RECLAMATION

Managing Water in the West

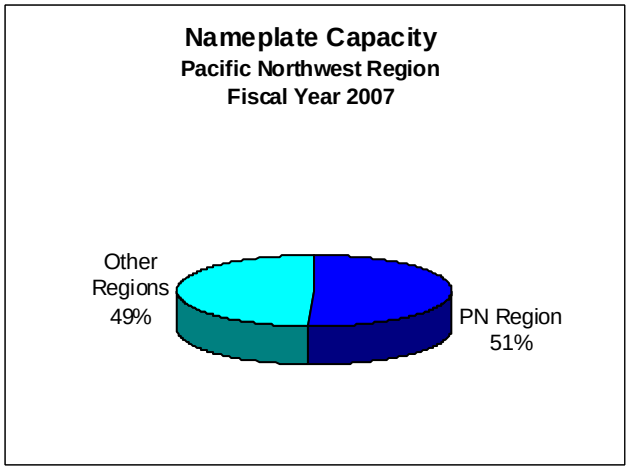
Pacific Northwest Region Power Performance

For Fiscal Year 2007

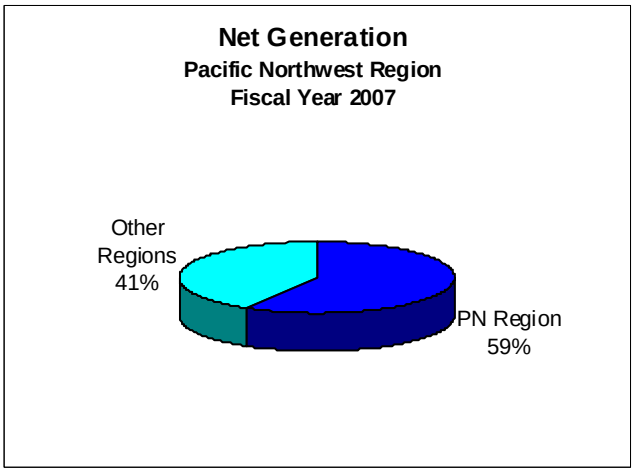
U.S. Department of the Interior
Bureau of Reclamation

Pacific Northwest Regional Power Overview

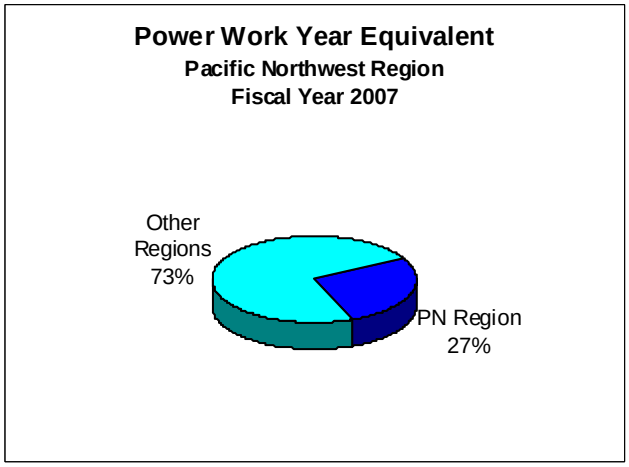
The Pacific Northwest Regional Office is located in Boise, Idaho. The regional office oversees the operation of ten powerplants: Anderson Ranch, Black Canyon, Boise River Diversion, Chandler, Grand Coulee, Green Springs, Hungry Horse, Minidoka, Palisades, and Roza.



The total capacity for this region is 7,537 megawatts, which comprises 51 percent of Reclamation's total capacity.



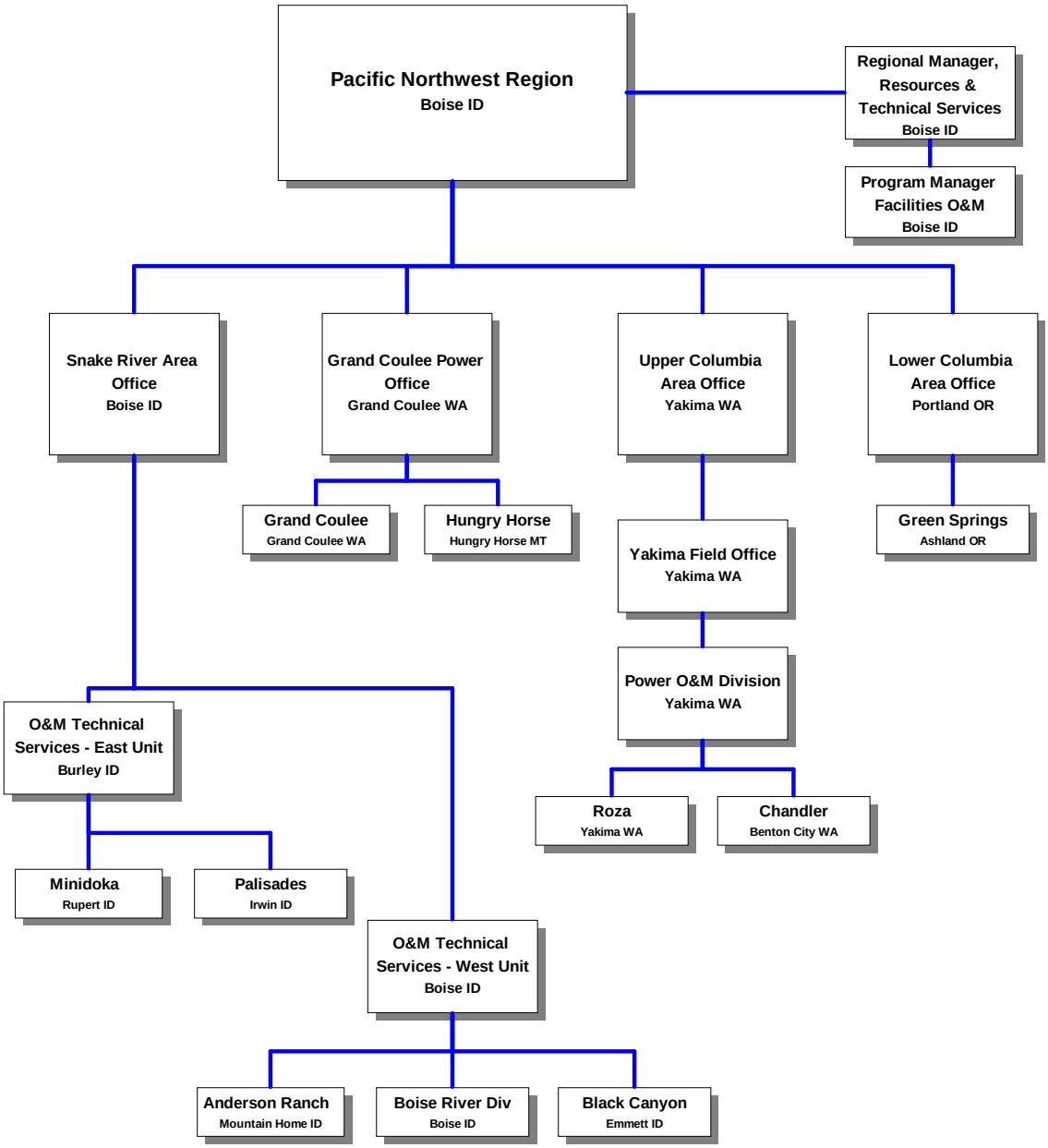
In 2007, this region produced 23,754 net gigawatt-hour. This comprises 54 percent of the total net generation for Reclamation in 2007.



In 2007, this region consisted of 28 percent of the total work year equivalents charged to power facilities.

Of the 10 facilities located in this region, only 1 has no personnel stationed on site. In addition, Reclamation operates and maintains two powerplants, Elwha and Glines Canyon, for the National Park Service.

Organizational structure:



This organizational structure displays the offices directly involved with the power program.

Regional Office:

Bureau of Reclamation
Pacific Northwest Regional Office
1150 North Curtis Road, Suite 100
Boise ID 83706-1234

J. William McDonald, Regional Director
PN-1000
(208) 378-5012

Facilities Operation and Maintenance Group:	Terry Kent, PN-3200 Program Manager (208)-378-5290 Bob Ross, PN-3248 (208) 378-52332 Bent Mouritsen, PN-3246 (208) 378-5117 Ben Cano, PN-3244 (208) 378-5296
Grand Coulee Power Office:	Bureau of Reclamation Grand Coulee Power Office Grand Coulee Dam, PO Box 620 Grand Coulee WA 99133-0620 David Murillo Power Manager, GC-1000 (509) 633-9501
Hungry Horse Field Station:	Bureau of Reclamation Hungry Horse Field Station Hungry Horse Powerplant Hungry Horse MT 59919 Dennis Philmon, HH-3000 (406) 387-5241, ext. 313
Snake River Area Office - West:	Bureau of Reclamation Snake River Area Office - West 230 Collins Road Boise ID 83702-4520 Jerrold D. Gregg Area Manager, SRA-1000 (208) 383-2246 Coleman Smith, SRA 3100 O&M Manager – West (208) 383-2266

Snake River Area Office - East:	Bureau of Reclamation Snake River Area Office - East 1359 Hansen Avenue Burley ID 83318-1821 Jerrold D. Gregg Area Manager, SRA-1000 (208) 383-2246 Larry Hieb, SRA 3300 O&M Manager – East (208) 378-0461, ext. 20
Upper Columbia Area Office:	Bureau of Reclamation Upper Columbia Area Office PO Box 1749 Yakima WA 98907-1749 Jerry Kelso Area Manager, UCA-1000 (509) 454-5624 ext. 202 Dawn Wiedmeier, YAK-5000 Manager, Yakima Field Office (509) 575-5848, ext. 213
Lower Columbia Area Office:	Bureau of Reclamation Lower Columbia Area Office 825 NE Multomah, Suite 1110 Portland OR 97232-2135 Ronald Eggers Area Manager, LCO-1000 (503) 872-2795

Grand Coulee
Hungry Horse
WASHINGTON
Roza
Chandler
MONTANA
OREGON
Green Springs
IDAHO
Black Canyon
Boise Diversion
Anderson Ranch
Palisades
Minidoka
WYOMING
NEVADA
UTAH
COLORADO
CALIFORNIA
NEW MEXICO
ARIZONA

Anderson Ranch Powerplant
Boise Project

Plant Contact:
Denny Johnson
Power Plant Maintenance Supervisor

Plant Address:
Anderson Ranch Powerplant
20465 NE South Fork Rd
Mountain Home ID 83647

Telephone Numbers:
Phone: (208) 587-4051
Fax: (208) 587-4078

E-Mail Address:
djohnson@pn.usbr.gov

Reclamation Region: Pacific Northwest Region

NERC Region: Western Electricity Coordinating Council, Northwest Power Pool Area

PMA Service Area: Bonneville Power Administration, Southern Idaho Power System

Project Authorization: Construction of the original Boise Project was authorized on March 27, 1905. The Secretary of the Interior authorized Anderson Ranch Dam and Reservoir on August 12, 1940, under the Reclamation Project Act of 1939 (53 Stat. 1187).

Project Purposes: The Boise Project furnishes irrigation water to about 225,000 acres of project lands and 165,000 acres under special and Warren Act contracts. The irrigable lands are in southwestern Idaho and eastern Oregon.

The Arrowrock Division consists of 164,680 irrigable acres, with supplemental water to an additional 111,115 acres. Water for the division is stored in Anderson Ranch Reservoir on the South Fork of the Boise River; Arrowrock Reservoir on the Boise River; and in Lake Lowell, an off-stream lake in a large depression. Anderson Ranch Dam, the uppermost storage facility on the Boise system, is located 42 miles upstream from Arrowrock Dam.

Project History: Agricultural activity in the Boise and Payette River Valleys started in the early 1880's when settlers began filing on desert lands under private irrigation enterprises. By 1900, about 148,000 acres had been placed under irrigation. It quickly became evident that storage and distribution systems were needed for a dependable water source to serve the lands at high elevations. In response to petitions by local irrigators, the Boise Project was initiated by the Reclamation Service shortly after the passage of the first Reclamation Act of 1902.

Plant Location: Anderson Ranch Power plant is located in Elmore County, Idaho, on the South Fork of the Boise River about 20 miles northeast of Mountain Home, Idaho.

Plant Facts: Located in a remote area, the powerplant has been remotely operated from the Black Canyon control center since 1984. The dam is 456 feet high (the world′s highest earth fill dam at the time of its completion in 1950), and has a total storage capacity of 493,200 acre-feet. The powerplant originally had a rated capacity of 27,000 kilowatts with two units installed. In 1981, both generators were rewound and modernized to an increased capacity of 20,000 kilowatts each.

Plant Purpose: Anderson Ranch Dam and Powerplant is a multiple-purpose structure that provides benefits in irrigation, power, and flood and silt control. The plant supplies power to irrigation loads in the Boise, Owyhee, and Minidoka Projects as part of Reclamation=s Southern Idaho Power System. Surplus power is delivered to the BPA for marketing and distribution to regional industries and municipalities.

Present Activity: The original power transformers and cables were replaced in Jan-Feb 2001. Station Service air compressors were replaced in 2002. The switchyard oil circuit breakers were replaced in Sept-Oct 2002, completing the modernization of the power plant switchyard. The power plant crane was modernized in April 2001, the fire suppression system replaced in 2004 and Life Safety Code Phase I improvements completed in 2000 and 2003. Generator excitation equipment and electrical transducers were replaced in 2007

Future Planned Activities: Investigation is underway to determine a schedule for overhaul or replacement of the original turbines.

Special Issues: The upper Boise River system is a renowned game trout fishery and has been proposed as critical habitat for bull trout, a threatened species under the Endangered Species Act.

River:	South Fork of Boise River	**Plant Type:**	Conventional
Powerhouse Type:	Above Ground	**Turbine Type:**	Francis
Original nameplate capacity:	27,000 kW	**Installed capacity:**	40,000 kW
Year of initial operation:	1950	**Age:**	57 years
Net Generation (FY-2007):	128.1 GWh	**Rated head:**	329 feet
Average Plant Factor (FY-2007):	36.8 percent	**Remotely Operated:**	Yes
Production Mode:	Intermediate		

Ancillary Services

Anderson Ranch
Ancillary Services

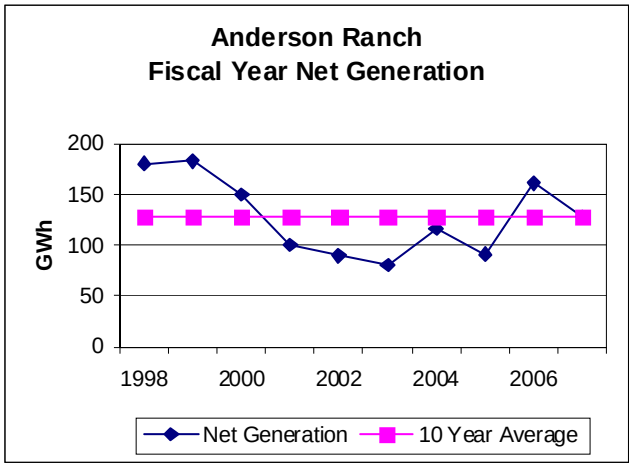
Spinning Reserve	Yes
Non-Spinning Reserve	Yes
Replacement Reserve	Yes
Regulation/Load Following	Yes
Black Start	Yes
Voltage Support	Yes

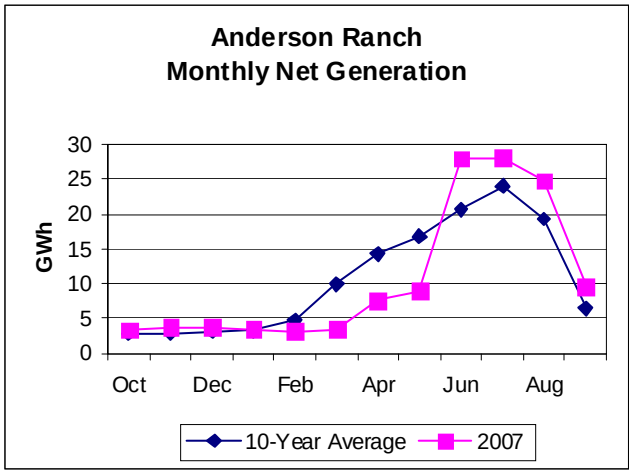
Generators

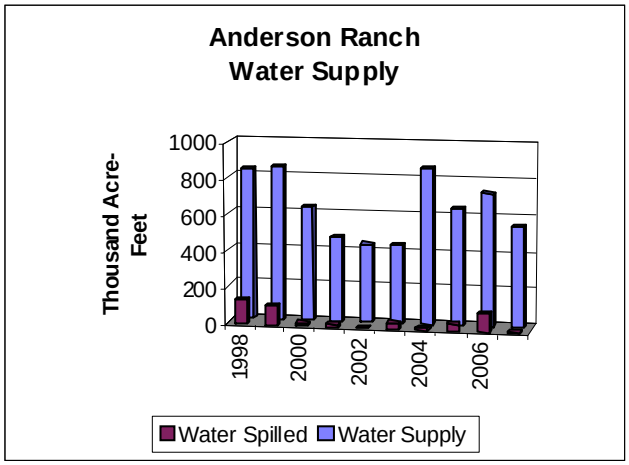
Anderson Ranch Generators
Existing Number and Capacity

Unit #	Original Capacity (kW)	Capacity Increased (kW)	Present Capacity (kW)
1	13,500	6,500	20,000
2	13,500	6,500	20,000
2 Units	27,000	13,000	40,000

Generation

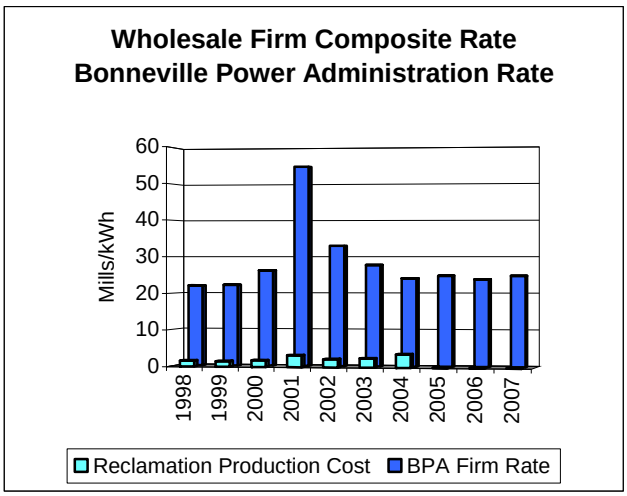

Anderson Ranch
Fiscal Year Net Generation
GWh
200
150
100
50
0
1998
2000
2002
2004
2006
Net Generation
10 Year Average


Anderson Ranch
Monthly Net Generation
GWh
30
25
20
15
10
5
0
Oct
Dec
Feb
Apr
Jun
Aug
10-Year Average
2007

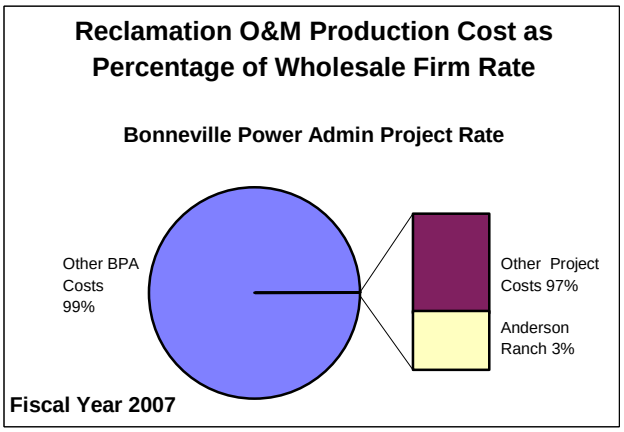

Anderson Ranch
Water Supply
Thousand Acre-Feet
1000
800
600
400
200
0
1998
2000
2002
2004
2006
Water Spilled
Water Supply

Prime Laboratory Benchmarks

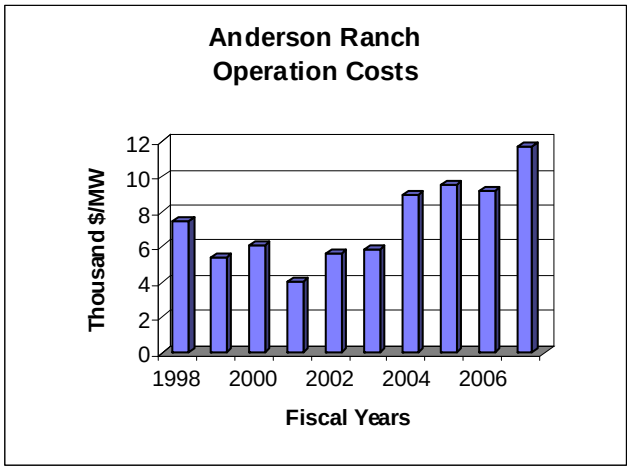
Benchmark 1
Wholesale Firm Rate

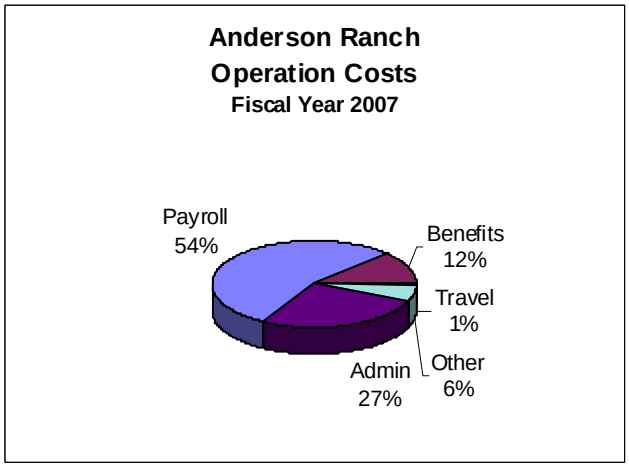


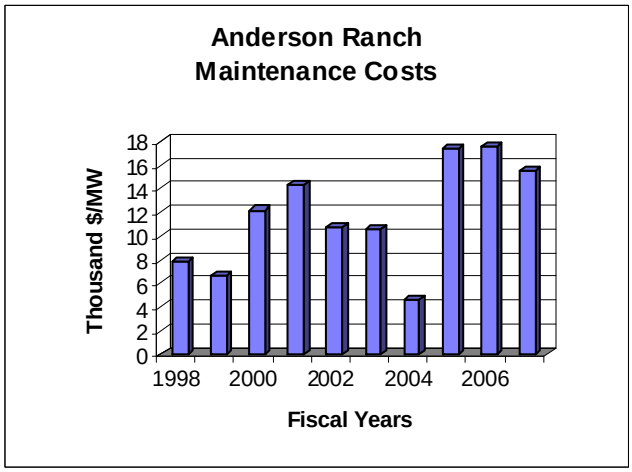
Benchmark 2
Reclamation's Production Cost as Percentage of Wholesale Firm Rate

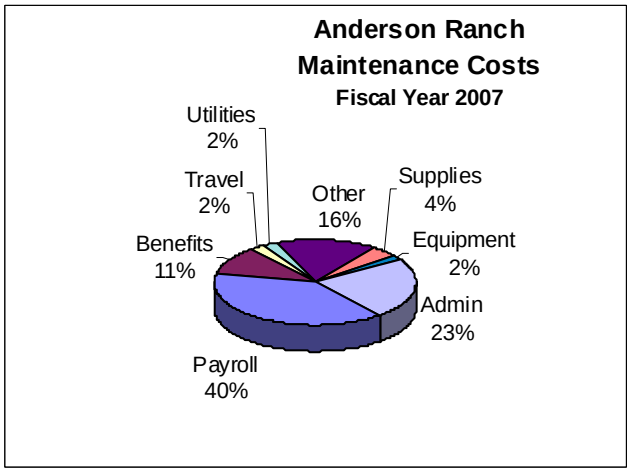


Benchmark 3
Production Cost

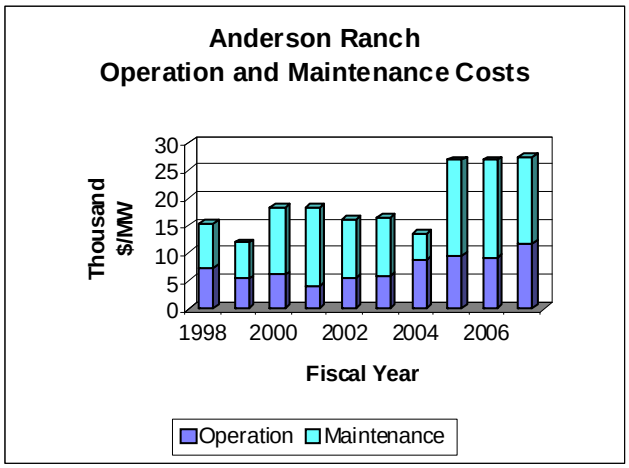


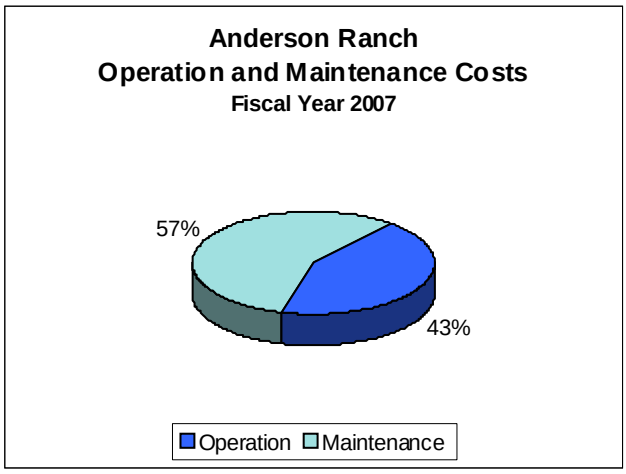


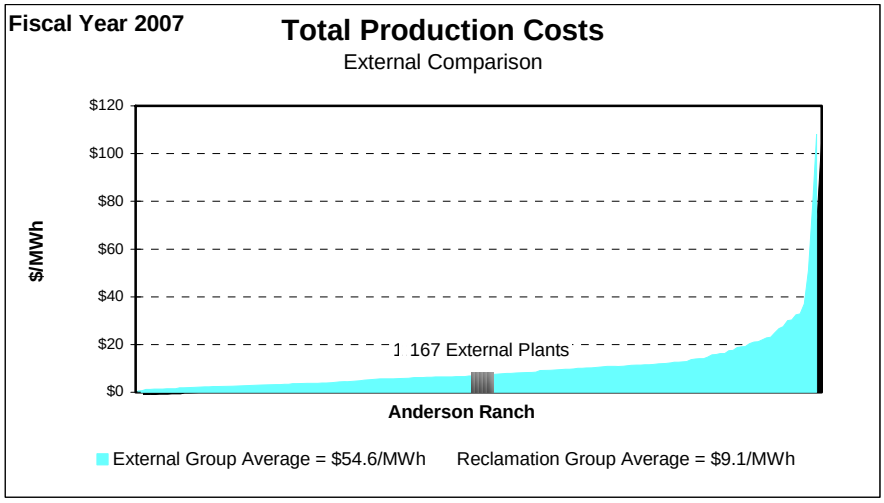


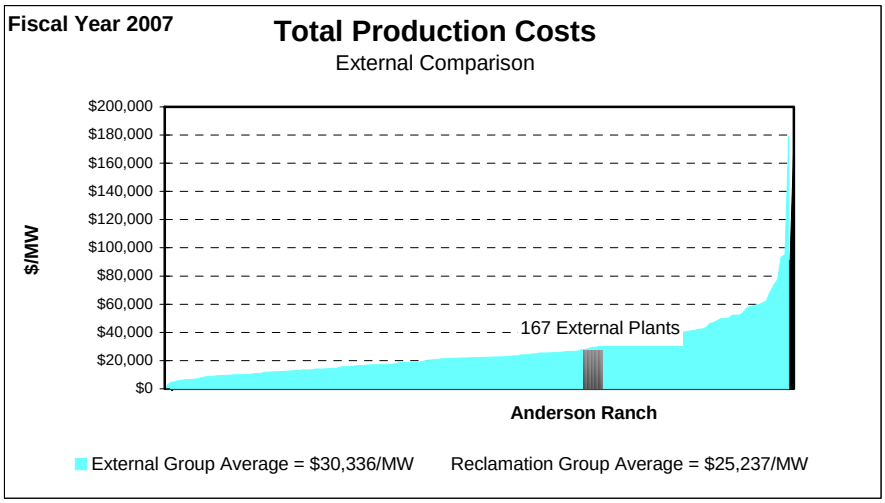


Benchmark 3
Production Costs





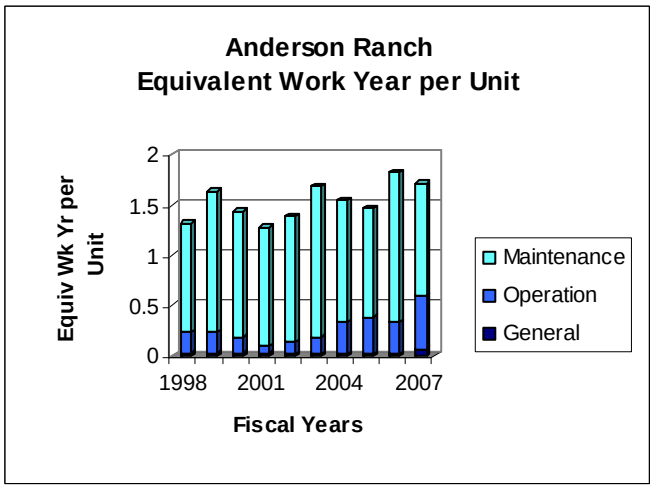


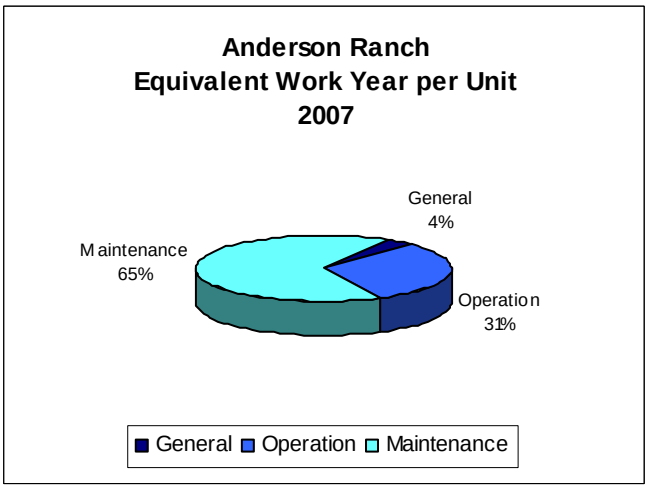


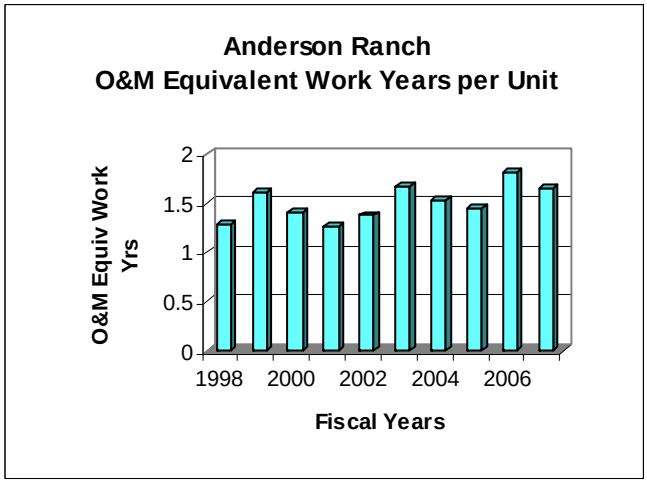
Benchmark 4
Workforce Deployment

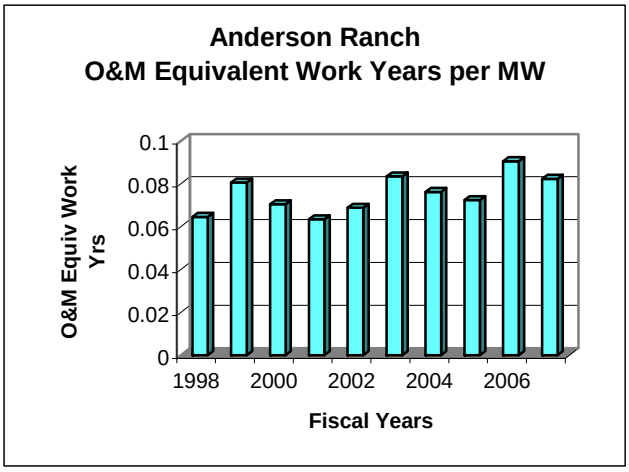
Anderson Ranch FY 2007 Equivalent Work Staffing Year Levels

	Equivalent Work Year Staffing Charged to Powerplant	Leave Additive	Denver and Washington Equivalent Work Year Staffing Additive	Total Equivalent Work Year Allocated to Powerplant	Total Equivalent Staffing Work Year per Generating Unit	Total Equivalent Work Year Staffing per Megawatt
General	0.10	0.01	0.04	0.13	0.07	0.00
Operation	0.95	0.10	0.00	1.05	0.52	0.03
Maintenance	2.03	0.22	0.00	2.25	1.12	0.06
Total Staffing	3.08	0.33	0.04	3.43	1.71	0.09

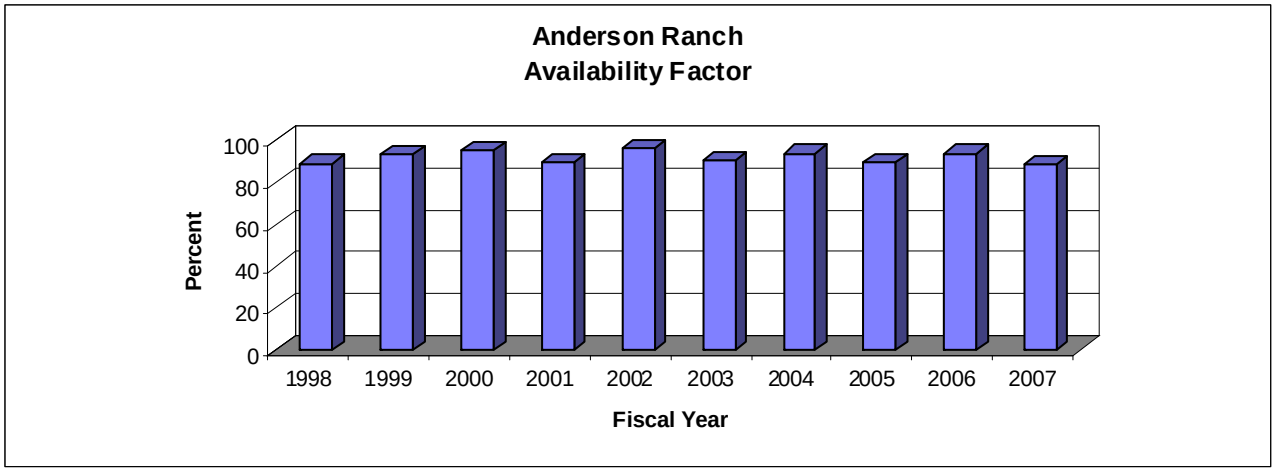




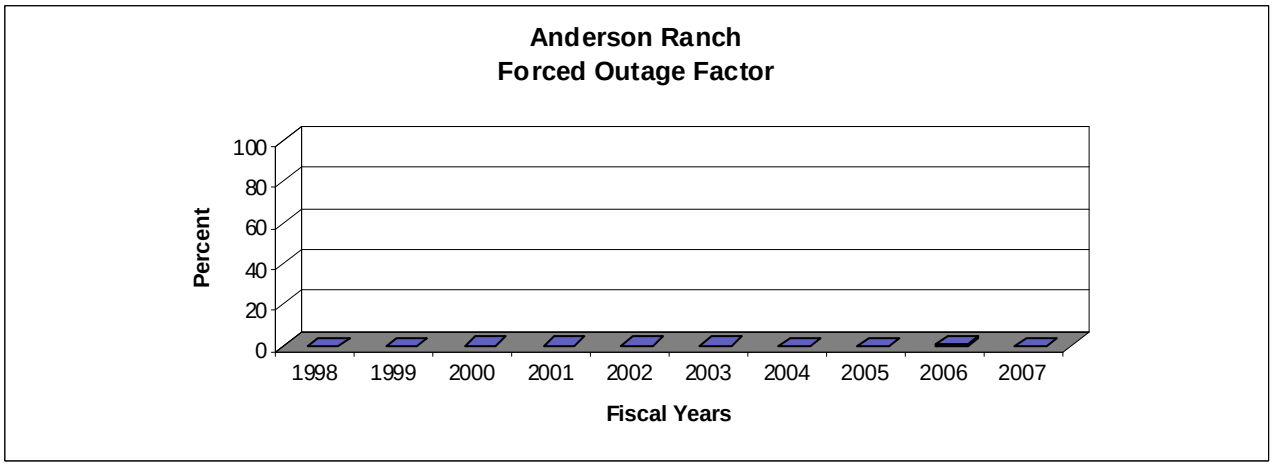




Benchmark 5
Availability Factor

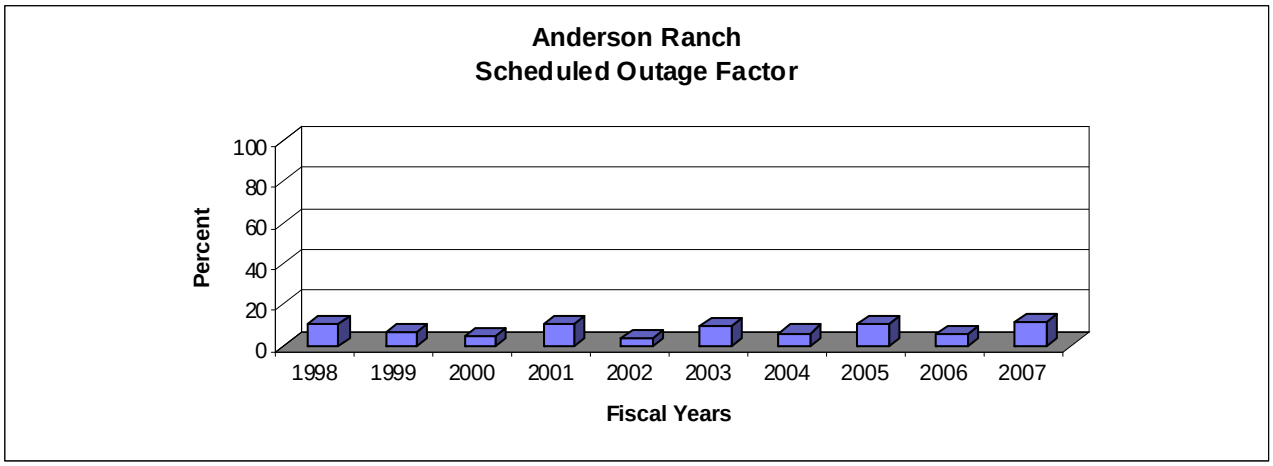


Benchmark 6
Forced Outage Factor

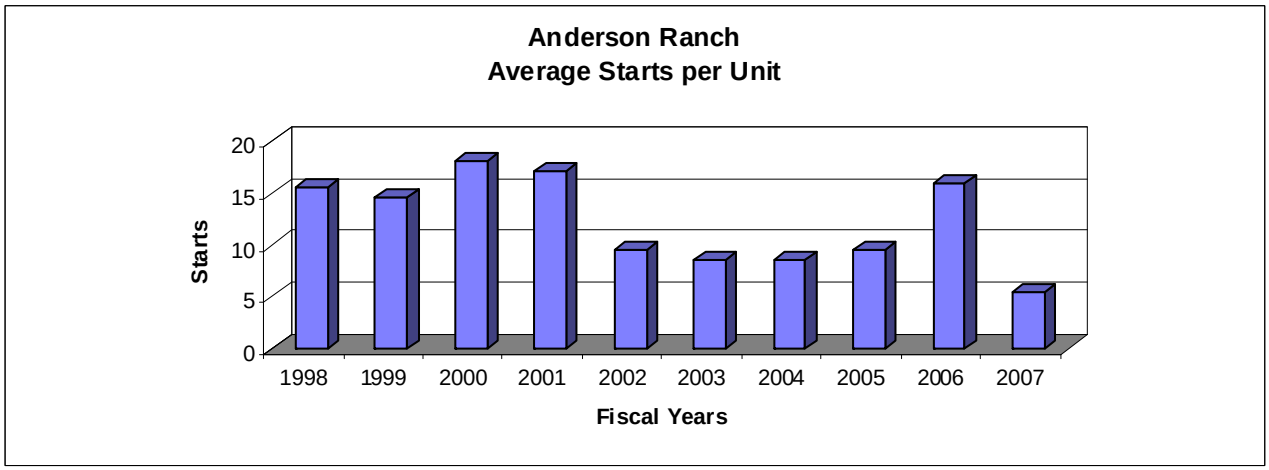


FY-97 Unit 1 out for generator cooling coil leak repair and Unit 2 out for two transformer differential trips

Benchmark 7
Scheduled Outage Factor



Number of Starts



Benchmark Data Comparison

Fiscal Year 2007	Anderson Ranch Powerplant	Reclamation Average 30-100 MW Group	Total Reclamation Average	Industry Average	Best Performers
Wholesale Firm Rate Mills/kWh	24.8	Not Applicable	*22.45	Not Available	Not Available
Production Cost as Percentage of Wholesale Firm Rate	0.04%	Not Applicable	12.1%	Not Applicable	Not Applicable
O&M Cost $/MWh	8.50	7.85	2.76	***54.63	1.00
O&M Costs $/MW	27,231	24,132	7,847	***30,336	2,897
O&M Equiv Work Year per MW	0.08	0.10	0.03	Not Available	0.00
Availability Factor	88.7	81.3	82.3	**88.64	98.5
Forced Outage Factor	0.00	0.2	2.6	**2.61	0.0
Scheduled Outage Factor	11.3	18.5	15.1	**8.74	0.0

*Weighted by Net Generation
**2006 NERC Average
*** Energy Information Administration Data

Black Canyon Powerplant
Boise Project

Plant Contact:
Coleman Smith
Power O&M Manager

Plant Address:
Black Canyon Powerplant
3999 East Black Canyon Highway
Emmett ID 83617

Telephone Numbers:
Phone: (208) 383-2266
Fax: (208) 383-2275

E-Mail Address:
csmith@pn.usbr.gov

Reclamation Region:
Pacific Northwest

NERC Region: Western Electricity Coordinating Council, Northwest Power Pool Area

PMA Service Area: Bonneville Power Administration, Southern Idaho Power System

Project Authorization: The Secretary of the Interior authorized construction of the original Boise Project on March 27, 1905, and the Black Canyon Dam on June 26, 1922, under provision of the Reclamation Act of June 17, 1902 (32 Stat. 388).

Project Purposes: The Boise Project furnishes irrigation water to about 225,000 acres of project lands and 165,000 acres under special and Warren Act contracts. The irrigable lands are in southwestern Idaho and eastern Oregon.

The 114,000 acres in the Payette Division receive water from the Payette River and surplus drainage from the Arrowrock Division. At Black Canyon Dam, water is diverted into the Black Canyon Canal and then into the distribution system. Storage features are Deadwood Reservoir on Deadwood River and Cascade Reservoir on the North Fork of the Payette. About 20 miles below Black Canyon Dam, a pumping plant lifts water from the main canal into a lateral system serving 26,014 acres.

Project History: Agricultural activity in the Boise and Payette River Valleys started in the early 1880's when settlers began filing on desert lands under private irrigation enterprises. By 1900, about 148,000 acres had been placed under irrigation. It quickly became evident that storage and distribution systems were needed for a dependable water source to serve the lands at high elevations. In response to petitions by local irrigators, the Boise Project was initiated by the Reclamation Service shortly after the passage of the first Reclamation Act of 1902.

Plant Location: Black Canyon Dam and Power plant are located on the main stem of the Payette River, six miles northeast of Emmett, Idaho.

Plant Facts: Black Canyon Dam is a concrete gravity diversion dam with a structural height of 183 feet and gated ogee overflow spillway. Two direct-connected turbine-driven pumps, located in the powerhouse, serve the Emmett Irrigation District Canal on the north side of the river. The Black Canyon Control Building (from which Black Canyon Dam and Powerplant, Anderson Ranch Dam and Powerplant, Cascade Dam, Boise Diversion Powerplant, and Deadwood Dam are remotely operated) is next to the powerplant.

The 1925 power plant was modernized in the early 1980s. The powerplant has a capacity of 10,200 kilowatts. The nameplate capacity of 4,000 kW was increased to 5,100 kW for each generator with the installation of forced air-cooling in 1972 and a stator rewind/upgrade in 1995 The switchyard disconnects and bus were replaced in 1998 and the oil circuit breakers were replaced in Sept-Oct 2002, completing the modernization of the power plant switchyard.

A short transmission line connects the Black Canyon Powerplant with the lines of the Idaho Power Company while another line supplies the C-Line Canal Pumping Plant.

Plant Purpose: Black Canyon Dam and Power plant is a multiple purpose structure that provides benefits to both irrigation and power. The plant supplies power to irrigation loads in the Boise, Owyhee, and Minidoka Projects as part of Reclamation's Southern Idaho Power System. Surplus power is delivered to the BPA for marketing and distribution to regional industries and municipalities.

Present Activities: Plant relaying will be replaced by the end of 2005. Scheduled work includes replacement of the electrical transducers in 2006. A feasibility study is underway for a 3rd generating unit.

Future Planned Activities: The station service will be upgraded along with K7 cabinet being replaced. A larger emergency generator is anticipated in 2008.

Special Issues:	The power plant is operated as a run-of-the-river plant, although operational releases from upstream reservoirs are coordinated to maximize power generation when possible. Siltation of the reservoir continues to be a long-term concern, but does not currently impact power operations or maintenance.		
River:	Payette River	**Plant Type:**	Conventional
Powerhouse Type:	Above Ground	**Turbine Type:**	Francis
Original Nameplate Capacity:	8,000 kW	**Installed Capacity:**	10,200 kW
Year of Initial Operation:	1925	**Age:**	82 years
Net Generation (FY-2007):	65.0 GWh	**Rated Head:**	112 feet
Average Plant Factor (FY-2007):	73.3 percent	**Remotely Operated:**	Yes
Production Mode:	Intermediate		

Ancillary Services

Black Canyon
Ancillary Services

Spinning Reserve	Yes
Non-Spinning Reserve	Yes
Replacement Reserve	Yes
Regulation/Load Following	Yes
Black Start	Yes
Voltage Support	Yes

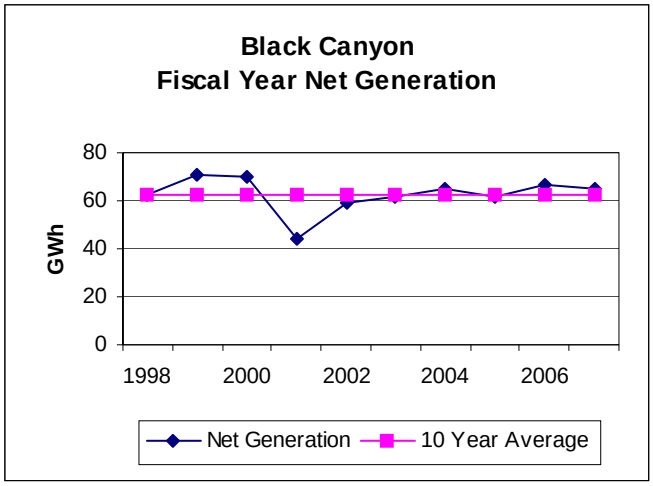
Generators

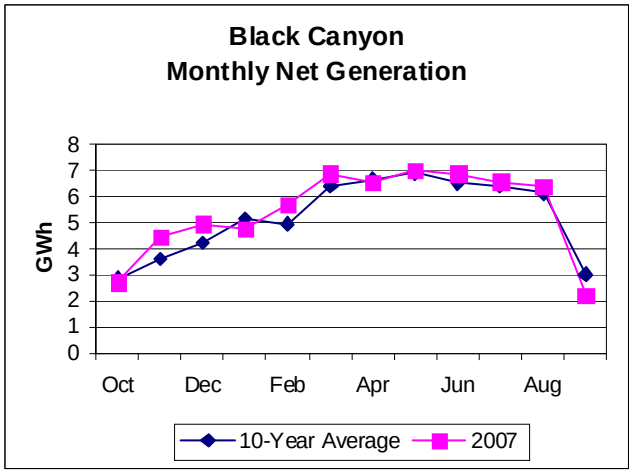
Black Canyon Generators

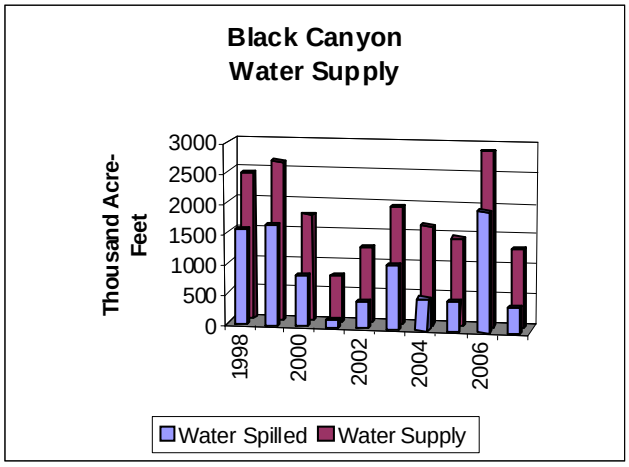
Existing Number and Capacity

Unit #	Original Capacity (kW)	Capacity Increased (kW)	Present Capacity (kW)
1	4,000	1,100	5,100
2	4,000	1,100	5,100
2 units	8,000	2,200	10,200

Generation

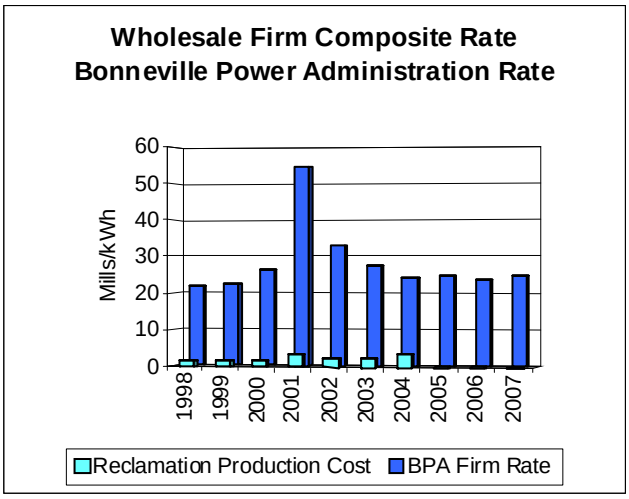

Black Canyon
Fiscal Year Net Generation
GWh
80
60
40
20
0
1998
2000
2002
2004
2006
Net Generation
10 Year Average


Black Canyon
Monthly Net Generation
GWh
8
7
6
5
4
3
2
1
0
Oct
Dec
Feb
Apr
Jun
Aug
10-Year Average
2007

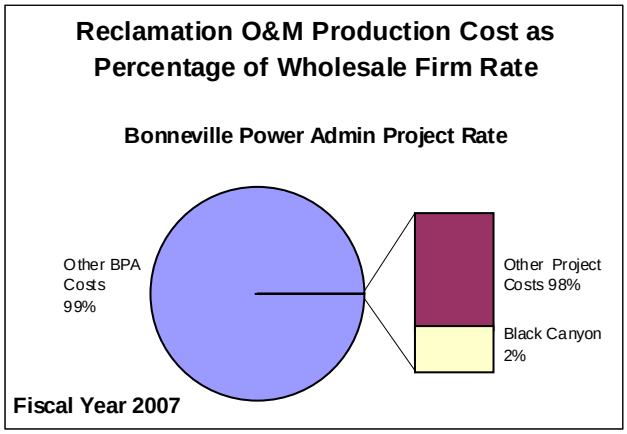

Black Canyon
Water Supply
Thousand Acre-Feet
3000
2500
2000
1500
1000
500
0
1998
2000
2002
2004
2006
Water Spilled
Water Supply

Prime Laboratory Benchmarks

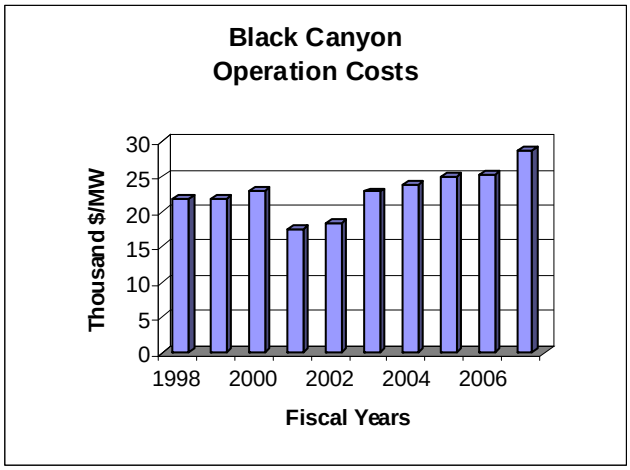
Benchmark 1
Wholesale Firm Rate

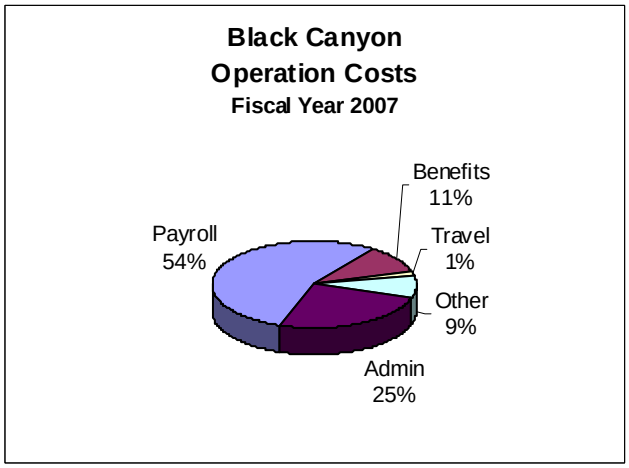


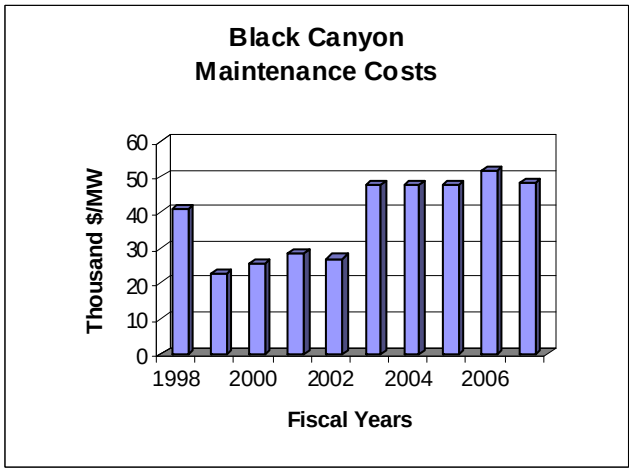
Benchmark 2
Reclamation's Production Cost as Percentage of Wholesale Firm Rate

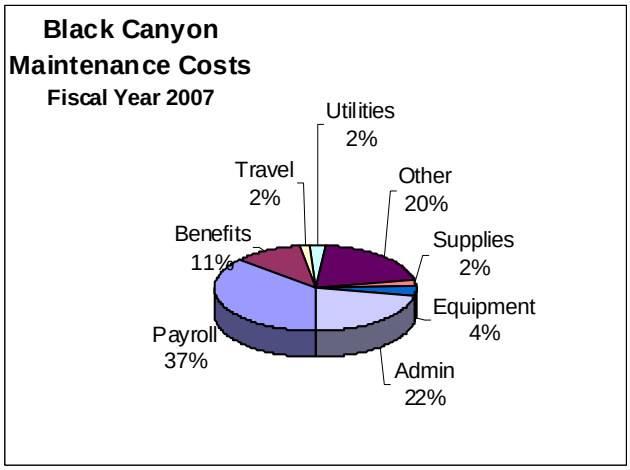


Benchmark 3
Production Cost

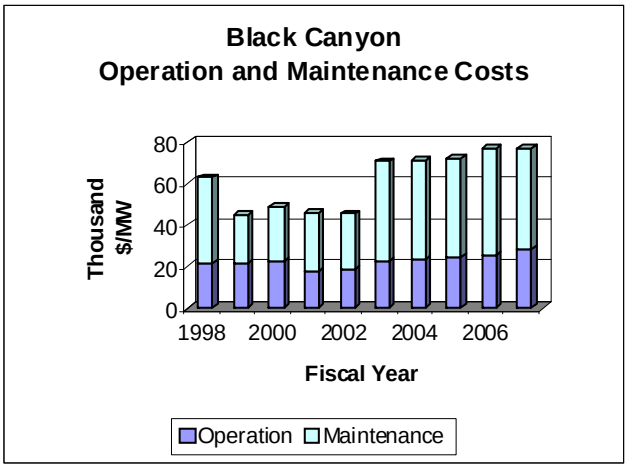


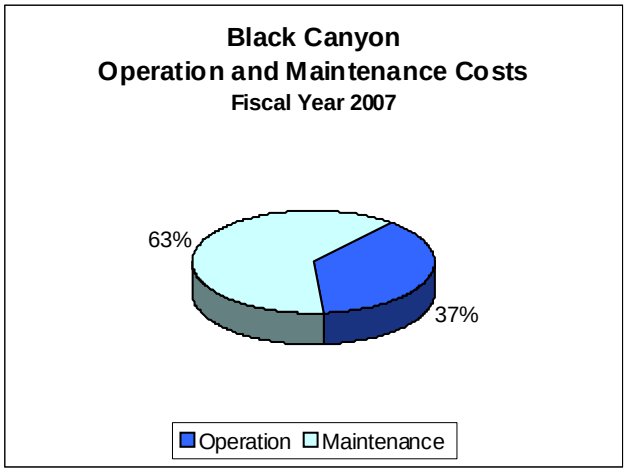


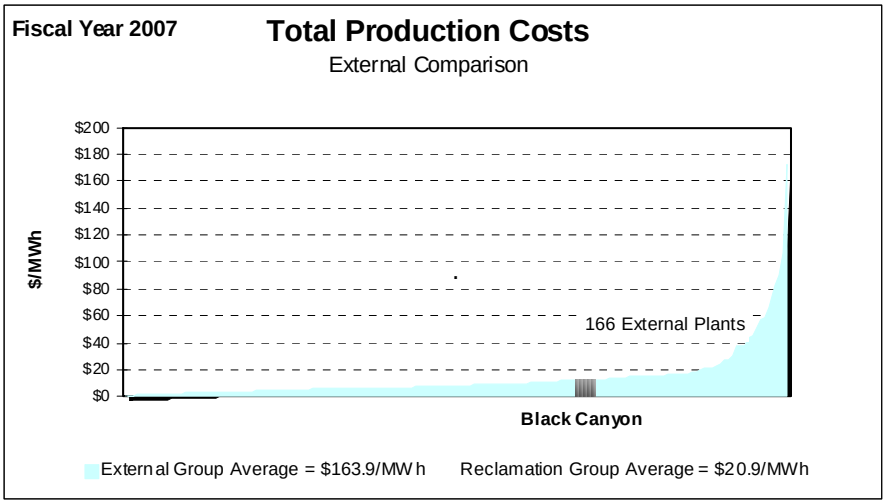


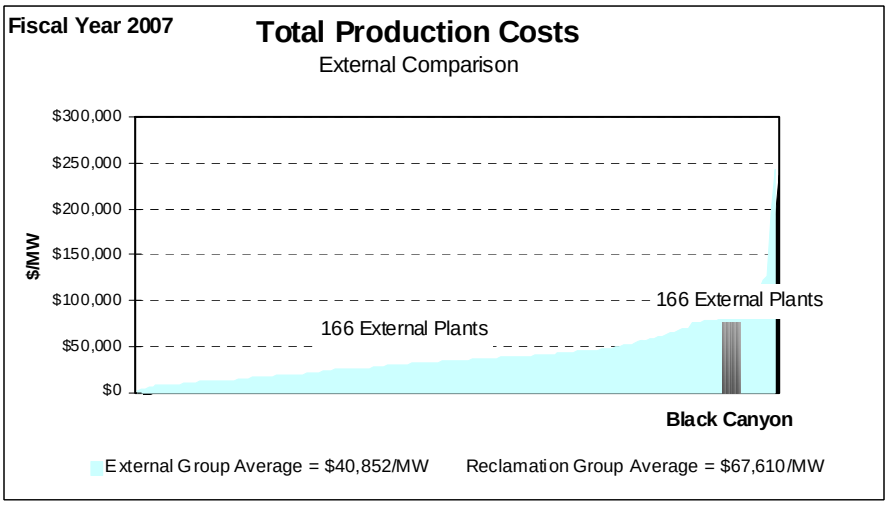


Benchmark 3
Production Cost



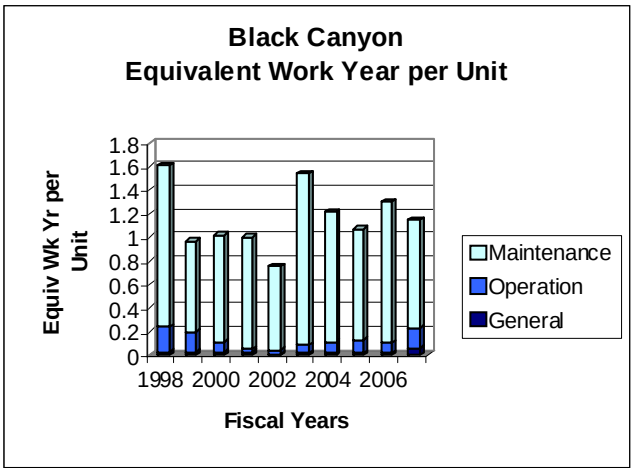


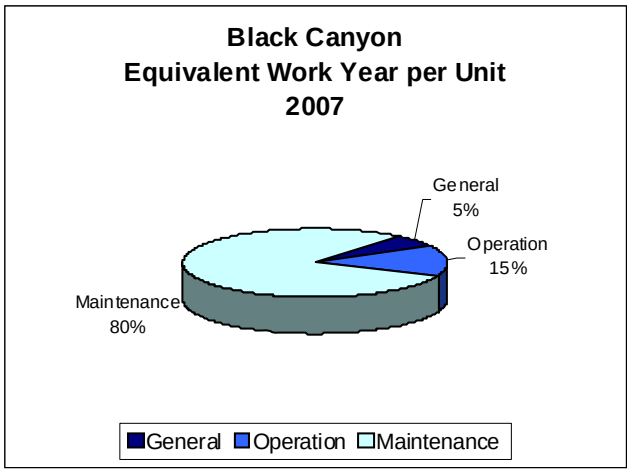


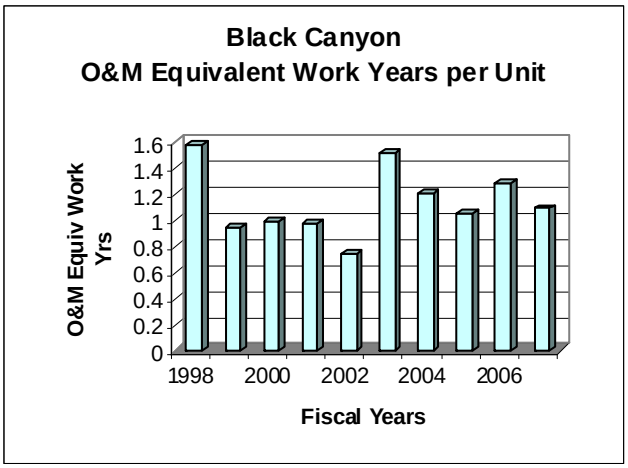


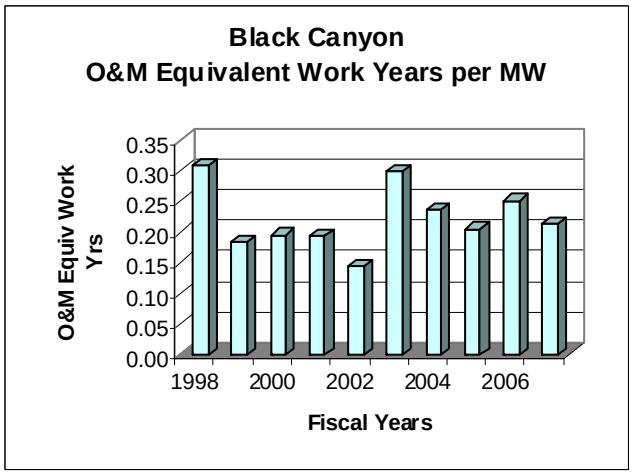
Benchmark 4
Workforce Deployment

Black Canyon FY 2007 Equivalent Work Staffing Year Levels						
	Equivalent Work Year Staffing Charged to Powerplant	Leave Additive	Denver and Washington Equivalent Work Year Staffing Additive	Total Equivalent Work Year Allocated to Powerplant	Total Equivalent Staffing Work Year per Generating Unit	Total Equivalent Work Year Staffing per Megawatt
General	0.08	0.01	0.04	0.12	0.06	0.01
Operation	0.31	0.03	0.00	0.34	0.17	0.03
Maintenance	1.66	0.18	0.00	1.84	0.92	0.18
Total Staffing	2.05	0.22	0.04	2.30	1.15	0.23

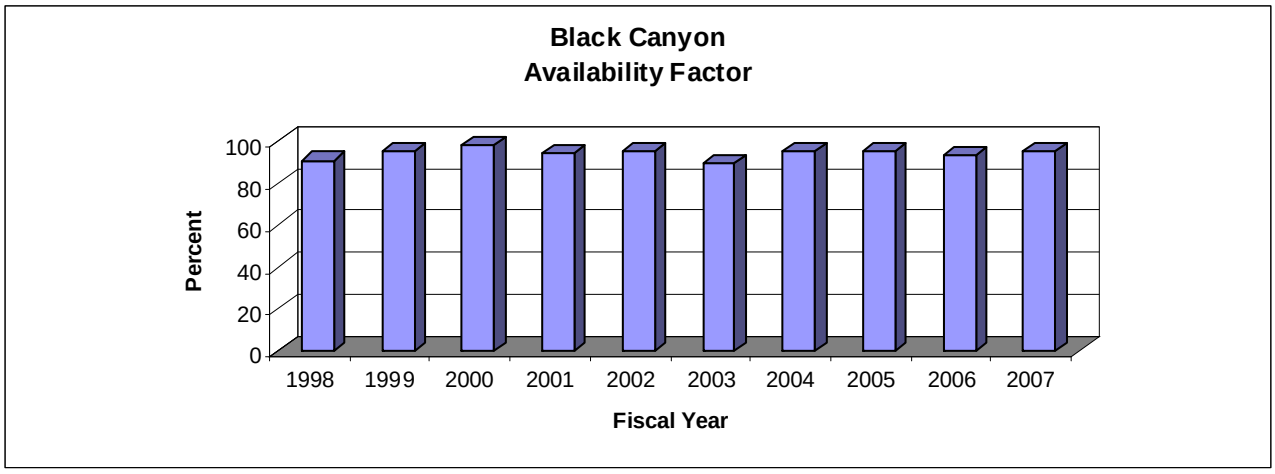




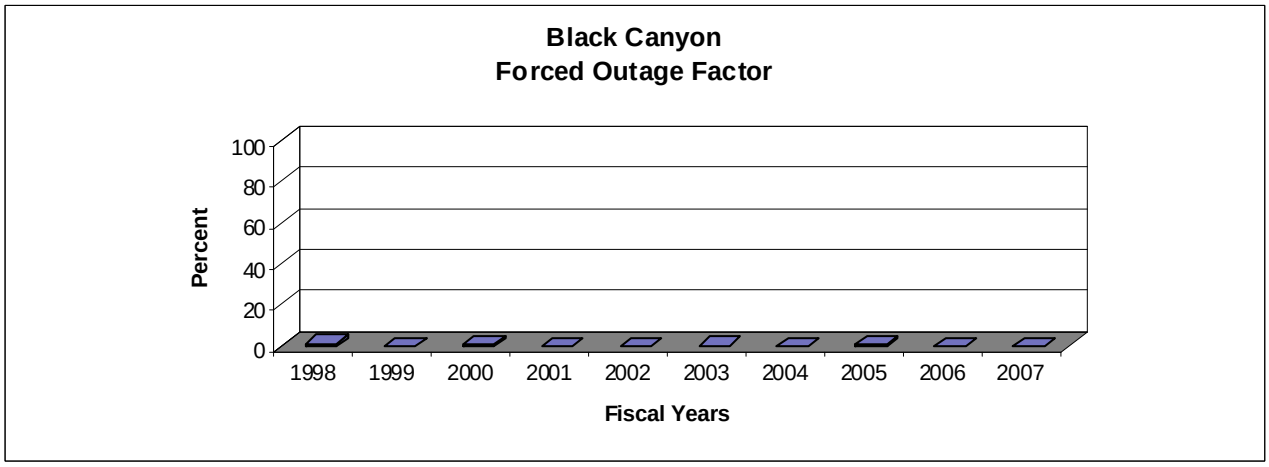




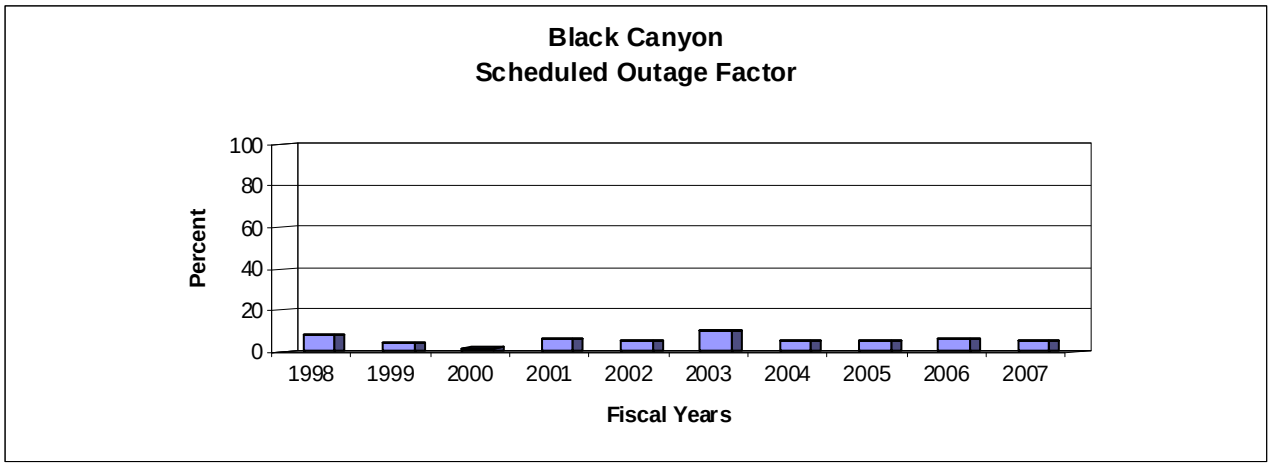
Benchmark 5
Availability Factor



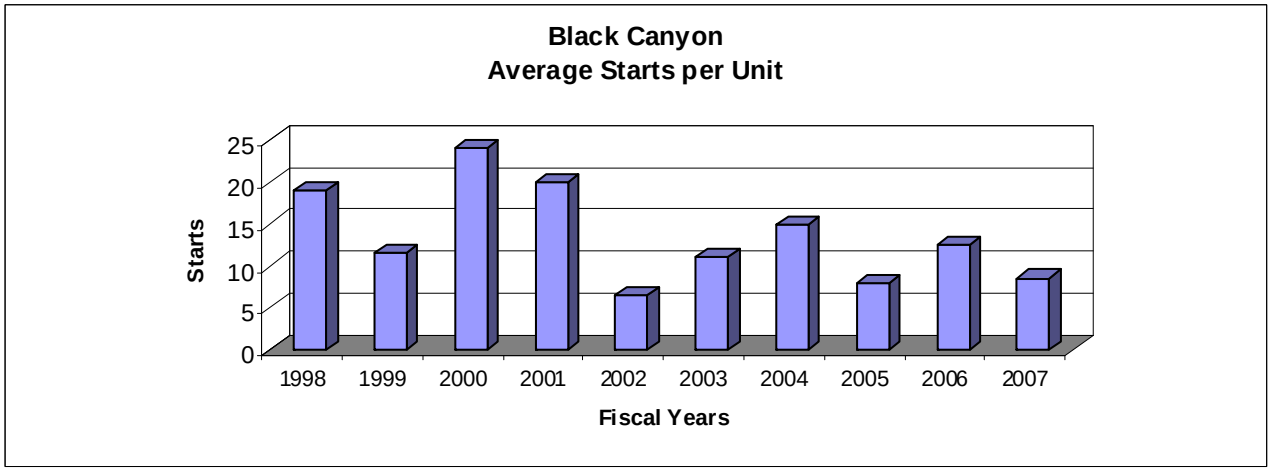
Benchmark 6
Forced Outage Factor



Benchmark 7
Scheduled Outage Factor



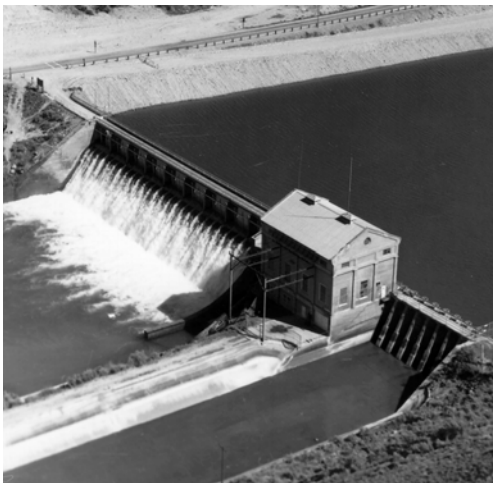
Starts



Benchmark Data Comparison					
Fiscal Year 2007	**Black Canyon Powerplant**	**Reclamation Average 10-30 MW Group**	**Total Reclamation Average**	**Industry Average**	**Best Performers**
Wholesale Firm Rate Mills/kWh	24.8	Not Applicable	*22.45	Not Available	Not Available
Production Cost as Percentage of Wholesale Firm Rate	0.03%	Not Applicable	12.1%	Not Applicable	Not Applicable
O&M Cost $/MWh	12.08	16.40	2.76	***25.9	1.00
O&M Costs $/MW	76,928	62,731	7,847	***75,984	2,897
O&M Equiv Work Year per MW	0.21	0.22	0.03	Not Available	0.00
Availability Factor	95.0	88.5	82.3	**88.64	98.5
Forced Outage Factor	0.02	0.1	2.6	**2.61	0.0
Scheduled Outage Factor	5.0	11.4	15.1	**8.74	0.0

*Weighted by Net Generation
**2006 NERC Average
*** Energy Information Administration Data

Boise River Diversion Powerplant
Boise Project



Plant Contact:
Denny Johnson
Power Plant Maintenance Supervisor

Plant Address:
Boise River Diversion Powerplant
230 Collins Rd.
Boise ID 83702-4520

Telephone Numbers:
Phone: (208) 587-4051
Fax: (208) 587-4078

E-Mail Address:
djohnson@pn.usbr.gov

Reclamation Region: Pacific Northwest

NERC Region: Western Electricity Coordinating Council, Northwest Power Pool Area

PMA Service Area: Bonneville Power Administration, Southern Idaho Power System

Project Authorization: The original Boise Project was authorized on March 27, 1905. The Arrowrock Dam was authorized on January 6, 1911.

Project Purposes: The Boise Project furnishes irrigation water to about 225,000 acres of project lands and 165,000 acres under special and Warren Act contracts. The irrigable lands are in southwestern Idaho and eastern Oregon.

Project History: Agricultural activity in the Boise and Payette River Valleys started in the early 1880s when settlers began filing on desert lands under private irrigation enterprises. By 1900, about 148,000 acres had been placed under irrigation. It quickly became evident that storage and distribution systems were needed for a dependable water source to serve the lands at high elevations. In response to petitions by local irrigators, the Boise Project was initiated by the Reclamation Service shortly after the passage of the first Reclamation Act of 1902

Plant Location: Boise River Diversion Powerplant is located in Ada County, Idaho, on the Boise River about 7 miles southeast of Boise, Idaho.

Plant Facts:

The Boise River Diversion Dam is a rubble concrete, weir-type structure with a hydraulic height of 39 feet. The dam was constructed in 1908 to divert water into the New York Canal, a 40-mile long canal which serves the Boise Valley. In 1912, the powerplant and a 17-mile transmission line were constructed to supply construction power for Arrowrock Dam. The original plant had three vertical generators each with a name plant capacity of 500 kW, with many unique engineering features of the era including double Francis turbines, wooden turbine bearings, and belt-driven auxiliary systems. The powerplant was added to the National Register of Historic Places in 1976.

Due to the deteriorated condition of the equipment and high operating costs resulting from full-attended operation, the powerplant was placed in ready reserve status in 1982. The plant was reconstructed in 2002 to 2004 and returned to service in June, 2004.

Plant Purpose:

Boise River Diversion Dam and Powerplant is a multiple purpose structure that provides benefits to both irrigation and power. The plant supplies power to irrigation loads in the Boise, Owyhee, and Minidoka Projects as part of Reclamation's Southern Idaho Power System. Surplus power is delivered to the BPA for marketing and distribution to regional industries and municipalities.

Present Activities:

Construction to rebuild or replace the deteriorated power plant equipment was finished in June 2004. The nameplate rating for the plant increased from the original 1500 kW to 3300 kW. The existing double turbine configuration was retained, but refurbished with new materials and technology. New modern generators were installed inside the original generator housing. The lower level of the power plant contains the new switchgear, station service, battery, governor, excitation, and auxiliary equipment. Intake gates have been refurbished and modernized with electric operators and new trash racks.

Special care was taken to retain the historic qualities of the main generator floor. The original governors, slate control panels, transformers, overhead crane, and generator housings, although no longer functional, were retained for historic purposes. As part of the rebuilding effort, the plant was automated and can now be remotely controlled from the Black canyon Control Center.

Future Planned Activities:

The reconstruction of the power plant replaced all critical components. No major replacements or additions are currently planned.

Special Issues:

Bonneville Power Administration's transmission facilities are limited in the region, resulting in the need to wheel power into the area over other utilities' systems. Points of interconnections are at capacity, which will increase future wheeling costs and limit future capacity. The power plant's return to service contributes towards serving the federal load within Southern Idaho.

River:	Boise River	**Plant Type:**	Conventional
Powerhouse Type:	Above Ground	**Turbine Type:**	Francis
Original Nameplate Capacity:	1,500 kW	**Installed Capacity:**	3,450 kW
Year of Initial Operation:	1912	**Age:**	95 years
Net Generation (FY-2007):	9.7 kWh	**Gross Head:**	39 feet
Average Plant Factor (FY-2007):	33.3 percent	**Remotely Operated:**	Yes

Ancillary Services

Boise River Diversion
Ancillary Services

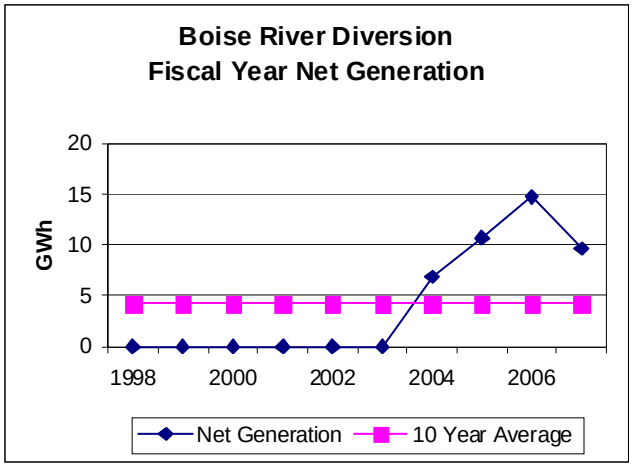
Spinning Reserve	No
Non-Spinning Reserve	No
Replacement Reserve	No
Regulation/Load Following	No
Black Start	No
Voltage Support	No

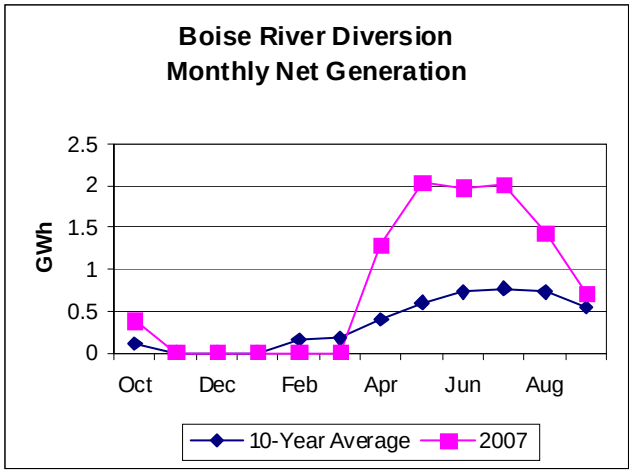
Generators

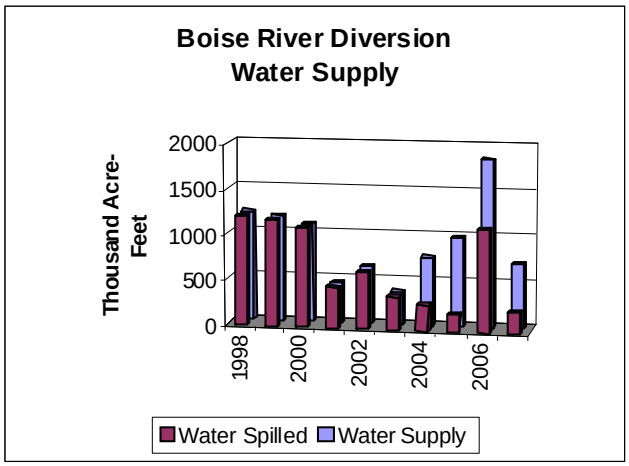
Boise River Diversion Generators
Existing Number and Capacity

Unit #	Original Capacity (kW)	Capacity Increased (kW)	Present Capacity (kW)
1	500	650	1,150
2	500	650	1,150
3	500	650	1,150
3 units	1,500	1,950	3,450

Generation



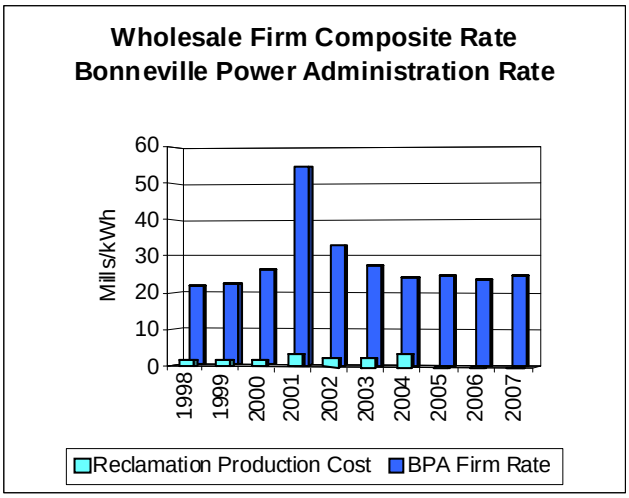




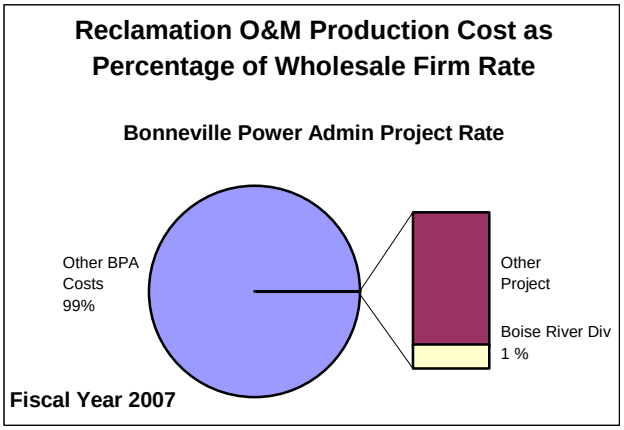
All three units at Boise River Diversion came online during FY 2004

Prime Laboratory Benchmarks

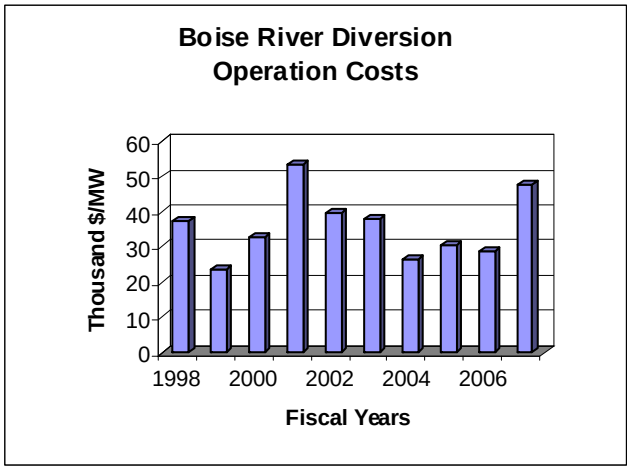
Benchmark 1
Wholesale Firm Rate

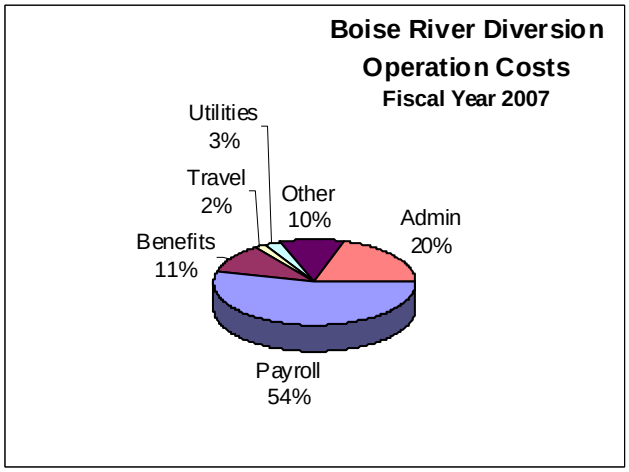


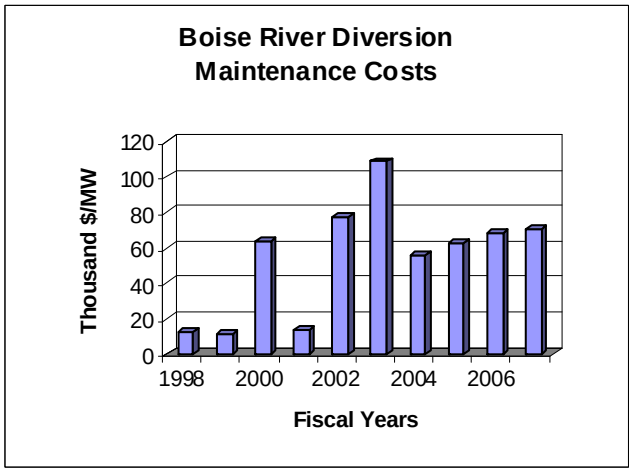
Benchmark 2
Reclamation's Production Cost as Percentage of Wholesale Firm Rate

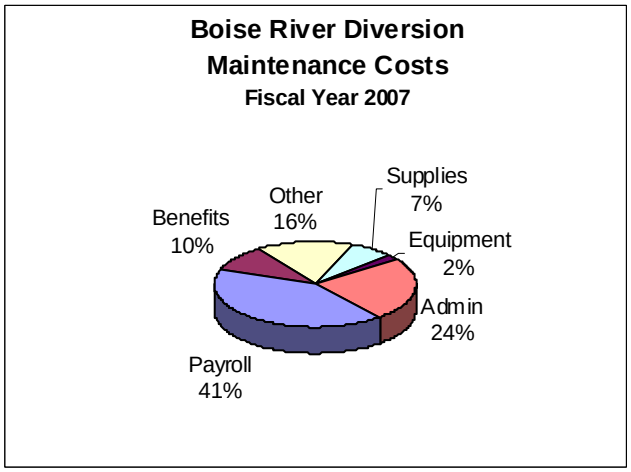


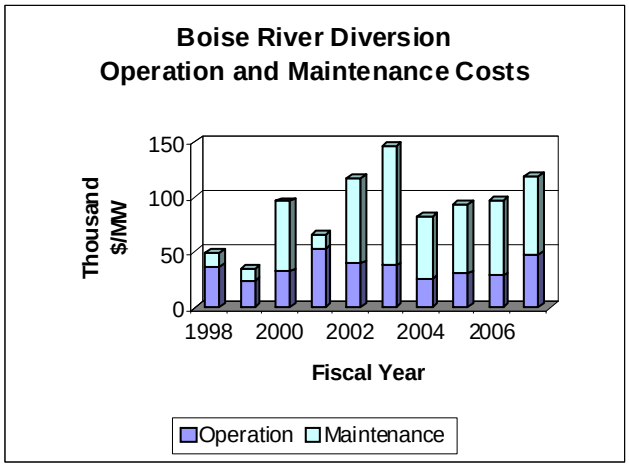
Benchmark 3
Production Cost

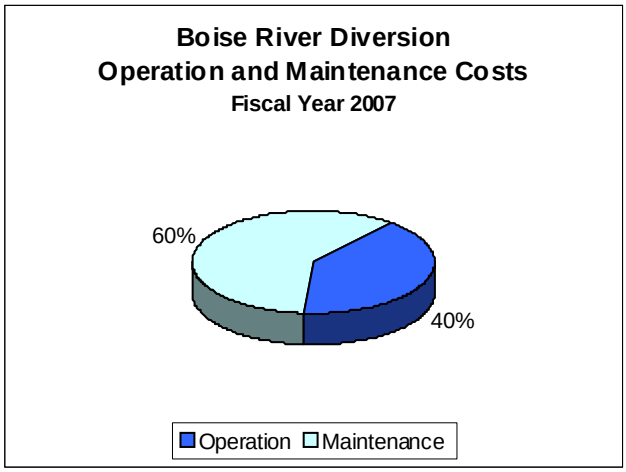






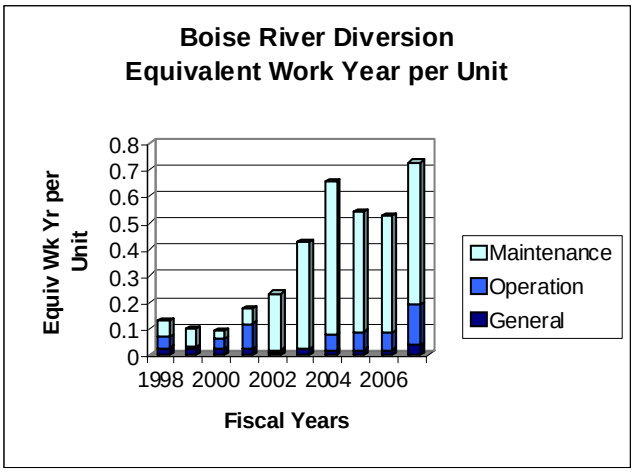


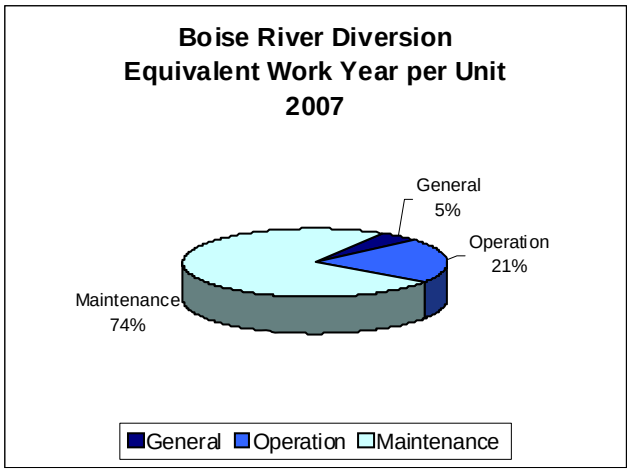


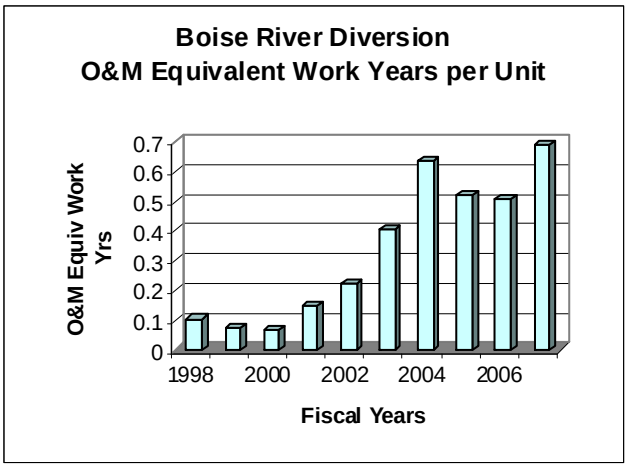


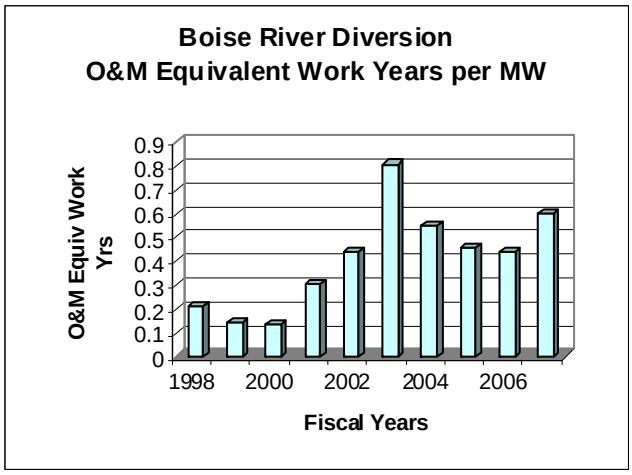
Benchmark 4
Workforce Deployment

Boise River Div FY 2007 Equivalent Work Staffing Year Levels						
	Equivalent Work Year Staffing Charged to Powerplant	Leave Additive	Denver and Washington Equivalent Work Year Staffing Additive	Total Equivalent Work Year Allocated to Powerplant	Total Equivalent Staffing Work Year per Generating Unit	Total Equivalent Work Year Staffing per Megawatt
General	0.06	0.01	0.05	0.12	0.04	0.03
Operation	0.41	0.04	0.00	0.46	0.15	0.13
Maintenance	1.45	0.15	0.00	1.61	0.54	0.47
Total Staffing	1.92	0.20	0.05	2.18	0.73	0.63

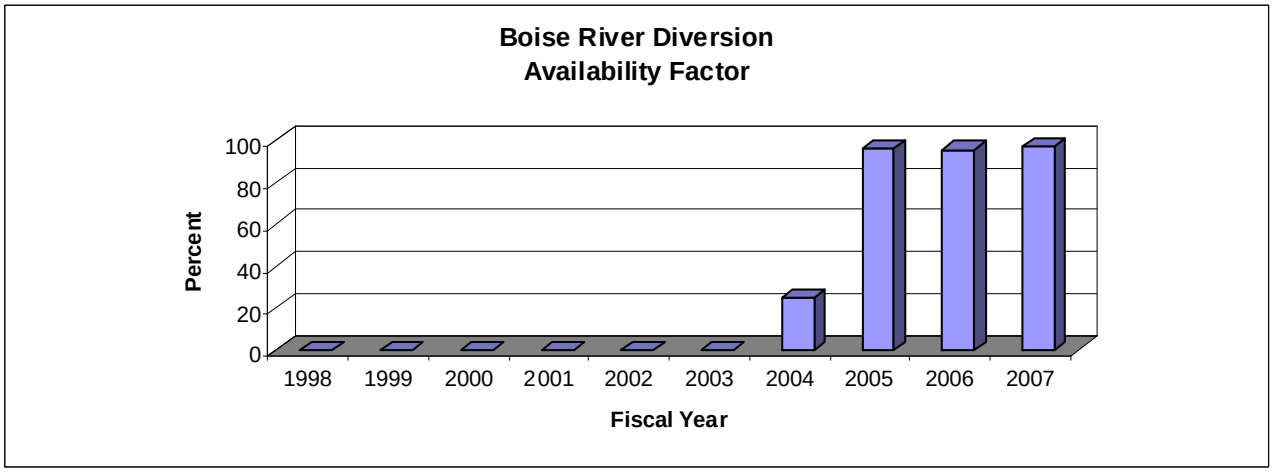






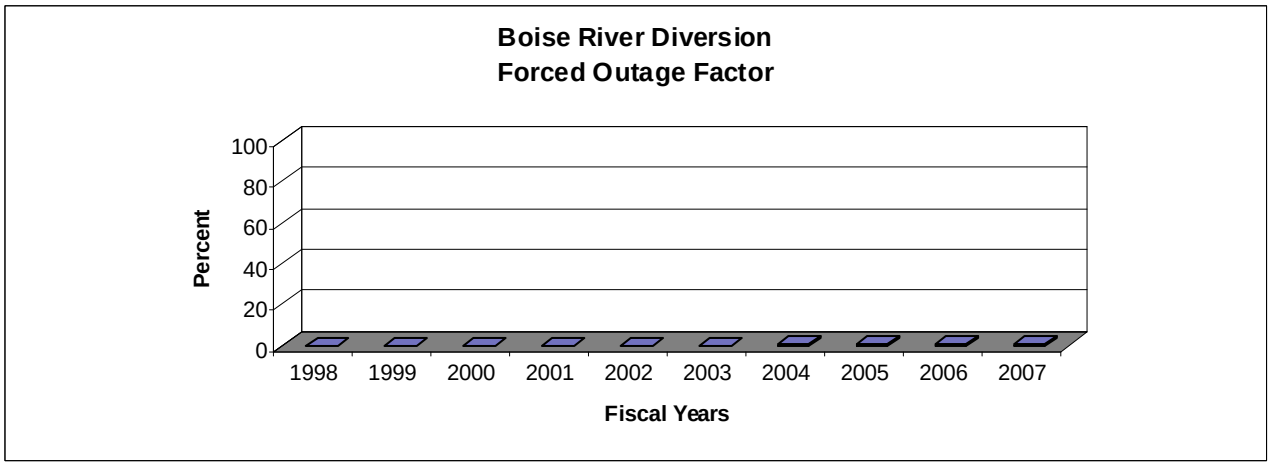


Benchmark 5
Availability Factor

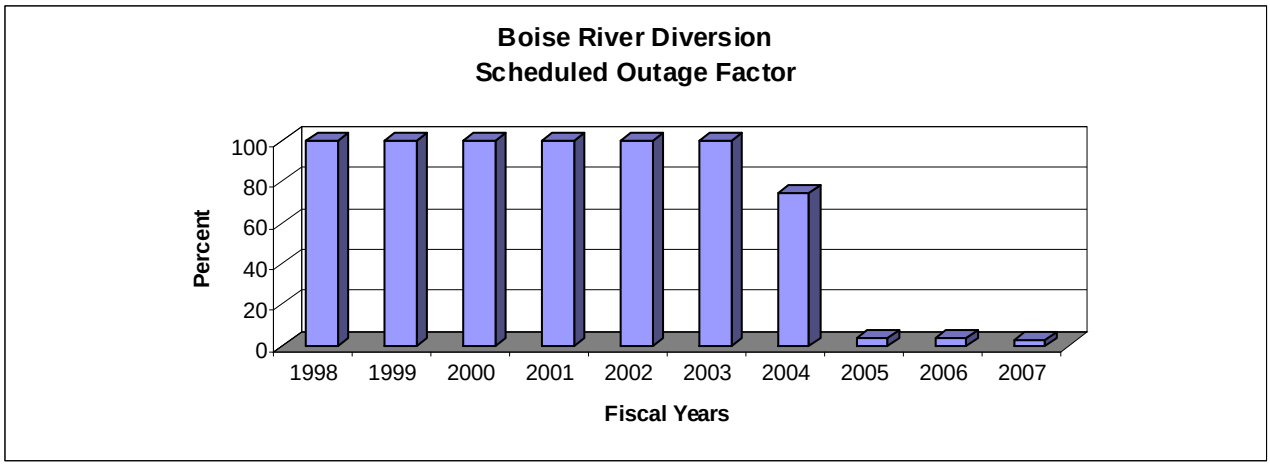


FY-04 – Three units on line.

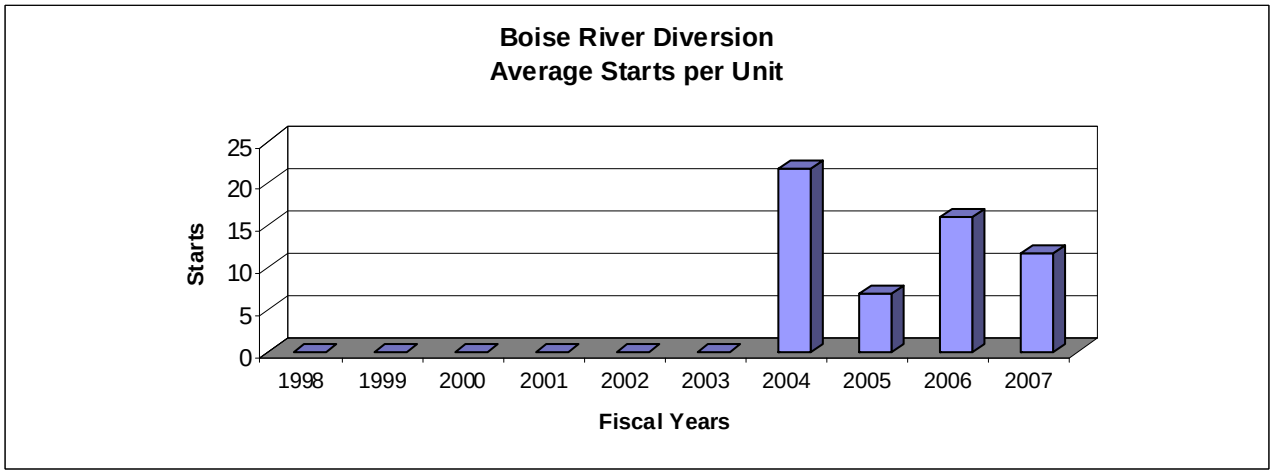
Benchmark 6
Forced Outage Factor



Benchmark 7
Scheduled Outage Factor



Starts



Benchmark Data Comparison				
Fiscal Year 2007	**Boise River Diversion**	**Total Reclamation Average**	**Industry Average**	**Best Performers**
Wholesale Firm Rate Mills/kWh	24.8	*22.45	Not Available	Not Available
Production Cost as Percentage of Wholesale Firm Rate	0.015%	12.1%	Not Applicable	Not Applicable
O&M Cost $/MWh	Not Applicable	2.76	***25.9	1.00
O&M Costs $/MW	118,543	7,847	***75,984	2,897
O&M Equiv Work Year per MW	0.60	0.03	Not Available	0.00
Availability Factor	0.0	82.3	**88.64	98.5
Forced Outage Factor	0.0	2.6	**2.61	0.0
Scheduled Outage Factor	100.0	15.1	**8.74	0.0

*Weighted by Net Generation
**2006 NERC Average
*** Energy Information Administration Data

Chandler Powerplant
Yakima Project

Plant Contact:
Tom Glover, Supervisor Power System
Upper Columbia Area Office

Plant Address:
Chandler Powerplant
47415 West Old Inland Empire Hwy
Benton City WA 99320

Telephone Numbers:
Phone: (509) 588-3317
Fax: (509) 454-5611

E-Mail Address:
tglover@pn.usbr.gov

Reclamation Region: Pacific Northwest

NERC Region: Western Systems Coordinating Council, Northwest Power Pool Area

PMA Service Area: Bonneville Power Administration

Project Authorization: The Congress authorized the Yakima Project, Kennewick Division, on June 12, 1948, under Public Law 629, 80th Congress (62 Stat. 382).

Project Purposes: The Yakima Project provides irrigation water for a comparatively narrow strip of fertile land that extends for 175 miles on both sides of the Yakima River in south-central Washington. The irrigable lands presently being served total about 465,000 acres.

The Kennewick Division is a combined irrigation and power development. It includes the 12,000-kilowatt Chandler Powerplant and 19,171 acres of irrigable land.

Plant Location: Chandler Powerplant is located in Benton County, Washington, about 10 miles northeast of Prosser, Washington. It is on the Chandler power channel next to the Yakima River.

Plant Facts:	The Chandler Powerplant includes two 6.0 megawatt, 4160 volt hydropower generators, and two 2,600 horsepower pumps which operate from a 10.6 mile canal, diverting up to 1,500 cubic feet per second of water from the Prosser Diversion Dam.
Plant Purpose:	The powerplant has not historically supplied project power for irrigation pumping, but it is planned to install electric pumps to replace the existing hydraulically powered pumps at the powerplant.
Plant History:	The powerplant was constructed in 1956 as part of the Yakima Project.
Present Activities:	Turbine rehabs on both Unit 1 and Unit 2. Unit 2 completed Fall of 2007, Unit 1 to be completed by late Spring of 2008.
Future Planned Activities:	Both units scheduled for Static Excitation and Voltage Regulation upgrades in the Spring of 2009.
Special Issues:	None

River:	Chandler Power Canal	**Plant Type:**	Conventional
Powerhouse Type:	Above Ground	**Turbine Type:**	Francis
Original Nameplate Capacity:	12,000 kW	**Installed Capacity:**	12,000 kW
Year of Initial Operation:	1956	**Age:**	52 years
Net Generation (FY-2007):	25.9 GWh	**Rated Head:**	118 feet
Average Plant Factor (FY-2007):	25.1 percent	**Remotely Operated:**	No
Production Mode:	Intermediate		

Ancillary Services

Chandler
Ancillary Services

Spinning Reserve	No
Non-Spinning Reserve	No
Replacement Reserve	No
Regulation/Load Following	No
Black Start	No
Voltage Support	Yes

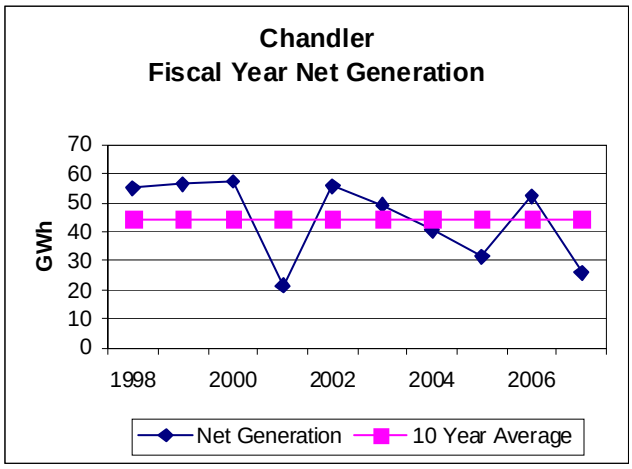
Black start possible, but it would never be done because of power line constraints.

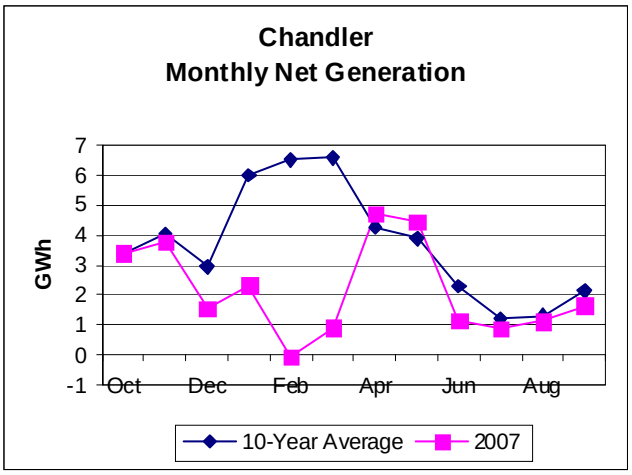
Generators

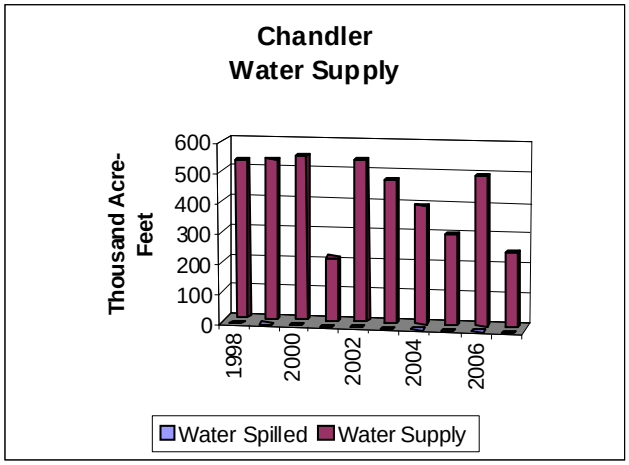
Chandler Generators
Existing Number and Capacity

Unit #	Original Capacity (kW)	Capacity Increased (kW)	Present Capacity (kW)
1	6,000	-	6,000
2	6,000	-	6,000
2 units	12,000	-	12,000

Generation

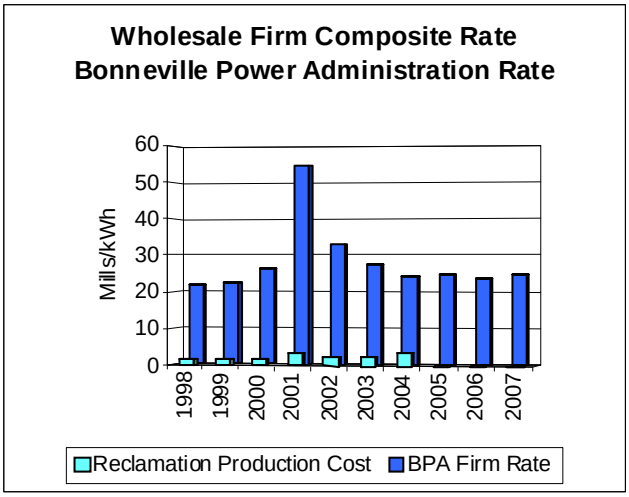

Chandler
Fiscal Year Net Generation
GWh
70
60
50
40
30
20
10
0
1998
2000
2002
2004
2006
Net Generation
10 Year Average


Chandler
Monthly Net Generation
GWh
7
6
5
4
3
2
1
0
-1
Oct
Dec
Feb
Apr
Jun
Aug
10-Year Average
2007

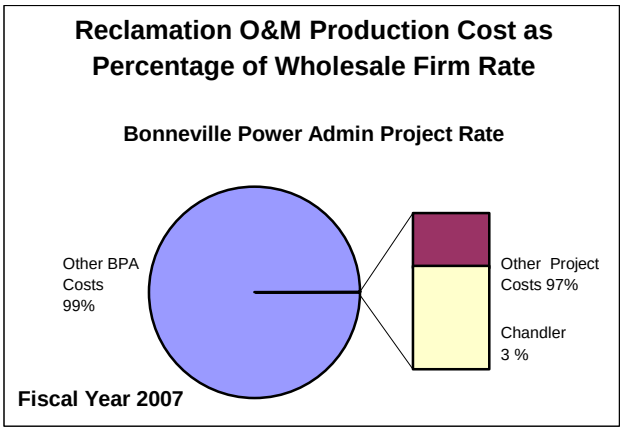

Chandler
Water Supply
Thousand Acre-Feet
600
500
400
300
200
100
0
1998
2000
2002
2004
2006
Water Spilled
Water Supply

Prime Laboratory Benchmarks

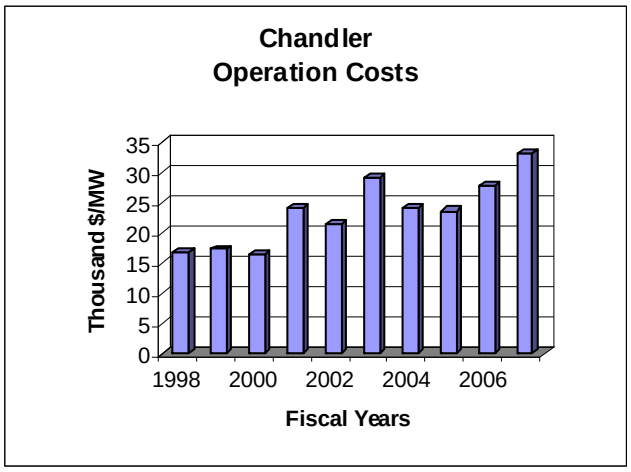
Benchmark 1
Wholesale Firm Rate

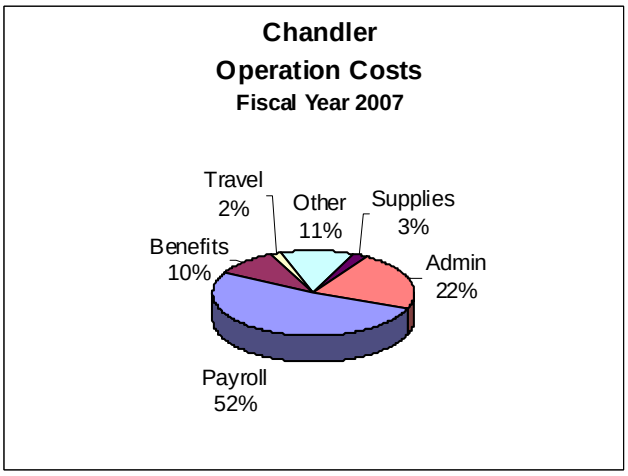


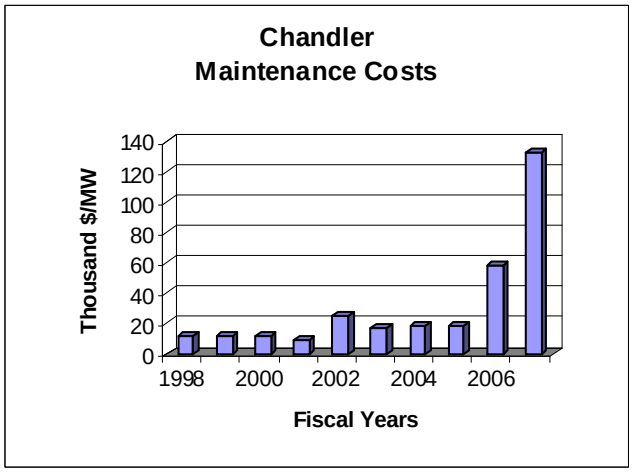
Benchmark 2
Reclamation's Production Cost as Percentage of Wholesale Firm Rate

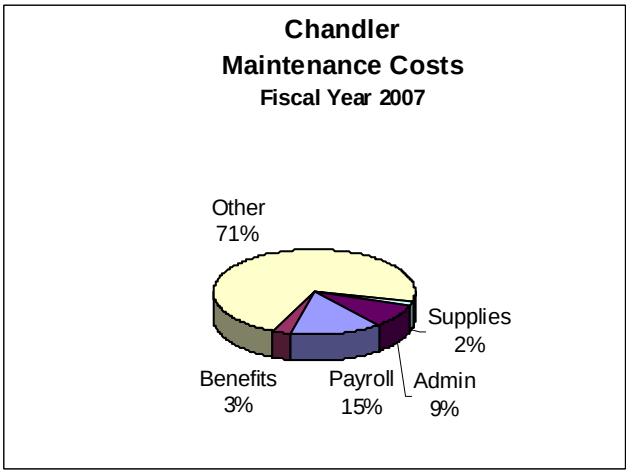


Benchmark 3
Production Cost

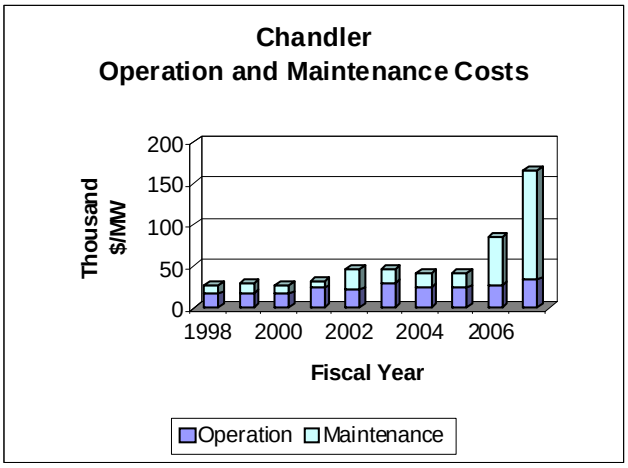


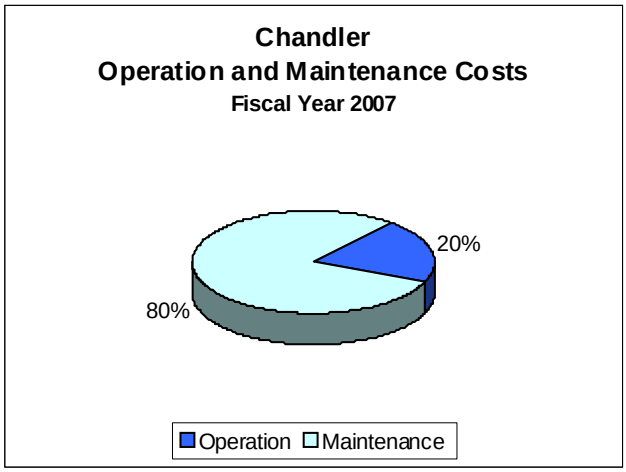


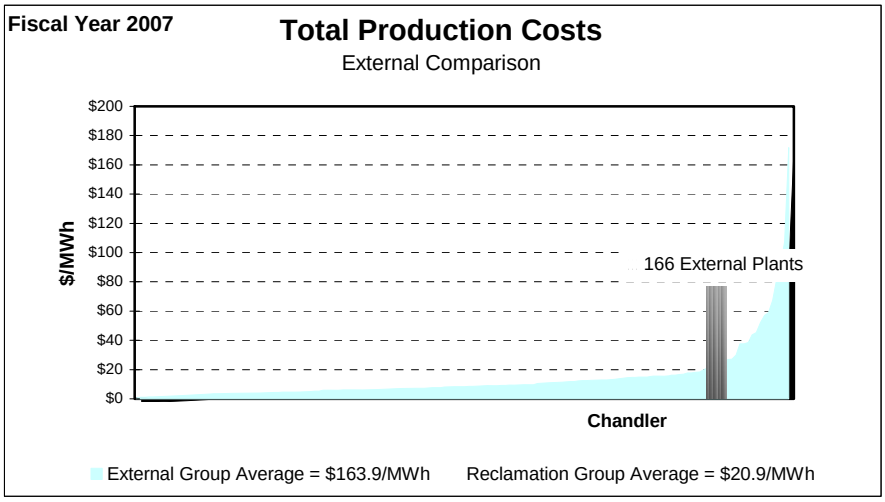


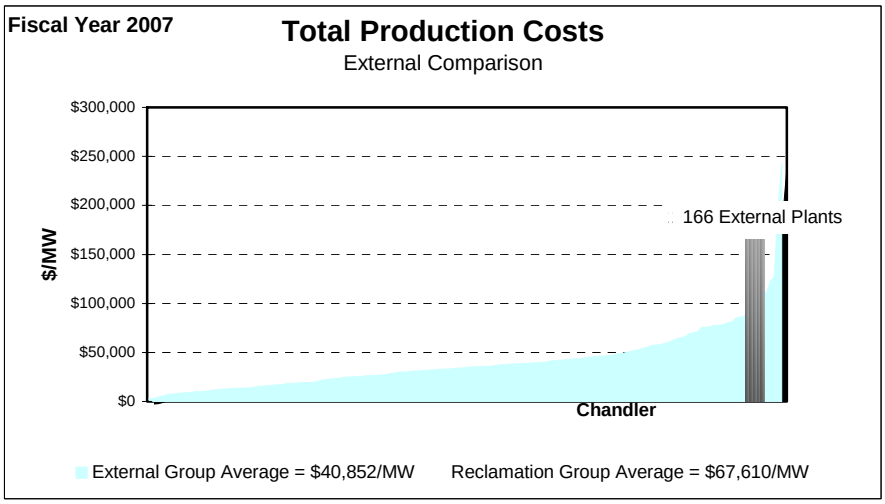


Benchmark 3
Production Cost



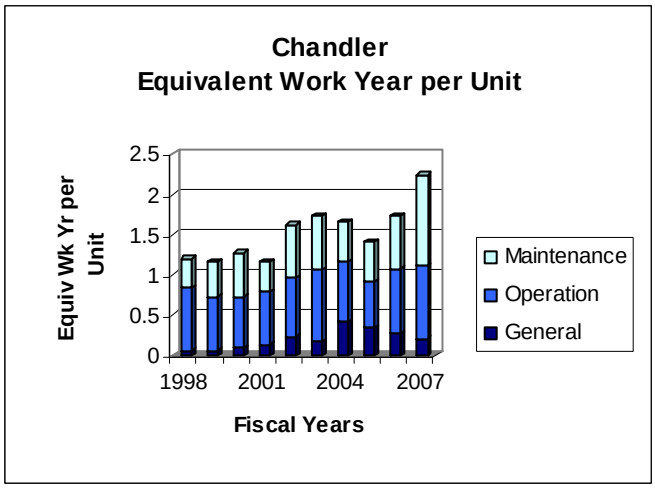


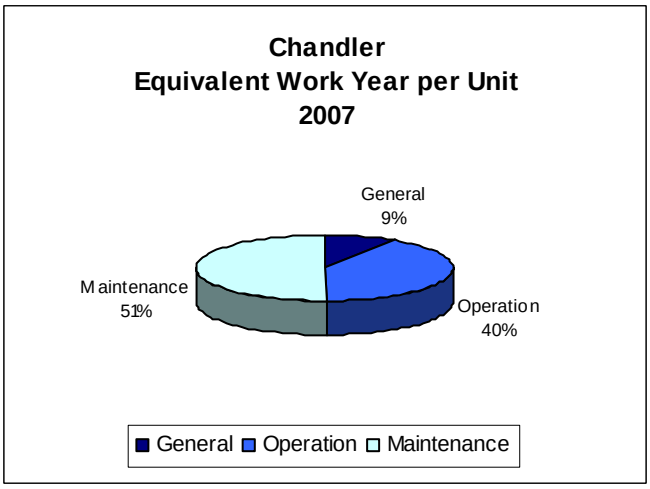


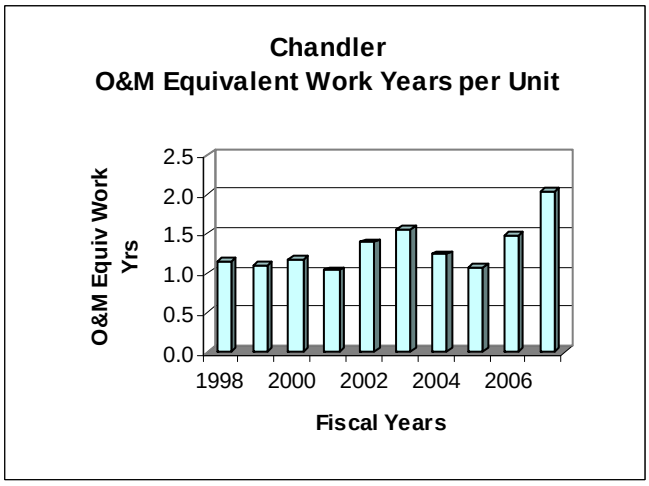


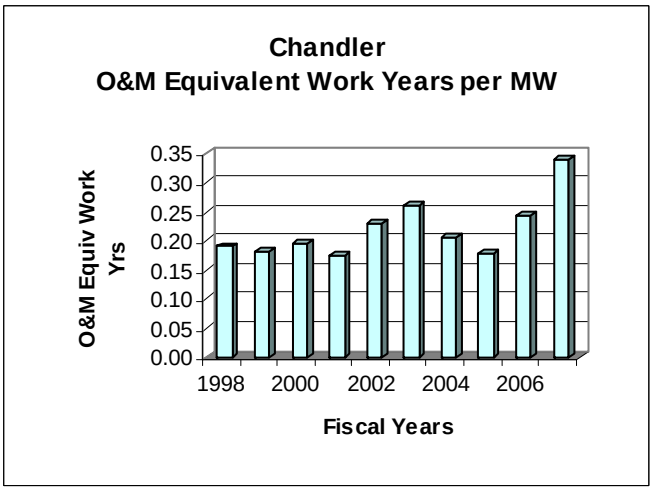
Benchmark 4
Workforce Deployment

Chandler FY 2007 Equivalent Work Staffing Year Levels						
	Equivalent Work Year Staffing Charged to Powerplant	Leave Additive	Denver and Washington Equivalent Work Year Staffing Additive	Total Equivalent Work Year Allocated to Powerplant	Total Equivalent Staffing Work Year per Generating Unit	Total Equivalent Work Year Staffing per Megawatt
General	0.34	0.04	0.04	0.42	0.21	0.03
Operation	1.64	0.17	0.00	1.81	0.91	0.15
Maintenance	2.04	0.22	0.00	2.26	1.13	0.19
Total Staffing	4.03	0.43	0.04	4.49	2.24	0.37

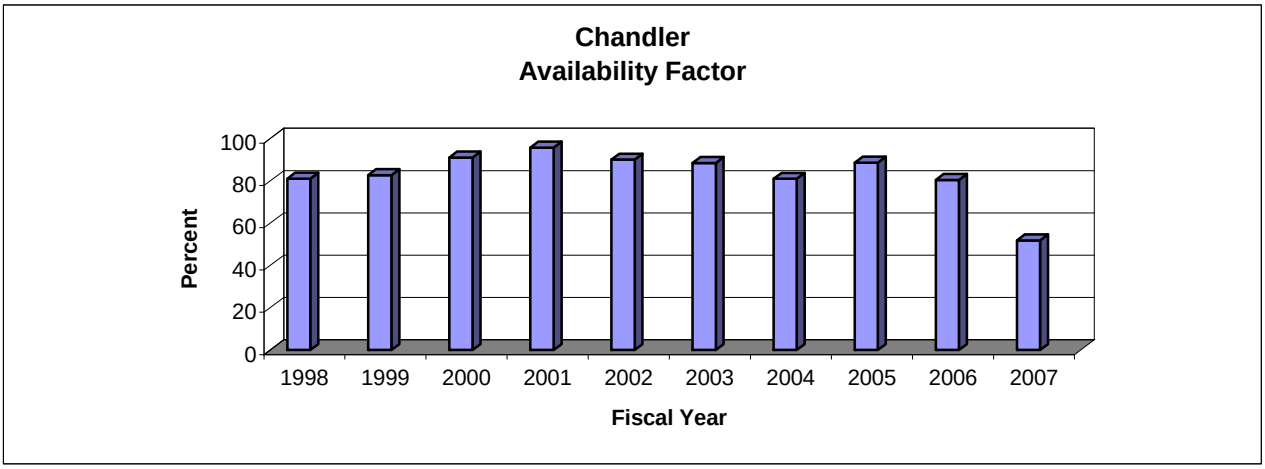




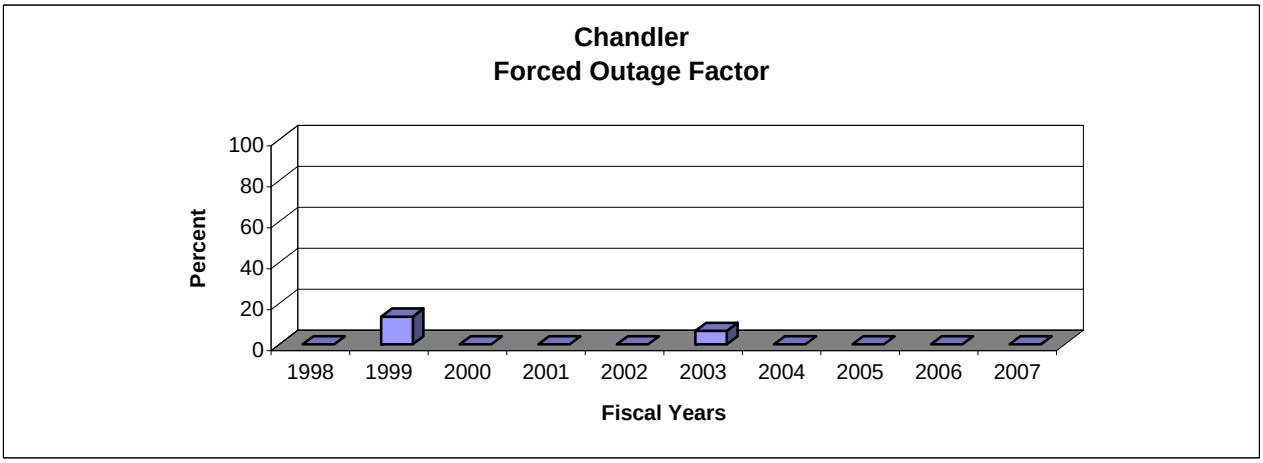




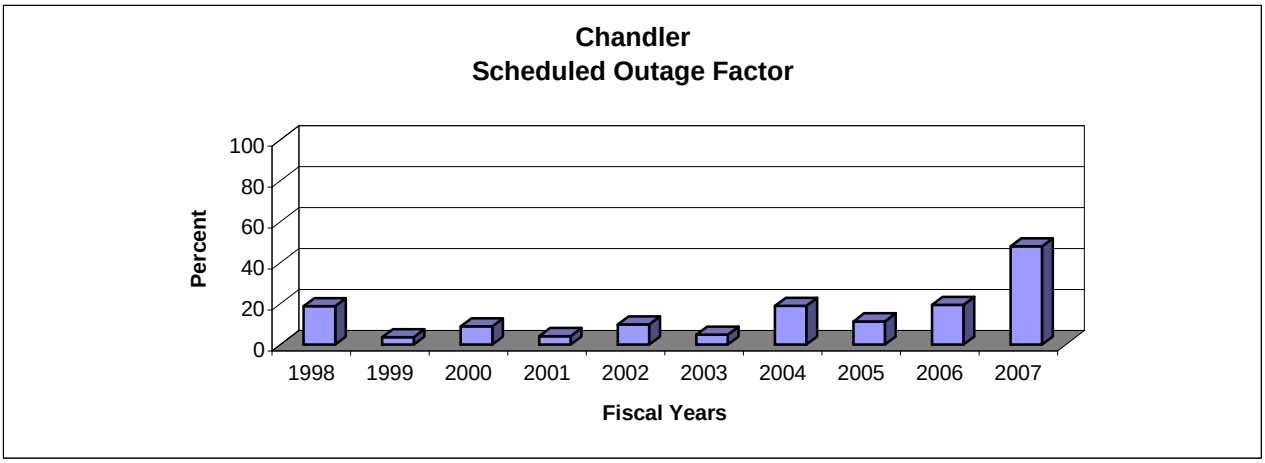
Benchmark 5
Availability Factor



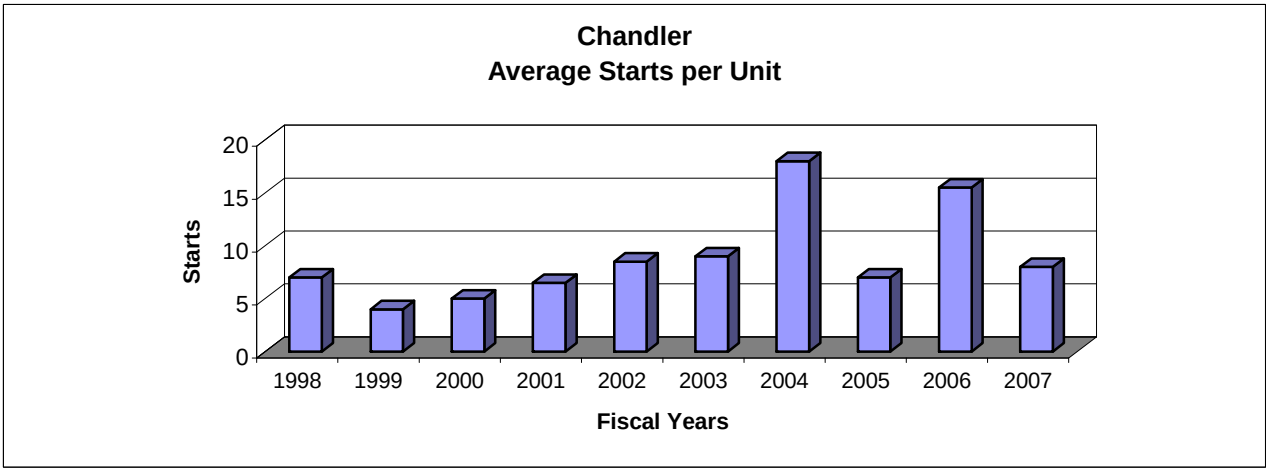
Benchmark 6
Forced Outage Factor



Benchmark 7
Scheduled Outage Factor



Starts

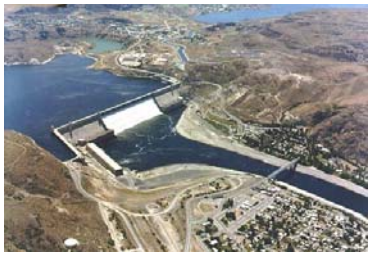


Benchmark Data Comparison

Fiscal Year 2007	Chandler Powerplant	Reclamation Average 10-30 MW Group	Total Reclamation Average	Industry Average	Best Performers
Wholesale Firm Rate Mills/kWh	24.8	Not Applicable	*22.45	Not Available	Not Available
Production Cost as Percentage of Wholesale Firm Rate	0.07%	Not Applicable	12.1%	Not Applicable	Not Applicable
O&M Cost $/MWh	76.91	16.40	2.76	***163.95	1.00
O&M Costs $/MW	165,987	62,731	7,847	***40,852	2,897
O&M Equiv Work Year per MW	0.34	0.22	0.03	Not Available	0.00
Availability Factor	51.9	88.5	82.3	**88.64	98.54
Forced Outage Factor	0.0	0.1	2.6	**2.61	0.00
Scheduled Outage Factor	48.1	11.4	15.1	**8.74	0.00

*Weighted by Net Generation
**2006 NERC Average
*** Energy Information Administration Data

Grand Coulee Powerplant
Columbia Basin Project



Plant Contact:
David G. Murillo
Power Manager

Plant Address:
Grand Coulee Powerplant
PO Box 620
Grand Coulee WA 99133-0620

Telephone Numbers:
Phone: (509) 633-9501
Fax: (509) 633-9138

E-Mail Address:
dmurillo@pn.usbr.gov

Reclamation Region: Pacific Northwest

NERC Region: Western Electricity Coordinating Council, Northwest Power Pool Area

PMA Service Area: Bonneville Power Administration

Project Authorization: The Columbia Basin Project began with fund allocation for Grand Coulee Dam pursuant to the National Industrial Recovery Act of June 16, 1933. The Rivers and Harbors Act approved August 30, 1935 specifically authorized the project for construction. The Columbia Basin Project Act of March 10, 1943 (57 Stat. 14), reauthorized the project, bringing it under the provisions of the Reclamation Project Act of 1939.

Construction of the Third Powerplant was authorized by Public Law 89-448 (80 Stat.200) dated June 14, 1966, as amended by Public Law 89-561 (80 Stat. 714) dated September 7, 1966.

Project Purposes: The Columbia Basin Project is a multi-purpose development using part of the resources of the Columbia River in the central part of the State of Washington. The key structure, Grand Coulee Dam, is on the main stem of the Columbia River about 90 miles west of Spokane, Washington. The extensive irrigation works extend 125 miles southward on the Columbia Plateau to the vicinity of Pasco, Washington, where the Snake and Columbia Rivers join.

The project irrigation facilities are designed to deliver a full water supply to 1,095,000 acres of land previously used only for dry farming or grazing. Of the 1,095,000 acres, approximately 550,000 are currently irrigated. Power production facilities at Grand Coulee Dam are the largest in North America.

Plant Location: Grand Coulee Dam is located in Grant and Okanogan Counties, Washington, on the Columbia River about 28 miles northeast of Coulee City, Washington.

Plant Facts: Grand Coulee Dam is the largest concrete structure ever built. This structure, which raises the water surface 350 feet above the old riverbed, is 5,233 feet long, 550 feet high, and contains 11,975,500 cubic yards of concrete. The original dam was modified for the Third Powerplant by a 1,170-foot-long, 201-foot-high forebay dam along the right abutment approximately parallel to the river and at an angle of 64 degrees to the axis of Grand Coulee Dam.

The power facilities at Grand Coulee Dam consist of a powerplant on both the left and right sides of the spillway on the downstream face of the dam. The Third Powerplant, on the downstream face of the forebay dam, the pumping generation plant on the left abutment of the dam, and an 11.95/115-kilovolt switchyard, a 230-kilovolt consolidated switchyard, and a 525-kilovolt Third Powerplant cable-spreading yard and switchyard are located high on the hills west of Grand Coulee Dam.

The Left Powerhouse contains three station service generators rated at 10,000 kW and nine generators rated at 125,000 kW. The Right Powerhouse contains 9 generators rated at 125,000 kW. The Third Powerplant contains three generators nameplate rated at 600,000 kW but able to operate up to 690,000 kW, and three generators rated at 805,000 kW. The Pump-Generating Plant contains six pumps rated at 65,000 horsepower, two pump-generators rated at 67,500 horsepower, and four pump-generators rated at 70,000 horsepower. Each of the generators is fed by an individual penstock with the largest (Third Powerplant) approximately 40 feet in diameter and carrying up to 35,000 cubic feet per second of water. One switchyard has 11.95-kilovolt local distribution and four 115-kilovolt transmission lines; one switchyard has 230-kilovolt generation (from eighteen 125,000 kW units) and eleven transmission lines; the third switchyard has 525 kilovolt generation (from six Third Powerplant Units) and four transmission lines. There are electrical connections through transformers between the 115 and 230 kilovolt switchyards and the 230 and 525 kilovolt switchyards. The main dam contains 11 drum gates, each 135 feet long and 40 outlet tubes with 102-inch ring seal gates for spilling water. The average water released from Grand Coulee Dam is 110,000 cubic feet per second. The average power generation is 21 billion kilowatt hours per year.

Plant Purpose:

Grand Coulee Dam is a key feature of Reclamation=s Columbia Basin Project in central Washington. A multi-purpose project, it provides flood control, irrigation, hydropower production, recreation, stream flows, and fish and wildlife benefits. Facilities at the dam include three powerplants, a pump-generating plant, and three switchyards. Franklin D. Roosevelt Lake behind the dam is 151 miles long with over 5,000,000 acre-feet of active storage. An average of 2,500,000 acre-feet of water is pumped annually for irrigation. Water is pumped in the Columbia Basin to irrigate approximately 550,000 acres with an ultimate potential of 1.1 million acres.

Plant History:

Construction of the original project started in 1933 and was completed in 1942. The first power was generated in 1941 and the last of the original 18 units (Right and Left Powerhouses) began production in 1950. Pumping for irrigation commenced in 1952 with six pumps installed. Six pump-generators were installed from the mid-1970's (P/G-7 and P/G-8) to the early 1980's (P/G-9 through P/G-12). Construction of the Third Powerplant and Forebay Dam commenced in 1967 with the first unit (G-19) commissioned in 1975 and the last (G-24) in 1980. The 18 original generators in the Right and Left Powerhouses have had the stator windings replaced increasing the rating from the original 108,000 kW to 125,000 kW. The last three generators in the Third Powerplant (G-22, G-23, and G-24) have had the stator windings and cores replaced and are now rated at 805 MW (825,640 kva at 0.975 power factor). Six banks (18) of the original transformers in the Left Powerhouse have been replaced with the ratings increased to 129,000 kilovolt amperes.

Present Activities:

Replacement of the original main unit (G-1 through G-18) and respective transformer protective relays are being replaced along with replacement of the original 460-volt power circuit breakers, the 250-volt DC breakers and the 120-volt AC control breakers. In conjunction with this work old lead covered control cable is being replaced and control system upgrades are being performed. This work is being performed during outages for the contractor replacing the turbine runners.

A contract was awarded to Grand Coulee Consortium (GCC), consisting of GE Hydro of Lachine, Quebec, Canada and VA Tech of Linz, Austria, to replace the turbine runners on main unit generators G-1 through G-18. The first runner was installed on unit G-3 and tested during the week of October 22, 2001. The peak efficiency measured was 95.6 percent at 323 feet of head and a servo stroke of 78 percent. This compares to the original peak turbine runner efficiency of approximately 92 percent at this head. The contractor has completed 10 units, 6 in the Left Powerhouse and 4 in the Right Powerhouse. The contractor was nearly completed with G-14 (Right Powerhouse) by the end of FY 2007 and is continuing manufacturing and installing turbine runners on one unit in the Left Powerhouse and one unit in the Right Powerhouse concurrently. The contractor has proposed an accelerated schedule in order to complete the project earlier than is currently

scheduled.

BPA is currently funding plant/unit optimization studies that is ongoing for Grand Coulee generators as well an overall hydro system optimization effort of the entire Federal Columbia River Power System (FCRPS).

The contractor replacing the Pump unit and G-1 through G-18 air circuit breakers with new SF_6 ABB circuit breakers completed all installations in FY2005.

Pump Unit P-3 had it's impeller replaced by a contractor. During return to service checkout procedures, a seal ring failure occurred requiring the contractor to correct the problem. The unit was returned to service in the spring of calendar year 2008. A stator core and winding replacement is scheduled for this same unit in the fall of calendar year 2009.

A contract was awarded to replace eight station air system air compressors with installation completed in FY 2005.

A contract was awarded to upgrade the 11.95-kV switchgear. A new arrangement of switchgear is currently being installed which will provide better reliability for station service power to the switchyards. Completion of this upgrade is scheduled for FY2009.

A contract was awarded to provide new generator air housing coolers for units G1-18. The first set of coolers will be received in FY2007 with the remainder to be supplied on a scheduled basis from FY 2008 through FY 2013.

A contract was awarded for upgrading six elevators throughout the dam and powerhouses. Three of the elevators are in the Pumping/ Generating Plant and three of them are in the Dam structure. Scheduled completion of this contract is calendar year 2008.

A contract was awarded to replace the log booms upstream of the dam. This work was completed in FY2007.

The breakers in the 500 kV switchyard are being replaced. By the end of calendar year 2007, 12 of 17 breakers will be replaced with new SF6 gas insulated breakers.

Future Planned Activities: Efforts continue with specification preparations, issuing a request for proposals and review of proposals for a new Supervisory Control and Data Acquisition (SCADA) System. This project is scheduled for award in FY 2008.

The powerplant roofs of the Left, Right, and Third Powerplants will be resurfaced by contract in FY2008.

The projects bridge and gantry cranes will be upgraded with new controls and variable frequency drives. This project will begin in FY2008.

A recent failure of a single phase transformer on Unit G10 resulted in re-evaluation of the need for replacement transformers. A new set of transformers will be purchased for this unit with a contract to be awarded in calendar year 2008. Additional replacement transformers for four units in the Left Powerplant will be purchased beginning in FY2010. Due to condition and age of the transformers in the Third Powerplant, 6 new 276MVA transformers will be purchased. Specifications will be issued beginning in FY2008.

The protective relays for the 500kV and 230kV switchyards will be replaced beginning in FY 2009. This will provide more reliable service between the powerplants and the switchyards and for the power system.

The Third Powerplant units are approaching the time for mechanical overhauls. Planning efforts are underway to determine the extent of this work and also to evaluate if increasing the capacity is a technically and economically viable alternative.

The project personnel are working with the Bonneville Power Administration (BPA) and the capital work group of the Bureau/BPA's Joint Operating Committee (JOC). They are working on various capital replacement items of the project including excitation systems, governor control systems, station service equipment, and switchyard circuit breaker replacement.

Special Issues:

Since Grand Coulee has such a large amount of generation; it is used as a peaking facility by BPA. Fluctuations in the downstream tailbay/river have required extensive downstream stabilization measures, including elaborate monitoring and pump systems to maintain riverbank stability.
BPA has requested an evaluation of the downstream tail water elevation change restrictions in an effort to allow BPA additional flexibility in peaking operations.

Water releases from Grand Coulee play a significant role in providing water for the fish that have been listed under the Endangered species Act. In addition, to the extent possible, spill is minimized to keep the Total Dissolved Gas (TDG) below the state standards. As part of the power peaking operation the pumps and pump-generators in the Pump-Generating Plant are load factored (used for pumping during light load hours) to allow BPA to sell more power during peak hours and also to provide a load during light load hours (to reduce spill). The pump-generating plant provides an approximate load swing of 900 MW - from consuming 600 MW with all 12 units pumping to generating 300 MW with 6 pump-generators generating.

River operations have been modified to comply with biological opinions and court decisions. The water supply for FY2007 above Grand Coulee was sufficient to provide benefits for endangered species, power supplies, and agricultural growers.

River:	Columbia River	**Plant Type:**	Conventional and Pump Generator
Powerhouse Type:	Above Ground	**Turbine Type:**	Francis
Original Nameplate Capacity:	1,974,000 kW	**Installed Capacity:**	6,809,000 kW
Year of Initial Operation:	Left and Right - 1941 Third - 1975 Pump-Generator - 1973	**Age:**	67 years
Net Generation (FY-2007): Left, Right, and Third	21,859.0 GWh	**Rated Head:**	330 feet
		Remotely Operated:	No
Average Plant Factor (FY-2007):	36.9 percent	**Production Mode:**	Intermediate

Ancillary Services

Grand Coulee
Ancillary Services

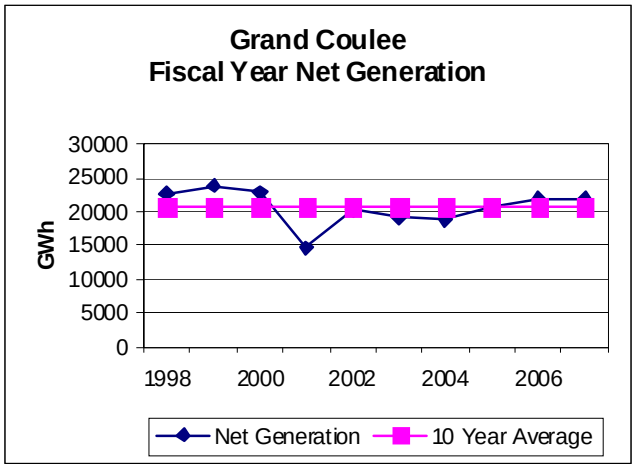
Spinning Reserve	Yes
Non-Spinning Reserve	Yes
Replacement Reserve	Yes
Regulation/Load Following	Yes
Black Start	Yes
Voltage Support	Yes

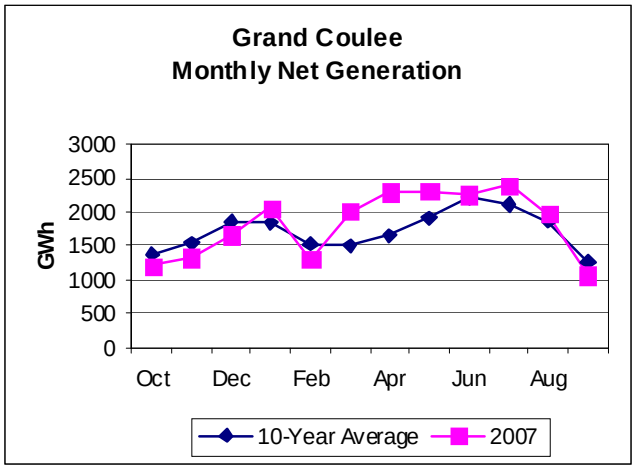
Grand Coulee Generators Existing Number and Capacity			
Unit #	Original Capacity (kW)	Capacity Increased (kW)	Present Capacity (kW)
01	108,000	17,000	125,000
02	108,000	17,000	125,000
03	108,000	17,000	125,000
04	108,000	17,000	125,000
05	108,000	17,000	125,000
06	108,000	17,000	125,000
07	108,000	17,000	125,000
08	108,000	17,000	125,000
09	108,000	17,000	125,000
10	108,000	17,000	125,000
11	108,000	17,000	125,000
12	108,000	17,000	125,000
13	108,000	17,000	125,000
14	108,000	17,000	125,000
15	108,000	17,000	125,000
16	108,000	17,000	125,000
17	108,000	17,000	125,000
18	108,000	17,000	125,000
19	600,000	-	600,000
20	600,000	-	600,000
21	600,000	-	600,000
22	700,000	105,000	805,000
23	700,000	105,000	805,000
24	700,000	105,000	805,000
LS1	10,000	-	10,000
LS2	10,000	-	10,000
LS3	10,000	-	10,000
27 units	5,874,000	621,000	6,495,000

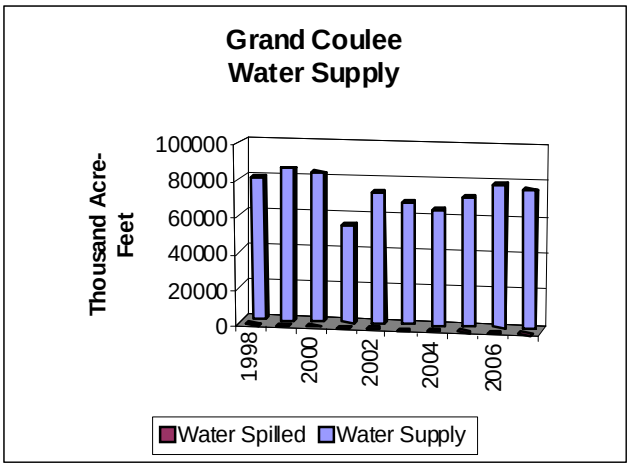
G-19, G-20, G-21 have an operating capability of 690 MW.

Grand Coulee P/G Generators Existing Number and Capacity			
Unit #	Original Capacity (kW)	Capacity Increased (kW)	Present Capacity (kW)
PG07	50,000	-	50,000
PG08	50,000	-	50,000
PG09	53,500	-	53,500
PG10	53,500	-	53,500
PG11	53,500	-	53,500
PG12	53,500	-	53,500
6 units	160,500	-	160,500

Generation

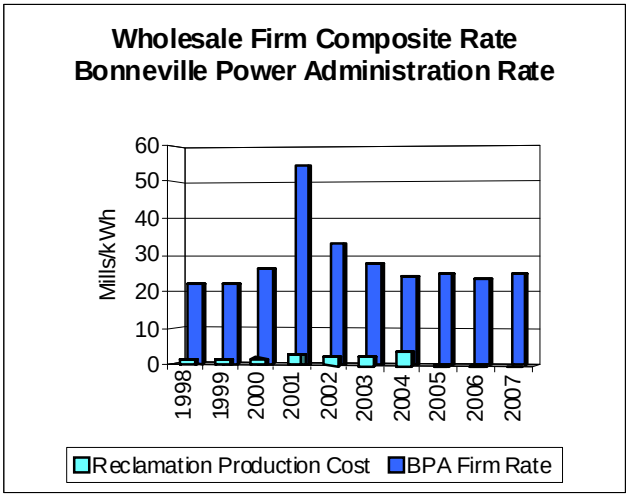




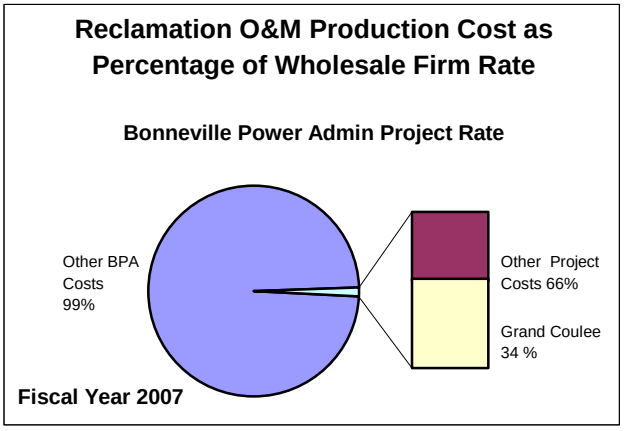


Prime Laboratory Benchmarks

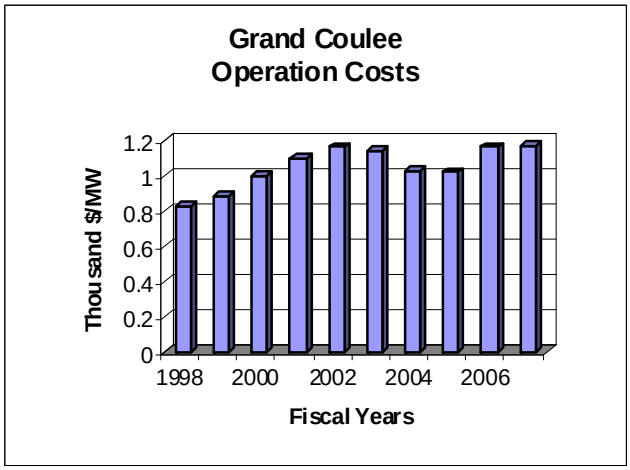
Benchmark 1
Wholesale Firm Rate

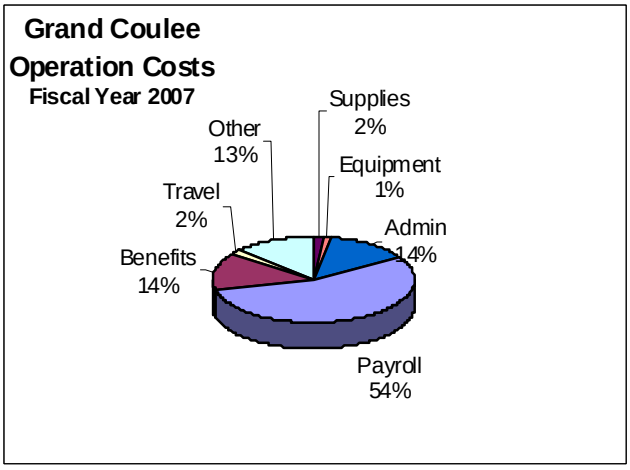


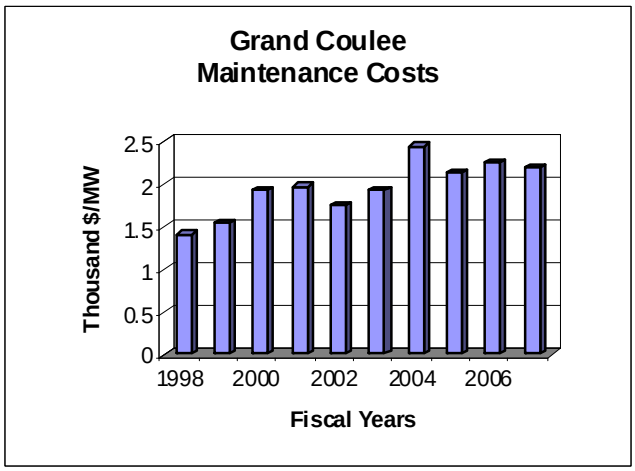
Benchmark 2
Reclamation=s Production Cost as Percentage of Wholesale Firm Rate

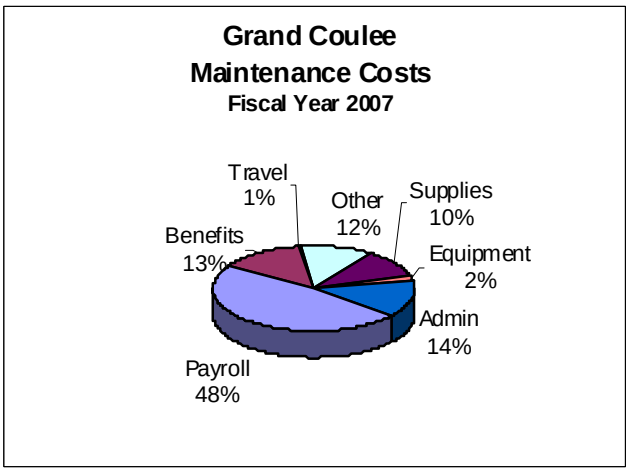


Benchmark 3
Production Cost

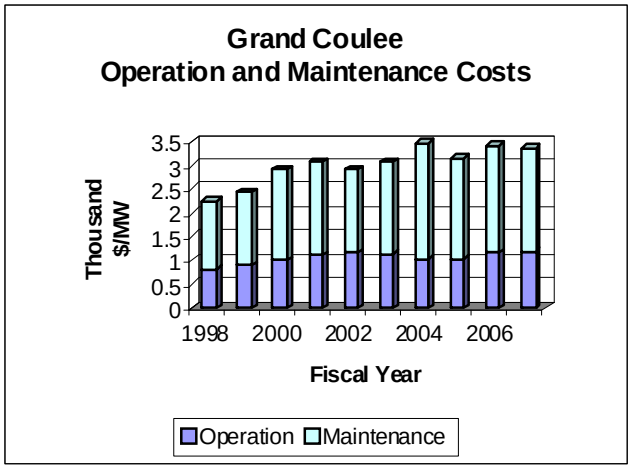


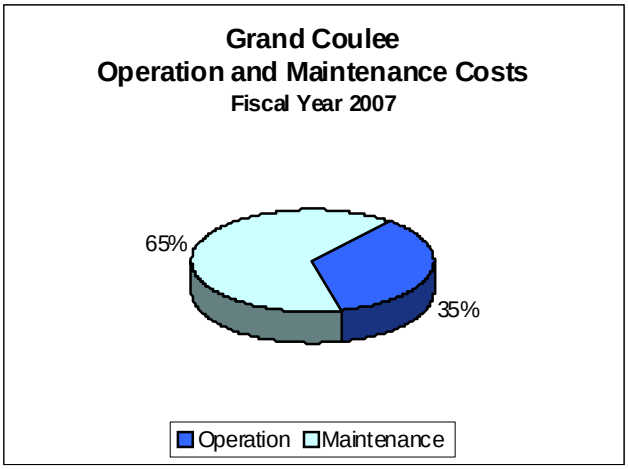


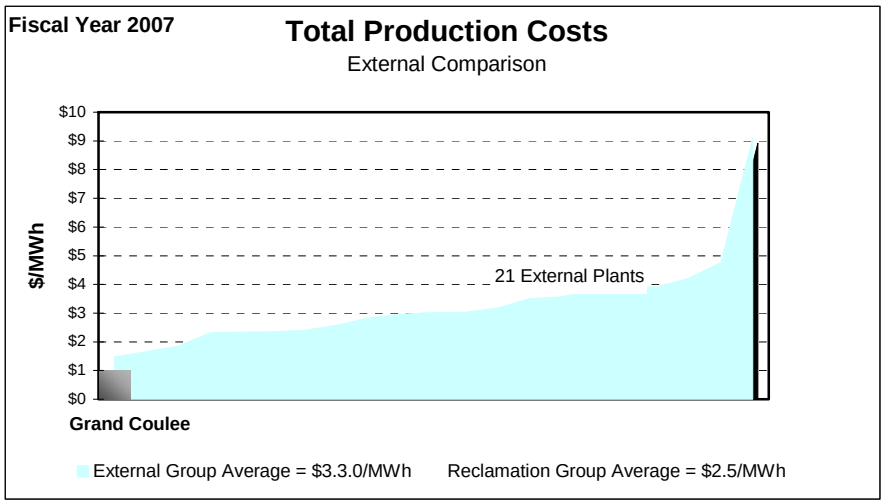


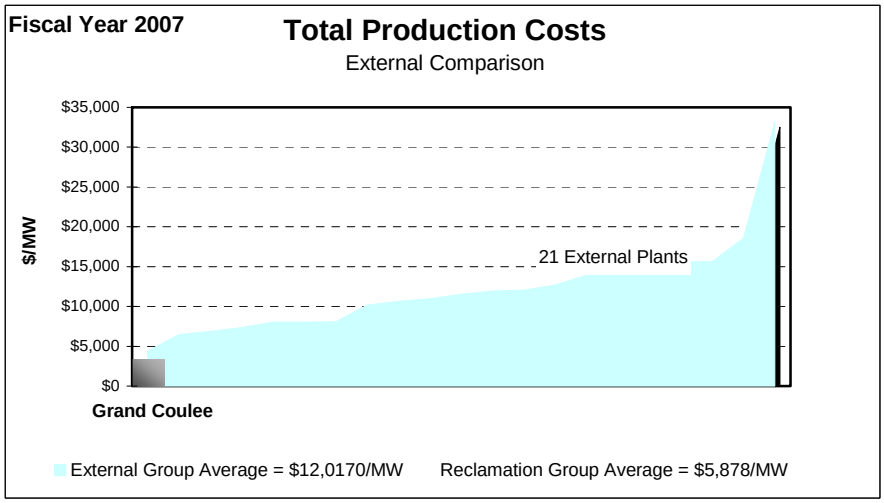


Benchmark 3
Production Cost



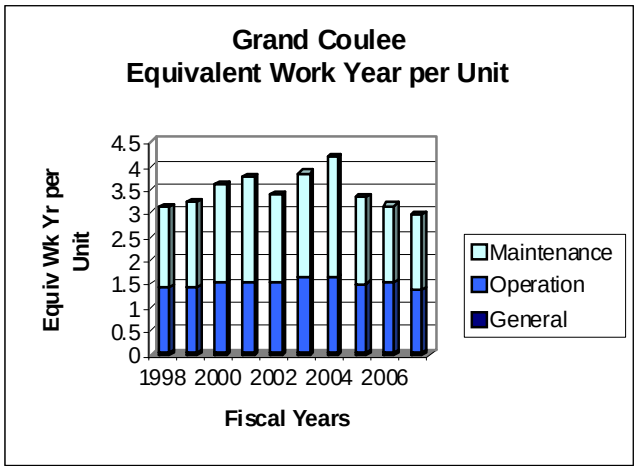


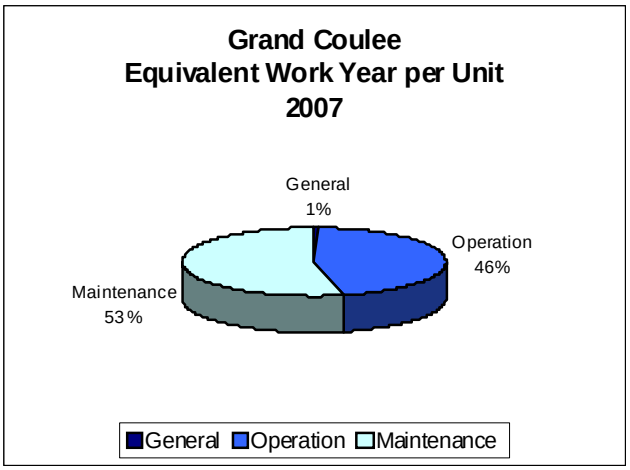


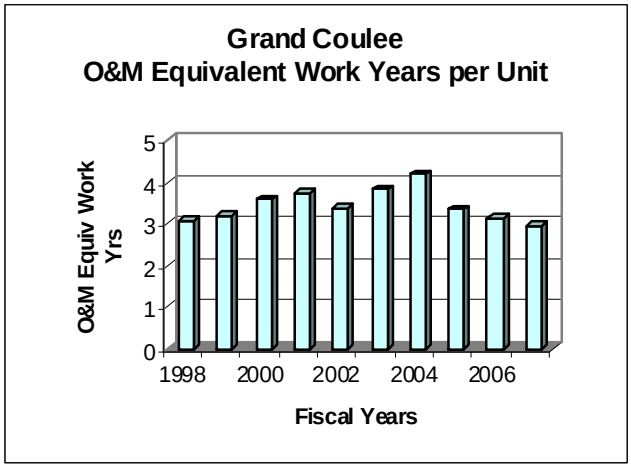


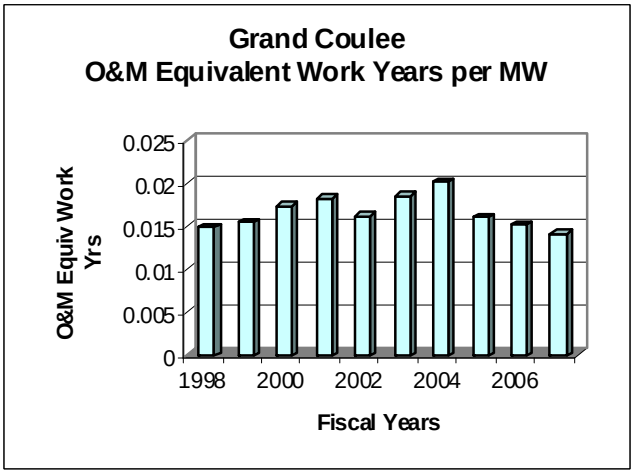
Benchmark 4
Workforce Deployment

Grand Coulee FY 2007 Equivalent Work Staffing Year Levels						
	Equivalent Work Year Staffing Charged to Powerplant	Leave Additive	Denver and Washington Equivalent Work Year Staffing Additive	Total Equivalent Work Year Allocated to Powerplant	Total Equivalent Staffing Work Year per Generating Unit	Total Equivalent Work Year Staffing per Megawatt
General	0.06	0.01	0.59	0.65	0.02	0.00
Operation	40.53	4.29	0.00	44.82	1.36	0.01
Maintenance	47.42	5.02	0.00	52.44	1.59	0.01
Total Staffing	88.00	9.32	0.59	97.91	2.97	0.01

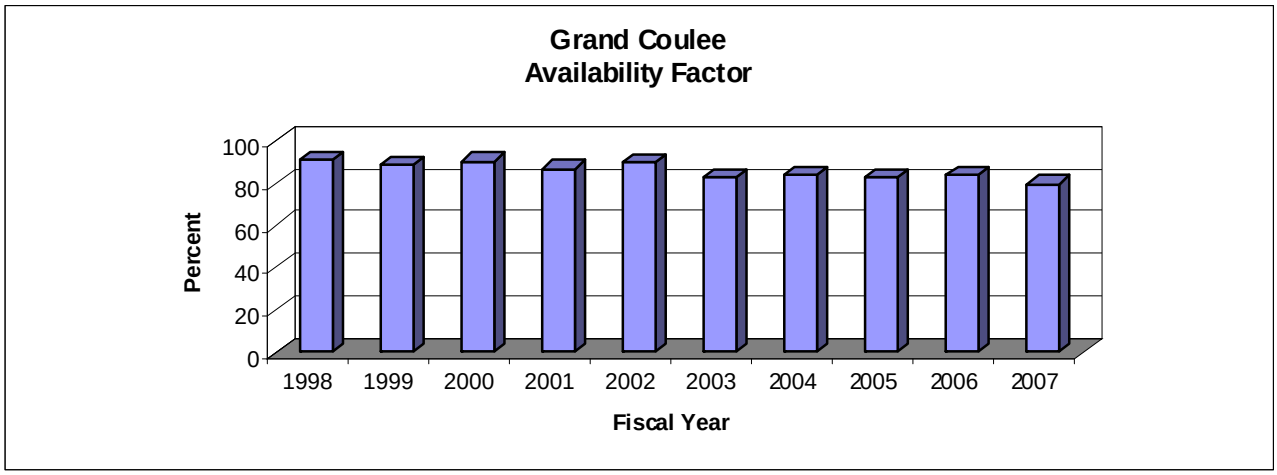




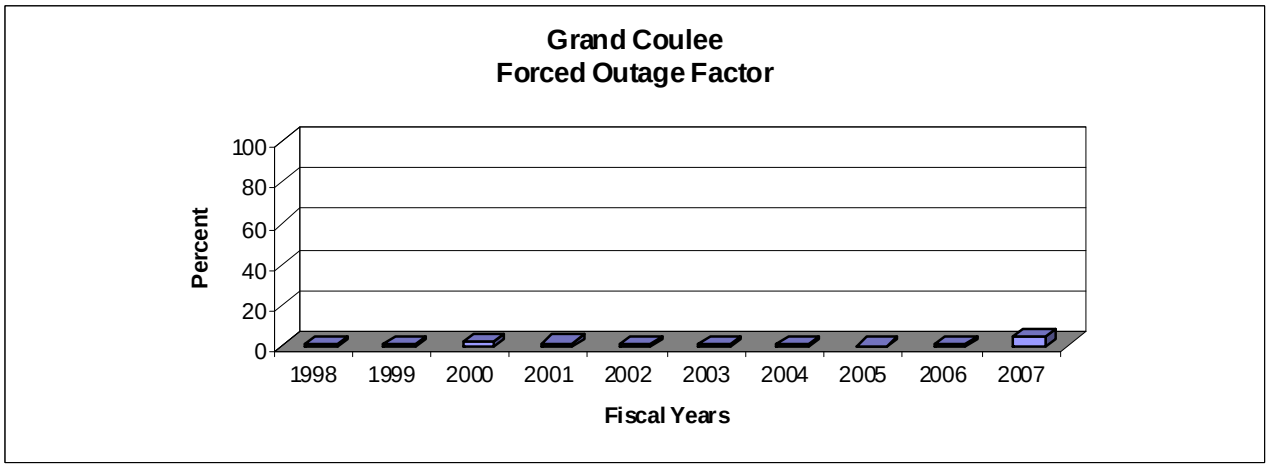




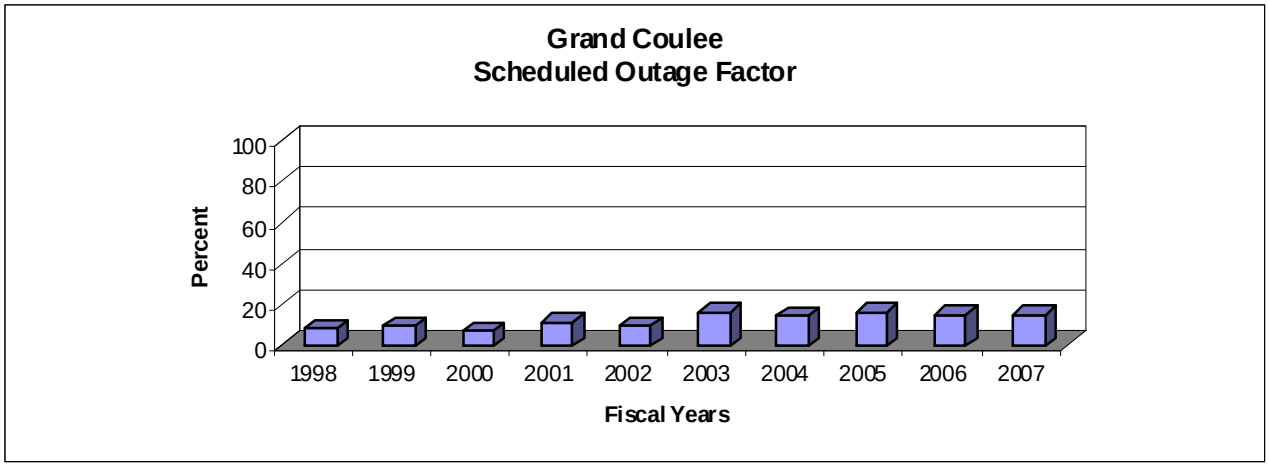
Benchmark 5
Availability Factor



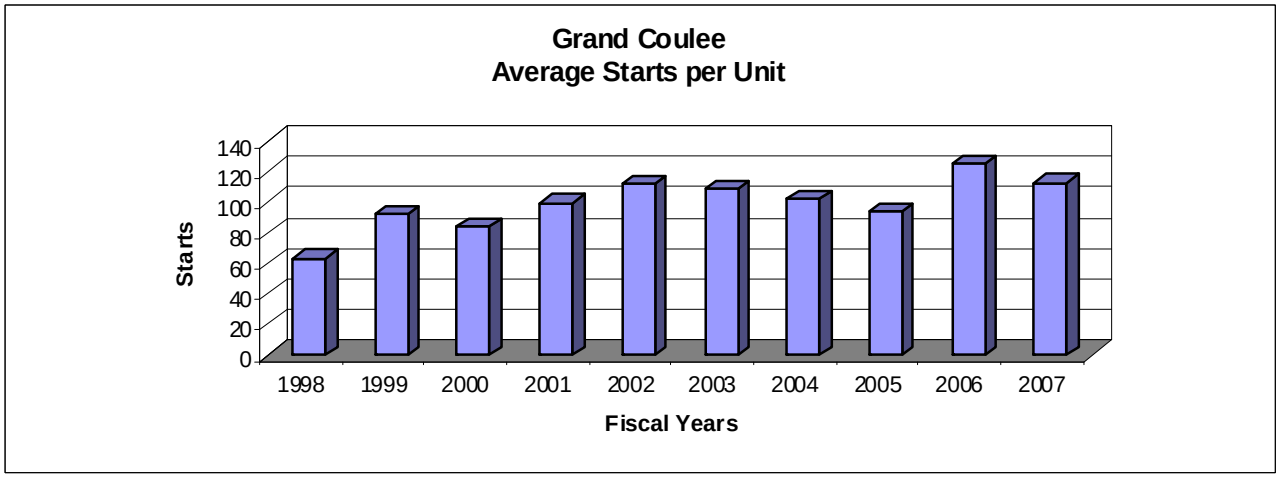
Benchmark 6
Forced Outage Factor



Benchmark 7
Scheduled Outage Factor



Starts

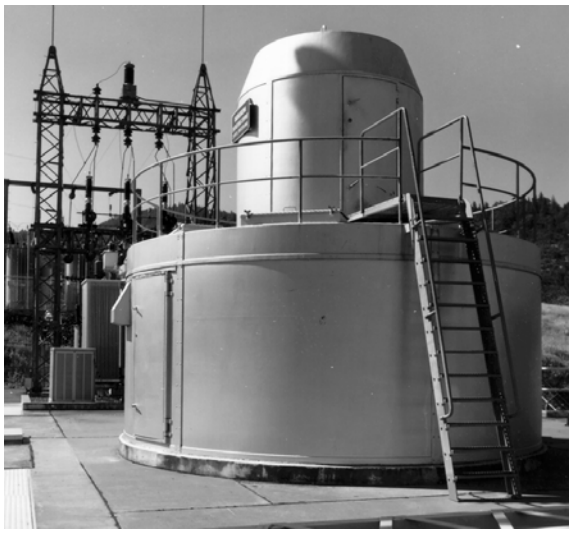


Benchmark Data Comparison

Fiscal Year 2007	Grand Coulee Powerplant	Reclamation Average 500+ MW Group	Total Reclamation Average	Industry Average	Best Performers
Wholesale Firm Rate Mills/kWh	24.8	Not Applicable	*22.45	Not Available	Not Available
Production Cost as Percentage of Wholesale Firm Rate	0.8%	Not Applicable	12.1%	Not Applicable	Not Applicable
O&M Cost $/MWh	1.00	1.65	2.76	***3.28	1.00
O&M Costs $/MW	3,368	4,863	7,847	***12,0170	2,897
O&M Equiv Work Year per MW	0.01	0.02	0.03	Not Available	0.0
Availability Factor	80.0	81.93	82.3	**88.64	98.5
Forced Outage Factor	4.9	3.15	2.6	**2.61	0.0
Scheduled Outage Factor	15.1	14.92	15.1	**8.74	0.0

*Weighted by Net Generation
**2006 NERC Average
*** Energy Information Administration Data

Green Springs Powerplant
Rogue River Project



Plant Contact:
Terry Kent
Program Manager, Facilities O&M

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Ashland OR 97520

Telephone Numbers:
Phone: 208-378-5290
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E-Mail Address:
tkent@pn.usbr.gov

Reclamation Region: Pacific Northwest

NERC Region: Western Systems Coordinating Council, Northwest Power Pool Area

PMA Service Area: Bonneville Power Administration

Project Authorization: Congress authorized the Talent Division of the Rogue River Project in Public Law 606, 83d Congress, 2d Session, approved August 20, 1954, (68 Stat. 752).

Project Purposes: The Talent Division of the Rogue River Basin Project provided for construction, rehabilitation, and improvement of the irrigation facilities of three privately owned irrigation districts in the vicinity of Medford, Oregon, and the provision for supplemental water for these lands. A collection canal system and three reservoirs are used to divert the project water supply through a transbasin tunnel into a tributary of the Rogue River.

Plant Location: Green Springs Power plant is located in Jackson County, Oregon, about 10 miles east of Ashland, Oregon.

Plant Facts: The Green Springs tunnel and power conduit are 6,650 feet long and connect to the penstock, which is 60 inches in diameter and 9,000 feet long. The Green Springs Powerplant is an outdoor-type plant with a capacity of 16,000 kilowatts and a discharge of 133 cubic feet per second operating under a head of 1,800 feet. The powerplant is generally manned on a two-shift basis.

Plant Purpose: Green Springs Powerplant was constructed to take advantage of the head drop of the transbasin diversion to produce power for commercial sales to assist repayment of the division costs.

Plant History: The Green Springs Powerplant was placed in service in 1960 and has helped meet expanding power demands in southern Oregon and northern California. Revenues have contributed significantly to the repayment of construction costs of the Talent Division. The generator was rewound and the switchyard rehabilitated in 1993.

Present Activities: Normal operations

Future Planned Activities: Unit Transformer replacement and Switchyard Mods. will be done in Spring 2010.

Special Issues: None

River:	Trans Mountain Diversion	**Plant Type:**	Conventional
Powerhouse Type:	Above Ground	**Turbine Type:**	Impulse
Original Nameplate Capacity:	16,000 kW	**Installed Capacity:**	17,290 kW
Year of Initial Operation:	1960	**Age:**	47 years
Net Generation (FY-2007):	64.0 GWH	**Rated head:**	1,800 feet
Average Plant Factor (FY-2007):	42.4 percent	**Remotely Operated:**	No
Production Mode:	Intermediate		

Ancillary Services

Green Springs
Ancillary Services

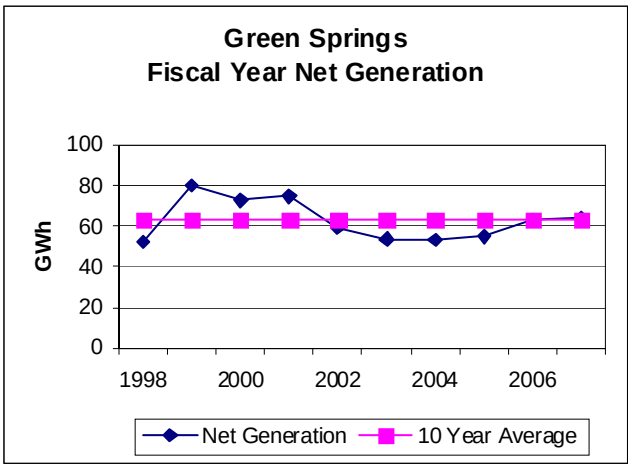
Spinning Reserve	No
Non-Spinning Reserve	No
Replacement Reserve	No
Regulation/Load Following	No
Black Start	No
Voltage Support	Yes

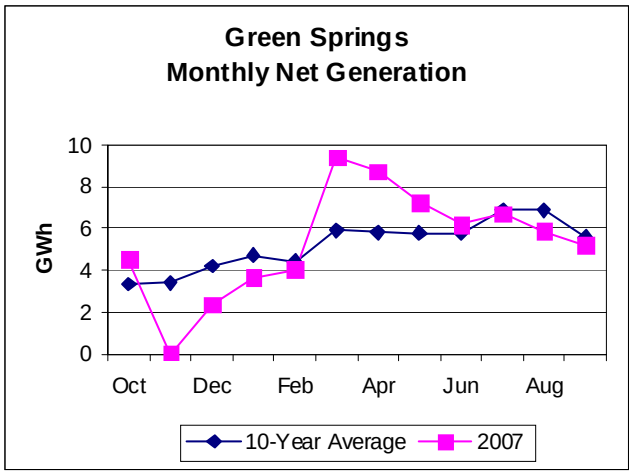
Generators

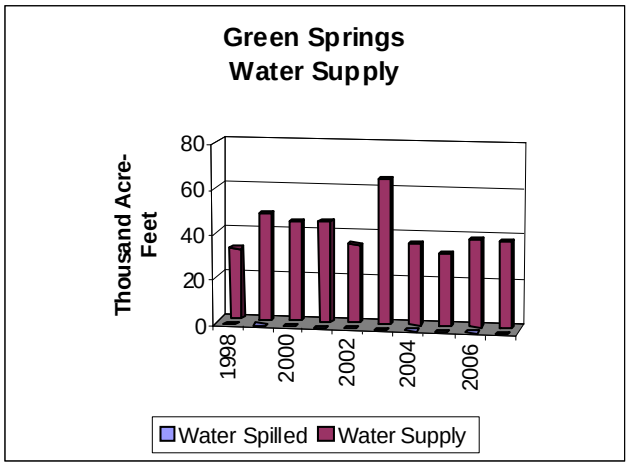
Green Springs Generators
Existing Number and Capacity

Unit #	Original Capacity (kW)	Capacity Increased (kW)	Present Capacity (kW)
1	16,000	1,290	17,290
1 Unit	16,000	1,290	17,290

Generation

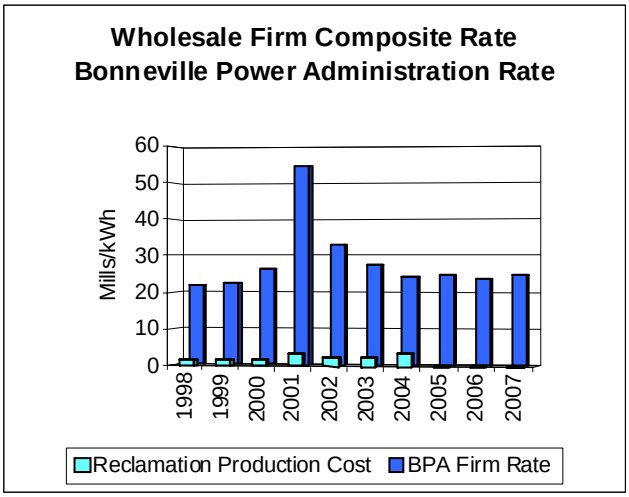

Green Springs
Fiscal Year Net Generation
GWh
100
80
60
40
20
0
1998
2000
2002
2004
2006
Net Generation
10 Year Average


Green Springs
Monthly Net Generation
GWh
10
8
6
4
2
0
Oct
Dec
Feb
Apr
Jun
Aug
10-Year Average
2007

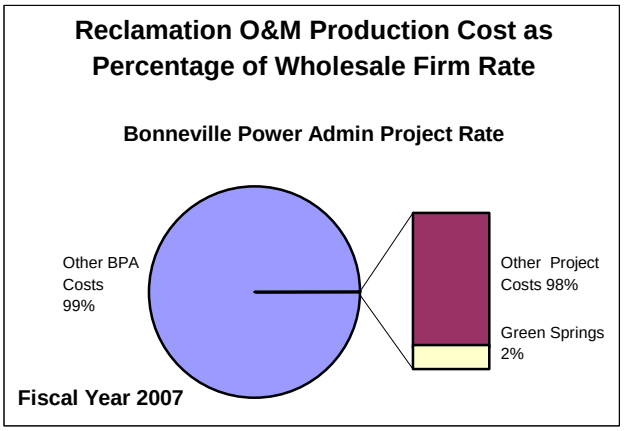

Green Springs
Water Supply
Thousand Acre-Feet
80
60
40
20
0
1998
2000
2002
2004
2006
Water Spilled
Water Supply

Prime Laboratory Benchmarks

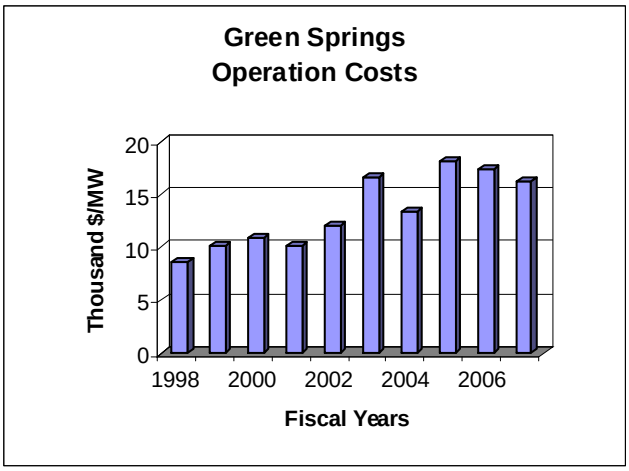
Benchmark 1
Wholesale Firm Rate

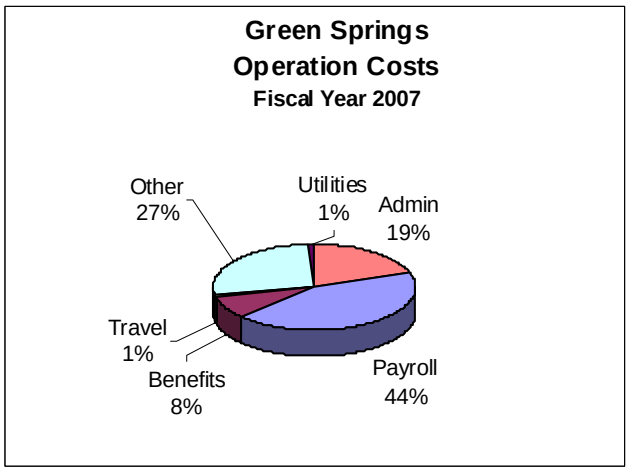


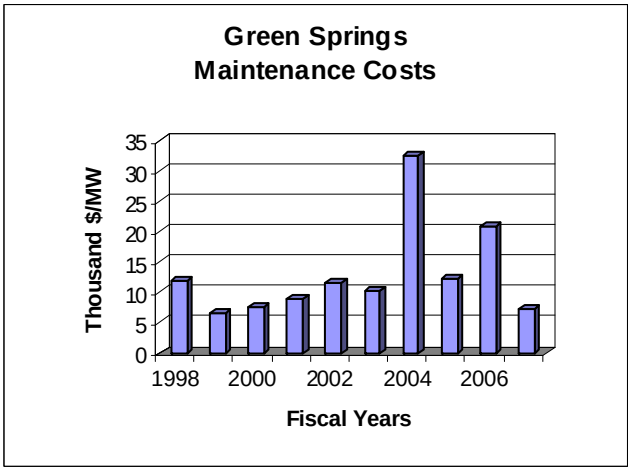
Benchmark 2
Reclamation's Production Costs as Percentage of Wholesale Firm Rate

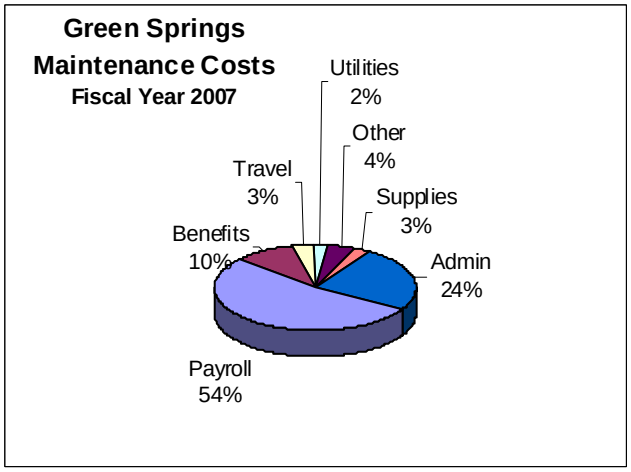


Benchmark 3
Production Cost

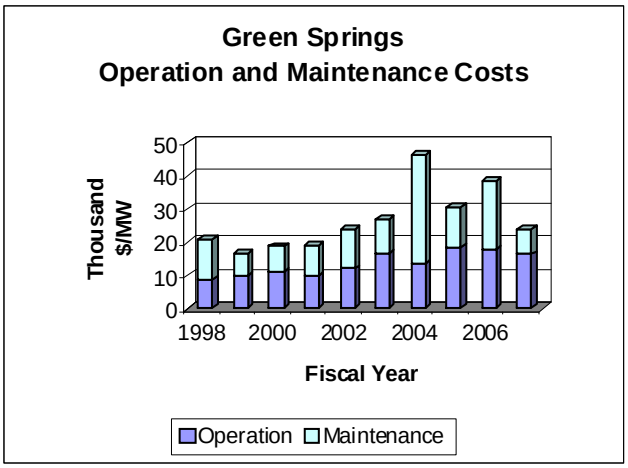


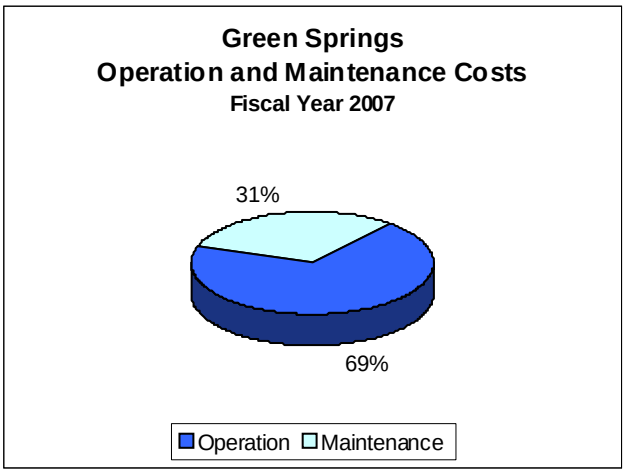


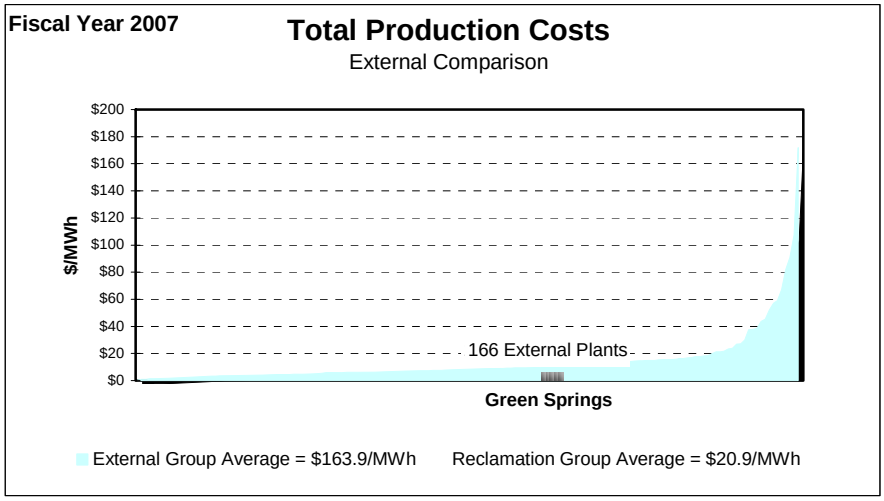


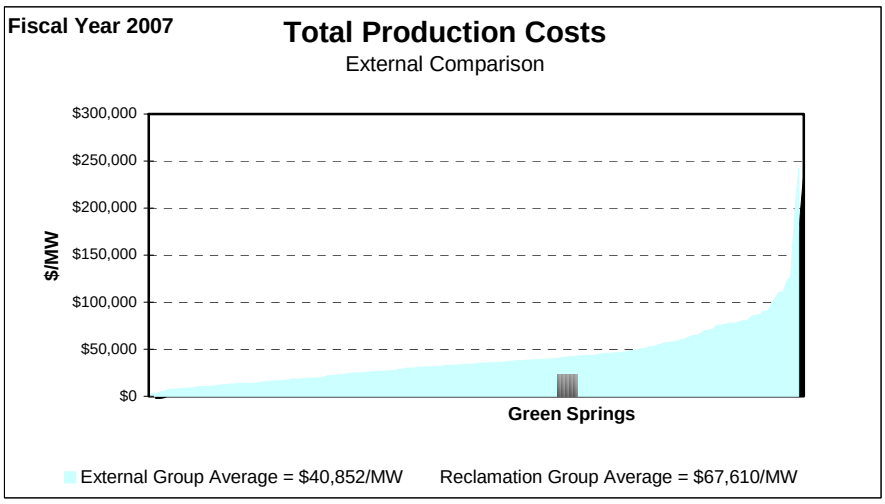


Benchmark 3
Production Cost



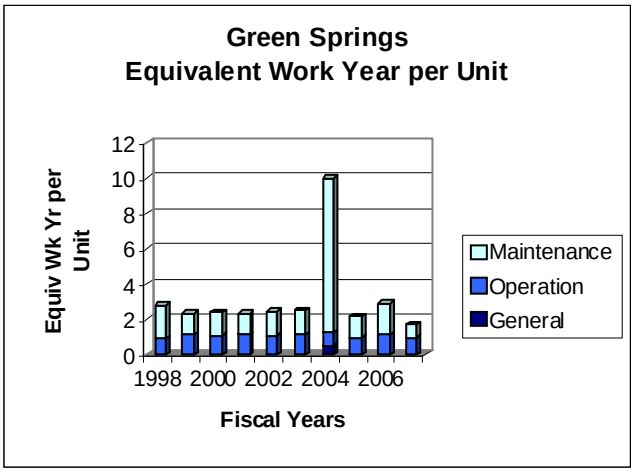


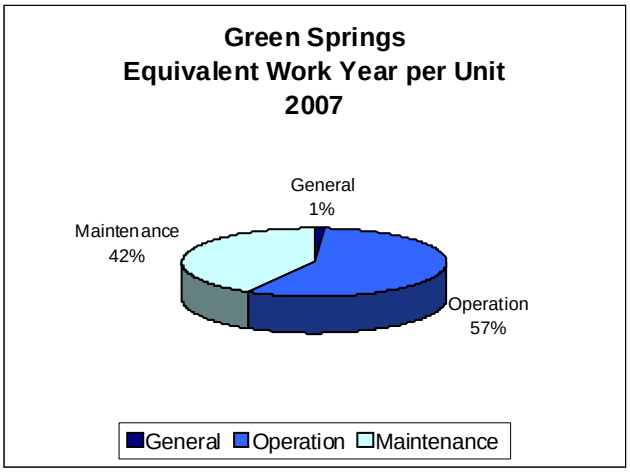


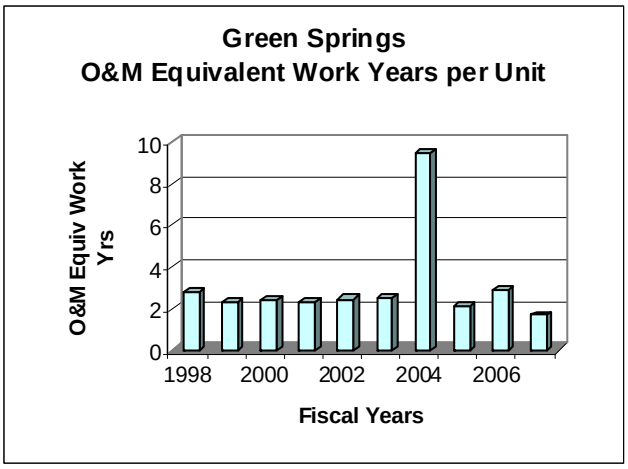


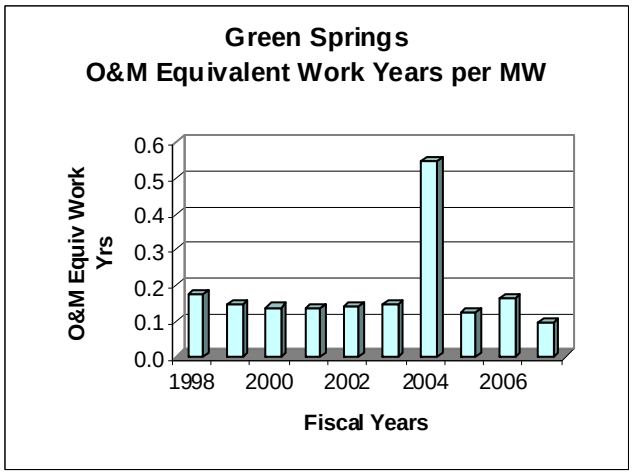
Benchmark 4
Workforce Deployment

Green Springs FY 2007 Equivalent Work Staffing Year Levels						
	Equivalent Work Year Staffing Charged to Powerplant	Leave Additive	Denver and Washington Equivalent Work Year Staffing Additive	Total Equivalent Work Year Allocated to Powerplant	Total Equivalent Staffing Work Year per Generating Unit	Total Equivalent Work Year Staffing per Megawatt
General	0.01	0.00	0.02	0.02	0.02	0.00
Operation	0.88	0.09	0.00	0.97	0.97	0.06
Maintenance	0.65	0.07	0.00	0.71	0.71	0.04
Total Staffing	1.53	0.16	0.02	1.71	1.71	0.10

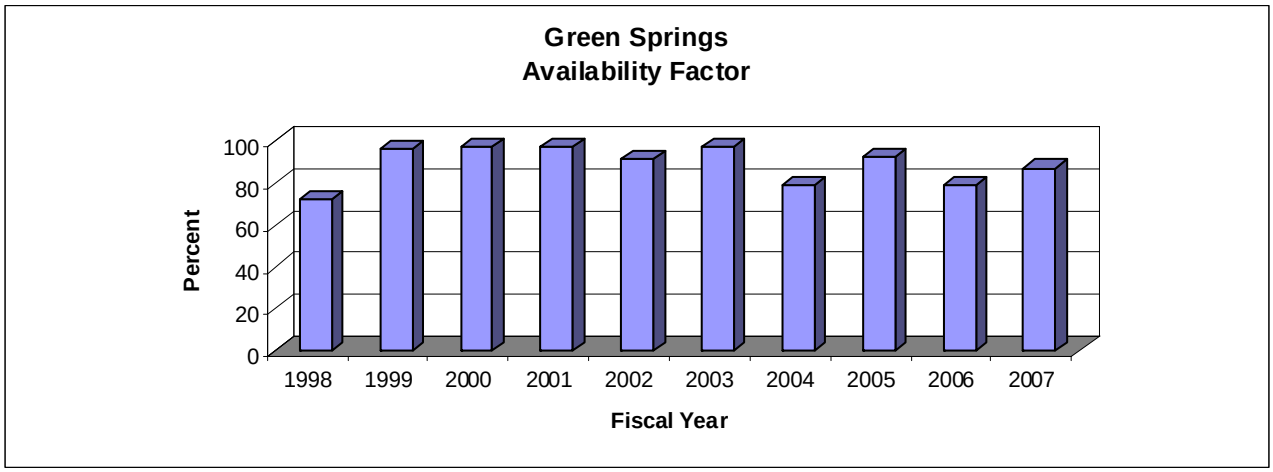




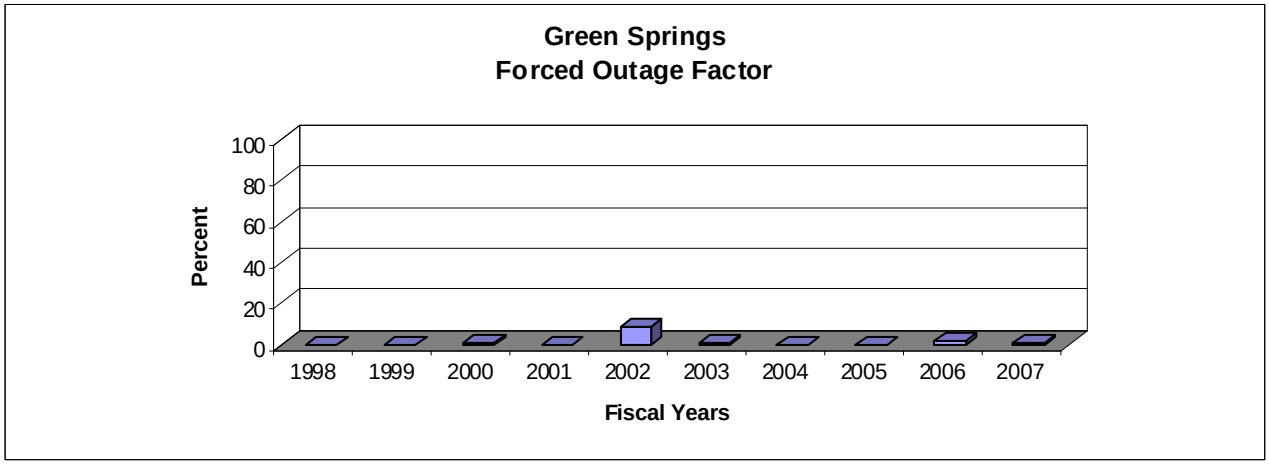




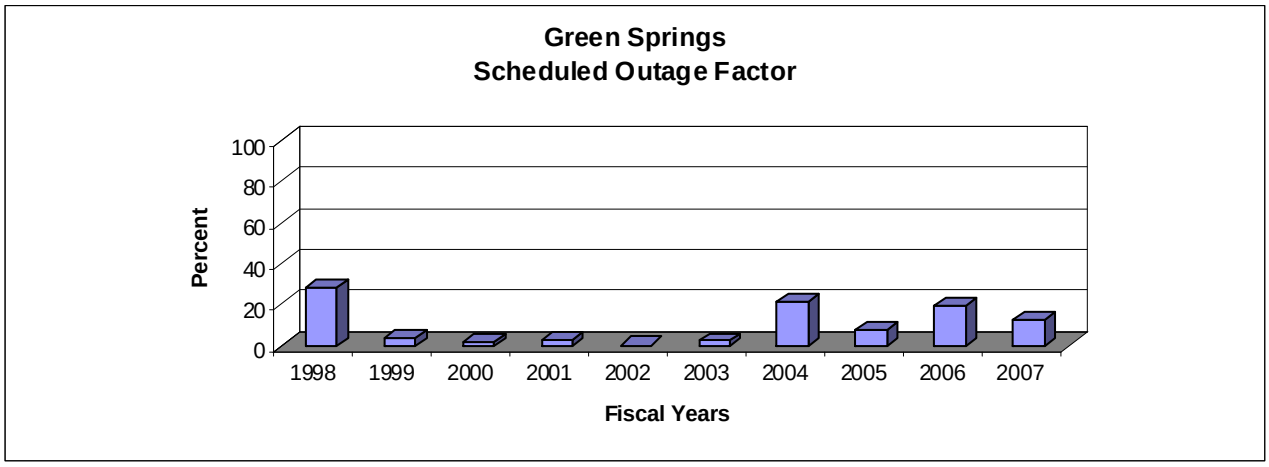
Benchmark 5
Availability Factor



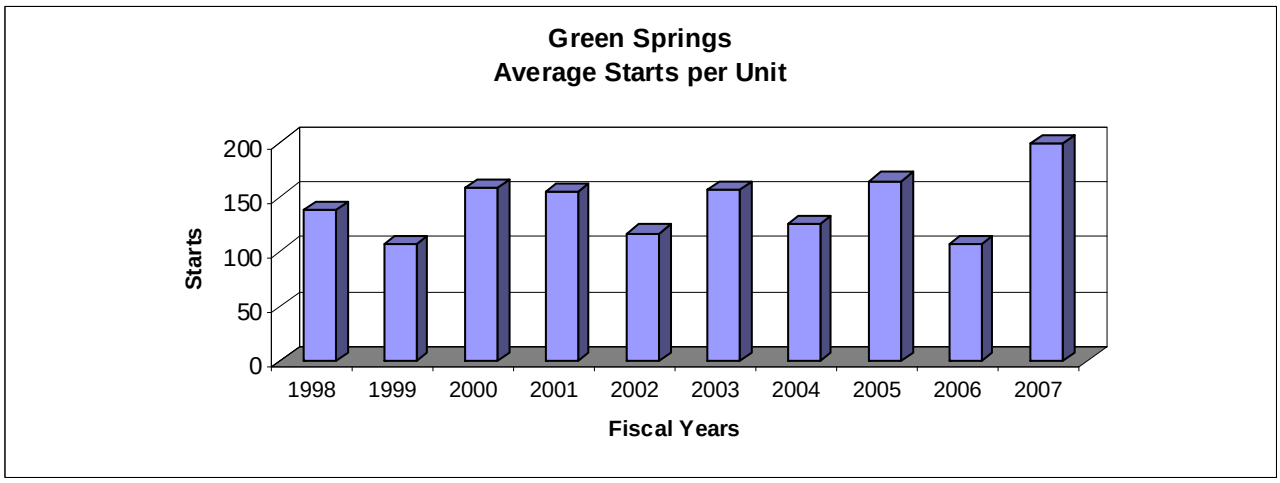
Benchmark 6
Forced Outage Factor



Benchmark 7
Scheduled Outage Factor



Starts

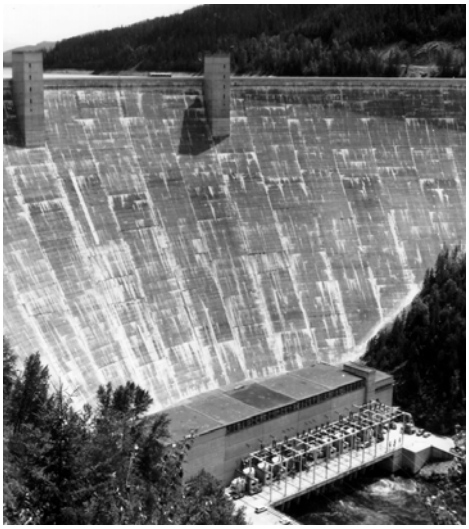


Benchmark Data Comparison

Fiscal Year 2007	Green Springs Powerplant	Reclamation Average 10-30 MW Group	Total Reclamation Average	Industry Average	Best Performers
Wholesale Firm Rate Mills/kWh	24.8	Not Applicable	*22.45	Not Available	Not Available
Production Cost as Percentage of Wholesale Firm Rate	0.01%	Not Applicable	12.1%	Not Applicable	Not Applicable
O&M Cost $/MWh	6.38	16.40	2.76	***163.95	1.00
O&M Costs $/MW	23,610	62,731	7,847	***40,852	2,897
O&M Equiv Work Year per MW	0.10	0.22	0.03	Not Available	0.00
Availability Factor	87.1	88.5	82.3	**88.64	98.5
Forced Outage Factor	0.4	0.1	2.6	**2.61	0.0
Scheduled Outage Factor	12.5	11.4	15.1	**8.74	0.0

*Weighted by Net Generation
**2006 NERC Average
*** Energy Information Administration Data

Hungry Horse Powerplant
Hungry Horse Project



Plant Contact:
Dennis Philmon
Facility Operations

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Hungry Horse MT 59919

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Fax: (406) 387-4012

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dphilmon@pn.usbr.gov

Reclamation Region: Pacific Northwest

NERC Region: Western Electricity Coordinating Council, Northwest Power Pool Area

PMA Service Area: Bonneville Power Administration

Project Authorization: The Congress authorized construction of Hungry Horse Dam under Public Law 329, 78th Congress, 2d Session, approved June 5, 1944 (58 Stat. 270).

Project Purposes: Hungry Horse is a key project in the Department of the Interior=s long-range program for multiple-purpose development of the water resources of the vast Columbia River drainage basin. The dam creates a large reservoir by withholding water in times of heavy runoff to minimize downstream flooding. This stored water is released for power generation when the natural flow of the river is low. Downstream power benefits are of major importance since more than five times as much power can be produced from water releases downstream than is produced at Hungry Horse Powerplant.

Hungry Horse Project creates power benefits that extend from the Continental Divide westward to the Pacific Ocean. At-site production averages about a billion kilowatt-hours annually. The principal power benefit from the project arises from its ability to store water through the spring flood season for later release. In an average year, this water will generate about 4.6 billion kilowatt-hours of power as it passes through a series of downstream power plants.

Plant Location: Hungry Horse Power plant is located in Flathead County, Montana, on the South Fork of the Flathead River about 9 miles southeast of Columbia Falls, Montana.

Plant Facts: The above ground powerplant building at the base of the dam houses four 107,000 kW hydroelectric generation units. The four steel penstocks are 13.5 feet in diameter and 450 feet long. Maximum operating head is 477 feet with a maximum turbine discharge of 3,150 cubic feet per second for each turbine. A selective withdrawal system is installed in each penstock trashrack to control the temperature of water released for downstream fishery enhancement.

Plant Purpose: Hungry Horse Project creates power benefits that extend from the Continental Divide westward to the Pacific Ocean. The principal power benefit from the project arises from its ability to store water through the spring flood season for later release.

Plant History: The generating units were up rated and overhauled during the period 1990-1993. Capacity of each unit went from 71,250 kW to 107,000 kW. Conversion work for remote operation began in 1994. The switchyard was rebuilt in 1995 and a penstock selective withdrawal system was also installed in 1995.

Present Activities: Installation of a guard rail along the lower power plant access road. Investigation continued with evaluation of alternatives necessary to address corrosion and re-painting of the gantry crane on top of the dam. Hook and trolley upgrades to the crane to be completed this year

Future Planned Activities: Seal coat of the lower access road planned for completion in 2007 is rescheduled to 2008. Begin investigations to replace sewage treatment facility. Prepare for contract necessary to re-cable hoists of selective withdrawal systems on four unit intake structures in 2007. Prepare specifications for repair of slope along left abutment parking lot in 2007. Continued investigations for replacement SCADA system with Grand Coulee Power Office. Prepare for work necessary to replace power plant molded case breakers. Prepare specifications to replace plant unwatering pumps. Update SOPs.

Special Issues: In December of 2000 two new Biological Opinions (BO) were implemented for the FCRPS which includes Hungry Horse. One of them was for Bull Trout and the other was for anadromous fish. The BO for Bull Trout put new power plant ramp rate restrictions and minimum flow restrictions on the plant. These restrictions do influence the power production. In March of 2003 the local aluminum plant reduced their production by 66 percent (160 MW) that will influence Hungry Horse's power production in the future.

River:	South Fork Flathead River	**Plant Type:**	Conventional
Powerhouse Type:	Above Ground	**Turbine Type:**	Francis
Original Nameplate Capacity:	285,000 kW	**Installed Capacity:**	428,000 kW
Year of Initial Operation:	1952	**Age:**	55 years
Net Generation (FY-2007):	906.7 GWh	**Rated Head:**	400 feet
Average Plant Factor (FY-2007):	24.3 percent	**Remotely Operated:**	Conversion in Progress
Production Mode:	Peaking		

Ancillary Services

Hungry Horse
Ancillary Services

Spinning Reserve	Yes
Non-Spinning Reserve	Yes
Replacement Reserve	Yes
Regulation/Load Following	Yes
Black Start	Yes
Voltage Support	Yes

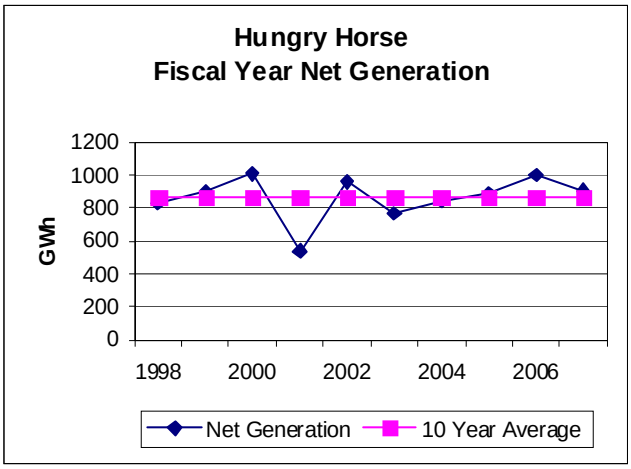
Generators

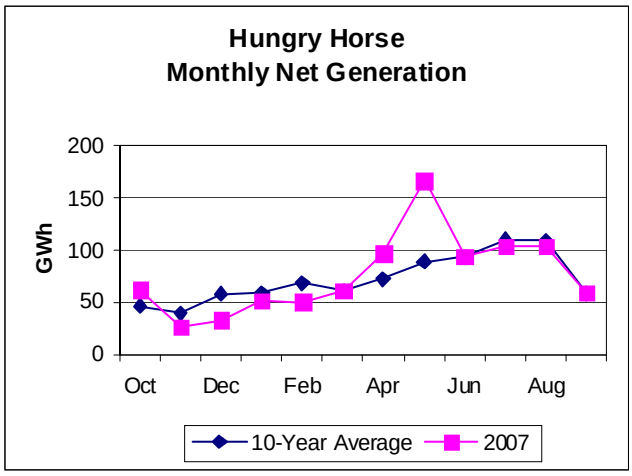
Hungry Horse Generators

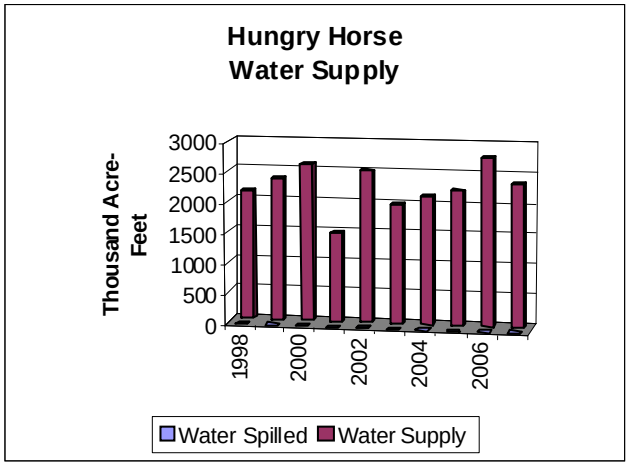
Existing Number and Capacity

Unit #	Original Capacity (kW)	Capacity Increased (kW)	Present Capacity (kW)
1	71,250	35,750	107,000
2	71,250	35,750	107,000
3	71,250	35,750	107,000
4	71,250	35,750	107,000
4 units	285,000	143,000	428,000

Generation

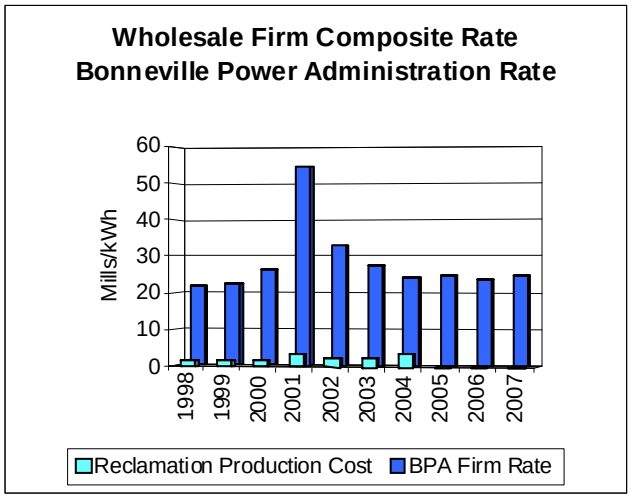

Hungry Horse
Fiscal Year Net Generation
GWh
1200
1000
800
600
400
200
0
1998
2000
2002
2004
2006
Net Generation
10 Year Average


Hungry Horse
Monthly Net Generation
GWh
200
150
100
50
0
Oct
Dec
Feb
Apr
Jun
Aug
10-Year Average
2007

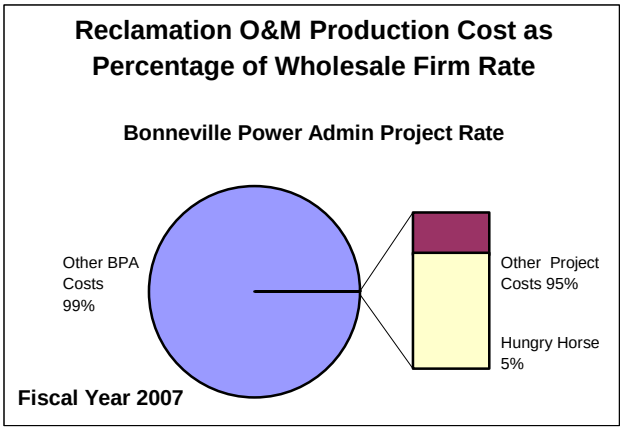

Hungry Horse
Water Supply
Thousand Acre-Feet
3000
2500
2000
1500
1000
500
0
1998
2000
2002
2004
2006
Water Spilled
Water Supply

Prime Laboratory Benchmarks

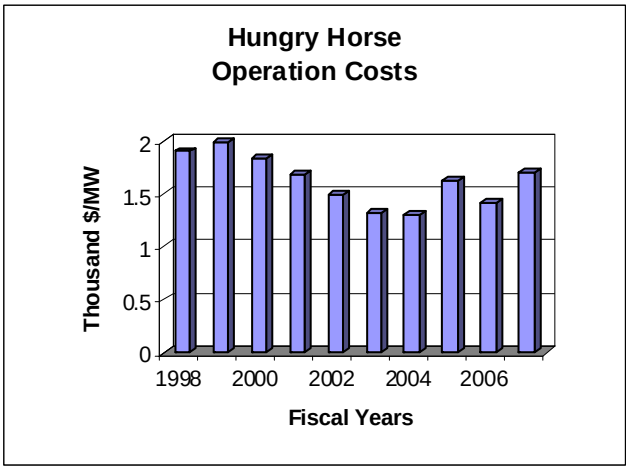
Benchmark 1
Wholesale Firm Rate

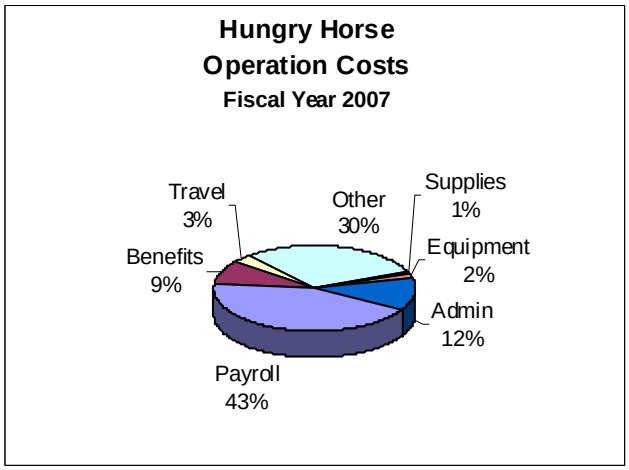


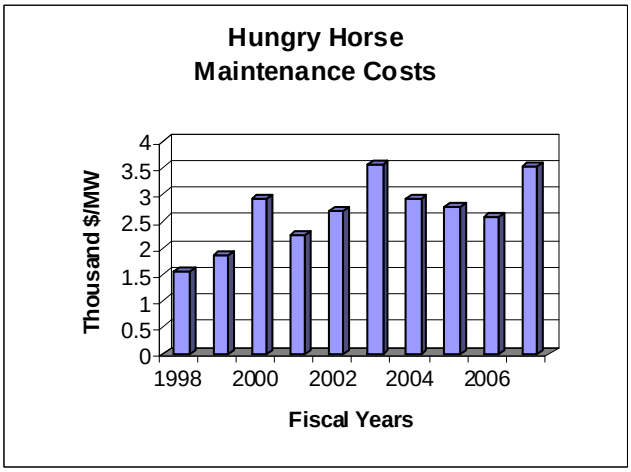
Benchmark 2
Reclamation's Production Cost as Percentage of Wholesale Firm Rate

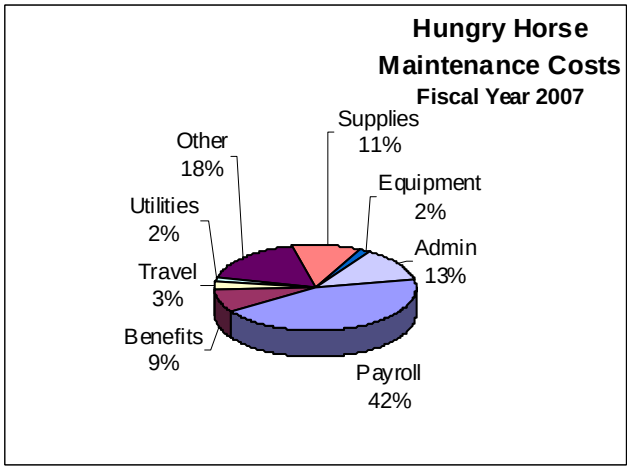


Benchmark 3
Production Cost

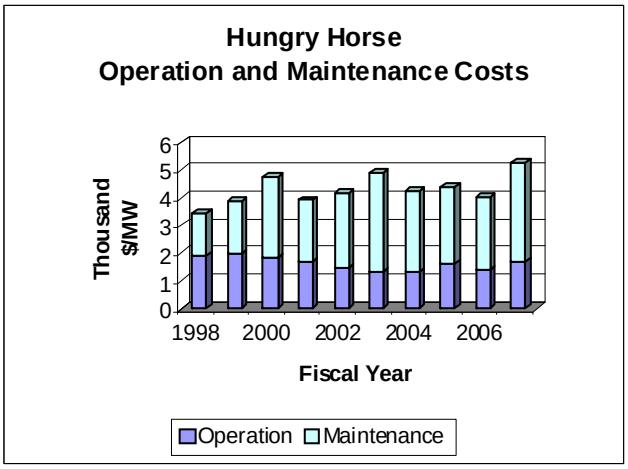


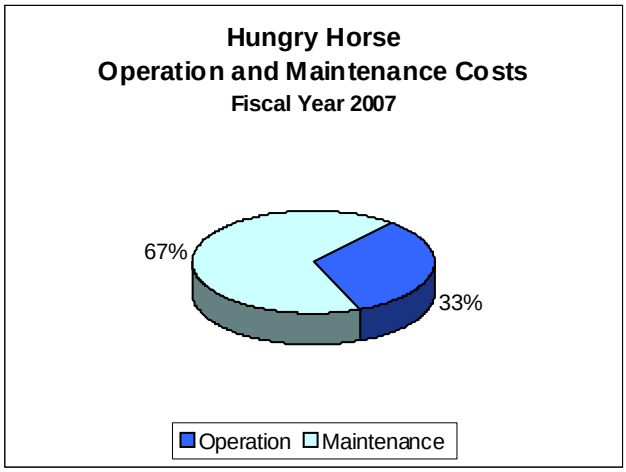


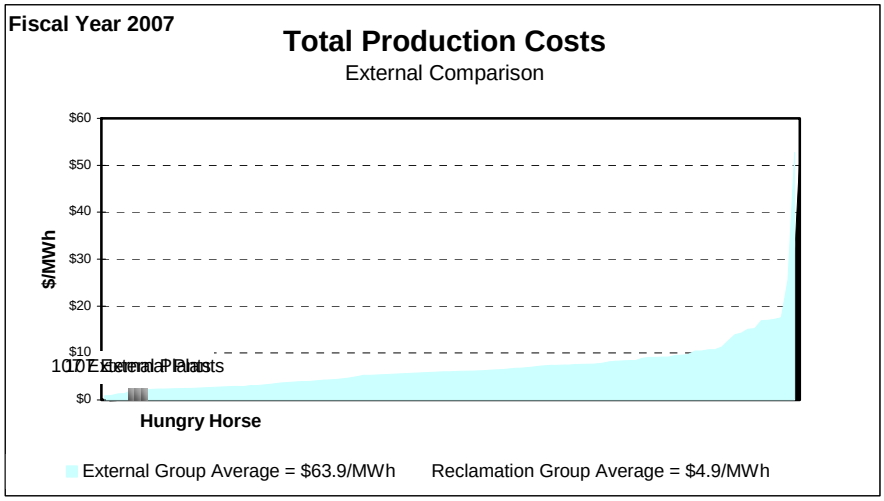


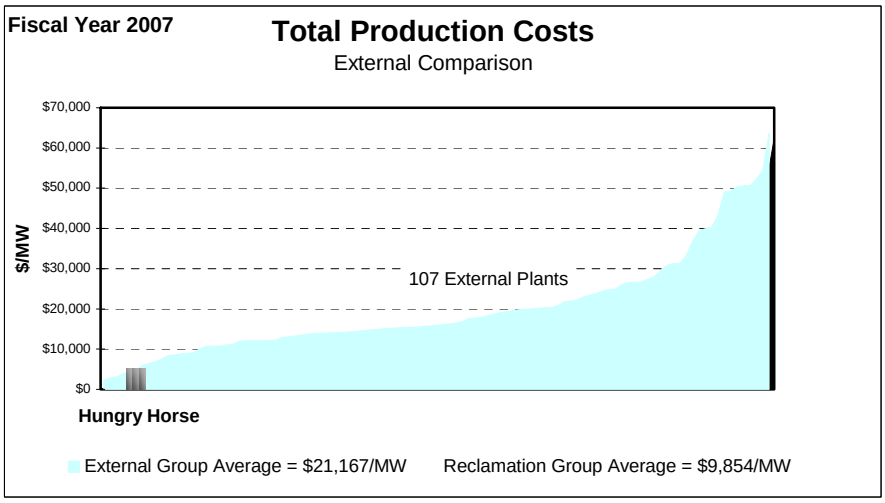


Benchmark 3
Production Cost



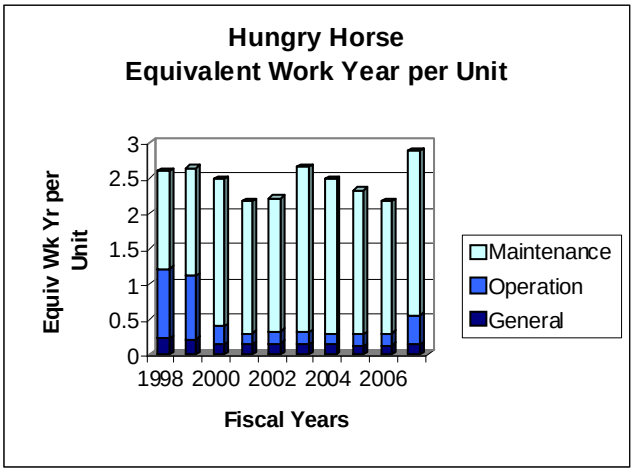


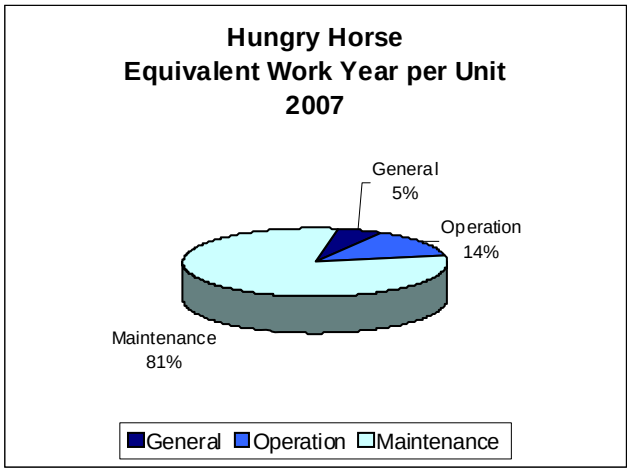


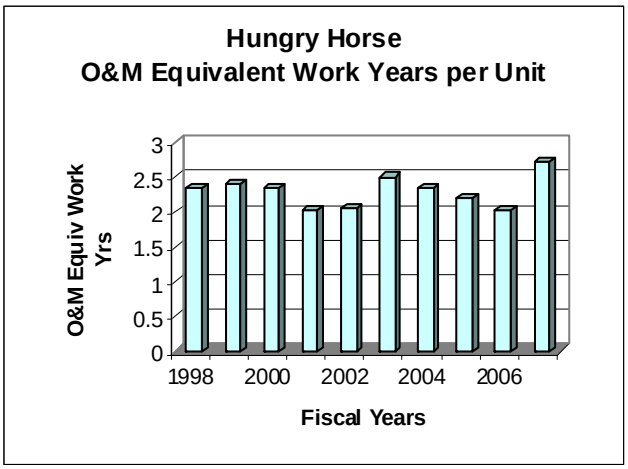


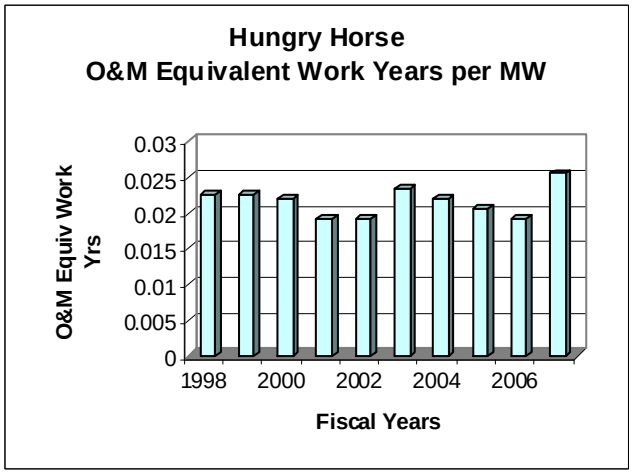
Benchmark 4
Workforce Deployment

Hungry Horse FY 2007 Equivalent Work Staffing Year Levels						
	Equivalent Work Year Staffing Charged to Powerplant	Leave Additive	Denver and Washington Equivalent Work Year Staffing Additive	Total Equivalent Work Year Allocated to Powerplant	Total Equivalent Staffing Work Year per Generating Unit	Total Equivalent Work Year Staffing per Megawatt
General	0.48	0.05	0.07	0.60	0.15	0.00
Operation	1.50	0.16	0.00	1.66	0.41	0.00
Maintenance	8.38	0.89	0.00	9.27	2.32	0.02
Total Staffing	10.36	1.10	0.07	11.53	2.88	0.03

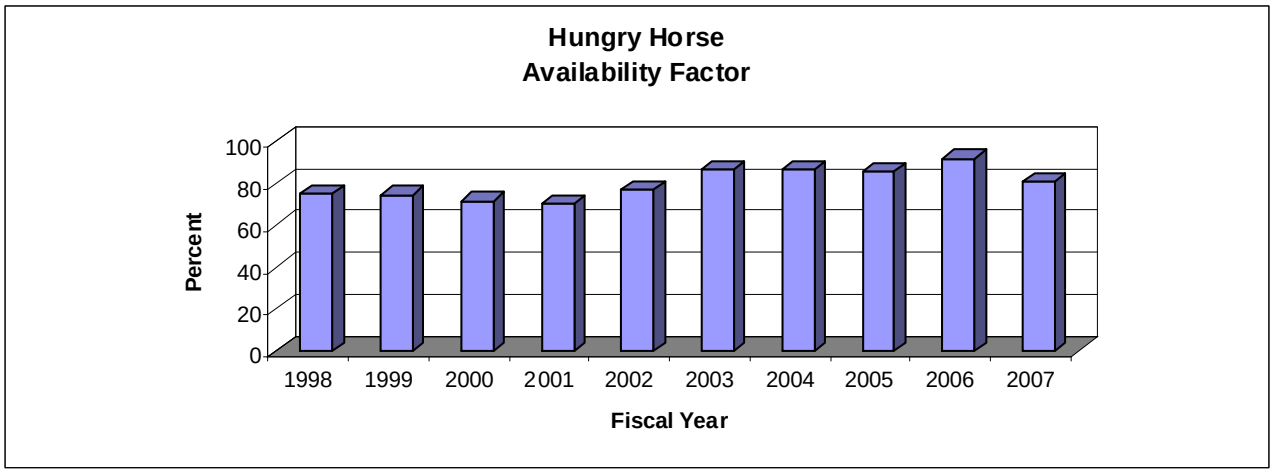




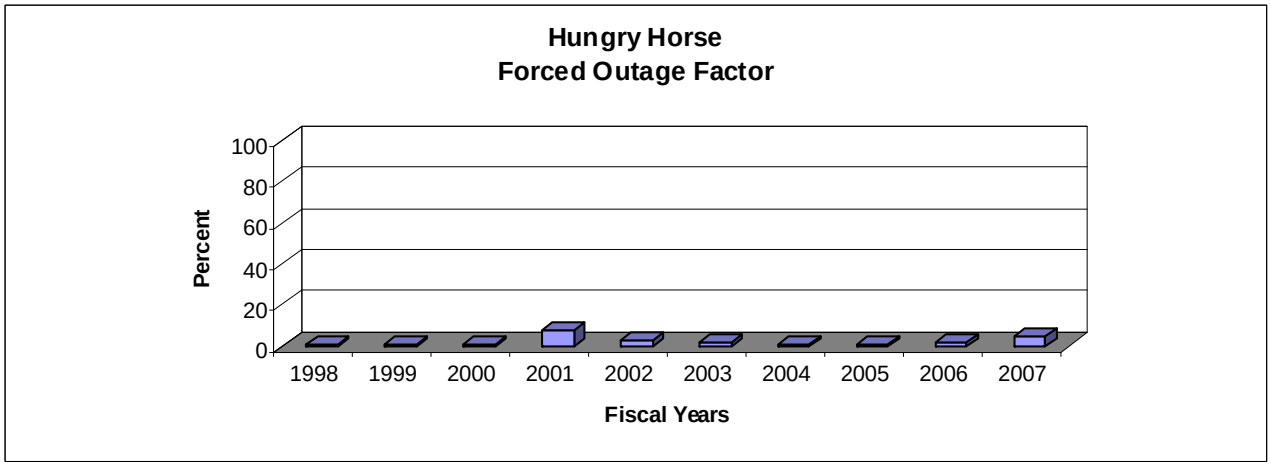




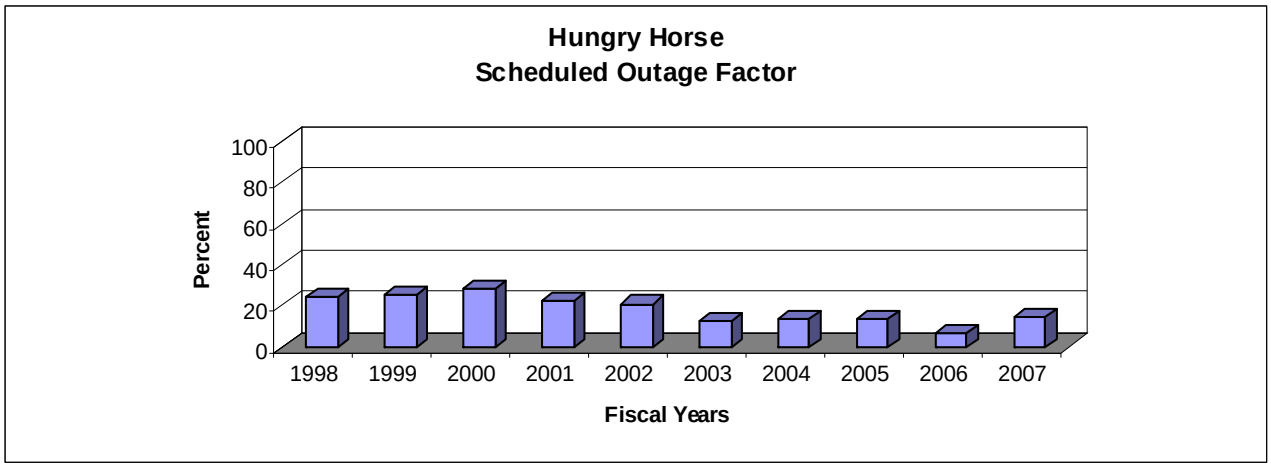
Benchmark 5
Availability Factor



Benchmark 6
Forced Outage Factor

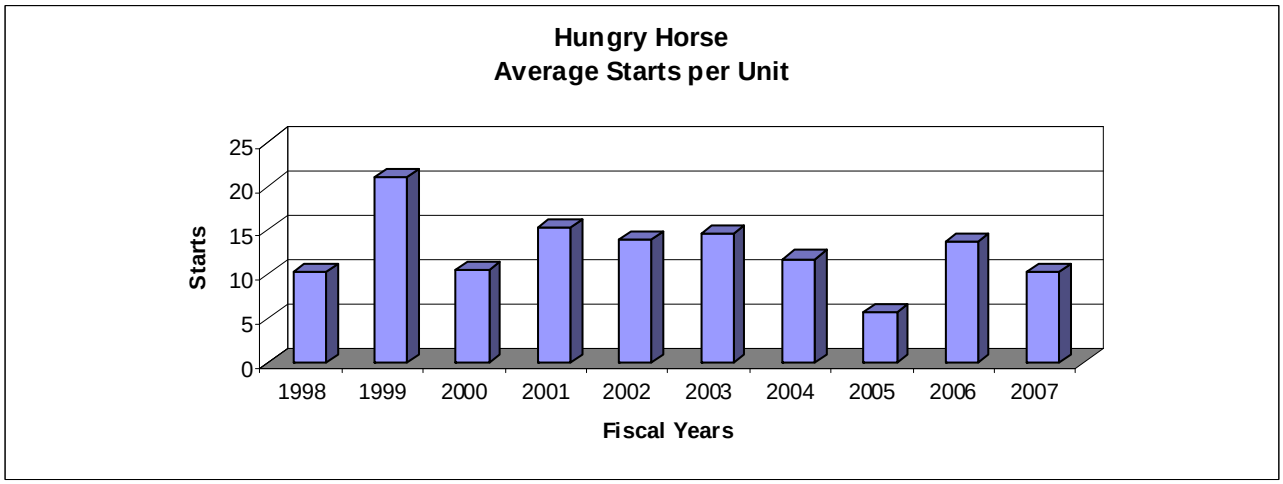


Benchmark 7
Scheduled Outage Factor



FY-97, FY-98 - Automation work

Starts



Benchmark Data Comparison

Fiscal Year 2007	Hungry Horse Powerplant	Reclamation Average 100-500 MW Group	Total Reclamation Average	Industry Average	Best Performers
Wholesale Firm Rate Mills/kWh	24.8	Not Applicable	*22.45	Not Available	Not Available
Production Cost as Percentage of Wholesale Firm Rate	0.08%	Not Applicable	12.1%	Not Applicable	Not Applicable
O&M Cost $/MWh	2.47	4.44	2.76	***63.88	1.00
O&M Costs $/MW	5,240	10,502	7,847	***21,167	2,897
O&M Equiv Work Year per MW	0.03	0.04	0.03	Not Available	0.00
Availability Factor	80.6	83.5	82.3	**88.64	98.5
Forced Outage Factor	4.9	1.2	2.6	**2.61	0.0
Scheduled Outage Factor	14.5	15.4	15.1	**8.74	0.0

*Weighted by Net Generation
**2006 NERC Average
***Energy Information Administration Data

Minidoka Powerplant
Minidoka Project

Plant Contact:
Brett Barnhart
Facility Manager

Plant Address:
Minidoka Powerplant
951 East Minidoka Dam
Rupert ID 83350

Telephone Numbers:
Phone: (208) 436-4187
Fax: (208) 436-0697

E-Mail Address:
bbarnhart@pn.usbr.gov

Reclamation Region: Pacific Northwest

NERC Region: Western Systems Coordinating Council, Northwest Power Pool Area

PMA Service Area: Bonneville Power Administration

Project Authorization: The Secretary of the Department of the Interior authorized the Minidoka Project on April 23, 1904. The Upper Snake River storage was authorized by a finding of feasibility by the Secretary of the Interior and approved by the President on September 20, 1935.

Project Purposes: Natural flow of the Snake River and some of its tributaries and water stored in the reservoirs at Jackson Lake, Grassy Lake, Island Park, American Falls, and Lake Walcott are delivered at numerous diversion points to irrigation districts, American Falls Reservoir District, and Warren Act contractors. Much of the power developed on the project is used for pumping water to lands lying above the gravity canals and for pumping drainage water.

Plant Location: Minidoka Power plant is located in Minidoka and Cassia Counties, Idaho, on the Snake River about 25 miles northeast of Burley, Idaho.

Plant Facts: Minidoka Powerplant and Dam is a combined diversion, storage, and power structure located just south of Minidoka, Idaho. A key structure in the initial development of the project, the zoned earthfill dam is 86 feet high. The reservoir, Lake Walcott, has an active storage capacity of 95,200 acre-feet. During the irrigation season, water is diverted at the dam into a canal on each side of the river.

The original powerplant was constructed upon the concrete buttress section of the dam, located at the right end of the rock fill section. The original generating Units 1-5 have been retired. Units 6 and 7 have been refurbished and continue to operate. At full head and flow Unit 6 provides 3 megawatts, and Unit 7 provides 5.5 megawatts of power.

Construction was completed in 1997 at the Allen E. Inman Powerplant. Intended to replace the retired units (1-5) and utilize more of the excess flows previously spilled, this powerplant houses two 10-megawatt horizontal shaft Kaplan Units.

The combined generation capacity of all four units is 28.5 megawatts, with combine flow of 8,670 cubic feet per second.

Plant Purpose: Minidoka Powerplant was originally authorized and constructed to provide power for pumping water to high bench lands on the south side of the Snake River. Since that time, two generating units have been added and the energy in excess of project needs is marketed by the BPA. Water delivery to the high bench lands has enabled the transformation of 48,000 acres of high sagebrush desert into productive farmland. The economy of the local communities heavily depends on agriculture.

Plant History: Minidoka Dam was originally designed and constructed without a powerplant and was completed in 1907. The powerplant (and three pumping plants) was added later (1909-1910) to allow water to be delivered to lands, which could not be fed by gravity irrigation. The concrete buttress section of the dam forms the upstream structure of the original powerplant. The powerplant could only use a fraction of the water that passed through the dam, so Unit 6 was added in 1927 to allow commercial sales of power in excess of project needs. Unit 7 was added in 1942 to help feed the publics' growing thirst for electric power. In September 1995, the five original generating units were retired and Units 6 and 7 taken off-line and rebuilt.

Present Activities: Day-to-day river discharges are now controlled from the Black Canyon Control Center near Emmett, Idaho.

A value engineering study is being performed for the replacement of the spillway structure.

Future Planned Activities: The anticipated start date for construction of a new spillway structure using radial gates is 2010.

Special Issues: The spillway at Minidoka Dam consists of a radial gate structure, which is controlled remotely from Black Canyon Control Center near Emmett, Idaho and 300 6-foot long stoplog bays which each contain 11 stoplog boards. The structure is one-half mile long. Long-term summertime spilling over the dam has created a blue ribbon trout fishery in the area below this spillway. Minimum flows are guaranteed to this area, even if power production must be curtailed to provide them.

Because the Inman Powerplant encroached on 1.6 acres of existing wetland, a new controlled flow 5-acre wetland was developed as mitigation for this loss. Waste materials from excavation of the new powerhouse were used to build the core of the dikes for the wetland.

Construction of the new complex was carefully conducted so as not to disturb the endangered Utah Valvata snails in the river below the site.

The original Minidoka Powerplant is listed on the National Register of Historic places. Structural changes and maintenance must be conducted so as not to change the historic nature of the facility.

River:	Snake River	**Plant Type:**	Conventional
Powerhouse Type:	Above Ground	**Turbine Type:**	Francis and Kaplan
Original Nameplate Capacity:	6,000 kW	**Installed Capacity:**	27,700 kW[1]
Year of Initial Operation:	1909	**Age:**	98 years
Net Generation (FY-2007):	112.6 GWh	**Rated Head:**	47 feet
Average Plant Factor (FY-2007):	47.4 percent	**Remotely Operated:**	Yes
Production Mode:	Intermediate		

[1]Units 1 through 5 were retired September 1995.

Ancillary Services

Minidoka
Ancillary Services

Spinning Reserve	No
Non-Spinning Reserve	No
Replacement Reserve	No
Regulation/Load Following	No
Black Start	Yes
Voltage Support	Yes

Generators

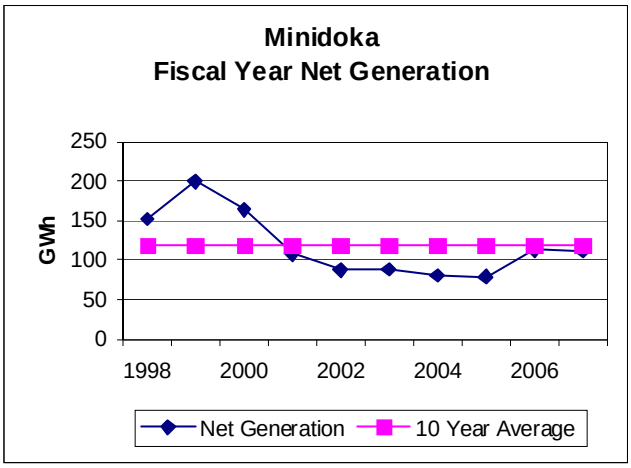
Minidoka Generators

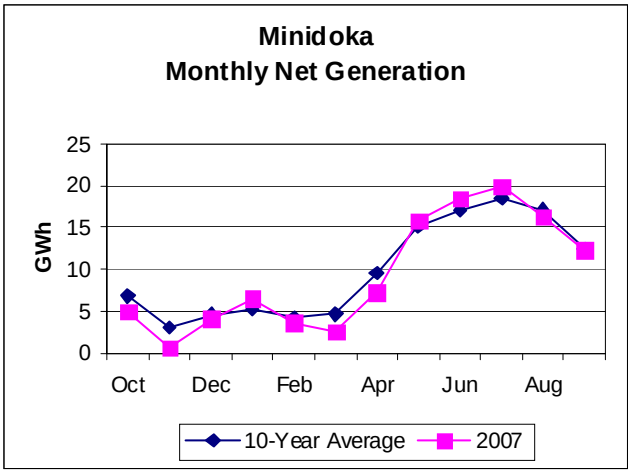
Existing Number and Capacity

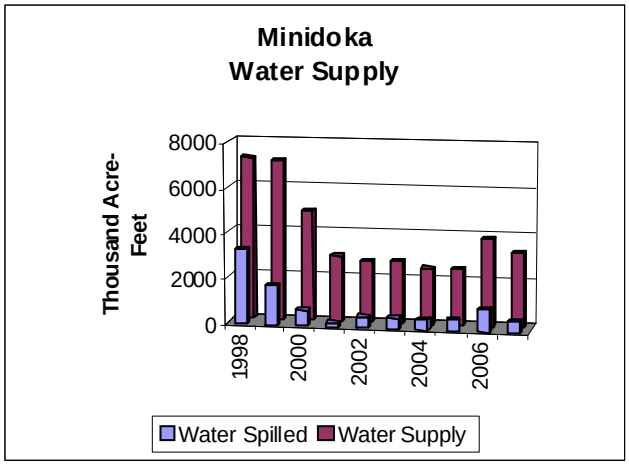
Unit #	Original Capacity (kW)	Original Capacity New Units	Capacity Increased (kW)	Present Capacity (kW)
1	1,200		0	Retired
2	1,200		0	Retired
3	1,200		0	Retired
4	1,200		0	Retired
5	1,200		0	Retired
6		2,400	300	2,700
7		5,000	0	5,000
8*		10,000	0	10,000
9*		10,000	0	10,000
1 Unit	6,000	27,400	300	27,700

*Renamed Allen E. Inman Powerplant May 6, 1998

Generation

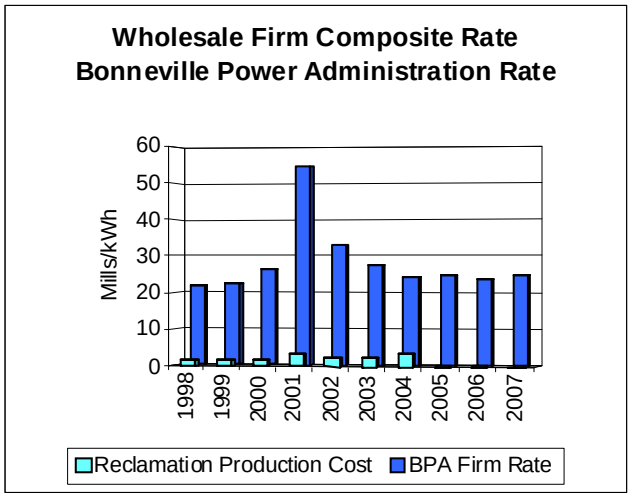

Minidoka
Fiscal Year Net Generation
GWh
250
200
150
100
50
0
1998
2000
2002
2004
2006
Net Generation
10 Year Average


Minidoka
Monthly Net Generation
GWh
25
20
15
10
5
0
Oct
Dec
Feb
Apr
Jun
Aug
10-Year Average
2007

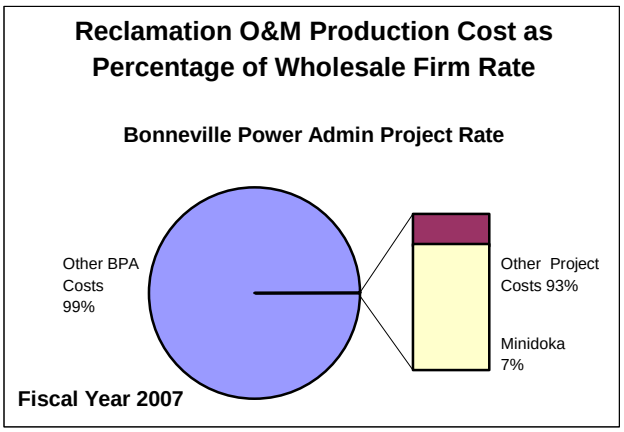

Minidoka
Water Supply
Thousand Acre-Feet
8000
6000
4000
2000
0
1998
2000
2002
2004
2006
Water Spilled
Water Supply

Prime Laboratory Benchmarks

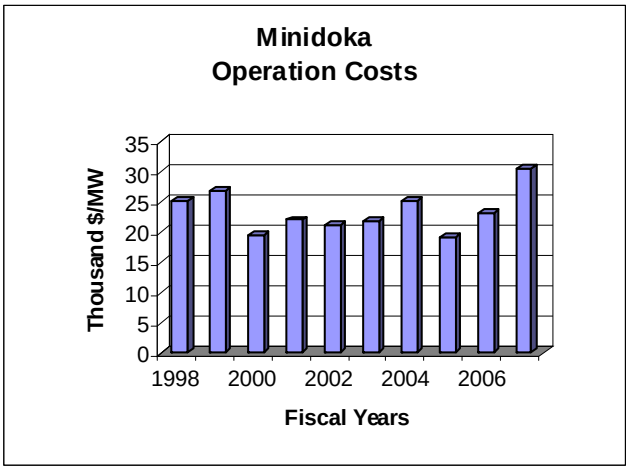
Benchmark 1
Wholesale Firm Rate

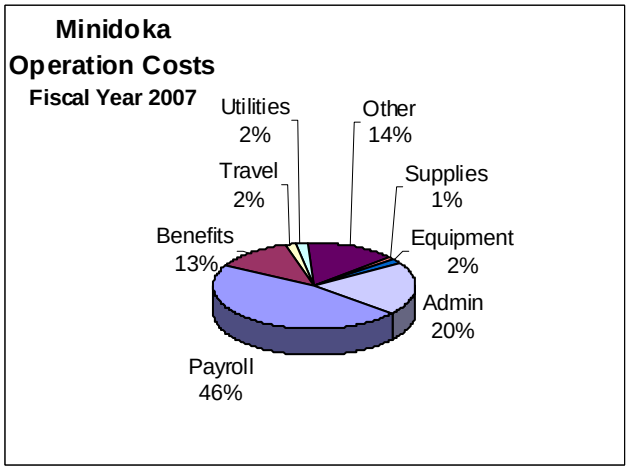


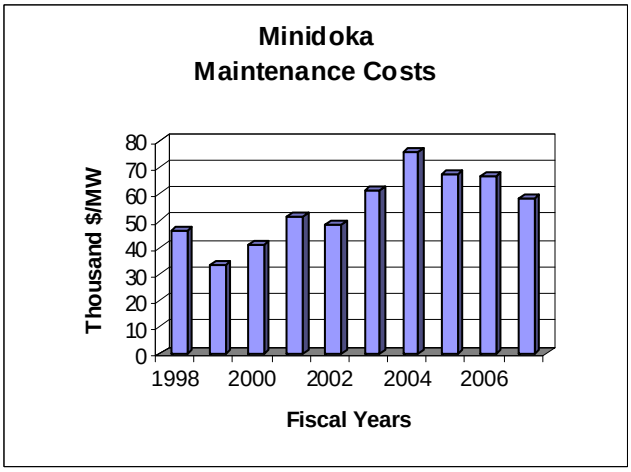
Benchmark 2
Reclamation's Production Costs as Percentage of Wholesale Firm Rate

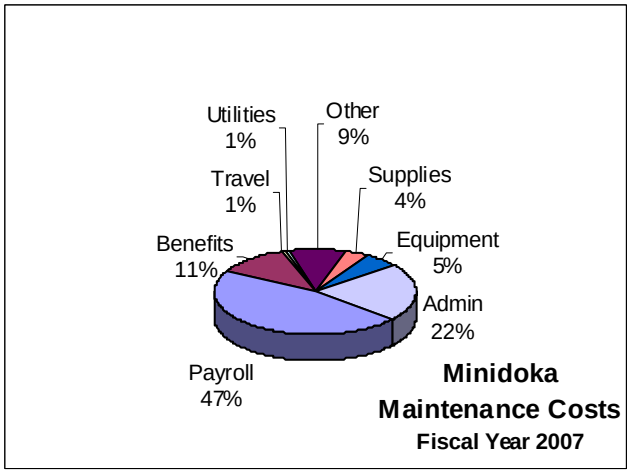


Benchmark 3
Production Costs

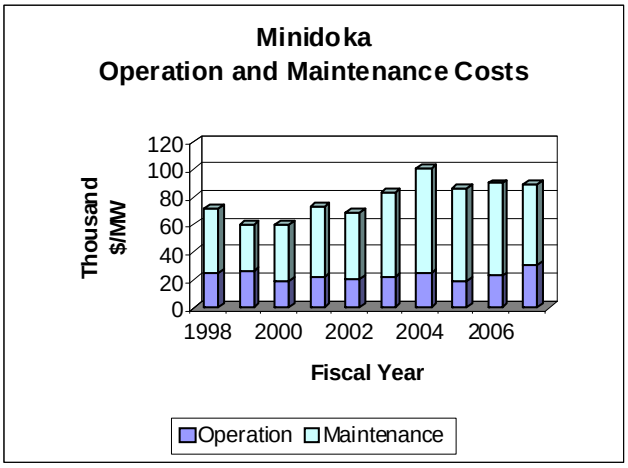


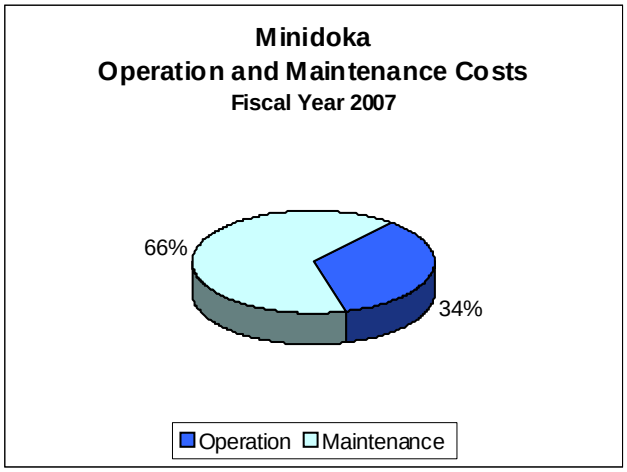


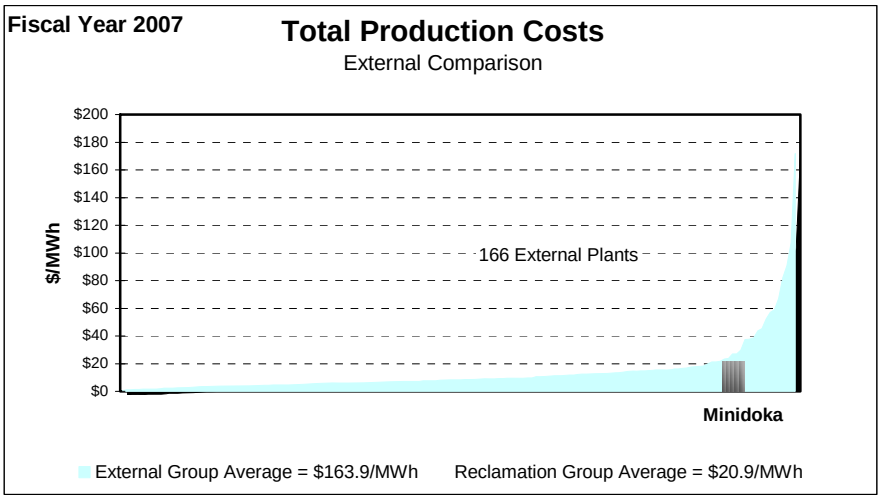


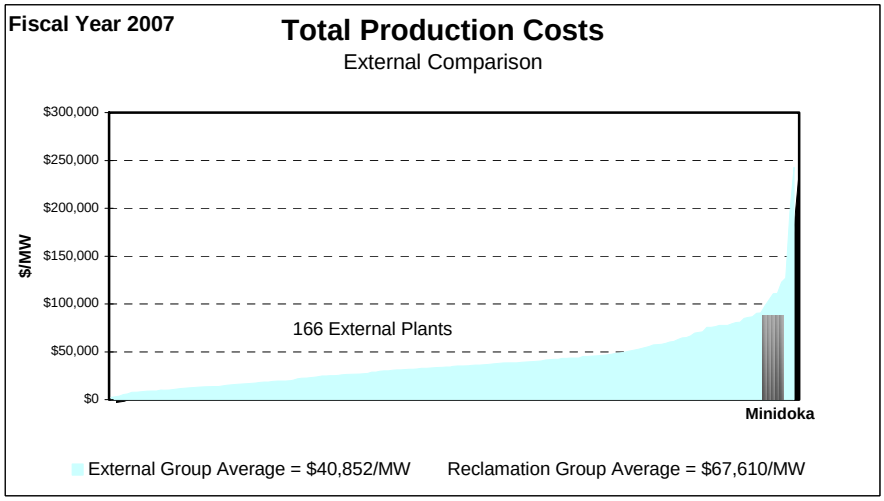


Benchmark 3
Production Cost



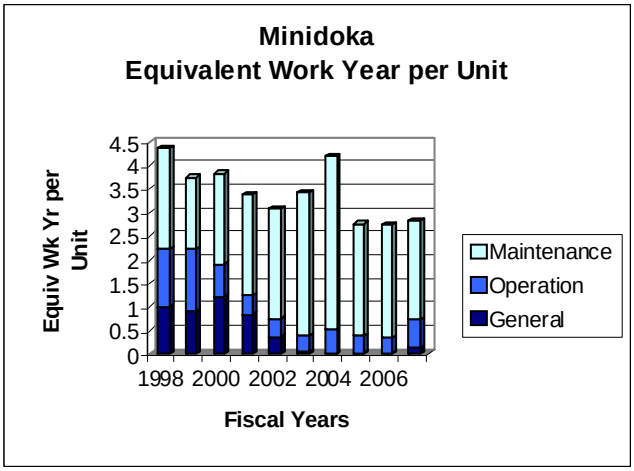


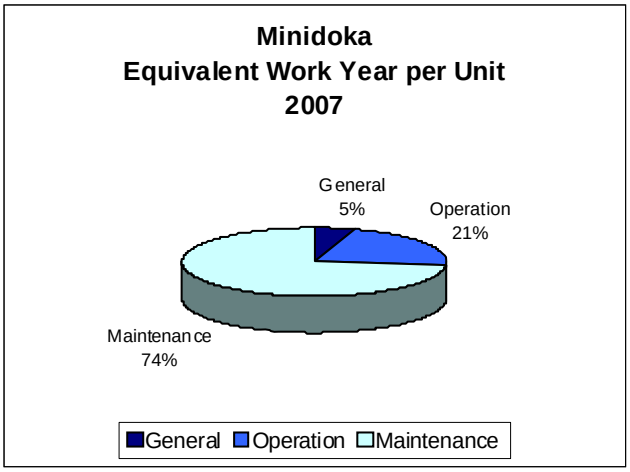


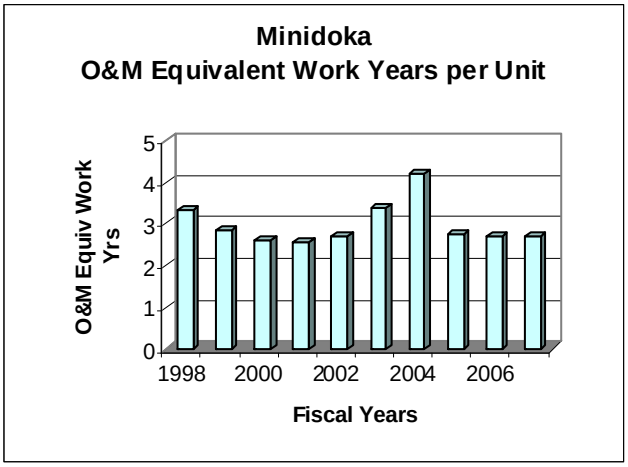


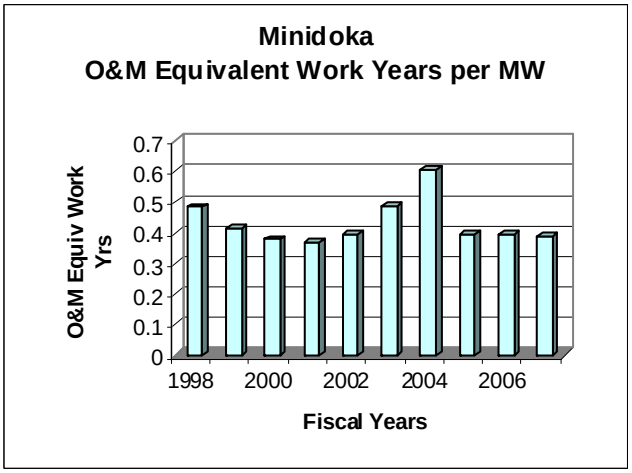
Benchmark 4
Workforce Deployment

Minidoka FY 2007 Equivalent Work Staffing Year Levels						
	Equivalent Work Year Staffing Charged to Powerplant	Leave Additive	Denver and Washington Equivalent Work Year Staffing Additive	Total Equivalent Work Year Allocated to Powerplant	Total Equivalent Staffing Work Year per Generating Unit	Total Equivalent Work Year Staffing per Megawatt
General	0.45	0.05	0.07	0.57	0.14	0.02
Operation	2.15	0.23	0.00	2.38	0.59	0.09
Maintenance	7.60	0.80	0.00	8.41	2.10	0.30
Total Staffing	10.21	1.08	0.07	11.36	2.84	0.41

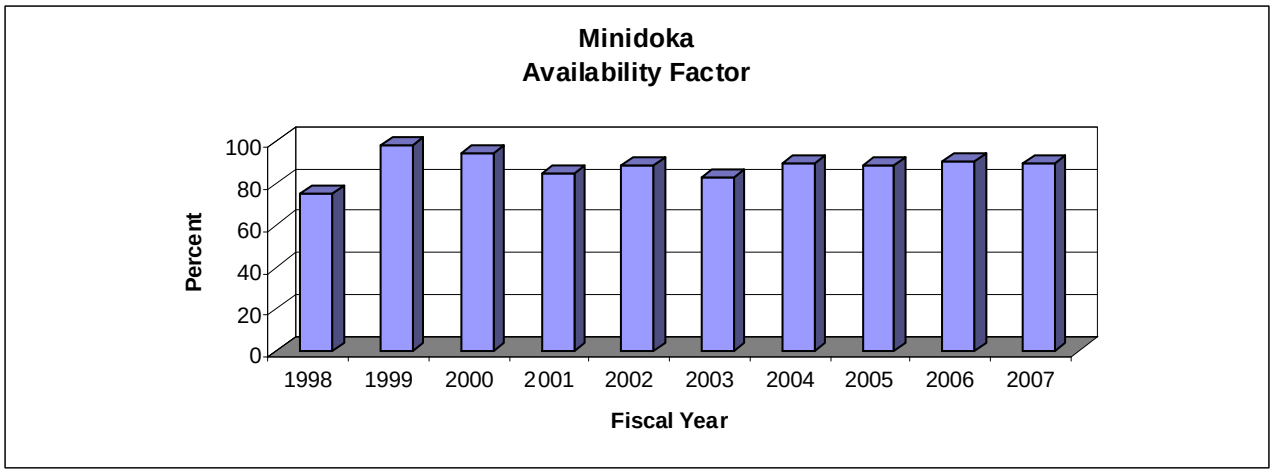




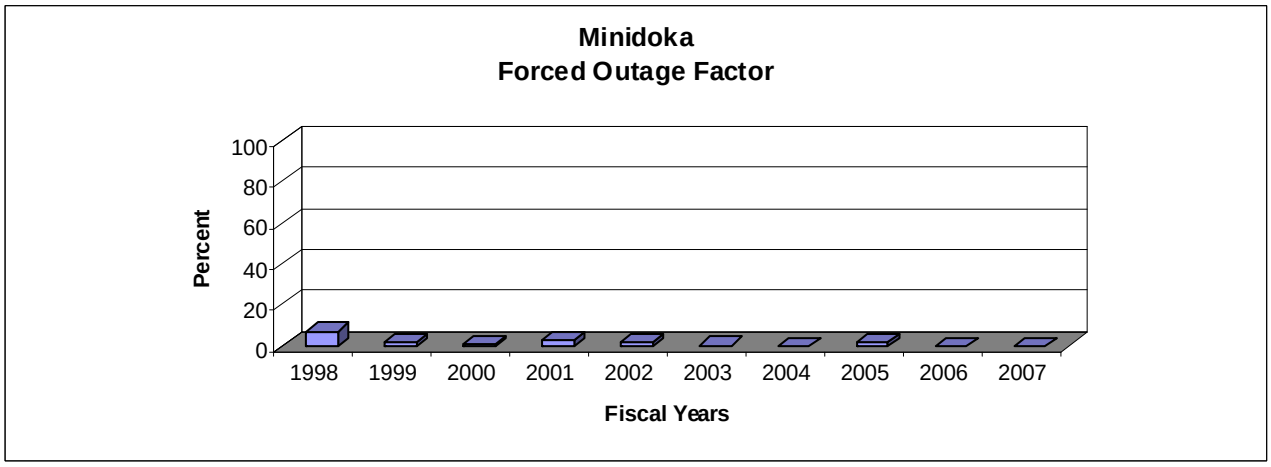




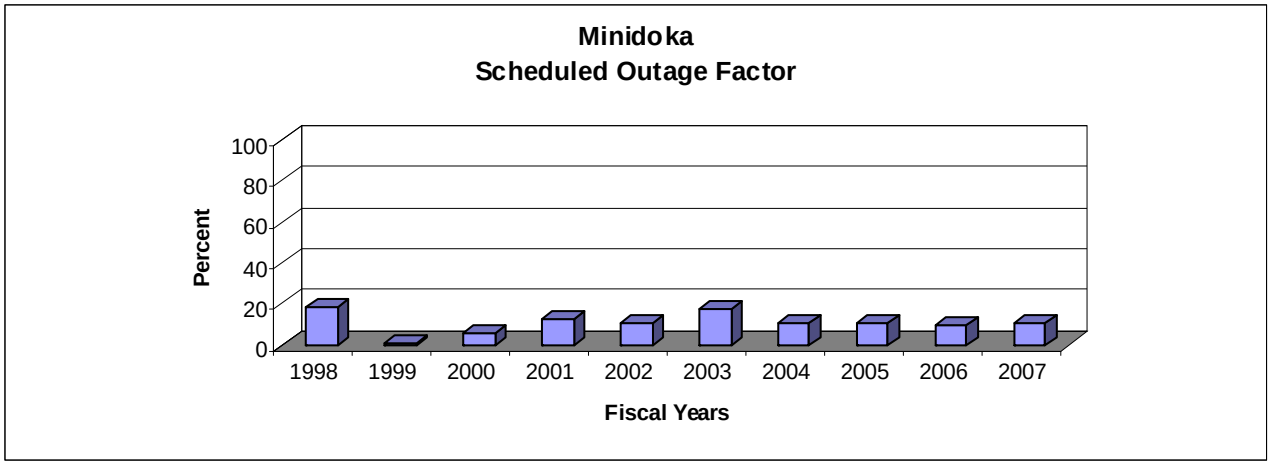
Benchmark 5
Availability Factor



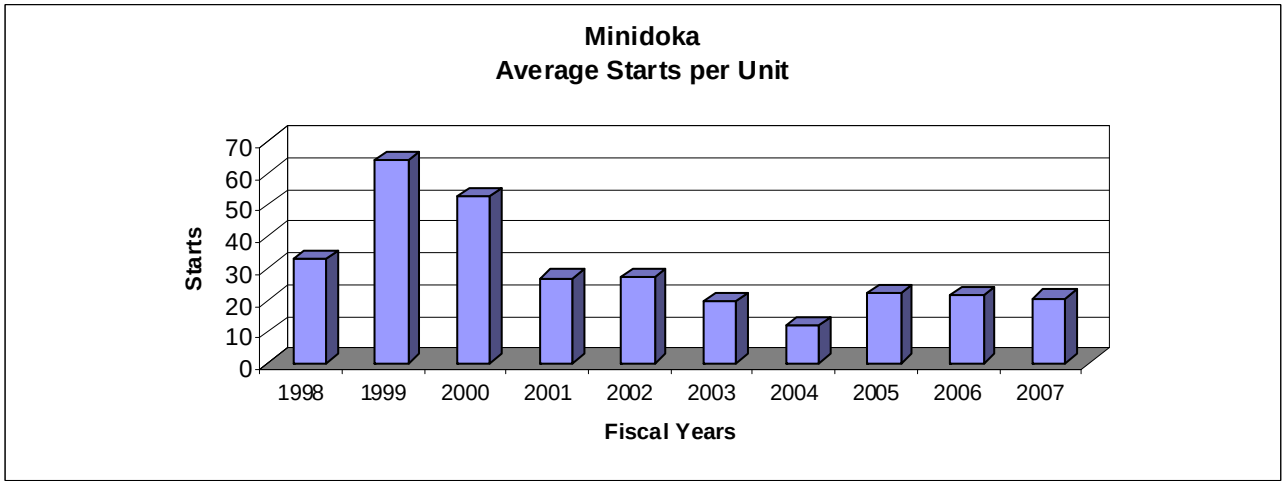
Benchmark 6
Force Outage Factor



Benchmark 7
Scheduled Outage Factor



Starts



Benchmark Data Comparison					
Fiscal Year 2007	**Minidoka Powerplant**	**Reclamation Average 10-30 MW Group**	**Total Reclamation Average**	**Industry Average**	**Best Performers**
Wholesale Firm Rate Mills/kWh	24.8	Not Applicable	*22.45	Not Available	Not Available
Production Cost as Percentage of Wholesale Firm Rate	0.09%	Not Applicable	12.1%	Not Applicable	Not Applicable
O&M Cost $/MWh	21.83	16.40	2.76	***163.95	1.00
O&M Costs $/MW	88,738	62,731	7,847	***40,852	2,897
O&M Equiv Work Year per MW	0.39	0.22	0.03	Not Available	0.00
Availability Factor	89.7	88.5	82.3	**88.64	98.5
Forced Outage Factor	0.0	0.1	2.6	**2.61	0.0
Scheduled Outage Factor	10.3	11.4	15.1	**8.74	0.0

*Weighted by Net Generation
**2006 NERC Average
***Energy Information Administration Data

Palisades Powerplant
Palisades Project

Plant Contact:
Bruce Ludington
Facility Manager

Plant Address:
Palisades Powerplant
3933 Swan Valley Hwy
Palisades, ID 83428

Telephone Numbers:
Phone: (208) 483-4015
Fax: (208) 483-4635

E-Mail Address:
bludington@pn.usbr.gov

Reclamation Region: Pacific Northwest

NERC Region: Western Electricity Coordinating Council, Northwest Power Pool Area

PMA Service Area: Bonneville Power Administration

Project Authorization: The Secretary of the Interior initially authorized the Palisades Project on December 9, 1941, under the provisions of Section 9 of the Reclamation Project Act of 1939 (53 Stat. 1187). The Congress reauthorized the Palisades Project on September 30, 1950 (Public Law 864, 81st Congress), in accordance with a supplemental report approved by the Secretary of the Interior in 1949.

Project Purposes: The Palisades Project is a multiple-purpose development involving irrigation, power, flood control, recreation, and fish and wildlife conservation. Palisades Dam is on the South Fork of the Snake River at Calamity Point in eastern Idaho about 18 miles west of the Idaho-Wyoming boundary. The project provides a supplemental water supply to about 670,000 acres of irrigated land in the Minidoka and Michaud Flats Projects. The 176,564-kilowatt hydroelectric powerplant furnishes energy needed in the upper valley to serve irrigation pumping units, municipalities, rural cooperatives, and other power users.

The project, in addition to providing needed holdover storage, helps control floods, develops a substantial block of power, and permits the annual storage of about 135,000 acre-feet of water saved by shutting off canals in the upper valley during the winter. This water is stored to the credit of and delivered to the water users who make the savings possible.

Plant Location: Palisades Powerplant is located on the South Fork of the Snake River about 7.5 miles southeast of Irwin, Idaho, and 55 miles southeast of Idaho Falls, Idaho, in Bonneville County.

Plant Facts: Palisades Dam is a large zoned earthfill structure 270 feet high, has a crest length of 2,100 feet, and contains 13,571,000 cubic yards of material. At the time of construction, this was the largest volume of material placed in a dam by Reclamation. The powerplant and outlet works are fed by separate 26-foot diameter tunnels through the left abutment. The Palisades Powerplant has four generators, and an original hydraulic capacity of 8,000 cubic feet per second. The spillway is a 28-foot diameter tunnel through the left abutment, with a capacity of 48,500 cubic feet per second. The powerplant serves large irrigation pumping power requirements on and near the Minidoka Project in Southern Idaho. Energy in excess of project uses is marketed by BPA. Palisades Powerplant was transferred to the Minidoka Project Office (now Snake River Area Office) for operations and maintenance soon after construction.

Plant Purpose: Palisades Powerplant serves large irrigation pumping power requirements on and near the Minidoka Project in southern Idaho.

Plant History: Palisades Powerplant was completed in 1957, with the last unit placed on line in 1958. From the start, the generators produced copious quantities of ozone, due to corona discharge, which deteriorated all metal parts and the winding. The original windings lasted less than 10 years. All the generators were rewound in the 1960's, using an epoxy-mica insulating system, instead of the original asphalt-mica insulating system. Corona was a problem, and ozone deterioration continued to the point that windings were seriously deteriorated by the late 1980's. Generators were rewound again in 1991-1995, increasing unit capacity to 44 MW. Station service switchgear was replaced in 2001; and penstock flow meters were installed in 2002.

Present Activities: Palisades has been operating under drought conditions since 2001 affecting net generation. A power penstock and steel tunnel liner inspection, a Power Facility Review of the powerplant and 5 year governor testing were conducted in 2007.

Future Planned Activities: Re-grouting of void areas in the scroll case and draft tube, powerplant roof replacement, remove lead base paint and recoat steel intake structures in fall of 2008. Denver TSC to perform rough zone vibration testing on units to define generator/turbine rough zones. BPA beginning a 3 year uprate project to increase 115 kV line support structures to 230 kV structures in summer 2008, limiting generation to 140 mW during construction. Replacement of control panel / metering and replacement of un-watering valve operator to commence in 2009.

Special Issues: None

River:	South Fork Snake River	**Plant Type:**	Conventional
Powerhouse Type:	Above Ground	**Turbine Type:**	Francis
Original Nameplate Capacity:	114,000 kW	**Installed Capacity:**	176,564 kW
Year of Initial Operation:	1957	**Age:**	51 years
Net Generation (FY-2007):	506.2 GWh	**Rated Head:**	190 feet
Average Plant Factor (FY-2007):	32.9 percent	**Remotely Operated:**	Yes
Production Mode:	Intermediate		

Ancillary Services

Palisades
Ancillary Services

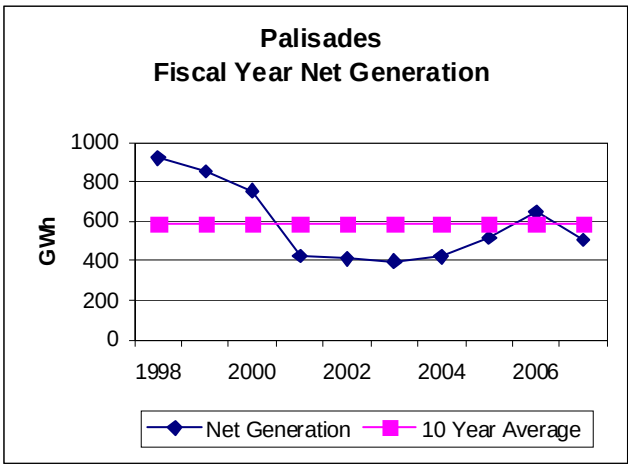
Spinning Reserve	Yes
Non-Spinning Reserve	Yes
Replacement Reserve	Yes
Regulation/Load Following	Yes
Black Start	Yes
Voltage Support	Yes

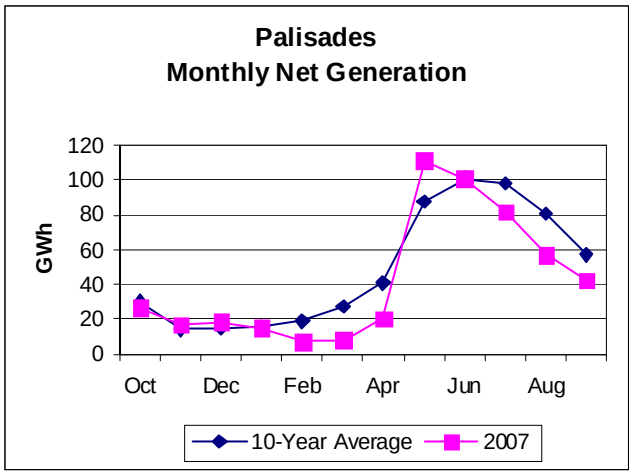
Generators

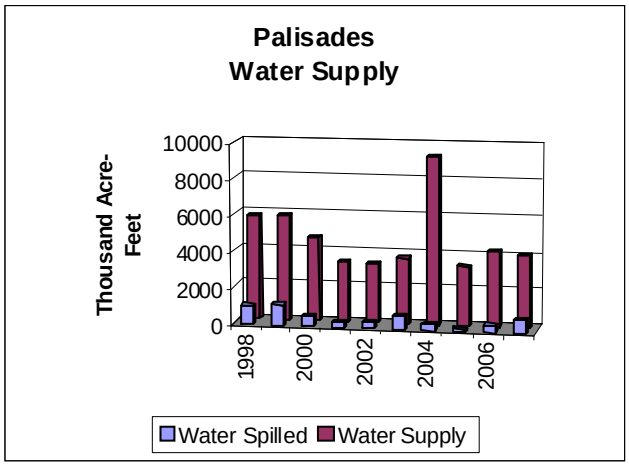
Palisades Generators
Existing Number and Capacity

Unit #	Original Capacity (kW)	Capacity Increased (kW)	Present Capacity (kW)
1	28,500	15,641	44,141
2	28,500	15,641	44,141
3	28,500	15,641	44,141
4	28,500	15,641	44,141
4 units	114,000	62,564	176,564

Generation

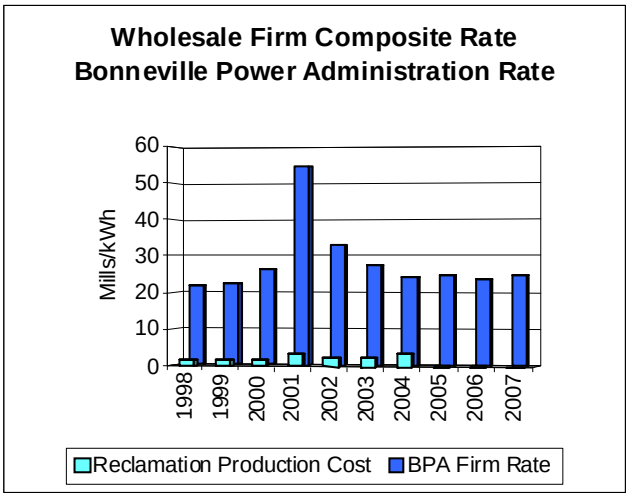

Palisades
Fiscal Year Net Generation
GWh
1000
800
600
400
200
0
1998
2000
2002
2004
2006
Net Generation
10 Year Average


Palisades
Monthly Net Generation
GWh
120
100
80
60
40
20
0
Oct
Dec
Feb
Apr
Jun
Aug
10-Year Average
2007

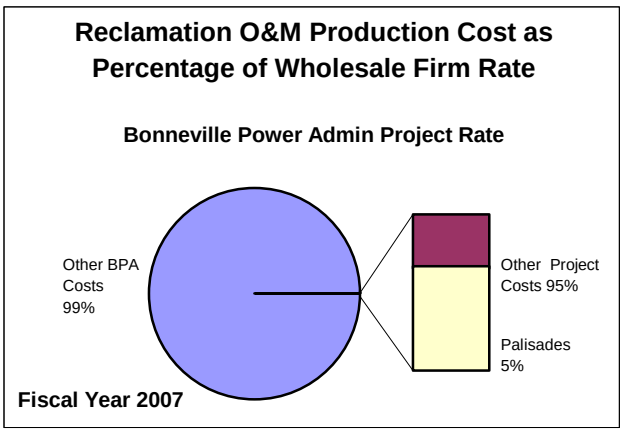

Palisades
Water Supply
Thousand Acre-Feet
10000
8000
6000
4000
2000
0
1998
2000
2002
2004
2006
Water Spilled
Water Supply

Prime Laboratory Benchmarks

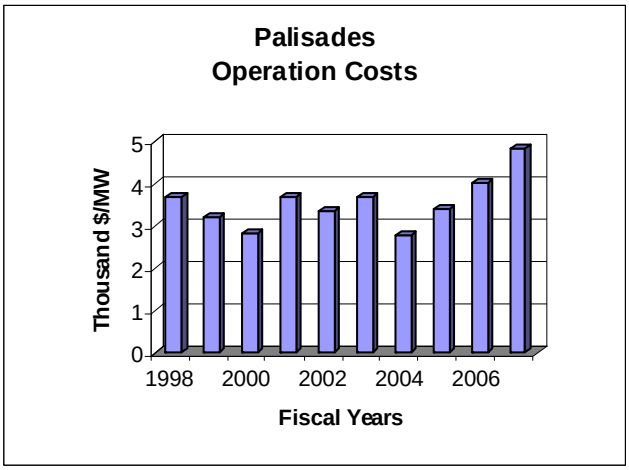
Benchmark 1
Wholesale Firm Rate

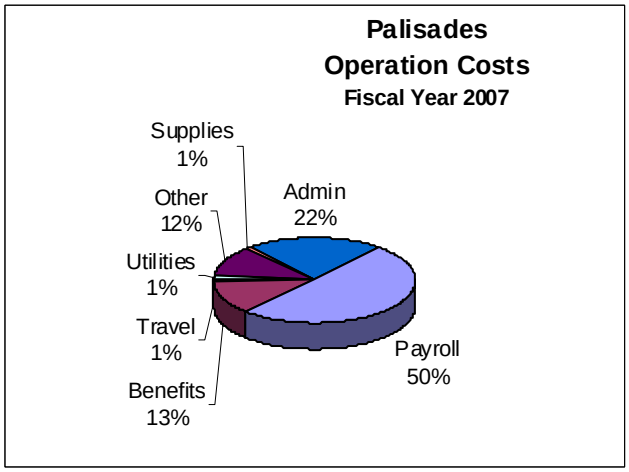


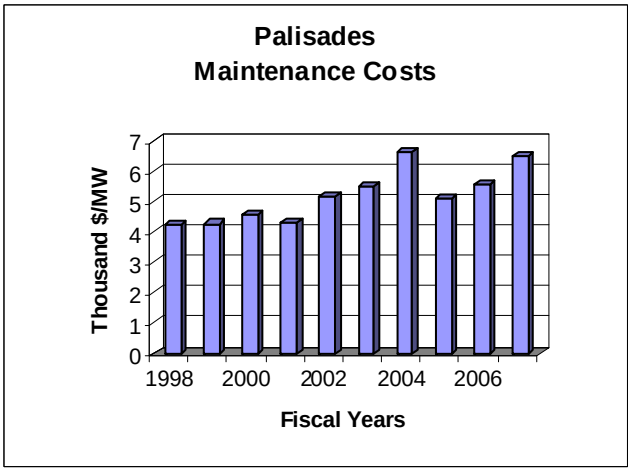
Benchmark 2
Reclamation's Production Cost as Percentage of Wholesale Firm Rate

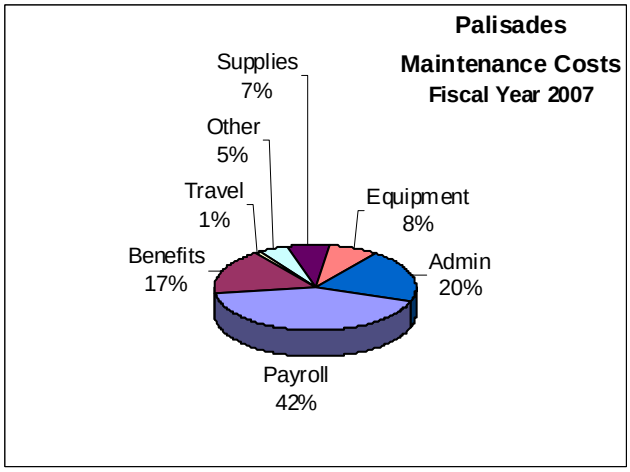


Benchmark 3
Production Cost

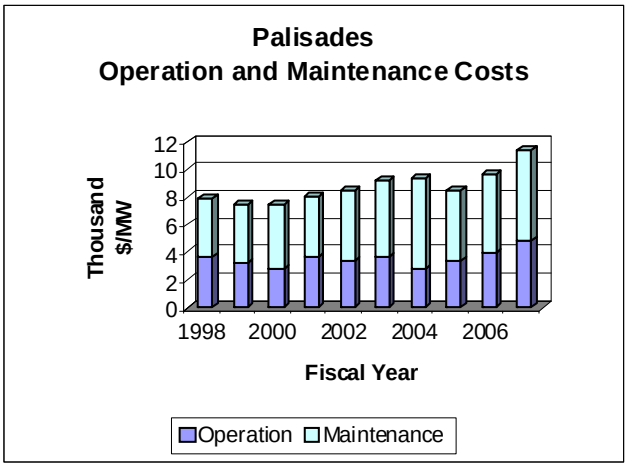


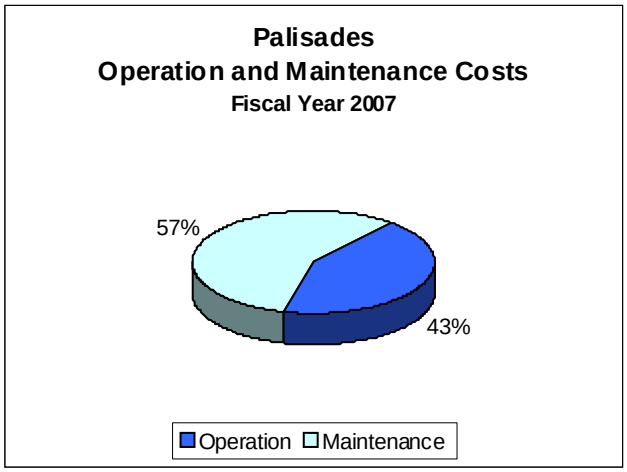


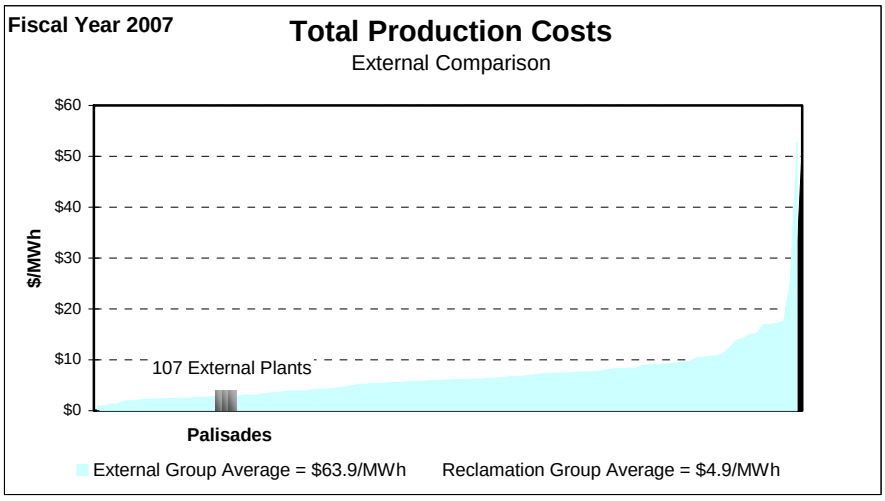


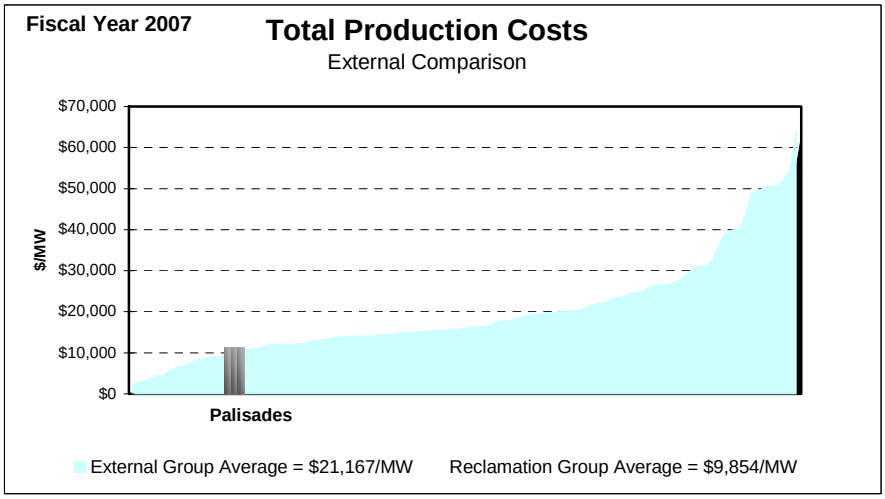


Benchmark 3
Production Cost



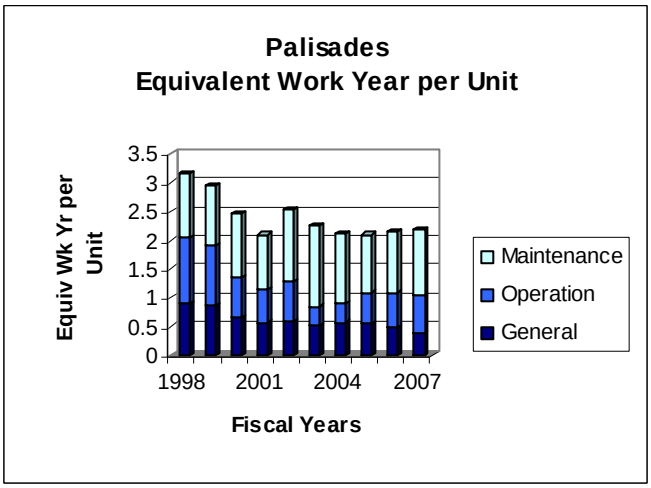


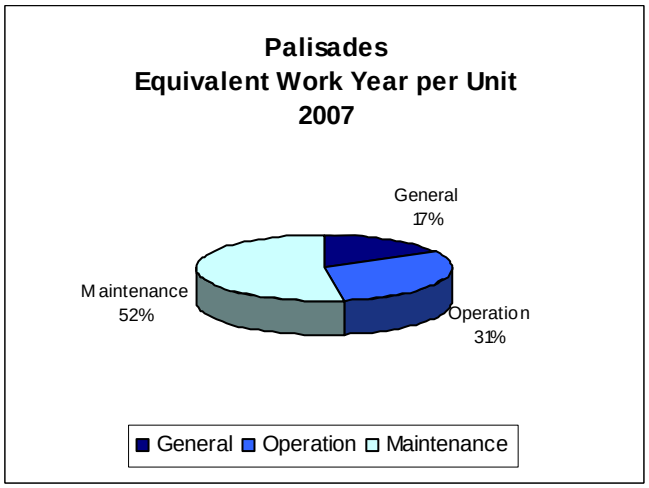


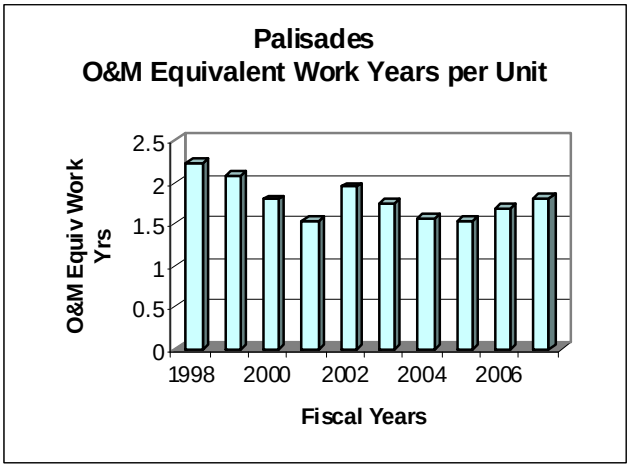


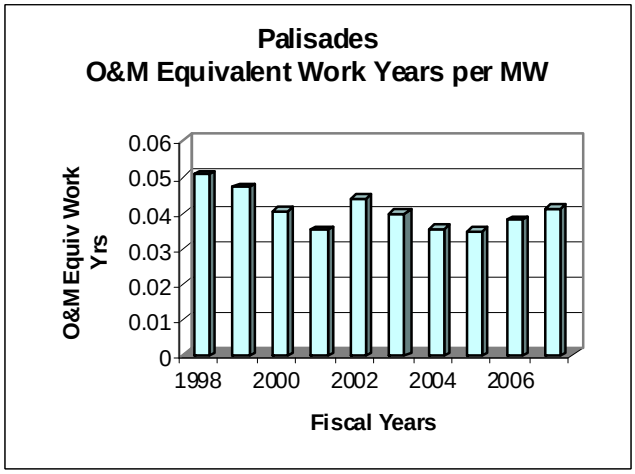
Benchmark 4
Workforce Deployment

Palisades FY 2007 Equivalent Work Staffing Year Levels						
	Equivalent Work Year Staffing Charged to Powerplant	Leave Additive	Denver and Washington Equivalent Work Year Staffing Additive	Total Equivalent Work Year Allocated to Powerplant	Total Equivalent Staffing Work Year per Generating Unit	Total Equivalent Work Year Staffing per Megawatt
General	1.27	0.13	0.07	1.48	0.37	0.01
Operation	2.42	0.26	0.00	2.68	0.67	0.02
Maintenance	4.15	0.44	0.00	4.59	1.15	0.03
Total Staffing	7.84	0.83	0.07	8.75	2.19	0.05

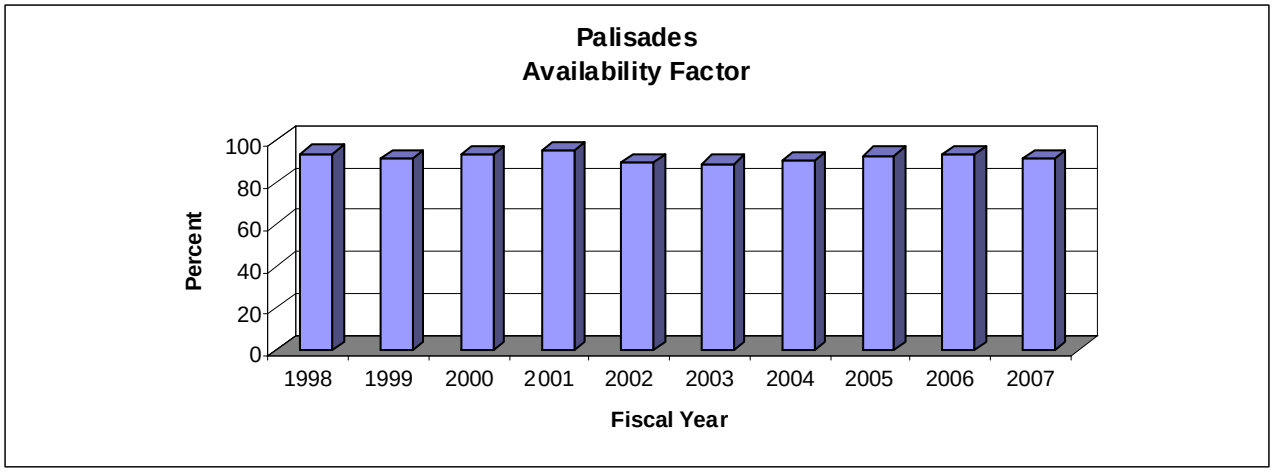




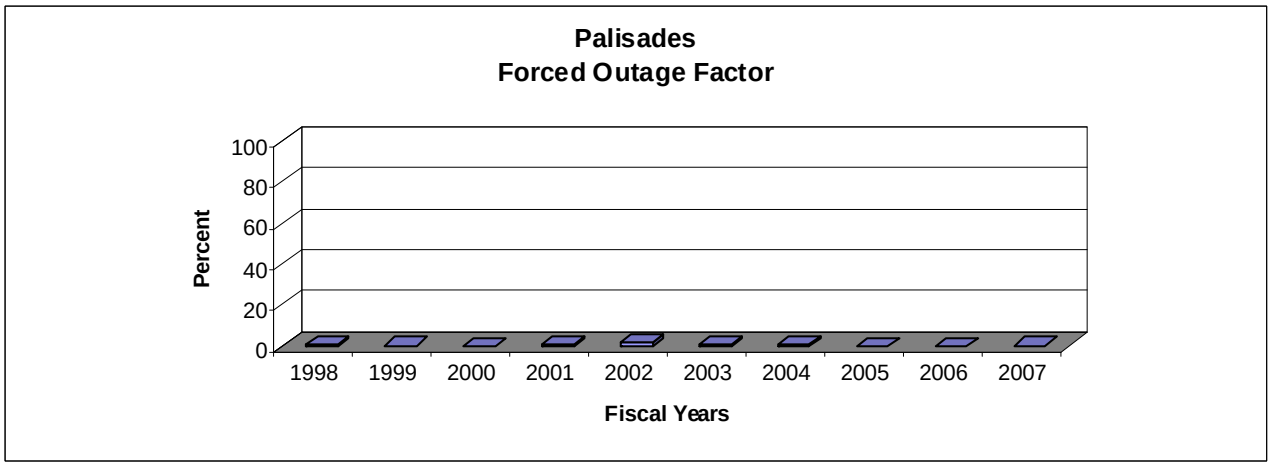




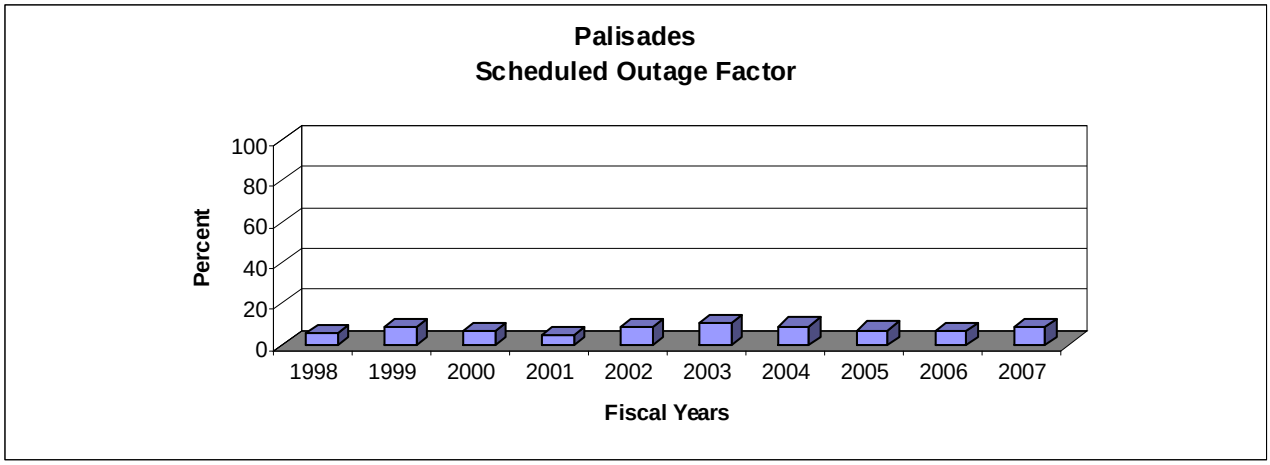
Benchmark 5
Availability Factor



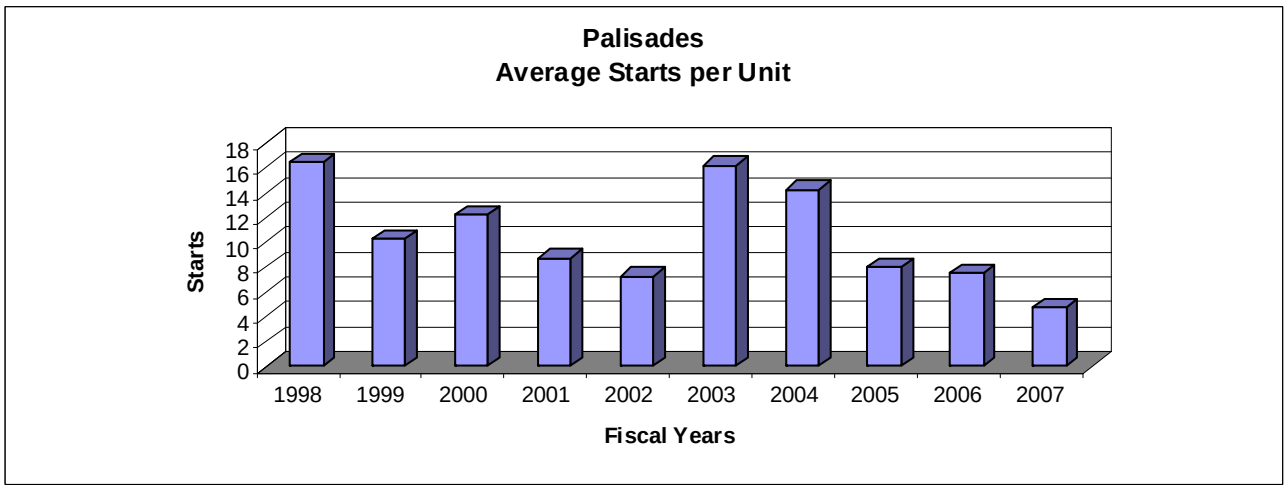
Benchmark 6
Forced Outage Factor



Benchmark 7
Scheduled Outage Factor



Starts



Benchmark Data Comparison

Fiscal Year 2007	Palisades Powerplant	Reclamation Average 100-500 MW Group	Total Reclamation Average	Industry Average	Best Performers
Wholesale Firm Rate Mills/kWh	24.8	Not Applicable	*22.45	Not Available	Not Available
Production Cost as Percentage of Wholesale Firm Rate	0.07%	Not Applicable	12.1%	Not Applicable	Not Applicable
O&M Cost $/MWh	3.96	4.44	2.76	***63.88	1.00
O&M Costs $/MW	11,362	10,502	7,847	***21,167	2,897
O&M Equiv Work Year per MW	0.04	0.04	0.03	Not Available	0.00
Availability Factor	91.1	83.5	82.3	**88.64	98.5
Forced Outage Factor	0.1	1.2	2.6	**2.61	0.0
Scheduled Outage Factor	8.8	15.4	15.1	**8.74	0.0

*Weighted by Net Generation
**2006 NERC Average
***Energy Information Administration Data

Roza Powerplant
Yakima Project

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Upper Columbia Area Office

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Fax: (509) 454-5611

E-Mail Address:
tglover@pn.usbr.gov

Reclamation Region: Pacific Northwest

NERC Region: Western Electricity Coordinating Council, Northwest Power Pool Area

PMA Service Area: Bonneville Power Administration

Project Authorization: The President approved the Yakima Project on November 6, 1935.

Project Purposes: The Yakima Project provides irrigation water for a comparatively narrow strip of fertile land that extends for 175 miles on both sides of the Yakima River in south-central Washington. The irrigable lands presently being served total about 465,000 acres.

The Roza Division, a unit containing 72,511 acres of land north of the Yakima River, extends from the vicinity of Pomona to a point north of Benton City. The distribution system is supplied by the Roza Canal, which originates at the Roza Diversion Dam on the Yakima River about 10 miles north of Yakima. The Roza Powerplant is adjacent to the Roza Canal, 3 miles from Yakima.

Plant Location: Roza Powerplant is located in Yakima County, Washington, on the Roza Main Canal about 3 miles northeast of Yakima, Washington.

Plant Facts: The Roza Powerplant develops 12,937 kilowatts. More than 70 miles of transmission lines deliver power to pumping plants in the Roza Division.
Roza Diversion Dam is a concrete weir structure 67 feet high.

Plant Purpose: The Roza Powerplant provides power at the cost of production to operate pumps on the Roza Irrigation District. The Roza Irrigation District pumps to 27,700 acres of their irrigation deliveries. Any other power generated is marketed through the BPA.

Plant History: Plans for the Roza Division were initiated in 1932. The powerplant was completed in conjunction with that plan in 1958. It has been operated since at the maximum capacity allowed by available flows, weather, and maintenance.

Present Activities: Normal operations

Future Planned Activities: Static Excitation and Voltage Regulation upgrade scheduled for Spring of 2009.

Special Issues: A major contributor to the cost of O&M at the Roza Powerplant is the cost of maintaining about 10 miles of delivery canal and over 70 miles of transmission line.

River:	Roza Main Canal	**Plant Type:**	Conventional
Powerhouse Type:	Above Ground	**Turbine Type:**	Francis
Original Nameplate Capacity:	10,660 kW	**Installed Capacity:**	12,937 kW
Year of Initial Operation:	1958	**Age:**	49 years
Net Generation (FY-2007):	76.9 GWh	**Rated Head:**	158 feet
Average Plant Factor (FY-2007):	67.9 percent	**Remotely Operated:**	No
Production Mode:	Intermediate		

Ancillary Services

Roza
Ancillary Services

Spinning Reserve	No
Non-Spinning Reserve	No
Replacement Reserve	No
Regulation/Load Following	No
Black Start	No
Voltage Support	Yes

The Roza Powerplant is capable of black start, but it has doubtfully ever been done. The canal feed makes it impractical to operate separate from BPA.

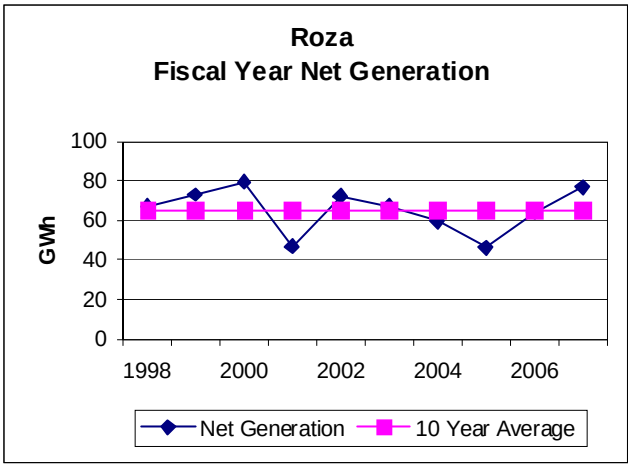
Generators

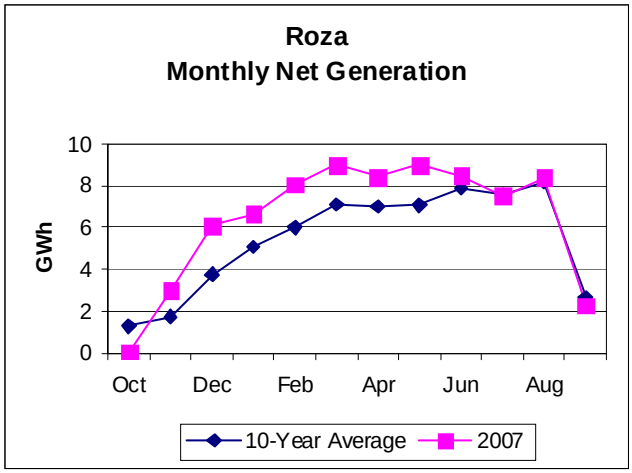
Roza Generators
Existing Number and Capacity

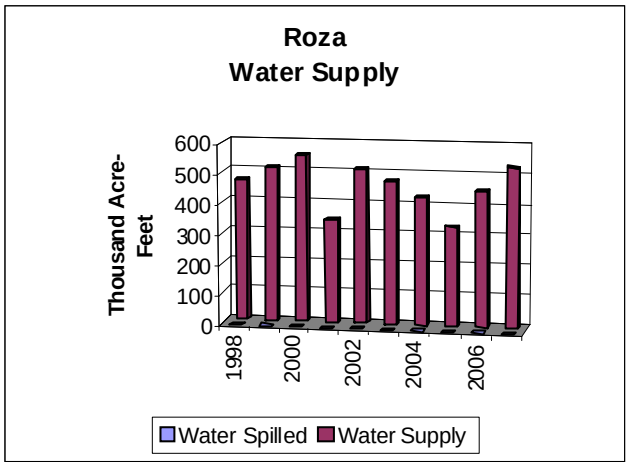
Unit #	Original Capacity (kW)	Capacity Increased (kW)	Present Capacity (kW)
1	11,250	1,687	12,937
1 unit	11,250	1,687	12,937

Winding capacity is 12,937 kW, but actual capacity of plant is 11,845 kW due to canal restrictions on load rejection.

Generation

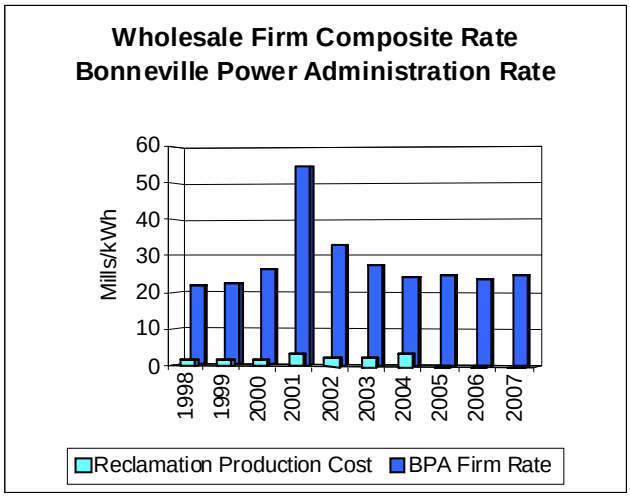

Roza
Fiscal Year Net Generation
GWh
100
80
60
40
20
0
1998
2000
2002
2004
2006
Net Generation
10 Year Average


Roza
Monthly Net Generation
GWh
10
8
6
4
2
0
Oct
Dec
Feb
Apr
Jun
Aug
10-Year Average
2007

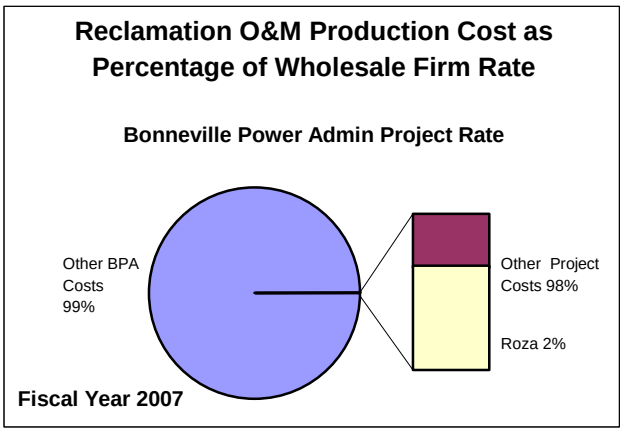

Roza
Water Supply
Thousand Acre-Feet
600
500
400
300
200
100
0
1998
2000
2002
2004
2006
Water Spilled
Water Supply

Prime Laboratory Benchmarks

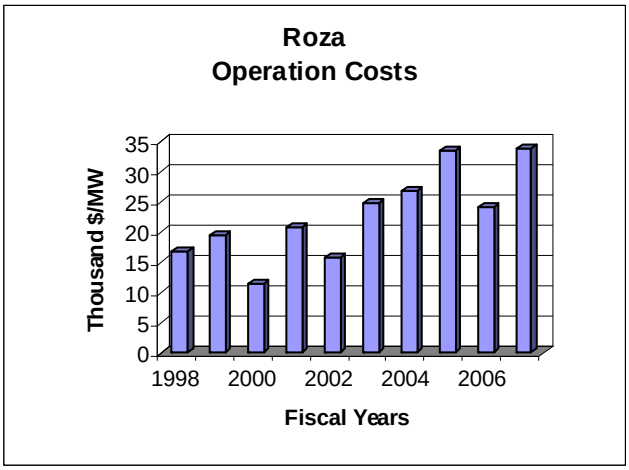
Benchmark 1
Wholesale Firm Rate

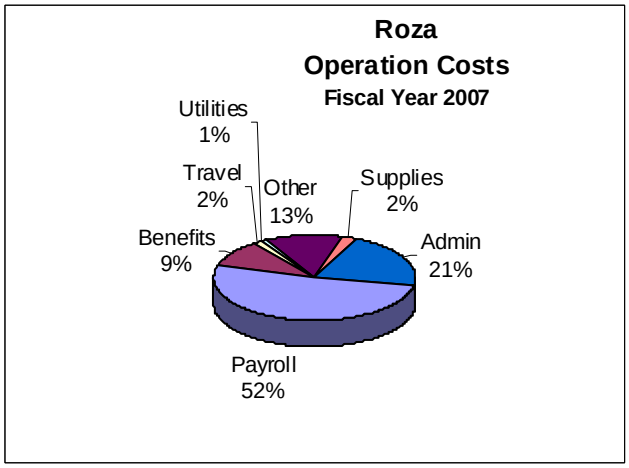


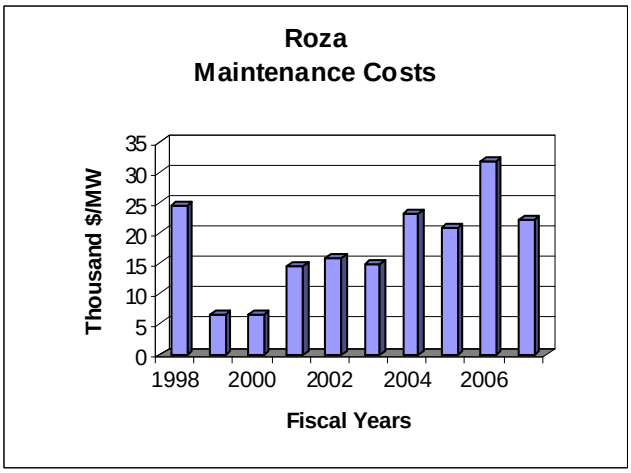
Benchmark 2
Reclamation's Production Costs as Percentage of Wholesale Firm Rate

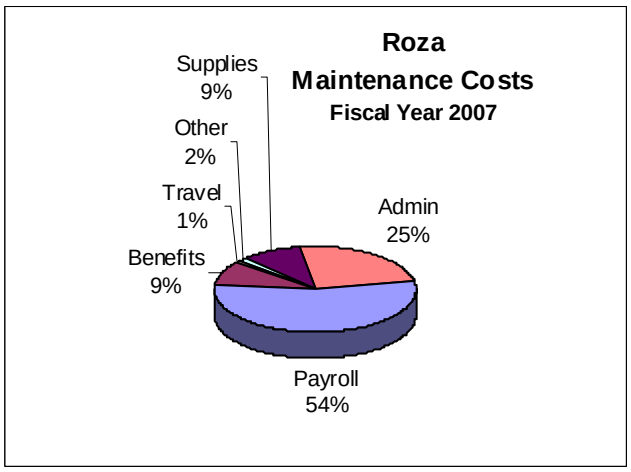


Benchmark 3
Production Costs

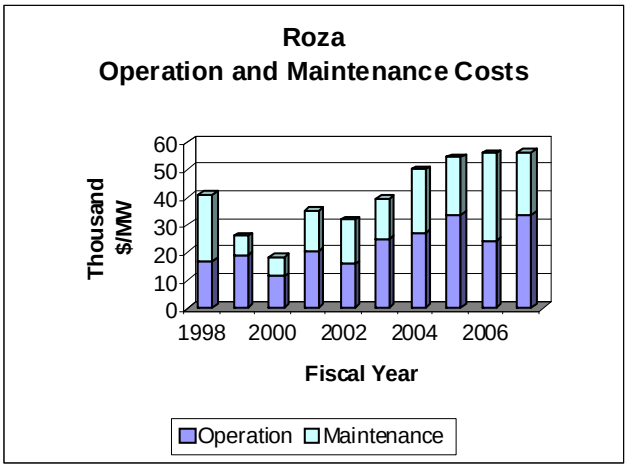


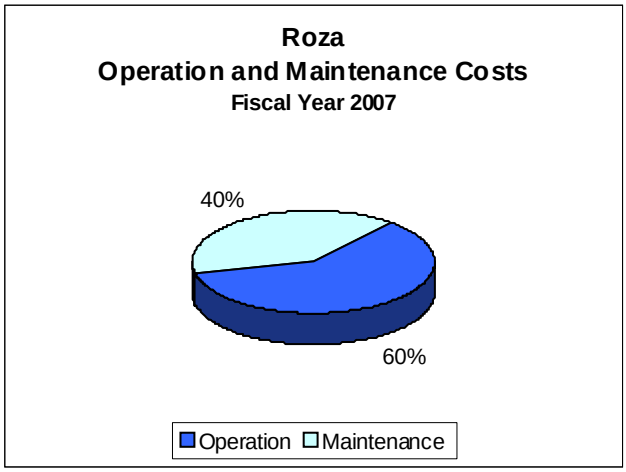


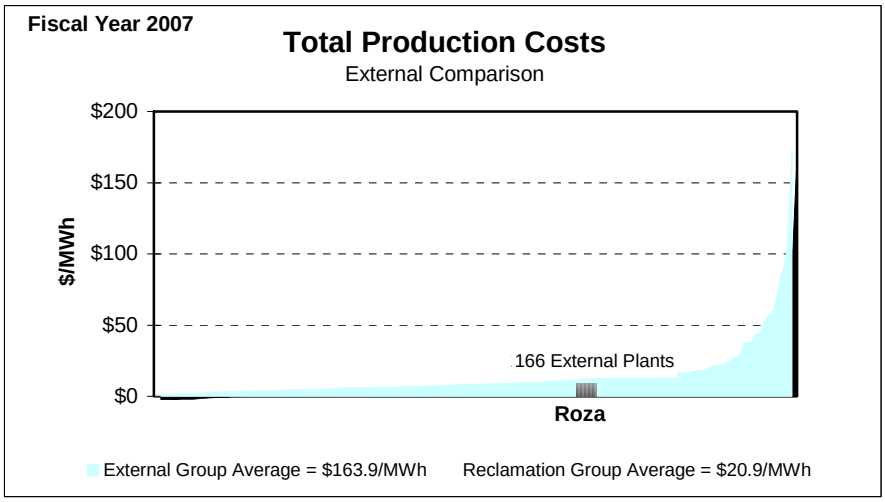


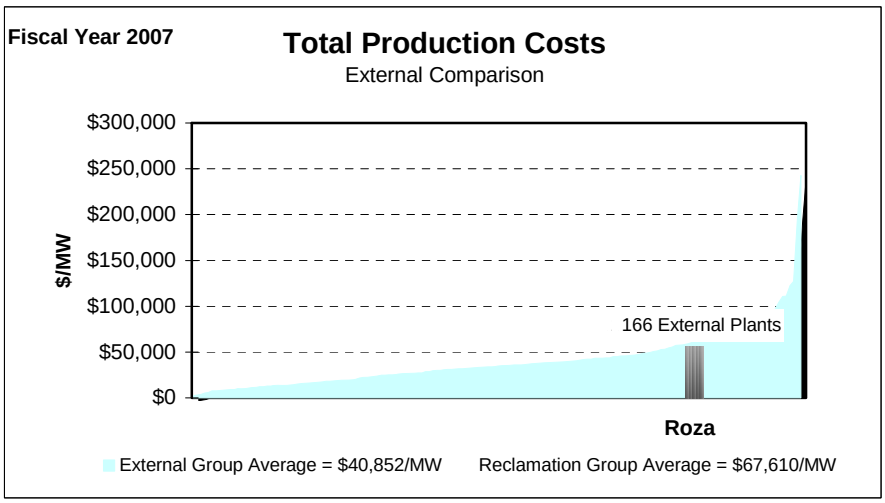


Benchmark 3
Production Cost



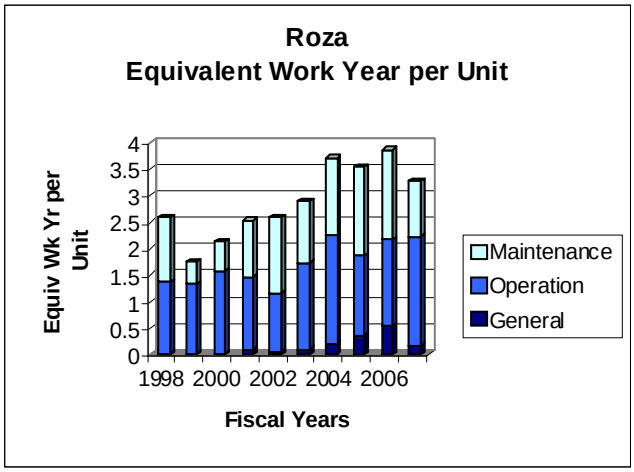


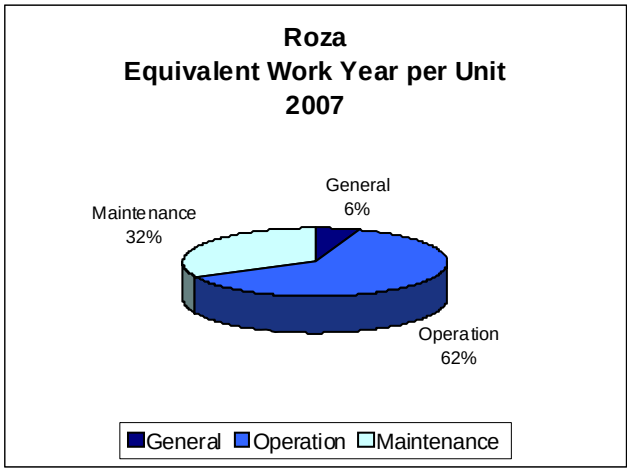


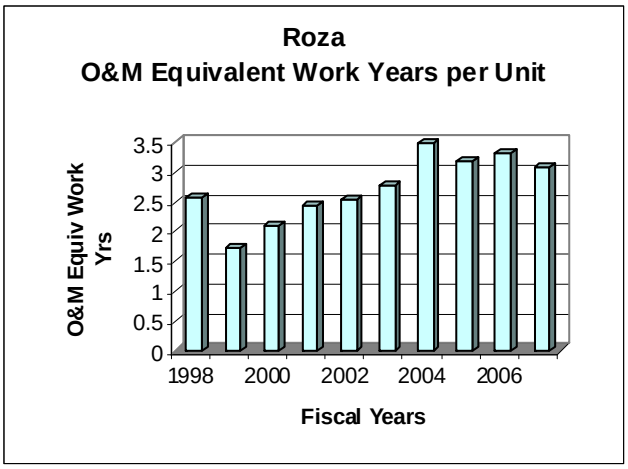


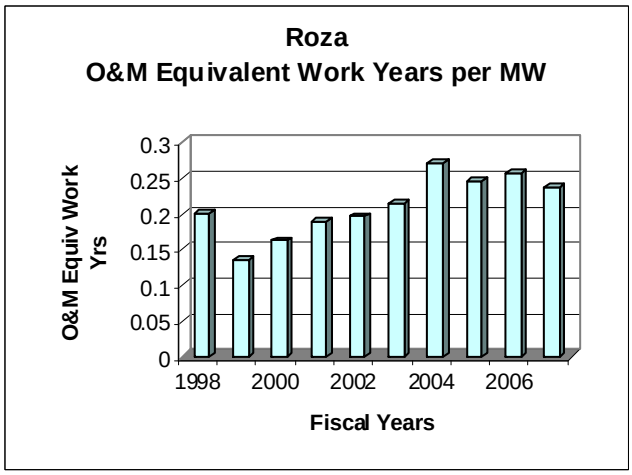
Benchmark 4
Workforce Deployment

Roza FY 2007 Equivalent Work Staffing Year Levels						
	Equivalent Work Year Staffing Charged to Powerplant	Leave Additive	Denver and Washington Equivalent Work Year Staffing Additive	Total Equivalent Work Year Allocated to Powerplant	Total Equivalent Staffing Work Year per Generating Unit	Total Equivalent Work Year Staffing per Megawatt
General	0.15	0.02	0.02	0.18	0.18	0.01
Operation	1.84	0.20	0.00	2.04	2.04	0.16
Maintenance	0.94	0.10	0.00	1.04	1.04	0.08
Total Staffing	2.93	0.31	0.02	3.26	3.26	0.25

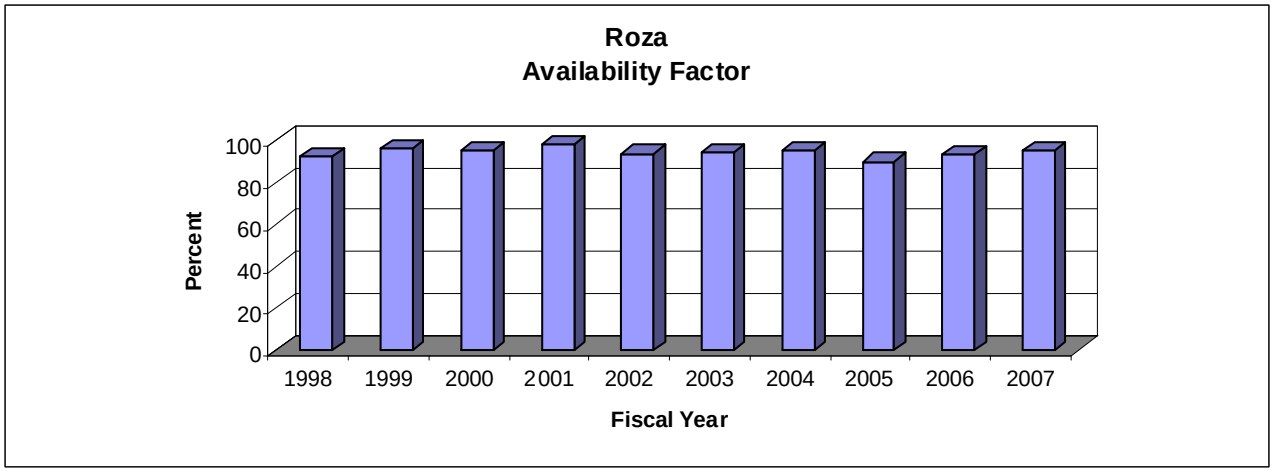




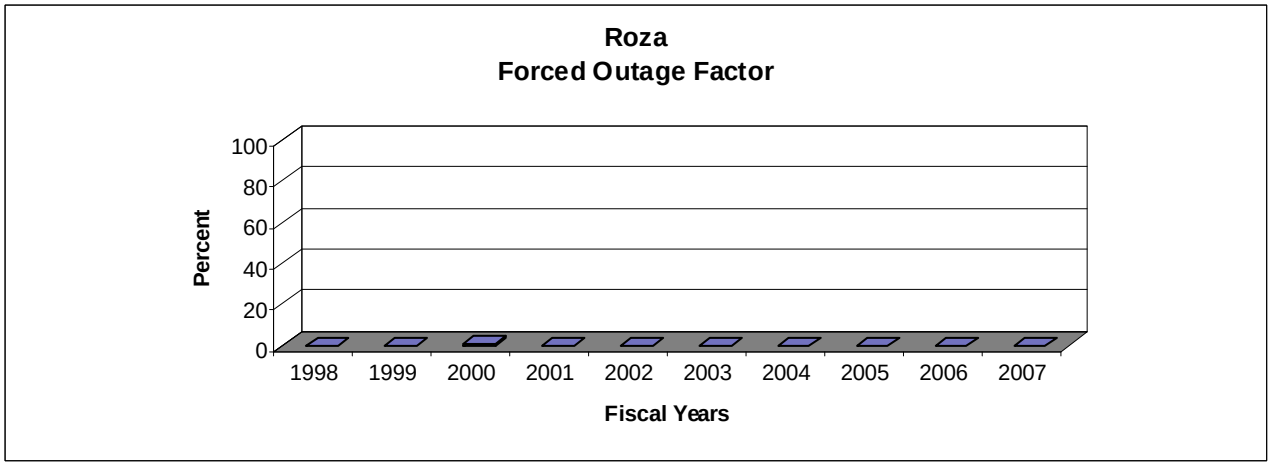




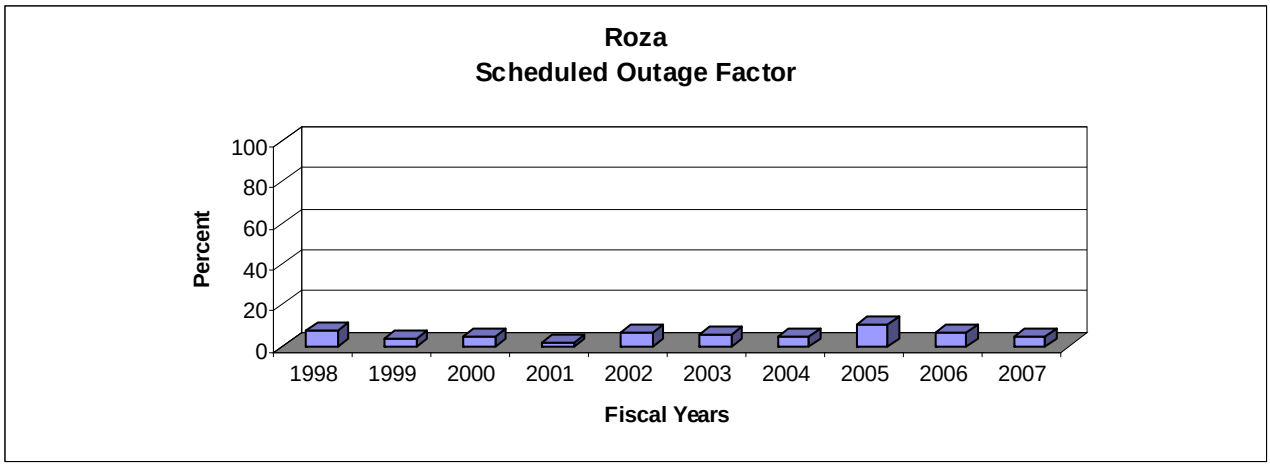
Benchmark 5
Availability Factor



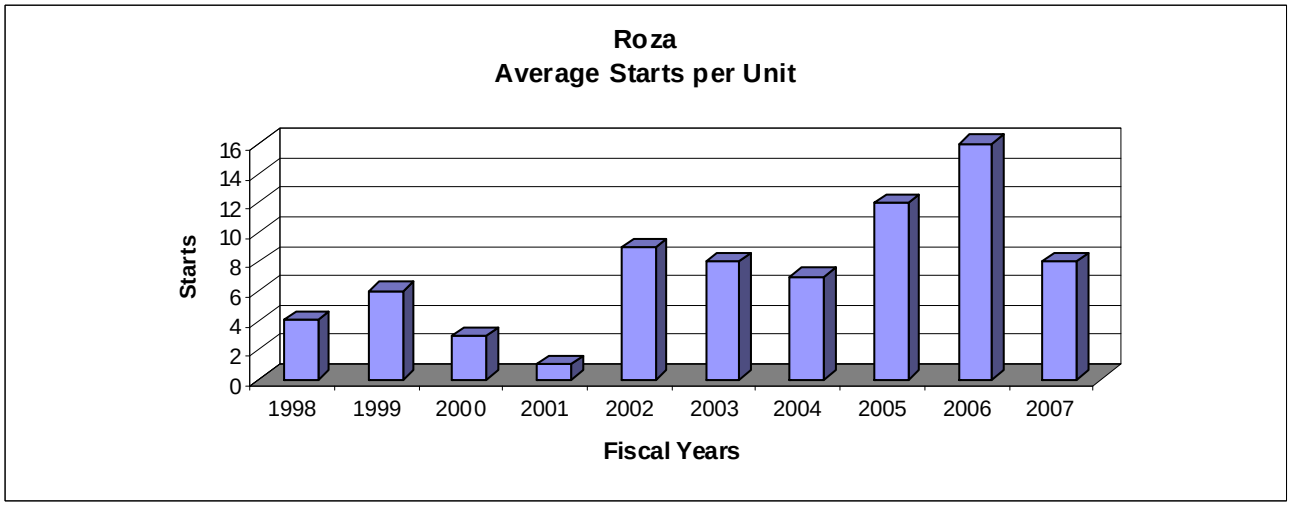
Benchmark 6
Force Outage Factor



Benchmark 7
Scheduled Outage Factor



Starts



Benchmark Data Comparison

Fiscal Year 2007	Roza Powerplant	Reclamation Average 10-30 MW Group	Total Reclamation Average	Industry Average	Best Performers
Wholesale Firm Rate Mills/kWh	24.8	Not Applicable	*22.45	Not Available	Not Available
Production Cost as Percentage of Wholesale Firm Rate	0.03%	Not Applicable	12.1%	Not Applicable	Not Applicable
O&M Cost $/MWh	9.42	16.40	2.76	***163.95	1.00
O&M Costs $/MW	55,950	62,731	7,847	***40,852	2,897
O&M Equiv Work Year per MW	0.24	0.22	0.03	Not Available	0.00
Availability Factor	95.2	88.5	82.3	**88.64	98.5
Forced Outage Factor	0.0	0.1	2.6	**2.61	0.0
Scheduled Outage Factor	4.8	11.4	15.1	**8.74	0.0

*Weighted by Net Generation
**2006 NERC Average
***Energy Information Administration Data