); **4.** U4; **5.** U3; **6.** U5; **7.** U1; **Option with Technical Services concurrence: U2+U3+U4+U5; Flows from Saluda need to be ≥ 2500 cfs before Unit 2 can be run**
31-36	2500-3000	**1. U3+U4+U5; 2.** U5+(U3 or U4); **3.** U4+(U3 or U1); **4.** U4; **5.** U3; **6.** U5; **7.** U1; **Option with Technical Services concurrence: U2+U3+U4+U5; Flows from Saluda need to be ≥ 2500 cfs before Unit 2 can be run**
36-44	3000-3600, limit for 4 mg/L	**1. U2+U3+U4+U5; 2.** U3+U4**; 3.** U3 + (U4 or U5); **4.** U5; **Flows from Saluda need to be ≥ 2500 cfs before Unit 2 can be run**
44-75	3600-6300	**1.** U2+U3+U4+U5; **2.** U4 full gate + rest split between U2+U3; **3.** U5+U4+(U2 or U3); **4.** U3+U4; **5.** U4+U2+U5; **6.** U3+(U4 or U5); **Flows from Saluda need to be ≥ 2500 cfs before Unit 2 can be run**
75-113	6300-9500	**1.** U2+U3+U4+U5; **2.** U5+U4+(U3 or U2); **Flows from Saluda need to be ≥ 2500 cfs before Unit 2 can be run**
113-150	9500-12,600	**1.** U2+U3+U4+U5; **2.** any available small units with U5 as needed to supplement the small units; **Flows from Saluda need to be ≥ 2500 cfs before Unit 2 can be run**
150-178	12,600-15,000	**1.** U2+U3+U4+U5; **2.** any available small units with U5 as needed to supplement the small units; **Flows from Saluda need to be ≥ 2500 cfs before Unit 2 can be run**
≥ 178	≥ 15,000	All units **Flows from Saluda need to be ≥ 2500 cfs before Unit 2 can be run**

Note1: Minimum flows during periods of low DO should be maintained at 600-700 cfs so that venting will draw air into the units.
Note 2: When running multiple units spread load evenly among them whenever possible.

2022 Condensed Look-up Table for Daily Operations (greater than 4 hours per day) **Rev. 1 August 2022**

Turbine Inflow Conditions: DO = 0 – 4.9 mg/L; DO objective in tailrace is 5 mg/L		
MWs desired	**Approximate flow (cfs)**	**For Daily operating conditions (operating more than 4 hours per day), the following unit operations are recommended in the order of preference (the bold, blue values should attain 5 mg/L DO):**
≤ 8	≤ 900	**1. U4; 2. U3; 3. U5;** 4. U1
8-18	900-1500	**1. U3+U4; 2. U5+(U3 or U4); 3. U5; 4.** U4; **5.** U3; **6.** U1
18-25	1500-2000	**1. U3+U4+U5; 2.** U5+(U3 or U4); **3.** U3+U4; **4.** U4; **5.** U3; **6.** U1 **Option with Technical Services concurrence: U2+U3+U4+U5; Flows from Saluda need to be ≥ 2500 cfs before Unit 2 can be run**
25-37	2000-3150, limit for 5 mg/L	**1.** U3+U4+U5; **2.** U3+U4; **3.** U3+(U4 or U5); **4.** U4; **5.** U3; **6.** U5; **7.** U1 **Option with Technical Services concurrence: U2+U3+U4+U5; Flows from Saluda need to be ≥ 2500 cfs before Unit 2 can be run**
37-75	3150-6300	**1.** U2+U3+U4+U5; **2.** U4+U5+(U3 or U2); **3.** U3+U4; **4.** U5+(U4 or U3); **Flows from Saluda need to be ≥ 2500 cfs before Unit 2 can be run**
75-113	6300-9500	**1.** U2+U3+U4+U5; **2.** U4+U5+(U3 or U2); **3.** any available small units with U5 as needed to supplement the small units; **Flows from Saluda need to be ≥ 2500 cfs before Unit 2 can be run**
113-150	9500-12,600	**1.** U2+U3+U4+U5; **2.** any available small units with U5 as needed to supplement the small units; **Flows from Saluda need to be ≥ 2500 cfs before Unit 2 can be run**
150-178	12,600-15,000	**1.** U2+U3+U4+U5; **2.** any available small units with U5 as needed to supplement the small units; **Flows from Saluda need to be ≥ 2500 cfs before Unit 2 can be run**
≥ 178	≥ 15,000	All available units **Flows from Saluda need to be ≥ 2500 cfs before Unit 2 can be run**

Note1: Minimum flows during periods of low DO should be maintained at 600-700 cfs so that venting will draw air into the units.
Note 2: When running multiple units spread load evenly among them whenever possible.

APPENDIX D

DESC AERATION TESTING ON UNIT 1 IN COMPARISON TO UNITS 3 AND 4 FOR LOW GATE SETTINGS (SEPTEMBER 2014)

Note that SCE&G is now Dominion Energy South Carolina, Inc. Appendix D references SCE&G since it is from a document issued in 2014 prior to becoming Dominion Energy South Carolina, Inc.

SALUDA HYDRO UNIT 1 AERATION STUDY, SEPTEMBER 2014

On September 23 & 24, 2014 testing was conducted in the tailrace of Saluda Hydroelectric Plant to determine the current aeration capabilities of Unit 1 as compared to Units 3 and 4. The test was conducted by running the single unit (1, 3 or 4) at spinning, then 2 MW, 4 MW, 6 MW, 8MW and 10 MW. For each sampling, time was allowed for the tailrace area to stabilize and collect the water quality data (approximately 30 – 45 minutes). Once 10 MW was attained on a Unit and water quality data were collected, then that Unit was shut down and the same test was run on the next Unit (with all other units shutdown). If at any time the dissolved oxygen (DO) in the tailrace was close to 4 mg/l during the test for that particular unit, generation was either increased by 1 MW above the current MW or the test was stopped for that unit at that time. Water quality data was collected approximately 155 feet downstream of the powerhouse.

The results indicated that Unit 4 aerated the best followed by Unit 1 and then Unit 3 with the lowest DO increase. The data also showed that higher DO occurred at the lower gate settings with DO decreasing as the gate openings increased.

The temperatures measured in the tailrace, ~ 14.5± °C, were very similar over the gate settings ranging from 19.3 to 23.3 for Unit 1 and 17.8 to 23.2 for Unit 4, indicating that inflow water quality was likely pulled from the same layer in the lake. This indicates that the difference in tailrace DO levels between Unit 1 at 4.09-4.89 mg/L and Unit 4 at 5.57-6.34 mg/L is probably attributed to Unit 4 drawing more air into its draft tube.

The DO measured for Unit 1 at 25.2 % gate dropped to 3.75 mg/L. This could be caused by less air being drawn into the unit and/or less time for water traveling through the draft tube, but it could also be attributed to lower DO in the intake since the temperature dropped from about 14.66 to 14.51 °C.

It should be noted that Unit 3 aeration was very similar to Unit 1 aeration for the higher gate settings tested for Unit 3 at 18.1 and 26 %.

Table D-1 Results of Aeration Testing

9/23/14 Time (EDT)	Unit 1 (MW)	DO (mg/l)	BP (mmHg)	TDG	Water Temp (°C)	Headwater (ft)	Tailwater (ft)	Turbine Gate setting (%)	USGS 02168504 Discharge (cfs)
9:15	0.1	7.89	762	813	15.18	356.87	174.47	3.5	686
10:00	2.0	7.06	762	801	14.90	356.87	174.49	10.1	706
10:45	4.0	6.04	762	791	14.72	356.86	174.65	15.0	832
11:35	6.1	4.89	762	747	14.64	356.86	174.84	19.3	993
12:16	7.0	4.42	762	754	14.64	356.87	174.97	21.4	1,100
12:36	8.1	4.09	762	741	14.66	356.86	175.00	23.3	1,140
12:56	9.0	3.75	763	746	14.51	356.86	175.11	25.2	1,200

9/23/14 Time (EDT)	Unit 3 (MW)	DO (mg/l)	BP (mmHg)	TDG (%)	Water Temp (°C)	Headwater (ft)	Tailwater (ft)	Turbine Gate setting (%)	USGS 02168504 Discharge (cfs)
13:40	0.5	7.04	763	817	15.03	356.87	174.67	7.5	776
14:18	2.5	6.25	762	800	14.99	356.87	174.62	11.3	781
14:45	4.2	5.47	762	782	14.61	356.88	174.73	11.7	827
9/24/14									
8:40	6.2	4.42	763	750	14.71	356.86	175.08	18.1	954
15:14	8.2	3.84	762	748	14.50	356.88	175.02	26.0	1,020

9/24/14 Time (EDT)	Unit 4 (MW)	DO (mg/l)	BP (mmHg)	TDG (%)	Water Temp (°C)	Headwater (ft)	Tailwater (ft)	Turbine Gate setting (%)	USGS 02168504 Discharge (cfs)
9:15	0.3	7.36	763	788	15.25	356.85	174.64	7.6	781
10:24	2.2	7.30	764	800	14.89	356.86	174.57	12.0	804
11:19	4.0	6.95	763	801	14.84	356.85	174.70	15.4	880
12:03	6.0	6.34	763	760	14.65	356.85	174.91	17.8	1,040
13:00	8.1	5.84	763	756	14.60	356.84	175.16	22.2	1,200
13:54	9.0	5.57	763	754	14.64	356.86	175.27	23.2	1,260
14:40	10.1	5.37	763	766	14.64	356.84	175.38	24.8	1,320

Figure D-1 Results of Aeration Testing—Results of DO Measurements over Ranges of Megawatts and % Gate Settings for Units 1, 3, and 4 at Low Gate Settings

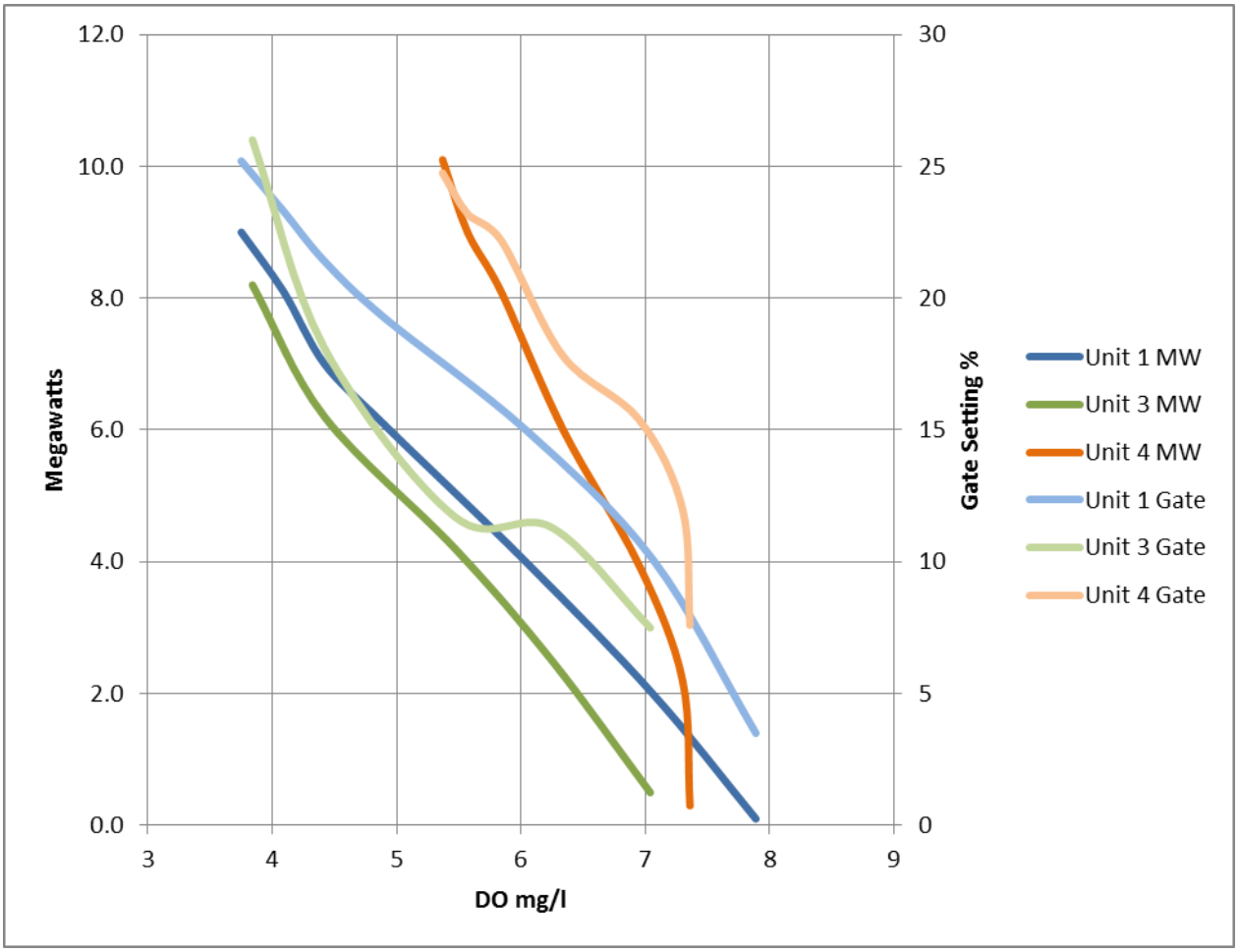
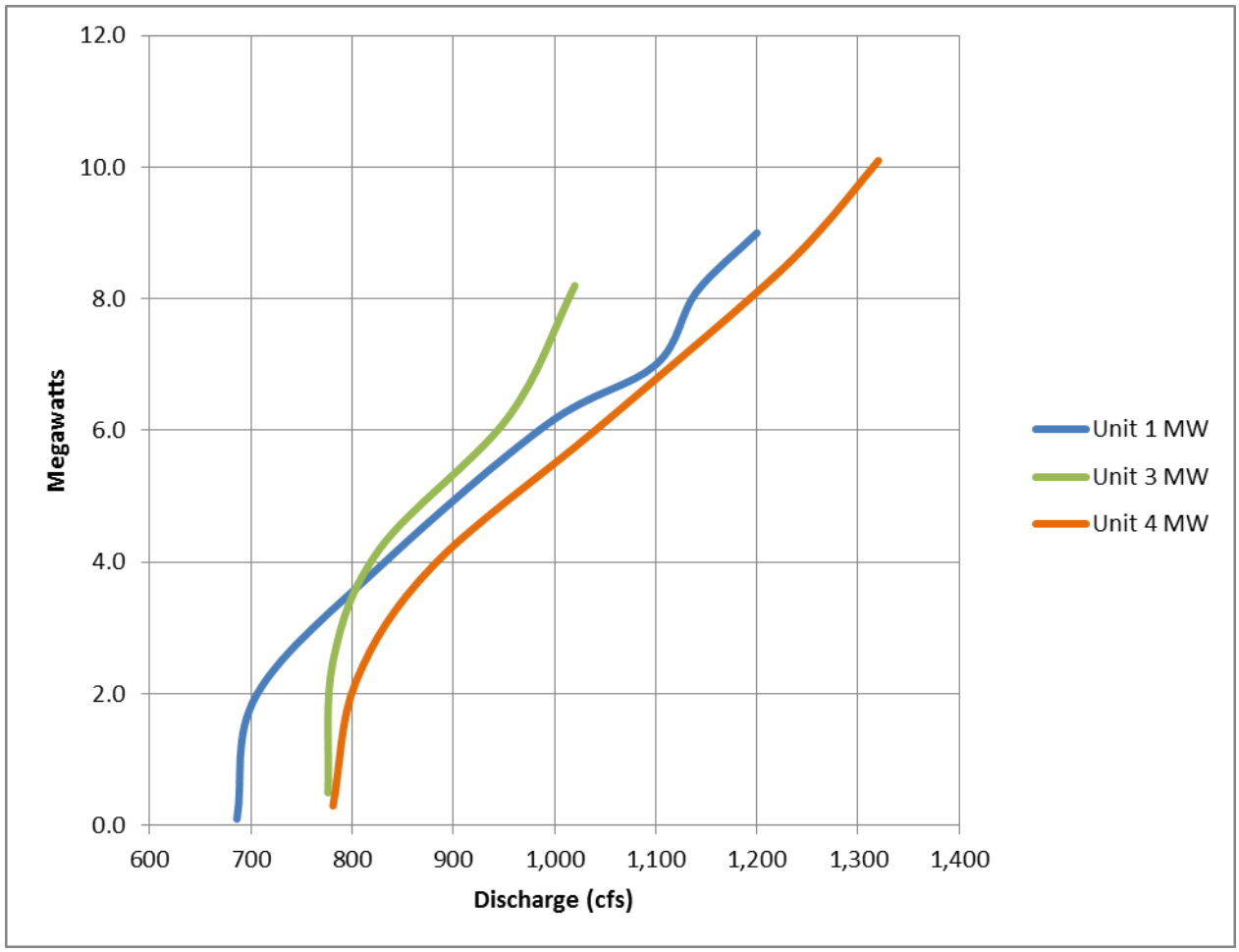


Figure D-2 Results of Aeration Testing—Results of Data Collection on Megawatts versus Discharge for Units 1, 3, and 4 at Low Gate Settings



APPENDIX E

AUGUST 29, 2022 LETTER FROM SCDNR –

LAKE MURRAY DRAWDOWN WINTER 2022-2023 – SCDNR RECOMMENDATIONS

South Carolina Department of
Natural Resources

1000 Assembly Street
PO Box 167
Columbia, SC 29202
843-953-3881 Office
millere@dnr.sc.gov

Robert H. Boyles, Jr.
Director

Lorianne Riggin
Director, Office of
Environmental Programs

August 29, 2022

Raymond R. Ammarell, P.E. Dam Safety & Civil Engineering
Dominion Energy South Carolina, Inc. 220 Operations Way
Mail Code B223
Cayce, SC 29033

REFERENCE: Lake Murray Drawdown Winter 2022-2023 – SCDNR Recommendations

Dear Mr. Ammarell:

The South Carolina Department of Natural Resources (SCDNR) is in support of Dominion Energy South Carolina Inc.'s (DESC) interest in a winter drawdown of Lake Murray. In your request, it is noted that DESC has received an increased volume of complaints from the public regarding nuisance aquatic vegetation. The species observed include Southern naiad (*Najas guadalupensis*), slender pondweed (*Potamogeton pusillus*), Illinois pondweed (*Potamogeton illinoensis*) and eel-grass (*Vallisneria americana*). While all of these species are native and generally good for fish and wildlife, they can be problematic to recreational users when they grow in abundance in shallow coves. The SCDNR encourages the drawdown be implemented this winter for purposes of water quality management, sediment transport from shallow areas to deeper areas of the lake, and aquatic vegetation management; the practice of regular Lake Murray drawdowns for these purposes is recommend by Sawyer and Ruane (2007). Additionally, a drawdown provides an ideal opportunity for residents to perform necessary maintenance on docks, shoreline stabilization, and other lake user maintenance activities.

The SCDNR continues to support the proposed Reservoir Drawdown Program, which is a component of the 2009 Saluda Hydroelectric Project Comprehensive Relicensing Settlement Agreement (CRSA). The SCDNR understands that DESC is not expected to implement the CRSA's Reservoir Drawdown Program until the Saluda Hydroelectric Project's (Saluda Project) Federal Energy Regulatory Commission license has been issued. However, the SCDNR appreciates DESC's willingness to provide this much needed management tool to control the spread of nuisance aquatic plant species and maintain water quality in Lake Murray.

If DESC implements a drawdown this winter, the SCDNR would like to offer the following comments and recommendations to be implemented throughout drawdown process.

- In order to maintain suitable habitat conditions for trout and other fishes in the Lower Saluda River the SCDNR recommends that flows from Saluda dam not exceed 5,000 cubic feet per second (cfs) with the target lake elevation reached by December 15th. Additionally, we would like to see the increased flows, which are required to accomplish the drawdown, spread over as long a period as possible (October-December) to reduce any potential negative physical (scour) effects that high-flows may have on the Saluda River fishery.
- SCDNR's Aquatic Plant Management staff recommends the lake be drawn down and maintained at the lower elevation for 30 days during the winter in order to prolong the exposure of nuisance aquatic plant species to dehydrating and freezing conditions.
- The SCDNR encourages DESC to begin refilling the reservoir and return to the Saluda Project's normal operating range of 360 mean sea level once the 30-day period has ended in order to support spring spawning fish within the reservoir.

The SCDNR will continue to communicate and coordinate with DESC staff to facilitate a successful drawdown of Lake Murray. In the event of any anticipated large inflow events, the SCDNR requests DESC staff notify SCDNR staff in advance of any large releases from the dam. Additionally, SCDNR staff will be available to assist DESC staff in communicating the necessity and benefit of implementing a reservoir drawdown through public meetings or other outreach opportunities.

Thank you for coordinating this effort and your consideration of SCDNR's comments and recommendations. Please let me know if you have any questions.

Sincerely,

Elizabeth C. Miller
FERC Coordinator, SCDNR

Reference:

Sawyer, A.F. and R.J. Ruane. 2007. Applications of the CE-QUAL-W2 Model for Lake Murray Relicensing Issues. Final Report of December 2007. Prepared for SCE&G by Reservoir Environmental Management, Inc., Chattanooga, TN.
https://www.saludahydrorelicense.com/documents/LakeMurrayW2applicationsReport-Final.pdf