

TABLE 1: PROJECT FEATURES SUMMARY
MIDDLE FORK AMERICAN RIVER HYDROELECTRIC PROJECT

Facility Titles: FERC Name (Common Name)

DUNCAN CREEK DIVERSION	
DAM	
Type	Gravity
Material	Concrete
Height of Dam Crest above Streambed	32 Ft.
Dam Crest Length	165 Ft.
Volume	1,750 cubic yards
Elevation of Dam Crest	5,275 Ft.
Elevation of Streambed	5,243 Ft.
Elevation of Spillway Crest	5,265 Ft.
Stream Maintenance Pipe Capacity	8 cfs
SPILLWAY	
Type	Uncontrolled Overflow
Width	100 Ft.
Capacity	7,200 cfs
RESERVOIR	
Gross Storage	20 AF

DUNCAN CREEK – MIDDLE FORK TUNNEL	
Nominal Size and Shape	9'-0" W x 10'-0" H / Horseshoe
Length:	
Total	7,864 Ft. or 1.5 miles
Concrete Lined (Est.)	300 Ft.
Maximum Diversion Capacity	400 cfs
Invert Gradient	0.0029

FRENCH MEADOWS DAM (L.L. ANDERSON DAM) AND FRENCH MEADOWS RESERVOIR	
DAM	
Type	Composite
Material	Gravel & Earthfill
Height of Dam Crest above Streambed	231 Ft.
Dam Crest Length	2,700 Ft.
Dam Crest Width	32 Ft.
Elevation of Dam Crest	5,273 Ft.
Elevation of Streambed	5,040 Ft.
Elevation of Spillway Crest	5,244.5 Ft.
Volume	3,510,000 cubic yards
Slopes – Upstream	2:1
Downstream	1.8:1 & 2.0:1
Stream Maintenance Pipe Capacity	8 cfs
Maximum Low Level Outlet Capacity @ Water Surface 5262 (full reservoir)	1,430 cfs
SPILLWAY	
Type	Gated Ogee Crest
Type of Gates	Radial
Number of Gates	2
Size of Gates	20' W x 18.5' H
Capacity (Res. Water Surface 5271.0, 2' freeboard)	19,800 cfs
RESERVOIR	
Maximum Operating Water Surface	5,262.0 Ft.
Minimum Operating Water Surface	5,125 Ft.
Gross Storage	134,993 AF

**PROJECT FEATURES SUMMARY
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Dead Storage (as constructed), at Tunnel Intake lip	7,635 AF
Active Storage (as constructed)	127,358 AF
Area at Maximum Operating Water Surface	1,408 Acres
Area at Minimum Operating Water Surface	434 Acres
Depth at Minimum Operating Water Surface	77 Ft.
Shoreline at Maximum Operating Water Surface	9 Miles

FRENCH MEADOWS — HELL HOLE TUNNEL	
Nominal Size and Shape	12'-4" Horseshoe
Length:	
Total	13,694 Ft. or 2.6 miles
Concrete Lined (Est.)	1,617 Ft.
Steel Lined (Est.)	317 Ft.
Maximum Discharge	400 cfs
Invert Gradient	0.0025

FRENCH MEADOWS POWERHOUSE	
PENSTOCK	
Length	691 Ft. or 0.1 miles
Diameter	6'-3" O.D.
POWER PLANT	
Installed Capacity, Generator	15,300 KW
Type of Turbine	Francis
Maximum Tail Water Surface	4,630 Ft.
Minimum Tail Water Surface	4,608 Ft.
Maximum Static Head	654 Ft.
Minimum Static Head	517 Ft.
Elevation Runner	4,612 Ft.
R.P.M.	450

HELL HOLE DAM AND RESERVOIR	
DAM	
Type	Rockfill with impervious earth core
Height of Dam Crest above Streambed	410 Ft.
Dam Crest Length	1,570 Ft.
Dam Crest Width	35 Ft.
Elevation of Dam Crest	4,650 Ft.
Elevation of Streambed	4,240 Ft.
Volume	8,440,000 cubic yards
Slopes - Upstream	2.5:1
Downstream	1.4:1
Stream Maintenance Pipe Capacity	20 cfs
Maximum Low Level Outlet Capacity @ water surface 4,630 (full reservoir)	852 cfs
SPILLWAY	
Type	Uncontrolled
Elevation of Spillway Crest	4,630 Ft.
Width at Lip	350 Ft.
Capacity (Water Surface 4647.1, 2.8' freeboard)	89,500 cfs
RESERVOIR	
Maximum Operating Water Surface	4,630 Ft.
Minimum Operating Water Surface	4,340 Ft.
Gross Storage	207,590 AF
Dead Storage (as constructed), at Tunnel Intake lip	2,533 AF

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Active Storage (as constructed)	205,057 AF
Area at Maximum Operating Water Surface	1,253 Acres
Area at Minimum Operating Water Surface	185 Acres
Depth at Minimum Operating Water Surface	88 Ft.
Shoreline at Maximum Operating Water Surface	11 Miles

HELL HOLE POWERHOUSE	
Installed Capacity, Generator	725 KW
Normal Operating Tail Water Surface	4,240 Ft.
Maximum Static Head	391 Ft.
Minimum Static Head	101 Ft.
R.P.M.	1,200

HELL HOLE — MIDDLE FORK TUNNEL	
Nominal Size and Shape	13'-5" Horseshoe
Length	
Total	55,006 Ft. or 10.4 miles
Concrete Lined (Est.)	6,780 Ft.
Steel Lined (Est.)	5,180 Ft.
Nominal Maximum Discharge, at full reservoir	920 cfs
Invert Gradient	0.0035 & 0.0077

NORTH FORK LONG CANYON DIVERSION	
DAM	
Type	Gravity
Material	Concrete
Height of Dam above Streambed	10 Ft.
Dam Crest Length	120 Ft.+
Elevation of Dam Crest	4,720 Ft.
Elevation of Streambed	4,710 Ft.
Volume	636 cubic yards
Stream Maintenance Pipe Capacity	2 cfs
SPILLWAY	
Type	Uncontrolled Overflow
Elevation of Spillway Crest	4,716 Ft.
Width of Spillway Crest	95 Ft.
Capacity	3,000 cfs

PIPE AND SHAFT TO HELL HOLE MIDDLE FORK TUNNEL	
PIPE	
Diameter	36 In.
Length	3,530 Ft. or 0.7 miles
SHAFT	
Diameter	6 Ft.
Length without 6' x 20 Ft. Standpipe	403 Ft. or 0.08 miles
Capacity	100 cfs
Invert Gradient	Vertical

SOUTH FORK LONG CANYON DIVERSION	
DAM	
Type	Gravity
Material	Concrete
Height of Dam Crest above Streambed	27 Ft.
Dam Crest Length	145 Ft.

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Elevation of Dam Crest	4,650 Ft.
Elevation of Streambed	4,623 Ft.
Volume	1,341 cubic yards
Stream Maintenance Pipe Capacity	5 cfs
SPILLWAY	
Type	Uncontrolled Overflow
Width of Spillway Crest	60 Ft.
Elevation of Spillway Crest	4,640 Ft.
Capacity	4,000 cfs

SHAFT TO HELL HOLE - MIDDLE FORK TUNNEL	
Diameter	6 Ft.
Length without 6' x 20 Ft. Standpipe	387 Ft. or 0.07 miles
Capacity	200 cfs
Invert Gradient	Vertical

MIDDLE FORK POWERHOUSE (L.J. STEPHENSON POWERHOUSE)	
PENSTOCK	
Length	3,653 Ft. or 0.7 miles
Diameter: Above Bifurcation	9'-0" O.D. to 7'-6" O.D.
Below Bifurcation	5'-6" O.D.
POWERPLANT	
Number of Units	2
Generator Installed Capacity (Total)	122,400 KW
Type of Turbine	Impulse
Elevation Nozzles	2,536 Ft.
Elevation Normal Tail Water Surface	2,529 Ft.
Maximum Static Head	2,096 Ft.
Minimum Static Head	1,806 Ft.
R. P. M.	400

MIDDLE FORK INTERBAY	
DAM	
Type	Gravity
Material	Concrete
Height of Dam Crest above Streambed	70.5 Ft.
Dam Crest Length	233 Ft.
Elevation of Dam Crest	2,535.5 Ft.
Elevation of Streambed	2,465 Ft.
Volume	14,360 cubic yards
Stream Maintenance Pipe Capacity	23 cfs
Low level Outlet Capacity @ water surface 2530.0 (full reservoir)	890 cfs
Roadway Width, curb to curb	14 Ft.
Elevation of Roadway	2,537.67 Ft.
SPILLWAY	
Type	Gated Ogee Crest
Capacity (Water Surface 2534)	36,506 cfs
Width of Spillway	80 Ft. Gated, 60 Ft. Uncontrolled
Number of Gates	4
Type of Gates	Radial
Size of Gates	20' H x 20' W
Elevation of Top of Gates	2,530 Ft.
Elevation of Sill of Gates	2,510 Ft.

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RESERVOIR	
Maximum Operating Water Surface	2,529 Ft.
Minimum Operating Water Surface	2,502 Ft.
Normal Operating Water Surface	2,527 Ft.
Gross Storage	175 AF
Dead Storage (as constructed), at Tunnel Intake lip	2 AF
Active Storage (as constructed)	173 AF
Area at Maximum Operating Water Surface	7 Acres
Area at Minimum Operating Water Surface	3 Acres
Depth at Minimum Operating Water Surface	37 Ft.

MIDDLE FORK — RALSTON TUNNEL	
Nominal Size and Shape	13'-5" Horseshoe
Length	
Total	35,397 Ft. or 6.7 miles
Concrete Lined (Est.)	8,245 Ft.
Steel Lined (Est.)	245 Ft.
Maximum Discharge	836 cfs
Invert Gradient	0.0054

RALSTON POWERHOUSE	
PENSTOCK	
Length	1,670 Ft.
Diameter	9'-6" O.D. to 8'-0" O.D.
POWERPLANT	
Installed Capacity, Generator	79,200 KW
Type of Turbine	Impulse
Elevation Nozzles	1,186 Ft.
Static Head	1,344 Ft.
Maximum flow	924 cfs
R. P. M.	240

RALSTON-OXBOW TUNNEL	
Nominal Size and Shape	13'-3" Horseshoe
Length:	
Total	403 Ft. or 0.08 miles
Concrete Lined	343 Ft.
Steel Lined	60 Ft.
Maximum Discharge	1,088 cfs
Invert Gradient	0.12035

OXBOW POWERHOUSE	
PENSTOCK	
Length	5 Ft.
Diameter	9'-0" I.D.
POWERPLANT	
Installed Capacity, Generator	6,100 KW
Type of Turbine	Francis
Elevation Runner	1,098.5 Ft.
Static Head	90 Ft.
Normal Tail Water Surface	1,089 Ft.
Maximum flow	1,025 cfs
R. P. M.	200

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RALSTON AFTERBAY	
DAM	
Type	Gravity
Material	Concrete
Height of Dam Crest above Streambed	89 Ft.
Dam Crest Length	560 Ft.
Volume	76,300 cubic yards
Elevation of Dam Crest	1,189 Ft.
Elevation of Streambed	1,100 Ft.
Streamflow Maintenance Pipe Capacity	155 cfs
Maximum Low Level Outlet Capacity @ water surface el. 1179.0 (full reservoir) - calculated	1,132 cfs
Roadway Width, Curb to Curb	12 Ft.
Elevation of Roadway	1,188.42 Ft.
SPILLWAY	
Type	Gated Ogee Crest
Capacity @ Water Surface 1186	171,200 cfs
Elevation of Top of Gates	1,179 Ft.
Elevation of Sill of Gates	1,149 Ft.
Crest Length	232 Ft.
Number of Gates	5
Type of Gates	Radial
Size of Gates	30' H x 40' W
RESERVOIR	
Gross Storage	2,782 AF

SUMMARY – PROJECT FEATURES	
Power and Energy Production	
Total Installed Capacity (at 0.9 power factor)	223,750 Kilowatts
Total Dependable Capacity (at 0.9 power factor)	210,100 Kilowatts
Average Annual Energy Production (Based on 38 years of operation: 1967-2004)	1,026,975,000 Kilowatt Hours
Maximum Total Static Head	4,162
Water Supply and Regulation	
Total Gross Storage	345,560 Acre Feet
Project Features	
Earth and Rockfill Dams	11,900,000 Cubic yards
Concrete Dams and Diversions	94,000 Cubic yards
Tunnels and Penstocks	23.2 miles
Project Completed – 1967	