CONSTRUCTION WATER
QUALITY ASSURANCE PROJECT PLAN
ENLOE DAM WATER QUALITY MONITORING

ENLOE HYDROELECTRIC PROJECT
(FERC PROJECT NO. 12569)

FEBRUARY 2012

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ACRONYMS AND ABBREVIATIONS

BMP	Best Management Practice
CESCL	Certified Erosion and Sediment Control Lead
cfs	cubic feet per second
°C	degrees Celsius
District	Public Utility District No. 1 of Okanogan County
DQO	data quality objective
Ecology	Washington State Department of Ecology
EPA	Environmental Protection Agency
FERC	Federal Energy Regulatory Commission
MQO	measurement quality objective
NPDES	National Pollutant Discharge Elimination System
NTU	nephelometric turbidity units
Project	Enloe Hydroelectric Project
QA	quality assurance
QA/QC	quality control quality assurance
QAPP	Quality Assurance Project Plan
RPD	relative percent difference
SOP	Standard Operating Procedure
SRP	Spill Response Plan
SWPPP	Stormwater Pollution Prevention Plan
WAC	Washington Administrative Code
WQMP	Water Quality Management Plan

1.0 QUALITY ASSURANCE PROJECT PLAN

1.1 PROJECT BACKGROUND

The Public Utility District No. 1 of Okanogan County (District) is obtaining a Federal Energy Regulatory Commission (FERC) license to redevelop and operate a hydroelectric power generation project at the existing Enloe Dam site. The Enloe Hydroelectric Project (Project) will be located on the Similkameen River about 3.5 miles northwest of the City of Oroville, in north-central Washington. The Project boundaries are show in Figure 1.

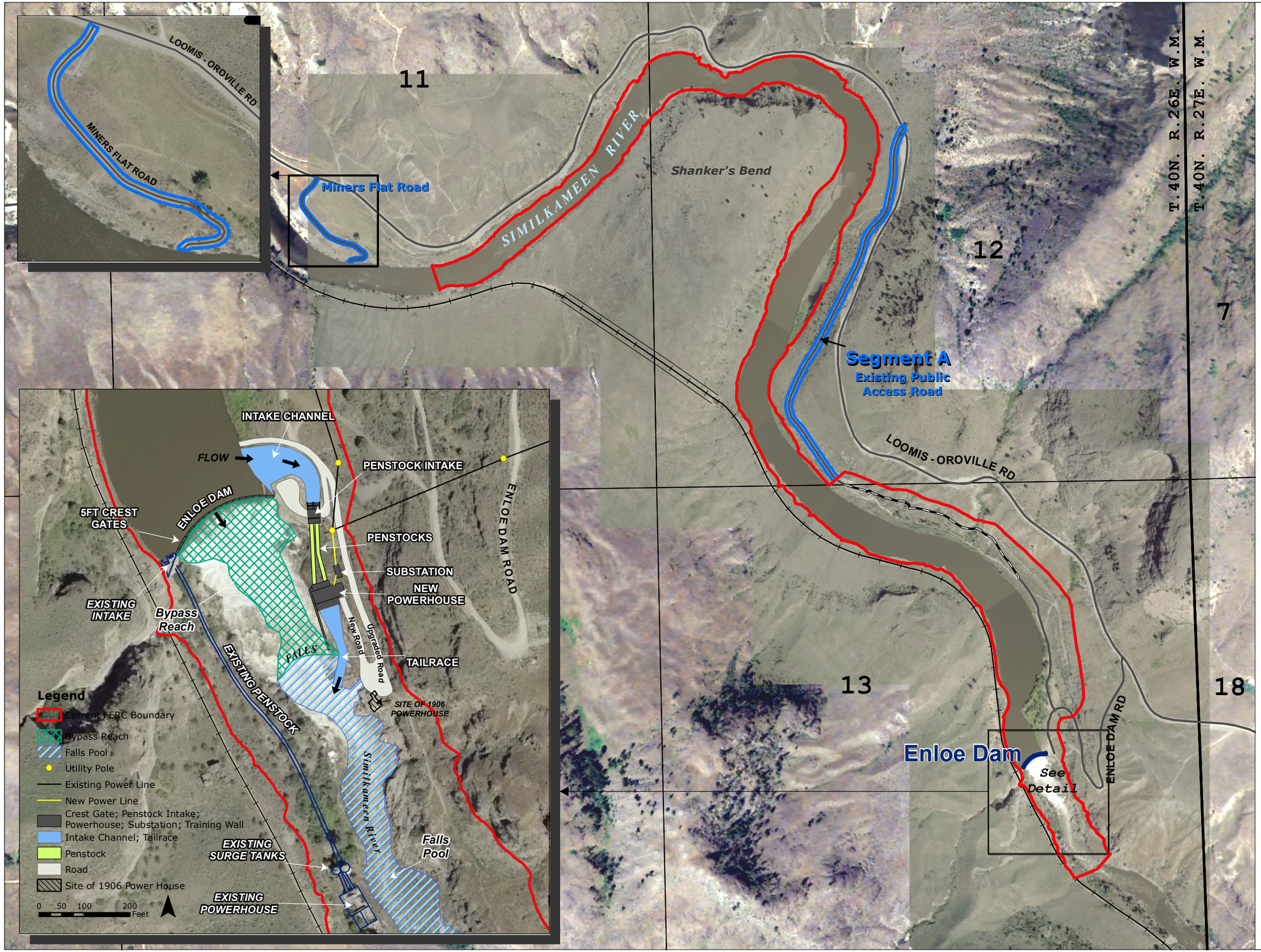
1.2 HYDROELECTRIC PROJECT DESCRIPTION

The existing concrete gravity arch dam is owned by the District and was completed in 1920 by the Okanogan Valley Power Company for the purpose of power generation. The dam is a 54 foot high structure designed to be overtopped. The crest of the spillway is at 1,044.3 feet, and replacement of removable 5 foot flashboards by crest gates that will raise the normal water surface elevation to 1,048.3 feet for most of the year except during spring runoff when the gates will be lowered and the water surface elevation will be controlled by the existing spillway crest. Over the years, much of the reservoir has been filled with sediment. The dam now creates a pool approximately two miles long and 200-feet wide with an average depth of nine feet and a surface area of approximately 50 acres.

The Project will redevelop hydroelectric power generation by building a new power plant on the east bank of the river closer to the dam. The Project would not restore the existing power plant, which was decommissioned over 50 years ago. As part of the Project, the existing dam will be refurbished to meet current dam safety requirements and to extend its service life.

The Project will operate in a run-of-river mode, meaning that flow through the turbines will be regulated to match the natural flow in the river so that inflow and outflow from Enloe Reservoir are similar. When river flow exceeds turbine hydraulic capacity (1600 cfs), the surplus will be discharged over the existing spillway.

The new proposed Project configuration reduces potential environmental impacts to water quality immediately downstream of the dam by moving the powerhouse upstream closer to the dam and replacing sections of penstock with open channel, thereby reducing the bypass reach from about 900 feet to the roughly 370 feet between the dam and the natural waterfall below it. This modification also provides continuous flow downstream of the falls. Construction of the headworks of the Project will involve excavating an entrance to the approach channel on the northeast bank of the reservoir just upstream from the dam. Preliminary design concepts include a tapered trapezoidal approach channel between the river and an intake structure at the head of two penstocks which deliver water to the new hydro powerhouse. A tailrace channel will return water from the powerhouse to the Similkameen River near the base of the existing waterfall.



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Following extensive consultation and analyses to develop a Clean Water Act §401 water quality certification, the Project will provide the following minimum instream flows in the river reach below Enloe Dam and above the Project tailrace: 30 cfs from mid-July to mid-September, and 10 cfs for the rest of the year. To regulate the bypass flows and protect water quality for limited fish use and aesthetic benefits, water is proposed to be released through an existing penstock intake in the west abutment of the dam where it will be piped to a point of discharge to the existing plunge pool at the base of the dam.

1.3 WATER QUALITY STANDARDS

The water quality standards that will be most pertinent during construction of the Project are turbidity and pH. The Water Quality Standards for Surface Waters of the State of Washington (Chapter 173-201A WAC) were most recently updated effective December 21, 2006 (Ecology 2006), and the standards were approved by the Environmental Protection Agency (EPA) on February 11, 2008. Among the designated uses for the lower Similkameen River are salmonid spawning, rearing, and migration. During Project construction, the standard's numerical criteria for turbidity are important for the protection of designated beneficial uses. During both Project construction and operations, narrative water quality standards dictate that aesthetic values must not be impaired by materials or their effects, excluding those of natural origin, which offend the senses of sight, smell, touch, or taste (e.g. an oil sheen from a petroleum fuel or lubricant that enters the river from construction equipment).

1.3.1 Turbidity Criterion

Turbidity is measured in nephelometric turbidity units (NTUs). As summarized in Chapter 173-201A WAC, the turbidity criterion for salmonid spawning, rearing, and migration are as follows:

Turbidity will not exceed 5 NTU over background turbidity when the background turbidity is 50 NTU or less, or have more than a 10 percent increase in turbidity when the background turbidity is more than 50 NTU.

Background, or natural conditions, is defined as water quality conditions before construction of any dams or other human influences.

As stated in Chapter 173-201A WAC, this turbidity criterion "shall be modified, without specific written authorization from the department, to allow a temporary area of mixing during and immediately after necessary in-water construction activities that result in the disturbance of in-place sediments." This temporary area of mixing is subject to the constraints of WAC 173-201A-400 (4) and (6) and can occur only after state permits and approvals, and after the implementation of appropriate BMPs to avoid or minimize disturbance of in-place sediments and exceedances of the turbidity criteria. Based on historical and expected stream flows, the temporary area of mixing shall be as follows:

for waters above 100 cfs flow at the time of construction, the point of compliance shall be 300 feet downstream of the activity causing the turbidity exceedance.

For upland discharges, the point of compliance will be at a location designated by the Certified Erosion and Sediment Control Lead (CESCL) based on where construction activities are occurring and/or at a location where storm water is observed to be discharging into the Similkameen River.

1.3.2 pH

For the salmonid spawning, rearing, and migration aquatic use category, pH shall be within the range of 6.5 to 8.5 with a human caused variation of less than 0.5 units. Construction using concrete within the Similkameen River will be isolated from river water until the concrete has cured for at least seven days, thus there will be no contact between newly poured concrete and river water. In the event that stormwater contacts newly poured concrete, pH sampling would be conducted at the identified upland construction site discharge points after each 24-hour rainfall event of 0.5 inch or greater, or if construction site discharge is observed.

The point of compliance for upland discharges during storm events will be at a location designated by the CESCL based on where construction activities are occurring and/or at a location where storm water is observed to be discharging into the Similkameen River.

1.3.3 Petroleum Hydrocarbons

Section 260 of Chapter 173-201A WAC defines narrative criteria for toxics and aesthetic values that apply to all existing and designated uses for fresh and marine water:

(a) Toxic, radioactive, or deleterious material concentrations must be below those which have the potential, either singularly or cumulatively, to adversely affect characteristic water uses, cause acute or chronic conditions to the most sensitive biota dependent upon those waters, or adversely affect public health.
(b) Aesthetic values must not be impaired by the presence of materials or their effects, excluding those of natural origin, which offend the senses of sight, smell, touch, or taste.

Accidental leaks and spills of chemicals or fluids (including petroleum-based products) from construction processes. Construction equipment could release substances containing petroleum hydrocarbons directly to surface water that is protected by the narrative criteria of Chapter 173-201A.260 WAC. Such a release could potentially cause adverse effects to aquatic biota or impair aesthetic values. Actions to be taken during a spill if one should occur are described in the Spill Response Plan (SRP; District 2009b). In addition to equipment inspections during project operations, periodic monitoring will be conducted to determine if there is evidence of any oil sheen on the Similkameen River downriver from the powerhouse.

1.4 WATER QUALITY PROTECTION PLANS

Spill Response Plan

The Spill Response Plan (SRP; District 2009b) describes the measures be taken to prevent, contain, and clean up oil or hazardous waste spills should they occur during construction activities associated with the project. The purpose of this SRP is to establish procedures, methods, equipment, and other measures to prevent the discharge of oil or hazardous materials to water bodies or upland areas during construction. The SRP details planning and prevention, material handling and storage, spill management, and spill notification responsibilities.

Construction Sediment Management Plan

The Construction Sediment Management Plan (District 2012) describes proposed construction activities and sediment management measures to be employed during construction of the project. Proposed activities include construction of the crest gates, intake channel, penstock intake, penstocks, powerhouse, tailrace, access road, and recreation area. This plan describes the BMPs that will be utilized to minimize sediment disturbance and maximize sediment containment within the Similkameen River, including the reservoir above the Enloe Dam during construction of the proposed infrastructure related to the project.

Erosion and Sediment Control Plan

The Erosion and Sediment Control Plan (District 2009a) describes proposed construction activities and erosion and sediment control measures to be employed during construction of the project. This plan describes the measures to address or mitigate erosion and provide sediment control during construction. Activities include improvements to existing dam and spillway, construction of the crest gates, intake channel, penstock intake, penstocks, powerhouse, tailrace, access road, and recreation area. This plan describes the temporary erosion and control measures that may be employed during construction activities including construction access BMPs, control installation BMPs, soil stabilization BMPs, and slope protection BMPs.

2.0 CONSTRUCTION WATER QUALITY MONITORING PROJECT DESCRIPTION

The Clean Water Act §401 certification for the Project requires water quality monitoring, assessment and reporting according to an approved WQMP. This QAPP identifies the organization, schedule, monitoring approach, and reporting associated with water quality monitoring and management. The QAPP documents provide additional details on the data quality objectives, monitoring designs, sampling design, field and laboratory procedures, quality control, and data quality review protocols. The purpose of the QAPP is to provide detailed procedures to (1) guide the District in determining compliance with water quality standards during construction activities, and (2) inform adaptive management decisions during Project construction. A separate QAPP has been developed for water quality monitoring requirements during Project operation.

2.1 PROJECT CONSTRUCTION MONITORING

The following parameters constitute the monitoring requirements of the Enloe Hydroelectric Project §401 water quality certification during construction activities:

- Turbidity (daily during in-stream construction activities with potential to cause elevated turbidity)
- pH (only when concrete is used during construction and there is potential for it to enter the waters of the Similkameen River)

The standard methods used to collect these data are:

- Turbidity – Standard Method 2130 B. Nephelometric Method (APA 1998).
- pH – Standard Method 4500-H+B. Electrometric Method (APA 1998).
- Petroleum products – At a minimum, water will be inspected daily during project construction for the presence of sheen or for other indications that a petroleum spill has occurred in the Similkameen River. Samples will be collected and analyzed if there is a spill, according to procedures outlined in the Project's SRP (District 2009b).

The reporting requirements for these monitoring data are:

- Reporting requirements are summarized in Section 5 of this QAPP and are consistent with the requirements set forth in Ecology's Construction Stormwater General Permit (Ecology 2010).
- Water quality data posted to the District's Project website on a monthly basis (no later than the 30th day of the month following the previous month of monitoring during construction activities).
- An annual data report to Ecology in an approved format that includes a data assessment of compliance with water quality data, summaries of monitoring data, a tabulation of water quality criteria exceedances, if any, and a description of any

adaptive management actions that were implemented in response to monitoring results.

3.0 ORGANIZATION AND SCHEDULE

This section includes key personnel assigned to the monitoring project and an associated organizational diagram, a schedule for monitoring activities and project deliverables, and information on the monitoring budget and funding.

3.1 KEY PERSONNEL

This monitoring project will be conducted primarily by District personnel, the project's CESCL, and with contractor assistance as needed to expedite the monitoring activities and reporting, reduce costs, or assure quality. All monitoring project personnel will have sufficient training and experience to complete assigned activities at a high level of quality. Anticipated staff assignments are identified in Table 1.

Table 1. Key Personnel

Assigned Staff	Responsibility
Dan Boettger	*Okanogan PUD Regulatory and Environmental Affairs Director.* Responsible for Enloe Hydroelectric Project management, QAPP and report review and approval, and funding approval.
Nick Christoph	*Okanogan PUD Environmental Coordinator.* Responsible for monitoring project management, monitoring activities, data management and interpretation, and reporting.
Water Quality Specialist	*Water Quality Specialist.* Responsible for technical review and quality assurance for QAPP development, monitoring data collection, data interpretation and reporting.
Charlie McKinney	*Ecology Central Regional Office Water Quality Program Section Manager.* Responsible for oversight of Ecology participation in implementing the §401 water quality certification.
Patricia Irle	*Ecology Central Regional Office Hydropower Projects Manager.* Responsible project management of §401 water quality certifications.
Okanogan PUD Webmaster	*Okanogan PUD Webmaster.* Responsible for maintaining the Project website and posting monthly operations monitoring data, construction monitoring data, and annual water quality monitoring reports.
Construction Field Data Collection Team (includes CESCL)	*Field Data Collection Team/CESCL.* Responsible for the maintenance, calibration, and data collection during construction activities. Also responsible for health and safety during field operations, and documentation of field activities, including equipment maintenance and calibration.
Field Data Technician	*Field Data Technician.* Responsible for the maintenance, calibration, deployment, data downloading, and retrieval of water quality monitoring instruments. Also responsible for health and safety during field operations, and documentation of field activities, including equipment maintenance and calibration.

3.2 ORGANIZATIONAL DIAGRAM

The organizational relationships between persons responsible for implementing this QAPP are illustrated in Figure 2. In the course of implementing the WQMP and the Construction Monitoring QAPP, unforeseen field conditions may lead the team to deviate from specific details of these plans to best meet monitoring objectives. Any

deviations from the WQMP or Construction Monitoring QAPP would be communicated as soon as possible to the District's Environmental Coordinator and Ecology's Hydropower Projects Manager.

Figure 2. Organizational Diagram

3.3 SCHEDULE

3.3.1 Monitoring Schedule

The construction monitoring schedule is based on the §401 water quality certification monitoring requirements described in Section 2. Monitoring will begin when construction activities commence. Monitoring sites are expected to be located within Project boundaries. External permission will not be required to access these locations. Monitoring will begin when construction activities commence.

Table 2. Construction Monitoring Schedule

Parameter	Monitoring Schedule	Comments
Turbidity	Daily during in-stream construction activities	In upland areas, following storm events if water is discharged into surface water bodies.
pH	pH measurements would be collected if significant concrete work is being conducted where there is contact between concrete and the waters of the Similkameen River	In upland areas, following storm events if water is discharged into surface water bodies and only if there is potential for contact of concrete with the waters of the Similkameen River.
Petroleum Products	If petroleum is discharged into surface water bodies.	Evidence of oil sheen, if observed, will be reported by telephone and e-mail with 48 hours after observation.

3.3.2 Construction Reporting Schedule

Construction monitoring data will be posted to the District's Project website following sample collection for turbidity and/or pH throughout the construction monitoring period. Evidence of oil sheen, if observed, will be reported by telephone and e-mail within 48 hours after observation. All monitoring data will be summarized each year in an annual construction monitoring data report that will be submitted to Ecology in conjunction with the water quality data report in December.

3.4 MONITORING PROJECT BUDGET AND FUNDING

A preliminary budget has been developed to assist with Project planning (Table 3). This budget anticipates that a CESCL or District employee will be utilized to conduct the construction monitoring activities described in this QAPP. The CESCL and a Water Quality Specialist will be responsible for sample and data collection, quality assurance, data interpretation, and annual report preparation. The District will fund the monitoring and reporting.

Table 3. Summary of Estimated Budget for Monitoring and Reporting during Construction

Year	Equipment/Expenses	Labor	Total
1	$ 2,000	$ 15,000 – 25,000	$ 17,000 – 27,000
Total			**$ 17,000 – 27,000**

4.0 DATA QUALITY OBJECTIVES

The primary objectives for construction monitoring data are to ensure that project related BMPs and erosion and sediment control measures are protecting surface water resources, to evaluate compliance with water quality standards, and to assist in making adaptive management decisions. The purpose of the QAPP is to identify specific methods and standards used to obtain data of sufficient quality to meet these objectives. Data quality objectives (DQOs) are statistical statements of the level of uncertainty that a decision-maker is willing to accept as reflected in the results derived from environmental data. DQOs describe what data are needed and how the data will be used to address the water quality questions being investigated. The DQOs also establish numeric limits to ensure that data collected are of sufficient quality and quantity for data user applications.

The overall data quality objective (DQO) is to ensure that the monitoring project produces data of known and acceptable quality. Proper execution of this QAPP will yield consistent results that are representative of the conditions present during monitoring. All monitoring data will be summarized and reported in conventional units to facilitate comparability.

The decision quality objectives for construction monitoring are to:

- Generate monitoring data of sufficient quality to withstand scientific and regulatory scrutiny
- Collect data with methods and procedures appropriate to meet monitoring objectives, and
    - Implement monitoring methods and procedures in compliance with Ecology requirements for the §401 certification.

4.1 DECISION QUALITY OBJECTIVES

The monitoring program is designed to determine if water quality standards, including specific numeric criteria, are met during construction activities related to the Enloe Hydroelectric Project. The Monitoring Design (Section 5) addresses the requirements for representativeness, comparability and completeness to meet decision quality objectives.

4.1.1 Representativeness

Representativeness is the degree to which monitoring data reflect the true magnitude and variability of environmental conditions present in the Project area and during the period of interest. For this monitoring program, representativeness is a qualitative professional judgment exercised in the monitoring design, and is satisfied by ensuring that monitoring instruments are properly located and the frequency and timing of measurements is sufficient.

4.1.2 Comparability

Comparability is a qualitative professional judgment of the confidence with which one data set can be compared to another. For this monitoring program, water quality and discharge data will be compared to water quality criteria. Comparability will be achieved by consistently implementing monitoring methods and procedures at all field locations throughout the monitoring program, following standard operating procedures (SOPs) for monitoring instrument maintenance and calibration, and using consistent procedures for data management and reporting.

4.1.3 Completeness

Completeness is the number of valid monitoring results compared to the total number of monitoring results intended by the monitoring program design. Water quality monitoring instrument malfunctions are common in the field and typically result in completeness of less than 100 percent. A generally accepted goal for completeness is 90 percent. Completeness will be evaluated and documented throughout the monitoring program and corrective actions will be taken, as necessary, to maximize completeness.

4.1.4 Measurement Quality Objectives

For many of the field measurements to be conducted under this QAPP, MQOs are specified to determine if monitoring instruments are measuring the water quality parameters in an acceptable manner (Table 4). No MQOs are established for petroleum observations, a simple yes or no visual check.

Table 4. Measurement Quality Objectives

Parameter	Smallest Reference Level for Decision Making	Range of Instrument	Precision (Duplicate Measurements)	Bias/ Accuracy	Sensitivity/ Resolution
Turbidity	0.01 NTU	0 – 1000 NTU	20% RPD	+/- 2% + < 0.02 NTU	0.01 NTU
pH	0.01 units	0 – 14 units	20% RPD	+/- 0.2 units	0.01 units

RPD = relative percent difference

4.1.5 Precision

Precision, the reproducibility of measurements under a given set of conditions, is a measure of the scatter of data when more than one measurement is made. Precision can be expressed as the relative percent difference (RPD) between duplicate measurements. For turbidity, and pH, duplicate measurements will be obtained during sample collection and field data collection activities at a frequency of one in ten samples collected.

4.1.6 Bias/Accuracy

Accuracy is the degree of agreement between a measured value and its accepted “true” value, and is a measure of bias in a system. Bias will be minimized by following SOPs

for monitoring instrument calibration and maintenance and during laboratory QA/QC procedures.

4.1.7 Sensitivity

Sensitivity is the increment of change in an environmental parameter that is detected by the measurement method. For this monitoring program, sensitivity is the resolution or smallest increment recorded by the monitoring instruments.

5.0 MONITORING PROGRAM DESIGN

During construction, the water quality monitoring program design is focused on the compliance construction for turbidity and pH. Compliance will be monitored during storm events and/or during discharges to surface waterbodies, and during in-stream construction activities. Construction water quality monitoring locations upstream and downstream from the proposed intake channel, downstream of the proposed powerhouse, and downstream of the Project tailrace are conceptually designated in the Construction Sediment Management Program (District 2008b) and Erosion and Sediment Control Plan (District 2008a). Based on historical and expected stream flows (above 100 cfs at the time of construction), the point of compliance for downstream monitoring is expected to be 300 feet downstream of the activity causing the turbidity exceedance. Final monitoring locations will be agreed with the TRG, with the intent that flexibility will be allowed for field siting.

5.1 TURBIDITY

During construction of the intake channel, tailrace, powerhouse foundation, or any other instream activity, daily turbidity monitoring will be performed at select locations. Water will be collected from below the water surface using a dipper or equivalent sampling device. The collected sample will then be transferred to the sampling bottleware included with the turbidity meter. Turbidity will be measured with a HACH 2100P portable turbidity meter or equivalent and reported in Nephelometric Turbidity Units (NTUs).

As summarized in Chapter 173-201A WAC, the turbidity criteria for salmonid spawning, rearing, and migration should not exceed 5 NTU over background turbidity when the background turbidity is 50 NTU or less, or have more than a 10 percent increase in turbidity when the background turbidity is more than 50 NTU. If turbidity exceeds water quality standards (WAC 173-201A) due to any project-related event at any location and time, adaptive management will be conducted to reduce turbidity levels to acceptable levels.

During construction within the Similkameen River and impoundment above Enloe Dam, turbidity monitoring will be conducted daily at selected locations (points of compliance). The same criteria for turbidity and protocols if exceedances levels are met as outlined above will be followed.

5.2 pH

If required, pH would be measured using a hand-held pH meter or multi-parameter water quality meter in conjunction with the required turbidity sampling.

5.3 PETROLEUM COMPOUNDS

Sampling procedures to be taken regarding the potential for petroleum spills in surface water bodies or on uplands is addressed in the SRP (District 2009b). At a minimum,

water will be inspected daily during project construction for the presence of sheen or for other indications that a petroleum spill has occurred in the Similkameen River.

6.0 MEASUREMENT METHODS

6.1 TURBIDITY MONITORING

6.1.1 Upland Monitoring (Discharges to Surface Water Bodies)

Inspections and water quality monitoring activities will be conducted as specified in the National Pollutant Discharge Elimination System (NPDES) Construction Stormwater General Permit to be completed for the site construction activities (Ecology 2010).

All BMPs and sediment and erosion control measures used on-site must be inspected, maintained, and repaired by the CESCL and General Contractor as needed to assure continued performance of the intended function. Whenever inspection and/or monitoring reveals that BMPs are inadequate to fulfill their intended purpose, the BMP will be modified or replaced in a timely manner. Additionally, the Erosion and Sediment Control Plan will be updated to document these modifications.

Inspections will be carried out as follows: routine inspections must be performed by the CESCL at least weekly and within 24 hours after a rain event greater than 0.5 inches in a 24 hour period. All weekly written reports will include active construction activities as well as restored areas until re-vegetation is established. All inspections will be documented using the “Routine Inspection Form” provided in the Stormwater Pollution Prevention Plan (SWPPP; District 2008).

If site water is discharged into the Similkameen River or other surface water body, water quality monitoring will be conducted by the CESCL or general contractor. Water quality monitoring will include measurement of turbidity, and pH (if significant concrete work or engineered soils are used, as explained below) at all of the identified site discharge points after each 24-hour rainfall events of 0.5 inches or greater or if site discharge is observed. If turbidity at any of the site discharge points exceed the water quality standards (WAC 173-201A), then the Contractor shall make appropriate adjustments to the erosion control measures and update the Erosion and Sediment Control Plan. Turbidity will be measured with a HACH 2100P portable turbidity meter or equivalent and reported in Nephelometric Turbidity Units (NTUs). The point of compliance will be the location just prior to where the discharge water enters the Similkameen River.

Water samples would be collected directly into the sampling bottleware included with the turbidity meter. If necessary, based on field conditions, a dipper would be used to collect the water sample. The collected sample will then be transferred to the sampling bottleware included with the turbidity meter.

Specifically, turbidity will not exceed 5 NTU over background turbidity when the background turbidity is 50 NTU or less, or have more than a 10 percent increase in turbidity when the background turbidity is more than 50 NTU. Any time that sampling indicates that turbidity is 250 NTU or greater, the permittee shall notify Ecology by phone within 24 hours of analysis.

During all site inspections, the CESCL will visually monitor for turbid water or off-site sedimentation. The CESCL will check for potential BMP improvements if sediment is accumulating off-site, or if the discharge appears turbid.

6.1.2 In-Stream Construction Monitoring

During in-stream construction activities, turbidity will be monitored daily. Potential sources of turbidity will be monitored downstream of the intake channel, downstream of the silt curtain (for construction of the proposed powerhouse), and downstream of the silt curtain (for construction of the tailrace).

Turbidity will be measured with a HACH 2100P portable turbidity meter or equivalent and reported in NTUs, as described above. Water will be collected from beneath the water surface using a dipper or equivalent sampling device. The collected sample will then be transferred to the sampling bottleware included with the turbidity meter.

Specifically, turbidity will not exceed 5 NTU over background turbidity when the background turbidity is 50 NTU or less, or have more than a 10 percent increase in turbidity when the background turbidity is more than 50 NTU. Any time that sampling indicates that turbidity is 250 NTU or greater, the permittee shall notify Ecology by phone within 24 hours of analysis.

6.2 pH MONITORING

In the event that stormwater contacts newly poured concrete, pH sampling would be conducted at the identified upland construction site discharge points after each 24-hour rainfall event of 0.5 inch or greater, or if construction site discharge to the Similkameen River is observed. A calibrated portable pH meter or multi-parameter water quality meter will be used to measure pH using the electrometric method (Standard Method 4500-H+B, APHA 1998). If the pH of discharge water is determined to be outside 6.5 to 8.5 units, Ecology will be notified and steps will be taken to prevent it from entering surface water bodies. Construction using concrete within the Similkameen River will be isolated from river water until the concrete has cured for at least seven days, thus there will be no contact between newly poured concrete and river water that would require river monitoring for pH.

6.3 PETROLEUM COMPOUND SAMPLING

Sampling procedures to be taken regarding the potential for petroleum spills in surface water bodies or on uplands is addressed in the Spill Response Plan (District 2009b). At a minimum, water will be inspected daily during project construction for the presence of sheen or for other indications that a petroleum spill has occurred in the Similkameen River.

7.0 QUALITY CONTROL

After each sampling event, field crew personnel will conduct a review of all field data, including field logbooks, prior to entry into the monitoring project files. Data will be evaluated to ensure that its collection was conducted according to procedures specified in the QAPP. Abnormal or irregular values will be identified and resolved as soon as possible. A summary narrative in the form of a technical memorandum to the District's Environmental Coordinator will document any procedural deviations, data qualifications, or problems identified in the review of monitoring records.

This section provides project-specific objectives and intended data usage, measures that will be taken to assure the integrity of field sampling procedures and quality assurance review of reported data.

7.1 QUALITY ASSURANCE OBJECTIVES FOR MEASUREMENT DATA

The overall quality assurance (QA) objective is to develop and implement procedures for field measurements (turbidity and pH), field sampling, and reporting that will provide results that are defensible.

7.2 LEVEL OF QUALITY CONTROL EFFORT

To evaluate precision of field measurements (turbidity and pH), the general level of the QC effort will be one field duplicate for every 10 or fewer samples collected. For turbidity and pH, two consecutive measurements will be collected at the selected monitoring location. Data will be recorded in the field notebook and/or appropriate data sheets and will be designated as 'duplicate'.

7.3 CUSTODY PROCEDURES

7.3.1 Field Custody Procedures

Field logbooks will provide the means to record data during all field activities performed. Entries will be described in detail so that someone could reconstruct a particular situation or activity at the Site without reliance on memory. Field logbooks will be bound field survey books or notebooks, or equivalent. Logbooks will be assigned to field personnel and will be stored with the project files when not in use. Each logbook will be identified by the project number.

The title page of each logbook will contain the following:

- Person to whom the logbook is assigned
- Logbook number
- Project name
- Project start date
- End date.

Entries into the logbook will contain a variety of information. At the beginning of each entry, the date, start time, weather, names of all sampling team members present, level of personal protection being used, and the signature of the person making the entry will be entered. The names of visitors to the Facility during activities and the purpose of their visit will also be recorded in the field logbook.

7.4 EQUIPMENT CALIBRATION

The 2100P portable turbidity meter and hand-held pH meter or multi-parameter water quality meter will be calibrated prior to each day's use as per the manufacturer's instructions.

8.0 DATA MANAGEMENT PROCEDURES

After each sampling event, field crew personnel will conduct a review of all field data, including field logbooks, prior to entry into the monitoring project files. Data will be evaluated to ensure that its collection was conducted according to procedures specified in the QAPP. Abnormal or irregular values will be identified and resolved or isolated as soon as possible. A summary narrative in the form of a technical memorandum to the District's Environmental Coordinator will document any procedural deviations, data qualifications, or problems identified in the review of monitoring records.

All data will be entered into a spreadsheet that indicates the time, date, and location of each sample, including all applicable field data measurements (turbidity, pH). Each sample will be given a unique alpha-numeric code corresponding to the date and the location of the sample collected.

9.0 DOCUMENTATION AND REPORTS

Documentation and reporting requirements for water quality monitoring during construction activities will be followed as described in Ecology's Construction Stormwater General Permit (Ecology 2010). Specifically, reporting requirements consist of the following:

- High turbidity readings (above water quality criteria) will be reported to Ecology within 24 hours, and
    - During construction, discharge monitoring reports will be submitted monthly.

9.1 FIELD NOTEBOOK

Detailed notes on field activities will be maintained in a monitoring project-specific, bound field notebook or equivalent. Notebook entries for each day in the field will include:

- Date
- Weather conditions
- Personnel present
- Time arriving and departing each location
- Sequence of activities
- Description of any conditions that might affect the monitoring results (e.g. instrument condition, water quality observations)
- Any deviations from this QAPP and SOPs
- Descriptions of any photographs taken
- Signature of field team leader

The field notebook will be a detailed chronological record of all field work. It is intended to serve as a permanent record of activities sufficient to recreate all mobilization, data collection, instrument maintenance, and demobilization activities conducted in the field. The information will be permanently recorded in a bound notebook with sequentially numbered pages. No pages will be removed from the notebook, and any blank pages will be marked "Page Intentionally Left Blank." Notebook entries must be dated, legible written in permanent ink, factual, and accurate. Corrections will be made by crossing a line through the erroneous entry, writing in the correct information, and initialing and dating the correction. Unused portions of notebook pages will be crossed out, signed and dated at the end of each work day.

9.2 CALIBRATION LOG

A calibration log will be maintained to document the dates and times of the turbidity meter, pH meter, and/or multi-parameter water quality meter. Any calibration problems

and corrective actions taken (e.g. replacing electrolyte solution in the pH probe) will be recorded on the log forms. This log will be kept with the SOP and any maintenance kits that are taken to the field. The calibration logs will be retained in the monitoring project files and available for inspection upon request.

9.3 WEBSITE UPDATES WITH MONITORING DATA

The District will post summaries of monitoring data to the Project website monthly after the beginning of the monitoring season each year. The data will be posted no later than the 30th of the month following each month of monitoring.

9.4 INCIDENT REPORTING

Any incidence of an exceedance to the water quality criteria, including any observed sheen, will be reported to Ecology's Central Regional Office within 48 hours. The occurrence of any detection will be detailed in a notification describing the likely cause of the sheen and the proposed or implemented corrective action. In the case of a spill, provisions of the SRP will apply. These provisions include the immediate report of any spills to Ecology's 24-hour phone number (1-800-258-5900), the National Response Center (1-800-424-8802), and submittal of a detailed report to Ecology within five days of the incident.

9.5 ANNUAL REPORTS

Formal annual reports will be submitted to Ecology by December 31 of each year, providing the data assessments required to determine compliance with water quality standards (Chapter 173-201A WAC). The reports will summarize the information from all field activities, summarize results from the data quality assessments, describe any deviations from this QAPP and monitoring project SOPs, present the results of monitoring data with comparisons to water quality criteria, summarize the contents of any incident reports, and draw conclusions regarding water quality standards compliance and any recommendations for further action or changes to the monitoring program. The reports will also include a site map illustrating the locations of monitoring sites, and a table of coordinates for each location. Report appendices will include copies of the calibration log forms, any incident reports, photographs of the monitoring sites and equipment, and memoranda prepared to summarize field audits.

10.0 AUDITS AND DATA VERIFICATION

Both field audits and reporting audits will be conducted to ensure that the monitoring program is following the requirements of this QAPP. Data review and verification will occur monthly after information is downloaded from the monitoring instruments, as described in Section 8. In addition, the Water Quality Specialist will prepare a data quality assessment to performance in achieving MQOs.

10.1 FIELD AUDITS

Once per year the District will send an additional person into the field to observe and document all field activities including equipment retrieval and re-deployment, data downloading, instrument maintenance and calibration, and documentation in the field notebook and calibration log. The auditor will prepare a technical memorandum addressed to the Environmental Coordinator that addresses conformance to this QAPP and the monitoring project SOPs. The memo will include any recommendations on how the monitoring practices or the plans should be changed to minimize the need for future deviations from the plans. The Environmental Coordinator will be responsible for ensuring that if needed, any corrective actions meet Ecology's approval and are implemented.

10.2 REPORTING AUDITS

The District is responsible to ensure that all of the §401 certification reporting requirements are met. The Environmental Coordinator will be responsible for tracking and confirming that requirements are met timely. This responsibility will include checking to see if the field notebook and calibration log are complete, data review and verification has been conducted properly, monthly website updates are correctly posted during the monitoring season, and annual reports contain the required information, including documentation of any deviations and corrective actions.

10.3 DATA REVIEW, VERIFICATION, AND QUALITY ASSESSMENT

Section 8 describes the process for data reduction that will take place after field data collection and sampling has been conducted. Duplicate measurements will allow for calculating the overall precision of each method. Results of the data quality assessments will be included in the annual monitoring reports, including a description of the rationale for excluding any monitoring results from the data analyses, any corrective actions taken, and a summary of precision calculations, if conducted.

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