Operations and Compliance Plan

Bear River Hydroelectric Project
FERC Project No. P-20
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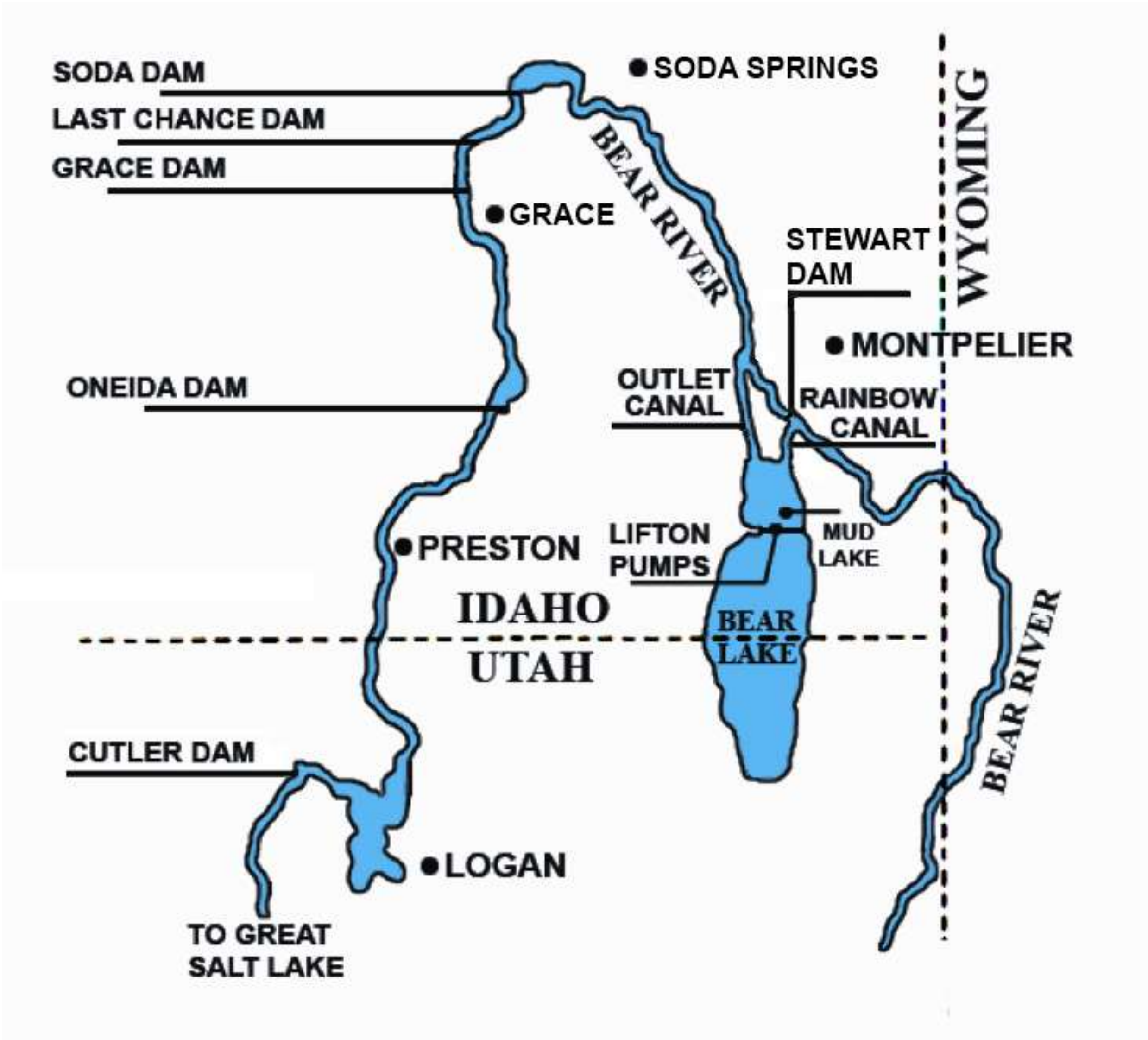

Figure 1. Bear River Hydroelectric Project Area

1 Introduction

The Bear River Hydroelectric Project (Project) includes three hydroelectric developments located on the Bear River in Caribou and Franklin counties, Idaho (Figure 1). PacifiCorp Energy (PacifiCorp) received a new license for the Project from the Federal Energy Regulatory Commission (FERC) on December 22, 2003. The 30-year license allows for the continued operation and maintenance of the Soda, Grace and Oneida developments.

An Operations and Compliance Plan (Plan) was prepared in 2005, as required by License Article 415, to describe compliance with the Project's minimum flow requirements, ramping rates, and goal flow described in License Articles 408, 412 and 420. The Plan also addressed compliance with stream flow gaging requirements as described in standard License Article 8.

During 2013, PacifiCorp revised the Plan to include necessary updates and additions. This update reorganizes the document to reduce redundant information and incorporate required revisions from the FERC in the order approving and modifying the 2005 Plan. This version also incorporates modifications to improve the Plan based on experience gained since the approval of the 2005 Plan. Also included in this Plan is new information about ramping for whitewater flows in the Black Canyon, a new process for transitioning from minimum stream flow at the Grace Dam to lower flows during plant shut downs, and a change in minimum stream flow delivery point from the slide gates on the Grace Dam to a new low-level outlet. Article 415 requires this Plan to include the following information for each development of the Bear River Project:

- Requirements for minimum flow and ramping compliance for each development (see Appendix A);
- Proposed methodology and locations for monitoring minimum flows and ramping;
- Specific measures to ensure that the monitoring system will operate under all conditions, including loss of external electric power to the project (summarized in the body of this Plan with details in Appendix D);
- Design of the monitoring devices, including any pertinent hydraulic calculations, technical specifications or proposed instrumentation, erosion and sediment control measures, as appropriate, and design drawings of the system (see Appendix C);
- Descriptions of the relative extent of manned versus automatic operation of the monitoring equipment;
- Descriptions of the methods and schedule for installing, calibrating, operating and maintaining the monitoring equipment (summarized in the body of this Plan and in detailed checklists in Appendix B);
- Proposed data collection and storage protocols (details in Appendix D);
- Provisions for reporting the recorded data to the FERC and the consulted agencies (see Section 5 - Reporting to the FERC);

- Provisions for reporting incidents in which minimum flows or ramping rates deviate from license requirements (see Section 5 - Reporting to the FERC); and
- A schedule for implementation (see Section 6 – Implementation Schedule).

This plan was developed in consultation with the Bear River Environmental Coordination Committee (ECC) and United States Geological Survey (USGS). ECC members and the USGS were provided 30 days to review and provide comments on revisions to the Plan.

1.1 Plan Organization

Section 2 lists specific details about the Soda and Oneida developments because the compliance aspects of these developments are similar. Section 3 lists specific details about the Grace Development. Section 4 details the stream flow data recording and processing and Section 5 describes how reporting to the FERC will occur. Finally, the required implementation schedule is presented in Section 6.

Detailed material is presented in appendices including documents and checklists that will be used by operations staff to assure compliance with this Plan.

2 Soda and Oneida Minimum Flow and Ramping Rate Compliance

Due to the similarity in minimum flow and ramping rate compliance methodology at the Soda and Oneida developments, this section addresses both developments.

Although the methodology for both developments is quite similar, there are several significant differences.

For minimum flow, the differences are:

- The specific minimum flow threshold
- The inflow threshold that determines the compliance point used (termed the *compliance threshold*)
- The reservoir elevation deadband parameters used when inflow is less than the compliance threshold

For ramping rate, the differences are:

- The specific ramping rate limitation
- The Oneida limitation applies only to the descending arm of the ramping rate

2.1 Minimum Flow Requirements

The required minimum flow rates for the Soda and Oneida developments are specified in Article 408 (Appendix A). The minimum flow requirements are:

Soda Development

Below the Soda Dam: a year-round minimum flow of 150 cfs, or inflow into Soda Reservoir, whichever is less

Oneida Development

Oneida reach below the powerhouse: a year-round minimum flow of 250 cfs or inflow, whichever is less, in addition to current leakage from Oneida Dam (1 cfs, for a total of 251 cfs).

In addition to this year-round minimum flow, between Memorial Day and Labor Day, Article 420 requires that goal flows below the powerhouse be greater than 900 cfs, if available. The stated purpose of the goal flow is to minimize the frequency of river level fluctuations. The operational regime plan referred to in Article 420 has already been filed and accepted by the FERC.

2.2 Minimum Flow Compliance Methodology and Locations

In practice, these required minimum flows become difficult to maintain when the inflow to the development is at a level close to the minimum flow threshold. At this condition, it is difficult to match inflow, maintain a consistent reservoir elevation and stay strictly above the minimum flow level as indicated at the stream flow gage. This is due to a combination of random fluctuations in inflow rates, random error in stream flow gaging and fluctuations in reservoir level.

In order to insure that flow rates never fall below the specified minimum flow requirements, a *compliance threshold point* has been established for each development.

2.2.1 Compliance Threshold Point

The compliance threshold point is a specified inflow rate for each development.

The established compliance threshold points are:

- Soda Development – 170 cfs
- Oneida Development – 275 cfs

These values are anticipated to be static, but will be evaluated annually and may be adjusted in response to operating experience upon consultation with the ECC.

2.2.2 Minimum Flow Compliance Location Points

Minimum flow compliance points for each development are determined by the compliance threshold points. Typically, the compliance point does not change frequently because the compliance threshold represents an inflow level which is only observed in very dry years.

In order to determine which compliance location point governs minimum flow, each day the operator on duty calculates the inflow to the development based on the current manual reservoir elevation reading, the previous day's manual reservoir elevation reading, and the 24-hour average outflow from the development. The inflow is the sum of the change in storage and the outflow.

Data are collected and stored in accordance with the details set forth in Section 4 - Stream Flow Data Records and Processing. The stream flow and reservoir elevation gages are already installed and in operation for both Soda and Oneida. For site-specific details on these gages, see Appendix D.

2.2.2.1 Compliance Point When Inflow Rates Are Above the Compliance Threshold
When the inflow to the development is equal to or greater than the compliance threshold, the minimum flow compliance point is the top-of-the-hour hourly average flow at the stream flow gage below the development.

2.2.2.2 Compliance Point When Inflow Rates Are Below the Compliance Threshold
When the computed inflow to the development is less than the compliance threshold for two consecutive days, the reservoir elevation gage is the minimum flow compliance point. The minimum flow compliance point returns to the stream flow gage when the computed inflow is greater than the compliance threshold for two consecutive days.

The method for proving compliance when inflow is less than the compliance threshold is to keep the 24-hour moving average reservoir elevation relatively constant to ensure that the inflow to the reservoir is passed downstream. The reservoir elevation, at the time the inflow is determined to be below the compliance threshold, is the baseline elevation for monitoring compliance. The 24-hour moving average reservoir elevation is the measure of compliance and will be kept within the deadband parameters noted in Table 1.

Table 1. Soda and Oneida Reservoirs Deadband Thresholds (when inflow is below the compliance thresholds of 170 cfs for Soda and 275 cfs for Oneida).

Deadband Parameter	Soda	Oneida
Upper Threshold	Baseline + 0.5 feet	Baseline + 2.0 feet
Upper Target	Baseline + 0.25 feet	Baseline + 1.5 feet
Lower Target	Baseline – 0.25 feet	Baseline – 1.5 feet
Lower Threshold	Baseline – 0.5 feet	Baseline – 2.0 feet

The operator will make adjustments to outflow, typically once a day, to keep the reservoir elevation within target elevation range. However, the elevation would need to exceed the *upper* threshold before it is considered a reportable event. If the elevation falls below the lower threshold because of desired generation flows above the inflow or spinning reserve call-out event, a new (lower) baseline and associated deadband would be re-established. This situation represents outflow above and beyond the inflow and is protective of the resource and provides for use of stored water that does not impact minimum flow compliance; the drawdown would be refilled during times when inflow exceeds the minimum flow level.

2.2.2.3 Exception to Reservoir Level Minimum Flow Compliance During Ice Periods

The exception to maintaining this deadband is during extreme cold spells that cause ice jams to form upstream of the Soda and Oneida Reservoirs and temporarily reduce the inflow. Such cold spells happen several times during the winter months and typically last from 1 to 14 days. When the cold spell ends, the ice jams break loose and inflow may surge for a short time.

Without this exception, the operator would have to make many changes to the outflow to try to keep the reservoir elevation within the deadband and would likely not be successful as it takes several hours for each change to settle out. These changes would be counter-productive, detrimental to the resource and contrary to the intent of the minimum flow requirement. Hence, during ice periods a constant outflow will be maintained during these very cold periods and the elevation will be allowed to freely vary without regard to the deadband during cold periods.

Typically, the inflow decreases and reservoir elevations fall during the cold spell. When the temperature warms up and the ice jams break loose, the rapid increase in the inflows will increase the reservoir elevation back up into and possibly above the upper threshold. Once the inflow stabilizes, changes will be made to the outflow, if necessary, to return the elevation within the deadband. During ice periods, any exceedance of the reservoir deadband will not be treated as a reportable event.

2.2.3 Oneida Voluntary Minimum Flow Protection Measure

Article 408 allows the minimum flow to be suspended for equipment failures. Some infrequent equipment failures cause all non-leakage flow from the development to cease. These non-generation flows are minimal (1 cfs below the dam, as measured in October 18, 2004, and subsequently reported to the FERC, with other unquantified minimal reach gain and minor leakage through the powerhouse that accumulates in the reach upstream from the stream flow gaging station). If operations personnel are on site, restoration of flow through the powerhouse or from a spillgate on the dam would typically take 30 to 40 minutes. Because of the added travel time for operations personnel who must be called out to respond to such an equipment failure, this time frame could be much longer. Hence, if this were to occur, the stream flow would likely fall below the minimum flow threshold.

Despite the fact that this type of event is allowed by the license, PacifiCorp would prefer to maintain the stream flow above the minimum flow threshold, even under these conditions. Hence, PacifiCorp has installed a control system that will automatically open the spill gates to pass the minimum flow if the flow through the turbines is halted. The system is connected to an emergency power unit generator. Since this is a voluntary measure to provide additional protection not required by the license, it is noted here as an informational item and is not part of the compliance assurance process. PacifiCorp intends to keep the system active, but may discontinue it at any time. One current limitation is that the system will not be active during freezing conditions due to the gate damage that would result if the spill gates were opened automatically while iced in.

2.2.4 Soda Voluntary Minimum Flow Protection Measure

Article 408 allows the minimum flow to be suspended for equipment failures. Some infrequent equipment failures cause all non-leakage flow from the development to cease. These non-generation flows are small (42 cfs below the dam, as estimated from historical records). If on site operations personnel are on call and present at their company-owned residence, restoration of flow through the powerhouse or from a spill gate on the dam would typically take 30 to 40 minutes. If these ideal conditions are not met, such as an operator from the Grace area is on call or the on-site operator is away from home, this time frame could be much longer. Hence, if this were to occur, the stream flow would likely fall below the minimum flow threshold.

Despite the fact that this type of event is allowed by the license, PacifiCorp would prefer to maintain the stream flow above the minimum flow threshold, even under these conditions. Hence, PacifiCorp has installed a new bypass valve and control system that will automatically open the valve to pass the minimum flow if the flow through the turbines is halted. Since this is a voluntary measure to provide additional protection not required by the license, it is noted here as an informational item and is not part of the compliance assurance process. PacifiCorp intends to keep the system active, but may discontinue it at any time. One current limitation is that the system is not currently connected to an emergency power unit generator, so it would only activate in the event of a generation trip and not in the event of plant power failure. Plant power failures are relatively rare, approximately once per year. However, during drier years, the natural flow is sometimes insufficient to allow any level of generation and so the bypass valve is used to provide the minimum flow. When this is the case, a plant power outage would not result in decrease in discharge. If an extended plant power outage or other extended interruption occurs, the spill gates which are connected to emergency power would be used to restore the minimum flow as soon as possible.

2.3 Ramping Rate Requirements

This section specifies the common approach to ramping rate compliance at the Soda and Oneida developments. Ramping rate limits are specified in Article 412.

The ramping rate limits are:

Soda Development
1.2 feet per hour

Oneida Development
Only the descending arm of the ramp rate is limited to 2.0 feet per 15 minutes (see Section 5).

Compliance is assured by operators making generator load changes in accordance with the ramping rate limitation charts shown in Appendix B. At least once a year, typically during the preparation of the operational regime report (Appendix F) in November, the water management compliance representative checks the recent stage-change records at the stream flow gaging station downstream of the development to determine the maximum observed ramping rate since the previous check to ensure that no ramping rate limitations are exceeded. If a ramping rate limitation is exceeded, the event will be investigated and reported if required. Note that a spinning reserve call-out event (as described in Article 412(iii)) is an allowable reason for increasing the ramping rate limitation.

As noted in Article 412, there are several cases in which the ramping rate limitations may be modified and in summary these are:

(i) emergency or to avoid damage to life or property;

(ii) compliance with historic practices, flood control or other mandates;
(iii) utilization of spinning reserve;
(iv) compliance with the Cutler License (FERC Project No. P-2420).

Should any of these conditions arise, they would be recognized and reported as required within the 10-day period consistent with Section 5 of this Plan. The full text of Articles 408 and 412 (updated to reflect subsequent FERC orders) are included in Appendix A.

2.4 Automated Monitoring of Stream flow

At stream flow gaging stations the common elements are a stage encoder (typically a float system), a datalogger with telemetry (telephone modem or radio frequency), and battery backup with either AC charger or solar panel. The dataloggers hold approximately 3 to 5 months of data that is continuously updated to record the newest values and discard the older values. The datalogger represents a backup storage of the data as the data is polled and archived on a computer database at least daily at all sites. The stream flow gaging sites used to monitor minimum flow are enabled with real-time alarms.

The stream flow gages are operated and maintained by PacifiCorp and the station numbers consistent with the system used by the USGS is 10079500 for the Soda gage and 10086500 for the Oneida gage. Site-specific details and specifications are included in Appendix D.

Anticipated upgrades to the stream flow monitoring system include changing the telemetry system from a telephone modem-based to a radio transmitter-based system, which will result in greater integration with the supervisory control and data acquisition (SCADA) system. This will allow PacifiCorp to integrate stream flow alarms into the same system used for plant alarms if it is determined there is a need for such integration.

2.5 Automated Monitoring of Water Level at Reservoirs

The water levels at the reservoirs are measured by shaft encoders that directly relay data to the SCADA system where the data is recorded. They do not have their own data recorders. Currently these readings are relayed to both the PacifiCorp-wide database and Hydro-resources real-time database. These readings are used for various operational alarms currently unrelated to minimum flow compliance. These encoders are connected to station batteries or emergency power systems.

The reservoir water level gages are operated and maintained by PacifiCorp and the station numbers consistent with the system used by the USGS are 10079000 for the Soda gage and 10086000 for the Oneida gage. Site-specific details and specifications are in Appendix D.

2.6 Oneida Goal Flow Compliance

Compliance with the goal flow requirement of 900 cfs, if available, is a by-product of following the operational regime plan already in place. When irrigation demand requires flows in excess of 900 cfs, the flow is provided. The timing of the requirement from Memorial Day to Labor Day does not influence irrigation releases or the flow regime. From time-to-time reservoir releases are required to meet downstream irrigation demand and support Cutler Reservoir level requirements (FERC Project 2420).

The primary purpose for the goal flow, minimizing river level fluctuations, is reported in the operational regime report (Appendix F). This also represents the compliance reporting mechanism for goal flow, with the supporting documentation being the annually reviewed, daily averaged stream flow gage data described for the corresponding year-round minimum flow compliance. The same equipment and stream flow data reporting process will be used for supplemental compliance with the goal flow requirement of Article 420. The operational regime report notes the purposes for water releases through Oneida as well as any significant deviations from the operational regime plan.

3 Grace Minimum Flow and Ramping Rate Compliance

Minimum stream flow (MSF) and ramping rate compliance are somewhat different for the Grace Development than for the Soda and Oneida developments. The Grace Development has a bypassed reach below the Grace Dam known as the Black Canyon reach of the Bear River. MSF requirements below the Grace Dam into the Black Canyon reach vary depending on inflow to the Grace Reservoir. Another difference is there are no operational ramping requirements below the Grace Dam or the Grace Powerhouse, except for a down-ramp requirement at the end of recreational flow releases into the Black Canyon.

The MSF delivery below the Grace Dam into the Black Canyon is provided either through a low-level bypass valve (primary method) or slide gate (secondary method). Each of these MSF release methods has a different compliance methodology and location.

3.1 Minimum Flow Requirements

The required minimum flow rate for the Grace Development is specified in Article 408 (Appendix A). The minimum flow requirement is:

> Grace bypassed reach: a year-round minimum bypass flow of 63 cfs or inflow, whichever is less, in addition to current leakage below Grace Dam (2 cfs); for a total minimum stream flow in the Black Canyon of 65 cfs.

Although Article 408 allows the MSF to be reduced without limitation to match inflow when inflow is less than 63 cfs, PacifiCorp has voluntarily chosen to maintain a lower MSF target of 40 cfs when inflow falls below this number. Since this is a voluntary measure to provide additional protection not required by the license, it is noted here as an informational item and is not part of the compliance assurance process. PacifiCorp intends to maintain this minimum flow level in the future but may discontinue or modify it at any time. See Section 3.3 for a complete description of the minimum bypass flow methodology when inflow is less than 63 cfs at the Grace Development.

3.2 Minimum Flow Compliance Methodology and Locations

There are two available methods for minimum flow compliance at the Grace Development and each uses a separate compliance location.

- The primary method uses the low-level bypass valve installed on the minimum flow bypass conduit.

- The secondary method uses one or more of the slide gates on the dam.

3.2.1 Primary Flow Compliance Method – Bypass Valve

The primary method for maintaining minimum flow rate compliance at the Grace Development is using the bypass valve installed on the minimum flow bypass conduit. Design drawings of the bypass valve are shown in Appendix C.

The flow through the bypass valve will be at least 63 cfs on an hourly average basis measured at the top of each hour. In operation, the target flow will be 65 cfs to provide a buffer.

As needed, the minimum flow valve will be closed and the flow measurement sensors will be cleaned. Operationally, a convenient time for this cleaning is during the Grace flow line maintenance, which typically occurs annually. During the cleaning or any other time the valve is not used for any reason, the secondary compliance location and method will be used. The hourly average flow through the bypass will be recorded in the company PI database.

3.2.1.1 Primary Method Compliance Location

When using the primary flow compliance method, the bypass valve, the primary compliance location is the ultrasonic flow measurement device located on minimum flow bypass conduit. The 2 cfs leakage noted in Article 408 will pass through the dam and is not represented on the flow measurement device (see details in Appendix D).

During 2013, the first year of operation, the new flow measurement device on the bypass valve will be used for compliance and a supplementary alarm on the stream flow gage on the bypass reach will be implemented to confirm the adequate operation of the new flow measurement device.

3.2.2 Secondary Compliance Method – Dam Slide Gates

If the primary minimum flow bypass valve is not used for any reason, then one or more of the slide gates on the dam will be used. The slide gate(s) will be opened to a predetermined level to insure that the minimum flow requirements are met.

The hydraulic equation of flow for the gate relating the flow to the opening size and reservoir elevation will be used along with a gate-specific calibrated constant to determine the gate opening required to provide the minimum flow (see Appendix C for the equation and initial and as-needed calibration procedures).

3.2.2.1 Secondary Method Compliance Location

When the secondary compliance method (slide gates) is used, the flow compliance location is one of the nine powered recreational release slide gates or the one manual slide gate installed on the diversion dam along with the electronic reservoir water level gage.

The data from the reservoir water level gage are used to verify compliance with the minimum flow by relating the reservoir water level to the flow through a calibrated minimum flow gate (see Appendix C). The minimum flow gate opening(s) will be set such that the required minimum flow is passed at a specific reservoir water level (the threshold level) that is below the normal operating range.

The typical values for the threshold level, alert level and normal operating range for the Grace Reservoir, along with the anticipated flow rates for the alert level and normal operating range, are shown in Table 2. While these values are anticipated to be static, they will be modified as needed.

Table 2. Grace Minimum Flow Compliance Terms for Relating Reservoir Level to Minimum Flow		
Reservoir Level Term	**Typical Values**	**Flow through Secondary Compliance (slide gates)**
Threshold Level (used to determine opening size of minimum flow gate or valve)	5553.0’	65 cfs
Alert Level	5553.8’	70 cfs
Normal Operating Range	5554.2’ - 5554.5’	74 cfs (at 5554.3’)

Daily manual verification of the minimum flow gate setting will be done at the Grace Dam when the secondary compliance method is in use.

If the water level is discovered to be below alert level when the operator makes the daily check or monthly manual reading, they will take appropriate action to ensure the minimum flow is restored by increasing the reservoir water level or gate opening.

3.3 Grace Passing Minimum Stream Flow Methodology

Inflow for the purpose of the Grace Bypassed Reach MSF is the inflow to the Grace Reservoir less any irrigation demand withdrawn from the reservoir (the “Bench B” diversion of the Last Chance Canal Company and Lloyd brothers’ pump on the north shore), leakage from the wood-stave flowline, and leakage through the wicket gates at the Grace Plant.

There are four distinct MSF scenarios; plant on, plant off, plant shut-down, and plant start-up. These are summarized below:

- Plant On-line MSF Scenario - Whenever the Grace Plant is online, the 63 MSF requirement will be met through either the primary or secondary compliance method as described below.
- Plant Off-line MSF Scenario - When the Grace Plant is offline, the MSF will be 63 cfs or inflow, whichever is less. As noted below, if inflow is less than 63 cfs, MSF will follow inflow down to a lower target of 40 cfs. If allowed within operational and legal constraints, additional water will be released from the Soda Development to avoid extremely low bypass flows regardless of the inflow.
- Plant Shut-down MSF Scenario - Before shutting down the plant for any reason, the minimum flow, which is already being provided, will be kept constant until the plant is offline and inflow reduces below 63 cfs.

- Plant Start-up MSF Scenario - To bring the Grace Plant online, a minimum of 100 cfs inflow is required. Before bringing the plant online, the MSF requirement of 63 cfs will be established and verified.

The inflow to the Grace Reservoir during spring runoff and irrigation season typically exceeds the 63 cfs MSF requirement, so 63 cfs MSF is provided in the bypassed reach. In addition, historical records indicate that the average inflow to the reservoir during the winter months (the time of lowest flow) is also typically adequate to supply the 63 cfs MSF. Times when inflow can drop below 63 cfs include drought conditions and the typically short transition between natural flow at the end of spring runoff and the start of irrigation storage water delivery from Bear Lake. A similar situation of low flow can result during the fall transition when Bear Lake irrigation deliveries are curtailed.

Different MSF transition issues exist around plant startup and shut down. When the Grace plant is coming offline, inflow must be above 63 as the plant is in operation so this flow must be maintained until the plant is shut down and inflow into the reservoir drops below the 63 cfs MSF. When starting the Grace plant, the 63 cfs MSF must be established in advance of plant startup.

When the Grace plant is offline the transition from passing the 63 cfs MSF to a lower amount that matches inflow is typically known in advance, but can also be abrupt if upstream irrigation diversions increase their withdrawals on short notice (they may increase withdrawals on a daily basis early in the year). In a situation like this, the water level could decrease in the reservoir and trigger an alarm at the reservoir alert level (typically is 5553.5'). If an alarm is activated, the operator is notified of the condition. Regardless of the original cause, when decreased inflows are observed by a decrease in reservoir elevation or information about increased irrigation withdrawals is known, the minimum flow valve (or gate if the secondary compliance method is in use) may be reduced to pass inflow or a minimum of 40 cfs if inflow is less. If needed, the outflow from Soda Development will be increased to provide enough water to raise the Grace Reservoir level and maintain a target hourly average flow of 40 cfs. After the Soda adjustments arrive at the Grace Development (typically a 2-hour lag time) and the reservoir level reaches the top of the flash boards, all excess inflow above the target flow of 40 cfs through the minimum flow valve (or gate if the secondary compliance point is in use) will be passed over the top of the flashboards. In this situation, the entry on the log sheet for the minimum flow gate or valve opening would be: "partially closed, passing inflow."

When the primary compliance method (bypass valve) is in place while passing inflow, the outflow may be controlled by automated adjustments to the valve instead of passing excess inflow over the top of the flashboards on the dam. A hard-coded lower limit of 40 cfs would be used. If inflow falls below 40 cfs, the water level alarm would alert operators to the condition and the outflow from Soda Development would be increased to provide enough water to raise the Grace Reservoir level and maintain a target flow of 40 cfs, if allowable under the operational and legal constraints.

3.4 Grace Recreational Release Methodology

The Bear River FERC License and Settlement Agreement require the provision of recreational releases of water into the Grace Bypassed Reach for whitewater boating. The original program required that up to 16 six-hour releases be provided when inflow into the Grace Reservoir was above 700 cfs on weekend days between April 1 and June 15. This forecasted flow program was difficult to implement for all parties. It was difficult for the boaters to utilize the forecasted flows that were posted the week prior and it was difficult for PacifiCorp to schedule weekend duty for employees to run the flows on short notice. Staff time to administer the program was also excessive. The program was re-crafted in 2012 to change it to a scheduled release program where four weekends of flows are provided each year. The new program provides three two-day weekends and one three-day weekend of recreation flows. These weekend flows are provided between April 1 and June 5 on a schedule jointly prepared by PacifiCorp, American Whitewater and the ECC. Flows are to be 900 cfs from 10 a.m. to 4 p.m., with 200 cfs provided between flow days. If inflow is greater than 900 cfs, the larger flow will be provided up to 1,500 cfs. Flows above 1,500 cfs can be used for generation.

Whitewater flows will generally be provided one of two ways, or a combination of both, depending on whether the Grace Plant is running or not and the flow through the plant. The simplest scenario would be that the Grace Plant is online and passing 900 cfs or more. In this scenario the plant would be taken offline and the flows put in the bypass reach (see notes on ramping and the “pillow/hole fix” below). In the second scenario, the Grace Plant is offline so all of the boater flow is released from Soda. The third, a combination, could happen when flows in the Grace Plant are below 900, so to make a boater flow the plant is taken offline and supplemental water is released from Soda to make up the difference.

Concerning up-ramp and down-ramp rates for boater flows, Article 419 for whitewater boating flows refers to Article 412 for the ramping rate limitations. However, Article 412 is silent on whitewater boating flow down-ramping rate limitations. The likely reason for the discrepancy is that the Bear River Settlement Agreement was not specific on a ramping rate limitation and deferred the matter for subsequent consideration by the ECC. A ramp rate study was subsequently conducted and it was decided in 2012 to use a one-foot-per-hour down-ramp target and the compliance method is set forth here. The up-ramp rate is not limited, but will mimic the standard unloading procedure for the Grace Plant. The procedure for management of up-ramp and down-ramp will be different depending on whether flows are from a plant shutdown or increased flows from Soda.

Ramping for whitewater boating flows that result from reducing flow in the flowline and bypassing the water into the natural channel will be controlled by the slide gates on the dam. A schedule for adjusting the slide gates will be derived from the stream flow gage rating table to target the prescribed ramp rate by relating the target water level to flow changes at the slide gates. Slide gate change targets will be scheduled at 15-minute increments. The changes target the ramp rate precisely with no additional buffer. During the ramp rate study, the observed down-ramp rate varied slightly above and below the target ramp rate at various times, but was acceptable.

Compliance with down-ramp rate when flows are provided by reducing flowline flows is verified by following the slide gate change schedule during the ramping event. The observed stage change at the

Grace bypass stream flow gage is not part of the compliance verification since it lags the slide-gate changes and is not useful for adjusting slide gate changes during the event. However, the stage change at the Grace bypass stream flow gage will be evaluated as needed to verify that the target down-ramp rate is still representative of the desired down-ramping rate. Hydraulic conditions in the channel, gate operation at the dam, and upstream irrigation diversion changes provide confounding factors that can result in variation in observed ramping rate in the channel as recorded at the gage. The relationship will be re-evaluated if a discrepancy is noted.

To reduce river fluctuations downstream (colloquially referred to as the "pillow/hole fix") of the Grace Power Plant when the Grace Development is online at the time of a recreational release, the timing of generation reduction will lag behind the release of water in the Black Canyon by 2 hours (or as refined through operational experience) to allow water from the Black Canyon to reach the tailrace of the Grace Plant coincidental to it being taken off line. To accomplish this, the flow from Soda is adjusted so that there is enough water to both start the boater flow and keep the Grace plant on line. At the end of the recreational release event, generation flow increases are delayed to allow the water in the bypass channel to dissipate. This avoids a "pillow" or surcharge of water into the river below the Grace Development.

If the Grace flowline is out of service during whitewater boating flow events, water changes will be made at the Soda Development rather than the Grace Development. The extremely small storage capacity of the Grace Reservoir makes using storage to buffer ramp rates infeasible. Despite the fact that the Soda Development releases are planned to result in flows consistent with the desired slide gate changes, the 2-hour water travel time between the Soda Development and the Grace Reservoir plus the small storage capacity of the Grace Reservoir may produce unintended deviations from the slide gate/ramping schedule.

Compliance with the down-ramp rate when flows are provided from Soda will be based on generation changes at Soda. The generation changes at the Soda Development will be based on target flows at the Grace stream flow gage using the rating curve with adjustments made for irrigation withdrawals. The generation changes will be derived from the target flow using the most up-to-date flow-power table available. Due to the lag time and operational considerations at Grace, generation changes at Soda will be made only once every half hour. Slide gate changes will still be made every 15 minutes at Grace.

3.5 Automated Monitoring of Stream flow

As noted in Section 3.2, stream flow monitoring will occur by one of two methods. The primary method is the ultrasonic flow monitoring device on the automated bypass valve installed on the minimum flow bypass conduit. The secondary method is using one or more of the slide gates on the dam, which have been calibrated to determine the gate opening required to provide a particular flow.

The calibration of the slide gates will be verified as needed by discharge measurements made downstream of the slide gates during appropriate conditions (excluding high-water periods and periods when the inflow was being passed). See Appendix C for details. The flow monitoring device on the automated bypass valve uses acoustic technology that does not require calibration.

3.6 Automated Monitoring of Water Level at Reservoir

The automated measuring and recording of the water level in the Grace Reservoir will be done with electronic measuring equipment, which is connected to the PacifiCorp SCADA system and recorded in PacifiCorp's electronic databases. The water level is always monitored for operational purposes. When the secondary compliance method is in place, the following processes will be followed:

The slide gate setting and the electronic readout of the reservoir level will be checked each day as part of the operator's compliance duties. The electronic reservoir water level will be verified by a manual measurement once a month. The operator will check to make sure there is no blockage in the gate and that the minimum flow is being provided by confirming that the gate setting is correct and that the water level is at or above the threshold level. The operator will check other available information such as outflow from the Soda Reservoir, and flows in the Last Chance and Bench B irrigation diversion canals to determine river conditions and verify that the minimum flow requirement can be met. The minimum flow gate setting and electronic read-out of the Grace Reservoir water level will be documented each day on a compliance log along with the monthly manual reading.

4 Stream flow Data Records and Processing

The primary official data record is the daily average flow with instantaneous (15-minute) maxima and minima by month. The 15-minute stage data is archived in an annual spreadsheet organized by site and by year (Data may be collected at sub-15 minute intervals, but the annual spreadsheets use 15-minute samples of the stage data as the basis). The annual spreadsheets are printed out and archived in the Salt Lake Hydro Operations office and the company's electronic document database (P8). The daily average flow values are reviewed at least annually. The data records are published by the USGS and will be made available through its public website and on PacifiCorp's public website.

In accordance with Article 420, an operational regime has been implemented that minimizes the frequency of river level fluctuations below the Oneida powerhouse. Annually, at the time of the November Bear River Commission meeting, a report is prepared (see example in Appendix F) that summarizes observed river level fluctuations in the previous water year (Oct 1 through Sept 30). The report also summarizes the maximum 15-minute down-ramp by day. In its current form, the daily maximum, minimum and average river stage values are plotted and a table containing these values as well as the daily maximum 15-minute down-ramp stage change is provided.

5 Reporting to the FERC

5.1 Minimum Flow Compliance Parameters

The following parameters and computations are used for compliance and will be reported to the FERC as necessary.

- Stream flow gage flows used for minimum flow and ramping compliance reporting will be top-of-the-hour hourly averages, computed as shown in Appendix D.

- Reservoir elevations used for minimum flow compliance reporting will be 24-hour moving averages computed at the top of the hour.
- The flow through the minimum flow valve at the Grace Dam will be determined through the ultrasonic flow and computed as the top-of-the-hour hourly average. This is the primary compliance method for minimum flow into the Grace bypass reach.
- The flow through the minimum flow slide gate at Grace will be calculated from instantaneous electronic reservoir elevation readings and the current slide gate calibration curve. This is the secondary compliance method for minimum flow into the Grace bypass reach.
- Reservoir elevations used to determine the flow through the primary minimum flow opening at Grace will be instantaneous electronic readings.

5.2 Ramping Rate Compliance Parameters

The following compliance parameters for ramping rate will be used at each development:

Soda Development
The ramping measure of compliance is the difference between top-of-the-hour hourly averages (the difference between, for example, the stage recorded at 2:00 and 1:00).

Oneida Development
The ramping measure of compliance is the 15-minute stage change, as measured by instantaneous quarter-hour stage (i.e., 1:00, 1:15, 1:30, 1:45).

Grace Development
During whitewater boating events, the measure of compliance is the 15-minute change to slide gate openings from the beginning of the ramping event when flows are provided by reducing flow for generation. When recreational releases are provided from Soda the ramping will be based on generation changes.

5.3 Reporting Minimum Flow and Ramping Events

Operators will monitor available generation, stream flow and reservoir elevation information as a part of normal operation duties and, should a potential reportable event occur, they will notify the Hydro Control Center (HCC) and the production manager, who will notify the water management compliance representative who will investigate the event and prepare a report about the event. The license program manager and the FERC compliance analyst will be notified as soon as practical.

Any event suspected by the plant operators, production manager, license program manager, agency representative or member of the public that is reported to PacifiCorp will be investigated in a timely manner by the water management compliance representative. Should a reportable event be verified, the Regional FERC office will be notified of the violation as soon as possible and will be sent a report of the event within 10 days after the reportable event is verified.

A potentially reportable event is any under release of a required MSF or exceedance of a ramp rate.

The report will include the following information:

1. All relevant flow or reservoir elevation data will be provided to verify the event. The data will be presented in table or graph format, as appropriate, for the time period in question.

2. The report will include the preliminary results of the investigation to determine the cause, severity, and duration of the event, if available.
3. The report will include a description of any corrective measures that have been or will be implemented to prevent future events from occurring, if enough information is available to make this determination.
4. The report will include any comments or correspondence that was received from interested parties regarding the event.

If there is not enough information or time to make a final determination of the cause, severity, duration or proposed corrective measures, the report will include a timetable for providing a follow-up report specifying the results of a final investigation.

Concerning the release of data, should a verified reportable event have occurred, data will be provided in the report to FERC. If the event was reported by an agency or other concerned parties, the data will be provided to the concerned party if specifically requested regardless of whether an incident was determined to have occurred or not. PacifiCorp will provide sufficient data to verify whether the suspected event occurred or did not occur. The agency, non-governmental organization, or other interested party will need to request the data in writing. The request will need to state the specific purpose for the data, the time period desired, what specific data are needed, and the format in which to supply the data. Since PacifiCorp has a large amount of stored data and limited staff time, each request will need to be evaluated as to the time it will take to prepare the requested data. Much of the stored data is raw and may take a significant amount of time and resources in order to respond. Any such request for data may also be limited to prevent the release of confidential, proprietary business information.

5.4 Reporting Stream flow and Reservoir Level Records

The stream flow and reservoir level records are prepared as summarized above and detailed in Appendix D. The final published data summary sheets will be available to the public on the USGS and PacifiCorp public websites.

6 Implementation Schedule

All equipment is currently installed and operating. The alarm changes presented in Section 3.2.1.1 and Appendix D will be made before using the ultrasonic flow measurement device on the bypass valve as the compliance point.

Appendix A – Requirements from the License as Revised by Subsequent Orders

The text from relevant articles in the FERC License for the Bear River Hydroelectric Project, FERC Project No. P-20 issued on December 22, 2003, is included here and updated to reflect changes made by subsequent orders from the FERC. Summaries for License Articles, 408, 412, 415 and 420 are provided as well as Standard License Article 8.

Current Requirements

Stream-gaging Stations

Article 8. The Licensee shall install and thereafter maintain gages and stream-gaging stations for the purpose of determining the stage and flow of the stream or streams on which the project is located, the amount of water held in and withdrawn from storage, and the effective head on the turbines; shall provide for the required reading of such gages and for the adequate rating of such stations; and shall install and maintain standard meters adequate for the determination of the amount of electric energy generated by the project works. The number, character, and location of gages, meters, or other measuring devices, and the method of operation thereof, shall at all times be satisfactory to the Commission or its authorized representative. The Commission reserves the right, after notice and opportunity for hearing, to require such alterations in the number, character, and location of gages, meters, or other measuring devices, and the method of operation thereof, as are necessary to secure adequate determinations. The installation of gages, the rating of said stream or streams, and the determination of the flow thereof, shall be under the supervision of, or in cooperation with, the District Engineer of the United States Geological Survey having charge of stream-gaging operations in the region of the project, and the Licensee shall advance to the United States Geological Survey the amount of funds estimated to be necessary for such supervision, or cooperation for such periods as may be mutually agreed upon. The Licensee shall keep accurate and sufficient records of the foregoing determinations to the satisfaction of the Commission, and shall make return of such records annually at such time and in such form as the Commission may prescribe.

Minimum Flow

Article 408 as modified by FERC Order on May 23, 2006 and FERC Order on October 23, 2006.

The licensee shall maintain continuous minimum flows from the project developments as follows:

a) Below the Soda Dam: a year-round minimum flow of 150 cfs, or inflow into Soda Reservoir, whichever is less;
b) Grace bypassed reach: a year-round minimum flow of 63 cfs or inflow, whichever is less, in addition to 2 cfs leakage below Grace Dam; provided however, that during the Period of Cove dam removal and upon consultation with the Bear River Project's environmental coordination committee (ECC), this required continuous flow may be reduced or suspended for short periods

of time as necessary to implement the project removal plan attached as Appendix B to the Cove settlement agreement filed on August 16, 2005 ; and

c) Oneida reach below the powerhouse: a year-round minimum flow of 250 cfs or inflow, whichever is less, in addition to current leakage from Oneida Dam (1 cfs, for a total of 251 cfs).

Maintenance of the above minimum flows shall begin within six months of the issuance of the license, or on an alternative schedule as determined by the Project Implementation Plan required under Article 401, and shall continue through the license term. The licensee shall maintain reservoir levels in accordance with historic practices, water rights and flood control responsibilities that are memorialized in water contracts and agreements, an interstate compact and its subsequent amendments, and judicial decrees and opinions.

The licensee may suspend the flows described in this article on a temporary basis to facilitate regular maintenance or emergency repairs, or for equipment failures or unforeseen hydrologic events beyond the licensee's control. The licensee shall consult with the ECC regarding when to schedule and how to conduct regular maintenance, and shall consult with the ECC, to the extent practicable, in emergency situations. The licensee shall implement regular maintenance routines including drawdown and project shutdown activities so that aquatic resources, including fish spawning and rearing, are protected to the maximum extent practicable. The licensee shall minimize the number of such project maintenance shutdowns, drawdowns, and spillway tests and shall attempt to schedule such activities at times that will not interfere with trout spawning or harm incubating trout eggs. If project operations or the minimum flows are modified in accordance with this article, the licensee shall notify the Commission as soon as possible, but not later than 10 days after each such incident, and shall provide the reason for the modified operation.

Nothing in this article shall require the licensee to violate its obligations under, or permit or require any action inconsistent with, the water contracts and agreements, interstate compact, judicial decrees, state water rights, and flood control responsibilities described in Section 5.10 and Appendix C of the August 28, 2002, Settlement Agreement.

Ramping Rate Limitations

Article 412 as modified by FERC Order on July 7, 2004 and FERC Order on April 7, 2005.

The licensee shall implement the following maximum ramping rates, associated with hydroelectric generation at the Bear River Project Developments:

a) 1.2 feet per hour downstream of the Soda Development, ascending and descending, as measured at USGS Gage No. 10075000; and
b) 2.0 feet every 15 minutes on the descending arm of the ramp downstream of the Oneida Powerhouse, as measured at USGS Gage No. 10086500.

Restrictions on ramping rates shall begin within six months of the issuance of the license, or on an alternative schedule as determined by the Project Implementation Plan required under Article 401. The licensee shall consult with the ECC regarding scheduling annual maintenance, and shall schedule and implement annual maintenance to minimize, to the extent practicable, effects to aquatic resources including spawning, incubation of trout eggs, and rearing. The licensee may increase the ramping rates described in this article in case of the following:

(i) emergency or to avoid damage to life or property;
(ii) compliance with historic practices, water rights and flood control responsibilities that are memorialized in water contracts and agreements, an interstate compact and its subsequent amendments, state water rights, and judicial decrees and opinions, as described in Section 5.10 and Appendix C of the August 28, 2002 Settlement Agreement;
(iii) utilization of spinning reserve for the PacifiCorp Eastern System control area, in compliance with the Northern Energy Reliability Council guidelines; or
(iv) compliance with Article 401 of the Commission's license for the Cutler Project (Project No. 2420 001).

If the ramping rates are modified in accordance with this article, the licensee shall notify the Commission as soon as possible, but not later than 10 days after each such incident, and shall provide the reason for the modified ramping rate. Based upon the frequency and magnitude of deviations, the Commission reserves the right to modify the required ramping rates set forth in this article.

Operations Compliance Plan

Article 415. The licensee shall develop and implement an Operations and Compliance Plan to monitor the minimum flows and ramping rates at the Soda, Grace-Cove, and Oneida Developments, as required by Articles 408 and 412. The Operations and Compliance Plan shall be developed in consultation with the ECC and the US Geological Survey (USGS), and filed with the Commission for approval within 6 months after the issuance of the new license, or on an alternative schedule as determined by the Project Implementation Plan required under Article 401.

The Operations and Compliance Plan shall include, but not be limited to the following:

a) the proposed methodology and locations for monitoring minimum flows and ramping rates;
b) specific measures to ensure that the monitoring system would operate under all conditions, including loss of external electric power to the project;
c) the design of the monitoring devices, including any pertinent hydraulic calculations, technical specifications or proposed instrumentation, erosion and sediment control measures, as appropriate, and design drawings of the system;
d) a description of the relative extent of manned versus automatic operation of the monitoring equipment;
e) a description of the methods and schedule for installing, calibrating, operating and maintaining the monitoring equipment;
f) proposed data collection and storage protocols;
g) provisions for reporting the recorded data to the Commission and the consulted agencies; and
h) a schedule for implementing the plan.

The Operations and Compliance Plan shall include provisions consistent with the notification and consultation requirements for the minimum flows and ramping rates required by this license. In addition, should minimum flows or ramping rates deviate from the license requirements, the plan shall include a provision whereby the licensee files with the Commission a report of the incident within 10 days of the incident.

The report shall, to the extent possible, identify the cause, severity, and duration of the incident, and any observed or reported adverse environmental impacts resulting from the incident. The report also shall include: (1) operational data necessary to determine compliance with the article; (2) a description of any corrective measures implemented at the time of the occurrence and the measures implemented or proposed to ensure that similar incidents do not recur; and (3) comments or correspondence, if any, received from interested parties regarding the incident. Based on the report and the Commission's evaluation of the incident, the Commission reserves the right to require modifications to the project facilities and operations to ensure future compliance.

The licensee shall prepare the Operations and Compliance Plan in consultation with the ECC and USGS. The licensee shall include, with the plan, documentation of agency consultation, copies of comments and recommendations on the completed plan after it had been prepared and provided to the parties, and specific descriptions of how the agencies' comments are accommodated by the plan. The licensee shall allow a minimum of 30 days for the agencies to comment and to make recommendations before filing the plan with the Commission. If the licensee does not adopt a recommendation, the filing shall include the licensee's reasons, based on site-specific information.

The Commission reserves the right to make changes to the plan. Upon Commission approval, the licensee shall implement the plan, including any changes required by the Commission.

Oneida Regime Report

Article 420

The Licensee, in consultation with the ECC, shall develop an operational regime that minimizes the frequency of river level fluctuations below the Oneida powerhouse. Pursuant to this goal flows below the powerhouse shall be greater than 900 cfs between Memorial Day and Labor Day, if available. This operational regime shall be filed with the Commission for approval within six months of license issuance, or on an alternative schedule as determined by Project Implementation Plan required under Article 401.

Nothing in this article shall require the licensee to violate its obligations under, or permit or require any actions inconsistent with, the water contracts and agreements, interstate compact, judicial decrees, state water rights, and flood control responsibilities described in Section 5.1 and Appendix C of the August 28, 2002, Settlement Agreement.

The licensee shall include with the operational regime documentation of consultation with the above entities, copies of comments and recommendations on the completed plan after it has been prepared and provided to the agencies and specific descriptions of how the agencies’ comments are accommodated by the operational regime. The licensee shall allow a minimum of 30 days for the agencies to comment and to make recommendations before filing the operational regime with the Commission. If the licensee does not adopt a recommendation, the filing shall include the licensee's reasons, based on project-specific information.

The Commission reserves the right to require changes to the operational regime. Upon Commission approval, the licensee shall implement the operational regime, including any changes required by the Commission.

Appendix B – Operational Checklists and Ramping Rate Limitation Tables

PacifiCorp maintains a Compliance Management System Handbook as a resource for local and on-call compliance personnel and operational checklists for operators to assure that the elements of this plan are clearly communicated and followed. The information is a summary of key elements of the plan and is included to make sure that these elements are consistent with the overall plan.

The minimum requirements cited in the license articles include the following:

(e) methods and schedule for:

a. installing
b. calibrating
c. operating
d. maintaining the equipment

All of the stream flow and reservoir level gages to be used for compliance are already installed.

The checklists for the calibration, operations and maintenance are presented on the following pages. The ramping rate limitation charts are included in this appendix and follow the checklists.

Oneida/Soda Minimum Flow and Ramping Rate Limitation Compliance Checklist

Daily

Minimum Flow

- □ Determine compliance point
  - Calculate inflow
  - Compare to previous day's calculated inflow
  - Currently using reservoir elevation as compliance point? (rare, only during ice conditions)
    - If 2 consecutive days are above the compliance threshold (170 cfs for Soda and 275 cfs for Oneida) alert begin using stream flow gage as compliance point.
  - Currently using stream flow gage as compliance point?
    - If 2 consecutive days are below the compliance threshold (170 cfs for Soda and 275 cfs for Oneida) begin using reservoir elevation as compliance point
  - If compliance point changed today, complete and fax or e-mail form on the back of this sheet.

- □ Ice conditions affecting inflow? If so, hold outflow constant regardless of reservoir deadband.
- □ If Ice conditions are no longer affecting inflow and inflow has stabilized then adjust outflow to match current inflow and maintain reservoir elevation within deadband.
- □ If using reservoir elevation as compliance point and spinning reserve or additional generation was called out during the previous day, re-establish a new baseline using the daily reservoir elevation reading after the event and calculate new reservoir deadband compliance thresholds.

Ramping Rate Limitation

- □ Load change scheduled or anticipated today? Follow attached table.
  - Soda: Up-ramp and down-ramp
  - Oneida: Down-ramp only

TABLE B-1: Soda and Oneida Reservoir deadband thresholds when inflow is at or below the compliance threshold (170 cfs for Soda and 275 cfs for Oneida).

Deadband Parameter	Soda	Oneida
Upper Threshold Reservoir Elevation	Baseline Reservoir Elevation + 0.5 feet	Baseline Reservoir Elevation + 2.0 feet
Upper Target Reservoir Elevation	Baseline Reservoir Elevation + 0.25 feet	Baseline Reservoir Elevation + 1.5 feet
Lower Target Reservoir Elevation	Baseline Reservoir Elevation - 0.25 feet	Baseline Reservoir Elevation - 1.5 feet
Lower Threshold Reservoir Elevation	Baseline Reservoir Elevation - 0.5 feet	Baseline Reservoir Elevation - 2.0 feet

Soda or Oneida Development Change of Minimum Flow Compliance Point Documentation Form

E-mail or fax this form to: Connely Baldwin at 801-220-4748

Location:

- ☐ Oneida
- ☐ Soda

Date of Change:__________________

Type of Change:

- ☐ Compliance Point changed to reservoir elevation
- ☐ Compliance Point changed to stream flow gage
- ☐ Establish new reservoir elevation deadband parameters

New reservoir elevation deadband parameters (if applicable):

Baseline Elevation: ________________________

Date and time of baseline reading: _______________________

Deadband Parameter	Value
Upper Threshold Reservoir Elevation	
Upper Target Reservoir Elevation	
Lower Target Reservoir Elevation	
Lower Threshold Reservoir Elevation	

Comments:

____

____

____

Grace Operations Minimum Flow and Ramping Rate Limitation Compliance Checklist

Daily (Primary – Bypass Valve Compliance)

- ◻ Is minimum flow valve opening clear of debris and blockage? Record on Form.
- ◻ Is the flow measurement device readout consistent with the water balance and bypass river gage reading?
- ◻ If answer to previous question is no, then check the flow measurement device and adjust the current flow setting on the bypass valve as necessary.

Daily (Secondary – Slide Gate compliance)

If Plant is online:

- ◻ Is minimum flow gate opening clear of debris and blockage? Record on Form
- ◻ Check and record the gate opening setting on the minimum flow gate and Grace Reservoir elevation on minimum flow Grace Minimum Flow Compliance Form (attached).
- ◻ Confirm that the reservoir elevation is above the alert level as indicated by the water management compliance representative and recorded on the top of the Grace Minimum Flow Compliance Form.

If Plant is offline:

- ◻ Confirm that minimum flow gate is shut and inflow in excess of flowline leakage and irrigation diversion is flowing downstream

Monthly (Secondary – Slide Gate compliance)

- ◻ Calibrate the electronic reservoir elevation readout to manual reading. Record on Grace Minimum Flow Compliance Form (attached).[see: Grace Minimum Flow Monitoring Form.xls]

Annual (Primary – Bypass Valve compliance)

- ◻ Clean the flow measurement sensors (during the annual Grace flowline maintenance when the secondary compliance method is in place and the minimum flow valve can be closed).

Hydrographer Stream Flow Gage Site Visit Calibration and Maintenance Checklist

<u>During regular visit (about every 6 weeks)</u>

Calibration

Compare electronic reading to internal staff gage readings - update electronic reading to match if difference is greater than 0.05’

Maintenance

Check all wires/cables and screw-downs on green clip – check and tighten all.

Check and refill battery water in deep cycle battery, if present.

Check battery charger or solar panel regulator.

Check voltage reading on battery.

If battery is replaced, update sticker indicating the date the battery was replaced.

<u>Annually</u>

Maintenance

Pull and clean ultrasonic transducers, if present.

Winterizing

For stream flow gages with AC power (Soda and Oneida): turn heat lamps on and assure that two spare lamps are present in gage house.

Bear River Water Management Compliance Representative Checklist

Monthly

- □ Review minimum flow and ramping rate compliance at Soda, Oneida and Grace. Note: Grace ramping rate limitations only apply during whitewater boating flow events (PI compliance spreadsheet).

Annual

- □ Evaluate adequacy of minimum flow and ramping rate limitation compliance program, implement changes as necessary.

As Needed (triggered by unusual events or annual evaluation)

- □ Compare Grace slide gate opening flows determined by the calibrated equations to any discharge measurements made downstream excluding high-flow and periods when inflow less than the minimum flow threshold is passed (see Bear River Operations Compliance Plan for details). If necessary recalibrate the minimum flow gate equation.

- □ Evaluate alert level on Grace Reservoir – communicate to Grace operations personnel for recording on current Grace Minimum Flow Compliance Form

- □ Evaluate minimum flow gate opening size – communicate to Grace operations personnel for recording on current Grace Minimum Flow Compliance Form

- □ Process in-coming change of compliance point documents

- □ Update the ramping rate limitation charts when new rating table is produced for the stream flow gage.

Soda Ramping Table

This table is used by the operators to guide operational load changes based on total outflow from the project. This table will be updated as the rating table is updated.

SODA PLANT RAMPING TABLE (Changes *per Hour*)
(Based on Rating Table of 2/20/2009)

Current Flow (cfs)	**Low Threshold** during next hour	**High Threshold** during next hour
150	150	920
160	150	940
170	150	950
180	150	970
190	150	990
200	150	1010
210	150	1040
220	150	1100
230	150	1120
240	150	1140
250	150	1160
260	150	1180
270	150	1190
280	150	1210
290	150	1230
300	150	1240
310	150	1260
320	150	1290
330	150	1320
340	150	1350
350	150	1380
360	150	1410
370	150	1410
380	150	1420
390	150	1420
400	150	1430
410	150	1440
420	150	1440
430	150	1450
440	150	1460
450	150	1470
460	150	1480
470	150	1500
480	150	1540
490	150	1590
500	150	1610
510	150	1620
520	150	1630
530	150	1640
540	150	1650
550	150	1660
560	150	1670
570	150	1680
580	150	1690
590	150	1700
600	150	1710
610	150	1720
620	150	1730
630	150	1740
640	150	1750
650	150	1750
660	150	1760
670	150	1780
680	150	1790
690	150	1800
700	150	1810
710	150	1820
720	150	1830
730	150	1840
740	150	1850
750	150	1860
760	150	1870
770	150	1880
780	150	1890
790	150	1900
800	150	1900
810	150	1910
820	150	1920
830	150	1930
840	150	1950
850	150	1960
860	150	1970
870	150	1980
880	150	1990
890	150	2000
900	150	2010

Current Flow (cfs)	**Low Threshold** during next hour	**High Threshold** during next hour
910	150	2020
920	150	2030
930	150	2040
940	160	2050
950	160	2060
960	170	2070
970	180	2080
980	180	2090
990	190	2100
1000	190	2110
1100	220	2200
1200	270	2300
1300	320	2400
1400	360	2500
1500	470	2600
1600	490	2700
1700	580	2800
1800	680	2900
1900	780	3000
2000	880	3200
2100	980	3300
2200	1100	3400
2300	1200	3500
2400	1300	3600
2500	1400	3600
2600	1500	3600
2700	1600	3600
2800	1700	3600
2900	1800	3600
3000	1800	3600
3100	1900	3600
3200	2000	3600
3300	2100	3600
3400	2200	3600
3500	2300	3600
3600	2400	3600

Oneida Ramping Table

This table is used by the operators to guide operational load changes based on total outflow from the project. This table will be updated as the rating table is updated.

ONEIDA PLANT RAMPING TABLE (Changes *per 15 minutes*)

Current Flow (CFS)	**Low Threshold** during next 15 minutes (CFS)	**Current** Flow (CFS)	**Low Threshold** during next 15 minutes (CFS)	**Current** Flow (CFS)	**Low Threshold** during next 15 minutes (CFS)
254	*251*	1256	282	2943	1317
268	*251*	1286	298	2999	1348
282	*251*	1317	314	3055	1379
298	*251*	1348	331	3113	1411
314	*251*	1379	349	3171	1443
331	*251*	1411	367	3231	1476
349	*251*	1443	386	3291	1508
367	*251*	1476	405	3353	1542
386	*251*	1508	425	3416	1575
405	*251*	1542	446	3480	1609
425	*251*	1575	467	3545	1643
446	*251*	1609	488	3611	1678
467	*251*	1643	510	3678	1713
488	*251*	1678	533	3747	1749
510	*251*	1713	556	3817	1785
533	*251*	1749	579	3888	1821
556	*251*	1785	602	3960	1858
579	*251*	1821	626	4033	1896
602	*251*	1858	651	4108	1934
626	*251*	1896	675	4184	1973
651	*251*	1934	700	4261	2012
675	*251*	1973	725	4340	2052
700	*251*	2012	751	4419	2092
725	*251*	2052	777	4501	2133
751	*251*	2092	803	4583	2175
777	*251*	2133	829	4667	2217
803	*251*	2175	856	4752	2260
829	*251*	2217	883	4839	2304
856	*251*	2260	910	4927	2348
883	*251*	2304	937	5016	2393
910	*251*	2348	965	5106	2439
937	*251*	2393	993	5198	2486
965	*251*	2439	1021	5292	2533
993	*251*	2486	1049	5387	2581
1021	*251*	2533	1078	5483	2630
1049	*251*	2581	1107	5581	2680
1078	*251*	2630	1136	5680	2731
1107	*251*	2680	1166	5780	2783
1136	*251*	2731	1195	5882	2835
1166	*251*	2783	1225	5985	2889
1195	254	2835	1256	6090	2943
1225	268	2889	1286	6196	2999

Grace Recreational Release Ramping Tables

REPRESENTATIVE GRACE BYPASS REACH RAMPING TARGETS FOR RECREATIONAL RELEASES

(1/4-foot changes *per 15 minutes*; 1 foot per hour)

Target Time	Target Stage (feet)	Flow (cfs)	Note
16:00	4.25	900	Initial Flow
16:15	4.00	715	
16:30	3.75	548	
16:45	3.50	401	
17:00	3.25	277	
17:15	3.00	177	
17:30	2.75	103	
17:45	2.62	73	Final Flow

This and the following tables are representative of the tables that will be used. The tables will be adjusted based on the initial flow available for each recreational release event. The guiding parameter is the 1 foot per hour ramp rate. Water mass balanced is used to determine the other tables. Note that the Soda generation table below reflects changes to accomplish the “pillow/hole fix” described in Section 3.5.

REPRESENTATIVE SODA FLOW AND GENERATION TABLE FOR RECREATIONAL RELEASE (Used when Grace Development is in maintenance)

Time	Soda Flow (CFS)	Soda Generation* (MW) Using 5718'
7:00	1035	4.9
7:15	1035	4.9
7:30	1035	4.9
7:45	1035	4.9
8:00	1223	6.0
8:15	1223	6.0
8:30	1633	8.2
8:45	1633	8.2
9:00	1735	8.8
9:15	1735	8.8
9:30	1735	8.8
9:45	1735	8.8
10:00	1735	8.8
10:15	1735	8.8
10:30	1475	7.2
10:45	1475	7.2
11:00	1390	6.6
11:15	1390	6.6
11:30	1390	6.6
11:45	1390	6.6
12:00	1390	6.6
12:15	1390	6.6
12:30	1390	6.6
12:45	1390	6.6
13:00	1390	6.6
13:15	1390	6.6

Time	Soda Flow (CFS)	Soda Generation* (MW) Using 5718'
13:30	1390	6.6
13:45	1390	6.6
14:00	1122	5.4
14:15	1122	5.4
14:30	829	3.8
14:45	829	3.8
15:00	630	2.5
15:15	630	2.5
15:30	803	3.6
15:45	803	3.6
16:00	1002	4.7
16:15	1002	4.7
16:30	1107	5.3
16:45	1107	5.3
17:00	1058	5.1
17:15	1058	5.1
17:30	1035	4.9
17:45	1035	4.9
18:00	1035	4.9
18:15	1035	4.9
18:30	1035	4.9
18:45	1035	4.9
19:00	1035	4.9
19:15	1035	4.9

Note: * Soda generation is the ramping compliance measure when Grace plant is offline.

REPRESENTATIVE GRACE SLIDE GATE CHANGE COMPLIANCE TABLE FOR RECREATIONAL RELEASE

This table is used when the Grace Development is operating and the generation flow is sufficient to buffer inflow changes enough to meet the slide gate reduction targets without using excessive storage from the reservoir. The table shows slide gate closure as a % of full opening (the same unit of measure as operator controls and display).

Scheduled Time	Actual Time (15 minute increments after start)	% Reduction Gate 1	% Reduction Gate 2	% Reduction Gate 3	% Reduction Gate 4	% Reduction Gate 5 (END AT 75% SATURDAY)	Note: no changes on other gates
16:00		62*					
16:15		38	15				
16:30			55				
16:45			30	15			
17:00				50			
17:15				35	4		
17:30					43		
17:45					33		
18:00					20	13	
18:15						^Sat: 12 Sun: 30	
18:30						Sat: no chg Sun: 25	
18:45						Sat: no chg Sun: 32 As needed.	

Notes:
* This means reduce gate opening by 62%, so for this gate it should go from 100% down to 38%.
^ This gate setting should result in 200 CFS or after the Saturday Events. After Sunday event, return to usual minimum flow settings.

Appendix C – Hydraulic Calculations, Technical Specifications and Design Drawings of the System

The Grace Diversion Dam (Figure C1) has 9 whitewater boating flow slide gates and existing angled flashboard bays. Figure C2 shows the location of gates. Figure C3 shows a close-up of one set of gates. Figure C4 shows a typical gate configuration. Figure C5 shows the location of the minimum flow valve.

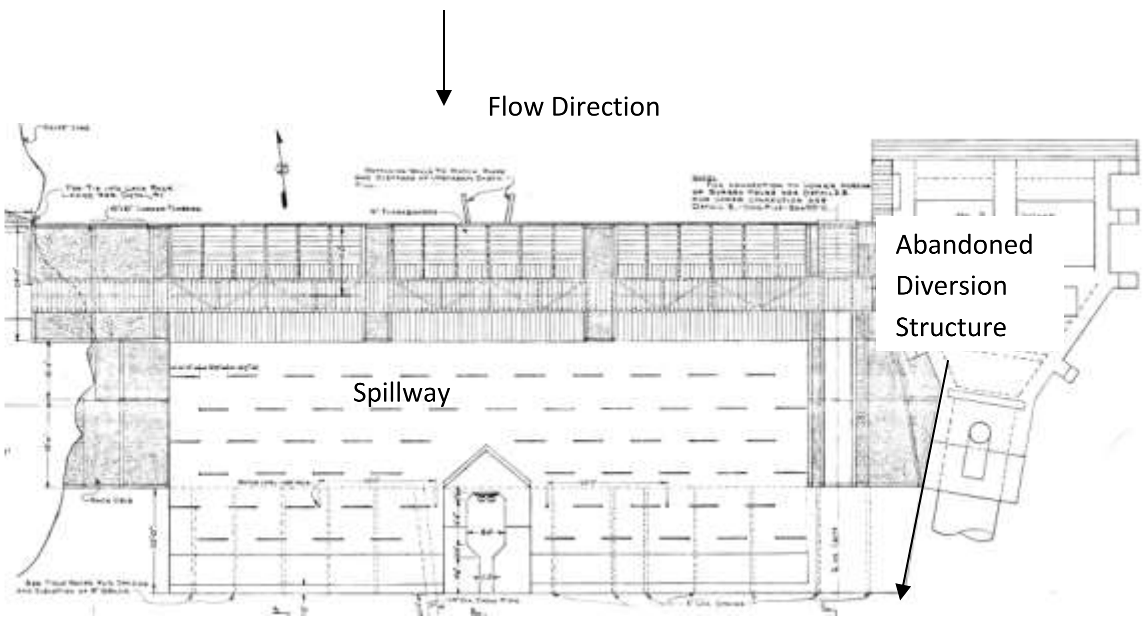

Figure C1. Annotated plan view of the Grace Diversion Dam. (Note that the flashboards are installed on a 45 degree angle.).

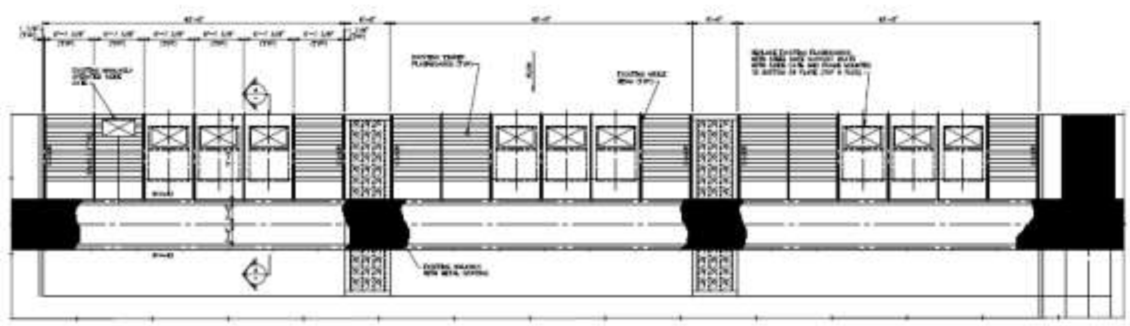

Figure C2. Plan view of gates installed in 9 flashboard bays.

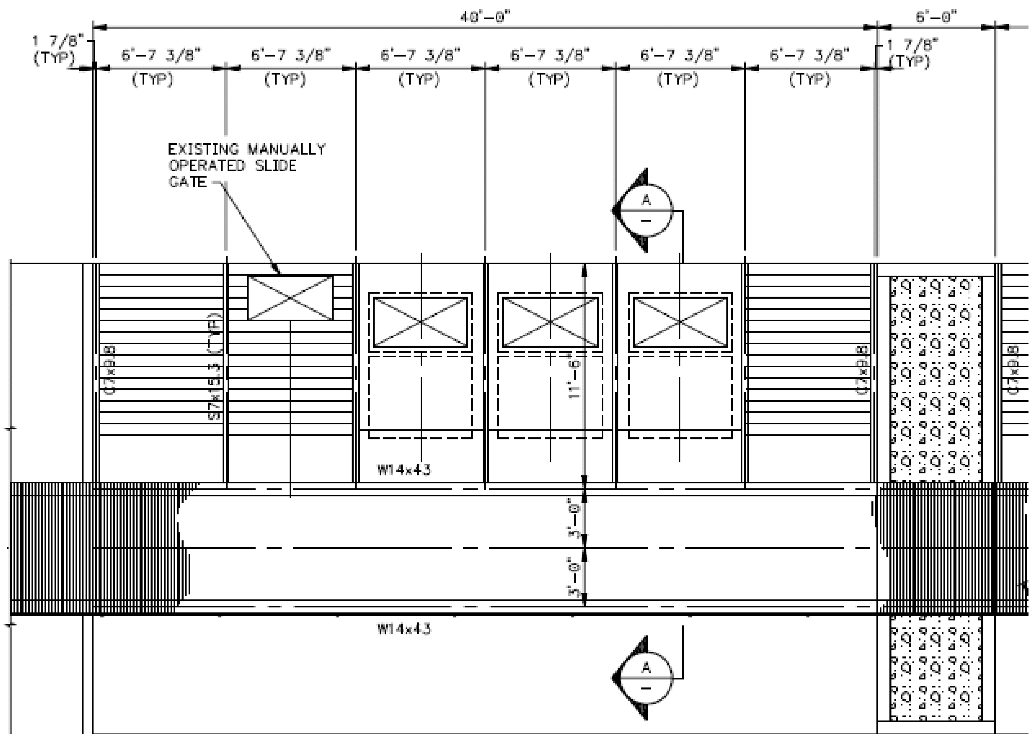

Figure C3. Close-up plan view of 3 gates.

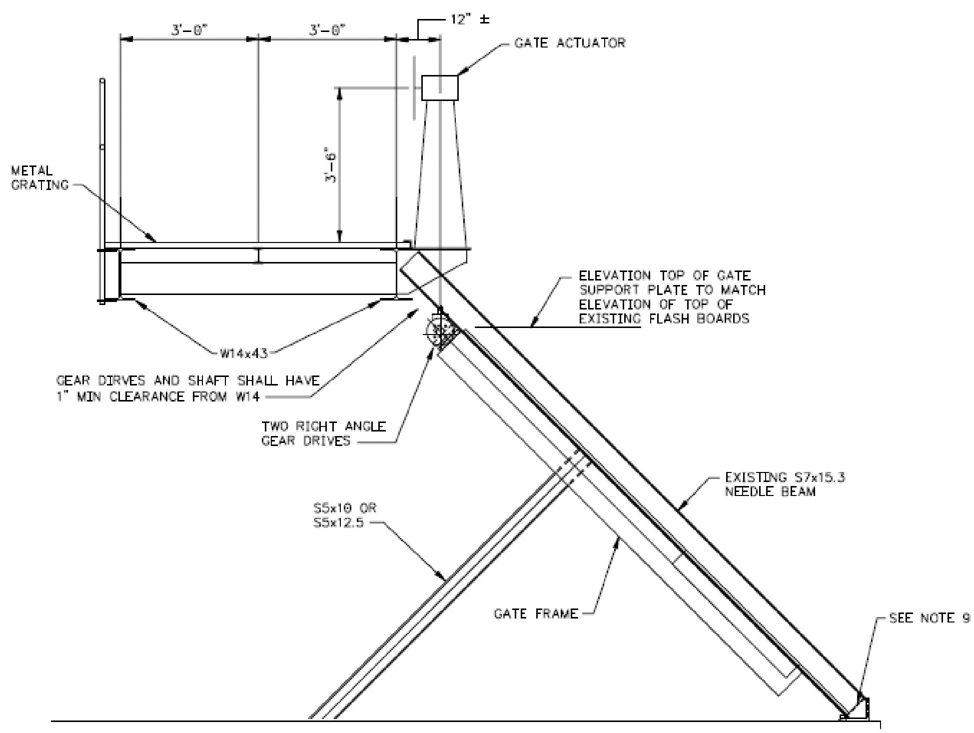

Figure C4. Side view of gate (typical).

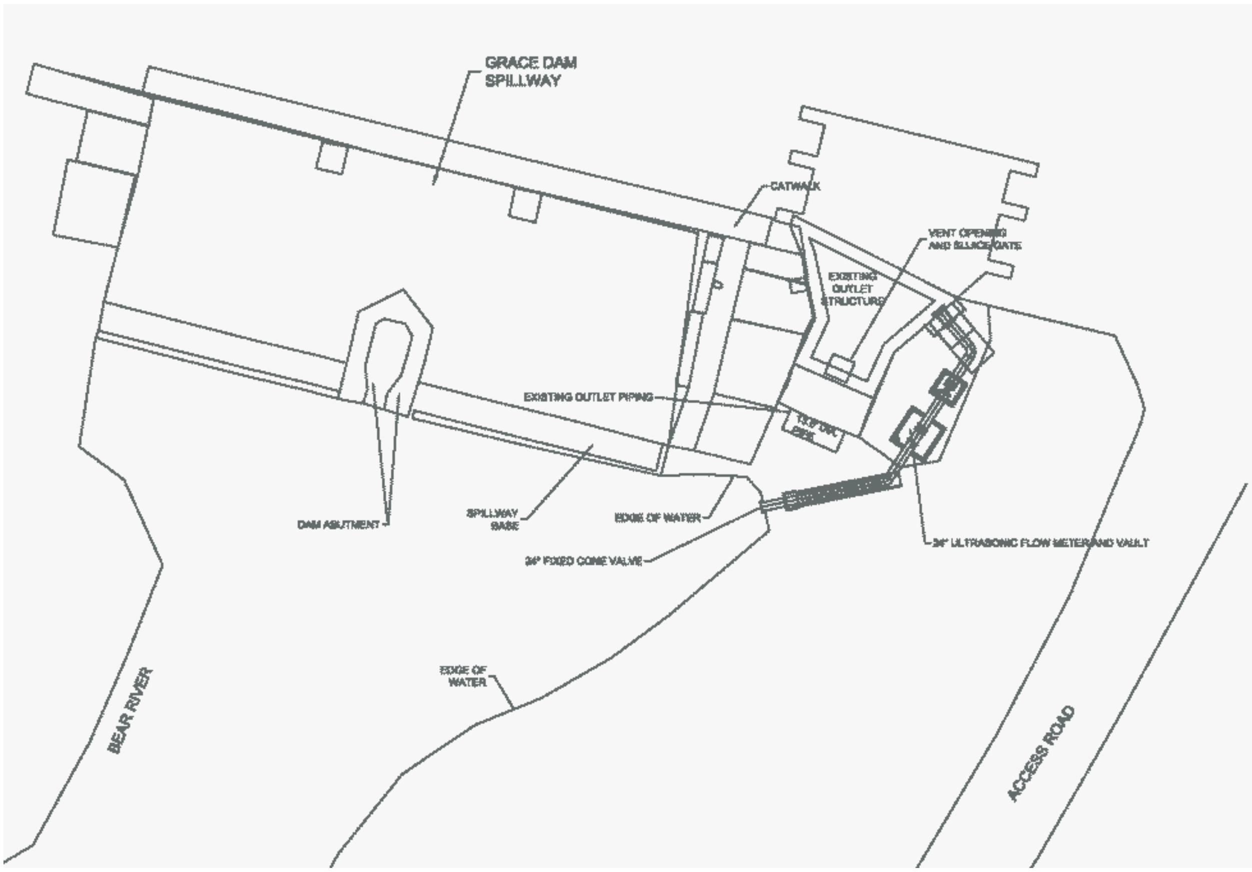

Figure C5. Minimum Flow Valve and Flow Meter Locations. The locations flow valve and flow meter are labeled.

Grace Minimum Flow Slide Gate Calibration Equation and Initial Calibration

The orifice equation relates the flow through a submerged opening relative to the water level (head) through the centerline of the opening.

$$Q = CA\sqrt{2gh}$$

Where *Q* is the flow through the orifice, *C* is a constant, *A* is the area of the opening, *g* is the gravitational acceleration and *h* is the water level to the centerline of the opening). The constant *C* accounts for various energy losses due to the configuration of the opening and associated flow paths. A calibration was done for the slide gates on the dam which are used for secondary minimum flow compliance method, and recreational flow down-ramp rate compliance. (Note that for the primary compliance method, the minimum flow valve, the output of the ultrasonic flow measurement device is used, which requires no calibration).

The calibration process consisted of computing the constant based on multiple discharge measurements taken in the downstream channel during two flow conditions:

1. Water level near the operational level and the gate opening set as close to the anticipated minimum flow threshold with buffer (65 cfs) and;
2. Water level held at the reservoir threshold level of 5553.0 with the gate opening set on the opposite side of the minimum flow threshold that was actually measured in the first test.

Hence, one of the calibration measurements will be targeted to be below the minimum flow threshold of 65 cfs. This was statistically necessary and required to allow an accurate estimate of the constant.

Due to the variability in the discharge measurements in the downstream channel, multiple measurements were taken at each opening by at least two different people using different equipment. The resulting average discharge for the two flow conditions were used to compute the average constant. Then the constant will be used to relate the opening size and reservoir level to flow.

In order to provide a better discharge measurement cross-section, the existing berm (see memos that follow) that extends across the majority of the channel was reinforced with plastic sheeting to direct the flow through a rock-free cross-section. The data used for calibration was the average of at least four discharge measurements made in this cross-section of the river at each gate opening. The reservoir elevation and gate opening was used to calculate the coefficient. The measurements confirm that a *C* coefficient of 0.67 accurately measures the flow through the gate (Figure C6). At full pool (5554.3') a gate opening of 39% will provide 1' of allowable drawdown before the minimum flow would drop below 65 cfs. An alarm was set at 5553.8' to allow 6" of freeboard above the alert level at elevation of 5553.3'. The flow through the slide gate when opened to 39% of a full opening while the reservoir is at full pool is 74 cfs.

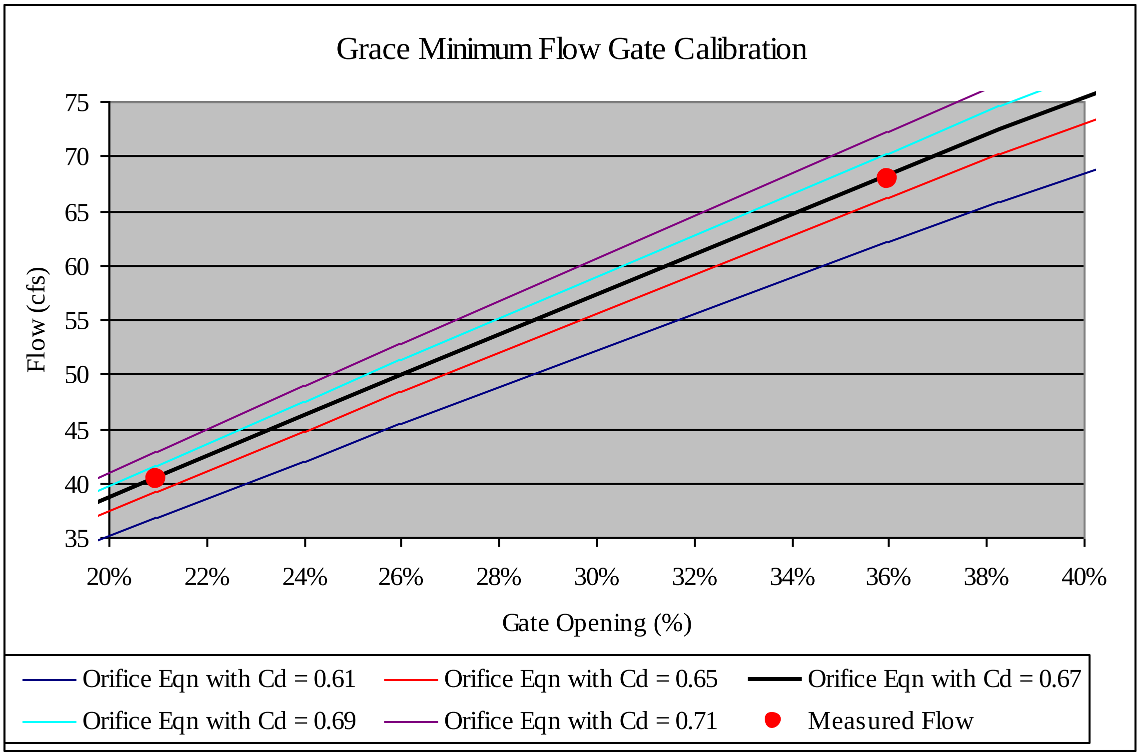

Figure C6. Orifice equation using multiple coefficients and the measured discharge flows.

The calibration was finalized on Oct 15, 2008. The full calculations are used in spreadsheet format to facilitate calculations at precise reservoir elevations and gate openings. The calculations using the calibrated orifice equation at key elevations are shown below.

Elevation	Slide Gate Opening (%)	Flow Through Slide Gate (CFS)
Normal Pool (5554.3 ft)	39%	74
Alarm Point (5553.8 ft)	39%	70
Threshold (5553.3 ft)	39%	66

Grace Hydro Plant
822 Grace Power Plant Road
Grace, Idaho 83241

INTEROFFICE MEMO

Date: January 29, 2010

To: PacifiCorp Energy, Hydro Operations Files

Prepared by: Mark J. Stenberg
Hydro Operations
License Program Manager – Idaho

PURPOSE: Document history of rock and gravel berm in the Bear River above USGS Gage No. 10080000 and permitting authorization for maintenance and repair of it. Bear River Hydroelectric Project, FERC Project No. 20.

History of Rock and Gravel Berm above USGS Gage No. 10080000

1928

The first documentation of the berm is in the 1928 Hydrographer's log. This log recorded discharge measurements below Grace Dam in 1928. A note written by Karl Gilgen, June 6, 1928, noted that the first discharge measurement on that day was taken before repair of the dike and the second reading was after repair of the dike. See attachment A.

1973

When interviewed in October of 2008, Carly Burton, Hydrological Supervisor, recalled that the berm was in place in 1973 when he started with the company.

1974-1975

Mr. Burton interviewed retired employee Jay Golden Haite, in October of 2008 about the history of the berm. Mr Haite was responsible for flow measurements at this site during his role as hydrographer. Mr. Haite remembered maintaining the berm in 1974 or 1975 when the cableway was moved downstream.

2008

On April 14, 2008, PacifiCorp filed a letter requesting Commission approval to discontinue use of USGS Gage No. 10080000 (river gage) for minimum stream flow (MSF) compliance monitoring in the Grace Bypass Reach. PacifiCorp proposed to relocate the MSF compliance point from the river gage to the Grace Forebay elevation gage (forebay gage).

PacifiCorp proposed to maintain a specific reservoir elevation range and calibrate one of the ten newly installed whitewater boater flow gates (gate) to provide, when combined with leakage, the MSF of 65 cfs. Article 408 requires the release of 65 cfs (including 2 cfs of leakage) or inflow, whichever is less.

An Approval Order was issued by FERC on June 20, 2008, for the compliance point change and amending the Operations Compliance Plan under Article 415.

On September 16, 2008, the river flow above the river gage was consolidated using the rock and gravel dike and plastic sheeting. This facilitated accurate flow measurements on September 16 and 19, 2008, for the calibration of flow through one of the new gates.

Pictures of the rock and gravel berm taken in 2008 while it was lined with plastic sheeting is attached as Attachment B (Full details of this gate calibration and change of compliance point are documented in a letter dated November 12, 2008 to FERC, titled, *Bear River Hydroelectric Project, FERC Proj. No. P-20, Minimum Flow Monitoring at Grace Dam, Final Report of Compliance Point Change.*

Current Authorization to maintain berm

Although the Bear River is a regulated waterway under the Clean Water Act (CWA), Section 404(f) of the CWA provides that the discharge of dredge or fill material for the purpose of maintenance of currently serviceable structures such as dikes, dams, levees, groins, riprap, etc is not prohibited by or otherwise subject to regulation under Section 404, as long as the activity is not intended to allow a change in the use of the area to one which it was not previously subject or to change the flow or circulation of navigable waters so they are impaired or reduced.

In addition, US Army Corp of Engineers 2007 Nationwide Permit No. 3, part (a) allows for the repair, rehabilitation, or replacement of any previously authorized or currently serviceable fill provided that the structure or fill is not put to a use other than originally intended. No preconstruction notification is required. NWP #3 is for those structures and fills that do not qualify for a permit exemption under Section 404(f).

Idaho Department of Water Resources authority under their Idaho Stream Protection Act is preempted within the FERC boundary so no Stream Alteration Permit is required plus their statute also exempts work within hydro projects.

<u>*Maintenance Coordination*</u>

Relevant BMPs, timing of work, and coordination will be employed to minimize environmental issues. Specifically, the Idaho Department of Environmental Quality (IDEQ) will be contacted regarding water quality resulting from berm maintenance. The Idaho Department of Fish and Game (IDFG) will be coordinated with to ensure that maintenance activities are conducted during a time period with the least effect on aquatic or riparian life. US Army Corp of Engineers General Conditions for NWP#3 will be reviewed and followed.

Attachments:

Attachment A – 1928 Hydrographer's Log
Attachement B – 2008 pictures of berm lined with plastic.

Cc: Hydro Document Services; Jack Kolkman, Hydro East Plan Manager; Kelly Holt; Idaho Production Manager; Connely Baldwin, Hydrographer; James M. Joyner, Regulatory Projects Manager, US Army Corp of Engineers; Dave Teuscher, Regional Fisheries Manager; Lynn Van Every, Regional Water Quality Manager.

Attachment A – 1928 Hydrographer's Log

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UTAH POWER & LIGHT COMPANY

WATER RESOURCES

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Discharge Measurements of BEAR RIVER BELOW GRACE DAM, 1922

Date	Hydrographer	Width	Area of Section	Mean Velocity	Gage Height	Discharge	Remarks	
		Feet	Sq. ft.	Ft. per sec.	Feet	Sec. ft.	Staff Gage	Staff Gage
					Weir	Weir	In Gage Well	On Dam
Jan. 4	Karl Gilgen				.92	32.9	11.23	42.70
" 13	"				.89	31.2	11.23	42.18
" 21	"				.92	32.9	11.24	43.20
Feb. 1	"				.93	33.5	11.26	43.40
" 14	"				.98	36.5	11.29	44.30
" 23	"				.98	36.5	11.29	44.30
Mar. 2	"				.95	34.7	11.29	43.70
" 10	"				.92	32.9	11.28	43.80
" 23	"				.94	34.0	11.30	42.95
" 29	"				1.12	45.6	11.30	44.05
Apr. 5	"						13.18	45.65
" 14	"				.94	34.0	11.16	43.95
" 20	"				.82	27.4	11.12	42.25
" 27	"				.80	26.2	11.10	42.55
May 5	"	cleaned intake			.06	1.3	10.08	29.20
" 12	"				.67	19.4	11.03	43.40
" 29	"				.61	17.2	11.04	42.80
June 5	"				.64	18.6	11.04	42.20
" 6	"	before repairing dike .65						
	☆	after repairing dike .67				19.8	11.04	
		measurement				21.6		
" 13	"				.89	31.2	11.08	42.82
" 29	"				.83	27.9	11.12	43.78
July 7	"				.62	17.6	11.00	39.95
		Measurement				18.9		
" 14	"				.81	26.8	11.07	42.90
		Measurement				28.0		
Aug. 11	"				.77	24.7	11.08	42.50
" 18	"				.81	26.8	11.10	43.70
Sept. 1	"				.83	27.9	11.13	44.10
" 22	"				.91	32.3	11.16	44.86

UTAH POWER & LIGHT COMPANY

WATER RESOURCES

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Discharge Measurements of BEAR RIVER BELOW GRACE DAM, 1929

Date	Hydrographer	Width (Feet)	Area of Section (Sq. ft.)	~~Mean~~ ~~Velocity~~ (~~Ft. per sec.~~ Weir)	Gage Height (Feet)	Discharge from Table (Sec. ft.)	Elevation of Dam / Remarks
Jan. 12	Karl Gilgan			.79	11.14	25.7	43.64
Feb. 2	"			.91	11.13	32.3	44.76 about 3 cfs going over weir dyke
Mar. 5	"			.73	11.10	22.7	43.00
" 29	"			.86	11.18	29.6	44.90 stopped leak in weir dyke
Apr. 12	"			.64	11.08	18.6	43.25
" 26	"			.42	10.97	9.58	40.73
May 4	"			.53	11.04	13.7	43.25
" 11	"			.51	11.07	13.0	41.33
" 18	"			.53	11.06	13.7	43.45
" 27	"			.60	11.05	16.8	42.75
June 4	E.J. Baird			.58	11.03	16.0	Increased flow from pipe approx 12 cfs
" 13	Taylor & Gilgan			.64	11.07	18.6	43.47
July 1	E.J. Taylor			.73	11.08	22.7	42.58
" 20	"			.78	11.10	25.6	42.00 Weir leakage 0.4 cfs.
Aug. 26	"			.90	11.22	33.3	43.72 " " 1.5 cfs.
Oct. 1	"			.90	11.23	32.8	45.03 " " 1.0 cfs.
Nov. 10	"			.79	11.22	26.7	43.86 " " 1.0 cfs.
Dec. 7	"			.74	11.18	24.2	43.06 " " 1.0 cfs.

A

Attachment B – 2008 Pictures of berm lined with plastic.

Figure 1 - Grace Gage site gravel and rock berm in river,

Attachment B – 2008 Pictures of berm lined with plastic.

Figure 2 - Gravel and rock berm from upstream with plastic installed to consolidate flows.

Attachment B – 2008 Pictures of berm lined with plastic.

Figure 3 - Gravel and Rock Berm from river right with plastic installed to consolidate flows.

Attachment B – 2008 Pictures of berm lined with plastic.

Figure 4 - Gravel and Rock Berm from river right with plastic installed to consolidate flows.

Attachment B – 2008 Pictures of berm lined with plastic.

Figure 5 - Gravel and Rock Berm from river right with plastic installed to consolidate flows.

Grace Hydro Plant
822 Grace Power Plant Road
Grace, Idaho 83241

PACIFICORP ENERGY
A DIVISION OF PACIFICORP

Interoffice Memo

Date: August 27, 2012

To: PacifiCorp Energy, Hydro Operations Files

Prepared by: Mark J. Stenberg

Purpose: Document maintenance and repair of rock and gravel berm in the Bear River above USGS Gage No. 10080000.

PacifiCorp hired KCA Construction Inc. of Logan, Utah to place 16 CY of 6 inch minus material on the Grace gage berm in 2011. This work was performed by the contractor in late October using a track hoe and dump truck to deliver material.

This work was performed in compliance with US Army Corp of Engineers General Conditions for NWP #3. See January 29, 2010, Interoffice Memo prepared by Mark Stenberg for the history on the use and maintenance of this structure.

Attached to this memo is correspondence from Army Corp of Engineers concurring with Mark Stenberg's assessment of permitting requirements for maintenance of this structure. See Attachment A – Email from James Joyner, Army Corp of Engineers, February 9, 2010.

Cc: Hydro Document Services; Jack Kolkman, Hydro East Plant Director, Devan Pharis; Idaho Production Manager; Connely Baldwin, Hydrographer.

Attachments:

A) Email from James Joyner, Army Corp of Engineers, February 9, 2010

RE Grace gage site rock and gravel berm.txt

From: Joyner, James M NWW [James.M.Joyner@usace.army.mil]
Sent: Tuesday, February 09, 2010 3:05 PM
To: Stenberg, Mark
Subject: RE: Grace gage site rock and gravel berm

Mark,

I agree with the assessment on the rock and gravel berm. If there is no expansion of the footprint and the purpose/use doesn't change the maintenance work would likely be exempt from Section 404 CWA permitting requirements. Should you need to tweak the design and/or enlarge it slightly that would likely be covered by a non-reporting Nationwide Permit 3. The key here is that you have existence well documented and the berm hasn't fallen into disrepair. If the berm over time were to fail gradually to the point it was no longer serviceable the maintenance exemption/nationwide might not apply.

We are getting closer to verifying the Ashton Work. Shouldn't be too much longer. A project manager from our Alaska District just got here for a six month tour, so reviews should start to speed up a little.

James M. Joyner
Regulatory Project Manager

US Army Corps of Engineers
Walla Walla District
Idaho Falls Regulatory Office
900 North Skyline Drive, Suite A
Idaho Falls, Idaho 83402
Bus (208) 522-1676
Fax (208) 522-2994
james.m.joyner@usace.army.mil

-----Original Message-----
From: Stenberg, Mark [mailto:Mark.Stenberg@PacifiCorp.com]
Sent: Tuesday, February 09, 2010 7:23 AM
To: Joyner, James M NWW
Subject: RE: Grace gage site rock and gravel berm

If you want to concur or disagree with our analysis that would be helpful. This is just downstream from the Grace dam in the bypass reach adjacent to our USGS gage. How's that Ashton review going?

Mark Stenberg
208 547-7305

-----Original Message-----
From: Joyner, James M NWW [mailto:James.M.Joyner@usace.army.mil]
Sent: Monday, February 08, 2010 3:12 PM
To: Stenberg, Mark
Subject: RE: Grace gage site rock and gravel berm

Mark,

Do you need anything in writing from us. Where is this in relation to the Hydro facility?

James M. Joyner
Regulatory Project Manager

US Army Corps of Engineers
Walla Walla District

Idaho Falls Regulatory Office
900 North Skyline Drive, Suite A
Idaho Falls, Idaho 83402
Bus (208) 522-1676
Fax (208) 522-2994
james.m.joyner@usace.army.mil

-----Original Message-----
From: Stenberg, Mark [mailto:Mark.Stenberg@PacifiCorp.com]
Sent: Monday, February 08, 2010 12:26 PM
To: Joyner, James M NWW; Lynn Van Every; Teuscher,David
Subject: Grace gage site rock and gravel berm

Hello, I put the attached memo together to help our folks keep track of the history of an existing rock and gravel structure in Grace Bypass Reach of the Bear River. We will periodically continue to maintain this structure and our operations side needed the documentation of the current authorization to maintain it and direction on practices when they do choose to. I've cc'd you so your agency can have the history on this instream structure dating back to 1928.

Mark Stenberg

208 547-7305

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Appendix D – Instrumentation, Data Collection and Storage Protocols

The instrumentation details vary by site, but the data collection and storage protocols are similar, so the latter two items are described first.

Data Collection

Data is collected through radio or telephone modem telemetry. At the stream flow gaging sites the datalogger records and stores a local table of stage and flow at a 5-minute increment. The most recent values are transmitted to the company database at least hourly and subsequently averaged to provide the hourly average flows posted on the website (in accordance with Article 422). The website values are derived from the database which performs the time-weighted hourly average at the top of each hour (detailed below).

At the reservoir sites, the water level sensor data is transmitted directly into the PacifiCorp database on a real-time basis. A daily manual reading is also recorded in the plant log book and faxed to the hydro control center where it is manually entered into a spreadsheet that is saved on the corporate server.

Manual readings and inflow computation. Daily inflow computations are made by plant operators and recorded in the plant logbook and faxed daily to the hydro control center in Washington where the data is entered into a spreadsheet and posted on internal network folders through MS Outlook. The computations use the stream flow gages and daily reservoir level readings.

Calculation for time-weighted Hourly Top-of-Hour Average

The formula used to calculate the hourly top-of-hour averages uses all values of the previous hour, with ½ weighting to the value at the top of the previous hour and ½ weighting to the most recent reading (at 0:55 for five-minute data) and equal weight for all values within these endpoints. This weighting is used because it is the calculation performed in the PI database system used by PacifiCorp.

Calculations for ramping

For the Soda Development, the ramping measure of compliance is top-of-the hour hourly stage change (the difference between e.g., the instantaneous stage recorded at 2:00 and 1:00).

For the Oneida Development, the ramping measure of compliance is the 15-minute stage change, as measured by instantaneous quarter-hour stage (i.e., 1:00, 1:15, 1:30, 1:45).

Storage Protocols

The data is stored in two PacifiCorp databases and temporarily in the datalogger. The spreadsheets of (1) reviewed daily average, instantaneous (15-minute sampling interval) minimum and maximum flow, (2) reviewed reservoir levels and (3) manual readings and inflow computation results are recorded on a PacifiCorp network storage server that is backed up daily. Annual spreadsheets are archived in the corporate electronic document management system.

Publication

The reviewed records are published under the supervision of the United States Geological Survey.

Alarms

Real-time automated monitoring is done for minimum flow purposes at the stream flow gage sites that are maintained by PacifiCorp. In response to events in the first few years of the license when the previous Operations Compliance Plan was in place, the real-time alarming features of the dataloggers were programmed and activated for minimum flow purposes. This feature has proven useful and has been expanded to all minimum flow compliance stream flow gaging sites. The feature is not currently available at the Soda and Oneida reservoir compliance points and is not planned to be implemented at the Soda and Oneida reservoir elevation sites because daily checks are sufficient since they are only used for compliance during low inflow periods as described in Section 2.2.2.3 (Exception to Reservoir Level Minimum Flow Compliance During Ice Periods). The real-time elevations are available to the hydro control center which is manned 24 hours a day and are periodically checked as a routine part of operational dispatching.

Currently the minimum flow alarms on the stream flow gaging sites are local to the datalogger and if the alarm thresholds are met, an outgoing voice telephone message is triggered and an automated computerized voice alerts the hydro control center and other local employees as appropriate. This procedure may be replaced by a more centralized or SCADA-based telemetry and alarm system. The future alarm system may be based on text messages.

During calendar year 2013, the first year of using the Grace bypass valve as the primary minimum flow compliance point, an alarm will be programmed for the Grace bypass stream flow gage. The Grace bypass stream flow gage is not used as the minimum flow compliance point, but since it is an established gage it will provide reassurance that the new primary minimum flow compliance point, the flow sensor on the minimum flow bypass valve, is working as desired. The alarm will use the same methodology as the existing alarm, only the sensor used to trigger the alarm will be changed from the Grace Reservoir level to the Grace bypass stream flow gage. If the secondary compliance method is needed, the alarm will revert to the Grace Reservoir level.

The secondary minimum flow compliance point for the Grace Development is the reservoir level that controls the head through the minimum flow gate, when in use as the minimum flow compliance point, the reservoir level is alarmed with the automated telephone computerized voice alert. The alarm point will be set to an appropriate level to protect minimum flow and may be evaluated and adjusted (see Table 2 in the body of this plan). Operational low-level and high-level alarms are also present in the local logic controllers which relay the alarm to hydro control center.

Alert Threshold

The alert thresholds will be established on a case-by-case basis. Under normal flow conditions the alerts may be a few tens of cubic feet per second above the threshold. Under low flow conditions, the alert threshold may be set to the minimum flow threshold.

Alarm State

When the minimum flow compliance point is the stream flow gage, the alarm will be enabled. When the minimum flow compliance point is the reservoir deadband, the alarm will be disabled.

Responding to Alarms

When an alarm is triggered, the hydro control operator will call-out the local operator to come to the plant to make appropriate operational changes and ensure that the situation is restored or kept within the operating parameters as required by the license. The purpose of the alarm is to prevent reportable events, hence, a call-out will not necessarily result in a reportable event.

Instrumentation

Detailed information on the instrumentation present at each gage follows. Specifications are referred to and presented in Appendix E. The specific types of instrumentation and telemetry used may be upgraded in the normal course of business. These are shown to provide an indication of the currently installed equipment.

Soda Stream flow Gage (United States Geological Survey number: 10079500)

The PacifiCorp-maintained gage station downstream of the Soda plant utilizes a Campbell Scientific data logger, currently model CR206, to electronically measure the river stage (water depth) and record the stage measurement in electronic format. Due to scour in the channel, the stilling well is unable to measure flows below 0.63 feet on the staff gage in the stilling well (equivalent to 160 CFS using the current rating table). A Design Analysis Associates WaterLog H-355 model “bubbler” and pressure measuring device (model H-350LITE) has been added and is currently used as the primary stage indicator. The “bubbler” system is composed of a small air compressor, an orifice line tube run inside and protected by the pipe connected to the stilling well and a pressure sensor that is polled by the data logger.

A traditional shaft-encoder water level sensor is still present and will remain as a backup stage measuring device which may be used in place of the pressure transducer should the pressure transducer be malfunctioning for any reason. The water level sensor is a Sutron shaft encoder, model 56-0540, has a wheel, with spokes around the circumference, attached to the shaft. A perforated steel tape hangs around the wheel and has a float attached to one end that floats on the water and a counter weight attached to the other end. As the float moves up and down with the change in water level, the tape rotates the wheel and shaft, which causes the encoder to generate an electrical signal that is proportional to the rotation of the shaft. This signal is read digitally (SDI12 format) from the encoder by the data logger which logs the stage data. Appendix E lists the specifications for the sensors and dataloggers currently in use.

The water level sensors were calibrated upon installation and are checked about every 8 to 12 weeks to ensure that it is still measuring the correct stage. It is checked against a staff gage that is permanently attached to the side of the stilling well.

The data logger and sensors are connected to a local 12 volt dry cell battery which is constantly trickle-charged by local AC power outlet. The battery provides backup power in case of loss of AC power. There is little chance of the loss of data since the polling frequency from the electronic data loggers is every five minutes and even if the polling fails for a period of time, the data is still collected and stored locally on the data logger. The data logger relays data via the built-in 0.1 W spread spectrum radio to a CR1000 located in the Soda control room. Also at each five-minute collection interval, the data is stored remotely on the server maintained by PacifiCorp information technology and is imported into in the company archive of real-time data (PI database).

Soda Reservoir Elevation Gage (United States Geological Survey Number: 10079000)

The reservoir elevation is measured with an AMASS Technologies quadrature shaft encoder model PSE/RTU. A wheel, metal tape, and float assembly turns the shaft of the encoder. The encoder has both digital (MODBUS) and analog (4-20 mA current signal) outputs which are transmitted to the control through a communication cable. The digital output of the water level sensor is fed into the control system network and transmitted over a microwave channel to Salt Lake city and then over leased fiber optic cable to the hydro control center. This elevation data is stored in the PI database system. The analog output is also recorded in the CR1000 at the plant and may be used a backup source of reservoir data.

The reliability of this sensors sensor is high since it is the primary operational control and alarming mechanism for the operation of the Soda Development. The equipment is maintained by an electronic technician stationed at the Grace plant. A critical interruption of the signal would result in a call-out of an operator to verify the actual reservoir level and prompt corrective action to place the elevation sensor in service.

A manual record of the reservoir elevation read-out of the sensor is made in the morning soon after arrival (about 7:30 a.m.) which the operator records in the logs and reports to the hydro control center as the official elevation for the day. Appendix E lists the specifications for the AMASS quadrature shaft encoder.

Grace Bypass Flow Measurement Device (Primary Compliance Point, not previously published, no United States Geological Survey gage number currently assigned)

The flow is measured with an ultrasonic sensor made by Rittmeyer Ltd., and has 2 pairs of insertable sensors. The manufacturer's specifications and instructions indicate there is no need for calibration (there are no moving parts) and the only maintenance they require is annual cleaning. The digital output of the flow sensor is fed into the control system network and transmitted over a microwave channel to Salt Lake city and then over leased fiber optic cable to the hydro control center. This flow data is stored in the PI database system. The top of the hour hourly average is computed by the PI database system. A record of the daily average, and maximum and minimum 15-minute instantaneous flow will be produced.

The flow measurement device may be inoperable under the loss of external AC power, but the valve position would remain as it was when power was lost. Should an interruption to the information from the flow measurement device occur for any reason, the water level record of streamflow gage

(10080000) in the bypass reach will be used to determine the bypass flow released during the period the flow readings are unavailable.

Grace Reservoir Elevation Gage (Secondary Compliance Point, not previously published, no United States Geological Survey gage number currently assigned)

The reservoir elevation is measured with an AMASS Technologies quadrature shaft encoder model PSE/RTU. A wheel, metal tape, and float assembly turns the shaft of the encoder. The encoder has both digital (MODBUS) and analog (4-20 mA current signal) outputs which are transmitted to the control through spread spectrum radio telemetry. The digital output of the water level sensor is fed into the control system network and transmitted over a microwave channel to Salt Lake city and then over leased fiber optic cable to the hydro control center. This elevation data is stored in the PI database system. The analog output is also recorded in the CR1000 at the plant and may be used a backup source of reservoir data.

The reliability of this sensor is high since it is the primary operational control and alarming mechanism for the operation of the Grace Development. The equipment is maintained by an electronic technician stationed at the Grace plant. A critical interruption of the signal would result in a call-out of an operator to verify the actual reservoir level and prompt corrective action to place the elevation sensor in service.

A manual record of the reservoir elevation read-out of the sensor is made in the morning soon after arrival (about 7:30 a.m.) which the operator records in the logs and reports to the hydro control center as the official elevation for the day. Appendix E lists the specifications for the AMASS quadrature shaft encoder.

Grace Minimum Flow Gate Opening (Used in Secondary Compliance methodology)

The opening size will be verified using the electronic opening readout of the minimum flow gate and archived in the company PI database. The low-level minimum flow valve was installed in an abandoned flowline intake in 2010 (see location in Appendix C). When the secondary compliance methodology is used, it will be used in place of the primary minimum flow bypass record, and the difference in the source of the data will be noted.

The slide gate position readout may not be recorded under the loss of external AC power, but the slide gate position would remain in place. Should an interruption to information from the flow measurement device occur for any reason, the water level record of streamflow gage (10080000) in the bypass reach will be used to determine the bypass flow released during the period the flow readings are unavailable.

Grace Bypass Stream flow Gage (United States Geological Survey number: 10080000)

The PacifiCorp-maintained gage station downstream of the Grace dam in the bypass reach utilizes a Campbell Scientific data logger, currently model CR206, to electronically measure the river stage (water depth) and record the stage measurement in electronic format. The primary use of this gage is for the rating table, which is used as the basis for determining the slide gate changes which are the down-ramp rate compliance point. The gage is also used to help quantify the flow during high runoff and recreational release events.

A traditional shaft-encoder water level sensor is a Sutron shaft encoder, model 56-0540. It has a wheel, with spokes around the circumference, attached to the shaft. A perforated steel tape hangs around the wheel and has a float attached to one end that floats on the water and a counter weight attached to the other end. As the float moves up and down with the change in water level, the tape rotates the wheel and shaft, which causes the encoder to generate an electrical signal that is proportional to the rotation of the shaft. This signal is read digitally (SDI12 format) from the encoder by the data logger which logs the stage data. Appendix E lists the specifications for the sensors and dataloggers currently in use.

The water level sensors were calibrated upon installation and are checked about every 8 to 12 weeks to ensure that it is still measuring the correct stage. It is checked against a staff gage that is permanently attached to the side of the stilling well.

The data logger and sensors are connected to a local 12 volt dry cell battery which is trickle-charged by a solar panel. There is little chance of the loss of data since the polling frequency from the electronic data loggers is every five minutes and even if the polling fails for a period of time, the data is still collected and stored locally on the data logger. The data logger relays data via the built-in 0.1 W spread spectrum radio to a CR1000 located in the Soda control room (via a repeater located at a PacifiCorp microwave site). Also at each five-minute collection interval, the data is stored remotely on the server maintained by PacifiCorp information technology and is imported into in the company archive of real-time data (PI database).

Oneida Stream flow Gage (United States Geological Survey number: 10086500)

The PacifiCorp-maintained gage station downstream of the Oneida plant utilizes a Campbell Scientific data logger, currently model CR206, to electronically measure the river stage (water depth) and record the stage measurement in electronic format.

A traditional shaft-encoder water level sensor is a Sutron shaft encoder, model 56-0540. It has a wheel, with spokes around the circumference, attached to the shaft. A perforated steel tape hangs around the wheel and has a float attached to one end that floats on the water and a counter weight attached to the other end. As the float moves up and down with the change in water level, the tape rotates the wheel and shaft, which causes the encoder to generate an electrical signal that is proportional to the rotation of the shaft. This signal is read digitally (SDI12 format) from the encoder by the data logger which logs the stage data. Appendix E lists the specifications for the sensors and dataloggers currently in use.

The water level sensors were calibrated upon installation and are checked about every 8 to 12 weeks to ensure that it is still measuring the correct stage. It is checked against a staff gage that is permanently attached to the side of the stilling well.

The data logger and sensors are connected to a local 12 volt dry cell battery which is constantly trickle-charged by local AC power outlet. The battery provides backup power in case of loss of AC power. There is little chance of the loss of data since the polling frequency from the electronic data loggers is every five minutes and even if the polling fails for a period of time, the data is still collected and stored locally on the data logger. The data logger relays data via the built-in 0.1 W spread spectrum radio to a CR1000 located in the Oneida control room. Also at each five-minute collection interval, the data is stored remotely on the server maintained by PacifiCorp information technology and is imported into in the company archive of real-time data (PI database).

Oneida Reservoir Elevation Gage (United States Geological Survey number: 10086000)

The reservoir elevation is measured with an AMASS Technologies quadrature shaft encoder model PSE/RTU. A wheel, metal tape, and float assembly turns the shaft of the encoder. The encoder has both digital (MODBUS) and analog (4-20 mA current signal) outputs which are transmitted to the control through spread spectrum radio telemetry. The digital output of the water level sensor is fed into the control system network and transmitted over a microwave channel to Salt Lake city and then over leased fiber optic cable to the hydro control center. This elevation data is stored in the PI database system. The analog output is also recorded in the CR1000 at the plant and may be used a backup source of reservoir data.

The reliability of this sensor is high since it is the primary operational control and alarming mechanism for the operation of the Oneida Development. The equipment is maintained by an electronic technician stationed at the Grace plant. A critical interruption of the signal would result in a call-out of an operator to verify the actual reservoir level and prompt corrective action to place the elevation sensor in service.

A manual record of the reservoir elevation read-out of the sensor is made (at about 2:30 p.m.) which the operator records in the logs and reports to the hydro control center as the official elevation for the day. Appendix E lists the specifications for the AMASS quadrature shaft encoder.

Installation Notes

All gages have been installed and are operating.

Implementation Notes

When this plan is approved, and before using the ultrasonic flow meter on the bypass valve, the alarm on the Grace Reservoir elevation gage currently in place will be reprogrammed to alert based on the Grace bypass stream flow gage as described in Section 3.2.1.1 for one year (and then revert to inactive status once the ultrasonic sensor on the bypass valve and associated alarm are proven reliable). If the secondary compliance method is implemented, the alarm will revert to using reservoir elevation at the designated threshold.

Appendix E - Specifications for Instrumentation Currently in Use

Incremental Shaft Encoder – Model Number 56-0540

Source: Sutron, Inc., Sterling, VA

Input Voltage	7 to 16 VDC over voltage and reverse voltage protected
Power Consumption	< 2.5 mA @ 12 VDC and 2.5 rev/sec
Starting Torque	< 0.25 inch-ounce
Shaft Diameter	5/16 inch with both threads and a flat
Rotation Resolution	400 count per revolution
Counter Resolution	32 bit
Reported Resolution	User selectable Range 7 decimal digits (examples: ±99999.99 or ±9999.999)
Display	2 line, 8 character per line with backlight Backup Battery AA size, 1.5V or 3.6V accepted
Bearing Supports	Double bearing arrangement supports up to 10 lb. shaft load
Supported Wheels	User specifies wheel size - no required circumference
Support Units	User specified
Rotation Speed	User specified - factory default 2.5 rev/s
Maximum Rotation Speed	5 rev/s
Temperature Range	-40ºC to +60ºC (Display viewable -20ºC to +60ºC)
Communication Interfaces	SDI-12, RS-232, SDI-12 protocol over RS-485 (on -DT unit)
SDI-12 Support	V1.3 - will work with V1.0, V1.1, V1.2, and V1.3 dataloggers

Design Analysis Associates, Inc. WaterLog Model H-355 The "SMART-GAS" System

Source: Design Analysis Associates, Inc., Logan, Utah

Environment

Standard Operating Range: -40 to 60ºC

Storage: -50 to 80ºC

It is recommended to install unit in weather shielded enclosure.

Gas Delivery

Particulars:	Microprocessor controlled unit
Gas Flow Technology:	Constant mass flow
Gas Flow Control:	Bubble rate is user selectable from 30 to 120 bubbles per minute based on 1/4" tubing orifice pointing down. Auto zero error controlled flow nozzle.
Compressor	
Type:	HI-REL medical grade ISO 9003 qualified piston compressor (NO BROKEN DIAPHRAGM PROBLEMS)
Operation:	Low duty cycle (7 hours typical runtime per year at 60 bubbles per minute flow rate into 12ft of stage-purges not included)
Purge Functions	
Purge Pressure Level:	User Selectable 15 PSI to 80 PSI Options: Manual, Internally sensed requirement, Automatic timed interval, Remote controlled interface
RS - 485 Electrical Specification	
Protocol:	Flexible
Commands:	Half-duplex, 8-bit, no parity, 1stop bit
Baud rate:	9600

Power Requirements

Qualified for 12-volt battery operation

Two Supply Inputs:

Electronics supply via the RS-485 cable (10 to 16 volts)

Compressor supply (10 to 16 volts)

24 hour average current draw: 10 mA Based on a 60 bubbles per minute flow rate

Mechanical

Physical

Enclosure:	Sealed corrosion resistant fiberglass
Size:	10.0 in. wide x 12.0 in. long x 6.0 in. high
Weight:	12 lbs
Mounting:	Hardware supplied for wall mounting
Pressure Outlet:	1/8 in. FNPT
Sensor Pressure Outlet:	1/8 in. FNPT
Reserve Tank Inlet:	1/8 in. FNPT (80 psi MAX)

Pressure relief valve included

Design Analysis Associates, Inc. WaterLog H-350LITE Non-submersible Pressure Transducer (Dry Gas Only) Specifications

Source: Design Analysis Associates, Inc., Logan, Utah

Performance Accuracy (Maximum % of error in measurement)

Pressure:	Less than or equal to 0.02% full scale output (FSO) over temperature range referenced to a straight line stretched from zero PSI to maximum pressure.
Temperature:	± 1°C over temperature range.

Resolution (Smallest change detectable in output signal)

Pressure:	1 part in 250,000 (0.0004%)
Temperature:	1 part in 250,000 (0.0004%)
Linearity:	Less than 0.02% deviation from a straight line referenced to end points.
Pressure Hysteresis:	Less than 0.01% of FSO.
Long-term Stability:	Accuracy drift is less than ±0.05% of FSO per year.
Response Time:	16 second measurement sequence.

PSI Range Options

0-15 PSI = 0-39.6 ft (accuracy ± 0.007ft)

0-30 PSI = 0-69.2 ft (accuracy ± 0.014ft)

Custom calibrations from 5 to 100 PSI

Mechanical Data

Physical

Enclosure:	Sealed, corrosion resistant polycarbonate
Size:	4.68 W X 4.75 L X 4.375 H
Weight:	1.5 lbs
Pressure Inlet:	1/8 in. NPT female fitting

Power

Input Voltage:	9.6 to 16 Volts DC
Input Current:	Sleep mode = 8+mA; Active = 50mA

Environment

Temperature

Standard Operating Range: -40°C to +60°C

Compensated Range: -40°C to +60°C

Storage: -40°C to +80°C

Humidity	0-95% non-condensing.
Media Compatibility	Dry non-corrosive gases, compatible with Alumina, Aluminum, Brass and Fluorosilicone.

Interface

SDI-12 Output

Protocol:	7 bit, even parity, 1 stop bit.
Baud Rate:	1200

RS-232 Output

Protocol:	8 bit, no parity, 1 stop bit.
Baud Rate:	9600 0-5 Volt: Updated every two minutes.

CR1000 Datalogger Specifications

Source: Campbell Scientific, Inc. , Logan, Utah

Maximum Scan Rate: 100 Hz
Analog Inputs: 16 single-ended or 8 differential individually configured
Pulse Counters: 2
Switched Excitation Channels: 3 voltage
Digital Ports: 8 I/Os or 4 RS-232 COM2 Communications/Data Storage Ports: 1 CS I/O, 1 RS-232, 1 parallel peripheral
Switched 12 Volt: 1
Input Voltage Range: ±5 Vdc
Analog Voltage Accuracy: ±(0.06% of reading + offset), 0° to 40°C
Analog Resolution: 0.33 µV
A/D Bits: 13
Temperature Range
    Standard: -25° to +50°C
    Extended: -55° to +85°C
Memory:
    2 MB Flash (operating system),
    4 MB (CPU usage, program storage, and data storage)
Power Requirements: 9.6 to 16 Vdc
Current Drain: 0.7 mA typical; 0.9 mA max. (sleep mode)
    1 to 16 mA typical (w/o RS-232 communication)
    17 to 28 mA typical (w/RS-232 communication)
Dimensions:
    23.9 x 10.2 x 6.1 cm
    (9.4" x 4.0" x 2.4")
Dimensions with CFM100 or NL115 attached:
    25.2 x 10.2 x 7.1 cm
    (9.9" x 4.0" x 2.8")
Weight: 1.0 kg kg (2.1 lb)
Protocols Supported: PakBus, Modbus, DNP3, FTP, HTTP, XML, POP3, SMTP, Telnet, NTCIP, NTP, SDI-12, SDM
CE Compliance Standards to which Conformity is Declared: IEC61326:2002
Warranty: 3 years

CR200 Series Datalogger Specifications (including the CR206)

Source: Campbell Scientific, Inc. , Logan, Utah

- A/D converter: 12 bit
- Scan rate: once per second (max)
- Single-ended analog channel: 5, individually configured
- Analog voltage range: 0 to +2500 mV
- Measurement resolution: 0.6 mV
- Excitation channels: 2, programmable for either +2.5 or +5 volts
- Switched battery port: 1
- Pulse count channels: 2
- Control ports: 2
- Battery voltage range: 7 to 16 Vdc
- On-board 12 Vdc lead acid battery charger
- Communications: RS-232

CS 445 Pressure Transducer Specifications

Source: Campbell Scientific, Inc. , Logan, Utah

Electrical

Excitation: 8-24 VDC

Operating Current: 0.36 mA quiescent, ~7 mA during wake/measurement cycle

Operating Temperature: 0-60 C, Nonfreezing

Communications

Protocol: SDI-12 Subset

Output units: PSI

Pressure Measurement Specifications

Static Accuracy: 0.1% Span

Mechanical Construction

Diameter: 1.0”

Length: 13”

Sensor Element and Body: 316 Stainless

Cable

Diameter: 0.290” nominal shielded, 9 conductor #24 AWG, polyethylene insulators

PSE\RTU & PRTU Quadrature Shaft Encoder with ModBUS Protocol Interface including the following options: \D, \4-20

Source: AMASS Data Technologies Inc., Ogdensburg, New York

Processor: Atmel 89S8252 @ 3.6864 MHz
Word Size: 8 bit data - 8 bit instruction
Memory: 89S8252, 256 bytes RAM
EEPROM 2 kbytes

Shaft Encoder
C-Model
Sensor type - two channel optical incremental encoder 100 x 4 counts per revolution
Resolution - 400 counts per revolution; software conversion to engineering units provided in firmware. (Units per revolution)

Range
+/-85.3 ft (K series), +/-81.918ft (C series) with 1.00 ft circumference pulley

Max. Response Speed
2.5 rev/sec.

Output
ASCII accumulated level using
• Slave MODBUS RTU protocol driver: Response Messages transmitted upon request via RS485 (standard) or modem (/**MDM** and **/MDMLL** options)
OR
• 4-20 mA current loop for host interface (/**4-20** option)

Connector
• 9 pin AMP CPC Connector for comm (standard)
• 15 pin DB15P conn. (/MDM models)
• 8 pin AMP CPC for relay output and 4-20mA ("/4-20" option only)

Power Supply
+10.5 to 15 VDC input for external battery, charger or power supply

Power Consumption
< 5 mA quiescent current for a sample rate of once per second.
maximum current : < 30 mA (with "/D" display off)

Battery Backup
9 V 565 mAHr alkaline battery backup
(Only if connector is mounted)

Relay Output
Rated up to 2A.
Connects pin#2 to pin#1 of 8-pin CPC

Mechanical Interface

Maximum safe load
10 lb 4.5 kg.
Starting Torque
inch-oz (47 cm-g) max.

Physical Characteristics
Height : 165.0 mm. (6.5 in.)
Width : 114.0 mm. (4.5 in.)
Depth : 70.0 mm. (2.75 in.)
Weight : 1.35 Kg (3.0 lb.)
Mounting : Mounting brackets use four #10 bolts or screws.

Environmental Characteristics
Operating : -40 to +55 C
Storage : -60 to +100C
Humidity : <= 100% non-condensing

RISONIC Modular Transit Time Flowmeter System

Source: Rittmeyer Ltd., a member of the BRUGG Group

RISONIC modular ultrasonic flow measurement system for penstocks.

- 1 RISONIC modular controller complete
- Controller Module Interfaces:
- LAN1: Ethernet 10/100 BaseT, USB 1.1 host, Compact Flash Card
- COM1: RS232, COM2: RS485, COM3: RS485
- Status relay
- Power supply to convert to meter requirements for 24 VDC
- Overvoltage protection
- Din rail mounted in an NEMA 4 field unit
- 1 RISONIC modular ultrasonic transit time module complete
- 24 VDC power
- Status LEDs
- Interfaces:
    - 8 Ultrasonic Transducers (four measuring paths)
    - 1 Analog In and Output (0 to 4 mA)
    - 4 Relays Outputs (Change – over contact)
    - 1 Ethernet RJ45
- Din rail mounted in the RIMOCTRL NEMA 4 field unit
- 2 pairs RISONIC ultrasonic transducers - MFATA21 for 2E2P (2-path)
- Field frame small(1US mod.)USA - RIMOFGEH11.002

Note on Grace bypass installation:

Flow meter is installed on a 24-inch diameter pipe. Normal approach conditions of 10 diameters of straight run upstream from the metering section and 5 diameters downstream from the metering section, no entrained air and velocities greater than 1 fps provide the best accuracy and require fewer transducer paths.

Appendix F – Typical Oneida Operational Regime Report

The Oneida Operational Regime Report is required by Article 420.

Bear River Hydroelectric Project
Federal Energy Regulatory Commission
Project No. 20

Oneida Development
Water Year 2012 Operations Report

Submitted to:

Idaho Department of Environmental Quality

Prepared by:

PACIFICORP ENERGY
A DIVISION OF PACIFICORP

November 13, 2012

1.0 INTRODUCTION

This report fulfills the requirements of paragraph 4 of the 401 Water Quality Certification dated 23 June 2003 and Appendix A of the FERC license for FERC Project No. 20 issued 22 December 2003. The precise requirements are:

> *"At the November meeting of the Bear River Commission, PacifiCorp shall provide IDEQ a report for the preceding water year that describes PacifiCorp's* operation of the Oneida Project. The report shall set forth a record showing the times during the preceding water year when PacifiCorp released water for power production, flood control, irrigation delivery, facility maintenance or for other reasons. The annual report shall be delivered to IDEQ each year during the term *of the New License."*

2.0 RESERVOIR INFLOW, RELEASES AND ELEVATION

Reservoir releases were made to pass inflow for power generation and for downstream irrigation demand (Figure 1). The changes in reservoir storage (Figure 2) were made in October as a buffer to changing inflows during the maintenance outage; during April as a buffer to variable snowmelt inflow; and to keep the Bear River system in balance during the irrigation season.

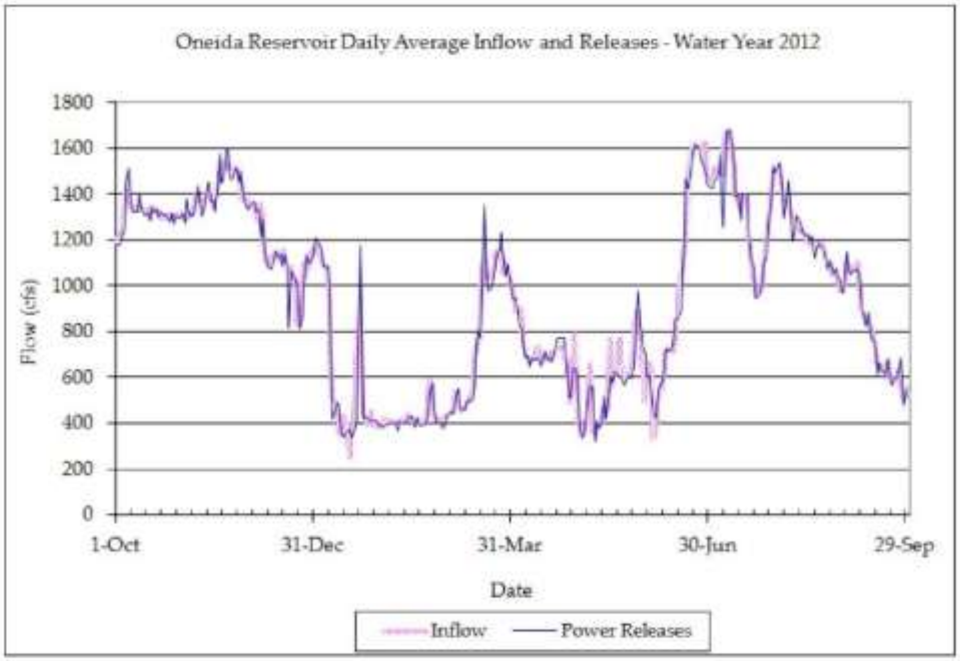

Figure 1. Daily average reservoir inflow and power releases. Flows are in cubic feet per second (CFS).

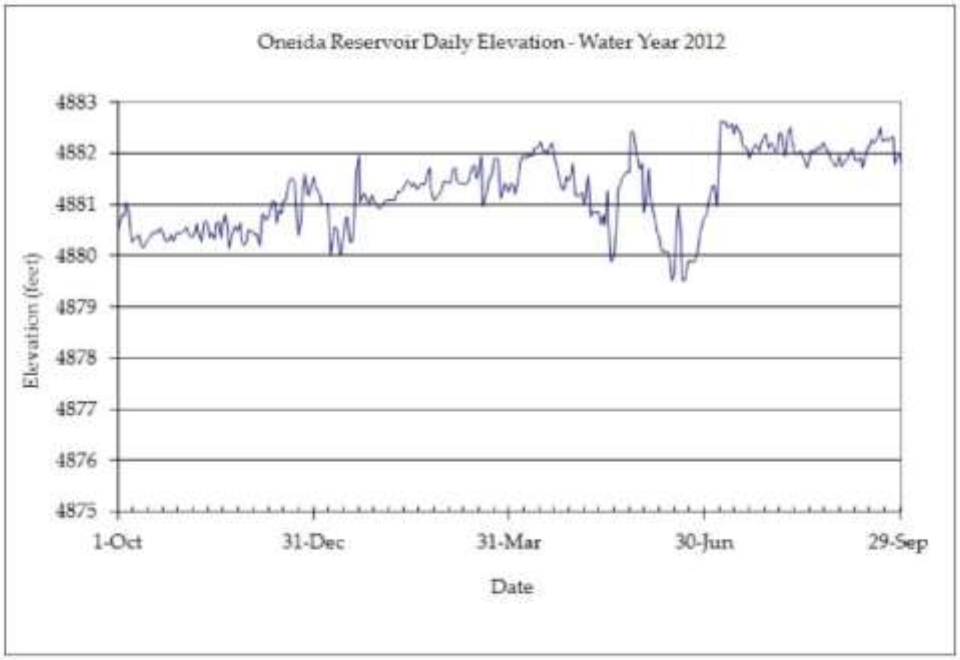

Figure 2. Oneida reservoir elevations.

3.0 DAILY FLUCTUATIONS

Daily fluctuations are summarized by the plots and tables of statistics of daily stage values that are recorded every 15-mintues. The statistics used are average, maximum, and minimum. This is a concise way of demonstrating the daily fluctuations. Figures 3 and 4 show the average stage for a day as a black square with a line spanning the range from the minimum to the maximum.

Because Oneida was used for electrical grid stabilization in the 1980s, frequent and large flow fluctuations on the order of minutes were common, and this is the baseline against which current operations are measured. This annual report documents the dramatic reduction in flow fluctuations compared with this baseline.

Appendix A provides the record of purpose for reservoir releases on a daily time scale.

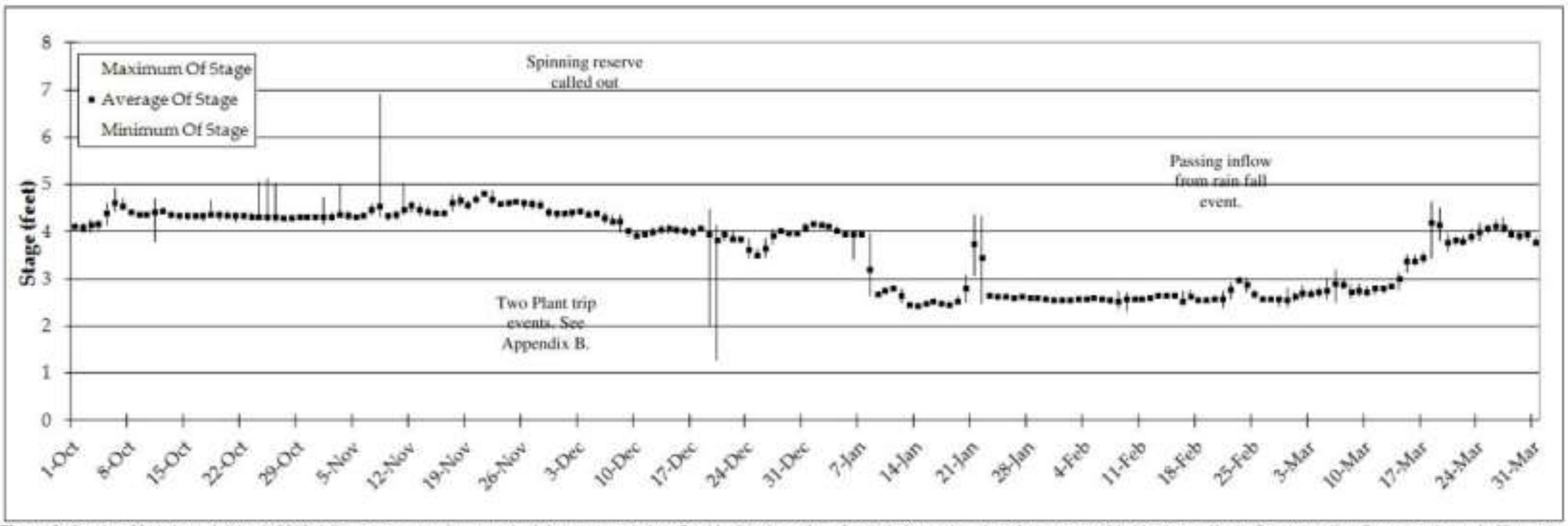

Figure 3. October 2011 through March 2012 daily average, maximum and minimum stage below Oneida. Precise values for each day and explanations are provided in Appendix A. Corresponding flows are shown in Figure 1.

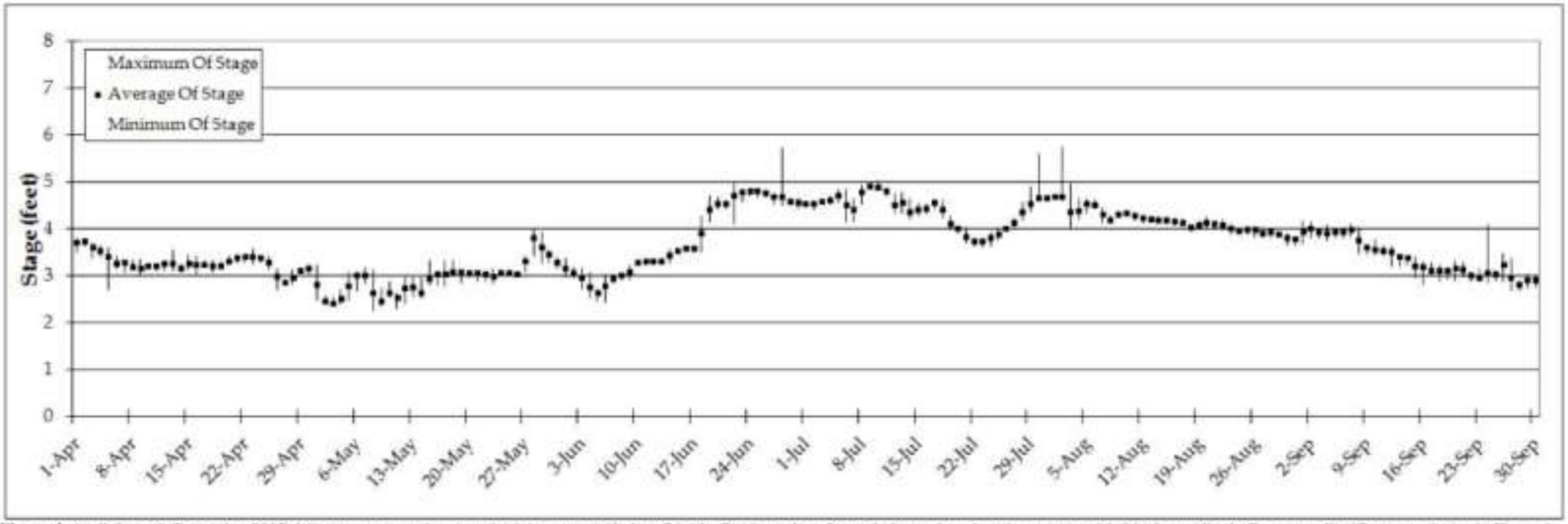

Figure 4. April through September 2012 daily average, maximum and minimum stage below Oneida. Precise values for each day and explanations are provided in Appendix A. Corresponding flows are shown in Figure 1.

4.0 RAMPING RATE ANALYSIS

An analysis of the maximum daily ramping rate is shown in Appendix A. The table summarizes the maximum stage decrease in any 15 minute period in each day. There was one event when the 15-minute down-ramping stage change exceeded 2.0 feet per 15 minutes on December 19, 2012. The event was caused a plant trip due to vibration tools being used to install a replacement bridge crane in the plant causing loose wire connections to activate the 138 kV bus current differential relay. See Appendix B for the letter from the Federal Energy Regulatory Commission declaring that the deviation was not a license violation. Note that the downramp on the following day, December 20th, was due to the same cause, but did not result in a deviation from the ramp rate on that day.

Appendix A. Daily Summary of Gage Height, Primary Purpose for Water Releases and Daily Maximum Down-Ramping Rate

Date	Daily Maximum Stage (ft)	Daily Minimum Stage (ft)	Daily Average Stage (ft)	Maximum 15-minute Down-Ramping Rate (ft/15 min)	Comment
1-Oct	4.14	4.11	4.13	0.02	Power production
2-Oct	4.18	3.97	4.11	0.14	Power production
3-Oct	4.26	3.97	4.15	0.15	Power production
4-Oct	4.23	4.04	4.18	0.09	Power production
5-Oct	4.60	4.13	4.40	0.17	Power production
6-Oct	4.93	4.42	4.63	0.13	Power production
7-Oct	4.71	4.45	4.56	0.11	Power production
8-Oct	4.46	4.36	4.41	0.03	Power production
9-Oct	4.38	4.36	4.37	0.01	Power production
10-Oct	4.37	4.36	4.36	0.01	Power production
11-Oct	4.71	3.79	4.41	0.61	Power production
12-Oct	4.51	4.38	4.46	0.06	Power production
13-Oct	4.41	4.28	4.37	0.12	Power production
14-Oct	4.39	4.29	4.34	0.03	Power production
15-Oct	4.39	4.27	4.34	0.06	Power production
16-Oct	4.39	4.24	4.35	0.14	Power production
17-Oct	4.41	4.22	4.35	0.19	Power production
18-Oct	4.69	4.30	4.36	0.31	Power production
19-Oct	4.44	4.24	4.38	0.12	Power production
20-Oct	4.44	4.31	4.36	0.06	Power production
21-Oct	4.40	4.21	4.35	0.12	Power production
22-Oct	4.40	4.26	4.35	0.13	Power production
23-Oct	4.39	4.26	4.31	0.11	Power production
24-Oct	5.06	4.26	4.33	0.61	Power production
25-Oct	5.13	4.21	4.31	0.91	Power production
26-Oct	5.02	4.20	4.32	0.60	Power production
27-Oct	4.34	4.26	4.30	0.07	Power production
28-Oct	4.35	4.26	4.30	0.08	Power production
29-Oct	4.34	4.32	4.33	0.02	Power production
30-Oct	4.33	4.31	4.32	0.01	Power production
31-Oct	4.33	4.31	4.32	0.01	Power production
1-Nov	4.73	4.15	4.33	0.20	Power production
2-Nov	4.41	4.22	4.32	0.04	Power production
3-Nov	5.00	4.28	4.36	0.48	Power production - testing spinning reserve capability

4-Nov	4.42	4.25	4.34	0.15	Power production
5-Nov	4.32	4.28	4.32	0.03	Power production
6-Nov	4.41	4.31	4.36	0.01	Power production
7-Nov	4.57	4.36	4.48	0.02	Power production
8-Nov	6.91	4.30	4.55	1.16	Power production - spinning reserve called out
9-Nov	4.38	4.24	4.34	0.08	Power production
10-Nov	4.44	4.26	4.36	0.07	Power production
11-Nov	5.04	4.36	4.46	0.59	Power production
12-Nov	4.62	4.41	4.56	0.14	Power production
13-Nov	4.61	4.32	4.46	0.13	Power production
14-Nov	4.53	4.35	4.42	0.08	Power production
15-Nov	4.45	4.34	4.40	0.05	Power production
16-Nov	4.47	4.33	4.40	0.02	Power production
17-Nov	4.78	4.44	4.62	0.04	Power production
18-Nov	4.79	4.53	4.66	0.23	Power production
19-Nov	4.64	4.49	4.58	0.09	Power production
20-Nov	4.78	4.59	4.69	0.05	Power production
21-Nov	4.86	4.77	4.81	0.02	Power production
22-Nov	4.87	4.57	4.69	0.20	Power production
23-Nov	4.60	4.53	4.59	0.04	Power production
24-Nov	4.64	4.53	4.62	0.06	Power production
25-Nov	4.68	4.63	4.66	0.02	Power production
26-Nov	4.69	4.48	4.62	0.16	Power production
27-Nov	4.67	4.48	4.60	0.05	Power production
28-Nov	4.67	4.48	4.58	0.08	Power production
29-Nov	4.51	4.32	4.43	0.14	Power production
30-Nov	4.43	4.29	4.39	0.13	Power production
1-Dec	4.43	4.30	4.39	0.13	Power production
2-Dec	4.45	4.31	4.42	0.07	Power production
3-Dec	4.46	4.35	4.44	0.07	Power production
4-Dec	4.46	4.30	4.38	0.15	Power production
5-Dec	4.46	4.30	4.39	0.05	Power production
6-Dec	4.41	4.18	4.31	0.18	Power production
7-Dec	4.35	4.14	4.23	0.02	Power production
8-Dec	4.35	3.98	4.22	0.16	Power production
9-Dec	4.09	3.89	4.02	0.15	Power production
10-Dec	4.03	3.88	3.93	0.08	Power production
11-Dec	4.01	3.89	3.94	0.09	Power production
12-Dec	4.09	3.90	4.00	0.07	Power production
13-Dec	4.13	3.98	4.05	0.04	Power production
14-Dec	4.13	3.96	4.07	0.12	Power production

15-Dec	4.11	3.96	4.05	0.06	Power production
16-Dec	4.12	3.94	4.02	0.10	Power production
17-Dec	4.09	3.89	4.00	0.06	Power production
18-Dec	4.11	4.03	4.07	0.03	Power production
19-Dec	4.49	2.00	3.94	2.02	Power production - plant trip. Down ramp rate allowance reported to and approved by Federal Energy Regulatory Commission. See Appendix B for letter.
20-Dec	4.13	1.28	3.82	1.57	Power production - plant trip.
21-Dec	3.98	3.80	3.96	0.16	Power production
22-Dec	3.97	3.79	3.86	0.11	Power production
23-Dec	3.86	3.76	3.84	0.05	Power production
24-Dec	3.85	3.44	3.62	0.29	Power production
25-Dec	3.63	3.44	3.50	0.16	Power production
26-Dec	3.86	3.47	3.66	0.10	Power production
27-Dec	4.06	3.72	3.93	0.03	Power production
28-Dec	4.06	3.98	4.02	0.05	Power production
29-Dec	3.99	3.96	3.98	0.02	Power production
30-Dec	3.99	3.95	3.98	0.01	Power production
31-Dec	4.19	3.98	4.10	0.01	Power production
1-Jan	4.19	4.16	4.17	0.01	Power production
2-Jan	4.16	4.14	4.15	0.03	Power production
3-Jan	4.14	4.09	4.12	0.02	Power production
4-Jan	4.11	3.96	4.03	0.04	Power production
5-Jan	3.97	3.95	3.96	0.01	Power production
6-Jan	3.96	3.41	3.95	0.54	Power production
7-Jan	3.96	3.95	3.96	0.01	Power production
8-Jan	3.96	2.64	3.21	0.26	Power production - Reduced inflow due to cessation of flood control releases from Bear Lake.
9-Jan	2.73	2.63	2.67	0.01	Power production
10-Jan	2.81	2.72	2.76	0.01	Power production
11-Jan	2.81	2.80	2.80	0.01	Power production
12-Jan	2.80	2.49	2.67	0.07	Power production
13-Jan	2.49	2.42	2.45	0.02	Power production
14-Jan	2.46	2.42	2.44	0.01	Power production
15-Jan	2.51	2.45	2.47	0.01	Power production
16-Jan	2.54	2.51	2.52	0.01	Power production

17-Jan	2.53	2.42	2.48	0.04	Power production
18-Jan	2.48	2.42	2.45	0.01	Power production
19-Jan	2.63	2.46	2.54	0.01	Power production
20-Jan	3.08	2.51	2.81	0.12	Power production
21-Jan	4.34	3.08	3.76	0.01	Power production – passing inflow from rainfall event.
22-Jan	4.34	2.46	3.45	0.63	Power production – passing inflow from rainfall event.
23-Jan	2.69	2.63	2.65	0.01	Power production
24-Jan	2.65	2.63	2.64	0.01	Power production
25-Jan	2.65	2.61	2.63	0.02	Power production
26-Jan	2.62	2.61	2.62	0.01	Power production
27-Jan	2.64	2.61	2.62	0.01	Power production
28-Jan	2.63	2.61	2.62	0.01	Power production
29-Jan	2.62	2.60	2.61	0.01	Power production
30-Jan	2.60	2.57	2.58	0.02	Power production
31-Jan	2.57	2.55	2.56	0.01	Power production
1-Feb	2.57	2.55	2.56	0.01	Power production
2-Feb	2.58	2.56	2.57	0.01	Power production
3-Feb	2.60	2.57	2.58	0.01	Power production
4-Feb	2.60	2.57	2.59	0.01	Power production
5-Feb	2.61	2.59	2.60	0.01	Power production
6-Feb	2.60	2.59	2.59	0.01	Power production
7-Feb	2.60	2.46	2.55	0.07	Power production
8-Feb	2.75	2.36	2.54	0.16	Power production
9-Feb	2.72	2.31	2.59	0.29	Power production
10-Feb	2.60	2.59	2.59	0.00	Power production
11-Feb	2.62	2.58	2.59	0.01	Power production
12-Feb	2.63	2.60	2.62	0.01	Power production
13-Feb	2.68	2.62	2.65	0.01	Power production
14-Feb	2.67	2.66	2.67	0.01	Power production
15-Feb	2.67	2.64	2.66	0.01	Power production
16-Feb	2.75	2.44	2.54	0.16	Power production
17-Feb	2.77	2.58	2.64	0.07	Power production
18-Feb	2.59	2.56	2.57	0.02	Power production
19-Feb	2.59	2.55	2.57	0.01	Power production
20-Feb	2.60	2.58	2.59	0.01	Power production
21-Feb	2.74	2.39	2.59	0.17	Power production
22-Feb	2.92	2.58	2.77	0.01	Power production
23-Feb	3.03	2.91	2.98	0.01	Power production
24-Feb	3.03	2.73	2.89	0.21	Power production

25-Feb	2.76	2.60	2.69	0.07	Power production
26-Feb	2.60	2.59	2.59	0.01	Power production
27-Feb	2.60	2.58	2.59	0.01	Power production
28-Feb	2.60	2.41	2.57	0.08	Power production
29-Feb	2.82	2.40	2.57	0.10	Power production
1-Mar	2.72	2.52	2.63	0.05	Power production
2-Mar	2.86	2.57	2.70	0.10	Power production
3-Mar	2.80	2.63	2.68	0.13	Power production
4-Mar	2.81	2.61	2.72	0.07	Power production
5-Mar	3.02	2.57	2.76	0.13	Power production
6-Mar	3.20	2.49	2.91	0.18	Power production
7-Mar	2.98	2.78	2.89	0.08	Power production
8-Mar	2.89	2.58	2.72	0.22	Power production
9-Mar	2.88	2.63	2.74	0.10	Power production
10-Mar	2.83	2.62	2.74	0.02	Power production
11-Mar	2.83	2.67	2.81	0.15	Power production
12-Mar	2.82	2.70	2.81	0.10	Power production
13-Mar	2.88	2.80	2.85	0.00	Power production
14-Mar	3.15	2.76	3.01	0.09	Power production
15-Mar	3.52	3.13	3.38	0.08	Power production
16-Mar	3.51	3.28	3.39	0.10	Power production
17-Mar	3.57	3.32	3.46	0.06	Power production
18-Mar	4.63	3.43	4.19	0.11	Power production
19-Mar	4.51	3.80	4.15	0.25	Power production
20-Mar	3.96	3.59	3.77	0.12	Power production
21-Mar	3.89	3.74	3.82	0.04	Power production
22-Mar	3.90	3.71	3.81	0.12	Power production
23-Mar	4.06	3.75	3.89	0.14	Power production
24-Mar	4.20	3.82	4.00	0.07	Power production
25-Mar	4.14	3.97	4.07	0.09	Power production
26-Mar	4.27	4.01	4.13	0.05	Power production
27-Mar	4.30	3.96	4.11	0.07	Power production
28-Mar	4.07	3.86	3.96	0.07	Power production
29-Mar	4.02	3.81	3.92	0.08	Power production
30-Mar	4.02	3.82	3.95	0.09	Power production
31-Mar	3.88	3.71	3.77	0.07	Power production
1-Apr	3.79	3.51	3.70	0.18	Power production
2-Apr	3.80	3.63	3.73	0.05	Power production
3-Apr	3.70	3.37	3.61	0.27	Power production
4-Apr	3.64	3.40	3.52	0.12	Power production
5-Apr	3.60	2.70	3.40	0.55	Power production
6-Apr	3.41	3.15	3.27	0.09	Power production
7-Apr	3.32	3.08	3.28	0.07	Power production

8-Apr	3.32	3.11	3.17	0.11	Power production
9-Apr	3.36	3.00	3.16	0.15	Power production
10-Apr	3.22	3.19	3.21	0.01	Power production
11-Apr	3.22	3.09	3.20	0.07	Power production
12-Apr	3.30	3.09	3.25	0.13	Power production
13-Apr	3.56	3.10	3.26	0.31	Power production
14-Apr	3.26	3.08	3.16	0.09	Power production
15-Apr	3.44	3.11	3.27	0.09	Power production
16-Apr	3.41	3.03	3.24	0.19	Power production
17-Apr	3.31	3.18	3.22	0.06	Power production
18-Apr	3.31	3.08	3.20	0.06	Power production
19-Apr	3.29	3.17	3.21	0.06	Power production
20-Apr	3.41	3.22	3.31	0.09	Power production
21-Apr	3.45	3.28	3.37	0.08	Power production
22-Apr	3.43	3.27	3.40	0.10	Power production
23-Apr	3.58	3.26	3.40	0.14	Power production
24-Apr	3.43	3.26	3.38	0.14	Power production
25-Apr	3.42	3.13	3.29	0.13	Power production
26-Apr	3.15	2.70	2.99	0.18	Power production
27-Apr	2.87	2.83	2.85	0.01	Power production
28-Apr	3.13	2.81	2.95	0.14	Power production
29-Apr	3.12	3.07	3.10	0.00	Power production
30-Apr	3.23	3.03	3.17	0.13	Power production
1-May	3.21	2.46	2.81	0.23	Power production
2-May	2.58	2.39	2.47	0.11	Power production
3-May	2.56	2.37	2.42	0.13	Power production
4-May	2.70	2.39	2.52	0.08	Power production
5-May	3.07	2.47	2.79	0.15	Power production
6-May	3.08	2.67	3.00	0.18	Power production
7-May	3.17	2.83	3.00	0.08	Power production
8-May	3.11	2.24	2.64	0.16	Power production
9-May	2.75	2.34	2.47	0.18	Power production
10-May	2.88	2.55	2.62	0.09	Power production
11-May	2.63	2.29	2.53	0.21	Power production
12-May	2.98	2.40	2.74	0.07	Irrigation delivery
13-May	2.96	2.55	2.76	0.18	Irrigation delivery
14-May	2.96	2.52	2.64	0.27	Irrigation delivery
15-May	3.33	2.79	2.94	0.16	Irrigation delivery
16-May	3.09	2.80	3.02	0.19	Irrigation delivery
17-May	3.31	2.77	3.02	0.19	Irrigation delivery
18-May	3.33	3.05	3.10	0.26	Irrigation delivery
19-May	3.09	2.85	3.08	0.22	Irrigation delivery
20-May	3.08	2.94	3.06	0.12	Irrigation delivery

21-May	3.08	2.87	3.05	0.18	Irrigation delivery
22-May	3.07	2.87	3.03	0.09	Irrigation delivery
23-May	3.15	2.82	2.97	0.12	Irrigation delivery
24-May	3.11	3.02	3.06	0.08	Irrigation delivery
25-May	3.13	3.01	3.05	0.03	Irrigation delivery
26-May	3.08	3.01	3.04	0.01	Irrigation delivery
27-May	3.43	3.07	3.30	0.01	Irrigation delivery
28-May	3.98	3.42	3.80	0.15	Irrigation delivery
29-May	3.93	3.23	3.60	0.32	Irrigation delivery
30-May	3.54	3.26	3.47	0.17	Irrigation delivery
31-May	3.39	3.15	3.29	0.14	Irrigation delivery
1-Jun	3.36	2.96	3.17	0.24	Irrigation delivery
2-Jun	3.17	2.95	3.07	0.10	Irrigation delivery
3-Jun	3.18	2.72	2.96	0.21	Irrigation delivery
4-Jun	3.08	2.52	2.75	0.24	Irrigation delivery
5-Jun	2.71	2.44	2.64	0.17	Irrigation delivery
6-Jun	3.01	2.42	2.79	0.37	Irrigation delivery
7-Jun	3.02	2.84	2.94	0.11	Irrigation delivery
8-Jun	3.03	2.90	3.00	0.02	Irrigation delivery
9-Jun	3.23	2.90	3.08	0.10	Irrigation delivery
10-Jun	3.33	3.22	3.27	0.07	Irrigation delivery
11-Jun	3.34	3.22	3.30	0.09	Irrigation delivery
12-Jun	3.35	3.23	3.30	0.09	Irrigation delivery
13-Jun	3.36	3.23	3.30	0.03	Irrigation delivery
14-Jun	3.56	3.25	3.43	0.06	Irrigation delivery
15-Jun	3.57	3.46	3.54	0.09	Irrigation delivery
16-Jun	3.59	3.52	3.57	0.06	Irrigation delivery
17-Jun	3.61	3.50	3.58	0.08	Irrigation delivery
18-Jun	4.26	3.50	3.91	0.07	Irrigation delivery
19-Jun	4.69	4.13	4.40	0.06	Irrigation delivery
20-Jun	4.66	4.41	4.54	0.11	Irrigation delivery
21-Jun	4.59	4.42	4.53	0.05	Irrigation delivery
22-Jun	4.97	4.09	4.71	0.77	Irrigation delivery
23-Jun	4.83	4.58	4.79	0.24	Irrigation delivery
24-Jun	4.83	4.68	4.81	0.13	Irrigation delivery
25-Jun	4.84	4.68	4.79	0.13	Irrigation delivery
26-Jun	4.85	4.67	4.76	0.05	Irrigation delivery
27-Jun	4.75	4.51	4.67	0.07	Irrigation delivery
28-Jun	5.71	4.50	4.67	0.93	Irrigation delivery
29-Jun	4.64	4.50	4.59	0.11	Irrigation delivery
30-Jun	4.64	4.42	4.54	0.09	Irrigation delivery
1-Jul	4.55	4.46	4.53	0.07	Irrigation delivery
2-Jul	4.58	4.39	4.53	0.02	Irrigation delivery

3-Jul	4.60	4.55	4.57	0.01	Irrigation delivery
4-Jul	4.68	4.52	4.61	0.09	Irrigation delivery
5-Jul	4.84	4.54	4.69	0.08	Irrigation delivery
6-Jul	4.84	4.14	4.51	0.41	Irrigation delivery
7-Jul	4.64	4.14	4.42	0.02	Irrigation delivery
8-Jul	4.91	4.52	4.79	0.11	Irrigation delivery
9-Jul	4.92	4.88	4.90	0.01	Irrigation delivery
10-Jul	5.02	4.81	4.88	0.11	Irrigation delivery
11-Jul	4.84	4.70	4.79	0.05	Irrigation delivery
12-Jul	4.75	4.31	4.50	0.13	Irrigation delivery
13-Jul	4.76	4.31	4.56	0.06	Irrigation delivery
14-Jul	4.64	4.20	4.35	0.21	Irrigation delivery
15-Jul	4.54	4.26	4.41	0.09	Irrigation delivery
16-Jul	4.51	4.32	4.44	0.09	Irrigation delivery
17-Jul	4.61	4.41	4.55	0.07	Irrigation delivery
18-Jul	4.59	4.23	4.40	0.12	Irrigation delivery
19-Jul	4.26	3.97	4.10	0.17	Irrigation delivery
20-Jul	4.04	3.89	4.00	0.12	Irrigation delivery
21-Jul	4.01	3.70	3.83	0.13	Irrigation delivery
22-Jul	3.79	3.62	3.74	0.13	Irrigation delivery
23-Jul	3.78	3.60	3.73	0.03	Irrigation delivery
24-Jul	3.91	3.62	3.80	0.09	Irrigation delivery
25-Jul	4.02	3.75	3.88	0.11	Irrigation delivery
26-Jul	4.04	3.98	4.02	0.04	Irrigation delivery
27-Jul	4.21	4.01	4.13	0.01	Irrigation delivery
28-Jul	4.57	4.17	4.36	0.08	Irrigation delivery
29-Jul	4.90	4.38	4.52	0.09	Irrigation delivery
30-Jul	5.58	4.59	4.65	0.84	Irrigation delivery
31-Jul	4.69	4.59	4.64	0.01	Irrigation delivery
1-Aug	4.69	4.64	4.67	0.01	Irrigation delivery
2-Aug	5.74	4.61	4.67	0.87	Irrigation delivery
3-Aug	4.94	4.00	4.36	0.94	Irrigation delivery
4-Aug	4.63	4.19	4.38	0.10	Irrigation delivery
5-Aug	4.64	4.32	4.54	0.04	Irrigation delivery
6-Aug	4.62	4.41	4.50	0.08	Irrigation delivery
7-Aug	4.43	4.13	4.31	0.14	Irrigation delivery
8-Aug	4.26	4.11	4.18	0.01	Irrigation delivery
9-Aug	4.36	4.22	4.30	0.01	Irrigation delivery
10-Aug	4.36	4.31	4.33	0.01	Irrigation delivery
11-Aug	4.32	4.16	4.28	0.09	Irrigation delivery
12-Aug	4.26	4.13	4.24	0.11	Irrigation delivery
13-Aug	4.25	4.11	4.20	0.08	Irrigation delivery
14-Aug	4.25	4.11	4.19	0.08	Irrigation delivery

15-Aug	4.24	4.09	4.19	0.07	Irrigation delivery
16-Aug	4.21	4.07	4.15	0.02	Irrigation delivery
17-Aug	4.20	4.04	4.12	0.11	Irrigation delivery
18-Aug	4.08	3.93	4.03	0.04	Irrigation delivery
19-Aug	4.18	3.96	4.07	0.10	Irrigation delivery
20-Aug	4.24	4.01	4.13	0.15	Irrigation delivery
21-Aug	4.15	3.99	4.12	0.05	Irrigation delivery
22-Aug	4.19	3.96	4.08	0.09	Irrigation delivery
23-Aug	4.09	3.88	4.02	0.09	Irrigation delivery
24-Aug	4.03	3.87	3.97	0.12	Irrigation delivery
25-Aug	4.05	3.89	3.99	0.09	Irrigation delivery
26-Aug	4.04	3.82	3.97	0.11	Irrigation delivery
27-Aug	4.00	3.80	3.90	0.12	Irrigation delivery
28-Aug	3.98	3.80	3.93	0.09	Irrigation delivery
29-Aug	3.91	3.87	3.89	0.01	Irrigation delivery
30-Aug	3.89	3.65	3.81	0.11	Irrigation delivery
31-Aug	3.83	3.65	3.78	0.13	Irrigation delivery
1-Sep	4.16	3.67	3.92	0.14	Irrigation delivery
2-Sep	4.14	3.79	4.00	0.17	Irrigation delivery
3-Sep	3.97	3.79	3.93	0.12	Irrigation delivery
4-Sep	4.08	3.76	3.91	0.12	Irrigation delivery
5-Sep	3.98	3.79	3.93	0.10	Irrigation delivery
6-Sep	4.02	3.80	3.93	0.06	Irrigation delivery
7-Sep	4.08	3.83	3.98	0.14	Irrigation delivery
8-Sep	4.03	3.47	3.75	0.18	Irrigation delivery
9-Sep	3.65	3.44	3.61	0.10	Irrigation delivery
10-Sep	3.77	3.42	3.55	0.14	Irrigation delivery
11-Sep	3.65	3.41	3.52	0.14	Irrigation delivery
12-Sep	3.62	3.20	3.52	0.16	Irrigation delivery
13-Sep	3.43	3.19	3.40	0.19	Irrigation delivery
14-Sep	3.43	3.23	3.39	0.13	Irrigation delivery
15-Sep	3.39	2.95	3.21	0.09	Irrigation delivery
16-Sep	3.29	2.79	3.17	0.14	Irrigation delivery
17-Sep	3.27	2.99	3.10	0.12	Irrigation delivery
18-Sep	3.23	2.88	3.12	0.16	Irrigation delivery
19-Sep	3.18	2.93	3.10	0.11	Irrigation delivery
20-Sep	3.31	2.86	3.15	0.11	Irrigation delivery
21-Sep	3.28	2.97	3.14	0.09	Irrigation delivery
22-Sep	3.08	2.88	3.00	0.09	Irrigation delivery
23-Sep	3.15	2.86	2.97	0.06	Irrigation delivery
24-Sep	4.10	2.85	3.07	0.51	Irrigation delivery
25-Sep	3.09	2.89	3.04	0.08	Irrigation delivery
26-Sep	3.47	2.87	3.24	0.13	Irrigation delivery

27-Sep	3.37	2.68	2.97	0.20	Irrigation delivery
28-Sep	2.88	2.68	2.80	0.07	Irrigation delivery
29-Sep	3.03	2.73	2.91	0.07	Irrigation delivery
30-Sep	2.99	2.77	2.90	0.12	Irrigation delivery

Appendix B. Federal Energy Regulatory Commission Letter Regarding Deviations from Minimum Flows and Ramping Requirements

FEDERAL ENERGY REGULATORY COMMISSION
Washington, D. C. 20426

OFFICE OF ENERGY PROJECTS

Project No. 20-099-Oregon
Bear River Hydroelectric Project
PacifiCorp Energy

March 1, 2012

Mr. R. A. Landolt
Managing Director, Hydro Resources
PacifiCorp Energy
825 NE Multnomah, Suite 1500
Portland, OR 97232

Subject: Deviations from Minimum Flows and Ramping Requirements Pursuant to Articles 408 and 412 of the License

Dear Mr. Landolt:

This is in response to your filing submitted on December 28, 2011, concerning deviations from minimum flows and ramping requirements at the Oneida Development of the Bear River Hydroelectric Project No. 20. You submitted the filing pursuant to Articles 408(d) and 412 of the license. [1]

License Requirements

Under Article 408(d) of the license, you are required to maintain a year-round minimum flow of 250 cfs or inflow, whichever is less, in addition to current leakage from Oneida Dam, which was measured at 1 cfs on October 1, 2004. You may suspend the required minimum flows on a temporary basis to facilitate regular maintenance or emergency repairs or for equipment failures or unforeseen hydrologic events beyond your control. If project operations or the minimum flows are modified, you are required to notify us as soon as possible, but no later than 10 days after such incident, and provide the reason for the modified operation of the project.

[1] See Order Approving Settlement Agreement and Issuing New License, 105 FERC ¶ 62,207, issued December 22, 2003.

In addition, under Article 412(b) of the license,[2] you are required to maintain a ramping rate of 2.0 feet every 15 minutes on the descending arm of the ramp downstream of the Oneida Powerhouse, as measured at USGS Gage No. 10086500.

Deviation Events

You report that on December 19, 2011, at about 10:00 AM, the minimum flow from the Oneida Development fell below the required 251 cfs, and exceeded the down ramp rate requirement of 2.0 feet per every 15 minutes. The average flow dropped to 193 cfs, and a down ramping event of 2.02 feet per 15 minute interval occurred below the Oneida Powerhouse. Your plant employees removed the ice from a spill gate, and opened the gate to restore streamflows.

You state that a plant power outage caused all three units to trip off-line resulting in a rapid reduction of streamflow below the plant. You discovered that vibration from the operation of tools being used to install a replacement bridge crane in the plant caused loose wire connections to activate the 138 kV bus current differential relay. You tightened the loose wire connections to prevent the current fault sensor from tripping the 138 kV bus and to prevent this type of incident from happening again. Also, you included two tables listing the minimum flows and ramping rates for the December 19, 2011 incident.

Furthermore, you notified the federal agencies immediately after the incident. No environmental impacts were reported from the incident. No comments were received in response to the notification.

Conclusion

After reviewing the information provided, we have concluded that the deviations from minimum flows and ramping rate requirements that occurred on December 19, 2011, were due to the units tripping-off line because of in-plant construction. In addition, you took corrective measures. Therefore we have determined that the deviations will not be considered violations of the project license. Thank you for your cooperation.

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[2] See Order Modifying Article 412(b), 108 FERC ¶ 62,011, issued July 7, 2004, and Order Approving Operation and Compliance Plan Under Article 415, 111FERC ¶ 62,030, issued April 7, 2005.

If you have any questions concerning this letter, please contact Anumzziatta Purchiaroni at (202) 502-6191, or by e-mail at anumzziatta.purchiaroni@ferc.gov.

Sincerely,

William Guey-Lee
Chief, Engineering Resources Branch
Division of Hydropower Administration
and Compliance