

Compliance Monitoring for LIHI Certification Prospect No. 3 Hydroelectric Project

1 Introduction:

PacifiCorp has applied to the Low Impact Hydropower Institute (LIHI) for Low Impact Hydropower Certification (Certification) for the Prospect No. 3 Hydroelectric Project (Project), located on the South Fork Rogue River near Prospect, Oregon. The LIHI Certification requires that the applicant demonstrate compliance with state water quality standards in waters affected by the candidate hydropower project, either by producing a recent Clean Water Act Section 401 Certification or by other demonstrable means. A Federal Energy Regulatory Commission (FERC) license was issued to PacifiCorp for the Project in 1989. During relicensing, PacifiCorp applied for Section 401 Certification, but the requirement was waived by the Oregon Department of Environmental Quality (ODEQ). In lieu of Section 401 Certification, PacifiCorp proposes to document compliance with state water quality standards by implementing a water quality monitoring plan (Plan), developed in consultation with the ODEQ.

2 Goal and Objectives:

The goal of the Plan is to develop water quality information to support LIHI Certification. The principal objectives include:

- Monitor key water quality parameters in the Project vicinity. This Plan establishes relevant water quality parameters, monitoring locations, and a reporting schedule.
- Evaluate data for compliance with State criteria. PacifiCorp will provide a draft report to the ODEQ for review. Should the final report indicate that data collected at monitoring locations meet relevant state water quality standards, written concurrence will be provided by the ODEQ. Signed concurrence will then be submitted to LIHI for Certification of the Project.

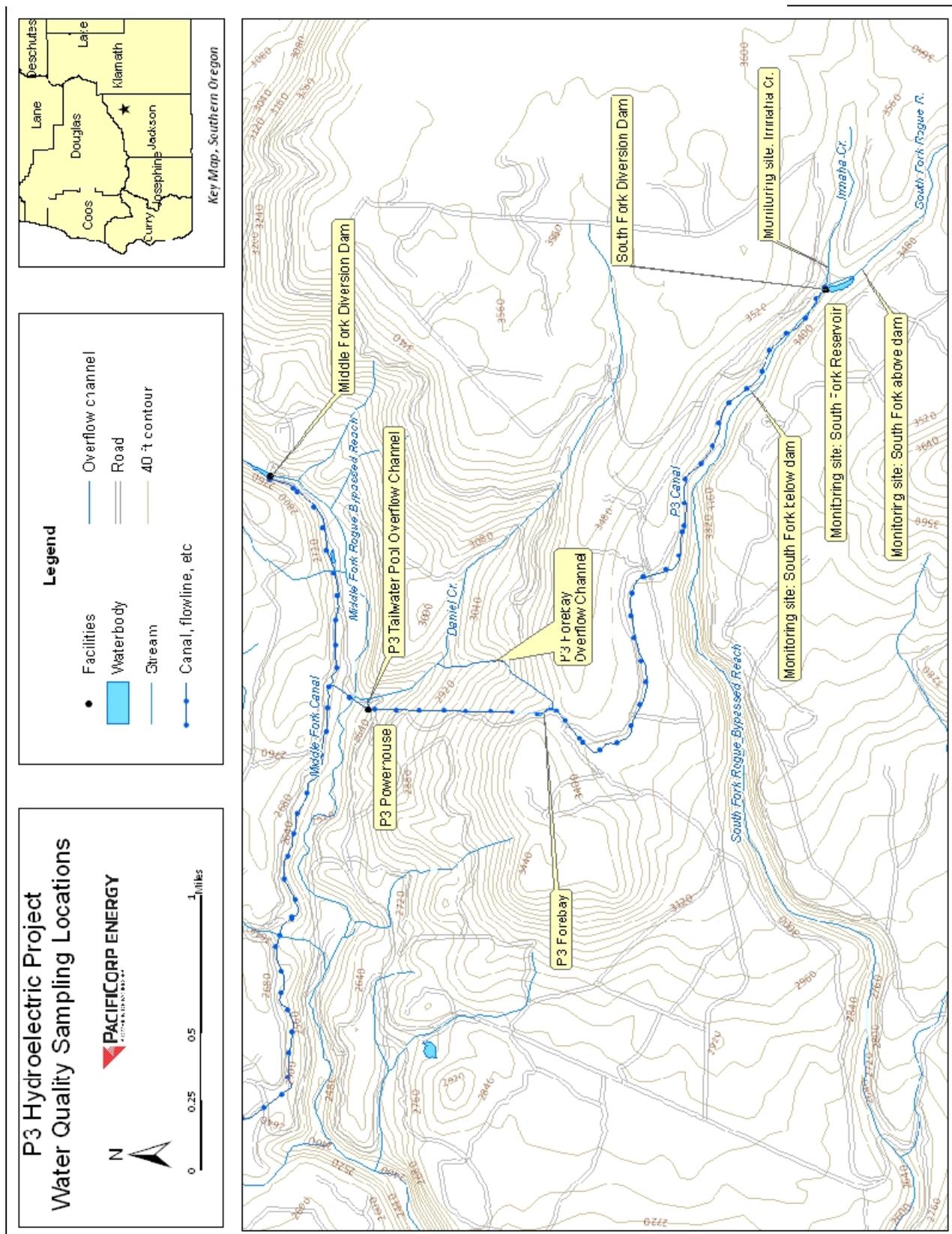
3 Project Description

3.1 Hydraulics

The Project, shown in Figure 1, is operated as a run-of-river project. The South Fork Diversion Dam is located on the South Fork Rogue, immediately below the junction of Imnaha Creek. The dam creates a small impoundment with a maximum depth of approximately four feet and an area of one acre. The intake of the P3 Canal is located at the right (north) side of the dam. Up to 150 cfs is conveyed over the three mile conveyance system to the P3 Powerhouse. Water is discharged from the turbine to a concrete tailwater pool, which transitions to a sag pipe that carries flows across the Middle Fork Rogue River and into the Middle Fork Canal.

The P3 FERC license stipulates that a minimum flow of 10 cfs must be maintained in the South Fork Rogue below the diversion dam. This 10 cfs minimum flow, in addition to limiting diversions at the Middle Fork Rogue and Red Blanket Creek, in accordance with the 401 Certification for the Prospect 1, 2, and 4 license, provides for minimum flow compliance at South Fork USGS stream gage number 143334700 (200 cfs, Aug 1 – Oct 31; 60 cfs, Nov 1 – Mar 31; 120 cfs, Apr 1 – Jul 31).

Figure 1. Map of P3 Hydroelectric Project



3.2 Affected Waters

Project-affect waters are limited principally to the South Fork bypass reach (South Fork Rogue River from the diversion dam to the confluence with Middle Fork) and the small impoundment (approximately one acre) above the South Fork Diversion Dam.

Daniel Creek, which flows roughly parallel to the P3 canal, is affected at infrequent intervals by overflow from the Project. Both the P3 forebay (a wide section of canal above the P3 penstock) and the P3 tailwater pool structure have overflow channels that drain to Daniel Creek. The P3 forebay is well-regulated by a PLC that prevents spill under normal operations. When the P3 plant trips off-line, up to 30 cfs may spill into the overflow channel from the forebay. Operations personnel estimate that the forebay spills four or five times per year. These occurrences are of short duration because the penstock is equipped with a bypass relief valve upstream of the scroll case which, during a unit trip, diverts water around the unit and into the tailrace pool. The bypass relief valve functions to keep the water flowing smoothly through the conveyance system during a unit trip, thereby minimizing spill at the forebay. Even less common are spill events at the tailrace pool structure. Up to five cfs of spill from the pool may occur due to unusual circumstances when a unit is being ramped up after an outage. Because spill events into Daniel Creek are rare, unpredictable, and small in magnitude and duration, PacifiCorp does not propose compliance monitoring at this creek.

4 Existing Information

PacifiCorp is able to make limited inferences regarding temperature and dissolved oxygen (DO) in the South Fork Rogue River based on previous monitoring. The Prospect Nos. 1, 2, and 4 FERC license included a provision for monitoring water temperatures and DO in the South Fork Rogue River at abandoned USGS gage no. 143334700. Temperatures were monitored in 2009, 2010, and 2011, as detailed in Table 1. Stream temperatures observed during the monitoring periods were consistently cooler than the state criterion of a seven-day-average-maximum (7DMAX) of 18°C.

DO was monitored at the USGS gage for a 72-hour period between 7/9/2009 and 7/12/2009 to assess compliance with the state's minimum criteria of 8 mg/L. The lowest concentration observed during the monitoring event was 8.47 mg/l. DO data were collected during the early July through early August period characterized by the warmest ambient temperatures of the year when DO levels are most likely to be compromised. Although both temperature and DO data indicate that compliance is maintained even during the warmest period of the year, these data were collected below to confluence of the Middle Fork Rogue River and may not be representative of the Project-affected waters within the vicinity of the South Fork diversion.

Table 1. Summary of existing water temperatures collected at USGS gage no. 143334700, South Fork Rogue River

Year	Sampling Period	Max 7DMAX Temperature (°C)	Average Temperature (°C)
2009	May 1 – Oct 21	13.69	10.05
2010	Sep 2 – Oct 27	14.01	9.84
2011	May 1 – Oct 31	12.43	9.22

5 Approach

5.1 Study Parameters

Table 2 lists all of the numeric water quality standards and criteria provided in OAR 340-041, and addresses PacifiCorp’s rationale for sampling plans based on the nexus between each parameter and Project facilities and operations.

Table 2. Sampling rationale for selected numeric water quality criteria

Numeric Criteria	Sampling Planned?	Rationale	Applicable Standard
Bacteria	Yes	Total coliforms and <i>E. coli</i> will be sampled, consistent with the parameters sampled for Prospect Nos. 1, 2, and 4 relicensing studies. However, Project facilities and operations do not contribute to bacteria levels in Project waters. There are no Project-related discharges of raw or treated sewage or animal wastes into Project waters.	OAR 340-041-0009
Biocriteria	Yes	This criterion clarifies that waters of the State must be of sufficient quality to support aquatic species without detrimental changes in the resident biological communities. Compliance with this criterion will be determined based on data obtained from water temperature, DO, and other monitoring as described herein.	OAR 340-041-0011
Dissolved Oxygen (DO)	Yes	Project facilities and operations do not contribute any oxygen-demanding substances in Project waters. Project operations can affect physical flow conditions (depth, velocity, and discharge in the bypass reach). Such effects are unlikely to influence DO concentrations, although verification is warranted as DO is an important parameter for supporting native resident trout and other cold water organisms.	OAR 340-041-0016
Nuisance Phytoplankton Growth	No	The forebay created by the South Fork diversion dam is less than the 10-acre minimum size described in OAR 340-41 as warranting nuisance phytoplankton sampling. Further, Project facilities and operations do not contribute nutrients or other conditions in Project waters that would contribute to primary production.	OAR 340-041-0019
pH	Yes	pH levels are unlikely to be affected by the presence of Project developments or by Project operations. The Project does not contribute any nutrients to receiving waters that could enhance the growth of aquatic plants or phytoplankton which affect pH levels.	OAR 340-041-0021
Temperature	Yes	Project facilities and operations cause changes to stream flow (depth, velocity, discharge) that may influence temperatures by increasing the relative amount of solar radiation entering the water. Although it is unlikely that the Project contributes to any exceedance of State temperature standards, verification is warranted as temperature is an important parameter for supporting native trout and other cold-water	OAR 340-041-0028

Numeric Criteria	Sampling Planned?	Rationale	Applicable Standard
		organisms.	
Total Dissolved Gas	No	Total dissolved gas (TDG) supersaturation can occur when at hydropower facilities when large volumes of water are spilled from dams and entrain significant volumes of atmospheric gases. TDG supersaturation typically occurs only at larger mainstem dams; where relatively deep reservoirs or non-turbulent river reaches offer less-effective gas dissipation than shallow, more turbulent river reaches that facilitate degassing. TDG monitoring is not warranted, as supersaturation is unlikely to occur below the South Fork dam due to shallow, turbulent waters and relatively low spill volumes.	OAR 340-041-0031
Total Dissolved Solids	Yes	Project facilities and operations do not discharge substances to Project waters that could affect total dissolved solids (TDS), nor does the Project engage in irrigation or water reuse that could act to increase TDS. However, TDS criteria specific to the Rogue River exist, and this parameter will be sampled for compliance with the basin-specific standard.	OAR 340-41-0032 and OAR 340-041-0275
Toxic Substances *	Limited*	Project facilities and operations do not discharge any potentially toxic substances to Project waters. There is no reason to suspect that elevated levels of toxic substances may be present in Project-affected waters. However, certain toxic substances were sampled during Prospect 1, 2, and 4 relicensing, and these substances will be sampled again in waters affected by the P3 Project to maintain consistency. Several additional toxic substances will be sampled, for a total of 16 substances, as the additional tests for these substances are part of a laboratory sampling package.	OAR 340-41-0033
Turbidity	Yes	Turbidity increases are possible during Project maintenance activities that necessitate spill at the diversion dam. Increased spill may mobilize sediments and influence turbidity levels in the bypassed reach of the South Fork Rogue River for short periods of time. Sampling will be conducted to determine compliance with the State turbidity criterion.	OAR 340-41-0036
<p>*Toxic substances to be sampled include those which were sampled during Prospect 1, 2 and 4 relicensing (arsenic, alkalinity, chloride, iron, lead, manganese mercury, nitrate nitrogen, and zinc), and well as toxic substances which were not previously sampled, but are included in the laboratory's sampling package (antimony, barium, beryllium, cadmium, nickel, selenium, and thallium).</p>			

5.2 Sampling Methodology

Monitoring of the selected parameters will occur between May 1 and September 31 to encompass a range of conditions, including the summer months when: (1) stream temperatures and DO are most likely to be

compromised by low base flows and high ambient temperatures, and (2) scheduled maintenance is likely to occur, which may contribute to turbidity changes. Table 3 provides schedules and locations for DO, temperature, and turbidity monitoring

Table 3. Frequency, duration and monitoring location for parameters to be monitored.

Numeric Criteria	Sample Type	Frequency/Duration	Location
DO	Continuous	Hourly readings for 72 hours, performed between June 1-15 (trout fry emergence), and repeated once in July and once in August	South Fork Rogue Below Dam
Temperature	Continuous	Hourly readings collected between May 1 and September 31.	-South Fork Rogue Above Reservoir -Imnaha Creek -South Fork Rogue Below Dam -South Fork Rogue at Highway Crossing
Bacteria	Discrete	A grab sample will be collected once per month between May 1 and September 31	-South Fork Rogue Above Reservoir -Imnaha Creek -South Fork Rogue Below Dam
Dissolved Oxygen (DO)	Continuous	Hourly readings for 72 hours, performed between June 1-15 (trout fry emergence), and repeated once in July and once in August	South Fork Rogue Below Dam
pH	Discrete	A grab sample will be collected once per month between May 1 and September 31	-South Fork Rogue Above Reservoir -Imnaha Creek -South Fork Rogue Below Dam
Temperature	Continuous	Hourly readings collected between May 1 and September 31.	-South Fork Rogue Above Reservoir -Imnaha Creek -South Fork Rogue Below Dam
Total Dissolved Solids	Discrete	A grab sample will be collected once per month between May 1 and September 31	-South Fork Rogue Above Reservoir -Imnaha Creek -South Fork Rogue Below Dam
Toxic Substances	Discrete	A grab sample will be collected once per month between May 1 and September 31	-South Fork Rogue Above Reservoir -Imnaha Creek -South Fork Rogue Below Dam
Turbidity	Continuous	60-second readings before, during, and after ramping event, for a total duration of at least 2 hours. At least three discrete readings will be collected above dam to provide background levels before, during and after the event.	-South Fork Rogue Above Reservoir -Imnaha Creek -South Fork Rogue Below Dam

DO sampling will be conducted with a YSI multi-parameter water quality sonde (sonde) equipped with an optical DO sensor. The sensor will be calibrated to 100% saturation in water-saturated air prior to each deployment. Calibrations will occur on-site to ensure that the probe is calibrated at the same barometric pressure to which it will be exposed during deployment. The periods selected represent trout fry emergence (June 1-15) and the two warmest months of the year (July and August).

Temperature monitoring will be performed with Tidbit thermistors. The May 1 through September 31 deployment period was selected to capture temperature variances over the wide range of flows and weather conditions, from the high snowmelt runoff flows in May, to the low baseflows and high air temperatures in late July. Inflows to the diversion from Imnaha Creek and the South Fork Rogue above the dam will provide important background information for comparison to temperatures in the South Fork Rogue below the dam. The temperature monitoring site at the highway crossing, located approximately two miles below the dam, will facilitate data comparisons in the bypassed reach of the South Fork Rogue River.

Turbidity monitoring will be performed with a turbidity sensor on a YSI sonde, or similar. Readings in the bypassed reach will capture the full range of turbidity conditions that occur before, during, and after a maintenance-related ramping event.

All other parameters will be measured by an environmental testing laboratory. Grab samples will be collected in bottles supplied by the laboratory, and will be preserved and delivered as required by the laboratory.

5.2.1 Data Analysis

Summary tables of the water quality data will be produced, and will include sample dates, times, locations, and results. Mean daily values, and maximum and minimum values will be computed and tabulated. Key water quality statistics will be computed as needed for evaluation against the respective state standard (e.g. 7-day average of the maximum daily water temperature, percent turbidity change background condition, etc).

6 Schedule

Monitoring described in this Plan will be implemented between the months of May 1 and September 31, 2012, as provided in Table 3. PacifiCorp will provide a draft report to the ODEQ for review and approval of compliance with state water quality standards by January 31, 2013. A final report and concurrence by ODEQ that the Project meets state water quality standards will be submitted to LIHI by March 1, 2013.