

DRAFT

Klamath Hydroelectric Project
(FERC Project No. 2082)

Explanation of Facilities and Operational Issues associated with
PacifiCorp's Klamath Hydroelectric Project

PacifiCorp
Portland, Oregon

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1.0 INTRODUCTION

The intent of this document is to provide general information that may help participants interested in the relicensing of PacifiCorp's Klamath Hydroelectric Project ("Project") better understand how and why the Project is operated as it is. To this end, the influence of the Project on hydrology in the Klamath Basin will be more apparent. This document provides information on PacifiCorp's hydroelectric facilities, the company's contractual and operational relationship with the U.S. Bureau of Reclamation (Reclamation), Klamath out-of-basin transfers in the Project area, and other specific issues directly associated with the operation of PacifiCorp's Project. This information and details of Project operations will be provided in Exhibit B of the draft and final license application to the Federal Energy Regulatory Commission (FERC).

PacifiCorp's Project and Reclamation's Klamath Irrigation Project ("Reclamation Project") are two distinctly different projects with two different owners and objectives, yet they are intertwined historically, geographically, physically, and operationally. The relationship between the projects is quite complicated. This document is intended to describe the relationship and its implications.

Section 1 provides an overview of how the two projects are operated. Subsequent sections provide more detailed explanation of pertinent issues associated with each Project facility.

1.1 PACIFICORP PROJECT OVERVIEW

The PacifiCorp Project consists of six generating facilities, between river mile (RM) 190 and RM 254, and a re-regulation dam with no generation facilities along the mainstem of the Upper Klamath River, as well as one generating facility on Fall Creek, a tributary to the Klamath River at about RM 196 (Figure 1.1-1). The eight major Project developments include:

- The East Side (3.2 megawatt [MW]) and West Side (0.6 MW) powerhouses that are the most upstream facilities, located near RM 254 within the city limits of Klamath Falls, Oregon. They are associated with Link River dam which is owned by Reclamation and which PacifiCorp currently operates under Reclamation's directives (see Appendix A). The powerplants and water conveyance system are owned and operated by PacifiCorp.
- Keno Dam, a diversion and re-regulating facility with no generation capability, is 20 miles further downstream at RM 233. Keno Reservoir buffers flows downstream of Keno dam from inflow and outflow changes originating from Reclamation's Project.
- J.C. Boyle (80 MW) dam and reservoir are located within Oregon. The dam is at RM 224.7 and the powerhouse is several miles downstream at RM 220.4.
- The Copco hydroelectric facilities are located in California. Copco reservoir supplies Copco No. 1 (20 MW) and No. 2 (27 MW) powerhouses which are at RM 198.6 and RM 196.8, respectively. Copco No. 2 reservoir, being a small reservoir located immediately downstream of Copco 1 dam and having no active storage, causes Copco No. 2 powerhouse to operate as a "slave" to Copco No. 1.
- Iron Gate dam, reservoir, and powerhouse (18 MW) comprise the farthest downstream (RM 190) development. The dam is operated to meet monthly river flow needs for the Klamath River downstream of the Project.

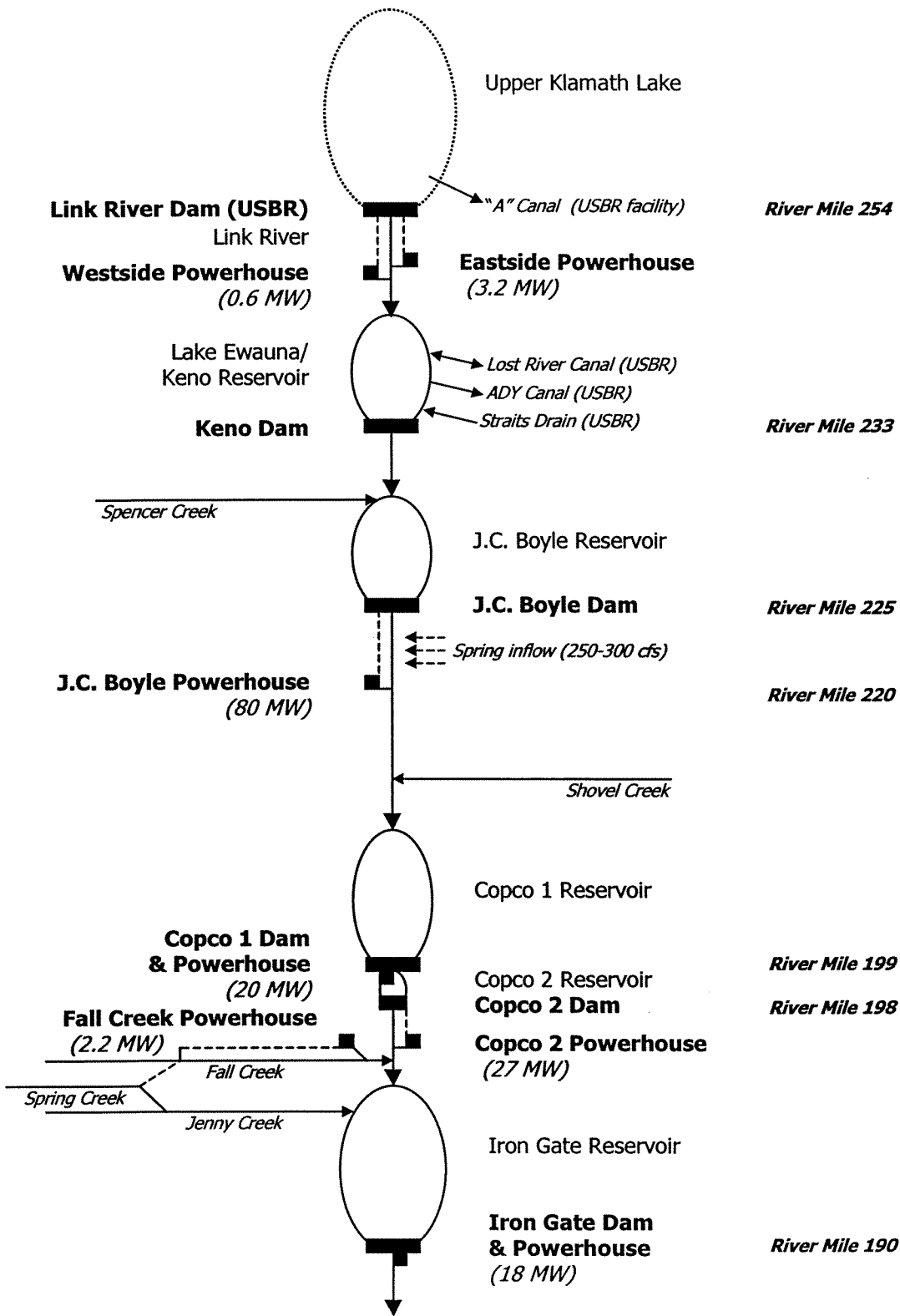
- The Fall Creek powerhouse (2.2 MW) is located on a small Klamath River tributary that flows into the upper end of Iron Gate reservoir.

Operational responsibilities are shared among three different workforces within PacifiCorp. The Wholesale Energy Services (WES) group is responsible for scheduling the Project's generation while providing water management to meet FERC license articles, agency needs, and public needs. WES forecasts for storm events, snowpack, and runoff and it determines how these factors impact water management. WES provides a daily schedule to the field operation groups for the Project's power generation and water releases. The facilities are not staffed 24 hours per day, seven days a week, yet they are still monitored around the clock. PacifiCorp's Hydro Control Center (HCC), located near Ariel, WA, is responsible for monitoring all the facilities and controlling specific power plants that are crucial for generation needs and water releases. The response team for any issue needing onsite attention is the various field personnel stationed at or near the Project facilities. This field operation includes technical support (centered in Medford, OR) for any maintenance needs.

1.2 RECLAMATION PROJECT OVERVIEW

Reclamation's Klamath Irrigation Project provides irrigation water for both agricultural and national wildlife refuge lands in the Klamath Basin, and it provides flood control along the Klamath River in and downstream of the Project area. Two major watersheds comprise Reclamation's Project area: the Klamath River watershed and the Lost River watershed. The Lost River watershed collectively comprises the Clear Lake, Malone and Gerber watersheds (Figure 1.2-1). Reclamation's Project presently provides irrigation water for approximately 240,000 acres of agricultural land plus the wildlife refuge lands. Major Reclamation Irrigation Project features are:

- Clear Lake dam and reservoir located on the Lost River in California
- Gerber dam and reservoir located on Miller Creek, a tributary of the Lost River in Oregon
- Malone diversion dam on the Lost River in Oregon downstream from Clear Lake dam
- Lost River diversion dam on the Lost River in Oregon that diverts water to the Klamath River through the Lost River diversion channel
- ADY canal that allows water transfer from the Klamath River (Keno reservoir) to the Irrigation Project
- Klamath Straits Drain that allows water transfer from the Irrigation Project to the Klamath River (Keno reservoir)
- Link River dam on the Link River at the head of the Klamath River that regulates flow from Upper Klamath Lake (UKL) into the Klamath River. Water diverted from UKL provides the majority of irrigation supplies for Reclamation Project lands through the "A" Canal
- Anderson Rose dam on the Lost River that diverts water for irrigation of California lands
- Tule Lake tunnel that conveys drainage water from Tule Lake to Lower Klamath Lake



**Figure 1.1-1
PacifiCorp Project Facilities**

2.0 LINK RIVER DAM

2.1 FACILITY OVERVIEW

Link River dam, located at RM 254 in Klamath Falls, Oregon, is the Klamath Hydroelectric Project-related facility furthest upstream and the point of diversion for the East Side and West Side powerhouses. Construction of Link River dam was completed in 1921. The dam is a reinforced concrete slab about 16 feet high and 435 feet in length (Figure 2.1-1). The spillway section consists of six spill gates and 25 stop log spill gates.

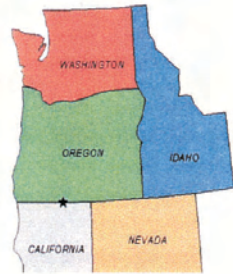
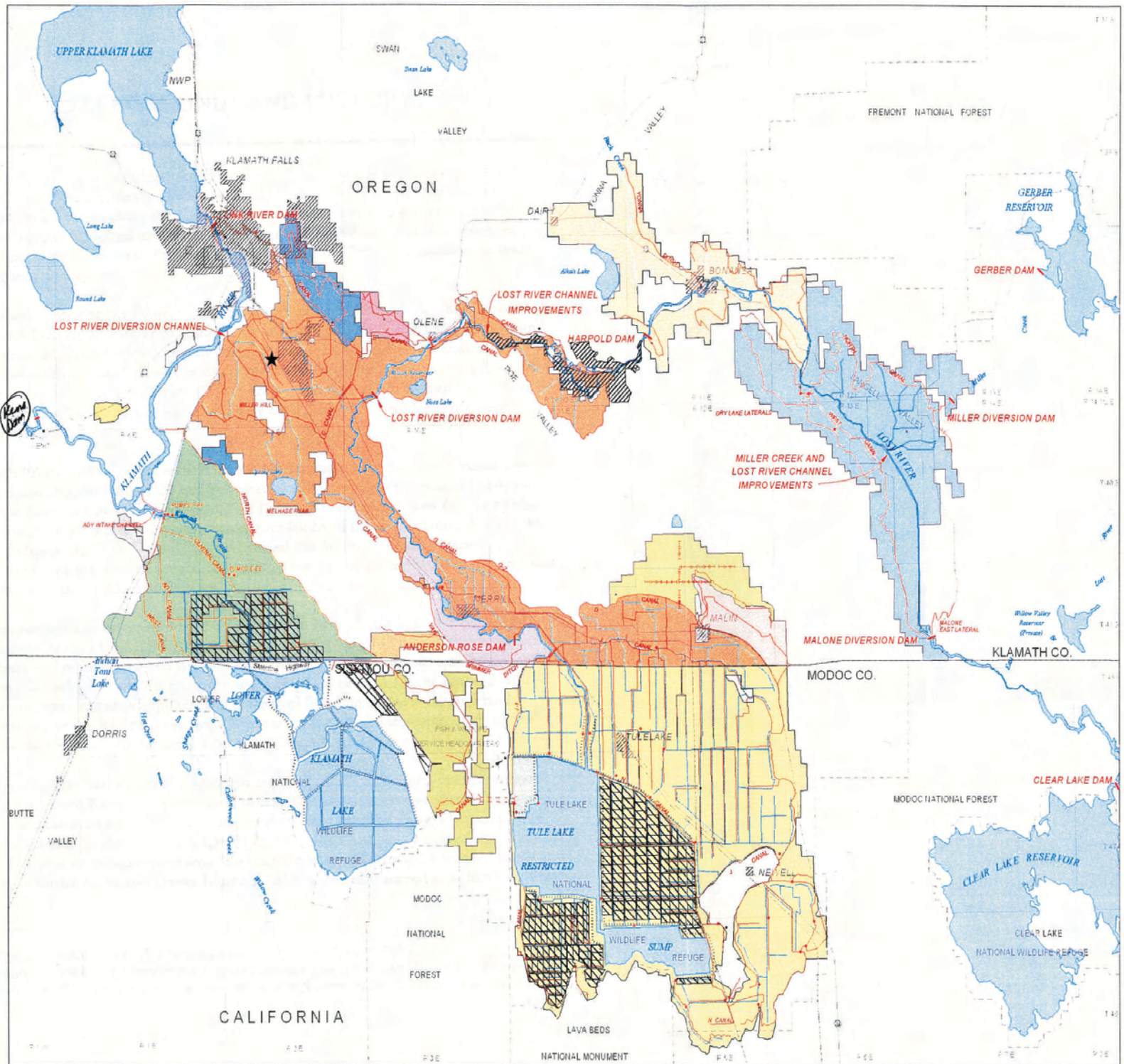
A pool and weir type fish ladder was constructed at the dam in 1926 and modified with a vertical slot entrance pool in 1988. Reclamation owns the ladder and PacifiCorp operates it. The ladder consists of 11 pools, is approximately 105 feet long, and provides for approximately 13 feet in elevation gain. Flow through the ladder is dependent upon Upper Klamath Lake water surface elevation and is adjusted manually with stop logs by PacifiCorp operators.

2.2 OWNERSHIP AND CONTRACTUAL OBLIGATIONS

PacifiCorp's operational relationship with Reclamation dates back to 1917. On February 24, 1917 PacifiCorp's predecessor, Copco (California and Oregon Power Company), entered into an agreement with Reclamation to construct Link River Dam for the regulation of UKL. Under this agreement, Copco constructed Link River dam at its own expense and agreed to operate it to serve Reclamation's Klamath Irrigation Project. In exchange, Copco received significant flexibility to regulate the large available active water storage in UKL to maximize water availability for downstream hydroelectric generation outside the irrigation period. The term of the 1917 agreement was 50 years. To gain additional active storage, construction of the dam included notching the natural bedrock reef upstream of Link River dam in the narrow of the UKL outlet. This notching lowered the hydraulic control point 3 feet so the lake could be drawdown to an elevation of 4137 feet mean sea level (msl).

On January 31, 1956 the parties renewed the agreement, on essentially the same terms, for another 50 years (Appendix A). Under the 1956 Contract, Reclamation owned Link River dam but Copco had a broad right to regulate UKL between the elevations of 4137 and 4143.3 feet msl. In exchange, Copco agreed to provide electric power at significantly reduced rates for use by Reclamation Project irrigators pumping Reclamation Project water.

Under the 1956 Contract, Reclamation set operational conditions that allowed PacifiCorp sufficient flexibility (in the form of storage water) to efficiently use UKL as a reservoir for hydroelectric benefits. Since 1992, however, Reclamation has modified Link River dam operations to benefit the shortnose sucker and the Lost River sucker, two Klamath Basin fish listed in 1988 as endangered under the ESA (USFWS 1992). To protect these fish, the U.S. Fish and Wildlife Service (USFWS) required that water levels in UKL be managed within specific elevation limits. The impact to PacifiCorp's downstream hydroelectric Project was lost flexibility in how UKL water storage could be used to optimize and shape power production. The 1992 operational directives have also increased the risk of springtime flooding. The overall impact has been higher UKL elevations during the spring run-off period with resultant increases in the amount of water spilled to the river that otherwise could have been used to generate electricity during the winter.



- FEATURES:**
- Hydrography
 - Canal
 - Drain
 - Dike
 - Tunnel
 - Flume
 - Siphon
 - Pipeline
 - Drop
 - Pumping Plant
 - Irrigation District Pumping Plant
 - Private Utility Powerplant
 - Project Headquarters
 - Project Land Lease Area

- MAJOR WATER DISTRICTS:**
- Ady Dist. Improv. Co.
 - Enterprise I.D.
 - Horsefly I.D.
 - Klamath Drain. Dist.
 - Klamath I.D.
 - Langell Valley I.D.
 - Malin I.D.
 - Midland Dist. Improv. Co.
 - P Canal Mutual Water Co.
 - Pine Grove I.D.
 - Pioneer Dist. Improv. Co.
 - Pievna Dist. Improv. Co.
 - Poe Valley Improv. Dist.
 - Shasta View I.D.
 - Sunnyside I.D.
 - Tulelake I.D.
 - Van Brimmer Ditch Co.
 - Westside Improv. Dist.

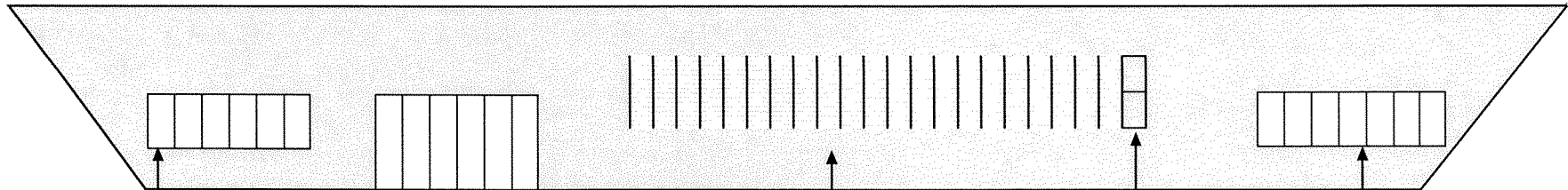
**Figure 1.2-1
Klamath Irrigation Project
Oregon - California**



Link River Dam Features

FIGURE 2.1-1

Note: View is looking upriver at downstream dam face



West Side Canal Intake Gates

- Six gates
- 5 ft width x 7 ft tall
- Two gates operate in manual mode
- Flow capacity approximately 250 cfs
- Length of canal 5,575 ft

Primary Spillway

- Six gates; cast iron
- 5 ft width x 7 ft tall
- Gate sill elevation 4,130 ft msl
- Two gates remote controlled electric motor driven
- Four gates manually operated

Secondary Spillway

- Length 260 ft
- 24 gates/weirs
- 8 ft width x 10 ft tall per gate
- Gate—stoplogs
- Weir invert elevation 4,135 ft msl

Fish Passage Facility

- Stoplogs serve as gate at dam
- Manual operation
- 11 pools, 8.5 ft wide x 8 ft long
- 13 ft vertical gain
- Floor slab elevation 4,130 ft msl

East Side Canal Intake Gates

- Seven gates
- 5 ft width x 7 ft tall
- Manually operated (normally open)
- Total capacity 1,200 cfs
- Gate invert elevation 4,130 ft msl

Top of Dam Elevation:	4,145 ft msl
Bottom of Dam Elevation:	4,130 ft msl
Dam Crest Length:	435.5 ft
Total Storage:	629,780 ac-ft
Normal Full Pool Elevation:	4,143.3 ft msl

In 1996, PacifiCorp consulted with USFWS under Section 7 of the ESA to discern the impacts that its Project operations had upon the two listed suckers. USFWS provided a Biological Opinion (BO) and an associated Incidental Take Statement (ITS) containing terms and conditions that required PacifiCorp to (1) invest in offsite habitat restoration on the Lower Williamson River to benefit larval suckers and (2) to conduct scientific studies to mitigate for Project impacts (USFWS 1996). Compliance with more recent Biological Opinions for Reclamation's operations have resulted in further loss of seasonal generation due to additional constraints on UKL operational flexibility and higher summer flows downstream of Iron Gate dam (USFWS 2001 and NMFS 2001).

Initially, PacifiCorp's flexibility was limited only by the requirement to satisfy Reclamation Project water requirements. But with the ESA listing of upstream suckers in 1988 and downstream coho salmon in 1997, PacifiCorp's ability to operate UKL for hydroelectric purposes was essentially eliminated. UKL elevations are driven by ESA requirements, then Tribal Trust, then irrigation needs, then hydroelectric purpose. In the mid-1990s, PacifiCorp considered rescinding the 1956 Contract because its original purpose in entering the contract was no longer viable (i.e., providing storage in UKL for hydropower generation). The situation had left PacifiCorp with significant liability exposure due to potential impacts on flood control while no longer affording PacifiCorp any real ability to operate UKL for the benefit of the downstream hydroelectric project.

In 1997, in order to induce PacifiCorp not to rescind the 1956 Contract, Reclamation proposed a modification to the 1956 Contract (see Appendix A). Under the 1997 modification, Reclamation assumed all discretionary responsibility for UKL levels and minimum stream flows at Iron Gate Dam. This eliminated PacifiCorp's exposure to liability under the ESA for the consequences of operating Link River dam and water levels of UKL, and thus made the lack of operational flexibility more palatable to PacifiCorp. Since 1997 Reclamation and PacifiCorp have signed annual letter of agreements to continue under the 1997 Contract modification (see Appendix A).

The 1997 modification was challenged in court by some groups of Klamath Project irrigators. The irrigators believed that PacifiCorp had authority under the 1956 Contract to refuse to implement Reclamation's annual operations plans. They hoped that PacifiCorp would exercise that authority to deliver water to them rather than to ESA listed fish in UKL and below Iron Gate dam. Ultimately, in *Klamath Water Users Protective Association v. Patterson* (January 28, 2000), the U.S. Ninth Circuit Court of Appeals upheld the 1997 modification and made it clear that the ESA gave Reclamation, not PacifiCorp, priority control over UKL levels and Iron Gate Dam flows.

PacifiCorp currently operates Link River dam and Iron Gate dam to meet agency target UKL levels and target minimum flows below Iron Gate dam. Lake levels and stream flows are typically presented in Reclamation's annual Klamath Project Operations Plans, following consultations with USFWS and NMFS. The Plans do not provide any significant operational flexibility for PacifiCorp. PacifiCorp must use its technical expertise to determine how best to meet the targets in Reclamation's plans, while also protecting against floods. PacifiCorp does not have any meaningful ability to alter UKL levels to increase downstream power generation.

The 1956 Contract will expire by its terms in 2006. At that point, unless the agreement is renewed, the right to operate and control Link River dam will revert to its owner, Reclamation.

As a federally owned dam, Link River dam is not included in the current FERC license for the PacifiCorp Project. Copco had included Link River dam in its license application in the early 1950s, but later removed it at the request of the Secretary of Interior. The license accordingly includes the East Side and West Side diversion canals and all downstream hydroelectric Project facilities, but it does not include Link River dam. PacifiCorp is not proposing that Link River dam be included in the next FERC license. If, in the future, regulatory conditions allow regulation of UKL to the benefit of PacifiCorp's Klamath Project, the company may elect to seek a license amendment for the inclusion of such operations. In proposing the amendment to FERC, the company would need to identify operational impacts on natural and social resources and propose measures to minimize or offset impacts. Finalization of measures would come via FERC's granting of the license amendment.

2.3 OPERATIONS

As discussed above, Link River dam is operated for UKL elevations and flows downstream of Iron Gate dam in accordance with Reclamation's direction. With each new operating plan and consequent BO, Upper Klamath Lake elevations and minimum discharges on the Klamath River below Iron Gate dam have become more specific with more frequent targets to meet throughout the year. For example, the 1997 Operating Plan set four minimum target elevations for UKL and the 2001 Operating Plan set six target minimum elevations. With the increase in constraint frequency, the operational flexibility of using UKL as a storage reservoir has been greatly reduced and the capability of the lake to provide flood management has been compromised.

Prior to the ESA limitations, the dam was operated within a rule curve for UKL. Elevation bounds on the lake were dependent upon the then current hydrologic conditions and required some storage in the winter to handle the large runoff from storms and snowmelt. Primary operating objectives were refill of UKL irrigation water, generation, and meeting minimum flows below Iron Gate (not necessarily in that order). PacifiCorp was able to use its discretion to manage the risk of storage inflow forecasts with lake elevation. With only these constraints, PacifiCorp was able to make some planning decisions on how to best use the UKL water according to anticipated power demands and market conditions as well as forecasted inflows to the system. Operational decisions were based upon the then current and forecasted hydrology and power needs within the region.

Since the release of the USFWS BO for Reclamation's Irrigation Project Operations in 1992, Link River dam operations are closely monitored by Reclamation to ensure that the lake elevations are met for ESA compliance. From one target elevation to the next on the elevation plot, PacifiCorp is expected to maintain a steady increase or decrease to the next target elevation. The option to use water for hydroelectric production in high demand months and to store water in low demand months is not an option that PacifiCorp can exercise if it would cause UKL elevations to deviate from the expected targets. The expectation that PacifiCorp follow a steady, fixed discharge schedule between elevations effectively eliminates any long-term operational flexibility. Instead of operating the dam in accord with its own long range generation and water management plans, PacifiCorp operates the per ESA requirements.

The operational flexibility remaining for the Klamath Hydroelectric Project rests with PacifiCorp's discretion in balancing the active storage at its own hydroelectric reservoirs downstream of Keno dam. This flexibility applies over a seven day period, but no longer.

Internal storage (J.C. Boyle, Copco, and Iron Gate reservoirs) is limited when compared to the former storage flexibility with UKL. Controlled water flow between the reservoirs is only possible for about three day period, after which reservoirs have to be refilled and cycled over again.

Flows at the Link River facilities and Keno dam must be continuously adjusted to balance the varied flows from Reclamation's Project and to meet flow requirements downstream of Iron Gate dam. This control is maintained by adjusting flows through East Side powerhouse. Flow through West Side powerhouse and Link River dam spill is kept constant, since fluctuating flows in the Link River could have the potential to strand fish, and the flows through the West Side turbine cannot be varied (the plant is either on or off).

Although most flow is diverted at Link River dam for irrigation or hydropower use, there are times when water is spilled at the dam. The six primary spill gates can pass up to 1000 cfs. The additional 25 stoplog spill gates when opened can pass up to 12,000 cfs. These releases are based on maintaining the full reservoir level of 4,143 ft.

Current ramp rates (see Table 2.3-1) at Link River dam were put in place in the 1980's through collaboration with ODFW. These ramp rates were accepted in USFWS's 1996 BO for operation of the Klamath Hydroelectric Project. Although ramp rates at Link River dam are within the capabilities of the equipment used to control flow, the ability to control flow with any high degree of accuracy is unknown at this time.

At Link River dam, instream flow is provided to the reach through spill gates and the fish ladder. Minimum flow in the Link River below the dam is 90 cfs. A requirement in the USFWS 2001 BO raised that value to a minimum flow of 250 cfs to improve water quality in this reach during the late summer/early fall of 2001.

Flow through the dam is measured by a rule curve determined by the opening of the spill gates and the reservoir head.

TABLE 2.3-1. LINK RIVER MINIMUM INSTREAM FLOW AND RAMP RATE DIRECTIVES				
River Reach	Length of Reach (River Miles)	Minimum Instream Flow	Ramp Rate	
			Flow Release Rate (cfs)	Ramp Rate
Link River	1.5	90 cfs from the dam (as per agreement with ODFW) 250 cfs during the summer when water quality is adverse as per USFWS 2001 BO for suckers (USFWS 2001)		
			0-300	(down) 20 cfs/5min
			300-500	50 cfs/30min
			500-1500	100 cfs/30min (USFWS 2001)

The field personnel on site generally manage the flow major releases needed at Link River Dam. Since the majority of the gates require manual operation, the plant operators make flow adjustments as needed for the East Side canal, the secondary spill section with stoplogs, and the West Side canal. The HCC has control of two of the six primary spillgates. As flows fluctuate and exceed the operating range of those gates, the plant operators are contacted to

adjust any of the manual gates and provide HCC with another flow range on the automated gates. Discharge flows exceeding the capacity of the primary spill section prompt the operators to begin removing stoplogs in the secondary spill section. The head gates for the West Side canal throttle the flows to maintain constant flow around 250 cfs for unit efficiency. When flow requirements drop off, West Side canal headgates are closed and East Side canal provides the needed downstream flows. The East Side canal headgates at the dam are normally kept open and the throttling of flows is done with the East Side Plant.

3.0 EAST SIDE AND WEST SIDE

3.1 EAST SIDE FACILITY OVERVIEW

PacifiCorp owns and operates the East Side Hydroelectric facilities including the canal from Link River dam to the powerhouse. The facilities consist of 1,729 feet of wood-stave flowline, 1,362 feet of steel flowline, a surge tank, and a powerhouse on the east bank of Link River. Maximum diversion capacity for the Eastside powerhouse is 1,200 cfs. The powerhouse consists of a single Vertical Francis 3.2-MW unit. There are no fish screens at the Eastside canal intake. A large trash rack (28 ft by 28 ft) is in place at the entrance to the wood stave flowline. It is made of steel bars with 2 3/4 inch bar spacing.

3.2 EAST SIDE OPERATION

Flow downstream of the East Side powerhouse is measured at USGS gage 11507500 approximately 1/4 mile downstream from the plant. This gage measures spill from Link River dam and water that is flowing through the powerhouse. Flow through the powerhouse is measured with a rule curve determined by the amount of electricity produced. That is, a particular flow is known to produce a given amount of electricity based on the efficiency of the turbine unit. There are no ramp rate restrictions for changing flows through the East Side powerhouse, however, a minimum instream flow of 450 cfs is in effect (Table 3.2-1).

River Reach	Length of Reach (River Miles)	Minimum Instream Flow	Ramp Rate
Downstream of East Side Powerhouse to Keno reservoir	Not Applicable	450 cfs (as per USFWS 1996 BO for PacifiCorp)	None

In the event of an unexpected powerhouse shutdown, flow in the East Side flowline is captured in a large surge tank. Surge tank water can then flow backwards into the flowline. There is no spill with this event. The canal headgates do not shut nor do they need to as the elevation of the forebay mimics that of UKL. Dependent on expected length of outage, Link River Dam spillgate(s) may be opened to meet downstream flow needs.

The East Side powerhouse is operated both manually and automatically. Manual operation includes manual watering up or de-watering of the water conveyance system before and after planned, extended outages. PacifiCorp personnel are present for normal unit startup and shutdown. For monitoring and control of project flows and generation, PacifiCorp's HCC in

Washington is able to provide service 24 hours per day, seven days a week. HCC adjusts unit loading to meet downstream flow requirements until those adjustments require additional manual changes by the local Project operator. At any time that monitoring and control is not available from HCC, local personnel are able to man the plant or shut the unit down until any problems are rectified.

3.3 WEST SIDE FACILITY OVERVIEW

The West Side facilities consist of a 5,575-foot-long earthen canal, 140 feet of steel penstock, and a powerhouse on the west bank of the Link River. Maximum diversion capacity for the West Side canal is 250 cfs. Near the downstream end of the canal is an ungated overflow spillway. The spillway also contains a small gate release to facilitate draining the canal. The West Side powerhouse consists of a Horizontal Pit-type Francis 0.6-MW unit. There are no fish screens at the West Side canal intakes; however, there is a 5 ft-wide by 16 ft-high trash rack ahead of each headgate, each having a 2.75-inch spacing. A second trash rack is located at the penstock entrance, it has 2-inch bar spacing and is 12 ft. high by 18 ft wide.

3.4 WEST SIDE OPERATION

Due to the design and turbine type of the horizontal Francis unit in the West Side powerhouse, the powerhouse can only operate under full flow, which is 230 cfs. Generation from the West Side plant is possible when downstream flow needs at Iron Gate dam exceed the sum of the East Side powerhouse hydraulic capability and the minimum instream flow in the Klamath River below the Link River dam, or when there is spill available from Upper Klamath Lake. When the powerhouse is not in operation, the canal is kept full, in part to meet small irrigation diversions to surrounding properties and in part to maintain the integrity of the canal.

In the event of an unplanned powerhouse shutdown, water flowing in the West Side canal backs up from the powerhouse raising the water elevation in the canal. Once the elevation is high enough, water flows over the ungated spillway down a short chute to Link River. This spill continues until the powerhouse is back in operation or the West Side canal headgates can be manually shut by a Project Operator.

The West Side powerhouse operates in a manual mode that includes manual watering up and de-watering of the conveyance system for planned extended outages or emergencies and all normal unit startup and shutdowns. The West Side generating unit is "block loaded" by setting the control on "head-level" indication, setting inlet canal flows at the dam, and allowing the unit to produce at its full capacity only. The HCC provides monitoring only (no control) of the canal flow and unit generation. Local operators are notified of any needed changes to the plant's operation unless an electrical emergency occurs and HCC is forced to trip the unit off-line.

4.0 KENO DAM

4.1 FACILITY OVERVIEW

Keno dam is a re-regulating facility located at about RM 233, approximately 21 miles downstream of Link River dam (Figure 1.1-1). There is no power generating capability at this facility. Construction of Keno dam was completed in 1967. The concrete dam has a height of

25 feet and a spillway section consisting of six 40-foot wide spill gates (Figure 4.1-1). The impoundment upstream of the dam has a surface area of 2,475 acres and a total storage capacity of 18,500 acre-feet. There is a 24-pool weir and orifice type fish ladder at the Keno dam. This fish ladder gains 19 feet in elevation in approximately 350 feet.

4.2 OWNERSHIP AND CONTRACTUAL OBLIGATIONS

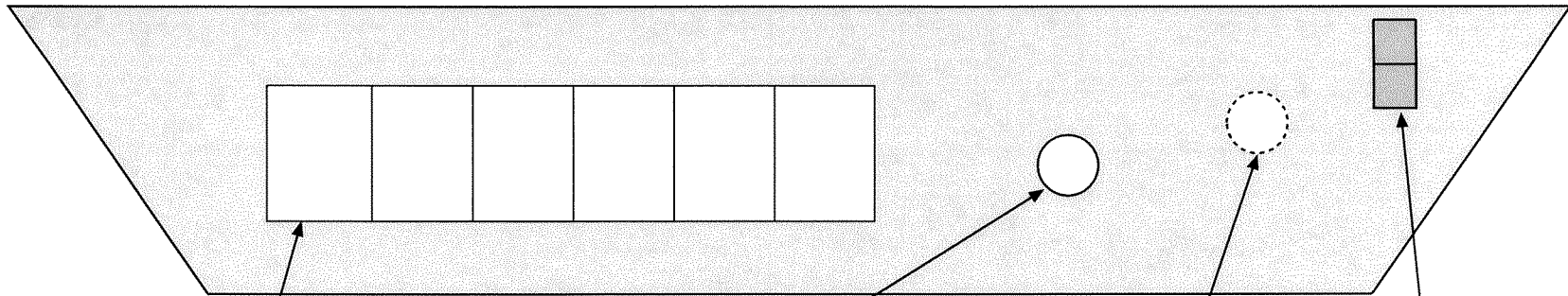
In 1930, Copco constructed a regulatory dam near the present-day Keno dam site. This dam is commonly referred to as “Needle Dam” and was built to protect Copco from damage claims from farmers who argued that flows from UKL were negatively affecting the integrity of the dikes protecting their farms. Flows in this stretch of river (now Keno reservoir) essentially increased when the railroad dike was built in 1907. Water from UKL used to have the ability to flow into Lower Klamath Lake but the dike channeled all the flow from the upper lake down the river. Historically, Lower Klamath Lake essentially acted as a flood storage facility. Pursuant to a 1930 agreement with Reclamation, Needle Dam was built to create a backwater condition in this reach and thus reduce flow velocities, thereby reducing the erosion potential on the dikes. In 1965 the Federal Power Commission granted Copco’s request to amend the Project license to allow the replacement of Needle Dam and the development of a future hydroelectric generating facility. Keno dam was built in 1967, but hydro generating facilities were never developed due to unfavorable economic conditions.

On January 3, 1968 Pacific Power & Light Company (formerly Copco, now PacifiCorp) and Reclamation entered into a contract to operate Keno Dam (Appendix B). This contract was in response to the FERC license article No. 55 “The licensee shall enter into formal agreement with the United States Bureau of Reclamation for the purpose of regulating the level of Lake Ewauna and the Klamath River between Keno Dam and Lake Ewauna, and in the event that the Licensee and the Bureau fail to reach an agreement, the Commission will prescribe the terms of such regulation after notice and opportunity for hearing” (FPC 1956). The 1968 contract requires PacifiCorp to maintain Keno reservoir at elevations between 4085.0 and 4086.5 feet whenever Reclamation is diverting water to their Irrigation Project. From the upper bounds to the lower bounds of these elevations is the equivalent of 18,500 acre-feet. The 1968 contract also requires PacifiCorp to take certain steps to facilitate the return flow of used irrigation water into the river at the Klamath Straits Drain (up to 300 cfs) and the Lost River Diversion Channel (up to 3,000 cfs). To operate in this manner requires close coordination between Reclamation and PacifiCorp on any issues where one party’s operation of its project facilities might impact the other party. This coordination is particularly difficult and important in the spring when run-off can be naturally high and irrigators are pumping a large volume of water from their fields into Keno reservoir in preparation for the growing season. The 1968 Keno contract expires in 2006 coincidentally with PacifiCorp’s current FERC license. Aside from the contract with Reclamation and at the request of irrigators with pumps on Keno Reservoir, PacifiCorp maintains Keno reservoir at elevation 4085.4 +/- 0.1 feet from October 1 to May 15 and 4085.5 +/- 0.1 feet from May 16 to September 30 so that lake elevations are suited to irrigation pump depths. These elevations also allow for gravity flow from Keno reservoir onto Oregon Department of Fish and Wildlife’s (ODFW) Miller Island Wildlife Refuge.

Keno Dam Features

Note: View is looking upriver at downstream dam face

FIGURE 4.1-1



Spillway Overflow

- Six taintor spillgates
- Total length 265 ft
- 40 ft width x 17.5 ft tall
- Auto-remote control on three gates
- All gates have push-button control
- Total discharge 35,000 cfs at elevation 4,082 ft msl

Sluice Conduit

- Invert elevation 4,073 ft
- 36" diameter
- Manual gate operator on upstream dam face
- 38" x 36" slide gate
- Discharges to atmosphere

Fish Attraction Outlet

- Invert elevation 4,075 ft msl
- 30" diameter conduit
- Drops to elevation 4,055 ft msl
- Control with manual gate valve, 30" handwheel on fish ladder attraction changer
- Fish passageway with 24 pools; 5 ft wide x 10 ft tall
- 19 ft vertical passage
- Flow into passage is held at 15 cfs

Fish Ladder Exit to Reservoir

- Invert elevation 4,078.5 ft msl
- Width 6 ft
- Gate—stoplogs; 8 ft width x 10 ft tall per gate
- Weir invert elevation 4,135 ft msl

Top of Dam Elevation:	4,091 ft msl
Bottom of Dam Elevation:	4,070 ft msl
Dam Crest Length:	680 ft
Total Storage:	18,500 ac-ft
Normal Full Pool Elevation:	4,085 ft msl

4.3 OPERATIONS

Keno dam is a re-regulating facility for the varying flows in and out of the Klamath River between Link River and Keno dam (Figure 4.3-1). In as much as possible, Keno dam is operated to maintain a steady reservoir elevation, while continuing to provide enough water to meet flow requirements at Iron Gate dam. The steady reservoir elevation allows both Reclamation to manage its irrigation water through its diversion channels and PacifiCorp to more effectively plan load following operations at the J.C. Boyle powerhouse. Operating in a reregulating fashion for the reservoir can result in river fluctuations below the dam, especially during high flow conditions.

Flows from Reclamation's Project enter PacifiCorp's Project in Keno reservoir via the Klamath Straits Drain and Lost River Diversion Channel. These return flows can be highly variable and can be somewhat problematic for stable reservoir elevations. Flows from Reclamation's Project can vary approximately 775 cfs and each 200 cfs has the ability to affect the reservoir elevation approximately 0.2-feet in a 24-hour period. Hence control of flows from East Side and flow through Keno dam are crucial to maintain a constant elevation in Keno reservoir. In order to achieve a reservoir fluctuation within +/- 0.1 feet, PacifiCorp and Reclamation coordinate and/or communicate their operations on a daily basis during periods of high flow fluctuation.

Given the limitations on Keno reservoir fluctuation and given that inflow upstream of Keno must balance with outflow, it follows that flows through Keno dam largely mimic those into Keno reservoir, namely releases from UKL plus the net Reclamation canal flows into Keno reservoir. The spill gates at Link dam are operated to assure tight control on minimum flow. Not all gates are can be remotely manipulated to respond to change. Similarly, the West Side powerhouse is manually placed on- or off-line and thus can not easily respond to change. Finally, the hydraulic capacity at the East Side powerhouse limits river flow adjustments to 1,200 cfs until gate positions at the dam can be reconfigured by field personnel. For example, if flow releases exceed the East Side Plant capacity, operators manually open spillgates to provide a range of operating levels that allow further adjustment to the plant's power generation. Along with operations at the Link River facilities, spill gate adjustments at Keno dam can be used to help maintain a constant elevation in Keno Reservoir. A result of such operations is the river below Keno may fluctuate to keep Keno reservoir flat. (See below for a further description of the magnitude and frequency of these changes). Minimum flow below Keno dam is 200 cfs, although flows rarely, if ever, get this low except in drought years (e.g., flows approached 150 cfs in 1992, a drought year).

There is no required FERC ramp rate below Keno dam. However, consistent with flow management at J.C. Boyle, PacifiCorp manages flow changes in observation of a 500 cfs per hour ramp rate or 9 inches per hour when not in high flow situations. Table 4.3-1 is a summary of hourly flows at Keno dam and the frequency of hourly changes for various change amounts. Average flow ranges from 700 cfs in July up to 3,600 cfs in March. Large hourly flow changes are mostly made in January through May. The effects of these hourly changes on river stage are summarized in the second column.

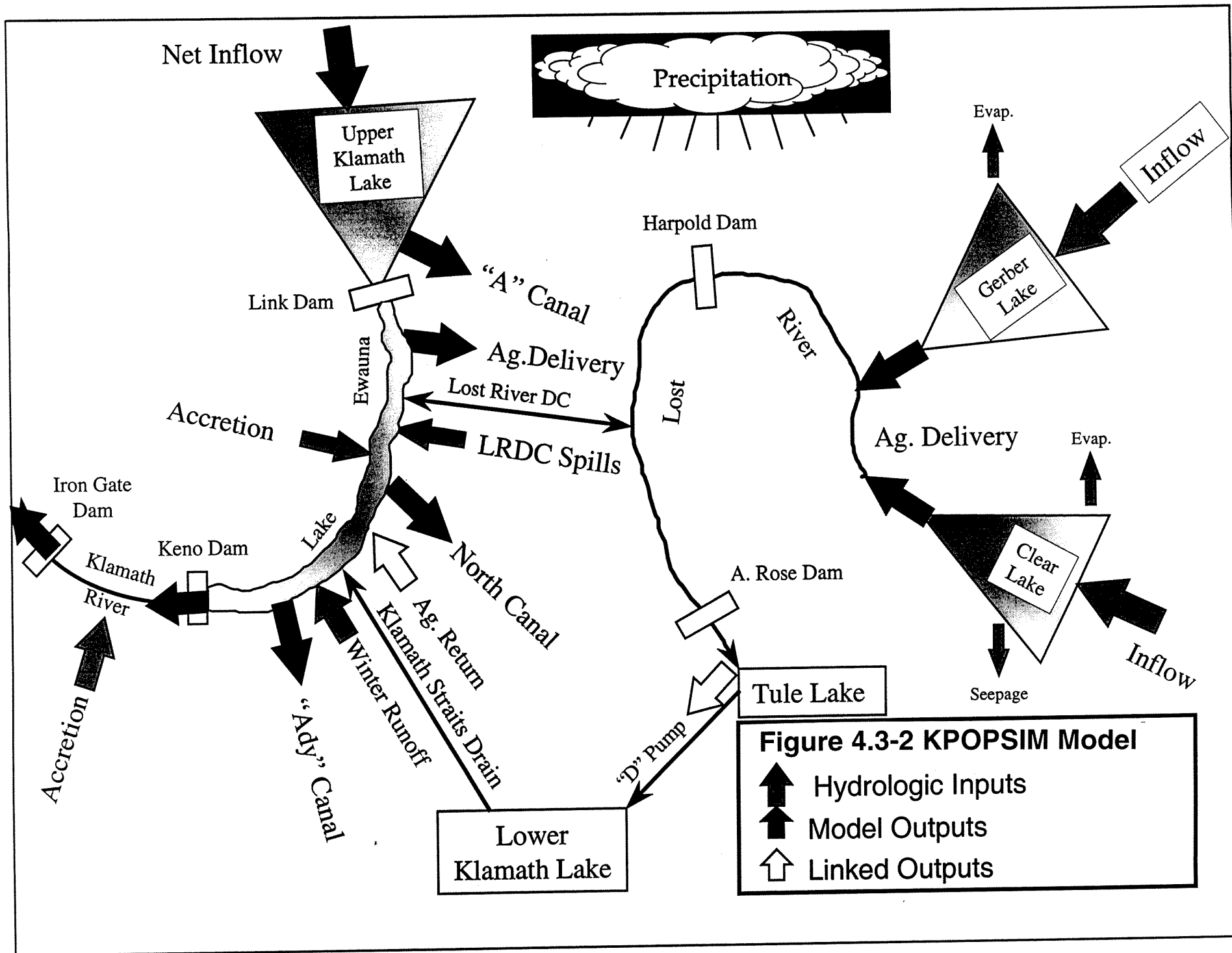


TABLE 4.3-1. FLOWS BELOW KENO DAM AND FREQUENCY/MAGNITUDE OF FLOW CHANGES; WY 1995-2001 (THROUGH SEPTEMBER 30, 2001) (USGS GAGE NO.11509500)

Month	Average Hourly stage change (Ft)	Average Hourly Flow (cfs)	Average Hourly Change (cfs)	Avg. # of 100-150 cfs hourly changes per month	Avg. # of 150-250 cfs hourly changes per month	Avg. # of 250-350 cfs hourly changes per month	Avg. # of 350-500 cfs hourly changes per month	Avg. # of > 500 cfs hourly changes per month
January	0.016	2,935	27	17	15	7	6	6
February	0.013	3,586	29	17	16	5	7	5
March	0.045	3,606	24	12	12	5	7	5
April	0.017	2,791	22	8	10	6	5	6
May	0.014	2,570	17	9	11	7	5	2
June	0.007	1,370	8	3	5	2	1	0
July	0.022	705	5	7	3	4	1	1
August	0.008	788	5	5	6	2	1	0
September	0.011	984	6	7	4	1	1	0
October	0.013	1,076	6	3	3	2	2	1
November	0.024	1,165	5	4	4	1	2	1
December	0.008	1,533	9	8	7	4	1	1
Total Average	0.02	1,976	14	93	94	45	38	28

Since the elevation of Keno Reservoir is tightly constrained between 4085.4 +/- 0.1 feet October 1 through May 15 and 4085.4 +/- 0.1 feet from May 16 through September 30, and since the inflow can vary considerably, Keno dam must be managed to balance inflow with outflow. Diversions from Reclamation's Project can vary by greater than 1,000 cfs over a 24-hour period. These fluctuations must be balanced by spill changes at Link River dam and/or generation adjustments at the East Side powerhouse. Wind compounds the problem of determining accurate lake levels and can indicate negative flows if gages are read as a function of their last data entry. The combination of those gages has to be considered to determine average values for Keno reservoir elevations. Tables 4.3-2 and 4.3-3 summarize the absolute value of average and maximum daily changes at the Reclamation diversions by month.

TABLE 4.3-2. AVERAGE 24-HR KLAMATH STRAIGHTS DRAIN CHANGE (CFS). FOR WY 1995-2001 (THROUGH SEPTEMBER 30, 2001)

Month	1995	1996	1997	1998	1999	2000	2001*
January	173	75	263	176	93	128	50
February	112	314	189	87	156	84	42
March	290	99	38	165	256	81	56
April	70	53	47	207	149	82	34
May	59	72	74	204	61	88	12
June	73	58	67	193	113	74	0
July	62	56	58	87	105	78	0
August	44	63	105	75	92	67	23
September	38	65	62	63	58	132	14
October	62	57	46	49	64	49	
November	37	55	78	87	40	44	
December	93	81	56	109	50	52	

*2001 was a drought year and irrigation supplies via the A Canal were terminated through the summer.

TABLE 4.3-3. MAXIMUM 24-HR KLAMATH STRAIGHTS DRAIN CHANGE (CFS) FOR WY 1995-2001 (THROUGH SEPTEMBER 30, 2001)

Month	1995	1996	1997	1998	1999	2000	2001*
January	1,106	463	1,079	1,049	349	799	137
February	681	1,273	1,051	407	483	330	123
March	1,756	495	114	619	924	512	158
April	298	176	149	851	660	277	121
May	261	288	254	765	253	263	29
June	224	158	193	1,132	557	169	0
July	231	216	261	265	568	281	0
August	127	178	280	264	228	169	104
September	91	192	188	281	165	688	67
October	296	335	129	153	178	376	
November	165	184	353	374	100	141	
December	492	458	226	447	225	222	

*2001 was a drought year and irrigation supplies via the A Canal were terminated through the summer.

Keno dam is critical to the water management of the Klamath River. Without Keno dam, the Klamath River would fluctuate as much as Reclamation diversions in and out of the reservoir vary.

Flows are released at Keno dam via three routes: the fish ladder, a 36-inch diameter sluice conduit, and/or the six spill gates. With the exception of critically dry periods, flow is typically released from all three points. During times when flow approaches 200 cfs, the spill gates are shut and flow comes from the sluice conduit (130 cfs capacity) and the fish ladder (70 cfs capacity). A USGS gage (No. 11509500) approximately one mile downstream of the Keno dam monitors river flows every few minutes. Table 4.3-4 identifies flow and ramp rate guidelines for operating Keno.

TABLE 4.3-4. KENO MINIMUM INSTREAM FLOW AND RAMP RATE DIRECTIVES			
River Reach	Length of Reach (River Miles)	Minimum Instream Flow	Ramp Rate
Below Keno Dam	5	250 cfs (as per agreement with ODFW)	500 cfs or 9 inches per hour during summer (self, imposed, nonregulatory ramp rate)

4.3.1 Description of plant control

Keno dam is an automated facility designed to provide flow regulation. It maintains a relatively constant reservoir level (with in a 0.5 foot band). The gate opening, gate closing, control and monitoring can be provided remotely without local personnel having to be present or involved. This operation is handled by the HCC twenty-four hours per day, seven days a week. Local crews provide checks of the facilities and manually adjust gate position to coincide with telemetry values on an as needed basis. During high runoff periods when spill releases exceed the capacity of the controlled gates, the field crew adjusts the locally controlled gates and provides a new operating range for the auto-remote controlled gates.

4.3.2 Keno Drawdown

At the request of Reclamation and irrigators with pumps located around Keno reservoir, PacifiCorp voluntarily draws down the reservoir approximately 2 feet every one or two years in the early spring (April or May) for 2-3 days. This is done to let irrigators clean out their water intakes and maintain the pumps before the irrigation season begins. The drawdown affects PacifiCorp Project operations for about a week, which includes the drawdown, cleaning time, and slow reservoir refill.

5.0 J.C. BOYLE

5.1 FACILITY OVERVIEW

The J.C. Boyle development consists of a reservoir, dam, diversion canal, and powerhouse on the Klamath River between about RM 228 and 220 (Figure 1.1-1). Construction was completed in 1958. The dam is an earth-filled dam 68 feet tall impounding a narrow reservoir of 420 surface acres (J.C. Boyle reservoir) (Figure 5.1-1). The impoundment formed upstream

of the dam contains about 3,495 acre-feet of total storage capacity and 1,724 acre-feet of active storage capacity, according to facility drawings.

The dam has three spill gates and can divert up to 2,850 cfs, which is the hydraulic capacity of the powerhouse. The intake from the dam to the power canal is screened with four vertical traveling screens (0.25-inch mesh) with high-pressure spray cleaners. A weir with cleaning orifice fish ladder approximately 569 feet long with 57 pools is located at the dam for upstream fish passage. The change in elevation between pool 1 and pool 57 is about 67 feet.

Water diverted at the dam enters a 617 foot long steel flowline that empties into a canal. Flow into the canal can be controlled by an automated headgate. The concrete-walled canal extends just over 2 miles along a cliff face. At the downstream end of the canal is a small forebay. At the forebay there are two automated spillgates leading to a short spillway into the bypass reach. Water flowing to the powerhouse goes through a 60 ft. long and 17.9 ft. high trash rack with 2 inch bar spacing before entering a tunnel and then into two steel penstocks. Each penstock serves a separate 40-MW unit. The powerhouse is located about 4.3 RM downstream of the dam.

5.2 OWNERSHIP AND CONTRACTUAL OBLIGATION

PacifiCorp owns and operates the J.C. Boyle development and has no direct contractual obligations with Reclamation regarding its operation. The J.C. Boyle facility, however, is operated in a manner to assure conformity with contractual agreements on other facilities.

5.3 OPERATIONS

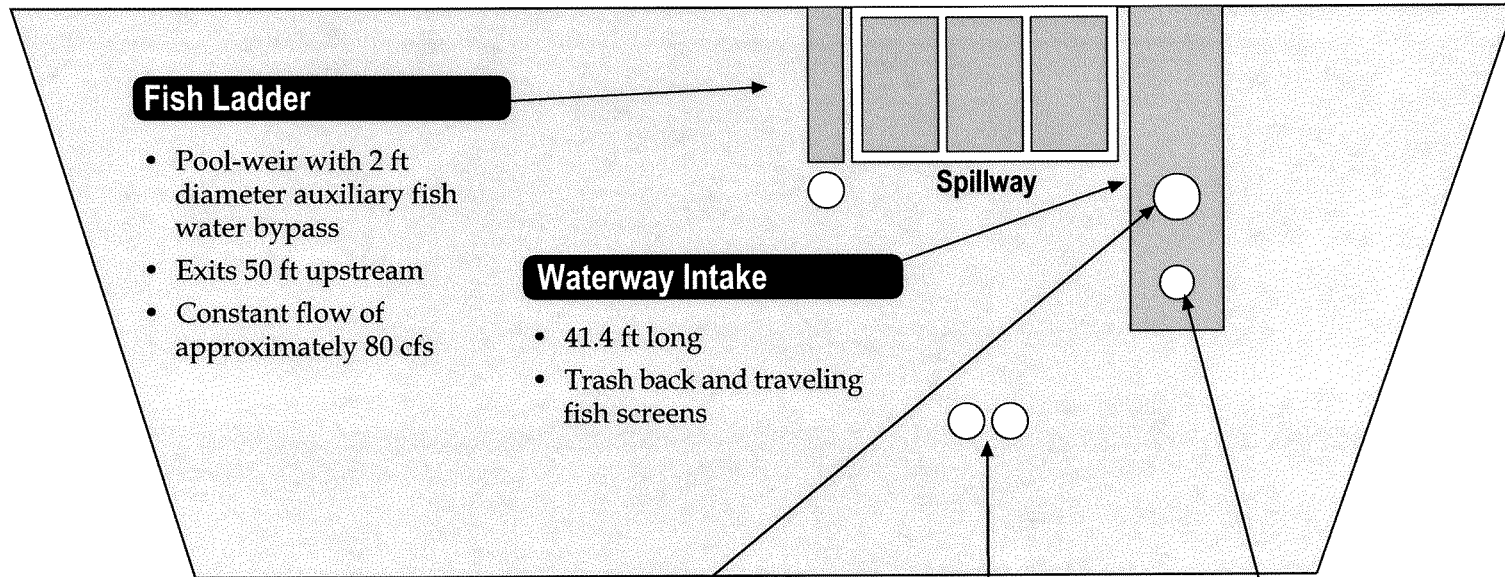
The J.C. Boyle powerhouse is typically operated as a power peaking facility, especially when river flows are less than maximum turbine hydraulic capacity 2,850 cfs. Due to turbine efficiencies, preferred flow is 2,500 cfs and is typically the maximum used at the plant. Power generation (and hence flow through the powerhouse) is shaped to coincide with peak customer electricity demand. During the summer months, peak demand typically occurs on weekdays in the late afternoons and early evenings. In general, on a daily basis, water storage occurs in the J.C. Boyle reservoir at night when generation is not occurring. Given the required ramp rate for the J.C. Boyle powerhouse (9 inches per hour), generation must begin well in advance of peak electric load requirements so that the units are at full generation capacity for the peak demand period. The reservoir usually begins to fill sometime after dark, is full by early morning, and begins to be drawn down again during the daylight hours. Specific period of releases may vary widely depending on the anticipated time of peak demand.

The J.C. Boyle bypass reach (i.e., the reach immediately downstream of the dam and upstream of the powerhouse) has a minimum flow requirement of 100 cfs. (Table 5.3-1)(FERC Article 34 initiated the consultation with final approval with FERC). This flow is comprised of approximately (a) 80 cfs from the fish ladder, (b) 20 cfs from the juvenile bypass system, and (c) any seepage from the dam. Flow through the fish ladder is regulated by a float attached to a head gate that moves up and down to open/close the head gate, as necessary, to maintain a constant flow through the facilities. Opening a valve manually regulates flow into the juvenile bypass system. The valve remains fully open at all times.

JC Boyle River Dam Features

FIGURE 5.1-1

Note: View is looking upriver at downstream dam face



Fish Ladder

- Pool-weir with 2 ft diameter auxiliary fish water bypass
- Exits 50 ft upstream
- Constant flow of approximately 80 cfs

Waterway Intake

- 41.4 ft long
- Trash back and traveling fish screens

Spillway

- Length 155 ft
- Three radial gates; 36 ft wide x 12 ft tall
- Discharge capacity 29,100 cfs at elevation 3,797.8 ft msl
- One spillgate auto-remote controlled

Waterway Pipeline

- 14 ft diameter
- 2,500 cfs capacity

Culverts

- Two culverts
- Elevation 3,752 ft msl
- Used for diversion during construction; concrete backfill

Fish Screen Bypass

- 2 ft diameter
- Constant flow of 20 cfs

Top of Dam Elevation:	3,800 ft msl
Bottom of Dam Elevation:	3,732 ft msl
Dam Crest Length:	693 ft
Total Storage:	3,495 ac-ft
Active Storage:	1,724 ac-ft
Normal Max Water Elevation:	3,793 ft msl
Normal Min Water Elevation:	3,788 ft msl

TABLE 5.3-1. J.C. BOYLE MINIMUM INSTREAM FLOW AND RAMP RATE DIRECTIVES			
River Reach	Length of Reach (River Miles)	Minimum Instream Flow	Ramp Rate
J.C. Boyle Bypass (dam to powerhouse)	5	100 cfs (FERC license)	9 inches per hour (up and down rate)
J.C. Boyle Reach Downstream of Powerhouse	22	100 cfs into bypass reach from dam. Additional natural flow from Big Springs (FERC license)	9 inches per hour (FERC license) (up and down rate)

Large springs that begin approximately half way down the bypass reach contribute approximately 220¹ cfs to the reach (Figure 5.3-1). Hence, when the dam is not spilling, flow in the downstream end of the bypass reach is approximately 320 cfs as is the flow in the reach below the powerhouse when the powerhouse is not operating. The bypass reach itself has no USGS gage; however, a USGS gage (No. 11510700) is located 1/4 mile downstream of the powerhouse. The gage records flow levels every few minutes.

As previously mentioned, the J.C. Boyle powerhouse generally operates as a load-factoring facility when flow is not adequate to allow continuous and efficient operations. Such operating conditions can result in a fluctuation of about 3.5 feet between minimum and full pool elevations in the J.C. Boyle reservoir, but the average daily fluctuation is about 2 feet. This type of operation can also result in flows from the powerhouse that varies according to power demand. As a result, flows downstream from the powerhouse may fluctuate on a daily basis, based on the amount of water available to the plant.

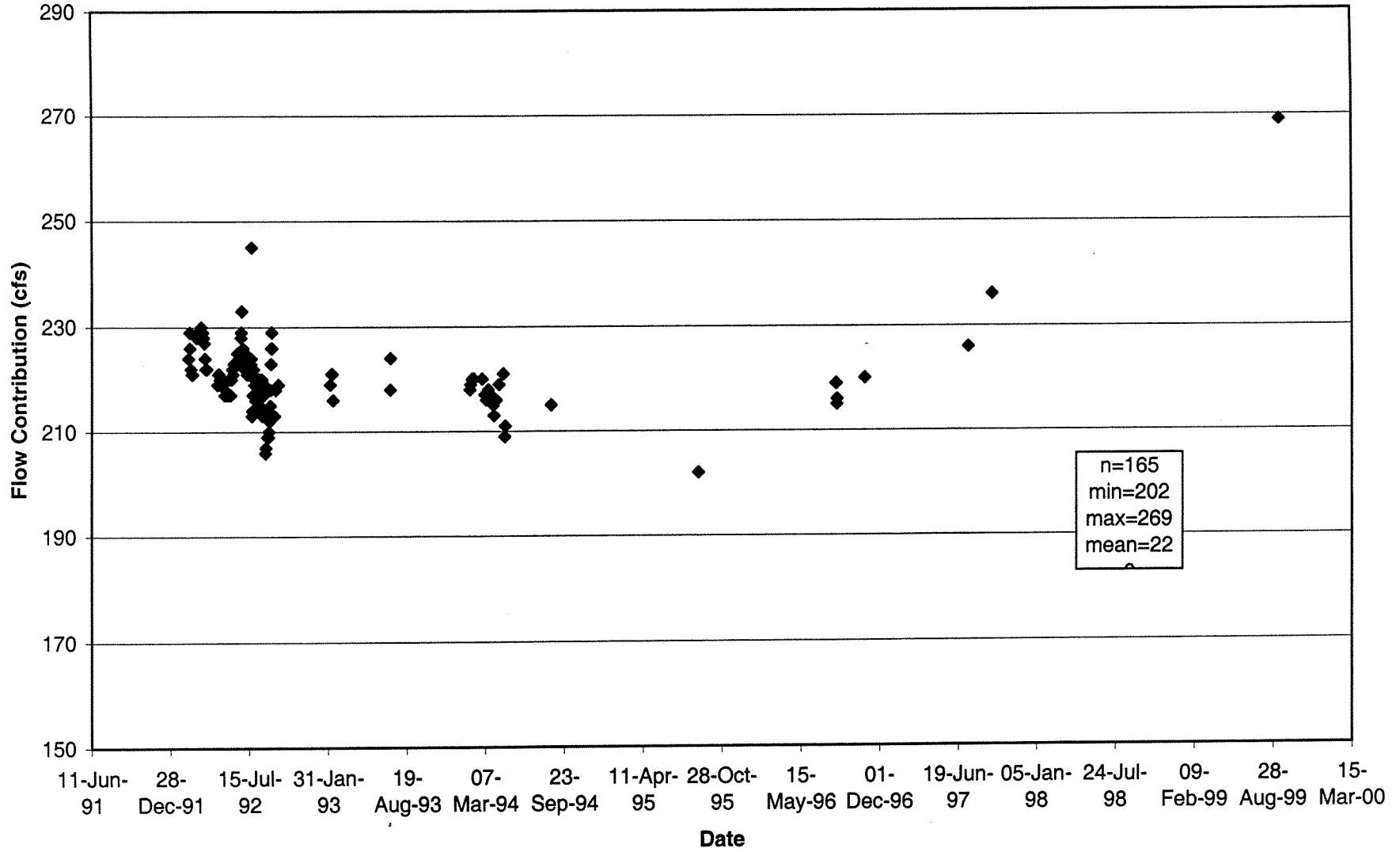
Operating in a load-factoring fashion allows commercial and recreational rafting opportunities from the powerhouse to Copco reservoir (approximately 15 miles) from May to mid-October. During that period and dependent on energy demand conditions, the WES may consider the timing needs of commercial rafters when it is scheduling the flow release.

In the event of an unscheduled powerhouse shutdown, the J.C. Boyle canal headgate automatically closes to prevent additional flow into the waterway. At the downstream end of the canal is a well with a float that triggers the operation of the canal spill gates. When water in the canal rises to a certain elevation, water flows into a well raising the float, which at a predetermined elevation triggers the spill gates to open. Spill continues until the float drops down below the critical canal elevation. The chances of such a spill event is related to water flow in the canal. If only one generating unit is in operation (1500 cfs or less) and it shuts down, the canal may be able to capture the water without the float triggering the spill gates to open. With both units in operation, it is most likely that spill will occur. Should the shutdown be lengthy and adversely effect water supply needs downstream, WES may elect to open spill gates at J.C. Boyle dam.

The operation of the J. C. Boyle development is automated. The operation of the two turbine-generator units is prescribed from a daily generation schedule established by PacifiCorp's Wholesale Energy Services to meet the power demands of the system while

¹ This flow was calculated by identifying those days when the dam was not spilling and flow through the powerhouse equaled zero. On those days, the minimum FERC flow of 100 cfs was subtracted from the USGS gage data flow located approximately 1/4 mile below the powerhouse.

Figure 5.3-1. JC Boyle Spring Accretion Contribution



passing required flows through the various river system plants. The HCC has the primary responsibility to blend the timed generation from this plant into the system. It monitors, controls and initiates all unit startups and shutdowns twenty-four hours a day, seven days per week. Upon unit startups, generation loads are set and the unit will automatically reach and hold that requirement until the Project Hydro Control Operator resets or shuts down the unit. In case of any equipment malfunction or communication interruption, HCC will contact local operators to control the operation manually from the powerhouse.

6.0 COPCO No. 1

6.1 FACILITY OVERVIEW

The Copco No. 1 development consists of a reservoir, dam, and powerhouse located on the Klamath River between about RM 204 and RM 199 near the Oregon-California border (Figures 1.1-1). Generation at unit 1 began in 1918. Copco No. 1 dam is a concrete arch dam 126 feet high, with 13 spill gates across the top (Figure 6.1-1). The impoundment formed upstream of the dam is approximately 1,000 surface acres containing about 46,900 acre-feet of total storage capacity and 6,235 acre-feet of active storage capacity. The Copco No. 1 powerhouse is located at the base of Copco No. 1 dam. Water diverted for power use flows through several 44 ft (w) by 12.5 ft. (h) trash racks with 3/4 inch bar spacing into three short flowlines that supply the two turbines. The powerhouse has two Double Runner Horizontal Francis turbines, each 10 MW in size. Combined hydraulic capacity of the turbines is roughly 3,200 cfs. Water diverted through the Copco No. 1 powerhouse is directed to the Copco No. 2 powerhouse intake (described below) through the approximately 1-mile-long reservoir.

6.2 OWNERSHIP AND CONTRACTUAL OBLIGATION

PacifiCorp owns and operates the Copco No. 1 development and has no direct contractual obligations with the Reclamation regarding its operation. The Copco No. 1 facility, however, is operated in a manner to assure conformity with contractual agreements on other facilities.

6.3 OPERATIONS

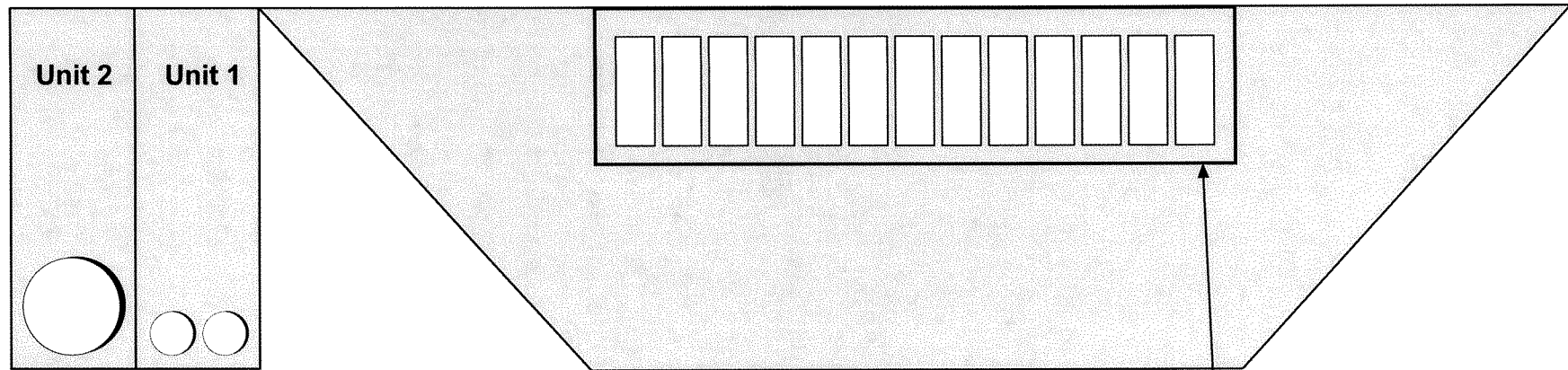
Copco dam is operated for power generation, some minor flood control, and control of water surface elevations of Copco and Iron Gate reservoirs. Copco No. 1 powerhouse usually operates as a load-factoring facility, typically from spring to high flows in early winter. As a load-factoring facility, it is operated to generate during the day when energy demands are highest, and to store water during the non-peak times (weeknights and weekend). When river flows are near or in excess of turbine hydraulic capacity, the powerhouse generates continuously and excess water is spilled through the spill gates. Copco reservoir can fluctuate 5.0 feet between normal minimum and full pool elevations, but the average daily fluctuation is about 0.5 feet.

Copco No. 1 and No. 2 operate together as load factoring facilities. Since flows through the system must be closely coordinated due to lack of significant storage and mandatory downstream flow requirements, flow through the Copco plants typically mimics flow (with a time lag) through J.C. Boyle on a daily average basis. Copco No. 2 has virtually no storage reservoir so is essentially "a slave" to Copco No. 1. That is, Copco No. 2 generation and hydraulic discharge must operate exactly synchronously with Copco No. 1 generation and hydraulic discharge.

Copco No. 1 Dam Features

Note: View is looking upriver at downstream dam face

FIGURE 6.1-1



Penstocks to Powerhouse

- Two 10-foot diameter pipes to unit 1 (max hydraulic capacity 1,679 cfs)
- One 14-foot diameter pipe to unit 2 (max hydraulic capacity 1,885 cfs)
- Pipe invert elevation approximately 2,575 ft msl
- Restricted gate opening of 5 ft limits releases to approximately 5,000 cfs

Waterway Intakes

- Unit 1 – four gates; approximately 40 feet long, 42 feet tall
- Unit 2 – three gates; approximately 30 feet long, 42 feet tall

Top of Dam Elevation:	2,613 ft msl
Bottom of Dam Elevation:	2,487 ft msl
Dam Crest Length:	415 ft
Total Storage:	46,867 ac-ft
Active Storage:	6,235 ac-ft
Normal Max Water Elevation:	2,607.5 ft msl
Normal Min Water Elevation:	2,604.5 ft msl

Spillway

- Section length 224 feet
- 13 taintor gates 14' x 14'
- Crest elevation 2,593.5 ft msl
- Discharge capacity of 44,800 cfs at 2,611.3 ft msl pool level
- One gate is auto-remote controlled
- 12 gates are locally operated with a single motorized hoist

Copco No. 1 dam has no bypass reach. Water flows directly from the diversion intake through a penstock to a powerhouse located at the base of the dam. Outflow from the Copco No. 1 powerhouse goes directly into the small Copco No. 2 reservoir. There are no minimum instream flow or ramp rate requirements for the Copco No. 1 reach nor specific requirements for reservoir fluctuations.

In the event of an unscheduled powerhouse shutdown, water backs up the penstock back into Copco reservoir. If the shutdown results in a lengthy outage and will adversely effect water supply needs downstream, WES may elect to open spill gates at Copco No. 1 dam.

The Copco No. 1 development has been automated to have the units start, stop and be controlled from any designated remote site. Copco No. 1 units are scheduled by a daily generation schedule established by WES to meet the power demands of the system while passing required flows through the various river system plants. The HCC has the primary responsibility to blend the timed generation from this plant into the system. It monitors, controls and initiates all unit startups and shutdowns twenty-four hours a day, seven days per week. Upon unit startups, generation loads are set and the unit will automatically reach and hold that requirement until the local Hydro Control Operator resets or shuts down the unit. In case of any equipment malfunction or communication interruption, HCC will contact Project operators to control the operation manually from the powerhouse.

7.0 COPCO No. 2

7.1 FACILITY OVERVIEW

The Copco No. 2 development consists of a diversion dam, small impoundment, and powerhouse located just downstream of Copco No. 1 dam between about RM 198.3 and RM 196.8 (Figure 1.1-1). The reservoir created by the 38-foot high dam has minimal storage capacity (73 acre-feet) (Figure 7.1-1). As a result, Copco No. 2 is entirely dependent upon Copco No. 1 for water to generate with and functions as a slave to the Copco No. 1 powerhouse.

Completed in 1925, the Copco No. 2 dam is small compared to Copco No. 1 dam, being only 38 feet high. The dam has five spill gates and a manual gate valve that can control a small amount of water into the bypass reach. The flowline to the powerhouse consists of portions of wood-stave, rock tunnel, and steel penstock. At the entrance to the flowline is a 36.5 ft. by 48 ft. trash rack with 2 inch bar spacing. Two Vertical Francis (13.5 MW each) units with a combined hydraulic capacity of 3,200 cfs reside in the powerhouse.

7.2 OWNERSHIP AND CONTRACTUAL OBLIGATION

PacifiCorp owns and operates the Copco No. 2 development and has no direct contractual obligations with Reclamation regarding its operation. The Copco No. 2 facility, however, is operated in a manner to assure conformity with contractual agreements on other facilities.

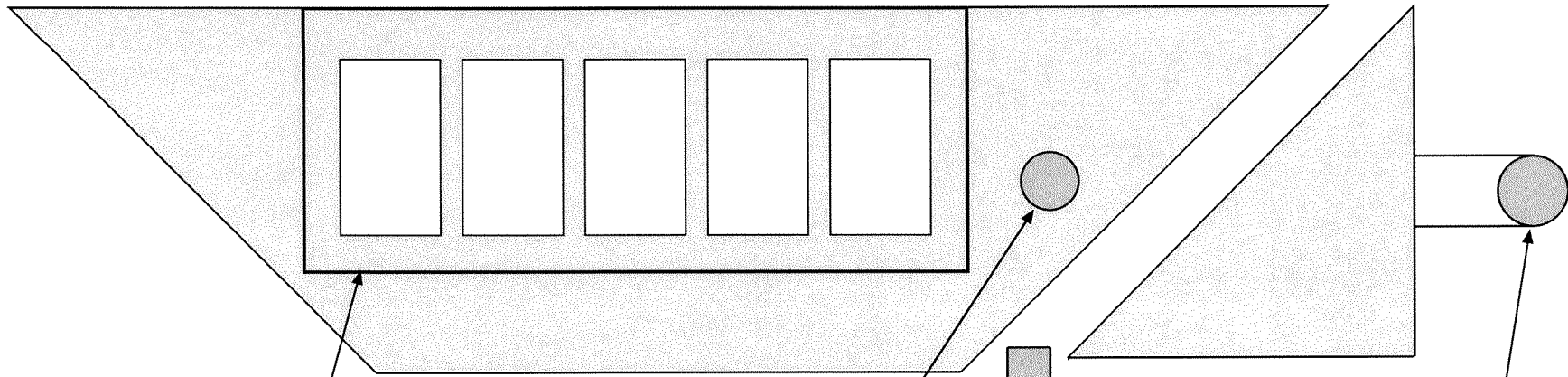
7.3 OPERATIONS

As mentioned in the previous Copco No. 1 section, Copco No. 2 has virtually no storage reservoir so is essentially “a slave” to Copco No. 1 for operating flows. That is, Copco No. 2 generation and hydraulic discharge must operate exactly synchronously with Copco No. 1 generation and hydraulic discharge. With this type of operation water surface elevations of the small Copco No. 2 reservoir rarely fluctuate more than several inches.

Copco No. 2 Dam Features

Note: View is looking upriver at downstream dam face

FIGURE 7.1-1



Spillway

- Section length 145 ft
- Five taintor gates; each 26 ft wide x 11 ft tall
- One gate is auto-remote controlled
- Discharge capacity is 3,060 cfs at 2,483 ft msl
- 12 gates are locally operated with a single motorized hoist

Uncorrugated Pipe

- Releases 5 to 10 cfs into reach

Sluiceway

- No longer operated

Waterway Intake Structure

- Upstream of dam
- 16 ft diameter pipeline
- Invert elevation 2,455.3 ft msl
- Base length 53 ft
- Gate width 20 ft
- Trashrack 48' wide x 36' tall
- Carry capacity 3,100 cfs

Top of Dam Elevation:	2,493 ft msl
Bottom of Dam Elevation:	2,455 ft msl
Dam Crest Length:	278 ft
Total Storage:	Approx. 40 ac-ft
Active Storage:	Approx. 0 ac-ft
Normal Max and Min Water Elevation:	2,483 ft msl

There are no ramp rate requirements for the 1.5 mile long bypass reach between Copco No. 2 Dam and Copco No. 2 powerhouse, but PacifiCorp releases a minimum flow of 5 to 10 cfs as standard operation practice (Table 7.3-1). PacifiCorp is not aware of any natural springs that contribute flow to this reach.

TABLE 7.3-1. COPCO MINIMUM INSTREAM FLOW AND RAMP RATE DIRECTIVES			
River Reach	Length of Reach (River Miles)	Minimum Instream Flow	Ramp Rate
Copco No.2 Bypass (dam to powerhouse)	1.5	10 cfs (nonregulatory release; PacifiCorp standard practice)	None.
Klamath River (Copco No. 2 tailrace to Iron Gate Reservoir)	0	None	None

In the event of an unscheduled powerhouse shutdown at the Copco No. 2 powerhouse, Copco No. 1 powerhouse is shutdown in response. This is due to the small size of the Copco No. 2 reservoir and the close operational tie to the Copco No. 1 development. If flow in the Copco No. 2 waterway is at full capacity at time of shutdown, some water may be spilled into the lower Copco No. 2 bypass reach via a hole in the tunnel. If water flow is near that of 1 unit (approximately 1600 cfs) a surge chamber in the tunnel can accommodate holding the water. If the outage at Copco No. 2 powerhouse will be lengthy, WES may elect to operate Copco No. 1 powerhouse and spill water at Copco No. 2 dam.

Since the Copco No. 2 development is immediately downstream of Copco No. 1 powerhouse, the Copco No. 2 generation is scheduled simultaneously with the generation of Copco No. 1. Copco No. 2 units are automated and are scheduled in a daily generation schedule established by WES to meet the power demands of the system while passing required flows through the various river system plants. The HCC has the primary responsibility to blend this generation into the system to meet the load demand. HCC monitors, controls and initiates all unit startups and shutdowns twenty-four hours a day, seven days per week. Upon unit startups, generation loads are set and the unit will automatically reach and hold that requirement until the Hydro Control Operator resets or shuts down the unit. In case of any equipment malfunction or communication interruption, HCC contacts the local operators to control the operation manually from the powerhouse.

8.0 IRON GATE

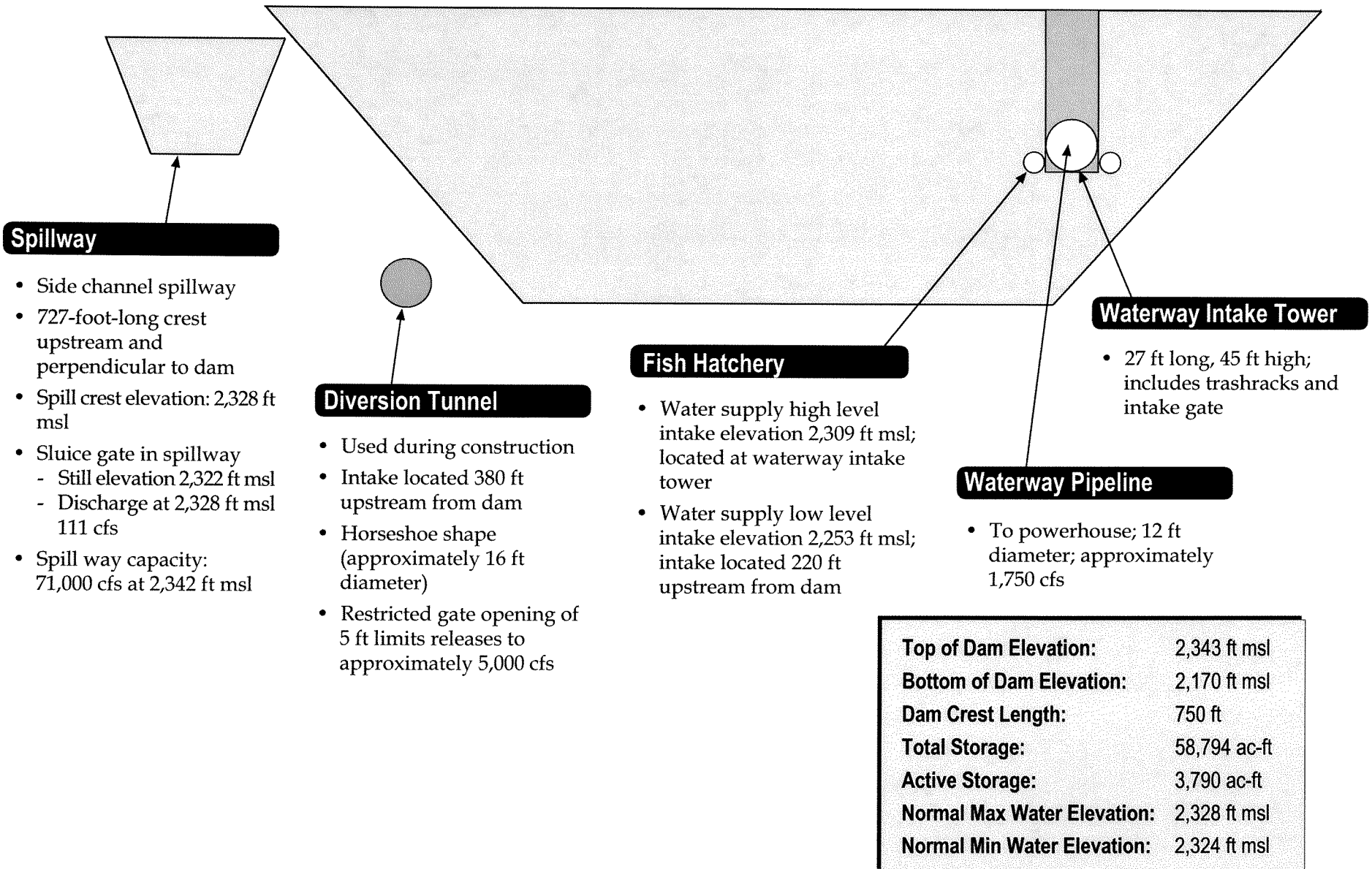
8.1 FACILITY OVERVIEW

The Iron Gate development consists of a reservoir, dam, and powerhouse located on the Klamath River between about RM 196.8 and RM 190 about 20 miles northeast of Yreka, California. It is the most downstream hydroelectric facility of the Klamath Hydroelectric Project (Figure 1.1-1). The rock fill Iron Gate dam was completed in 1962 and is 173 feet high (Figure 8.1-1). The impoundment formed upstream of the dam is approximately 944 surface acres and contains about 58,794 acre-feet of total storage capacity and 3,790 acre-feet of active storage capacity. An ungated spillway 730 feet long leads to a large spill canal,

Iron Gate Dam Features

Note: View is looking upriver at downstream dam face

FIGURE 8.1-1



allowing the transport of high flows past the structure. The powerhouse is located at the base of the dam. Trash is prevented from being entrained by a 17.5 ft. by 45 ft. trash rack with 4 inch bar spacing is in place at the penstock entrance.

The Iron Gate powerhouse consists of a single Vertical Francis unit (18 MW) with a hydraulic capacity of 1,735-cfs. In the event of a turbine shutdown, a synchronized bypass valve located immediately upstream of the turbine diverts water around the turbine to maintain flows downstream of the dam.

Although not a feature of typical Iron Gate dam operations, the original diversion tunnel used during construction is still in place. Operation of the gate controlling the flow through the tunnel is limited to emergency use during high flow events. If needed for such purposes, the tunnel can pass up to about 5,000 cfs.

8.2 OWNERSHIP AND CONTRACTUAL OBLIGATION

PacifiCorp owns and operates the Iron Gate development. Although it is not covered by the 1956 Contract with Reclamation, most of the discussion relating to Link River dam and UKL nonetheless applies to Iron Gate dam as well. The reason is simple: there is very little, manageable reservoir storage in PacifiCorp's Hydroelectric Project, so flows below Iron Gate dam are nearly a direct function of flows released upstream.

Initially, in 1992 Reclamation operational control required only specific UKL elevations, but now they also require specific flow releases at Iron Gate dam. In 1997, National Marine Fisheries Service (NMFS) listed coastal coho salmon below Iron Gate dam as federally threatened under the ESA. In compliance with ESA, for the period 1997-2001, Reclamation defined its own Project operations through annual operation plans. Each annual plan defined how UKL and flows downstream of Iron Gate dam could be regulated for that year, based on hydrological and environmental (e.g., water quality, fishery) conditions. Reclamation's consultation with USFWS and NMFS on the plans resulted in Biological Opinions that specifically defined UKL elevations and Klamath River flows downstream of Iron Gate dam needed to protect listed species. PacifiCorp has continued to assist Reclamation in achieving its UKL elevation and the river flow in compliance with the ESA. This commitment is expressed via annual agreements that PacifiCorp has signed with Reclamation stating its cooperation to operate the Hydroelectric Project in accordance with Reclamation's annual Operating Plans (see Appendix A).

Since coho salmon are listed under the ESA downstream of Iron Gate dam and flows below Iron Gate are closely correlated to releases at Link River and Keno dams, the 1997 modification of the 1956 Contract covers Iron Gate dam as well. Specifically, the modification states that Reclamation will assume all discretionary responsibility for setting minimum river flows below Iron Gate dam. Reclamation does this through consultation with NMFS. PacifiCorp implements the minimum flows pursuant to the 1997 modification and annual agreements with Reclamation. In summary, under the 1997 modification and because there is minimal in-project storage, Reclamation, not PacifiCorp, controls the amount of water released at Iron Gate dam.

8.3 OPERATIONS

Like Copco No. 1, the Iron Gate powerhouse is located at the base of the dam and has no bypass reach. The facility operates as a regulating dam to dampen the effects of fluctuating river levels from the Copco Nos. 1 and 2 load factoring operations. The powerhouse releases

flows less than 1,735 cfs which is the rated hydraulic capacity. When flows are naturally greater or higher flows are needed to meet regulatory conditions downstream, additional water can be passed over the un-gated spillway. The amount of spill is controlled to the extent possible through Copco Nos. 1 and 2 operations. If a consistent spill is needed at Iron Gate dam, these powerhouses cannot operate in a load-factoring operation, but must provide a constant flow to maintain Iron Gate reservoir elevations. Due to the width of the spillway, the fact that the amount of spill is directly related to Iron Gate reservoir elevation, and variable inflows from reservoir tributaries (Fall Creek, Jenny Creek, and Camp Creek), operating to meet less than a 500 cfs spill amount at Iron Gate dam is very difficult. In the event of a turbine shutdown, a synchronized bypass valve located immediately upstream of the turbine diverts water around the turbine. This bypass valve arrangement is to assure that downstream river flow is maintained regardless of turbine operations.

Flows below the dam have been regulated to meet targets specified in NMFS Biological Opinions since 1997. While the FERC License specifies minimum flows, BO flows may be less, equal to, or exceed the FERC minimums (Table 8.3-1). To comply with ESA, at a minimum, PacifiCorp passes through those minimum flows stated in the current BO rather than those cited as the FERC minimum. Iron Gate Hatchery return water and Bogus Creek contributions are included in this minimum flow.

TABLE 8.3-1. MONTHLY REVIEW OF INSTREAM FLOWS BELOW IRON GATE DAM IN THE U.S. BUREAU OF RECLAMATION'S KLAMATH PROJECT 2000 AND 2001 OPERATIONS PLAN (2000 WY OP, 2001 WY OP)			
Flow Below Iron Gate Dam (Average Daily Flow)			
Month	2000 wy OP Minimum/Target Klamath River Flows Below Iron Gate Dam (daily avg. cfs)	2001 wy OP Minimum/Target Klamath River Flows Below Iron Gate Dam (daily avg. cfs)	FERC Instream Flow Requirements Below Iron Gate Dam (daily avg. cfs)
2000			
October	1300	NP	1300
November	1300	NP	1300
December	1300	NP	1300
2001			
January	1300	NP	1300
February	1300	NP	1300
March	1300	NP	1300
April 1-15	NP	1700	1300
April 16-30	NP	1700	NP
May 1-15	NP	1700	1000
May 16-31	NP	1700	NP
June 1-15	NP	2100**	710
June 16-30	NP	1700**	NP
July 1-15	NP	1000	710

TABLE 8.3-1. MONTHLY REVIEW OF INSTREAM FLOWS BELOW IRON GATE DAM IN THE U.S. BUREAU OF RECLAMATION'S KLAMATH PROJECT 2000 AND 2001 OPERATIONS PLAN (2000 WY OP, 2001 WY OP)			
Flow Below Iron Gate Dam (Average Daily Flow)			
Month	2000 wy OP Minimum/Target Klamath River Flows Below Iron Gate Dam (daily avg. cfs)	2001 wy OP Minimum/Target Klamath River Flows Below Iron Gate Dam (daily avg. cfs)	FERC Instream Flow Requirements Below Iron Gate Dam (daily avg. cfs)
July 16-31	NP	1000	NP
August	NP	1000	1000
September	NP	1000	1300

NP: No Klamath River minimum flow below Iron Gate dam were provided for this time period in Reclamation's Operations Plan.

* A gradual increase/decrease in Iron Gate flows are expected to achieve the subsequent target by the given date. These numbers are not meant to imply that the given target must be maintained for the entirety of the time period.

** Down-ramping rates below Iron Gate Dam shall provide: (1) decreases in flows of 300 cfs or less per 24-hour period and no more than 125 cfs per 4-hour period when IGD flows are above 1,750 cfs; or (2) decreases in flows of 150 cfs or less per 24-hour period and no more than 50 cfs per 2-hour period when IGD flows are 1750 cfs or less.

NMFS has expressed a concern that down ramping at Iron Gate dam may, at certain ramp rates, cause fish stranding at points downstream. There is only one documented stranding incident to date; it occurred at the BLM Tree of Heaven campsite². Nonetheless, the 2001 BO issued by NMFS for Reclamation contained limits on PacifiCorp's ramp rates at Iron Gate. The 2001 BO specified a ramp rate of 50 cfs per 2-hour period at the Iron Gate powerhouse at those times when flows are within the hydraulic capacity of the plant (1750 cfs) (Table 8.3-2). The BO also set a limit for flow reduction to 150 cfs per day (NMFS 2001). This limit is five times more restrictive than the current FERC license ramp rate of 250 cfs per hour. PacifiCorp has found that the equipment in the power house can achieve this lower ramp rate, however, coordination between Reclamation and PacifiCorp is necessary to make sure enough water is available for release over the long ramp-down periods. This operational change relies on semi-automated control subject to occasional inaccuracies. PacifiCorp has committed to implement those ramp rates to the extent possible based on the physical limitations of the hydroelectric Project facilities. These limitations include the absence of spill gates at Iron Gate dam.

Flow downstream of the Iron Gate facility is measured every 15 minutes at a USGS gaging station (No. 11516530) located approximately 0.6 mile downstream. The gage is also downstream of Bogus Creek, a tributary to the Klamath River, hence instream flow at the gage is a measure of flow from the powerhouse, Iron Gate Hatchery return water and the ungaged Bogus Creek.

² Stranded juvenile salmonids were found near the BLM campsite known as "Tree of Heaven" in 1998, following a rapid reduction of inflow from Reclamation's Project and a subsequent reduction of flow below Iron Gate dam. This stranding was in an artificial spawning channel created by CDFG in the late 1970's. This channel has not been maintained and no longer functions as originally engineered, hence the potential for stranding fish at this site was high.

River Reach	Length of Reach (River Miles)	Minimum Instream Flow	Ramp Rate
Iron Gate Dam	Not Applicable	Specified in PacifiCorp license (FPC 1956) and in NMFS 2001 BO for Coho (NMFS 2001)	1.) 250 cfs or 3 inches per hour, whichever is less (FPC 1956) 2.) Decreases not more than 125 cfs per hour not exceeding 300 cfs per 24 hour period when flows are above 1,750 cfs and no more than 50 cfs per 2-hour period not exceeding 150 cfs per 24 hour period when flows are 1,750 cfs or less (NMFS 2001). (up and down rate)

The Iron Gate development is primarily operated manually with minor control provided remotely to serve as the Project's Klamath River regulating facility. Generation schedules provided by WES reflect the instream flow requirements and ramp rates PacifiCorp is obligated to provide. The exception to this may occur seasonally when high runoff river flows cause spills over the uncontrolled spillway at Iron Gate Dam. The single Iron Gate turbine generator unit is scheduled to maintain those regulated flows as well as provide minimal adjustments for seasonal peaks within its range limits. This schedule is given daily to HCC who is responsible for monitoring and controlling flow releases. Monitoring and control is provided twenty-four hours a day, seven days per week. Local operators will start and stop the unit and provide the control to HCC after or before having local control for maintenance functions. HCC, after accepting unit control, can raise or lower generation on a defined (pre-programmed) ramp rate in which case the control operator must monitor until the new release limit is reached and set. HCC also has the ability to trip the unit if electrical problems occur. Flows to the river will continue through the unit's synchronized bypass valve.

9.0 FALL CREEK

9.1 FACILITY OVERVIEW

The Fall Creek development is located on Fall Creek, a tributary to the Iron Gate reservoir, approximately 0.4 miles south of the Oregon-California border (Figures 1.1-1). The Fall Creek development consists of two small diversion dams, an earthen ditch, a penstock, and a powerhouse. The upstream-most diversion is located on Spring Creek; when in use it diverts water over to Fall Creek. The diversion on Fall Creek then diverts water into the waterway that supplies the powerhouse.

Built in 1903, the Fall Creek hydroelectric facility is one of PacifiCorp's oldest. The dam on Fall Creek is a log crib, earth filled diversion dam. Waterway length from dam to penstock intake is approximately 4,560 feet. At the entrance to the penstock is a 17.5 ft. long by 10.7 ft wide trash rack with 3 inch bar spacing. The 42-inch (reducing to 30-inch) diameter penstock drops over the hillside, providing a 730-foot head to the three Pelton turbines in the powerhouse. Generation capacity is 0.5 MW for Unit No. 1, 0.45 MW for Unit No. 2, and 1.25 MW for Unit No. 3. Hydraulic capacity of the three turbines totals 50 cfs.

9.2 OWNERSHIP AND CONTRACTUAL OBLIGATION

The Fall Creek Hydroelectric facilities are owned and operated by PacifiCorp.

9.3 OPERATION

The water supply for the Fall Creek powerhouse is predominantly spring fed and is fairly consistent. Given such, the facility was designed with no storage reservoir and is operated in a run-of-the-river fashion.

To provide the minimum instream flow, a notch in the lower stop logs at the Fall Creek diversion dam assures that 0.5 cfs is continually released into the bypass reach. Continuous operation at the powerhouse or flow through the bypass channel during maintenance assures that the 15 cfs minimum instream flow downstream of the powerhouse is met (Table 9.3-1). Although a gage was previously operated downstream of the powerhouse, no flow monitoring is currently in place. Flow released at the powerhouse can be estimated through a flow-generation relationship.

River Reach	Length of Reach (River Miles)	Minimum Instream Flow	Ramp Rate
Fall Creek Bypass	1.2	0.5 cfs into bypass plus a 15 cfs continuous flow downstream of the powerhouse tailrace (FPC 1956)	None.

The Fall Creek development is operated manually. The manual operation is due primarily to its run of river operation, smaller generation potential, and the consistency of the stream flow at the diversion point. The facility is operated at a constant discharge equal to the diversion dam inflow minus the 0.5 cfs instream release. The flashboards at the diversion dam are maintained at a constant elevation, and during periods of higher flow, the water in excess of the diversion capacity (50 cfs) passes over the diversion dam. The three units are manually operated as flows become available or diminish seasonally. After normal business hours the units are monitored by HCC through limited critical alarming. The HCC is able to monitor the Fall Creek generation twenty-four hours per day, seven days per week from a continuous total generation readout. Should any emergency occur that disturbs unit generation, a critical alarm alerts the HCC, which will contact the local operator who will respond on site. Since the units are impulse runners, normal unit shutdowns will deflect flows from the runners and not change flow releases until the operator elects to do so.

9.4 SPRING CREEK OUT-OF-BASIN TRANSFER

Spring Creek is a tributary to Jenny Creek that in turn feeds into Iron Gate reservoir. Spring Creek water can be diverted out of the Jenny Creek basin into the Fall Creek Basin for use at the Fall Creek powerhouse (Figure 9.4-1).

The Spring Creek earthen diversion was originally built near the turn of the last century and was approximately 2.5 feet high. As this dam and the associated canal fell into disrepair, PacifiCorp improved the structure to its current state in 1988. The dam is still a small earthen embankment and is approximately seven feet high. The dam spans the entire stream width (approximately 66 feet). The water from Spring Creek may be diverted

through an earthen canal that empties in the Fall Creek drainage where the flows meander a short distance before reaching Fall Creek. The Spring Creek facilities are not part of the FERC License No. 2082.

For at least a decade, PacifiCorp has been denied the opportunity to use Spring Creek water for hydroelectric production due a water rights dispute with an adjacent landowner. PacifiCorp and the landowner have filed their respective claims with the Oregon Water Resources Department and are awaiting adjudication on the matter. PacifiCorp's water rights claim is for a diversion of 16.5 cfs from Spring Creek into Fall Creek for hydroelectric production at the Fall Creek Hydroproject facility. PacifiCorp is waiting for the outcome of the state adjudication process before pursuing the inclusion of the Spring Creek diversion into a new FERC license. If the adjudication of the claim has not been decided prior to the new license, and if PacifiCorp is granted the claim, it may elect to amend the license in the future.

10.0 FLOW REGULATION THROUGH PACIFICORP PROJECT

Upper Klamath Lake inflow-outflow is the major source of water for PacifiCorp's Klamath Hydroelectric Project. Mean annual net inflow to the lake is 1.2 million acre-feet (AF); annual inflow ranges from 576 thousand AF (TAF) to 2.4 million AF (Reclamation 1998). When forecasting runoff from the April through September period, Reclamation uses the following descriptions to categorize inflows to UKL during this period.

UKL inflow is considered:

“Above Average” when UKL inflow > 500 TAF

“Below Average” when UKL inflow = < 500 TAF, > 312 TAF

“Dry” when UKL inflow = < 312 TAF, > 185 TAF, and

“Critical” when UKL inflow = < 185 TAF

UKL has a total storage capacity of 629,780 AF and an active storage capacity of 486,830 AF. The combined total active storage of UKL and the downstream PacifiCorp Project reservoirs is approximately 498,600 AF. Without UKL, the active storage for the PacifiCorp Project is only 12,000 AF (Table 10.0-1).

UKL elevations are controlled via Link River dam under the directive of Reclamation. Iron Gate dam releases are a stipulation of PacifiCorp's FERC license, however since 1997 they have become Reclamation's responsibility under the ESA. PacifiCorp has little or no effective control over the river's flow regime downstream of Iron Gate dam. The Project can manage short-term (hourly, daily) water balancing operations at certain hydroelectric reservoirs. Water flow through PacifiCorp's Project is directly related to Reclamation's control of UKL elevations, downstream releases out of Iron Gate, flows into and out of the Klamath Irrigation Project area, and the relatively small active storage capabilities in PacifiCorp Project reservoirs.

As mentioned previously, active storage within PacifiCorp's Project (between Link River dam and Iron Gate dam) is small relative to UKL's active storage (Table 10.0-1). For this reason, managing flow through the system to comply with regulatory requirements is largely an exercise of balancing total inflows with total outflow. Inflow to the upper portion of the Hydroelectric Project comes from Link River dam and Reclamation Project net inflows in

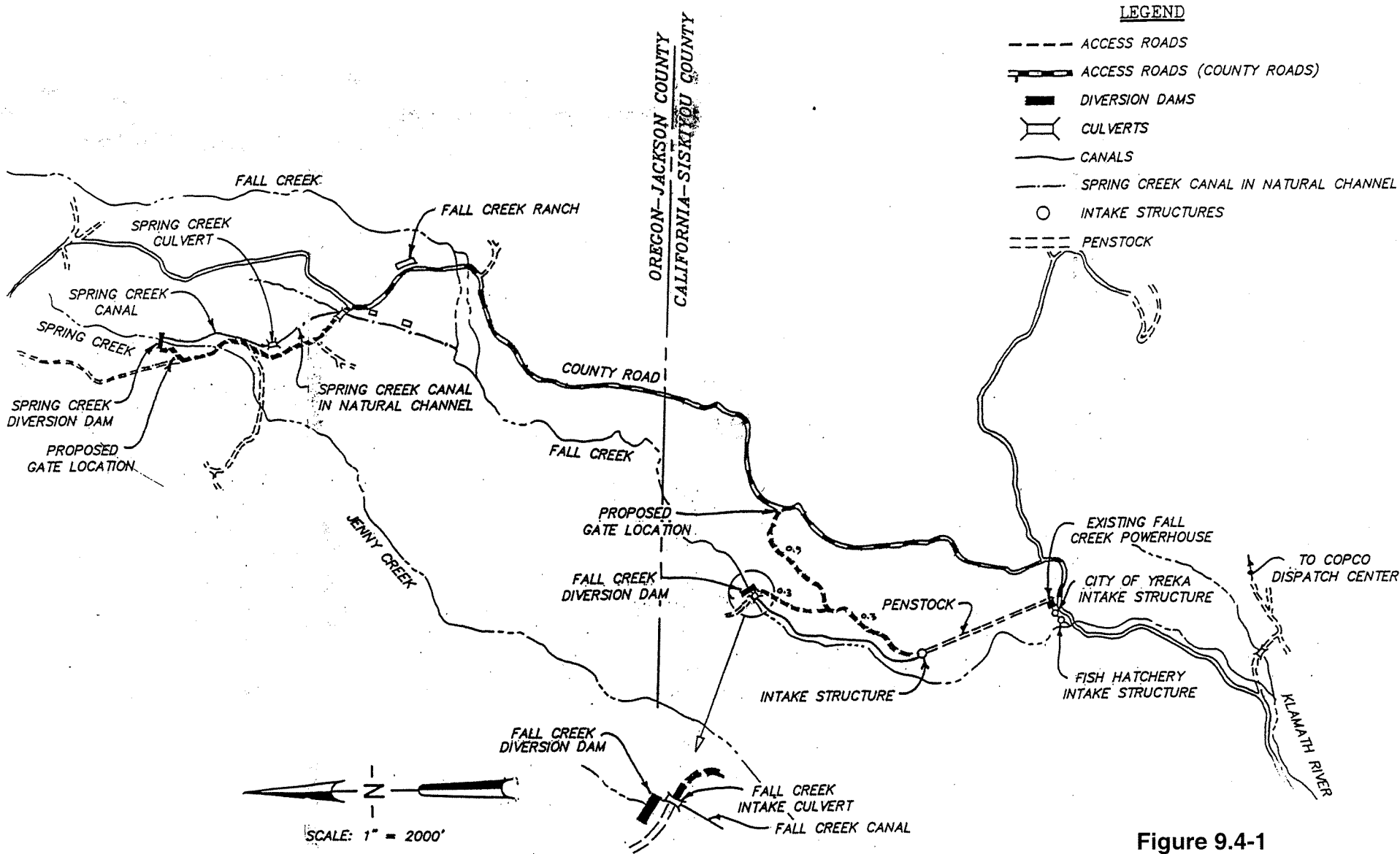


Figure 9.4-1
 FALL CREEK HYDROELECTRIC PROJECT
 GENERAL PROJECT MAP

TABLE 10.0-1. STORAGE CAPACITIES OF PACIFICORP KLAMATH PROJECT FACILITIES			
Reservoir	Total Storage (AF)	Active Storage* (AF)	Number of storage days of flow at 1000 cfs
Upper Klamath Lake (Reclamation facility)	629,780	486,830	245
Keno	18,500	0**	0
J.C. Boyle	3,495	1,724	0.9
Copco No. 1	46,867	6,235	3.1
Copco No. 2	73	0	0
Iron Gate	58,794	3,790	1.9
Total	651,429	498,579	251
Total without Upper Klamath Lake	127,729	12,000	6.0
Active storage is calculated using operational high vs. low reservoir elevation. Note that for UKL, active storage would actually be far less given minimum elevations stipulated in recent Biological Opinions.			
**Active storage is negligible since elevations are kept within +/- 0.1 feet.			

Keno reservoir. Tributary accretion downstream of UKL to Iron Gate dam is relatively low, especially during summer months (Table 10.0-2). Accretions from the springs in the J.C. Boyle bypass reach are approximately 220 cfs throughout the year. With the exception of a few out of basin transfers, outflow from the upper Klamath Basin is entirely through the Iron Gate facility. In water years when flows are in excess of the turbine capacity of any given facility, water is passed through the system as spill, and because the storage-limited hydroelectric reservoirs are typically full during high flows, Project releases become largely run of the river. This typically occurs in late winter and spring months in average to wet years. During the summer when flows are below turbine capacity of a facility, PacifiCorp is able to manage the short-term (hourly, daily) timing of flow through its facilities to generate power as effectively as possible within the limitations of reservoir storage and regulatory terms and conditions.

With the exception of Lost River inflow to Keno Reservoir, tributary accretions to the Project area are not gauged. However, tributary accretions can be estimated using KPOPSIM, a hydrologic model for the Klamath Basin. This model uses a mass-balance equation to measure (1) inflow of all accretions entering the Project between Keno dam and Iron Gate dam, and (2) the inflow from all other Reclamation canals between Link River dam and Keno dam (i.e., excluding Lost River diversion canal) (Figure 4.3-2). Using data from 1961-1997, mean yearly accretion is summarized in Table 10.0-2, below, and in Figures 10.0-1 and 10.0-2.

TABLE 10.0-2. ACCRETIONS TO UPPER KLAMATH RIVER SYSTEM DOWNSTREAM OF UKL TO IRON GATE DAM	
Tributary	Mean Annual Accretion (Thousand Acre Feet –TAF)
From Lost River Diversion Canal (into Keno Reservoir)	119
From Other Reclamation Diversion Canals (into Keno Reservoir)	21.4
From springs and tributaries between Keno Reservoir and Iron Gate dam	337
Total	477

Table 10.0-3 provides a summary of reservoir and river monitoring sites within the PacifiCorp Project Area.

TABLE 10.0-3. HYDRO MONITORING SITES IN KLAMATH PROJECT AREA				
Site Name	Location	Type of Monitoring	Responsible Party	Comments
Rocky Point (UKL)	Northwest end of UKL	Water level w/ staff gage, meter, USGS equip, PacifiCorp equip	Cooperative program w/ USBR, PacifiCorp	Real-time, updates, seen at HCC & WES
Rattlesnake (UKL)	East side of UKL	Water level w/ staff gage, meter, USGS equip, PacifiCorp equip	Cooperative program w/ USBR, PacifiCorp	Real-time, updates, seen at HCC & WES
Pelican (UKL)	South east end of UKL	Water level w/ staff gage, meter, USGS equip, PacifiCorp equip	Cooperative program w/ USBR, PacifiCorp	Real-time, updates, seen at HCC & WES
"833 Gauge" (USGS 11507500)	RM 253.4	Water level w/ staff gage, USGS equip, PacifiCorp equip	USGS	Real-time, seen at HCC & WES
Weed Bridge	Keno Reservoir at Hwy 97 bridge RM 249.3	Water level w/ staff gage, meter, USGS equip, PacifiCorp equip	USGS	Real-time, seen at HCC & WES
Keno Reservoir Level	At Keno Dam RM 233.4	Water level w/ staff gage, PacifiCorp equip	PacifiCorp	Real-time, seen at HCC & WES
Klamath River below Keno Dam (USGS 11509500)	RM 231.9	Water level w/ staff gage, USGS equip, PacifiCorp equip	USGS	Real-time, seen at HCC & WES, on USGS website

TABLE 10.0-3. HYDRO MONITORING SITES IN KLAMATH PROJECT AREA				
Site Name	Location	Type of Monitoring	Responsible Party	Comments
J.C. Boyle Reservoir Level	At J.C. Boyle Dam RM 224.7	Water level w/ staff gage, PacifiCorp equip	PacifiCorp	Real-time, seen at HCC & WES
Klamath R. below J.C. Boyle Powerhouse (USGS 11510700)	0.7 mi downstream of J.C. Boyle Powerhouse RM 219.7	Water level w/ staff gage, USGS equip, PacifiCorp equip	USGS	Real-time, seen at HCC & WES, on USGS website
Copco No. 1 Reservoir Level	At Copco Dam RM 198.7	Water level w/ staff gage, PacifiCorp equip	PacifiCorp	Real-time, seen at HCC & WES
Copco No.2 Intake Level	At Copco 2 Dam RM 198.4	Water level w/ staff gage, PacifiCorp equip	PacifiCorp	Real-time, seen at HCC & WES
Iron Gate Reservoir Level	At Iron Gate Dam RM 190.2	Water level w/ staff gage, PacifiCorp equip	PacifiCorp	Real-time, seen at HCC & WES
Klamath R. below Iron Gate Dam (USGS 11516530)	0.6 mi below Iron Gate Dam; RM 189.6	Water level, staff gage, USGS equip, PacifiCorp equip	USGS	Real-time, seen at HCC & WES; on USGS website
HCC = Hydro Control Center WES = Wholesale Energy Services				

10.1 FLOW REGULATION INTO AND OUT OF RECLAMATION'S PROJECT TO PACIFICORP'S PROJECT

Upper Klamath Lake and to a lesser extent, the Klamath River are major sources of water for Reclamation's Klamath Irrigation Project. Up to 1,150 cfs of water may be diverted from UKL through the A Canal (just upstream of the Link River dam) during the irrigation season (May - October). The amount diverted is typically about 20 to 30 percent of the annual outflow from the lake and 50 percent of the summer outflow (FERC 1990). Agricultural returns from this and other diversions have a mean of approximately 400 cfs in the summer and enter the Klamath River through the ADY Canal just upstream of Keno dam. In the fall and winter, spill from Reclamation's dams on the Lost River system and irrigation drain water from the Lost River Basin and Lower Klamath Lake (a closed system) are added to the total flow of the Klamath River upstream of Keno dam from the Lost River Diversion Channel. Such inflow can be as much as 3,000 cfs in the spring, but it usually ranges from 200 to 1,500 cfs in the summer. The Klamath Irrigation District (KID) via Reclamation calls PacifiCorp's Hydro Control Center daily with readings of the various irrigation flows. These flows include pumping from Keno reservoir (a negative value) and inflows into the reservoir from the Lost River Diversion Channel and Klamath Straits Drain.

Figure 10.0-1

**Total Average Accretions into/out of Keno Reservoir from Reclamation Irrigation Project
(for WY 1961-1997)**

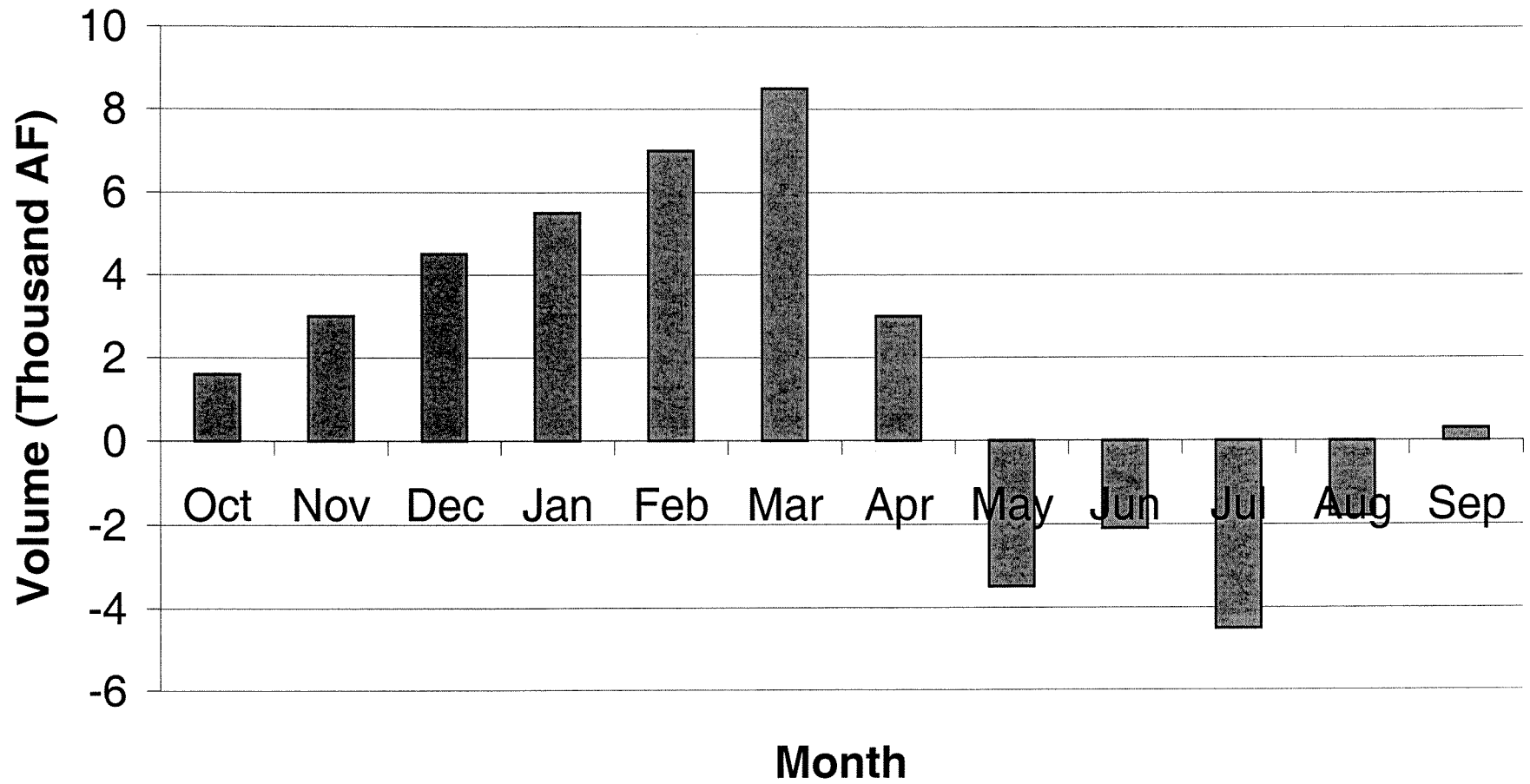
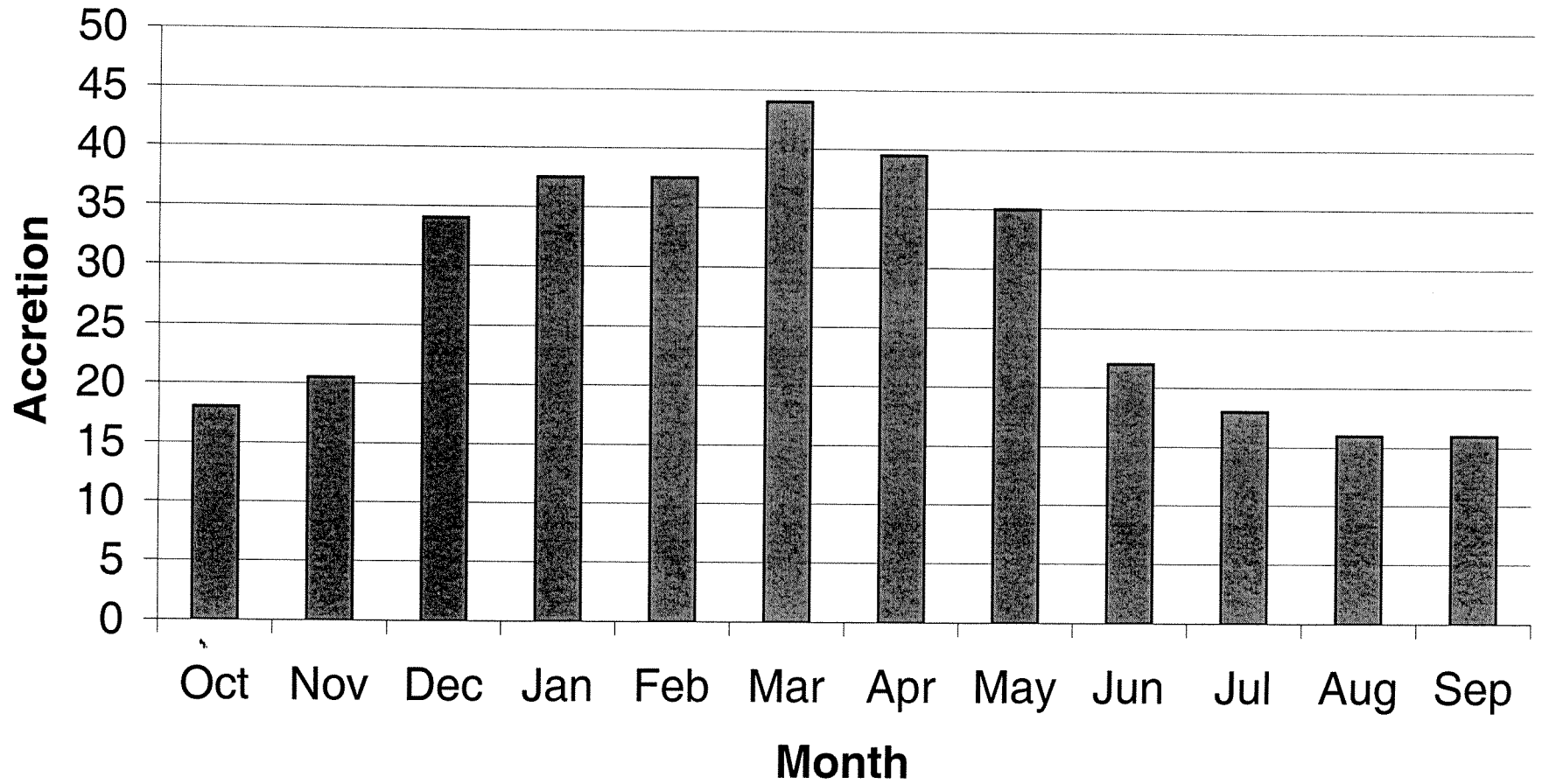


Figure 10.0-2

Total Average Accretion from Tributaries and Springs between Keno and Iron Gate Dams (as per KPOPSIM calculation for WY 1961-1997).



10.2 FLOW REGULATION THROUGH THE KLAMATH HYDROELECTRIC PROJECT DURING SUMMER AND/OR BELOW AVERAGE WATER YEAR

Since inflow to PacifiCorp's Project must be balanced with outflow as Project reservoirs have little active storage, total flow into the PacifiCorp Project is routinely adjusted to meet specified instream flows below Iron Gate dam. Total summer inflow is typically comprised of flow from UKL through Link River dam spill and the associated fish ladder, East Side and West Side powerhouses, return water from the Reclamation Project and summertime tributary accretion flows downstream of Keno dam. Based on available and Iron Gate dam required flows, J.C. Boyle, Copco No. 1 and Copco No. 2 may operate as load factoring generation facilities (see appropriate sections for description of such operations).

10.3 FLOW REGULATION THROUGH RECLAMATION AND PACIFICORP PROJECTS IN WINTER AND/OR HIGH WATER YEAR

The reservoirs in the upper basin are currently capable of storing approximately 40 percent of the mean annual flow as measured at the Iron Gate gage site. About 80 percent of this total storage is provided by UKL. Storage in all PacifiCorp reservoirs combined is only 127,729 AF and only 12,000 of this is in active storage. Therefore, PacifiCorp's facilities store only 7.8 percent of the mean annual flow, and only "actively" store 0.74 percent of the mean annual flow.

Typically, in winter and spring in average and above average water years, more water flows into UKL than can be stored in the lake and hydroelectric project reservoirs. During these times operations become run-of-river such that all hydroelectricity facilities operate at full hydraulic capacity and water in excess of the hydraulic capacity is spilled through spill gates at each of the dams. In below average water years (as in 2001) none of the projects may spill at all since total inflow to the Klamath system may be less than what can be stored in UKL. Under such conditions, the flow regulation conditions described in Section 10.2 apply.

The potential for high run-off conditions occurs each year from approximately November through April. Since PacifiCorp's Project reservoirs contain so little active storage, UKL provides the only meaningful storage in the basin to ameliorate high flow events. Since the inception of the 1992 Biological Opinion for suckers, target elevations in UKL have been relatively high in the spring months to benefit water quality and larval sucker nursery habitat. This condition compromises UKL's flood control benefits. High target lake levels during spring run-off essentially eliminate the ability of UKL to store a high flow event (about 10,000 cfs). Typically, PacifiCorp Project reservoirs (with the exception of Keno reservoir) are drawn down to some extent prior to spring run-off to capture whatever water is possible during high flow events for release at a later time.

11.0 OTHER OUT-OF-BASIN DIVERSIONS

11.1 ROGUE RIVER BASIN IRRIGATION PROJECT

Reclamation operates the Rogue River Basin Irrigation Project (Rogue River Project). The Rogue River Basin is the basin to the northwest of the Klamath Basin on the west slope of the Cascade Mountain Range. This project supplies irrigation water for approximately 35,000 acres in the Medford, Rogue River, and Talent Irrigation Districts.

Some water for the Rogue River Project is diverted from the Klamath Basin to the Rogue River Basin. Rogue Project water supplied from the Klamath Basin comes from Four Mile Lake, Hyatt Reservoir, and Howard Prairie Reservoir. The latter two reservoirs drain to

Jenny Creek, a tributary to Iron Gate reservoir. If water from these two reservoirs was not transferred out of basin, it would flow to Jenny Creek. A significant portion of the inflow to these reservoirs occurs in the wet winter months. Hence, this is the time period in which water is denied to Jenny Creek. Inflow to Hyatt and Howard Prairie reservoirs from the Klamath Basin is little to none July through September.

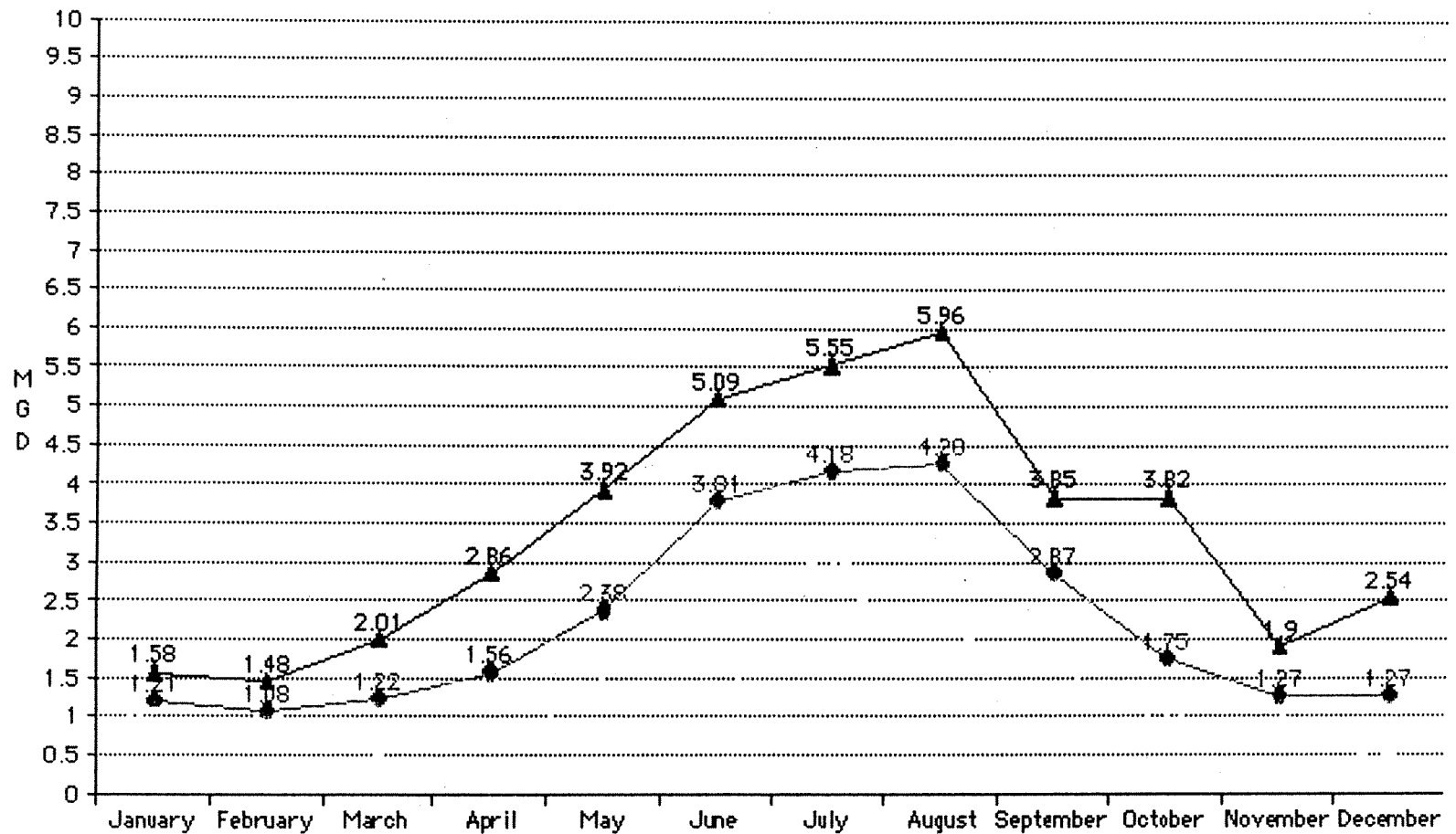
Approximately 32 water right permits (as per 1994 data) exist that allow for a Klamath River basin point of delivery to a Rogue River point of use. Thirteen of these are associated with Four Mile Lake and 19 are associated with Hyatt and Howard Prairie Reservoirs.

11.2 CITY OF YREKA MUNICIPAL WATER SUPPLY

The City of Yreka has a 1966 California water right of 15 cfs to divert water from Fall Creek for their municipal water supply. The city maintains and operates two diversions in Fall Creek: A-dam (the primary diversion structure) and B-dam (the secondary diversion structure). The A-dam is located just upstream from the CDFG Fall Creek hatchery intake and downstream from the Fall Creek powerhouse (Figure 9.4-1). The B-dam is located upstream of the powerhouse tailrace in the natural channel just below a waterfall. Two diversions are necessary since the dependability of adequate flow at each diversion is not guaranteed. For instance, if the Fall Creek powerhouse trips offline, flow to the A-dam may eventually cease. During that time, the City of Yreka can switch their point of diversion to the B-dam. Both of the diversions are concrete structures with stop logs that span the width of the creek. There is a screened pump at both locations. The data in Figure 11.2-1 for calendar year 2000 was provided to PacifiCorp from the City of Yreka. According to Dave Tanner, Asst. Director of Public Works, 2000 was a fairly typical year relative to the amount of water diverted to the City. Approximately 820 million gallons per year (2519 acre-feet per year) of water was diverted from Fall Creek with the largest diversions occurring during the late summer. Monthly average diversion rates did not exceed 10 cfs.

Figure 11.2-1

Yreka Filter Plant Flow (Year 2000)



APPENDIX A - 1956 Contract with
Reclamation for the Operation of
Link River Dam and Associated
Letters of Amendment

Contract No.
14-06-200-5075

UNITED STATES
DEPARTMENT OF THE INTERIOR

CONTRACT WITH THE CALIFORNIA OREGON POWER COMPANY

THIS CONTRACT, made this 31st day of January, 1956,
in pursuance of the Act of Congress of June 17, 1902 (32 Stat. 388),
and acts amendatory thereof or supplementary thereto, hereinafter
referred to as "the Federal reclamation laws", and acts of Congress re-
lating to the preservation and development of fish and wildlife resources,
between THE UNITED STATES OF AMERICA, hereinafter called "the United
States", represented by the officer executing this contract, his duly
appointed successor, or his duly authorized representative, hereinafter
called "the Contracting Officer", and THE CALIFORNIA OREGON POWER COMPANY,
a California corporation, its successors or assigns, hereinafter called
"Copco";

WITNESSETH:

WHEREAS, the United States, pursuant to the Federal reclamation
laws, is now engaged in the reclamation and irrigation of lands lying in
the State of Oregon and in the State of California in the vicinity of
Klamath Falls, Oregon, known as the Klamath Project; and

WHEREAS, the United States has investigated and is further
investigating and preparing plans for the development of water and related
resources of the Upper Klamath River Basin, including the area in
California known as Butte Valley; and

000001

1956

WHEREAS, on February 24, 1917, an agreement was made for the term of fifty (50) years between the United States and a predecessor of Copco, which agreement was thereafter assigned to Copco, providing, among other things, for the construction of Link River Dam, Klamath County, Oregon, for the purpose of regulating the level of Upper Klamath Lake, and said agreement has been amended and supplemented from time to time; and

WHEREAS, the parties deem it to their advantage and to the best interest of the users of the water in the Upper Klamath River Basin that a new agreement be entered into for a period of fifty (50) years, upon the terms and conditions hereinafter expressed;

NOW, THEREFORE, in consideration of the premises and the mutual covenants hereinafter contained, the parties hereto agree as follows:

1. Whenever used in this contract, the following terms shall have the respective meanings set opposite thereto:

(a) Upper Klamath River Basin -- The area so designated and delineated on the map annexed hereto and made a part hereof, marked Exhibit "A".

(b) Klamath Water -- The water lying or flowing in or which has been diverted from Upper Klamath Lake, Link River, Lake Ewauna, Lost River, Klamath River, or their tributaries, or water that is pumped from underground sources for use on Project Land as part of a plan for maximum water resource development.

(c) Project Land -- All land of the United States lying in the Upper Klamath River Basin, and all land in the Upper Klamath River Basin lying within any public district or within the service area of any association which has contracted or may hereafter contract and any land of individuals or corporations in the Upper Klamath River Basin which have contracted or may hereafter contract with the United States, pursuant to the Federal reclamation laws, for water service or for the construction of irrigation, drainage, or other reclamation works.

2. Copco shall operate and maintain for a period of fifty (50) years from the effective date hereof, subject to the conditions herein-after provided, Link River Dam, located in Klamath County, Oregon, heretofore constructed by Copco and transferred to the United States pursuant to the agreement of February 24, 1917. Copco may regulate the water level of Upper Klamath Lake between the elevations 4143.3 and 4137, (Reclamation Service Datum), but the water level shall not be raised above elevation 4143.3 and shall not be lowered below elevation 4137, except at such times, and on such conditions, as may be satisfactory to the Contracting Officer: Provided, That the Contracting Officer from time to time may specify a higher minimum elevation than 4137 if in his opinion such must be maintained in order to protect the irrigation and reclamation requirements of Project Land. Whenever the elevation of the

lake drops to a point two-tenths of a foot above the applicable minimum elevation, the Contracting Officer may assume control of the Link River Dam and its outlets and continue in control so long as the lake level remains at or below that elevation.

All elevations stated in this article, or specified by the Contracting Officer pursuant to this article, shall mean elevations in a state of calm.

3. Copco shall at its own expense maintain the approach channel to the "A" Canal of the Klamath Project to the satisfaction of the Contracting Officer so far as may be necessary to carry a flow of not less than 1200 c.f.s. into the "A" Canal with the water of Upper Klamath Lake at an elevation of 4137.

4. Copco assumes any and all liability for damages resulting from operation of the Link River Dam by Copco or resulting from its regulation and control of the water levels of Upper Klamath Lake. Copco hereby undertakes to hold the United States harmless from any and all liability for damage arising out of the operation by Copco of Link River Dam and the regulation and control by Copco of Upper Klamath Lake herein provided for.

5. For the period of this contract Copco agrees to furnish electric power for the purposes and for the rates set forth in Exhibit "B", attached hereto and hereby made a part of this contract.

6. Nothing in this agreement shall curtail or in anywise be construed

as curtailing the rights of the United States to Klamath Water or to the lands along or under the margin of Upper Klamath Lake. No Klamath Water shall be used by Copco when it may be needed or required by the United States or any irrigation or drainage district, person, or association obtaining water from the United States for use for domestic, municipal, and irrigation purposes on Project Land: Provided, That nothing in this agreement shall curtail or interfere with the water rights of Copco having a priority earlier than May 19, 1905, and: Provided further, That no water originating in the Upper Klamath River Basin shall be transported beyond the Upper Klamath River Basin except under the provisions of Article 7 of this contract and except for that water which originates within the drainage area of Fournmile Lake.

7. If there shall be authorized for construction pursuant to the Federal reclamation laws projects or units of projects including lands lying within Butte Valley, all drainage water shall be returned to the Klamath River at a point above the town of Keno, Oregon, unless the Secretary of the Interior shall determine that this would render the irrigation and reclamation of lands within Butte Valley economically less feasible than under an alternate plan of development, in which event, upon construction of such projects or units of projects, the drainage water from Project Land lying within Butte Valley shall be returned to the Klamath River at such point upstream from Copco Lake as shall be determined by the Secretary of the Interior: Provided, That

if Copco makes economic benefits available to such projects or units of projects by means of power rates lower than those specified in Exhibit "B", or otherwise, that will make it equally feasible, to the satisfaction of the Secretary of the Interior, to return the drainage water to a point in the Klamath River above Keno, then the drainage water shall be returned to the Klamath River above Keno. Copco shall have the first right to develop, for power purposes, drainage water removed by the United States from Project Land lying within Butte Valley, subject to establishment by Copco of its rights under the applicable state law.

8. Nothing in this agreement shall be deemed to confer on the United States or upon any of its successors any right to the use of Klamath Water for the purpose of generating electric power.

9. Except for the water rights of Copco having a priority earlier than May 19, 1905, no Klamath Water shall be used by Copco when it may be needed or required by the United States for waterfowl conservation in the Upper Klamath River Basin in the quantities in which it is being used for that purpose as of the effective date of this contract.

10. The failure of Copco to comply in the true intent and meaning with any of the provisions of this agreement in regard to the operation and use of Link River Dam during the fifty (50) year period shall render this contract in regard to said dam subject to cancellation by the Secretary of the Interior upon sixty (60) days' written notice to Copco stating the cause for such proposed cancellation and in case of failure

or refusal of Copco to comply with the provisions of this contract within the period allowed by the Secretary of the Interior he may cancel this contract. After such cancellation, or at the expiration of the fifty (50) year period of this contract, Copco shall have no further rights in regard to the use of Link River Dam and its appurtenances, the operation and control of which shall immediately pass to the United States, but such cancellation shall in nowise curtail or affect the rights which Copco now has in the waters of Link River and Klamath River.

11. This contract shall become effective on the date of its approval by the Public Utility Commissioner of the State of Oregon or the Public Utilities Commission of the State of California, whichever shall occur later, and shall not be effective in any way until approved by both regulatory authorities. Within thirty (30) days after the execution of this contract Copco shall file applications with both regulatory authorities for orders authorizing Copco to carry out the terms thereof and shall prosecute the applications and any proceedings on them diligently. If such orders are not issued and effective within nine (9) months after execution of this contract, the United States may, within sixty (60) days, terminate this contract on thirty (30) days' notice to Copco.

12. This contract shall supersede and cancel the contract, including all amendments thereto, entered into under date of February 24, 1917, by Copco and its predecessor company, California-Oregon Power Company, and the United States, upon the effective date hereof.

13. In connection with the performance of work under this contract, the contractor agrees not to discriminate against any employee or applicant for employment because of race, religion, color, or national origin. The aforesaid provision shall include, but not be limited to, the following: employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The contractor agrees to post hereafter in conspicuous places, available for employees and applicants for employment, notices to be provided by the contracting officer setting forth the provisions of the non-discrimination clause. The contractor further agrees to insert the foregoing provision in all subcontracts hereunder, except subcontracts for standard commercial supplies or raw materials.

14. No Member of or Delegate to Congress, or Resident Commissioner, shall be admitted to any share or part of this contract or to any benefit that may arise therefrom, but this provision shall not be construed to extend to this contract if made with a corporation for its general benefit.

15. This contract binds and inures to the benefit of the parties hereto, their successors and assigns, including without limitation any water users' organization or similar group which may succeed either by assignment or by operation of law to the rights of the United States hereunder.

16. Copco warrants that it has not employed any person to solicit or

secure this contract upon any agreement for a commission, percentage, brokerage, or contingent fee. Breach of this warranty shall give the United States the right to annul the contract or, in its discretion, to deduct from the contract price or consideration the amount of such commission, percentage, brokerage, or contingent fee. This warranty shall not apply to commissions payable by contractors upon contracts or sales secured or made through bona fide established commercial or selling agencies maintained by Copco for the purpose of securing business.

17. This contract shall be in effect for a period of fifty (50) years from the effective date determined pursuant to article 11.

IN WITNESS WHEREOF, the parties hereto set their hands and the seal of Copco is hereto affixed.

APPROVED AS TO LEGAL
FORM AND SUFFICIENCY
Kent Schuyler
ACTING REGIONAL SOLICITOR
DEPARTMENT OF THE INTERIOR

THE UNITED STATES OF AMERICA

By *[Signature]*

Title Regional Director, Region 2

Bureau of Reclamation,

U. S. Department of the Interior

Address P. O. Box 2511

Sacramento 11, California

THE CALIFORNIA OREGON POWER COMPANY

By *[Signature]*

A. S. CUMMINS

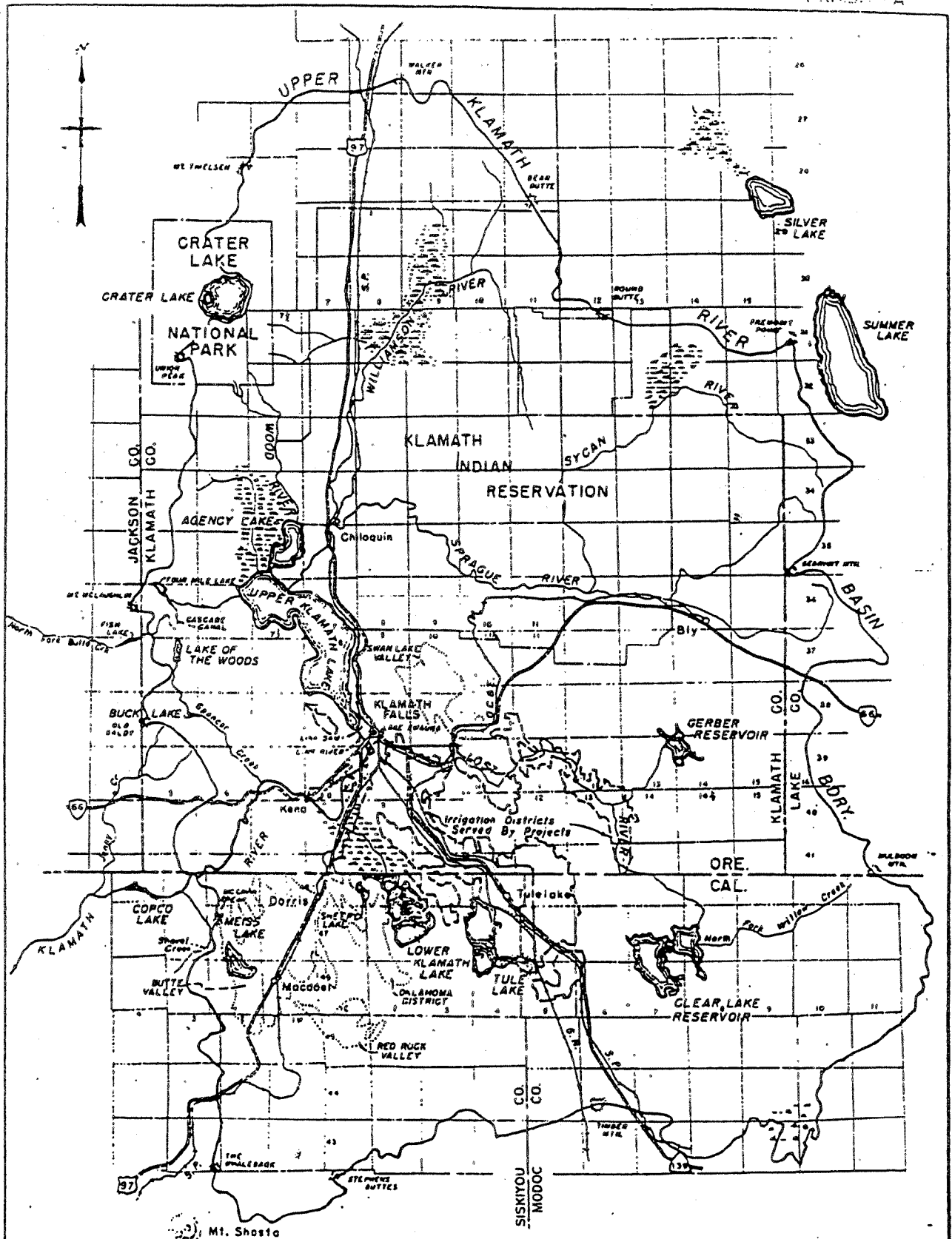
Title President

Address 216 West Main Street

Medford, Oregon

Attest:

[Signature]
E. L. LENOX
Title Secretary



UPPER KLAMATH RIVER BASIN
OREGON - CALIFORNIA

STATES OF CALIFORNIA AND OREGON
SPECIAL GOVERNMENT POWER RATE UNDER CONTRACT DATED January 31, 1956
BETWEEN UNITED STATES OF AMERICA AND THE CALIFORNIA OREGON POWER COMPANY
AGRICULTURAL POWER SERVICE: --RATE SCHEDULE "A".

This rate schedule shall be applicable only to pumping Klamath
Water for use on Project Land and for drainage of Project Land.

Territory:

Applicable to the Upper Klamath River Basin.

Rate:

0.6¢ per kwh

Annual Minimum Charge:

The annual minimum charge is based on the name plate rating in
horsepower of the maximum connected motor load at each instal-
lation during a calendar year.

100 H.P. or over:

for first two years of service	\$10.45 per H.P. per calendar year
after two years of service	No Charge

99 H.P. or less:

for first five years of service	
first 25 H.P.	\$6.00 per H.P. per calendar year
next 74 H.P.	\$5.25 " " " " "
after five years of service	
first 25 H.P.	\$3.00 per H.P. per calendar year
next 74 H.P.	\$2.625 " " " " "

Special Conditions:

- (1) Where 3-phase service is required for installation under 7-1/2 H.P., the annual minimum charge will be based on 7-1/2 H.P.
- (2) Installations in service prior to the effective date of this contract shall receive credit for the time service has been rendered under special power contracts entered into pursuant to the contract between the United States and Copco dated February 24, 1917, in meeting the time requirements used in determining annual minimum charges.
- (3) Energy will be supplied either single-phase or 3-phase at nominal voltages consistent with those in effect elsewhere in the territory served by Copco.
- (4) Special contracts shall be executed for all installations under this rate and all contracts shall have attached thereto a letter from the Contracting Officer stating the proposed consumer is entitled to this rate.
- (5) For installations of more than 7-1/2 H.P., Copco shall make all necessary line extensions at its own expense.
- (6) For installations of 7-1/2 H.P., or less, Copco shall make necessary line extensions in accordance with its established line extension policies as filed with the State regulatory authorities having jurisdiction.
- (7) The annual minimum charge is payable in consecutive monthly installments of 1/6 (one-sixth) of the annual minimum charge, beginning the first month of operation until such time as the accumulated energy charges equal the annual minimum charge.

DRAINAGE PUMPING: --RATE SCHEDULE "B"

This rate schedule shall be applicable only to the pumps operated by the United States, or its successors in interest, for the removal of water from Tule Lake Sumps and Lower Klamath Lake Sumps and any drains leading thereto or therefrom and for power used to pump such drainage water for the irrigation of the areas lying within the beds of Tule Lake and Lower Klamath Lake, all as shown on the map marked Exhibit "A".

Rate:

On-peak pumping--eight (8:00) A.M. to eight (8:00) P.M. of each day except Saturdays, Sundays and legal holidays--five (5) mills per kwh

Off-peak pumping--eight (8:00) P.M. to eight (8:00) A.M. of each day and during the 24-hour period of Saturdays, Sundays and legal holidays--three (3) mills per kwh

If at any time Copco's commercial rates for like service are lower than the rates specified in Schedules "A" and "B" herein, the commercial rates shall prevail during such time.



IN REPLY
REFER TO:

United States Department of the Interior

JUN - 4 1997
HYDRO RESOURC

BUREAU OF RECLAMATION
Mid-Pacific Regional Office
2800 Cottage Way
Sacramento, California 95825-1898

JUN 3 1997

MP-440
PRJ-13.00

Randy Landolt, Director Hydro Resources
PacifiCorp
920 SW 6th Street
Portland, Oregon 97204-1256

Subject: Temporary Modification of Contract No. 14-06-200-5075

Dear Mr. Landolt:

Under Contract No. 14-06-200-5075 dated January 31, 1956 (1956 Contract), PacifiCorp's predecessor, Copco, and the United States Department of the Interior acting through its Bureau of Reclamation (Reclamation) agreed that for a period of 50 years PacifiCorp would operate and maintain Reclamation's Link River Dam and, under section 5 of the 1956 Contract, sell power and energy to designated irrigation loads in the Klamath Basin at a reduced rate. In return for these efforts and concessions, Reclamation granted Copco some discretion in setting and maintaining the level of Upper Klamath Lake in order to enhance downstream power benefits at Copco (now PacifiCorp) hydroelectric developments.

In recent years, however, it has become evident that the water supply in the Klamath Basin cannot always meet the needs of the species listed pursuant to the Endangered Species Act (ESA), Tribal trust resources, irrigated agriculture, and wildlife refuges. As a result, PacifiCorp's ability to exercise its discretion in operating Link River Dam for power purposes has been restricted. In addition, the most recent listing of the Coho salmon under the ESA by the National Marine Fisheries Service has caused Reclamation to review its Klamath Project operations. The Klamath Project 1997 Annual Operations Plan, dated May 1, 1997, reflects this review by including certain minimum flows at Iron Gate Dam and elevations in Upper Klamath Lake that vary from the operation that PacifiCorp would prefer for this year.

PacifiCorp has expressed concern over the 1997 Plan and the loss of the benefits the parties expected PacifiCorp to obtain from its operation of Link River Dam. PacifiCorp has requested a modification to the 1956 Contract lest PacifiCorp assert its right to rescind the 1956 Contract on the grounds of frustration of purpose. Reclamation does not acknowledge PacifiCorp's right to rescind the 1956 Contract; Reclamation is, however, willing to negotiate a permanent modification to the 1956 Contract. Such a modification would potentially require a significant period of time to complete. Therefore, Reclamation


proposes a temporary modification for the remainder of calendar year 1997. Reclamation understands that PacifiCorp does not intend to enter into any subsequent temporary modifications to the 1956 Contract.

Reclamation desires PacifiCorp to continue to operate and maintain Link River Dam and to continue to provide low-cost electric power and energy for irrigation purposes under section 5 of the 1956 Contract, but wishes to specify that operations of Link River Dam meet the river flows and lake elevations contained in the 1997 Plan. In light of these positions and assuming that the Federal Energy Regulatory Commission does not object to these arrangements, Reclamation proposes that PacifiCorp until January 1, 1998, forbear from seeking to rescind the 1956 Contract and thus continue to be responsible for the daily operation and maintenance procedures at Link River Dam, in return for which Reclamation would take over discretionary responsibility for specifying Klamath River flows and Upper Klamath Lake elevations as contained in the 1997 Plan.

If the foregoing reflects your understanding and if PacifiCorp is willing to modify the 1956 Contract for the remainder of calendar year 1997 by turning over discretionary responsibility for specifying Klamath River flows and Upper Klamath Lake elevations as contained in the 1997 Plan while continuing to perform the ministerial functions associated with operation and maintenance of Link River Dam and continuing to provide power to the irrigation loads designated in the 1956 Contract at reduced prices, please sign both counterparts of this letter agreement and return one original to me.

We understand that this letter agreement shall expire at midnight on December 31, 1997, without action by either party. Thank you for your attention and assistance.

Sincerely,

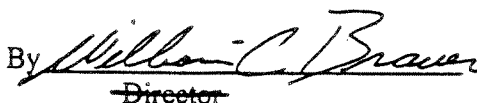


Roger K. Patterson
Regional Director

In Duplicate

PacifiCorp

By


~~Director~~

Attest



Date

June 5, 1997



United States Department of the Interior

BUREAU OF RECLAMATION
Mid-Pacific Regional Office
2800 Cottage Way
Sacramento, California 95825-1898

RECEIVED

JUN - 8 1998

HYDRO RESOURCES

IN REPLY
REFER TO:

KO-400
PRJ-13.00

4 1 1

Mr. Randy Landolt
Director Hydro Resources
PacifiCorp
920 SW 6th Street
Portland, Oregon 97204-1256

Subject: Continuation of the Temporary Modification of Contract No. 14-06-200-5075
Dated June 5, 1997


Dear Mr. Landolt:

On April 24, 1998, Reclamation adopted the 1998 Operations Plan Environmental Assessment (EA) and Finding of No Significant Impact. Alternative 1 (minimums) and 2 (targets) of the EA were adopted as the 1998 Operations Plan (1998 Plan). Reclamation and PacifiCorp agreed to renew and extend the June 5, 1997, temporary modification to Contract No. 14-06-200-5075 (1956 Contract). Reclamation proposes that this renewal and extension be on the same terms as the June 5, 1997, temporary modification to the 1956 Contract, which by this reference is incorporated herein, except that it now will relate to the 1998 Plan rather than the 1997 Operations Plan. This renewal and extension shall remain in effect until midnight of March 31, 1999, at which time it will expire automatically without action by either party.

If you wish to renew the temporary modification to the 1956 Contract, please sign both counterparts of this letter and return one original to Mr. James Bryant at the Klamath Basin Area Office, 6600 Washburn Way, Klamath Falls, Oregon 97603. You may retain the other copy for your files.

Sincerely,

ACTING FOR


Roger K. Patterson
Regional Director

In Duplicate

PacifiCorp

By: 

Date: 6/8/98



United States Department of the Interior



BUREAU OF RECLAMATION
MID-PACIFIC REGIONAL OFFICE
2800 COTTAGE WAY
SACRAMENTO, CALIFORNIA 95825-1898

IN REPLY
REFER TO:
KO-400
PRJ - 13.00

MAY 21 1999

RECEIVED
MAY 24 1999
HYDRO RESOURCES

Mr. Randy Landolt, Managing Director, Hydro Resources
PacifiCorp
825 NE Multnomah, Suite 550
Portland, Oregon 97232

Subject: Continuation of Temporary Modification of Contract No. 14-06-200-5075 dated June 5, 1997

Dear Mr. Landolt:

On March 8, 1999, Reclamation completed a draft 1999 Operations Plan (1999 Plan) Environmental Assessment. In anticipation of finalizing the 1999 Plan, Reclamation and PacifiCorp have agreed to renew and extend the June 5, 1997, temporary modification to Contract No. 14-06-200-5075 (1956 Contract). Reclamation proposes that this renewal and extension be on the same terms as the June 5, 1997, temporary modification to the 1956 Contract, which by this reference is incorporated herein, except that it will now relate to the 1999 Plan (in its draft form until superseded by the final version) rather than the 1997 Operations Plan. This renewal and extension shall remain in effect until midnight of March 31, 2000, at which time it will expire automatically without action by either party.

If you wish to renew the temporary modification to the 1956 Contract, please sign both counterparts of this letter and return one original to Mr. James Bryant at the Klamath Basin Area Office, 6600 Washburn Way, Klamath Falls, Oregon 97603. You may retain the other original for your files.

Sincerely,

Kirk C. Rodgers
Acting Regional Director

In Duplicate

PacifiCorp

By

Date

5/28/99



United States Department of the Interior

BUREAU OF RECLAMATION
Mid-Pacific Regional Office
2800 Cottage Way
Sacramento, California 95825-1898

IN REPLY
REFER TO:

KO - 400
PRJ - 13.00

MAY 22 2000

Mr. Randy Landolt
Managing Director, Hydro Resources
PacifiCorp
825 NE Multnomah
Suite 550
Portland, Oregon 97232

Subject: Continuation of Temporary Modification of Contract No. 14-06-200-5075
(Dated June 5, 1997)

Dear Mr. Landolt:

On April 26, 2000, Bureau of Reclamation (Reclamation) completed the 2000 Operations Plan (2000 Plan). Reclamation and PacifiCorp have agreed to renew and extend the June 5, 1997, temporary modification to Contract No. 14-06-200-5075 (1956 Contract). Reclamation proposes that this renewal and extension will be on the same terms as the incorporated herein, except that it will now relate to the 2000 Plan rather than the 1997 Operations Plan. This renewal and extension shall remain in effect until midnight of March 31, 2001, at which time it will expire automatically without action by either party.

If you wish to renew the temporary modification to the 1956 Contract; please sign both counterparts of this letter and return one original to Mr. James Bryant at the Klamath Basin Area Office, 6600 Washburn Way, Klamath Falls, Oregon 97603. You may retain the other original for your files.

Sincerely,

Kirk C. Rodgers
Deputy Regional Director

In Duplicate

PacifiCorp

by Randy A. Landolt

Date 5/31/00



March 26, 2001

Mr. Karl Wirkus
U.S. Bureau of Reclamation
6600 Washburn Way
Klamath Falls, OR 97603

Re: Renewal of Modification to the 1956 Contract between Reclamation and PacifiCorp's Predecessor, COPCO.

Dear Mr. Wirkus:

As you know, on May 31, 2000 PacifiCorp and Reclamation executed a renewal of the 1997 modification to the 1956 contract between Reclamation and PacifiCorp's predecessor, COPCO. By its terms, that renewal expires on March 31, 2001.

PacifiCorp expects to enter into another renewal this year. However, this year we believe it would be prudent to await resolution and finalization of the U.S. Fish & Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS) biological opinions on Reclamation's project operations. The results of the USFWS biological opinion in particular may have implications for PacifiCorp's ability to implement Reclamation's operations plans.

As we discuss this over the coming weeks, please be aware that PacifiCorp will need written, interim direction from Reclamation for the period from April 1, 2001 until the execution of this year's renewal of the 1997 modification. Please provide your directions as soon as possible.

Sincerely,

Randy Landolt
Director, Hydro Resources

cc:
T. Olson, PacifiCorp
M. Smith, PacifiCorp



United States Department of the Interior

BUREAU OF RECLAMATION
Mid-Pacific Regional Office
2800 Cottage Way
Sacramento, California 95825-1898

IN REPLY
REFER TO:

KO - 400
PRJ-13.00

AUG 08 2001

Mr. Randy Landolt
Managing Director, Hydro Resources
PacifiCorp
825 NE Multnomah, Suite 550
Portland, Oregon 97232

Subject: Continuation of Temporary Modification of Contract No. 14-06-200-5075 (Dated June 5, 1997)

Dear Mr. Landolt:

On April 6, 2001, Reclamation completed the 2001 Operations Plan (2001 Plan). Reclamation and PacifiCorp have agreed to renew and extend the June 5, 1997, temporary modification to Contract No. 14-06-200-5075 (1956 Contract). Reclamation proposes that this renewal and extension will be on the same terms as the incorporated herein, except that it will now relate to the 2001 Plan rather than the 1997 Operations Plan. This renewal and extension shall remain in effect until midnight of March 31, 2002, at which time it will expire automatically without action by either party.

If you wish to renew the temporary modification to the 1956 Contract, please sign both counterparts of this letter and return one original to James Bryant at the Klamath Basin Area Office, 6600 Washburn Way, Klamath Falls, Oregon 97603. You may retain the other original for your files.

Sincerely,

Kirk C. Rodgers
Acting Regional Director

In Duplicate

PacifiCorp

8/14/01
Date

825 N. E. Multnomah, Suite 1500
Portland, Oregon 97232
(503) 813-5000



March 28, 2002

Mr. Dave Sabo
U.S. Bureau of Reclamation
Klamath Basin Area Office
6600 Washburn Way
Klamath Falls, OR 97603

Subject: Continuation of Temporary Modification of Contract No. 14-06-200-5075 (Date June 5, 1997)

Dear Mr. Sabo,


On August 14, 2001 PacifiCorp renewed and extended the June 5, 1997 temporary modification to Contract No. 14-06-200-5075 (1956 Contract with Bureau of Reclamation). The renewal and extension was to remain in place until midnight of March 31, 2002 at which time it would automatically expire. The understanding was that by that date, Reclamation would have a new 2002 Operations Plan for the Klamath Irrigation Project in place and the 1997 temporary modification could be extended for another period of time.

In the absence of Reclamation's 2002 Operation Plan, PacifiCorp will continue to operate the Klamath Hydroelectric Project according to the 1997 modification until a 2002 plan is available. PacifiCorp will be responsible for daily operation and maintenance procedures at Link River Dam and will provide power to the irrigation loads designated in the 1956 Contract at identified prices, and Reclamation will have discretionary responsibility for specifying Klamath River flows and Upper Klamath Lake elevations. We anticipate signing another letter of agreement similar to past years with Reclamation once Reclamation's 2002 Operations Plan for the Klamath Irrigation Project is in place.

As you are aware, on March 15, 2002, PacifiCorp filed a 60-day notice of intent to sue the U.S. Fish and Wildlife Service under the Endangered Species Act. PacifiCorp views the 60-day notice as a necessary mechanism to support our continued cooperation and operation under the 1996 Biological Opinion. We also believe that continuing to implement our obligations under the 1996 BO is consistent with Reclamation's 2002 Biological Assessment that specifically excludes PacifiCorp's 1996 consultation.

PacifiCorp looks forward to continuing our close cooperation of water management in the Klamath basin.

Sincerely,



Randy Landolt
Managing Director, Hydro Resources

cc:

Jim Bryant – USBR Klamath Falls, OR

Bc:

Todd Olson

Dan Bevan

Doug Bornemeier

Mark Smith

Dennis Driessen

Peter Mostow – Stoel Rives

File:



IN REPLY
REFER TO:

UNITED STATES
DEPARTMENT OF THE INTERIOR

BUREAU OF RECLAMATION
Region 2
Klamath Project
P. O. Box R
Klamath Falls, Oregon 97601

APPENDIX B - Ken Contract with
Reclamation for the Operation of
Keno Dam

January 16, 1968

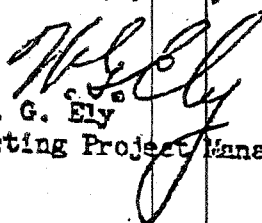
Pacific Power & Light Company
Public Service Building
Portland, Oregon

Attention: Mr. E. Robert deLuccia
Senior Vice President

Gentlemen:

Enclosed are two bound copies of "Contract between the United States
and Pacific Power & Light Company for Keno Development Pursuant to
Klamath River Project No. 2082 as Amended," executed by Regional
Director R. J. Pafford, Jr., for your use.

Sincerely yours,


W. G. Ely
Acting Project Manager

Encl. in dupl.

copied for Messrs. Jackson, Frisbee, McKee, Beard, Spicer,
Hurlbut, Millay, Stiles*, Alspaugh*, Lisbakken (6)*, Hadberg*,
Rives/H. Smith*

*w/encl.

(signed contracts sent to Central File)

with
1811

R.O. Draft 3/22-1967
Rev. R.O. 7/6-1967

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
Klamath Project, Oregon-California

Contract No.
14-06-200-3579A

CONTRACT BETWEEN THE UNITED STATES OF AMERICA AND PACIFIC
POWER & LIGHT COMPANY FOR KENO DEVELOPMENT PURSUANT
TO KLAMATH RIVER PROJECT NO. 2082 AS AMENDED

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1 UNITED STATES
2 DEPARTMENT OF THE INTERIOR
3 BUREAU OF RECLAMATION
4 Klamath Project, Oregon-California

Contract No.
14-06-200-3579A

5 CONTRACT BETWEEN THE UNITED STATES OF AMERICA AND PACIFIC
6 POWER & LIGHT COMPANY FOR KENO DEVELOPMENT PURSUANT
7 TO KLAMATH RIVER PROJECT NO. 2082 AS AMENDED

8 THIS CONTRACT, made this 4th day of January, 1968,
9 in pursuance generally of the Act of June 17, 1902 (32 Stat. 388),
10 and acts amendatory thereof or supplementary thereto, between THE
11 UNITED STATES OF AMERICA, hereinafter referred to as the United States,
12 represented by the Regional Director, Region 2, Bureau of Reclamation,
13 hereinafter referred to as the Contracting Officer, or his successor,
14 and the PACIFIC POWER & LIGHT COMPANY, hereinafter referred to as the
15 Company, a corporation organized under the laws of the State of Maine,

16 WITNESSETH, That:

17 EXPLANATORY RECITALS

18 WHEREAS, the parties hereto entered into a contract on
19 June 23, 1930, as amended June 30, 1931, granting the Company certain
20 rights upon public land acquired by the United States in connection
21 with the reclamation development of the Klamath Project of the
22 United States; and

23 WHEREAS, pursuant to the above contract, the Company has
constructed at approximately Mile 235.8 in the Klamath River at Keno
a needle-type dam for regulatory purposes; and

1 WHEREAS, the Company proposes to construct the Keno Development
2 consisting as a first stage of removal of the existing needle-type dam,
3 construction of a new diversion dam at approximately Mile 235, channel
4 improvements upstream from said dam, and as a second stage construction
5 of power facilities, all as proposed in the application for amendment
6 of License for Project No. 2082 made March 29, 1965, before the Federal
7 Power Commission; and

8 WHEREAS, the Federal Power Commission on November 29, 1965,
9 issued an Order Further Amending License for Klamath River Project
10 No. 2082, and said Order provides in Article 55 thereof:

11 "Article 55. The Licensee shall enter into a formal
12 agreement with the United States Bureau of Reclamation for
13 the purpose of regulating the level of Lake Ewauna and the
14 Klamath River between Keno Dam and Lake Ewauna, and in the
15 event that the Licensee and the Bureau fail to reach agree-
16 ment, the Commission will prescribe the terms of such
17 regulation after notice and opportunity for hearing.";

18 and

19 WHEREAS, this contract is entered into under said Article 55
20 and shall not be construed to affect the obligations of the Company
21 under any other provision of the License not related to Article 55; and

1 OPERATION OF DIVERSION DAM FOR REGULATION OF WATER LEVELS

2 2. (a) When the United States is diverting water from the
3 Klamath River for uses within the Klamath Project, the Company will
4 operate the diversion dam so that the upstream water level will not
5 be below the minimum normal objective operating height of
6 elevation 4085.0, Bureau of Reclamation datum, at or near the location
7 of the present Highway No. 66 bridge at Keno, Oregon, unless the flow
8 in the Klamath River at the diversion dam equals or exceeds six
9 thousand (6,000) cubic feet per second.

10 (b) The Company shall operate the diversion dam when
11 desired by the United States to provide for the discharge of three
12 thousand (3,000) cubic feet per second from the Lost River Diversion
13 Channel and three hundred (300) cubic feet per second from the
14 Klamath Straits Drain at all times when the flow from Link River
15 is at or below ten thousand (10,000) cubic feet per second. When
16 flow from Link River exceeds ten thousand (10,000) cubic feet per
17 second, the parties shall cooperate in operating their facilities
18 in order to minimize loss and damage to the area. The United States
19 may increase its inflow to the Klamath River at or downstream from
20 the Klamath Straits Drain from three hundred (300) cubic feet per
21 second to one thousand (1,000) cubic feet per second when the flow
22 from Link River is at or below nine thousand three hundred (9,300)

1 cubic feet per second. The United States will limit its discharges
 2 in accordance with the foregoing except when, and to the extent
 3 that, a greater discharge, together with the Company's planned
 4 discharge from Link River and other inflow (with the gates at the
 5 diversion dam adjusted to accommodate the total planned flow)
 6 will not raise the water level above elevation 4086.5 (Bureau of
 7 Reclamation datum) in the upper portion of Lake Ewauna.

8 (c) The Company and the United States will exchange
 9 information on recorded and estimated flows, will agree on criteria
 10 for operations affecting the other party and will notify the other
 11 party of proposed operations affecting the other party. Operating
 12 personnel of the respective parties will make appropriate arrange-
 13 ments for the foregoing.

14 (d) Elevations referred to in subdivisions (a) and (b)
 15 of this article are given on Bureau of Reclamation datum. Primary
 16 control point for such datum is a benchmark consisting of a brass
 17 cap established in 1907 and located on the intake works of "A"
 18 canal near Link River Dam at the outlet of Upper Klamath Lake.
 19 The benchmark is marked elevation 4148.0, which on the Bureau of
 20 Reclamation datum is elevation 4148.650 feet. Secondary benchmarks
 21 (the primary benchmark to control in case of question) used to
 22 establish elevations referred to in subdivisions (a) and (b) of
 23 this article are:

1 (i) Lake Ewauna: Benchmark L-74 (OSHD), set in
2 1931 on the southwest corner of Main Street Link River
3 Bridge. Elevation on Bureau of Reclamation datum is
4 4095.90 feet.

5 (ii) Highway No. 66 bridge: Benchmark #11 (USGS)
6 set in 1905 about 410 feet northeast of Highway 66 bridge
7 across Klamath River at Keno in a rock outcrop. Elevation
8 on Bureau of Reclamation datum is 4111.07 feet.

9 Established gages at Highway 66 bridge and Highway 97 by-pass
10 bridge crossing the Link River (the latter to determine elevation
11 of upper portion of Lake Ewauna) will be used for operations under
12 this contract, and elevations established by reading of such gages
13 shall be conclusive on all parties as to any matter hereunder. In
14 case of question as to setting of such gages for future operations,
15 the question will be resolved by reference to the primary benchmark.
16 Gages other than those specified above may be used for operations
17 under this contract provided that adequate correlation is established
18 in advance and agreed to by both parties from the gage to the control
19 point location specified in subdivisions (a) and (b) of this article.
20 Upon the establishment of such alternate gages, elevations established
21 by such gages shall be conclusive and the gages may be reset as
22 provided above for the existing gages.

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UNITED STATES TO BE HELD HARMLESS

3. The Company shall reimburse the United States for damage to its property resulting from, and shall hold the United States harmless from all claims for damage caused by reason of, water levels in Klamath River and Lost River Diversion Channel other than would have obtained had the new diversion dam not been built or the then existing channel improvements made by the Company not been made.

SUCCESSORS AND ASSIGNS OBLIGATED

4. The provisions of this contract shall apply to and bind the successors and assigns of the parties hereto.

OFFICIALS NOT TO BENEFIT

5. No Member of or Delegate to Congress or Resident Commissioner shall be admitted to any share or part of this contract or to any benefit that may arise herefrom, but this restriction shall not be construed to extend to this contract if made with a corporation or company for its general benefit.

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IN WITNESS WHEREOF, the parties hereto have executed
this contract the day and year first above written.

THE UNITED STATES OF AMERICA

By *R. J. Paddock*
Regional Director, Region 2
Bureau of Reclamation

PACIFIC POWER & LIGHT COMPANY,

(SEAL)

By *S. M. De Lucia*
Vice President *AB*

ATTEST:

Secretary

PACIFIC POWER & LIGHT COMPANY

Certified Copy of Resolution

I, M. E. Thompson, a duly elected and acting Assistant Secretary of Pacific Power & Light Company, a corporation of the State of Maine, HEREBY CERTIFY that the following is a full and true copy of a certain resolution which was duly adopted by its board of directors, at a meeting thereof duly held on September 13, 1967, namely:

RESOLVED, that the President or a Vice-President and the Secretary or an Assistant Secretary of Pacific Power & Light Company be authorized, and each of them is hereby authorized, in the name of and on behalf of the Company to enter into and execute a contract between the United States of America, Department of Interior, Bureau of Reclamation and Pacific Power & Light Company referring to the operation of the Keno Development portion of FPC Project No. 2082 substantially in the form set out in the draft identified R.O. Draft 3/22-1967, REV R.O. 7/6-1967.

I FURTHER CERTIFY that said resolution has not been rescinded or modified, and is now in full force and effect as set forth above.

WITNESS my hand and the seal of Pacific Power & Light Company this 18th day of September, 1967.

M. E. Thompson
Assistant Secretary

(Seal)

20

Mr. R. J. Pafford, Jr.
Regional Director, Region 2
United States Department of Interior
Bureau of Reclamation, Region 2
Sacramento, California 95825

Dear Mr. Pafford:

In accordance with the provisions of Article 1 of the "Contract Between the United States of America and Pacific Power & Light Company for the Klamath River Project No. 2082 as Amended", Contract No. 14-06-200-3579A, Pacific Power & Light Company hereby gives notice that the portion of the Keno Development which includes the new diversion dam at Mile 235 and planned channel improvements is sufficiently completed to permit regulating the Klamath River (Lake Ewauna to Keno) as provided in said contract.

Accordingly the effective date of such contract, as provided in Article 1 thereof, is the date of this letter.

Yours very truly,

PACIFIC POWER & LIGHT COMPANY

By [Signature]
Senior Vice President

Dated: January 29, 1972

cc: Mr. C. D. Lawrence, Project Manager
Bureau of Reclamation, Klamath Project
P. O. Box R
Klamath Falls, Oregon 97601

JHS
[Signature]
A.E.G.