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IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF OREGON

DESCHUTES RIVER ALLIANCE, an
Oregon nonprofit corporation,

Plaintiff,

v.

PORTLAND GENERAL ELECTRIC
COMPANY, an Oregon corporation,

Defendant.

Case No. 3:16-cv-01644-SI

DECLARATION OF ERIC NIGG

I, Eric Nigg, declare:

1. My name is Eric Nigg and I am a water quality manager for the Oregon Department of Environmental Quality (DEQ) for the eastern region of Oregon. This region includes all lands and waters within the State east of the Cascade Range of mountains. I have worked for the DEQ for nearly 20 years. I am responsible for management of a staff of scientists and engineers that perform a variety of tasks to ensure the agency and the public understand the

condition of surface waters in the State and the effects of pollutants on water quality. We also hold the responsibility for regulating pollutants from a variety of human activities to protect state water quality. In this role I manage staff in the Section 401 Hydropower Certification, Total Maximum Daily Load, Nonpoint Source Pollution Control, and Stormwater Management programs.

2. I hold a Master of Science degree in Marine Science from Moss Landing Marine Laboratories and San Jose State University, and a Bachelor's degree in Biology from the University of California at Santa Cruz. I have been involved as a professional in monitoring, characterizing and regulating water quality and pollutant sources in the public and private sectors for more than 30 years. I have personally collected and analyzed surface water data and produced pollutant budgets for waterbodies throughout the State. In the last decade, I have managed staff that do this work and provide oversight for their work.

3. I have been engaged since approximately 2010 with implementation of the 401 certification for the Pelton Round Butte (PRB) project, which is when major alterations at Round Butte Dam were completed. The PRB project is licensed by the Federal Energy Regulatory Commission (FERC), and co-owned and co-operated by Portland General Electric (PGE) and the Confederated Tribes of Warm Springs (CTWS).

4. This Declaration is based on my personal knowledge of events, and a review of DEQ and other publically available documents.

History of PRB relicensing

5. The original license for the PRB project was issued in 1951, prior to adoption of the Federal Clean Water Act (CWA) and its provision for state license conditioning authority. This license, though amended several times to accommodate additional hydropower facilities, expired in 2001. Application for the new license was made by both PGE and CTWS as joint applicants. Studies were conducted by these co-applicants and their consultants from the mid-1990s through the early 2000s in support of the application to DEQ for a 401 certification and to

FERC for a renewed license. These studies included data collection, mathematical modeling of reservoirs and the Deschutes River below the project, as well as engineering studies needed to accomplish the construction and operation of facilities that would improve water quality and provide for downstream fish passage. At the time, DEQ staff judged these studies to adequately support DEQ's conclusion that the PRB project, as conditioned, provided reasonable assurance that water quality standards would be met.

6. The 401 certifications for this project were issued on June 24th, 2002 by DEQ and on June 25th, 2002 by the CTWS. These certifications were coordinated to provide a consistent set of requirements for the operators.

7. The Joint Licensees initiated settlement discussions with a group of stakeholders in January 2003, forming the Settlement Working Group (SWG). This group included all Interveners in the FERC relicensing proceeding for the project. The SWG Parties were: PGE, CTWS, U.S. Department of the Interior (USDOI)-Bureau of Indian Affairs, USDOI-Bureau of Land Management, USDOI-Fish and Wildlife Service, National Marine Fisheries Service, U.S. Department of Agriculture -Forest Service, DEQ, Oregon Department of Fish and Wildlife, Oregon Water Resources Department, Oregon Department of Parks and Recreation, Deschutes Co., Jefferson Co., City of Bend, City of Madras, City of Redmond, Avion Water Company, American Rivers, The Native Fish Society, Oregon Trout, Trout Unlimited and Water Watch of Oregon. The SWG Parties signed a settlement agreement on July 13, 2004 that included the WQMMP as an exhibit and established a number of implementing committees, one of which was the Fish Committee. A stated presumption of the agreement was that "each of the Governmental Parties agrees that the Licensees' performance of their obligations under [this] Agreement will be consistent with and is intended to fulfill the Licensees' existing statutory and regulatory obligations as to each Governmental Party relating to the relicensing of the Project.

Impacts of the PRB Facility on the Lower Deschutes River

8. Construction of the Pelton Round Butte series of dams in the 1950s caused significant changes in the annual temperature profile of the Lower Deschutes River. These changes included both decreases and increases in temperature depending on the time of year. The magnitude of these changes varied depending on location, but the entire lower river was affected.

9. The reach of river immediately downstream of the project was typically 2.5°C colder in April than would have occurred without the effect of the dams (Huntington et al, 1999). Overall, temperatures were lower in winter, spring and early summer, about the same in August, then temperatures were warmer than without the dams in late summer through early fall, reaching a 1.5°C increase in October. The impacts of these temperature differences on designated beneficial uses, particularly spawning and fry emergence of anadromous fish were muted with distance downstream of the project, but were still evident. The cooler temperatures in the spring and early summer delayed emergence times of juvenile Fall Chinook and Summer Steelhead, resulting in their migrating downstream later in the year when river conditions in the Columbia were less favorable (Rod French Declaration, paragraph 7; Huntington et al et al, 1999).

10. The project reservoirs hold a vast amount of water from three rivers with very different characteristics. The Metolius River arises from springs in the Cascade Mountains and is very clear and cold. The Deschutes and Crooked Rivers are both spring-fed and snowpack-fed and traverse the most populated areas of Central Oregon, including rich agricultural lands with significant withdrawals of water for irrigation. These latter rivers are generally warmer than the Metolius, causing a stratification (or layering) in Lake Billy Chinook, with cold Metolius water overlain by warmer water.

11. Prior to the operation of the Selective Water Withdrawal (SWW) all water released to the Deschutes River below the project was discharged from a gate near the bottom of the dam. This release of cold water established an unnaturally cold temperature regime and also delayed natural heating. Cold water in the bottom of the reservoir is also oxygen depleted and

dissolved oxygen concentrations near the project were chronically lower than water quality standards in reaches just downstream (Raymond, et al, 1998). The Lower Deschutes River is very turbulent, which, along with primary production by algae and periphyton (attached aquatic plants) oxygenates water with distance from the project (Foster-Wheeler, 2001).

12. Prior to operation of the SWW, there were pH concentrations that exceeded criteria in the inflowing rivers, in the reservoirs, and in the river below the project. The extent of these exceedances varied and bottom release from the reservoirs probably reduced this effect in the Lower Deschutes River, but at the expense of lower dissolved oxygen concentrations.

Goals of the Settlement Agreement

13. The SWG had a common interest in managing reservoir discharge operations to improve water quality downstream of the project and facilitate fish passage downstream from the project reservoirs.

14. The SWW was designed to mitigate these unnatural river conditions caused by dams by blending warmer surface water with cold bottom water to mimic the temperature expected if the reservoirs were not there. Target temperatures are calculated in near real-time based on a mathematical relationship between upstream inflows and downstream river temperatures. This relation provides a target for the downstream river temperature that would occur if the dams were not present and the blending is managed to match that temperature target (Huntington et al, 1999). Blending surface water into the discharge was also intended to increase dissolved oxygen concentrations. The modeling indicated temperature profiles and dissolved oxygen concentrations would be improved relative to the pre-SWW operation conditions, but that pH would increase to some small degree (Foster-Wheeler, 2001).

15. The other chief interest of the SWG was fish passage above and below the project. Construction of the dams eliminated an important migratory pathway for anadromous fish in the basin important to the CTWS and for the basin as a whole. Earlier attempts to effect passage were unsuccessful and the SWW was designed with a Fish Handling Facility to attract,

capture, sort and facilitate fish passage downstream of the project. The SWW provides surface currents that attract fish in the reservoir to the outflow and allow capture and transport.

The WQMMP

16. The 401 certification included a Water Quality Management and Monitoring Plan (WQMMP) when issued, but that certification also required the Joint Applicants to revise it soon after issuance. The revised WQMMP was not finalized until the Settlement Agreement was completed and that revision was the outcome of input from all of the SWG (hereinafter referred to as WQMMP).

17. The WQMMP set forth the then-applicable water-quality standards for the project, and describes their application to the project, as well as the measures and monitoring necessary to provide reasonable assurance of compliance with those standards. Compliance with water quality standards relies upon implementation of a Water Quality Monitoring Plan (WQMP) and separate Management Plans for the following water-quality standards: temperature (TMP), dissolved oxygen (DOMP), pH (PHMP), nuisance phytoplankton growth and aesthetic conditions (NPGMP) and biological criteria.

18. Notably, an agreement among DEQ, CTWS and PGE in 2002 (DEQ, 6/24/2002) set forth the intention of DEQ and CTWS to reconsider in the required revised-WQMMP the appropriateness of developing conditions necessary to ensure compliance with the water quality standards for designated bull trout habitat areas in the Deschutes River Basin. At that time, significant questions were raised by fisheries biologists, DEQ, and the Tribe's Water Control Board as to whether that species existed in the Deschutes River below the project, which called into question the appropriateness of requiring compliance with that particular standard.

19. The WQMMP also describes the facilities the Licensees were required to construct and how they would be operated (for example, the Fish Handling Facility).

20. The WQMMP also provides substantial latitude for adaptive management. This was specifically intended by the SWG. Predictions of the operation of the facility were based on

mathematical models. There was no way to know how accurately these models would match the response of the reservoirs and river once the SWW became operational.

21. This revised WQMMP was submitted in July 2004. The temperature management plan included water quality standards and predetermined rates of blending of surface and bottom water to achieve a temperature target based on a balance of incoming temperature and flow for the 3 main rivers combining in the reservoirs: Metolius River, Deschutes River and Crooked River. The intention was to manage temperatures such that the unnaturally cold water historically released from the bottom of the reservoir would be blended with warmer water and remove the thermal influence of the reservoirs on the Lower Deschutes River.

22. Water quality standards in effect below the project prior to March 2004 assumed Bull Trout were present and included a 10°C spawning criterion and a 12°C criterion for non-spawning periods. This required the onset of blending very early in the season as temperatures were increasing. Along with the relatively low temperatures associated with the standard was a year-round spawning criterion of 11mg/L for dissolved oxygen. There was also an option allowing dissolved oxygen for the spawning period to be met by demonstrating that intergravel dissolved oxygen concentration of 8mg/L (applied to protect fish larvae living in spaces amid gravel) could be maintained if the concentration in the water column met 9mg/L. Although modeling of the reservoir suggested this criterion could be met throughout the year, there were times both prior to and since construction of the SWW when it could not be met immediately below the project.

23. At the time the WQMMP was finalized, DEQ had recently adopted new water quality standards for temperature (EPA approval was received in March of 2004). These standards included for the first time thorough designations of fish use and spawning periods for salmon and steelhead trout. After that standards revision, the bull trout temperature criteria were no longer applied to the Deschutes River below the project, and as a consequence, the applicable temperature criteria for the project were higher and the non-spawning dissolved oxygen criteria

were lower. New standards included a spawning criterion for salmon and steelhead from October 15 through June 15 of each year. The temperature in the non-spawning period (June 16 through October 14) is now Core Cold Water with a criterion of 16°C. There was also no longer a year-round spawning criterion in effect for dissolved oxygen. Instead, the spawning criterion of 11mg/L is effective during the salmon and steelhead trout spawning period and the non-spawning period has the cold water aquatic life criterion of a 30-day mean minimum of 8mg/L dissolved oxygen. The changes to these criteria resulted from a combination of significant modifications of our temperature standard and a review of appropriate beneficial uses in the area of the project, the latter of which was specifically anticipated at time DEQ issued its certification. DEQ did not make these changes to water-quality standards to affect the requirements of the Project Operators.

24. For reasons unknown to me, the 401 certification, including the WQMMP, was not revised to include modification of conditions necessary to provide reasonable assurances with compliance with these new federally-approved criteria. However, a real consequence of the change was that blending of water to achieve 13°C (the temperature criterion for spawning salmon and steelhead trout) could be delayed until slightly later in the spring. This delay in blending results in conserving cold bottom water for release later in the year. The 8.0mg/L dissolved oxygen criterion, as a monthly mean minimum, was applied to the non-spawning period. The period established by DEQ to protect resident trout spawning (January 1 through June 15 each year) was still included in the period established for salmon and steelhead trout spawning (October 15 through June 15 each year). The importance of these changes to overall management of water quality in the river became apparent after the SWW began operation.

SWW Operation and Interim Agreements

25. The SWW began operating in late 2009. It became apparent early in the operating season that controlling temperatures with the existing automated systems would be a challenge and fine-scale management might be impossible. Moreover, the reservoirs had not completely

filled following the construction period and were not set up as assumed in the modeling used to calculate blending parameters. A mistaken release of bottom water resulted in a sharply lower temperature and suggested that new systems needed to be developed. It also became apparent that the SWW had a limit on the proportion of cold bottom water it could release at any time and this limited the ability to cool the outflow in the late summer and early fall when cold water could be depleted. Management of dissolved oxygen in mid-summer was a challenge due to the competing nature of blending, because the cold water needed to reduce temperatures was oxygen depleted compared to the warmer surface waters. These facts suggested the Licensees needed to time to learn how to operate the facility and optimize mitigation of water quality exceedances. To accomplish this in the context of adaptive management as required by the WQMMP, DEQ chose to enter into temporary agreements with the co-operators that specified appropriate water-quality limits and tolerance for exceeding these limits until the facilities were operating at their highest potential.

26. DEQ and PGE entered into annual interim agreements beginning in 2011 following the first full year of operation. These agreements acknowledged the stated water quality standards in the WQMMP and modified these targets in several ways for the period of one year from the date of signature. For example, the temperature and dissolved oxygen requirements were made consistent with the USEPA and Environmental Quality Commission's currently approved criteria. Additionally, DEQ allows temperatures to exceed the target by up to 0.5°C for up to 3 days when there are rapidly changing temperatures. Such conditions particularly occur in the early part of the operating season and make meeting the criterion of 0.3°C challenging.

27. The last six years of interim agreements have facilitated the experimentation necessary to better understand the system. Since SWW operation began, the data has illustrated strengths and weaknesses that were not always anticipated. It took several years for the operations to be smooth and predictable enough for DEQ to reasonably expect to see routine

compliance with the applicable criteria. DEQ has continued to enter interim agreements on an annual basis to allow operators to implement the current state water quality standards for the reach below the project. DEQ believes that the studies generated during this interim period are necessary and important to inform any modification to the 401 certification; therefore, its use of enforcement discretion in agreeing to modify the targets is appropriate, especially to match currently applicable standards.

28. Beginning in 2013, DEQ included a provision that changes to the WQMMP would likely require modification of the 401 certification once we had a better understanding of the complex interactions between operations and reservoir response. We have stated publically and in meetings for several years that it is our intention to modify the WQMMP. The WQMMP describes in detail the measures to be carried out by the Licensees to ensure compliance with applicable water quality standards throughout the license term. Since these water quality standards have changed, it is appropriate to modify the conditions accordingly. We have also coordinated with the CTWS regarding inconsistencies between several of our respective water quality standards. CTWS is in the process of adopting revised criteria for the Deschutes River and is expected to complete this in the coming months. DEQ has indicated to PGE, CTWS, and others that once CTWS' water-quality-revision process was completed, we would proceed with modifying the 401 certifications issued by both regulatory entities. DEQ's modification will include a public notice and comment period.

29. The claims asserted by plaintiffs of widespread violation of water quality standards do not address compliance with the current EQC-adopted and USEPA approved water quality standards for the Deschutes River. DEQ intends to modify the 401 certification, including the WQMMP, to realign conditions in the 401 certification to provide reasonable assurance of compliance with currently applicable water quality standards for the relevant reaches of the Deschutes River as such were deemed appropriate for protection of the designated beneficial uses.

The Operators' Compliance with the Conditions of the 401 Certification

30. Compliance with the project's 401 certification is determined in light of progress with meeting or implementing *conditions* of that certification. These conditions required a large construction project that facilitated blending surface and bottom water to improve water quality in the lower Deschutes River. The project also facilitates fish passage downstream from the reservoirs. The project operators worked diligently to manage these facilities in the most effective way to achieve outcomes expressed in the WQMMP. The operators also communicated as required with regulatory agencies and with the Fish Committee (whom represents the parties to the settlement when making decisions on changes to the facilities and how they are operated).

31. The Licensees have also submitted timely reports required by the WQMMP and have provided additional information as requested. In addition, Licensees have embarked on a series of studies that will provide more sophisticated understanding of the reservoir system, the SWW and FHF, and the Lower Deschutes River. These studies are not a requirement of the WQMMP, but they will certainly provide a benefit to the ultimate modification of Oregon's and the Tribe's 401 certifications.

32. DEQ receives monthly and annual reports from PGE that provide complete data for all parameters required by the WQMMP. These reports demonstrate that the project has largely met the currently applicable water quality standards for temperature and dissolved oxygen for approximately the last 5 years, i.e., the targets set forth in the Interim Agreements described above. When there was a departure from expected temperatures or dissolved oxygen (e.g., summer of 2015), PGE and the Tribes made timely changes in order to balance competing processes (release of cold bottom water results in lower dissolved oxygen) as well as possible. Controlling pH in the discharge of the project continues to be a challenge. There is no operational procedure that can lower pH without adversely affecting temperature or dissolved oxygen, because bottom water that has a lower pH also has less dissolved oxygen. Releasing bottom water when not necessary for temperature control diminishes the available volume of

cold water that is needed later to reduce temperatures downstream. Therefore, the current operations in accordance with the interim agreements (i.e., that target compliance with the USEPA and Environmental Quality Commission's currently approved criteria) increase the likelihood that there will be that available cold water.

33. The WQMMP specifically addressed the balancing of parameters through adaptive management. The plan states:

Because operation of the selective withdrawal facility has the potential to affect numerous water quality parameters, as well as fish passage success, changes in the operation of the selective withdrawal facility must consider all possible impacts, not merely a single water quality parameter.

(WQMMP at 2).

34. The plan invokes adaptive management and sets some priority in the specific management plans by parameter, such as:

Because pH of the Project discharge could exceed inflow pH as a result of withdrawal of surface water from Lake Billy Chinook (due to photosynthetic activity in the reservoir's epilimnion), the likely modification would be the reduction in the amount of surface withdrawal relative to bottom withdrawal. The change in the proportion would be determined on a case-specific basis, if such modification can be undertaken consistent with temperature, DO [dissolved oxygen], and fish passage considerations.

(WQMMP at 13).

35. This establishes a clear priority that DEQ interprets as direction to maintain high water quality with respect to temperature and dissolved oxygen, facilitate fish passage, and then mitigate pH as much as possible.

36. Ongoing studies conducted by the Licensees will provide a better, more precise understanding of the operations of the project, reservoir dynamics and effects on the Lower Deschutes River. DEQ is mindful that conditions below the project have changed; some intended and others perhaps unintended. We expect these studies will give us greater insight into improved management options. In general, though, DEQ believes PGE is operating the project

and facilities consistent with the 401 certification and that water quality has improved in demonstrable ways.

I declare under penalty of perjury that the foregoing is true and correct.

EXECUTED on April 26, 2018.


ERIC NIGG