



January 15, 2020

Kimberly Bose, Secretary
Federal Energy Regulatory Commission
888 First Street, N.E.
Washington, D.C. 20426

Re: Hinckley (Gregory B. Jarvis) Hydroelectric Project, FERC No. 3211-009, Dissolved Oxygen Enhancement Study Plan and Notice of Intent to File a Draft License Application

Dear Secretary Bose:

The Power Authority of the State of New York (Power Authority), licensee of the Hinckley (Gregory B. Jarvis) Hydroelectric Project (Project), encloses for filing a Dissolved Oxygen Enhancement Study Plan (Study Plan) for the Project. The Study Plan responds to Federal Energy Regulatory Commission (Commission) staff's July 9, 2019 study request, which was approved in the Director of the Office of Energy Project's September 6, 2019 Determination on Requests for Study Modifications. The objective of the requested study is to assess the feasibility, potential effectiveness, and costs of various dissolved oxygen enhancement measures for the Project. The Study Plan is attached hereto as Attachment A.

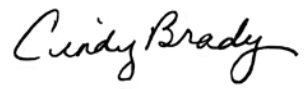
The Power Authority developed the Study Plan in consultation with the U.S. Fish and Wildlife Service and the New York State Department of Environmental Conservation, as recommended by Commission staff in the July 9, 2019 study request. Both agencies concur with the Study Plan as proposed. Their concurrences are included herein as Attachment B.

The Power Authority has begun Task 1 of the Study Plan (a literature review of different re-aeration methods) and intends to complete the study in winter 2021 with the filing of a study report. The full schedule for implementation of the study is set forth in the Study Plan.

In addition to submitting the Study Plan for placement in the Project docket, the Power Authority also notifies the Commission of its intent to file a draft license application (DLA) for the Project, rather than a preliminary licensing proposal (PLP). A potential applicant is obligated under section 5.16(c) of the Commission's regulations to notify the Commission of its intent to file a DLA when it files its updated study report (USR). However, in this relicensing proceeding, the USR is not due until May 11, 2020, which is after the date the DLA must be filed (March 3, 2020).

If you have any questions regarding the Power Authority's Study Plan or intent to file a DLA, please direct them to the undersigned at (914) 287-3153 or cindy.brady@nypa.gov.

Sincerely,

A handwritten signature in black ink that reads "Cindy Brady". The script is fluid and cursive, with the first letters of each name being capitalized and prominent.

Cindy Brady
Business Development Manager, Licensing

Attachment A

Dissolved Oxygen Enhancement Study Plan

DISSOLVED OXYGEN ENHANCEMENT STUDY PLAN

Prepared by:



December 2019

©Copyright 2019. New York Power Authority. All Rights Reserved

**GREGORY B. JARVIS PROJECT
RELICENSING**

FERC NO. 3211



**NY Power
Authority**

Table of Contents

1.1	Dissolved Oxygen Enhancement Study	1
1.1.1	General Description of the Study	1
1.1.2	Geographic Scope.....	1
1.1.3	Study Goals and Objectives.....	1
1.1.4	Relevant Resource Management Goals and Public Interest Considerations.....	1
1.1.5	Existing Information and Need for Additional Information.....	2
1.1.6	Project Nexus	2
1.1.7	Methodology.....	2
1.1.8	Schedule	4
1.1.9	Level of Effort and Cost.....	4
1.1.10	Consultation	5

List of Attachments

Attachment A:	Summary of 2019 DO Monitoring Results at the Jarvis Project.....	6
---------------	--	---

1.1 Dissolved Oxygen Enhancement Study

1.1.1 General Description of the Study

The Power Authority performed water quality monitoring in 2018 as part of the Tailwater Water Quality Study per the FERC-approved Revised Study Plan. Study results were presented in the Initial Study Report (ISR), dated May 8, 2019, and at the ISR meeting on May 22, 2019. FERC and other stakeholders submitted comments on the ISR on July 9, 2019, in which FERC provided a new study request for a Dissolved Oxygen Enhancement Study.

The objective of the requested study is to assess the feasibility, potential effectiveness, and costs of various dissolved oxygen (DO) enhancement options including, but not limited to, a desktop analysis of re-aeration methods such as turbine venting, air injection, and forebay mixing, in addition to field testing of various discharges from the Project's existing Gate 4 during the summer.

On August 9, 2019 the Power Authority submitted a response to the stakeholder comments received on the ISR. In its response, the Power Authority proposed to conduct another season of water quality monitoring in 2019 to more fully understand water quality dynamics in the Project tailwater. FERC issued its Determination on Requests for Study Modifications for the Project on September 6, 2019 in which it recommended that the Power Authority complete the Dissolved Oxygen Enhancement Study rather than modify the Tailwater Water Quality Study to include an additional year of water quality monitoring. The Power Authority conducted voluntary water quality monitoring from July 2019 through October 2, 2019 to further inform water quality dynamics in the Project tailwater and potential DO enhancement measures to be evaluated in the Dissolved Oxygen Enhancement Study. The results of voluntary monitoring during the summer of 2019 are provided in Attachment A.

This study plan addresses the request from FERC to conduct a Dissolved Oxygen Enhancement Study.

1.1.2 Geographic Scope

The geographic scope of the study includes the Project intake, powerhouse, turbines and tailwater.

1.1.3 Study Goals and Objectives

The goal of this study is to assess potential DO enhancement options for the Jarvis Project to inform the need for license conditions to ensure that DO concentrations in Project tailwaters remain compliant with the state's minimum DO criteria for downstream trout waters. The objective of the study is to assess the feasibility, potential effectiveness, and costs of various DO enhancement measures, including operational and physical options.

1.1.4 Relevant Resource Management Goals and Public Interest Considerations

Sections 4(e) and 10(a) of the Federal Power Act require FERC to give equal consideration to all

uses of the waterway on which the Project is located. When reviewing a proposed action, the Commission must consider the environmental, recreational, fish and wildlife, and other non-developmental values of the project, as well as power and developmental values.

The NYSDEC manages the West Canada Creek as a mixed cool/cold water fishery. Their relevant resource management goal is to assure that relevant water quality standards are achieved and maintained to help promote the maintenance and promulgation of all fish, wildlife, and plant species.

The NYSDEC classifies West Canada Creek downstream of the Project as Class B (trout waters). Class B trout waters shall have a minimum daily average DO concentration no less than 6.0 mg/L and at no time shall DO concentration be less than 5.0 mg/L.

1.1.5 Existing Information and Need for Additional Information

Water quality data in 2018 and 2019 indicate that instances of low DO concentrations in the Project tailwater can occur during the warmer summer months when water in Hinckley Reservoir is stratified. Data collected in 2018 were presented in the Tailrace Water Quality Study Report (2019). The Power Authority conducted another season of water quality monitoring in 2019 to more fully understand water quality dynamics in the Project tailwater. A summary of the 2019 monitoring results are provided as Attachment A.

Field testing of Gate 4 for potential reaeration during generation was tested in August 2019. Beyond these data, there is limited information regarding the effectiveness of other potential DO enhancement measures at the Jarvis Project.

1.1.6 Project Nexus

Existing water quality data demonstrates that stratification of Hinckley Reservoir sometimes occurs during the summer. The Project has deep intakes that withdraw water from the portion of the water column that is below the thermocline during the stratification period and therefore may have low DO concentrations. The operation of the Jarvis Project may cause instances of low DO (below state water quality standards) in the tailwater by releasing, through the powerhouse, low DO waters from Hinckley Reservoir that are not re-aerated as they enter downstream waters.

1.1.7 Methodology

Task 1: Literature Review of Potential Re-aeration Methods

The Power Authority will conduct a literature search about the effectiveness and costs associated with different re-aeration methods. This task will include a review of engineering drawings and a site visit with operations personnel to discuss the technical feasibility of various measures specific to the Jarvis Project based on the Project configuration and equipment. The outcome will be the identification of those DO enhancement measures with the most potential for further investigation.

The DO enhancement options to be evaluated will include, but not be limited to, the following: 1) passive aeration such as turbine venting, 2) reservoir mixing, 3) active aeration via ambient air or oxygen induction, and 4) operational measures.

Task 2: Evaluate Gate 4 Releases (Mass Balance Equation)

As stated in the Power Authority's August 9, 2019 filing, the Power Authority tested the potential of the Gate 4 outlet to contribute to adequate DO levels in the tailrace by providing releases through Gate 4 in conjunction with varying releases through the turbines. The tests were performed on August 7, 2019.

Although FERC recommended that field testing of Gate 4 should commence after the gate was repaired, the 2018 data show that the 20 cfs leakage was insufficient to maintain tailwater DO levels when the turbines were operating during August and early September. Therefore, Gate 4 testing occurred at flows above the 20 cfs leakage in 2019 to understand the aeration potential of Gate 4 releases greater than the 20 cfs leakage.

The Power Authority learned the following based on the 2018-2019 data collection:

1. 2018 and 2019 monitoring results show that 20 cfs leakage was insufficient to maintain tailwater DO levels during periods when the Hinckley Reservoir was stratified and low DO water was passed downstream through the turbine(s).
2. Using a mass balance equation, at the lowest turbine outflow of 300 cfs and assuming the tailwater DO was 4.0 mg/L, fully saturated releases of 20 cfs from Gate 4 theoretically increase the downstream DO by only 0.25 mg/L.
3. DO concentrations of water released through the turbines are dynamic throughout the summer and driven by the reservoir stratification profile; that is, there is no fixed baseline DO concentration through the turbines.
4. Based on the field testing and mass balance equation, in order to achieve compliance with downstream water quality standards, Gate 4 releases would involve a significant water requirement. The amount of water released through Gate 4 would depend on the DO concentration and volume of water releases through the turbines.

In addition to field collected DO data in 2019, a mass balance equation will be used to predict the DO concentration of water downstream from the tailwater under various Gate 4 and turbine releases. The Mass Balance Equation is as follows:

$$\text{Tailrace DO} = \frac{(\text{Turbine cfs} * \text{Turbine DO}) + (\text{Gate 4 cfs} * \text{Gate 4 DO})}{\text{Turbine cfs} + \text{Gate 4 cfs}}$$

For example, assume the reservoir is stratified and the tailwater DO concentration equals 4.0

mg/L (as occurred in August 2019). The DO concentration from the Gate 4 release has been shown to be near full saturation under all release volumes. At the temperatures measured during the testing in August 2019, the DO concentration of the Gate 4 release was approximately 8.0 mg/L. In order to achieve the average daily standard of 6.0 mg/L downstream when the turbine discharge is 300 cfs, the Gate 4 release would need to be 300 cfs, as shown in calculation below.

$$\text{Tailrace DO} = \frac{(300 \text{ cfs} * 4.0 \text{ mg/L}) + (300 \text{ cfs} * 8.0 \text{ mg/L})}{300 \text{ cfs} + 300 \text{ cfs}} = 6.0 \text{ mg/L}$$

Additional analysis of the feasibility of using Gate 4 releases as a DO enhancement option, in consideration of the Project's Operating Diagram, will be discussed in the DO enhancement study report.

Task 3: Desktop Feasibility Study

The Power Authority will study the feasibility of the DO enhancement measures identified in Task 1 with the most potential. This analysis will use cost information from the literature search to estimate capital, operation, and maintenance costs as well as potential impacts on generation.

Task 4: Report

A study report will be prepared to describe the results of the desktop feasibility evaluation. For each potential enhancement measure, the technical feasibility, predicted effectiveness, and estimated costs (including loss of generation revenue) will be presented.

1.1.8 Schedule

This proposed study schedule is listed below.

Task	Schedule
Task 1: Literature Review of Different Re-Aeration Methods	Winter-Spring 2020
Task 2: Evaluate Gate 4 Releases (Mass Balance Equation)	Winter-Spring 2020
Task 3: Feasibility Analysis	Fall 2020
Task 4: Report	Winter 2021

1.1.9 Level of Effort and Cost

The estimated cost for the *Dissolved Oxygen Enhancement Study* and associated tasks is \$50,000.

1.1.10 Consultation

In accordance with the FERC study request, the Power Authority developed this study plan in consultation with the NYSDEC and USFWS. The Power Authority provided an initial draft of this plan to the agencies on December 20, 2019.

Attachment A: Summary of 2019 DO Monitoring Results at the Jarvis Project.

Introduction

The Power Authority voluntarily collected additional water quality data at the Project in 2019 to determine if low dissolved oxygen (DO) conditions persist during year-to-year variation in flow and weather conditions in the Project area. The Power Authority also performed preliminary testing of the aeration potential of the Gate 4 release on downstream water quality.

The objective was to collect DO and temperature data in the Hinckley Reservoir near the Project intake and in the tailwater downstream of the Project during the warm summer and early fall months (i.e., the period when reservoir stratification may be most pronounced and low DO waters could be released from the reservoir downstream). The 2018 water quality data were collected during a period of moderate drought which resulted in low reservoir inflows and releases and extended periods when the turbines were off-line. The summer of 2019 was not as dry as 2018 and the Project turbines were run more frequently during the summer period.

Methods

The 2019 monitoring program involved the following:

- Monitoring Period: July 24 through October 2, 2019.
- Parameters: DO and water temperature on a continuous basis (15-minute intervals).
- Three locations (one continuous and two discrete sites):
- Tailwater location; same as 2018.
- An additional site further downstream from the tailwater site at the bridge; discrete measurements only.
- DO and temperature profiles in Hinckley Reservoir twice per month (at deep spot near intake).
- Monitoring during pre-arranged releases through Gate 4 while the turbine(s) were operating.

One continuously recording water quality meter was installed on July 24, 2019 below Hinckley Dam (as depicted in Figure 1), consistent with the 2018 tailwater monitoring location. A datasonde equipped with sensors to measure DO and water temperature was suspended to mid-depth in the channel from a surface buoy anchored to the river bottom. The datasonde was set to record DO and temperature every 15 minutes.

After installation of the continuous meter in the tailwater, the Project was visited approximately once every other week, at which time data were downloaded, the instrument checked for calibration, and then re-deployed. Discrete water quality measurements of DO and temperature

were collected with an independent meter at the tailwater site as a quality assurance check on the continuous meter. Discrete measurements were taken from the bridge downstream from the Project tailwater immediately thereafter to compare spatial variability.

A vertical temperature and DO profile was collected once every other week in Hinckley Reservoir to establish stratification trends. At this site, temperature and DO were measured at 1-meter increments starting from the water's surface and continuing to the bottom. Upon discovery of a thermocline, measurements were collected at 0.5-meter increments.

Gate 4 testing was performed on August 7, 2019. Prior to providing the water releases from Gate 4, a continuous datasonde was installed on August 6, 2019, below Gate 4 to capture DO levels at this location. See Figure 1. The tailwater datasonde remained in its original position to capture the tailrace data. All instruments were set to record data in one-minute intervals during the Gate 4 release testing. A vertical profile above the dam was taken on August 6 prior to the Gate 4 release testing.

On August 7, 2019, the special releases were provided on a 30-minute time-step as a combination of releases from Gate 4 with various levels of concurrent turbine discharges. Table 1 shows the sequence of releases planned during the study.

Table 1: Special Release Schedule to Test Aeration Potential at Jarvis on August 7, 2019

Date and Time	Turbine Discharge (cfs)	Gate 4 Discharge (cfs)	Total Release (cfs)	Duration (minutes)
8/7/2019 09:00	300	20 (leakage)	320	30 (Starting Condition)
8/7/2019 09:30	300	50	350	30
8/7/2019 10:00	300	90	390	30
8/7/2019 10:30	300	140	440	30
8/7/2019 11:00	600	20 (leakage)	620	30
8/7/2019 11:30	600	100	700	30
8/7/2019 12:00	600	180	780	30
8/7/2019 12:30	600	280	880	30
8/7/2019 13:00	600	360	960	30
8/7/2019 13:30	900	20 (leakage)	920	30
8/7/2019 14:00	900	150	1050	30
8/7/2019 14:30	900	270	1170	30
8/7/2019 15:00	900	420	1320	30
8/7/2019 15:30	900	540	1440	30
8/7/2019 16:00	300	20 (leakage)	320	Study Complete

Results

The summer of 2019 was not as dry as 2018 and the Project turbines were run throughout the summer with a few exceptions. Compared to 2018, when water quality data were collected during a period of moderate drought and turbines were off-line for extended amounts of time, the Project turbines were operated for much of the summer in 2019 which allowed for an evaluation of the effects of turbine discharges on downstream water quality. Figure 2 is a comparison of the reservoir's 2018 and 2019 surface water elevations and daily discharges; the data show that 2019 had higher surface water elevations and daily discharges compared to 2018. This allowed the Project turbines to operate throughout the monitoring period in 2019.

Reservoir Profiles

Figure 3 presents the vertical temperature profiles in Hinckley Reservoir from July 24 to October 2. Water temperatures ranged from 12.5 °C to 25.3 °C – both extremes occurred on August 6. All temperatures were relatively constant from near the water surface to the top of the intake except the July 24 sample, where temperatures began to decrease about 10 feet above the top of the intake. As the season progressed, there was less change in temperature throughout the water column and the temperature changes started lower in the water column. Table 2 shows the average water temperature from the elevations within the top and bottom of the intake for the dates when reservoir profiles were taken.

Table 2: Comparison of Water Quality Averages at the Intake Depths to the Tailwater

Date	Average Intake		Tailwater Spot Check		Difference		Turbine Operating
	Temp (°C)	DO (mg/L)	Temp (°C)	DO (mg/L)	Temp (°C)	DO (mg/L)	
7/24/2019	19.6	4.77	19.0	5.02	0.6	-0.25	Yes
8/6/2019	20.9	4.27	20.5	4.54	0.4	-0.27	Yes
8/23/2019	20.7	5.30	20.8	5.95	-0.1	-0.65	No, Gate 4 Maintenance
9/5/2019	18.8	6.24	19.0	6.82	-0.2	-0.58	Yes
9/18/2019	17.9	7.09	18.1	7.74	-0.2	-0.65	Yes
10/2/2019	16.9	7.23	17.0	7.37	-0.1	-0.14	Yes

Table 2 also shows that DO and water temperatures change very little while being pulled in through the intake, passing through the turbines, and released in the tailrace. The turbines were operating during all but one visit - August 23. The Power Authority shut down the turbines and closed all other releases from 7AM to 3PM beginning August 21 through August 23 and August 26 through August 29, as part of their Gate 4 repairs. Water releases continued to take place in the evenings and overnight to meet the daily Operating Diagram release requirement. The August 23 vertical profile and tailwater spot checks were taken at 10:30AM and 8:52AM, respectively, hours after releases were suspended. After August 23, 2019, the lack of a Gate 4 release resulted

in the intake and the tailwaters displaying similar DO and water temperatures.

Figure 4 presents the vertical DO profiles in Hinckley Reservoir from July 24 to October 2. The results show that Hinckley Reservoir was stratified from the onset of 2019 monitoring. Starting at the reservoir surface, DO concentrations began to decrease above or near the top of the intake for all samples. DO ranged from 0.09 to 8.56 mg/L. The first three samples (July 24 through August 23) showed most of the water column between the top and bottom of the intake as having DO concentrations below 5.0 mg/L. The last three samples (September 5 through October 2) showed all or most of the intake water column as having a DO concentration above 6.0 mg/L. Hypoxic conditions (DO less than 3.0 mg/L) typically occurred below the bottom of the intake, except for August 6 when DO levels were below 3.0 mg/L approximately two feet above the bottom intake level.

Continuous Tailwater Monitoring

The water quality datasonde was deployed July 24, 2019 and retrieved on October 2, 2019. Based on the QA/QC review of the data set, the only data that were rejected were readings immediately following service visits when it was apparent that the water quality sensors were still acclimating to the water temperature after being exposed to air during servicing. Upon comparison to the spot check measurement, the corresponding continuous DO readings were within ± 0.3 mg/L of the spot check value; no data were adjusted from the set.

Data recorded from the independent spot measurements performed during the bi-weekly service visits are shown in Table 3. The DO recorded during the bi-weekly measurements in the tailwater and bridge were similar and ranged from 4.54 to 7.74 mg/L and 4.68 to 7.68 mg/L, respectively. The tailwater temperature and DO is similar to the average intake measurements above the dam, as shown above in Table 2.

In addition to the tabular data summary, the DO and water temperature is presented graphically as daily averages in Figure 5. Biweekly plots of continuous DO and Project discharge data can be found in Appendix A.

In general, the daily water temperatures increased from July through the last week in August, and then decreased into October, as depicted in Figure 5. The maximum instantaneous tailwater temperature of 22.1 °C occurred in early August. The tailwater water temperatures remain moderated and cool due to the deep intake.

The maximum instantaneous DO value was 8.13 mg/L (87.9% saturation), recorded on September 25 at 1:45 pm. The minimum DO value of 3.65 mg/L (41.8% saturation) occurred on August 9 at 2:00 pm. The average monthly DO value in August was 4.77 mg/L and was 7.30 mg/L in September.

Tailwater DO values continually decreased from the beginning of the study until, on August 9, the DO values were at their lowest. DO values began to increase after August 9, but were still below

the NYS Water Quality Standard instantaneous minimum DO value of 5.0 mg/L and the daily average DO of 6.0 mg/L. On August 23, instantaneous DO measurements were regularly above 5.0 mg/L. On August 26, the average daily DO levels were above 6.0 mg/L and remained there for the rest of the study. Average daily DO levels were below 6.0 mg/L from July 24 to August 25 - 33 out of the 71 days of the 2019 study (46%).

Gate 4 Release Testing

The reservoir elevation on August 6, 2019 was 1214.5 ft. A vertical profile taken on August 6 indicated that the reservoir was stratified – DO at the top of the intake (1192 ft) was 7.18 mg/L and at the bottom of the intake (1167 ft) was 2.14 mg/L. The average DO concentration in the reservoir at elevations ranging between the top and bottom of intake was 4.27 mg/L and the average water temperature was 20.9 °C. A spot check at the installation of the logger below Gate 4 on August 6 showed a water temperature of 19.0 °C and a DO concentration of 8.35 mg/L. The tailrace spot check showed a slightly higher water temp of 20.5 °C and a significantly lower DO of 4.54 mg/L, 0.27 mg/L higher than the average DO at the intake. The top of the turbine intake starts at El. 1192 and tapers down to El. 1182 where the penstock begins. The bottom of the turbine intake is at El. 1167. The top of the 60-inch Gate 4 intake is lower in the water column at El. 1172 with the same bottom at El. 1167, resulting in deeper and colder water being pulled into Gate 4 when compared to the turbine intake temperatures.

Figures 6 through 9 show the results of the Gate 4 testing. The data show that the more water released through Gate 4, the higher the DO concentration in the tailwater. Included on the Figures are the mass balance DO predictions, which were close to the actual DO reading. All Gate 4 DO measurements throughout the study were near 8.0 mg/L (between 90 and 99% saturation).

During this first scenario, for a turbine release of 300 cfs, the tailrace DO did not reach above 5.0 mg/L until 90 cfs was released from Gate 4, as shown in Figure 7. There were a few readings where the tailrace DO was over 6.0 mg/L when Gate 4 was releasing 140 cfs.

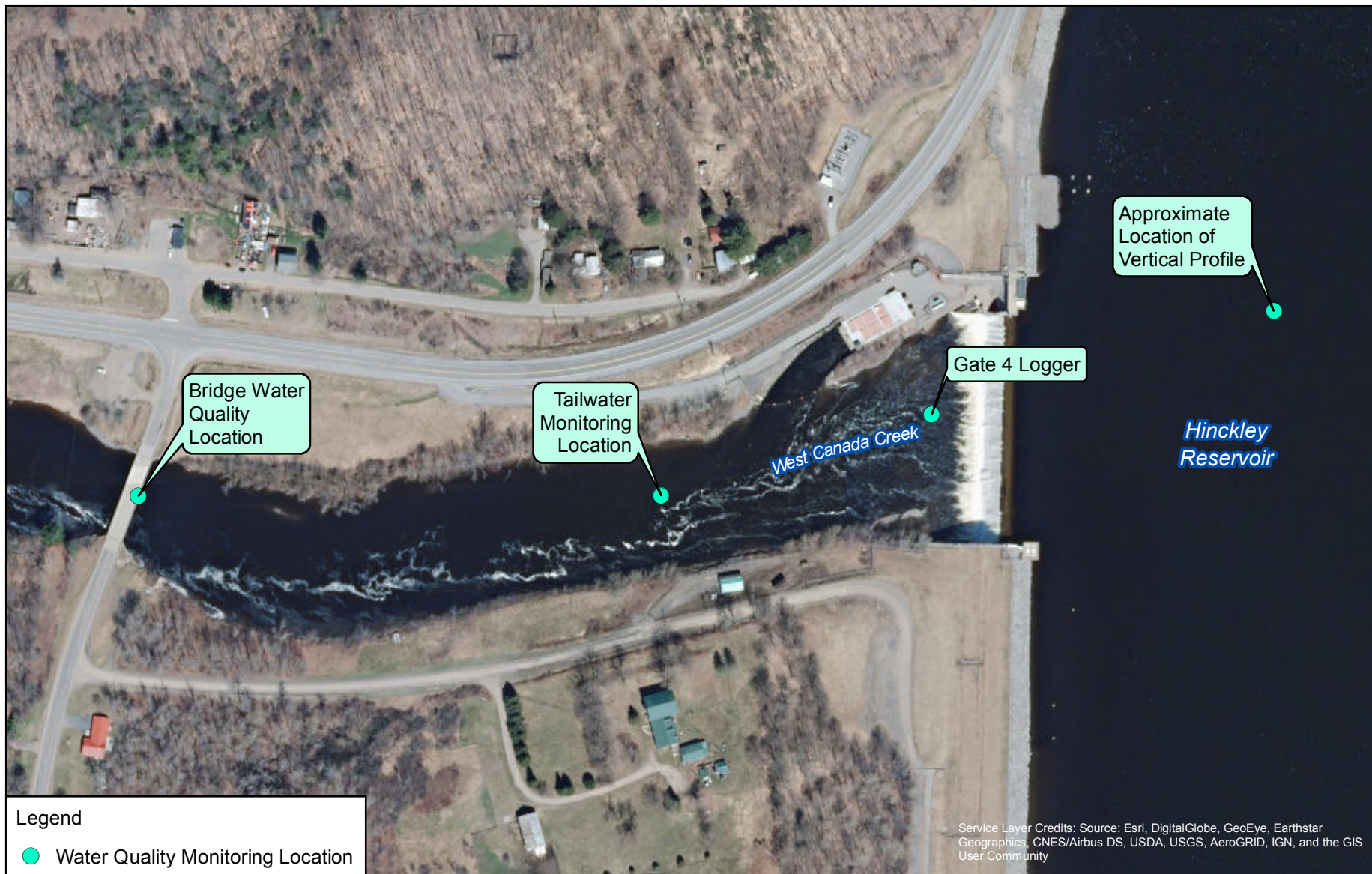
During the second scenario, for a turbine release of 600 cfs, the tailrace DO did not reach 5.0 mg/L until 180 cfs was released from the Gate 4 outlet, as shown in Figure 8. This scenario did result in DO of above 6.0 mg/L when 360 cfs were released from Gate 4, but the DO was not consistently above 6.0 mg/L during testing. There was a 9-minute turbine trip during this scenario.

During the third scenario, for a turbine release of 900 cfs, the tailrace DO was consistently above 5.0 mg/L for all Gate 4 releases. The final Gate 4 release of 540 cfs resulted in approximately half of the DO readings being above 6.0 mg/L.

The Gate 4 testing results demonstrated that DO enhancement is possible when the turbines are operating if Gate 4 releases are provided. The magnitude of releases from Gate 4 required to achieve DO enhancement to NYS water quality standards is proportional to turbine discharge volume and the stratification condition in Hinckley Reservoir.

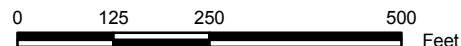
Table 3: Bi-weekly Spot Measurements

	Bridge			Tailrace			Difference		
Date	Temp (°C)	DO (mg/L)	DO %sat	Temp (°C)	DO (mg/L)	DO %sat	Temp (°C)	DO (mg/L)	DO %sat
7/24/2019	19.1	5.17	56.0	19.0	5.02	53.9	0.1	0.15	2.1
8/6/2019	20.7	4.68	52.1	20.5	4.54	50.4	0.2	0.14	1.7
8/23/2019	20.9	5.80	65.0	20.8	5.95	66.5	0.1	0.15	1.5
9/5/2019	19.0	6.78	73.1	19.0	6.82	73.5	0.0	0.04	0.4
9/18/2019	18.2	7.68	81.4	18.1	7.74	81.9	0.1	0.06	0.5
10/2/2019	16.9	7.30	75.4	17.0	7.37	76.3	0.1	0.07	0.9
Min	16.9	4.68	52.1	17.0	4.54	50.4	0.0	0.04	0.5
Max	20.9	7.68	81.4	20.8	7.74	81.9	0.2	0.15	2.1



Gregory B. Jarvis Project
(FERC No. P-3211)
Water Quality Study

Figure 1:
2019 Water Quality
Monitoring Locations



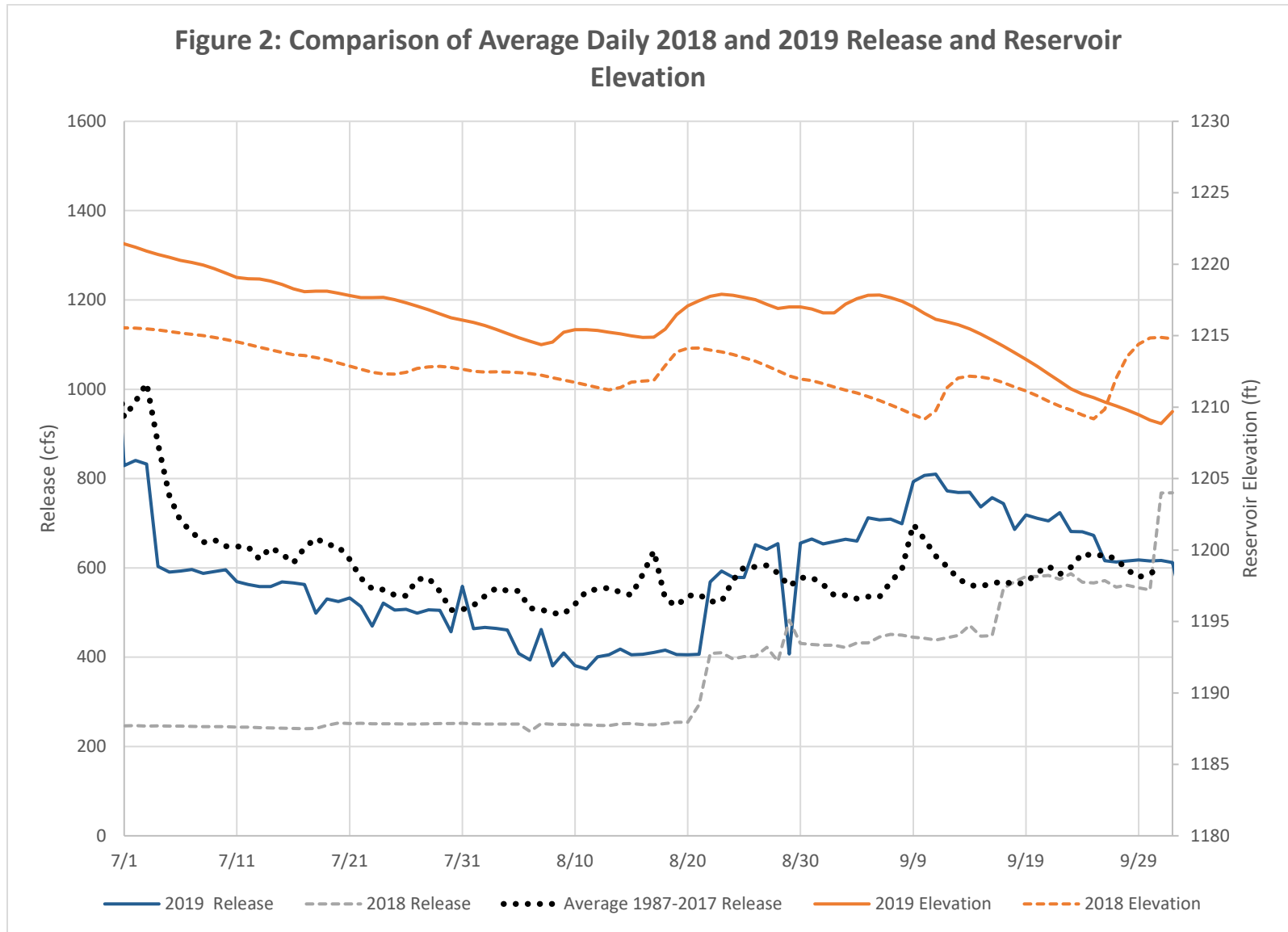


Figure 3: Hinckley Reservoir Temperature Vertical Profiles 2019

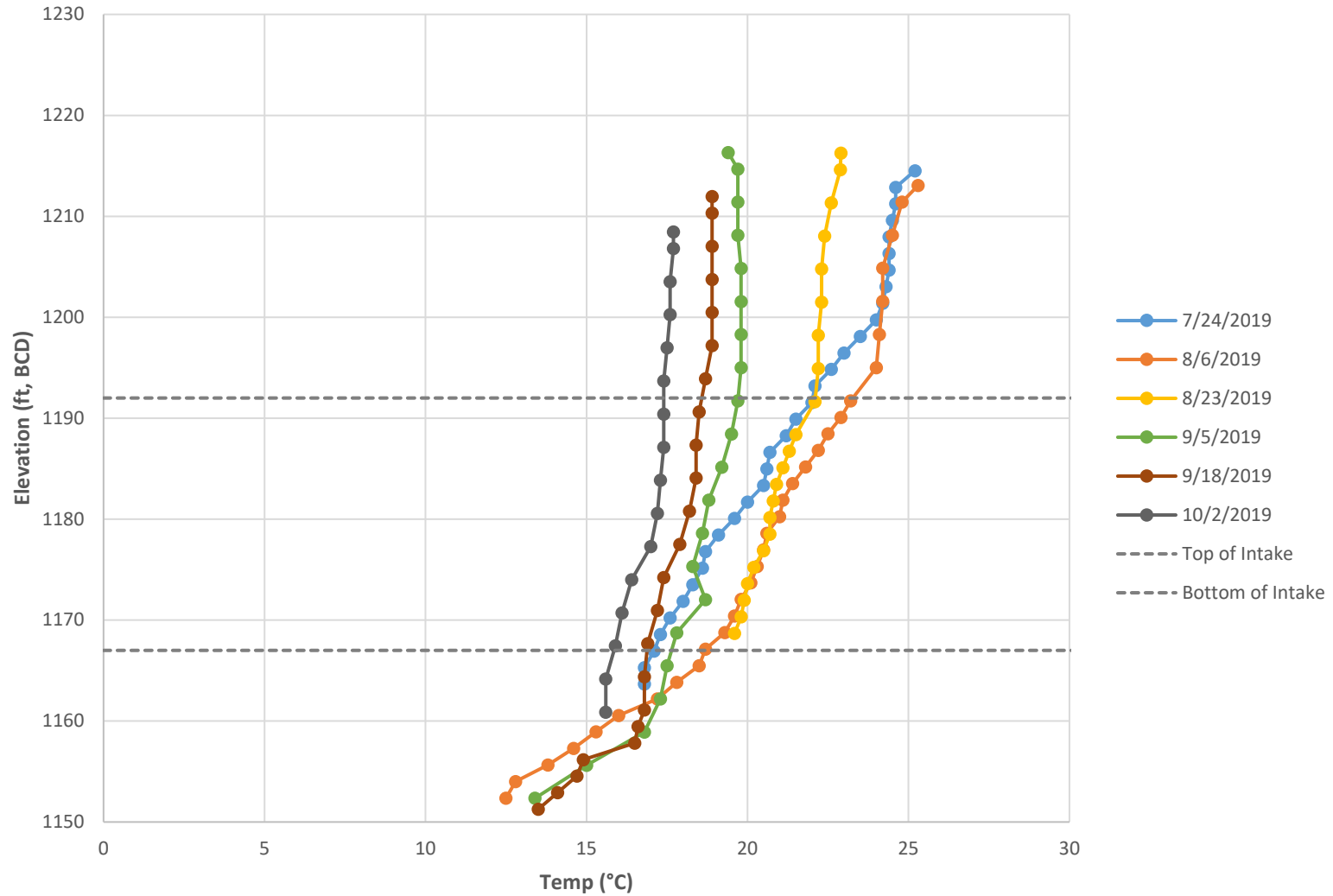
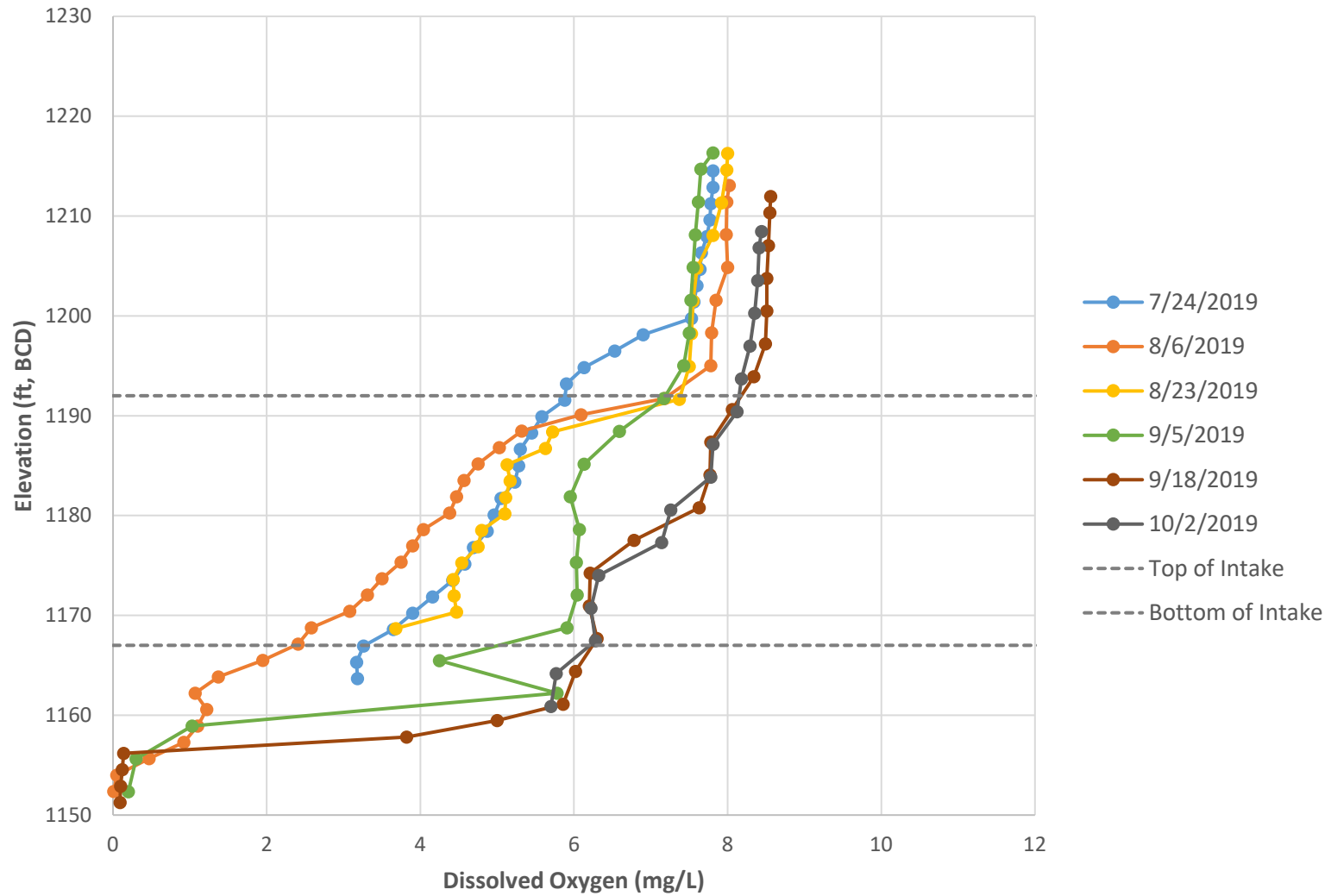
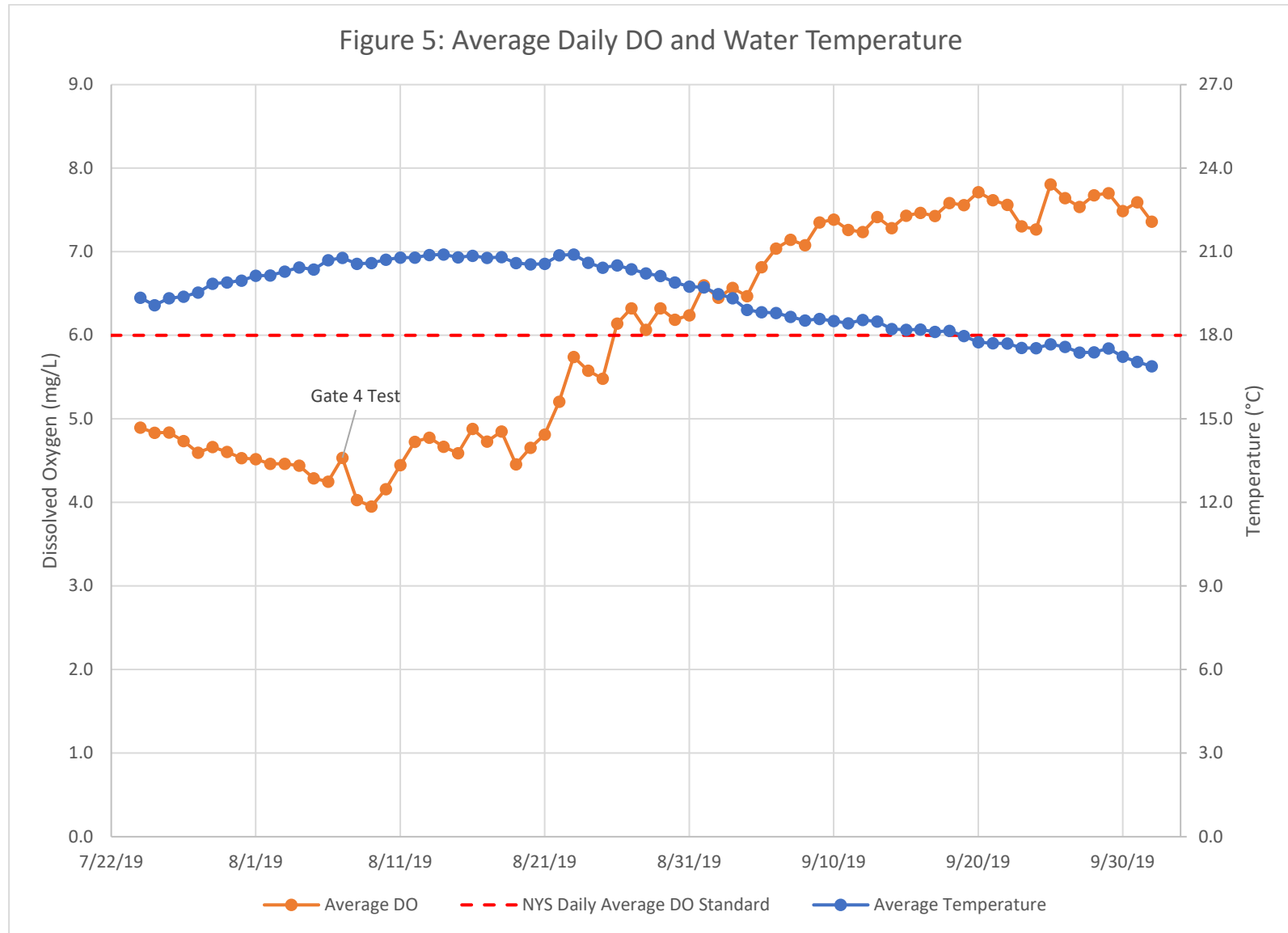
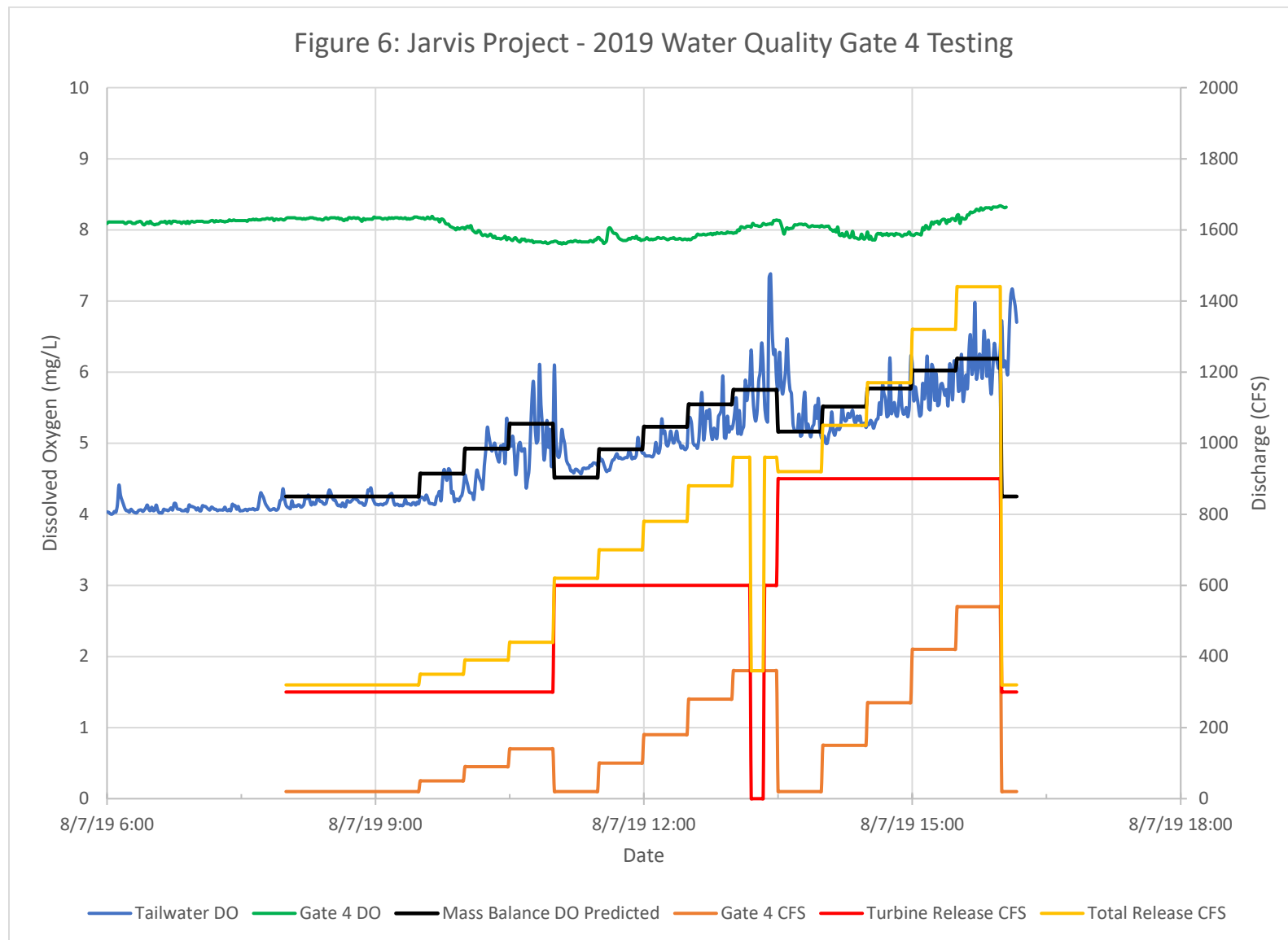


Figure 4: Hinckley Reservoir Dissolved Oxygen Vertical Profiles 2019







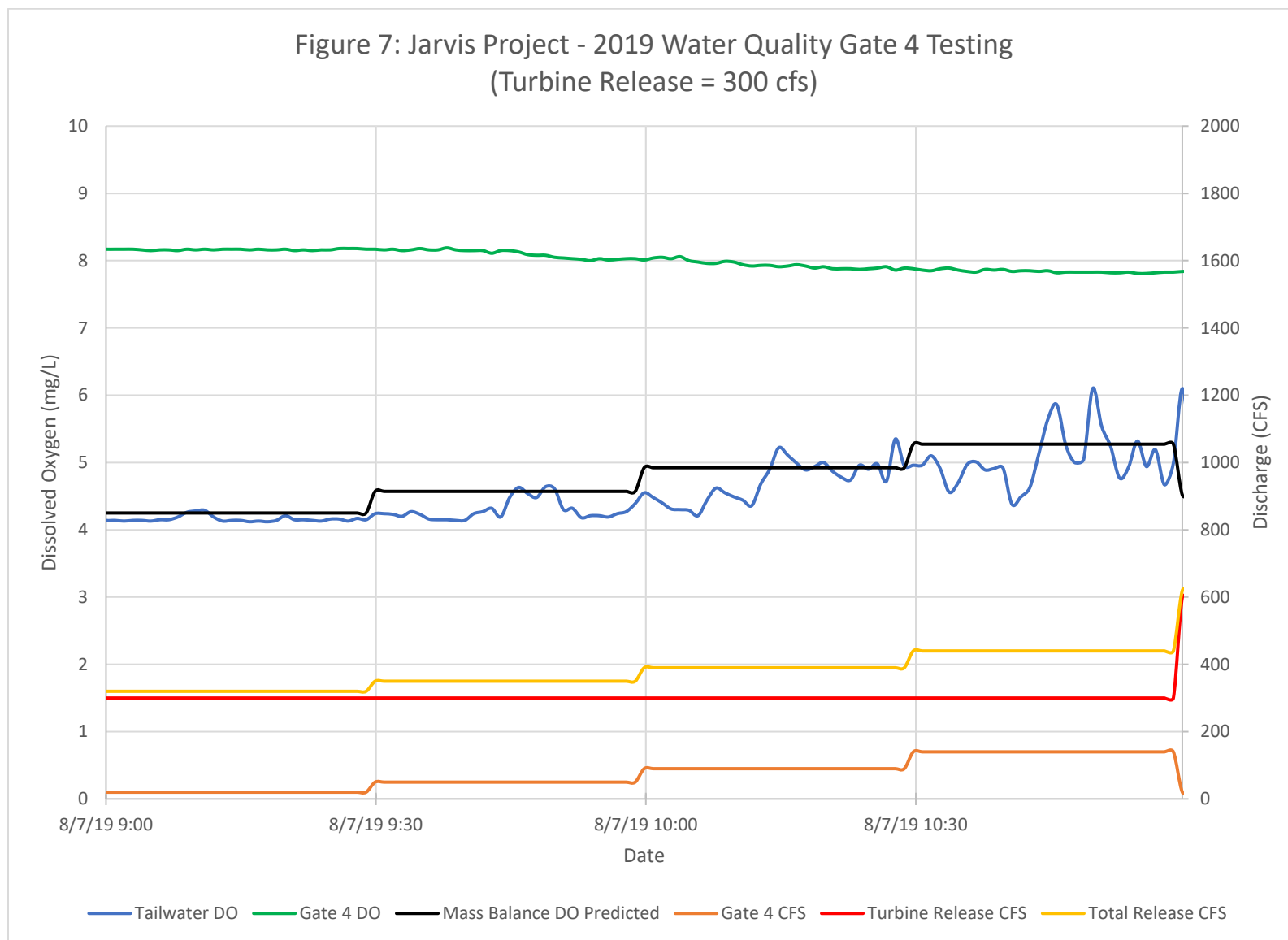


Figure 8: Jarvis Project - 2019 Water Quality Gate 4 Testing
(Turbine Release = 600 cfs)

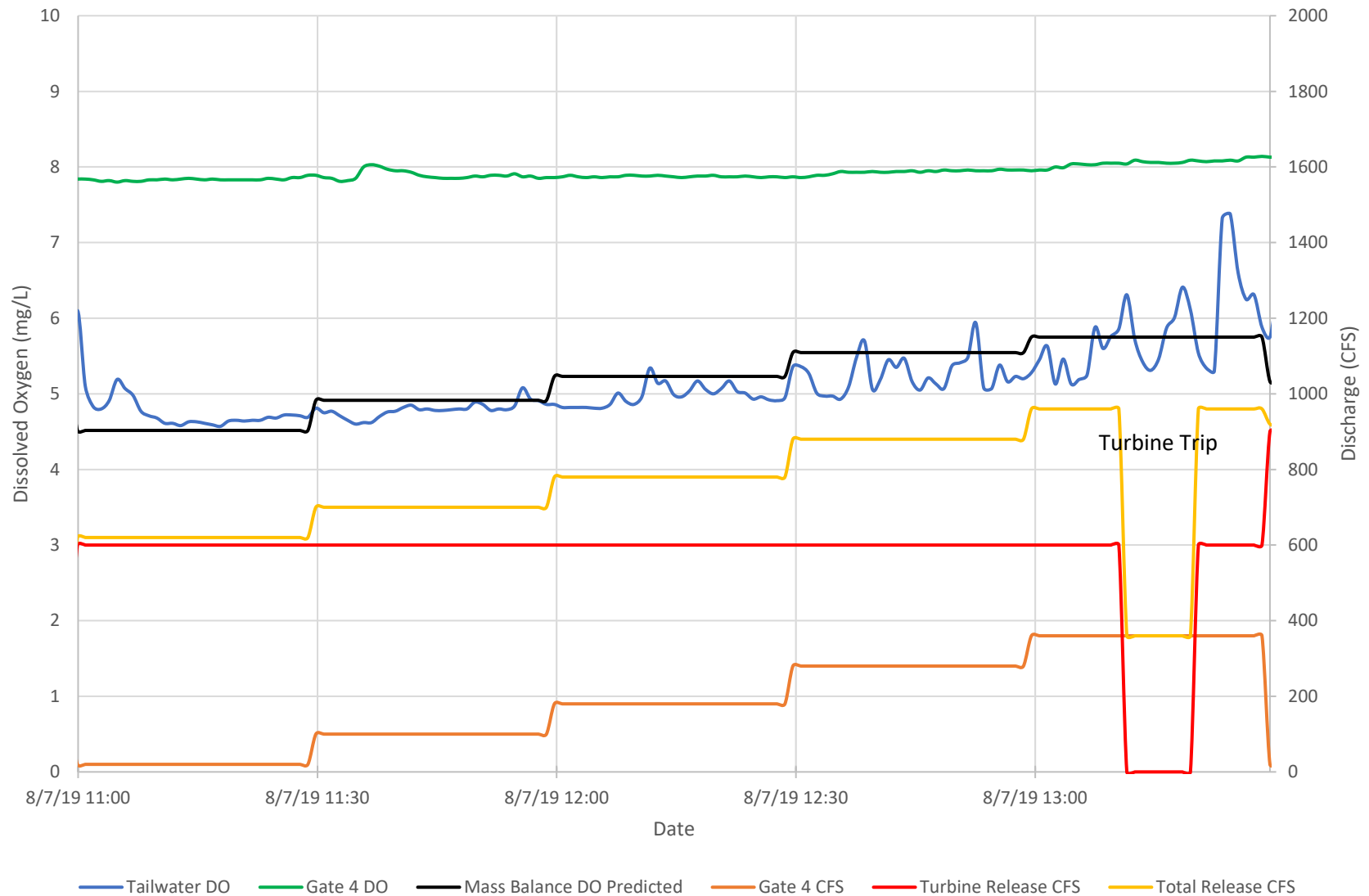
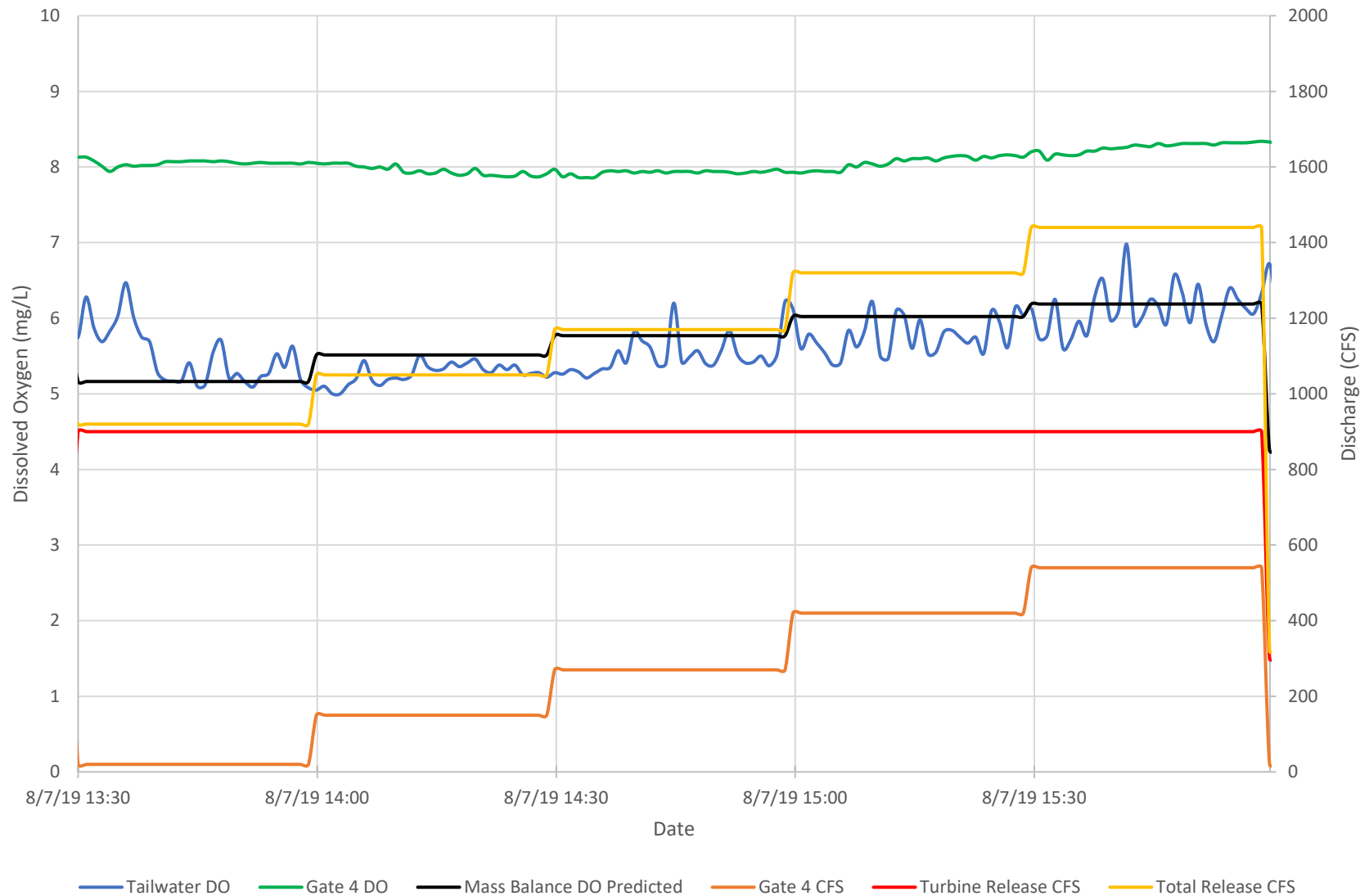
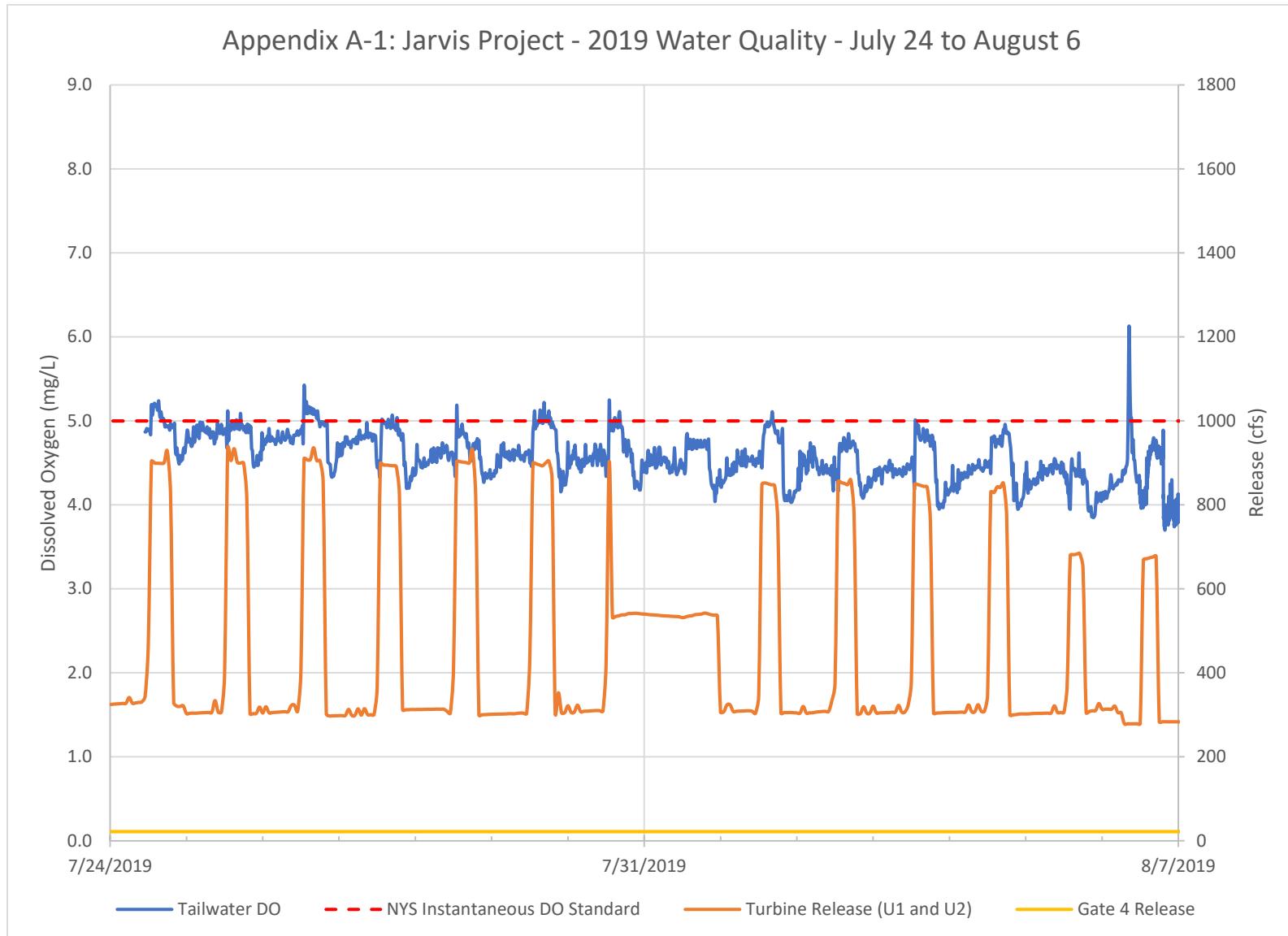


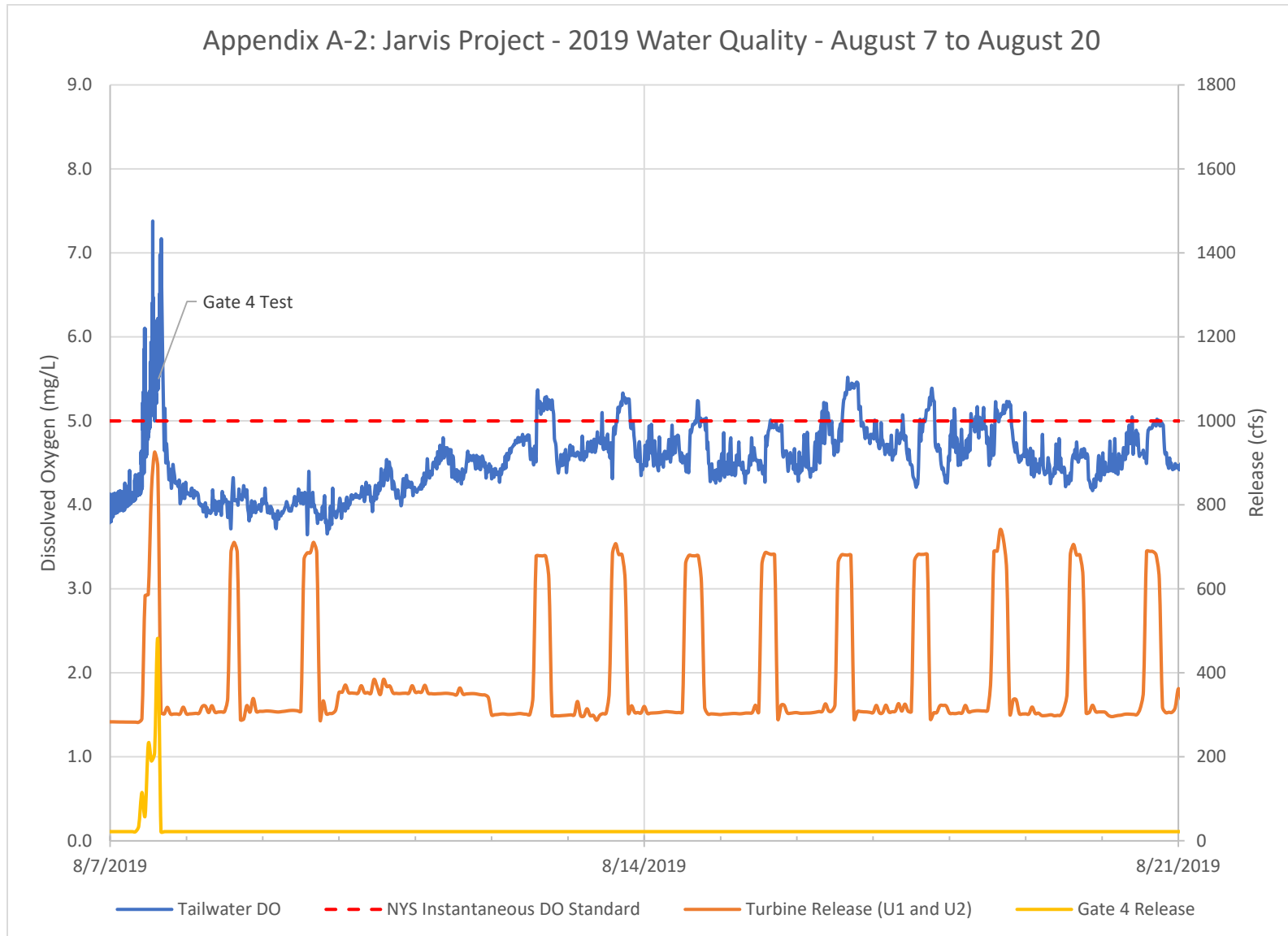
Figure 9: Jarvis Project - 2019 Water Quality Gate 4 Testing
(Turbine Release = 900 cfs)

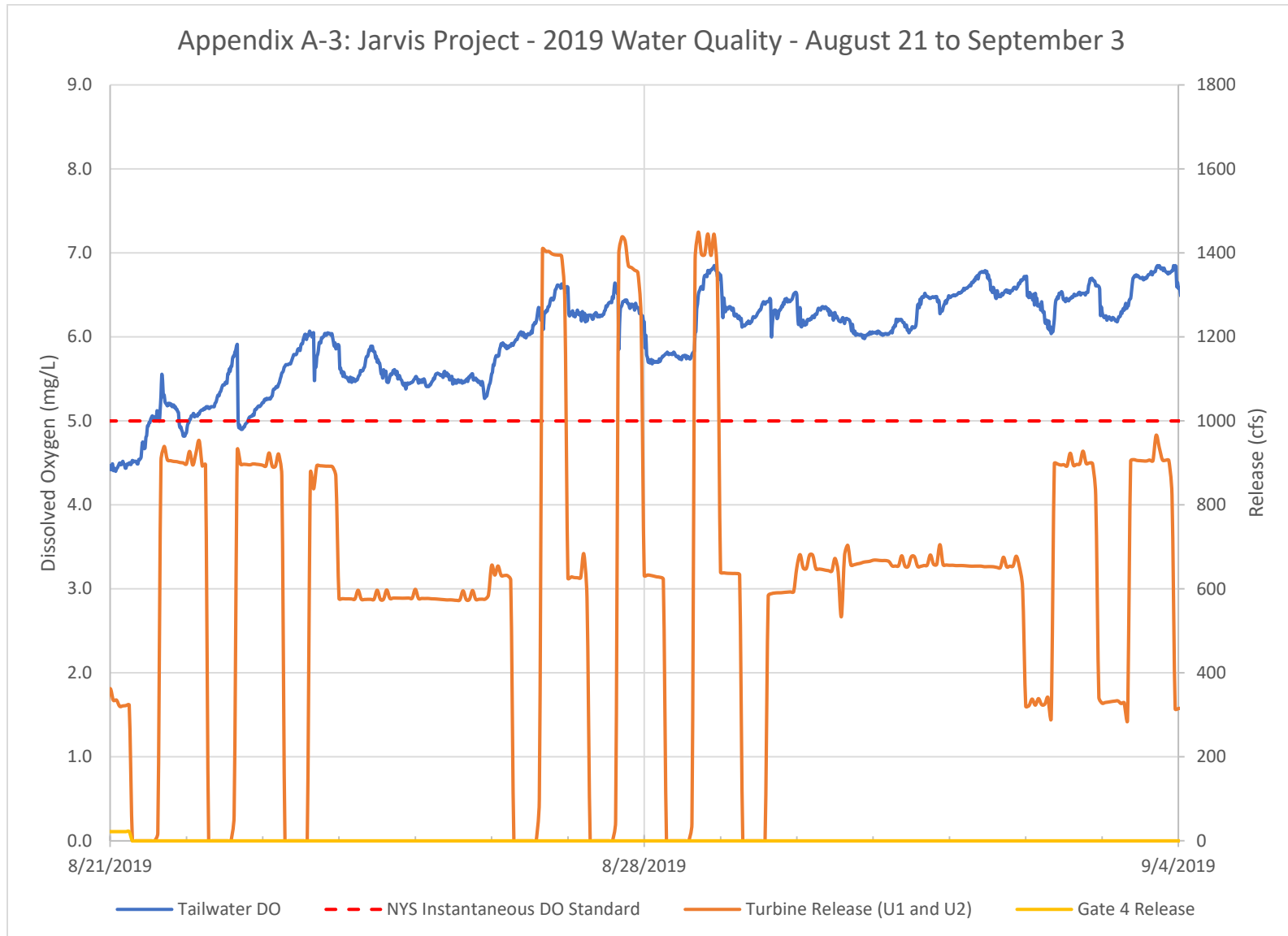


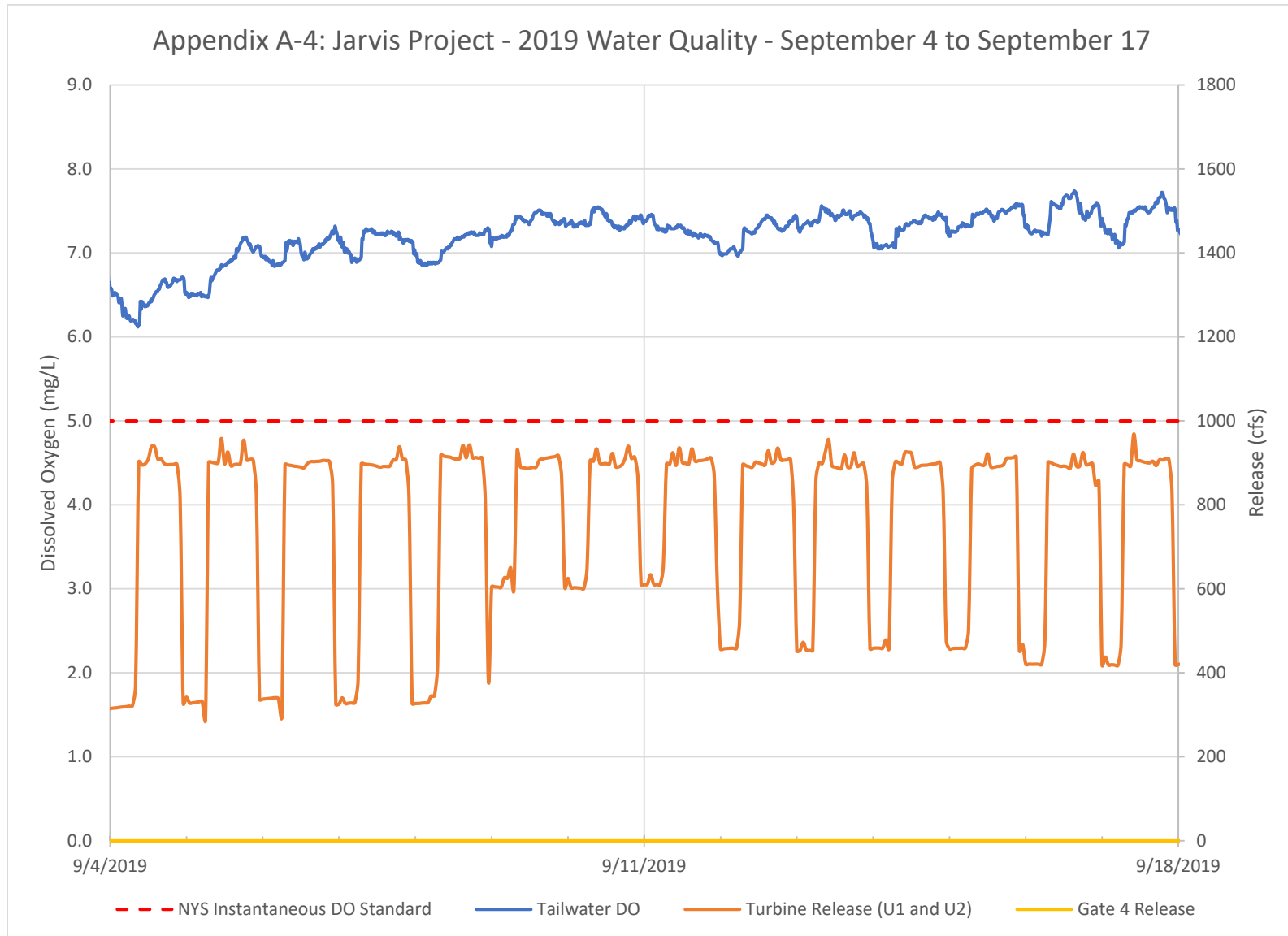
Appendix A:

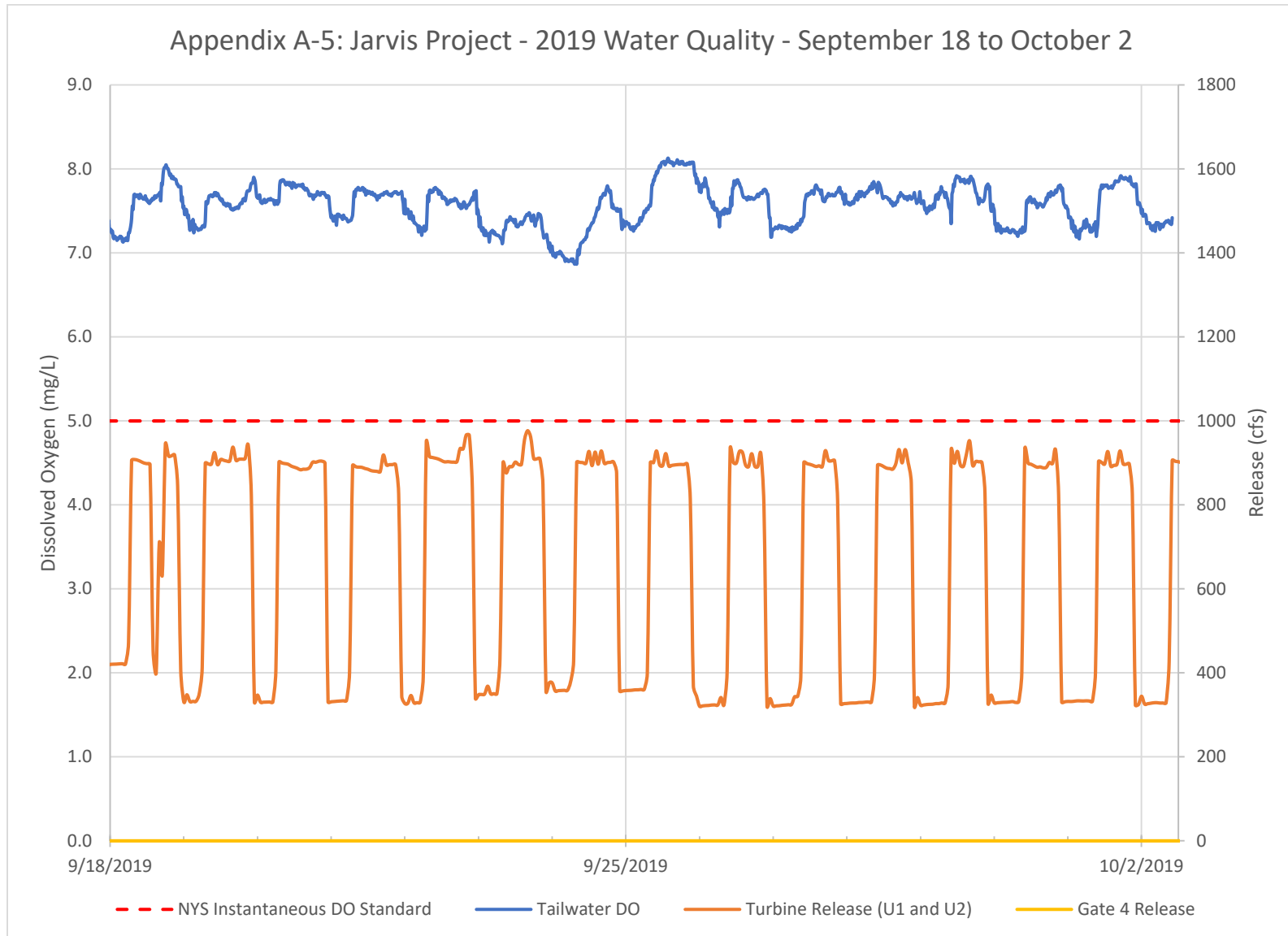
Bi-weekly Plots of 2019 Continuous DO and Project Discharges











Attachment B

Agency Concurrence Letters on
Dissolved Oxygen Enhancement Study Plan



United States Department of the Interior

FISH AND WILDLIFE SERVICE

3817 Luker Road
Cortland, New York 13045



December 31, 2019

Cindy Brady, Business Development Manager
New York Power Authority
123 Main Street
White Plains, NY 10601

**RE: Jarvis Hydroelectric Project (FERC #3211)
Dissolved Oxygen Enhancement Study Plan**

Dear Ms. Brady:

The U.S. Fish and Wildlife Service (Service) has reviewed the December 23, 2019, *Dissolved Oxygen Enhancement Study Plan* (DO Plan) for the Jarvis Hydroelectric Project, located on West Canada Creek in Oneida and Herkimer Counties, New York. The DO Plan was developed in response to a request by the Federal Energy Regulatory Commission. The Service concurs with the proposed DO Plan.

We appreciate the opportunity to comment on the DO Plan. If you have any questions or desire additional information, please contact Steve Patch at 607-753-9334.

Sincerely

David A. Stilwell
Field Supervisor

cc: NYSDEC, Utica, NY (T. Phillips)

From: [Tim Sullivan](#)
To: [Tim Sullivan](#)
Subject: FW: Jarvis Project - DO Enhancement Study Plan
Date: Tuesday, January 14, 2020 3:47:30 PM
Attachments: [2019_1231_USFWS_Concur_DO_StudyPlan.pdf](#)

From: Phillips, Todd J (DEC) <Todd.Phillips@dec.ny.gov>
Sent: Thursday, January 9, 2020 2:22 PM
To: Brady, Cindy <Cynthia.Brady@nypa.gov>
Subject: RE: Jarvis Project - DO Enhancement Study Plan

Good afternoon Cindy,

I just received confirmation late yesterday from staff that the DEC concurs with the USFWS determination that the DO Plan is sufficient.

Thanks,
Todd

From: Brady, Cindy <Cynthia.Brady@nypa.gov>
Sent: Thursday, January 09, 2020 1:54 PM
To: Phillips, Todd J (DEC) <Todd.Phillips@dec.ny.gov>
Subject: Jarvis Project - DO Enhancement Study Plan

Hi Todd and Happy New Year.

I am in receipt of a concurrence letter from the USFWS for the Dissolved Oxygen Enhancement Study Plan for the Jarvis Project.

When I emailed you the Study Plan in December I said I would reach out to you in January to see if you want to have a discussion or have questions.

Can you please let me know if you would like me to set up a call or if your organization also concurs with the Plan? If the DEC and FWS are in concurrence I will continue the process by sending it to FERC.

Attached for your convenience are the Study Plan and USFWS concurrence letter.

Thank you,

Cindy

Cindy Brady

Business Development Manager

New York Power Authority

123 Main Street

White Plains, NY 10601

914-287-3153 | Cell 315-323-4443 | Cindy.Brady@nypa.gov

www.nypa.gov

GSE CONFIDENTIALITY NOTICE: *This email and any files transmitted with it are confidential and intended solely for the use of the individual or entity to whom they are addressed. If you are not the intended recipient, please do not read or review the content and/or metadata and do not disseminate, distribute or copy this communication. Anyone who receives this message in error should notify the sender (timsullivan@gomezandsullivan.com) immediately by return e-mail and delete it from his or her computer.*