AVISTA

June 11, 2010

Mr. Dan Redline
Idaho Department of Environmental Quality
2110 Ironwood Parkway
Coeur d'Alene, ID 83814

Re: Federal Energy Regulatory Commission's Spokane River Hydroelectric Project (FERC Project No. 2545-091) License, Ordering Paragraph H – Total Dissolved Gas Control and Mitigation Program

Dear Dan:

On June 18, 2009 the Federal Energy Regulatory Commission (FERC) issued a new license for the Spokane River Hydroelectric Project, FERC Project No. 2545 (License). Ordering Paragraph H of the License requires Avista to develop a Post Falls Total Dissolved Gas Control and Mitigation Program (Program) and submit it to the Idaho Department of Environmental Quality (IDEQ) for approval by June 18, 2010.

As required, Avista worked with IDEQ to develop the Program, which IDEQ subsequently approved on June 10, 2010. The approved Program, including the consultation record with IDEQ, is enclosed for your records. If you have any questions, or have comments on the Program please let me know. I can be reached at (509) 495-4998.

Sincerely,

Speed Fitzhugh

Elvin "Speed" Fitzhugh
Spokane River License Manager

Enclosure

cc: Bob Steed

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AVISTA CORPORATION

POST FALLS HYDROELECTRIC DEVELOPMENT TOTAL DISSOLVED GAS CONTROL AND MITIGATION PROGRAM

ORDERING PARAGRAPH H

Spokane River Hydroelectric Project
FERC Project No. 2545

Prepared By:
Golder Associates Inc.
Redmond, WA

June 2010

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Acronyms and Abbreviations

%	percent
®	Registered
°C	degrees Celsius
Avista	Avista Corporation
cfs	cubic feet per second
DEQ	Idaho Department of Environmental Quality
DQO	data quality objective
Ecology	Washington Department of Ecology
FERC	Federal Energy Regulatory Commission
Golder	Golder Associates Inc.
HED	hydroelectric development
IDEQ	Idaho Department of Environmental Quality
mg/L	milligrams per liter
mm Hg	millimeters of mercury, as pressure
MQO	measurement quality objective
MS5	portable Hydrolab water quality instrument used for long-term and spot monitoring applications
NIST	National Institute of Standards and Technology
No.	number
PFFB	Post Falls HED forebay monitoring station
PFTR	Post Falls HED tailrace monitoring station
QA	quality assurance
TDG	total dissolved gas
USGS	United States Geological Survey

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1.0 PROJECT BACKGROUND

Post Falls Hydroelectric Development (HED) is owned and operated by Avista Corporation (Avista) and currently operates as one of five hydroelectric developments under a license issued by the Federal Energy Regulatory Commission (FERC) as the Spokane River Project No. 2545. Post Falls HED is the eastern-most of these five HEDs and is located on the Spokane River in northern Idaho (Kootenai and Benewah counties). The Spokane River originates at the outlet of Coeur d'Alene Lake in Idaho and flows westerly approximately 111 miles to the confluence with the Columbia River in eastern Washington (which is now within Lake Roosevelt, the impoundment created by Grand Coulee Dam). Post Falls HED is located 9 miles downstream of Coeur d'Alene Lake at river mile 102.

1.1 Post Falls HED Facilities and Operations

Post Falls HED includes three dams (North Channel, Middle Channel, and South Channel dams, which connect two islands to each other and the shorelines), spillways along the top of the North and South Channel dams, a powerhouse integral to the Middle Channel Dam, and various appurtenant structures (figure 1-1). Integral to Middle Channel Dam is a six-unit powerhouse with a total generating capacity of 14.75 megawatts and a total hydraulic capacity of 5,400 cfs. As stated by Ecology (2005), "The spill gates in the North and South Channels were built directly on top of the crest of the waterfalls, and when the spill gates are open flows fall over the historic waterfalls."

Post Falls HED has a summer normal full-pool elevation of 2,128 feet. The impoundment (Coeur d'Alene Lake and affected river reaches) has a usable storage volume of 223,100 acre-feet, based on an operating range (i.e., drawdown) of 9 feet at the dams and 7.5 feet in the lake. During about half of any year, a natural channel restriction controls Coeur d'Alene Lake's water elevation and Spokane River flows. In contrast, the Post Falls HED controls water elevations in Coeur d'Alene Lake and flow in the Spokane River after spring run-off, and through the summer and fall.

North Channel Dam is a 431-foot-long, 31-foot-high concrete gravity dam. The top of this dam is at elevation 2,133 feet. The dam includes a 431-foot-long gated spillway with a crest elevation of 2,114 feet and a capacity of 34,740 cubic feet per second (cfs) at water surface elevation 2,128 feet. The spillway gates consist of a motor-operated 100-foot-wide, 14-foot-high rolling sector gate and eight motor-operated 12-foot-high tainter gates, seven of which are 21 feet wide and one 12-foot-wide log gate.

Middle Channel Dam is a 215-foot-long, 64-foot-high concrete gravity dam (with a motor-operated trash rack). This dam, which is integrated into the 5,400-cfs-capacity powerhouse, has a crest elevation of 2,133 feet.

South Channel Dam is a 127-foot-long, 25-foot-high concrete gravity dam. The top of this dam is at elevation 2,135 feet. This dam includes a 37-foot-long gated spillway with a crest elevation of 2,128.5 feet and a capacity of 3,030 cfs. The spillway gates consist of six manually operated 6-foot-wide, 13-foot-high steel vertical sluice gates.

Figure 1-1 - Post Falls HED Total Dissolved Gas Monitoring Study Area (prepared by Avista)

Before construction of the Post Falls HED dams, "water fell over all three channels, beginning with the North Channel and spilling over into the other two channels at higher flows. But under current operations, the powerhouse occupies the Middle Channel and spill occurs at the North Channel until maximum discharge capacity is reached, after which spill is increased in the South Channel"[1] (Ecology 2005). Due to safety concerns and the laborious requirements of operating the South Channel gates, Avista has normally avoided using the South Channel gates until confident that flows will remain high for an extended period.

1.2 Historical Conditions

Avista funded Post Falls HED total dissolved gas (TDG) monitoring for the high-flow seasons of 2003 and 2004, which are reported in Golder (2003, 2004). Maximum TDG recorded at the Post Falls HED tailrace station (PFTR), the USGS gage 1.2 miles downstream of the dam, was 116 percent of saturation in 2003 and 118 percent of saturation in 2004. Post Falls HED tailrace TDG levels in 2004 were generally higher than in 2003 and TDG exceeded 115 percent of saturation for a total of approximately 14 days compared to 0.2 days in 2003. The higher TDG levels in 2004 were likely due to reduced use of the South Channel which resulted in reduced dilution of spill flow and associated elevated TDG levels from the North Channel. In 2003, TDG levels were 3-5 percent of saturation lower when the south spill channel was used than immediately before/after it was not used (Golder 2003). As in 2003, a decrease and corresponding increase in TDG was observed with activation and deactivation of the South Channel during testing in 2004 (Golder 2004). Therefore, 2003/2004 monitoring results indicate using the South Channel to pass flows in excess of powerhouse capacity can slightly reduce downstream TDG levels in the Spokane River as compared to passing the same water through the North Channel.

1.3 Interim Spill Gate Operating Protocols

As part of the relicensing process, Avista developed conceptual Interim Spill Gate Operating Protocols to maximize the use of the South Channel to the degree reasonably practical given the requirements for manual operation of these gates (Avista 2005, Appendix B, pages B-7 and B-8). Other issues associated with the operation of these gates include the loss of energy due to a higher tailwater elevation, meeting the aesthetic flow requirement, meeting the ramping rate restrictions, and addressing safety concerns. Recently, a team of Avista engineers, operators, and license implementation staff has refined Post Falls HED Interim Spill Gate Operating Protocols, which are illustrated by figure 1-2. Option A is chosen when a spill event is expected due to forecasted high flows for an extended period. This choice places the South Channel gates into service before the North Channel sector gate. The North Channel tainter gates, which offer much more versatile control than either the sector gate or South Channel gates, will be the first spill gates placed into operation. After the North Channel tainter gates reach capacity, the South Channel gates will be used, followed by the North Channel sector gate. If the spill event is forecasted to be of lesser flow or short duration Option B is chosen. This choice utilizes the North Channel sector gate if

[1] Spill begins through the North Channel tainter gates when the powerhouse capacity is exceeded.

the tainter gates reach capacity. Specific procedures for operation of these gates are found in Appendix A.

During the summer season, Avista will continue to make closing the South Channel gates a priority. This practice saves Avista energy during the summer and helps address safety issues at Q'emiln Park including the beach and boat launch.

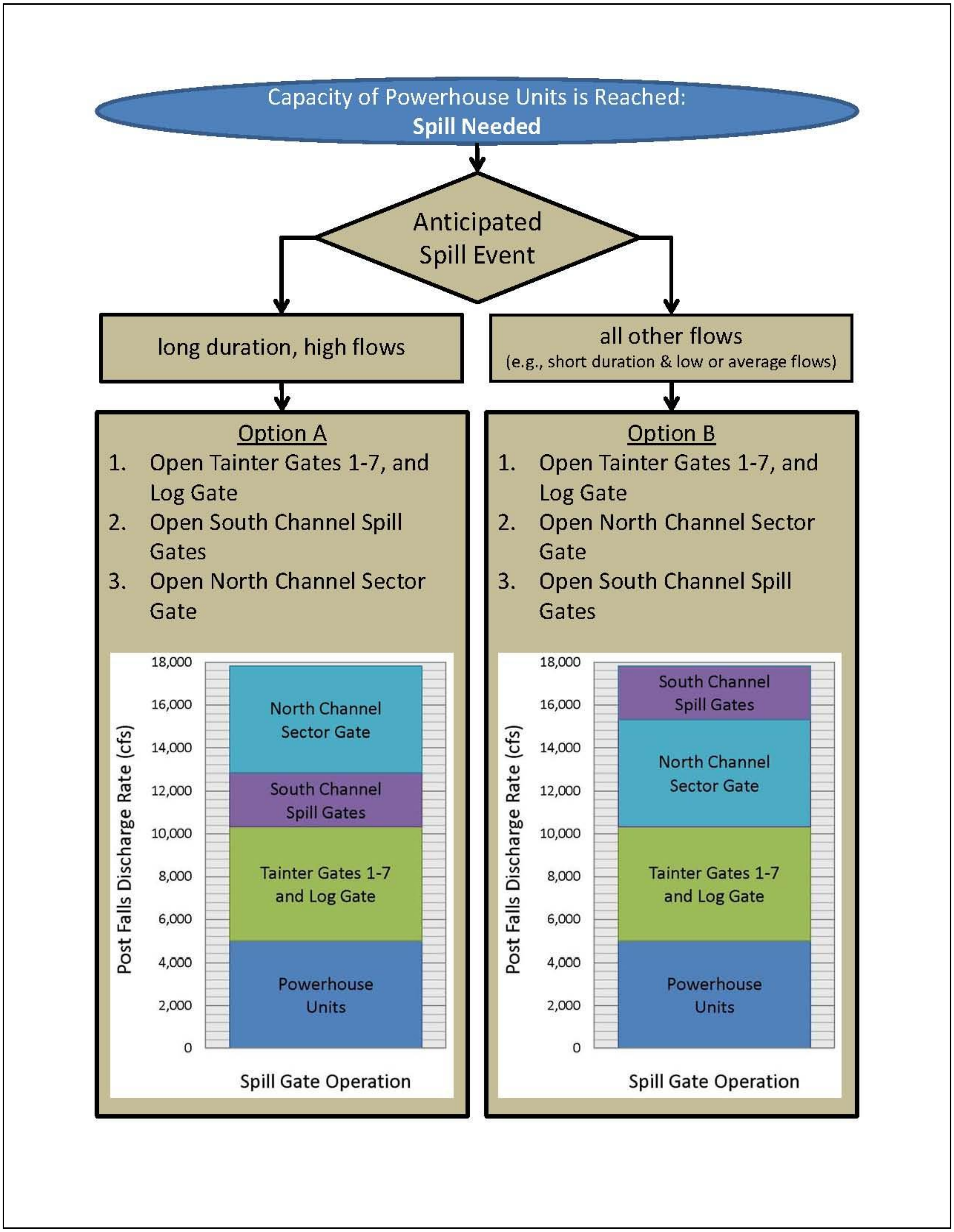

Figure 1-2 - Interim Spill Gate Operating Protocols

2.0 PURPOSE

The natural waterfalls at Post Falls, Idaho generate TDG (Ecology 2005), which can detrimentally affect fish. Although TDG in the Post Falls Hydroelectric Development (HED) tailwater is known to exceed the 110-percent of saturation criterion set by Idaho Administrative Procedures Act 58.01.02.250.01.b, Idaho Department of Environmental Quality (IDEQ) has not included TDG in the Spokane River on its 303(d) list and assessed the Spokane River as "not impaired" by excess TDG. Ecology (2005) states that "This assessment was based, in part, on the Idaho Department of Environmental Quality's (DEQ) understanding that TDG levels are at, or below, natural levels as a result of the Post Falls HED. Idaho also based their assessment on an evaluation of the impairment of beneficial uses, which found no adverse effects from elevated TDG on fish below Post Falls (Idaho DEQ, 2005)." Even though the Post Falls HED does not cause or contribute to high TDG levels in the Post Falls HED tailwater, Avista committed to look at potential ways to enhance TDG conditions in the Post Falls HED tailwater.

To accomplish this, Avista developed Interim Spill Gate Operating Protocols for Post Falls HED and proposed PF-WQ-1 Total Dissolved Gas Control and Mitigation Program to implement these Interim Spill Gate Operating Protocols while monitoring and evaluating TDG (Avista 2005, Appendix B, pages B-7 and B-8). With the exception of the funding provision, the FERC incorporated PF-WQ-1 as ordering paragraph H in the new FERC license which was issued on June 18, 2009 (FERC 2009). Specific requirements provided in PF-WQ-1 include:

"Within one year of a new FERC license [(i.e., by June 17, 2010)], Avista, in consultation with and subject to the approval of IDEQ, must develop and implement an appropriate TDG monitoring plan to:

- *Further evaluate TDG conditions at higher flows than those experienced in 2003 and 2004;*
- *Evaluate the effectiveness and refine the Interim Spill Gate Operating Protocols; and*
- *Evaluate potential TDG abatement options if needed.*

After 5 years of operating under the interim spill gate protocols, Avista shall submit a report to IDEQ that summarizes the monitoring data and evaluates the effectiveness of the plan."

3.0 DATA ACQUISITION

This section presents details pertaining to data collection and acquisition for the Post Falls HED TDG Study.

3.1 Goal and Objective

This Monitoring Plan will support the overall goal of the Post Falls HED TDG Control and Mitigation Program. Specifically, the objective of this Monitoring Plan is to:

- Confirm that the Interim Spill Gate Operating Protocols are effective at reducing TDG levels as compared to typical operations, which preferentially use the North Channel for spills

This Monitoring Plan has been developed in consultation with the IDEQ. Appendix B presents a record of the associated consultation.

3.2 Monitoring Design and Methods

The Monitoring Team will monitor TDG annually for five high-flow spill seasons during spill events that occur between March 15 and June 15 as discussed in this Monitoring Plan. Spot measurements of TDG will be made at the USGS gage station near Post Falls, Idaho (USGS 12419000) and in the Post Falls HED forebay during the first two years of monitoring (table 3-1). This monitoring strategy will be evaluated after the first two years to determine whether additional monitoring will be needed to meet the study objective. Long-term monitoring stations will be installed at the same locations identified in table 3-1, if necessary, based on the outcome of the two-year evaluation. Otherwise, the spot-measurement monitoring program will continue for the following three years of this study.

TDG monitoring for Post Falls HED will be coordinated with implementation of the Washington TDG Monitoring Plan, which applies to Long Lake and Nine Mile HEDs (Golder 2010). A Hydrolab® MS5 Multiprobe® (MS5) linked to a Hydrolab Surveyor 4a®, or equivalent instrumentation, will be used to make spot measurements during high-flow season spill events at approximately 2-week intervals following the same general schedule as site visits for Long Lake and/or Nine Mile HED under the Washington TDG Monitoring Plan.

TABLE 3-1

Post Falls HED TDG Monitoring Stations

Station Code	Description	Latitude, Longitude (NAD83)	Monitoring Type
PFFB	Post Falls HED forebay	47°42'33", 116°57'38"	Spot measurements
PFTR	Spokane River Near Post Falls, Idaho USGS gage station 12419000	47°42'11", 116°58'40"	Spot measurements

TDG (mm Hg), dissolved oxygen concentration (mg/L), water temperature (°C), and water depth (meters) will be recorded. Depth will be used to identify if and when TDG sensors are above the minimum TDG compensation depth. The range, accuracy, and resolution for each parameter measured are provided in table 3-2. The local barometric pressure will be obtained from a barometer in the Hydrolab Surveyor 4a®.

TABLE 3-2

Range, Accuracy and Resolution of Parameters That Will be Recorded Under the Post Falls HED TDG Monitoring Plan

Parameter	Range	Accuracy	Resolution
Total Dissolved Gas	400 to 1300 mm Hg	±0.1 % of span	1.0 mm Hg
Temperature	-5 to 50°C	±0.10°C	0.01°C
Depth (0-25 meters)	0 to 25 meter(s)	±0.05 meter	0.01 meter
Dissolved Oxygen	0 to 30 mg/L	± 0.01 mg/L for 0 to 8 mg/L ± 0.02 mg/L for >8 mg/L	0.01 mg/L
Barometric Pressure	500 to 800 mm Hg	±3.5 mm Hg within 6 months of zero calibration at 25°C	0.1 mm Hg

3.3 Quality Control

This section presents details pertaining to quality control of data collected for the Post Falls HED TDG Study. Quality control activities include field quality control, data quality control, and inspection of field supplies and materials.

3.3.1 Field Quality Control

This section discusses field procedures pertaining to quality of data collected for the Post Falls HED TDG Study.

3.3.1.1 Calibration and Maintenance

This section describes calibration and maintenance activities for the TDG monitoring equipment, including annual factory calibration and servicing, pre-season field verification, maintenance and servicing, and post-season field verification.

3.3.1.1.1 Annual Factory Calibration and Servicing

Each year before use of the TDG monitoring equipment, the need for factory calibration and adjustment will be evaluated. Factory calibration is a critical component that will help ensure reliable recording of quality data, and will provide an auditable track to verify equipment has been maintained in proper working order.

3.3.1.1.2 Pre-Season Field Verification

Each year, the Monitoring Team will conduct pre-season field verification of the monitoring equipment before the planned initial TDG field monitoring event. This will be done jointly as part of the Washington

TDG Monitoring Plan (Golder 2010) pre-deployment field verification. This will include the following steps for each instrument to be used for TDG monitoring:

- The clock of each TDG meter will be synchronized to the correct date and time, and then a test will be done to confirm that each meter will log and download data
- The TDG silastic membrane will be removed and the recorded TDG value will be compared to ambient barometric pressure of a recently calibrated external barometer
- The patency of each TDG silastic membrane will be confirmed by pressurizing the membrane using carbonated soda water and confirming that a substantial pressure change is registered
- A mass verification of the TDG meters will be conducted. Each unit will be delay started to the same time and set to log data at one-minute intervals. All units will then be consolidated into one group and deployed so that the TDG sensor of each unit is at a depth of about 10 feet below the water's surface. After a total deployment period of approximately one hour, the units will be downloaded and concurrent TDG, water temperature, and depth, at the 20 and 50 minute mark will be compared for all units and any differences noted

3.3.1.1.3 Maintenance and Servicing

Before each TDG monitoring session, the Monitoring Team will confirm the patency of the original TDG membrane by pressurizing the sensor with soda water. All damaged, unresponsive TDG membranes will be marked. Each unit's TDG membrane will be removed, cleaned and allowed to dry. With the TDG sensor exposed to air, the barometric pressure will be recorded and compared to the atmospheric barometric pressure reading from the Hydrolab Surveyor barometer or its equivalent. A one-point calibration will be conducted if the TDG pressure reading in air differs from the secondary source by more than 2 mm Hg. Once calibrated, the Monitoring Team will install a new TDG membrane and confirm its patency by again pressurizing the sensor with soda water.

3.3.1.1.4 Post-Season Field Verification

Following the end of each annual Post Falls HED and Washington TDG (Golder 2010) monitoring season, all units used for TDG monitoring will undergo post-season field verification following procedures identical to pre-season field verification (with the exception that mass *in situ* verification will not be conducted). All differences in TDG pressure, dissolved oxygen, temperature, and depth will be recorded. These differences, if substantial, will be used to qualify and correct the data for periods when the unit was out of calibration.

3.3.2 Data Quality Control

Golder Associates Inc. (Golder) will document records of factory calibration in its project files, and provide copies of them and completed field forms to Avista, upon request. This will include records of when the equipment is sent to and received from the manufacturer along with a record of servicing done by the manufacturer. All calibration done by Golder, as outlined above, will be recorded on datasheets. The hardcopies for all field forms will be scanned and saved as PDF files on a Golder file server. As a redundant protective measure, field notes and calibration forms will also be photocopied and the original stored in a fire-proof area.

Spot measurements will be conducted at approximately 2-week intervals during the high-flow spill season. The spot measurement results and corresponding dates and times will be documented in the field on each datasheet.

Golder will identify and remove outliers from downloaded TDG data and operations data, provided by Avista, by using Excel® to conduct conditional formatting and create comparative plots of the data. A second reviewer will verify the initial data review process and conclusions. The cleaned data will be plotted using Excel during the initial review process. A more sophisticated charting package, such as Sigmaplot®, may be required for final report figures of TDG and discharge data, especially to evaluate the effectiveness of the Interim Spill Gate Operating Protocols.

The quality of TDG data will be managed and evaluated following Data Quality Objectives as discussed in section 5.1 of this Monitoring Plan.

3.3.3 Inspection of Field Supplies and Materials

Prior to mobilization, all field monitoring supplies and materials will be inspected to ensure they are in proper condition and working order. Additional monitoring supplies will be brought into the field in the event that damage occurs.

3.4 Data Management

The Project Manager will ensure that the field forms are completed and data are downloaded, backed up, reviewed for outliers and data entry errors, and appropriately qualified and adjusted, if necessary. The Project Manager will ensure that the following information is included in the project files:

- Pre- and Post-field verification calibration checks
- Field forms and associated notes
- Quality assurance and quality control summaries
- Raw data including the water quality database and any related information or programs developed specifically for this purpose

3.5 Additional Data Collection Activities

The Monitoring Team also will acquire 15-minute flow data for USGS gage 12419000, Spokane River near Post Falls, Idaho for each year's TDG monitoring season. Real-time data (15-minute data) is available to download from the USGS website for the previous 60 days. Therefore, the Monitoring Team will need to go to the USGS website two times, once during the TDG monitoring season (March 15 to June 15) and once after the TDG monitoring season in order to download the flow data from March 15 to

June 15. These data will be provisional; therefore, the Monitoring Team will also request the final approved data from the USGS following the conclusion of the 5-year monitoring period.

The Avista License Implementation Team or Post Falls HED Plant Manager will provide the Project Manager with Post Falls HED operations data (including generation and usage of specific spill channels) annually shortly after the end of each TDG monitoring season during the 5-year period.

4.0 PROJECT MANAGEMENT

Golder, under the direction of the Avista License Implementation Team, will direct all project activities and will be responsible for scheduling and coordinating the sampling performed by the personnel conducting the field effort, data management, and analysis/reporting. An overview of the study hierarchy and channels of communication is provided in figure 4-1, and the person(s) fulfilling each role is provided in table 4-1. This TDG Monitoring Plan should be implemented for five years, with the TDG monitoring season occurring for spills associated with the high-flow season of March 15 through June 15.

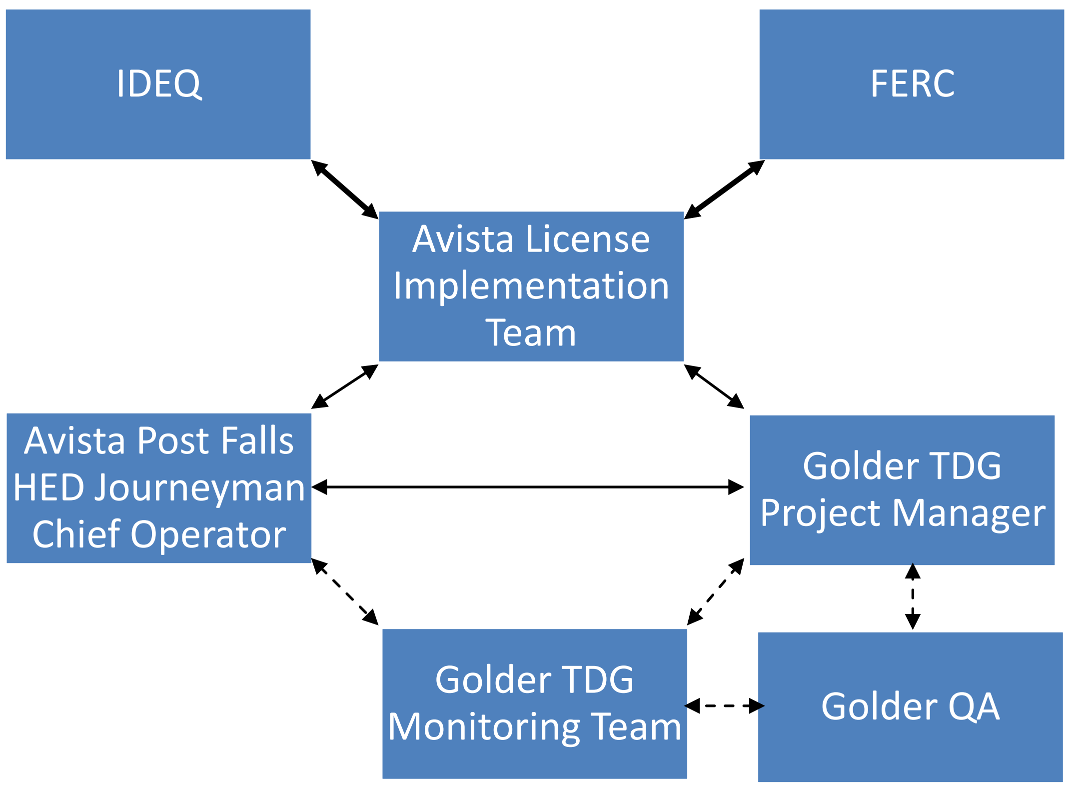

Figure 4-1 - Project Organization and Communication Channels for Post Falls HED TDG Monitoring Plan

Thick solid arrows indicate agency and public communication, thin solid arrows indicate management level communication, and dashed arrows indicate field level communication.

TABLE 4-1

Project Contacts

Position	Name
IDEQ	Robert Steed
FERC	George Taylor
Avista License Implementation Team	Speed Fitzhugh, Hank Nelson
Avista Post Falls HED Journeyman Chief Operator	Laroy Dowd
Golder TDG Project Manager	Brian Mattax
Golder TDG Monitoring Team	Paul Grutter, Max Birdsell
Golder QA	Alyssa Neir

5.0 MONITORING PLAN GOALS

5.1 Data Quality Objectives

Data quality objectives (DQOs) are the quantitative and qualitative terms used to specify the quality of data needed to meet the Monitoring Plan's specific goals. DQOs for data measurement are also referred to as data quality indicators, and include: precision, accuracy, measurement range, representativeness, completeness, and comparability. Below, we describe the DQOs for the TDG measurements for this study. Measurement Quality Objectives (MQOs) are the performance or acceptance thresholds or goals for the project's data, based primarily on the data quality indicators precision, bias and sensitivity. MQOs that will be used for this Monitoring Plan are displayed in table 5-1.

TABLE 5-1

Measurement Quality Objectives (MQOs) for Post Falls HED TDG Monitoring Plan

Parameter	MQOs
Barometric Pressure	2 mm Hg
Temperature	0.5ºC
Total Pressure	1% (5 to 8 mm Hg)
TDG%	1%

5.1.1 Precision

Precision refers to the degree of variability in replicate measurements; however, the precision of the results from continuous monitoring instruments cannot be estimated from replicate measurements. Therefore, the potential variability of TDG results may be indicated by agreement among the simultaneous results from two or more instruments, either during calibration or in the field. Instrument precision will be evaluated through the calibration and maintenance activities described in Section 3.3.1.1. Most TDG measurements are expected to fall into the range of 100 to 120 percent of saturation. The Idaho State criterion currently is set at 110 percent of saturation. MQOs are equal to DQOs and equal to 1 percent of saturation. MQOs will be met if spot TDG meter readings are within 1 percent of saturation or 5 mm Hg of duplicate spot measurements taken using portable Hydrolabs or equivalent instrumentation. If MQOs are not met, the differences will be evaluated but the data will not be qualified or discarded unless other information indicates a problem with the data.

TDG percent of saturation values are dependent on barometric pressure readings, so MQOs are also necessary for measurements of barometric pressure taken using portable Hydrolabs. The target for this project will be an MQO of 2 mm Hg for the field barometer measurements taken with a Hydrolab Surveyor. The barometric pressure MQO will be evaluated by paired readings with a field barometer, Hydrolab pressure sensor with the TDG membrane removed, or a known National Institute of Standards and Technology (NIST) pressure source at either a nearby USGS gage station or airport. The barologgers used at Long Lake and Nine Mile HED as part of the Washington TDG Monitoring Plan will be used, as needed, to provide back-up barometric pressure data.

Water temperature data also will be collected because it can influence TDG. Since this is a parameter of secondary importance to the study, associated DQOs have not been established. However, an MQO has been set at 0.5°C. Data will be reported if post-calibration shows that the temperature is within the MQO. Data associated with post-calibration that do not fall within the MQO will be flagged and not included in the “clean” data.

The quality of existing data will be evaluated where available. Sources within well-established programs will be acceptable based on the credibility of the source (such as the U.S. Geological Survey or National Weather Service data). The variability of data will be reviewed to evaluate whether it is appropriate based on expected values and comparison between data sets. Data that have much more or much less variability than expected will not be used unless documentation shows it’s quality is moderate or better.

5.1.2 Accuracy and Bias

Accuracy is a measure of confidence that describes how close an analytical measurement is to its "true" value, or the combination of high precision and low bias. Refer to table 3-2 for the accuracy of each measured parameter. At the end of each Post Falls HED TDG seasonal monitoring study, all MS5s will undergo post-season field verification procedures as described in Section 3.3.1.1.4. All differences between TDG pressure, dissolved oxygen, temperature, and depth will be recorded and these differences, if substantial, used to qualify and correct the data for periods when the unit was out of calibration.

TDG meters, like other field monitoring equipment, are subject to bias due to systematic errors introduced by calibration, equipment hardware or software functioning, or field methods. Bias will be minimized by following standard protocols for calibration and maintenance and by following field protocols for stabilization of meter readings. Bias is difficult to assess for TDG field measurements, because a more accurate verification method, such as a laboratory standard, is not available. No DQOs are being set for bias.

5.1.3 Measurement Range

Measurement Range is the range of reliable readings of an instrument or measuring device, as specified by the manufacturer. Refer to table 3-2 for the range for each measured parameter. Annual maintenance of field sampling equipment will be conducted in a manner consistent with the manufacturer’s recommendations and records of all maintenance activities will be recorded and included with the field notes.

5.1.4 Representativeness

Representativeness is the extent to which the measurements actually represent true environmental conditions. For this project, representativeness will be addressed through design of the sampling program, which will ensure that the monitoring locations are properly located and sufficient data are collected to characterize TDG at that location. This includes comparing duplicate spot measurements.

5.1.5 Completeness

Completeness is the amount of usable data that is actually collected in comparison to the amount of data that should be collected, expressed as a percentage. Data may be determined to be unusable in the validation process if the data set does not meet the completeness designated for the project. A project completeness of greater than 80 percent is expected under normal operating conditions. If project completeness is less than 80 percent, an evaluation will be done to 1) identify primary cause(s) for data gap(s), 2) identify/implement corrective measures to minimize future data gaps, and 3) determine the extent to which the missing data limit the Monitoring Plan's objective of confirming the effectiveness of the Interim Spill Gate Operating Protocols. Completeness will be evaluated and documented throughout all monitoring activities and corrective actions taken as warranted on a case-by-case basis.

5.1.6 Comparability

Comparability is the degree to which data can be compared directly to previously collected data of the same parameter. Comparability will be achieved through the selection of sampling locations that are in proximity to previously monitored stations along with procedures and analyses that are consistent with the 2003/2004 TDG studies (Golder 2003, 2004).

5.2 Training Needs and Certifications

All personnel will be qualified scientists with relevant experience; however, no special training or certifications are required for samplers or data managers involved with this Monitoring Plan. Strict adherence to sampling methods defined in this Monitoring Plan is required to ensure compliance with DQOs.

6.0 RECORDS MANAGEMENT AND REPORTING

The following documents will be produced during this monitoring program:

1. *Field Notebooks, Data Sheets, and Related Forms*. These will be produced during the course of the field component of the monitoring program.

2. *Data Files*. Raw TDG data will be compiled as soon as practicable after each site visit and consolidated at the end of each year's TDG monitoring season.

3. *Project Reports*.

    a. *Following the* first, third, and fourth annual TDG monitoring seasons, Golder will compile all data collected and acquired for the previous Post Falls HED TDG monitoring season, and conduct a QA audit of the data to minimize data quantity/quality issues. Golder will include a data quality summary, and time series charts of TDG along with flows reported by the USGS and spill channel usage.

    b. Following the second TDG monitoring season, Golder will prepare a report that determines whether additional monitoring will be needed to confirm the effectiveness of the Interim Spill Gate Operating Protocols. The report will present recommendations for the future monitoring strategy supported with rationale for any changes to the monitoring program.

    c. Following the fifth TDG monitoring season, Golder will prepare a Five-Year Report, which consolidates data from all five TDG monitoring seasons. This report will evaluate whether the Interim Spill Gate Operating Protocols are effective at reducing TDG levels in the Post Falls HED tailwater, and include a data quality summary, time series charts of TDG along with spill and generation flows, and charts of TDG in the tailrace compared with TDG in the forebay.

Additional project documents may be produced during the course of the monitoring program, and will be maintained by the Project Manager including communication records such as emails, telephone, fax, and written correspondence.

7.0 QUALITY ASSURANCE OVERSIGHT PROCESS

7.1 Quality Assurance Review Process

Prevention is the primary mechanism through which DQOs will be met. Thoughtful planning and design, including documented instructions and procedures, and use of qualified and experienced personnel will all be implemented to prevent data quality and quantity problems. The effectiveness of this monitoring program's ability to prevent data quantity and quality problems will be evaluated by the Project Manager throughout each year and further evaluated by Avista annually. The Project Manager will provide Avista notification of whether the DQOs were met each year and, if appropriate, any planned corrective actions to address not meeting them. As appropriate, Avista will notify IDEQ of these challenges and corrective actions.

7.2 Quality Assurance Response Actions

In the event that a quality assurance review identifies problems with this study's data, response actions will be implemented, as appropriate. The nature of any actions taken will depend upon the severity and type of problem, and will begin with a review of project procedures related to the identified problem(s). For any field-related issues such as an inoperable TDG meter, the Monitoring Team will notify the Project Manager as soon as practical. The Project Manager will notify a member of the Avista License Implementation Team of both field and office related issues that are identified and recommend a response to the issue. Avista's License Implementation Team will then decide whether to implement the recommended action and/or another response to the issue. Avista will inform IDEQ of any quality assurance issues identified and the responses to these issues that were taken at a minimum annually. Should Avista determine that it is important to discuss an issue and/or response, a conference call or meeting will be scheduled with Avista, IDEQ and, the Project Manager, as appropriate.

Additional response actions may include the following preventative and corrective actions:

- **Preventive Response Actions -** These measures are directed at preventing the identified problem from being repeated:
  - A high-level of monitoring project activities associated with the problem
  - Implementing a new system of audits to determine consistency with procedures outlined in this Monitoring Plan, and identifying appropriate corrective measures
- **Corrective Response Actions -** These measures will result in a correction of the problem and replacement of the data affected by the problem:
  - Implement appropriate corrective measures identified to address problems identified (see above)
  - Re-analyze data associated with the problems that are or may be related to procedures
  - Exclude data that are inconsistent with DQOs from the final product

8.0 DATA VALIDATION

8.1 Data Verification

Data verification refers to the routine checks the Project Manager conducts in ensuring that the Monitoring Plan is followed, as well as to the quality control procedures. At a minimum, data verification will include evaluation of sampling documentation, compliance with sample methods, and method quality control sample results.

8.2 Data Validation Feedback Mechanism

Data validation refers to the confirmation by examination and provision of objective evidence that the particular requirements for the intended use of data have been met. Data will be reviewed to check for calculation and transformation errors, verify measurements are within calibration range, verify that the TDG sensors were at an appropriate depth, and identify data entry errors. Various computer software programs, including Microsoft Excel may be used to assist in the data review process to identify data which may be erroneous.

The verified data will be evaluated according to the project DQOs. At a minimum, the validation process will include an evaluation of the overall quality of the data based on a review for potential transcription errors, data omissions, and suspect or anomalous values. Anomalous and suspect values will be noted and an explanation provided.

9.0 REFERENCES

Avista Corporation (Avista). 2005. Post Falls Hydroelectric Project, Currently Part of Project No. 2545, Final Application for New License Major Project - Existing Dam Volume I Exhibits A, B, C, D, F, G, and H. July 2005.

Federal Energy Regulatory Commission (FERC). 2009. Project Nos. 2545-091 12606-000 Order issuing New License and Approving Annual Charges for Use of Reservation Lands. Issued June 18, 2009.

Golder (Golder Associates Inc.). 2003. Total Dissolved Gas Pressure (TDG) Monitoring on the Spokane River 2003 Data Report. Prepared for Avista Corporation. Prepared by Golder Associates Inc. October 2003.

Golder (Golder Associates Inc.). 2004. Total Dissolved Gas Pressure (TDG) Monitoring on the Spokane River 2004 Final Data Report. Prepared for the Spokane River Water Resources Work Group and Avista Corporation. Prepared by Golder Associates Inc. September 2004.

Golder (Golder Associates Inc.). 2010. Washington Total Dissolved Gas Monitoring Plan, Washington 401 Certification, Section 5.4(A), Spokane River Hydroelectric Project, FERC No. 2545. Prepared for Avista Corporation. March 26, 2010.

Idaho Department of Environmental Quality (Idaho DEQ), 2005. Letter from Robert Steed, Surface Water Ecologist, Idaho Department of Environmental Quality, to Paul Pickett, Dated June 9, 2005. (not seen, as cited by Ecology, 2005).

Washington State Department of Ecology (Ecology). 2005. Assessment of Total Dissolved Gas in the Spokane River at Upriver and Little Falls Dams. Authored by P.J. Pickett. Prepared by the Washington State Department of Ecology. July 2005. Ecology Publication No. 05-03-010. 58 pp.

APPENDIX A
AVISTA OPERATOR'S SPECIFIC
INTERIM SPILL GATE OPERATING PROTOCOLS

Avista Operator's Specific Interim Spill Gate Operating Protocols

The following Interim Spill Gate Operating Protocols and procedures were provided by Avista (Nelson 2010a; 2010b):

Nelson, Hank. 2010a. Personal communication (e-mail) between Hank Nelson (Environmental Coordinator, Avista Corporation) and Brian Mattax (Sr. Aquatic Scientist, Golder Associates Inc.) FW: PF TDG Option A, March 23, 2010.

Nelson, Hank. 2010b. Personal communication (e-mail) between Hank Nelson (Environmental Coordinator, Avista Corporation) and Brian Mattax (Sr. Aquatic Scientist, Golder Associates Inc.) FW: PF TDG Option B, March 23, 2010.

Interim Spill Gate Operating Protocols

Option A

1. Tainter gates 1-8, which includes the log gate (See SOP for North Channel Tainter Gates/Log Gate Operations)

2. South Channel Spill Gates (See SOP for South Channel Spill Gates Operations)

3. North Channel Sector Gate (See SOP for Sector Gate Operations)

Option B

1. Tainter gates 1-8, which includes the log gate (See SOP for North Channel Tainter Gates/Log Gate Operations)

2. North Channel Sector Gate (See SOP for Sector Gate Operations)

3. South Channel Spill Gates (See SOP for South Channel Spill Gates Operations)

Standard Operating Procedure (SOP)
North Channel Tainter Gates/Log Gate

Operations

Opening Spill gates

1. In Plant control room turn on the Down Stream Warning System in panel (2C).

2. Make a visual inspection of the immediate downstream area to be clear of all recreators.

3. Make sure boat launch is closed at Q'emlin Park. If not, close the launch and change launch signs to closed or temporarily closed.

4. Check that boaters safety cables are in place and secure.

5. Turn on Spokane Street bridge sign (Spill gates open / Stay Away). Breaker located under Spokane Street bridge.

6. Starting at tainter gate 7, open motor compartment door. Press raise on local switch to open tainter gate until limit switch stops it. Continue to log gate if needed depending on water in flows and forebay level.

Note: *If you're going wide open with the gate never leave the gate while running and always open the gate to the upper limit switch making sure the gate stops with the limit switch.*

7. In plant control room turn off Down Stream Warning System in panel (2C).

8. Notify Generation Control Center (GCC) and System Operator (SO) with gate and water information. Record gate and water information in logbook / load sheet.

9. Notify Hydro Safety Coordinator with time that spill was underway.

When closing spill gates ramping rate calculator must be used.

Note: Use the Ramp Rate Calculator each time you close a spill gate. It's located on PF3 in control room or GCC 14

1. Calculate how much water can be decreased using down ramping calculator. Also using tainter / log gate water table book, (located in PF control room / GCC).
2. If all tainters are open, start closing at tainter gate 1 toward tainter 8.
3. Open motor compartment door, press lower on local switch.
4. Stop tainter gate when needed by pressing stop on local switch. Or close tainter gate completely until lower limit switch stops it.
5. Call GCC and SO with gate and water information. Record gate and water information in logbook / load sheet.

Closing last spill gate for Spill Season

Note: Use the Ramp Rate Calculator each time you close a Spill gate. It's located on PF3 in control room or GCC 14

1. Calculate how much water can be decreased using down ramping calculator. Also using tainter gate / log gate water table book, (located in PF control room / GCC).
2. Open motor compartment door, press lower on local switch.
3. Stop tainter gate / log gate when needed by pressing stop on local switch. Or close gate completely until lower switch stops.
4. Turn off Spokane Street bridge sign. Breaker is located under Spokane Street bridge (North side).
5. Call GCC and SO with gate and water information. Record gate and water information in logbook / load sheet.

Standard Operating Procedure (SOP)
South Channel Spill Gates

Operations

To Open South Channel

NOTE: Check that Boat launch is closed, boaters safety cable is in place, and that recreators are clear of South Channel before opening spill gates.

1. Inspect mule hoist and cord before operating.
2. Close in the 3 disconnects for mule.
3. Using the hydraulic controls position the mule in front of spill gate stems.
4. Engage mule gear rack with the spill gate operating mechanism.
5. Place shims below mule support located on concrete pedestal.
6. Start motor and raise spill gate to fully raised position.
7. Set safety legs in spill gate rack to hold gate from dropping.
8. Disconnect the mule and move to next spill gate.
9. Proceed to lift all six spill gates to fully raised position.
10. Report all spill gate operation to GCC and SO.

To Close South Channel Gates

NOTE: When closing South Channel spill gates cross load spill with North Channel tainter gates. Use ramping calculator to maintain down ramping guidelines located on PF3/GCC14.

1. Inspect mule hoist and cord before operating.
2. Close in the 3 disconnects for mule.
3. Using the hydraulic controls, position the mule in front of spill gate stems.
4. Engage mule gear rack with the spill gate operating mechanism.
5. Place shims below mule support located on concrete pedestal.
6. Start motor and raise spill gate to disengage safety legs.
7. Start motor and lower spill gate to closed position.
8. Disconnect the mule and move to next spill gate.
9. Repeat steps 3-7 until all six spill gates are closed.
10. Report all spill gate operation to GCC and SO.

Standard Operating Procedure (SOP)
Sector Gate

Operations

Opening the Sector Gate

1. Before opening the Sector gate, calculate how many tainter gates you need to close to maintain or increase flows from the North Channel which depend on the inflows to Coeur d’Alene Lake.

2. Start closing (Cross loading) the number of tainter gates needed to maintain or increase North Channel flows. See SOP for closing tainter gates.

3. Once the tainter gates start getting into the water, start opening the sector gate by closing the 240-volt power supply breaker located in the east gate house and then with the sector gate control buttons push and hold the open button. Open the sector gate to about 1 foot and stop. Allow the tainter gates that are closing to catch up. Keep doing this until the tainter gates are closed and the sector gate is wide open. The lower limit will stop the tainter gates and the upper limit will stop the sector gate.

4. Allow the forebay level to balance out and calculate if another tainter gate should be opened or closed.

5. Notify GCC and SO with gate and water information. Record gate and water information in logbook / load sheet.

Closing Sector Gate

Note: Use the Ramp Rate calculator each time you close sector gate. Calculator is located on PF3 in control room or GCC14.

1. Before closing the sector gate, calculate how many tainter gates you need to open to maintain or decrease flow per required down-ramping rate.

2. Close the 240-volt power supply breaker in the east gate house and with the hand held push button controls push the lower button until the gate touches the water.

3. Start opening (Cross loading) the number of tainter gates you will need to maintain or decrease flow. See SOP for opening tainter gates.

4. Start closing the sector gate one foot at a time to maintain an even North Channel flow.

5. The upper limits will stop the tainter gates and the lower limit will stop the sector gate.

6. Allow the forebay level to balance out and calculate if another tainter should be opened or closed.

7. Notify GCC and SO with gate and water information. Record gate and water information in logbook / load sheet.

APPENDIX B

CONSULTATION RECORD

Consultation associated with development and approval of Post Falls HED TDG Control and Mitigation Program included:

- May 14, 2010 – Avista (Speed Fitzhugh) submitted to IDEQ (Robert Steed) for review and approval its draft Post Falls HED TDG Control and Mitigation Program.
- June 10, 2010 – IDEQ (Robert Steed) sent a letter to Avista (Speed Fitzhugh) approving the Program.

May 14, 2010

Mr. Bob Steed
Idaho Department of Environmental Quality
2110 Ironwood Parkway
Coeur d'Alene, ID 83814

Re: Federal Energy Regulatory Commission's Spokane River Hydroelectric Project (FERC Project No. 2545-091) License, Ordering Paragraph H – Total Dissolved Gas Control and Mitigation Program

Dear Bob:

On June 18, 2009 the Federal Energy Regulatory Commission (FERC) issued a new license for the Spokane River Hydroelectric Project, FERC Project No. 2545 (License). Ordering Paragraph H of the License requires Avista to develop a Total Dissolved Gas Control and Mitigation Program (Program). Avista is required to develop and submit the Program to Idaho Department of Environmental Quality (IDEQ) for approval by June 18, 2010.

The purpose of the Program is to provide for the monitoring, evaluation, control and mitigation of dissolved supersaturation associated with the operations of Avista's Post Falls Hydroelectric Development.

Avista will implement the Program upon IDEQ's approval. If you have any questions, or have comments on the Program please let me know. I can be reached at (509) 495-4998. In my absence please feel free to contact Hank Nelson at (509) 495-4613.

Sincerely,

Elvin "Speed" Fitzhugh
Spokane River License Manager

Enclosure

STATE OF IDAHO
DEPARTMENT OF
ENVIRONMENTAL QUALITY

2110 Ironwood Parkway • Coeur d'Alene, Idaho 83814-2648 • (208) 769-1422

June 10, 2010

Elvin "Speed" Fitzhugh
Project Manager
Avista Utilities
PO Box 3727
Spokane, Washington 99220-3727

Subject: Federal Energy Regulator Commission's Spokane River Hydroelectric Project, FERC Project No. 2545 License, Ordering Paragraph H – Total Dissolved Gas Control and Mitigation Program

Dear Mr. Fitzhugh:

On May 14, 2010, Avista requested approval of the May, 2010 draft version of the Post Falls Hydroelectric Development Total Dissolved Gas Control and Mitigation Program (the Program). The Idaho Department of Environmental Quality (DEQ) requests that the Program finalized and implemented as is.

The May, 2010 version of the Program is consistent with Idaho's Water Quality Certification requirements and meets Federal Energy Regulatory Commissions' Spokane River Hydroelectric Project (FERC Project No. 2545) License, Ordering Paragraph H. DEQ approves the Plan as submitted by Avista.

If you have any questions regarding this approval, feel free to call me at (208) 769-1422

Sincerely,

Robert Steed
Surface Water Ecologist

RS/dh

c: Dan Redline, IDEQ
Jim Fredricks, IDFG