RECLAMATION

Managing Water in the West

Reclamation-Wide Power Performance

For Fiscal Year 2007

U.S. Department of the Interior
Bureau of Reclamation

Benchmarking Overview

Setting for Benchmarking Analysis

The Power Management Laboratory (Laboratory) has undertaken one of the most aggressive and intensive benchmarking efforts in the hydropower industry. This effort, part of the National Performance Review (NPR), compared Reclamation's powerplants with those of other major hydropower utilities by using publicly available data on more than 900 hydroelectric units. By quantifying the performance of the most effective plants in the industry, we can establish goals and actions to improve Reclamation's power program.

This benchmarking data book displays the quantitative power benchmarking results for Reclamation as a whole and also for individual Reclamation powerplants. These quantitative results are the basis for certain Laboratory recommendations discussed in the companion report entitled, *Future Generations: A New Era of Power, Performance, and Progress*.

Benchmarking Objectives

Benchmarking is a continuous formal process of measuring, understanding, and adapting more effective practices from best-in-class organizations that lead to superior performance. Benchmarking is essential to provide the best service to our customers.

Benchmarking will continue to help us:

- X Improve our performance and organization
- X Learn about industry leaders and competitors
- X Determine what world-class performance is
- X Accelerate and manage change
- X Achieve breakthrough results
- X Improve customer satisfaction
- X Become the best in the business

Benchmarks serve as indicators to:

- X Understand our process and approach. Comparing overall performance results can indicate whether an approach (e.g., maintenance, training, management decision) was effective. Benchmarks can indicate possible directions for change.

- X Pinpoint areas for effective change. Comparison of a powerplant=s performance to others in the industry can indicate areas for improvement.

While benchmarks are effective tools, they are not the only factors in evaluating and improving performance. Even though hydroelectric powerplants may have a similar classification, their operating circumstances vary widely. Factors such as location, size, number of units, age, topography, equipment type, and maintenance practices should be considered when examining benchmark performances.

Comparing performance among plants and regions is difficult, as each powerplant works within a unique context of river flows, physical settings, and organizational goals. However, benchmarks provide indicators that allow us to examine individual circumstances and performances within groups of similarly-sized powerplants.

We will use these benchmarks to recommend methods, approaches, and actions for reaching and surpassing identified business standards. To improve performance, we will set specific goals, take appropriate actions, and measure the results against the benchmarks. Implementing and monitoring actions will in turn provide information needed to analyze the benchmark effectiveness and to recalibrate and/or add benchmarks as appropriate.

Seven Prime Benchmarks

Six Laboratory work groups identified potential performance indicators. Out of approximately 500 potential performance indicators, each workgroup developed a list of 10-15 benchmarks. These were condensed into seven prime benchmarks for measuring performance. Benchmarks are valuable to the Reclamation power program because they mirror those used by other hydroelectric utilities and other groups for performance analyses and are recognized as meaningful industry-wide hydropower performance indicators.

The seven prime benchmarks we used were:

X **Benchmark 1 - Wholesale Firm Rate**

This benchmark shows the wholesale firm power rates that Western Area Power Administration (Western) and Bonneville Power Administration (BPA) charge to the customers.

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

This benchmark shows the Reclamation production cost as a percentage of the firm wholesale rate.

X **Benchmark 3 - Production Costs**

This benchmark displays the costs associated with producing one kilowatt-hour of energy.

X **Benchmark 4 - Workforce Deployment**

This benchmark tracks the full time equivalent (FTE) staffing levels. These staffing levels are further broken down by FTEs per generating unit and FTEs per megawatt.

X **Benchmark 5 - Availability Factor**

This benchmark illustrates the percentage of time the plant was available to generate power.

X **Benchmark 6 - Forced Outage Factor**

This benchmark illustrates the percentage of time the units were out of service for unanticipated repairs, etc.

X **Benchmark 7 - Scheduled Outage Factor**

This benchmark illustrates the percentage of time the unit was scheduled for outage due to maintenance.

We compared the powerplants with internal and external plants of similar capacity and generation type. Powerplants were grouped by the amount of installed capacity and type of operation, i.e., conventional, seasonal, and other (pump storage, station service, etc.) This is explained in further detail in the next section.

Methodology

Reclamation Powerplant Categories

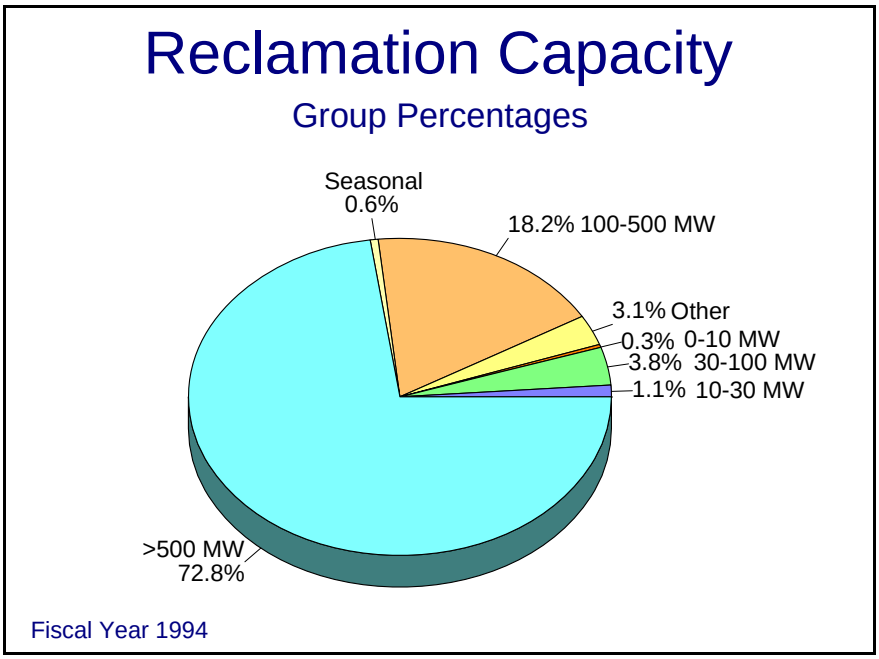
For this report, 56 of Reclamation's 58 hydroelectric powerplants were analyzed. Two hydroelectric powerplants, the San Luis Pump-Generating Powerplant and Spirit Mountain Powerplant were not analyzed. Reclamation owns 49 percent of the San Luis Powerplant, which is operated by the State of California. Western markets the Federal share of power for San Luis; therefore, it is included in the rate setting. Spirit Mountain Powerplant had not begun operations in fiscal year 1994 and had no operating statistics.

The 56 powerplants were divided into two primary categories consisting of:

X Conventional
X Pump-generating

Two powerplants, Grand Coulee and Flatiron, have both conventional generating and pump-generating units. In both cases, these pump-generating units are used primarily in a stand-by mode and represent less than one percent of the total energy production. Therefore, both plants were analyzed as conventional plants.

The primary categories were then subdivided into full-year and seasonal operation. The conventional powerplants operating on an annual basis were subdivided into five groups based on their installed capacity. The amount of total capacity varies greatly by group, as shown on the accompanying chart.



The seasonal plants were kept in one group as their capacity variance was small. The two pump-generating plants, Mt. Elbert and O=Neill, are operated differently. Mt. Elbert is operated as a traditional pumped-storage facility, and O=Neill generates only on a seasonal basis. Therefore, these plants were not grouped together and were not compared with other Reclamation powerplants.

Four of the conventional plants were excluded from the comparative analysis for the following reasons:

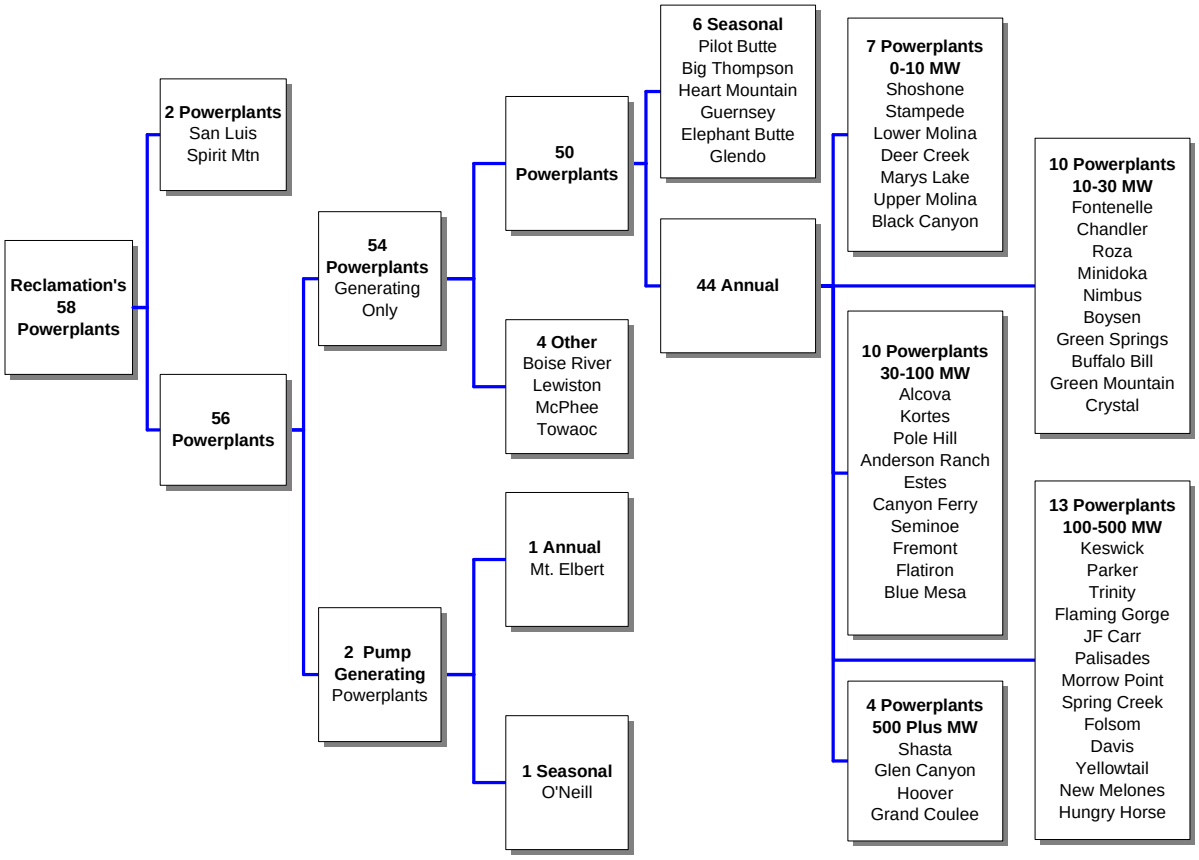
- X Boise River Diversion Powerplant was excluded from the comparative analysis as it is operated in the standby mode and has not generated power for several years.

- X Lewiston Powerplant was excluded from the comparative analysis as its capacity is small (350 kilowatts) and it is operated primarily for supplying station service to Trinity Powerplant.

- X McPhee and Towaoc Powerplants were excluded because the plants had not reached operational status through fiscal year 1994.

This left 50 powerplants in the conventional category with 44 operating year-round and 6 operating on a seasonal basis.

The following chart shows how each plant was grouped for internal comparisons.



Production Cost Calculations

Reclamation has historically analyzed financial data at the aggregate level, e.g., total revenues and costs, for all Reclamation power facilities. As part of the Laboratory, a Financial Work Group identified and recommended financial reporting improvements for Reclamation=s powerplants. To allow for project- and plant-specific financial analysis, the group compiled fiscal year 1994 revenue data at a project level and cost data at the powerplant level. This initial compilation will establish a baseline from which future financial performance can be measured.

Power related costs were divided into costs for producing power and for transmission. The costs for producing power were further divided into direct and indirect costs. Direct costs included operation, maintenance, and replacement costs, which were further subdivided into payroll; benefits; travel and transportation; utilities; other services; contracts; and materials, supplies, and equipment. Indirect costs included overhead and administrative and general expenses (A&GE).

Transmission costs discussed above are mainly associated with transmitting project use power from powerplants to project users and do not include the Power Marketing Administration=s (PMA) costs for marketing and delivering power. In addition, the PN Region allocates all costs associated with powerplant switchyards and the majority of transmission costs to commercial power sales.

Due to the unique nature of each Reclamation project, only 22 of the 56 powerplants have associated transmission costs. These costs vary widely, depending on the amount and size of transmission requirements and represent only about 5 percent of total costs for producing and transmitting power. For this reason, no attempt was made to analyze transmission costs.

The cost of producing power at Reclamation facilities is fully reimbursable. The costs for producing power are repaid through power revenues associated with power rates paid by customers. Power users pay a power rate that not only includes Reclamation=s power production costs but also includes "other" costs. Included within "other" costs are:

- X Repayment of capitalized costs of power related facilities
- X Interest on the unpaid capital investment
- X The portion of project irrigation costs, above the irrigator=s ability to pay, which have been allocated to power for repayment
- X The PMAs costs of marketing and transmitting the power
- X Other costs the Congress requires
- X PMAs cost of purchasing firm power

The costs and net generation were used to calculate performance parameters which are measured in mills (one thousandth of a dollar) per kilowatt-hour. Net generation is defined as the generation remaining after subtracting out generation used at the site to operate the facility. The net generation is the power supplied to project use power customers and to the PMAs.

Reclamation-Wide Power Profile

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Power Resources Office

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E-Mail Address: power@usbr.gov

World Wide Web Address: www.usbr.gov/power

Reclamation: The Bureau of Reclamation, an agency of the Department of the Interior, manages water and related resources in the western United States. Five regions cover the 17 Western States. The Power Resources Office develops and coordinates policy and power activities with external groups and provides leadership and guidance for Reclamation's power program.

NERC Regions: Western Systems Coordinating Council

PMA Service Area: Bonneville Power Administration and Western Area Power Administration

Authorization: The Secretary of the Interior has authority to develop the hydropower potential of Reclamation projects under the following acts:

- The Reclamation Act of 1902 authorized the Secretary of the Interior to develop irrigation and hydropower projects in the 17 Western States.
- The Town Sites and Power Development Acts of 1906 authorized the Secretary of the Interior to lease surplus power or power privileges.
- The Federal Water Power Act of 1920 regulated hydroelectric development of navigable waterways.
- The Reclamation Project Act of 1939 extended the contract term to 40 years for sale of power or lease of power privileges, giving preference to qualifying entities.
- Individual project authorizations.

Purposes: Reclamation plans, develops, and manages multipurpose water projects in the 17 Western States. The primary purposes of Reclamation projects have been irrigation; flood control; and water for domestic, industrial, and municipal uses. Including power in multipurpose Federal Reclamation projects is considered when it is in the national interest, economically justified, feasible by engineering and environmental standards, required for pumping to supply irrigation water, and capable of repaying its share of the Federal investment in accordance with Reclamation law.

Power Uses: Electric power produced at Reclamation's 58 hydropower facilities is used for pumping on Reclamation projects or sold as excess power. Reclamation power is marketed and transmitted by Federal PMAs. Preference for firm power contracts is given to municipalities, public corporations, public agencies, and cooperatives or other nonprofit organizations. Revenues from power sales are used to repay project costs. In addition, power revenues are scheduled to repay portions of other project costs, such as salinity control and irrigation.

Facts: Reclamation's power facilities cover a wide range of capacities, designs, and functions. This report provides powerplant facts, locations, purpose, special issues, etc. Similar information is available on the Internet at www.usbr.gov/power.

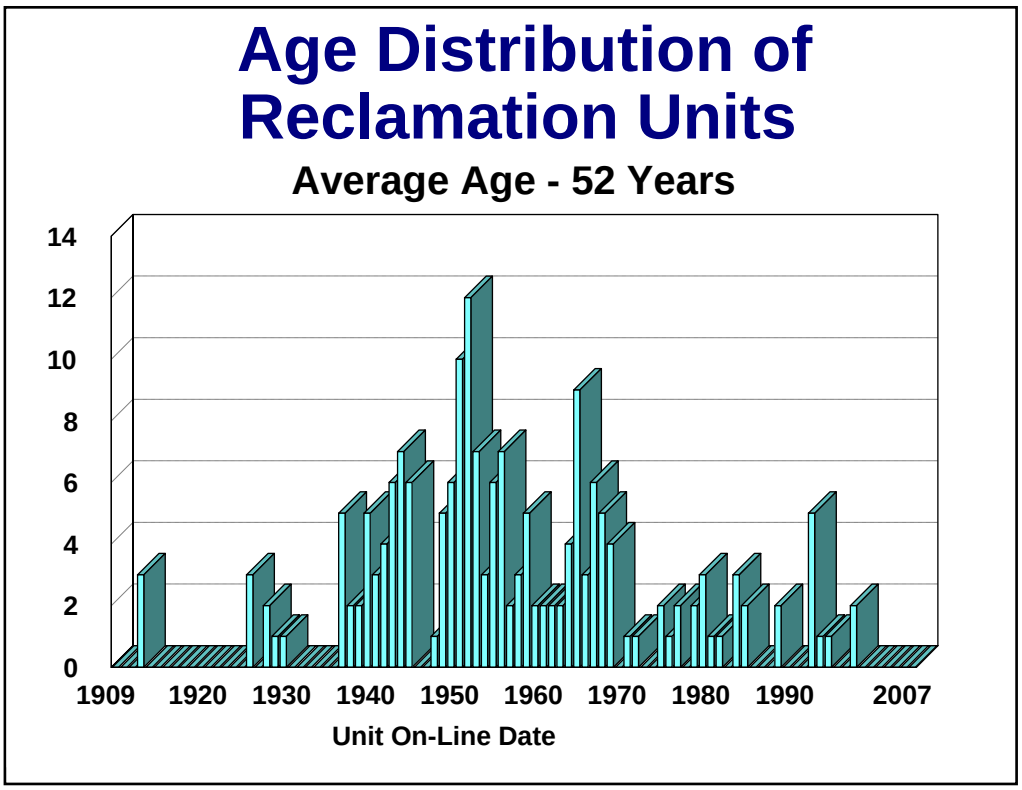
History: Reclamation's original purpose, "to provide for the reclamation of arid and semiarid lands in the West," now covers a wide range of interrelated functions. These include providing municipal and industrial water supplies, hydroelectric power generation, irrigation water for agriculture, water quality improvement, flood control, river regulation, navigation improvement, fish and wildlife enhancement, recreation, and research in water management. Reclamation programs involve close cooperation with the Congress, other Federal agencies, States, Indian Tribes, local governments, academic institutions, water user organizations, wildlife groups, recreation groups, conservation groups, and others.

Electric power generated at Reclamation damsites was initially used to process materials as well as to construct the engineering works. The plants powered sawmills, concrete plants, cableways, hoists, giant shovels, and draglines; they also powered lights for round-the-clock operations at some damsites. After construction, the energy-powered pumps provided drainage or conveyed water to lands that gravity canal systems could not reach. Surplus power was sold to municipal and farm consumers and helped meet local industrial demands for electricity. Hydroelectric features were included in project construction costs repaid by the water and power users under provisions of the Reclamation Act of 1902.

Location: Reclamation operates in the 17 Western States and has powerplants in 11 of the most western States.

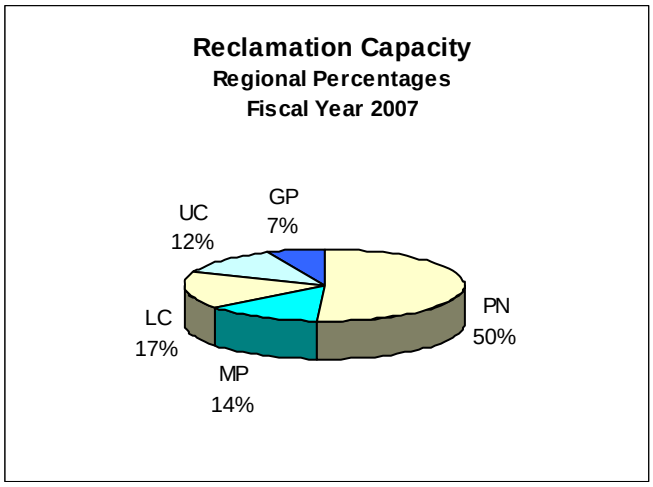
Rivers:	Reclamation's 58 hydropower electric powerplants are on 18 major rivers and numerous smaller tributaries.		
Installed Capacity (FY 2007):	14,859 MW	**Initial Operation:**	1909-1994
Net Generation (FY 2007):	40.53 billion kWh	**Average Unit Size[1]:**	78 MW
Average Powerplant Size:	256 MW	**Average Age:**	51 years
Range of Rated Head:	24 to 2,490 feet	**Remotely Operated:**	44 Yes and 14 No
Average Annual Plant Factor:	31.36 percent		

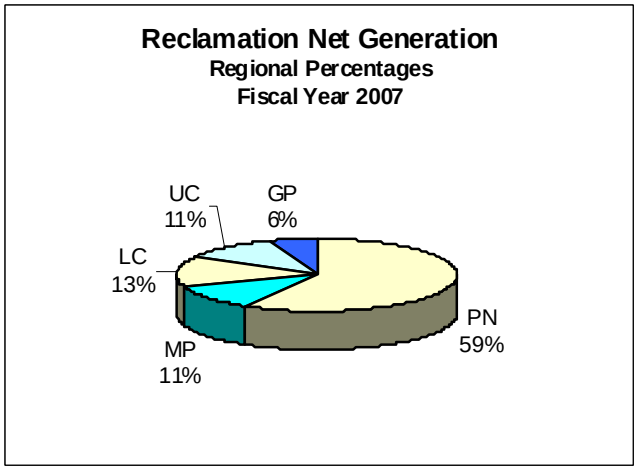
The accompanying chart portrays the age distribution of the generating units.



[1]The average includes the portion of San Luis' eight units jointly owned with the State of California.

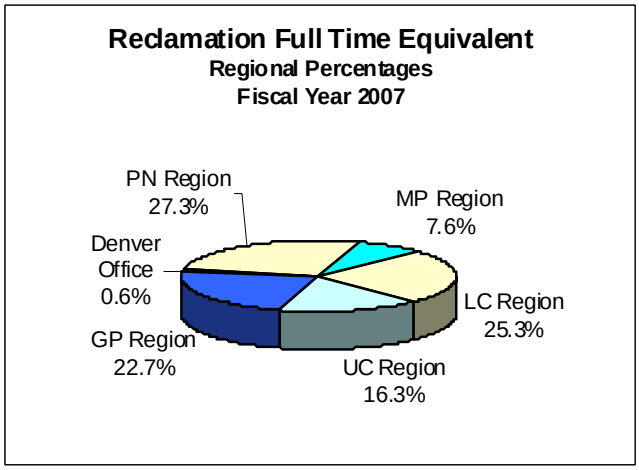
The total capacity for Reclamation in fiscal year 2007 was 14,859 megawatts. The regional breakdown is shown on the accompanying chart.



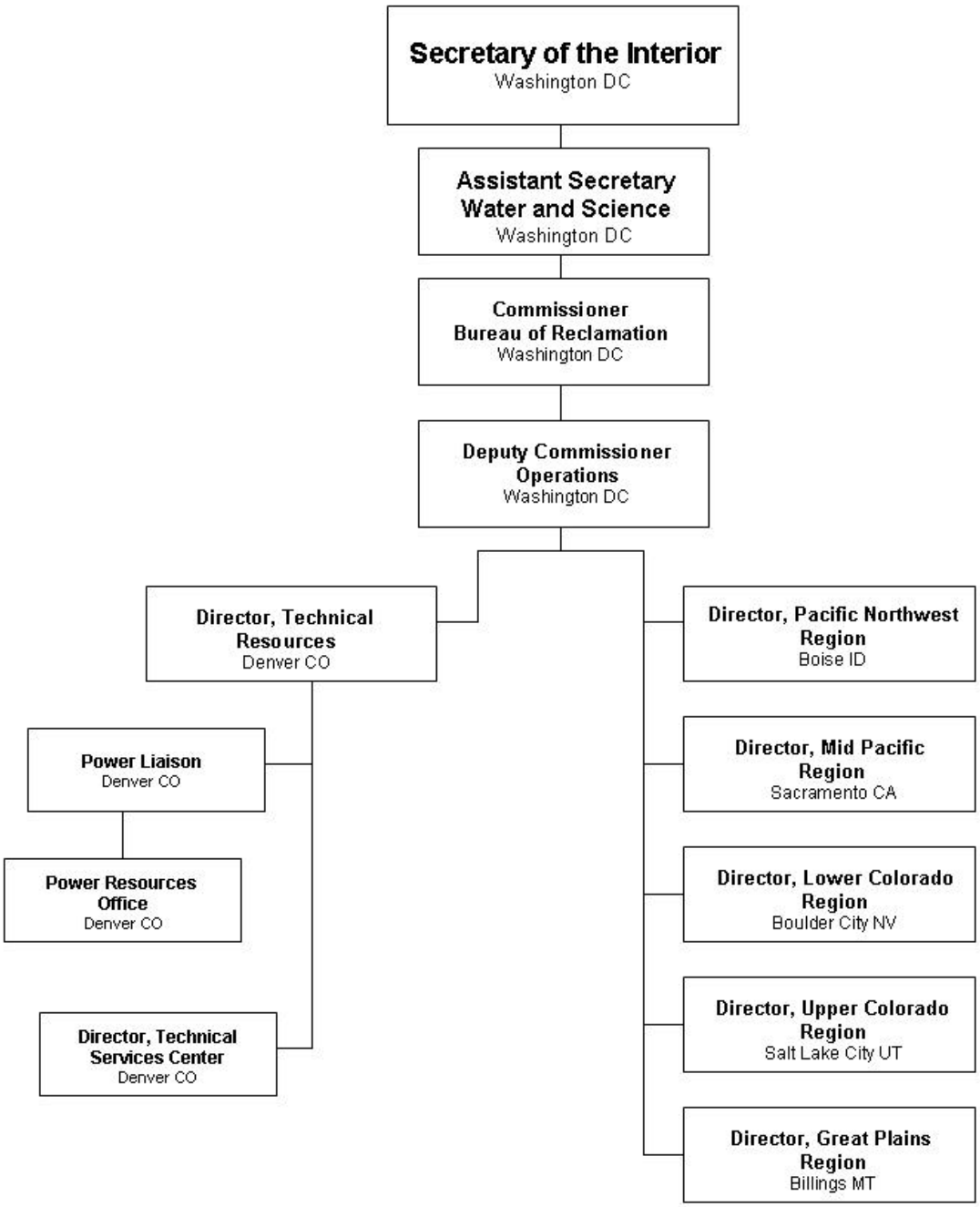


In fiscal year 2007, Reclamation produced 40529295.88 net megawatt hours of energy.

In fiscal year 2007, the power employees worked the equivalent of full time employees.



Organizational Structure:



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

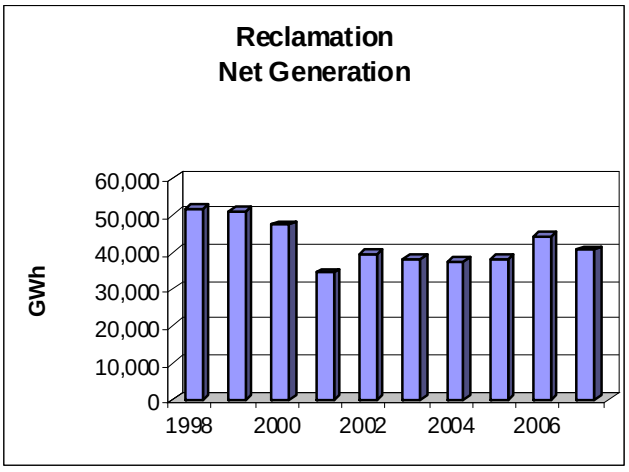
Generators

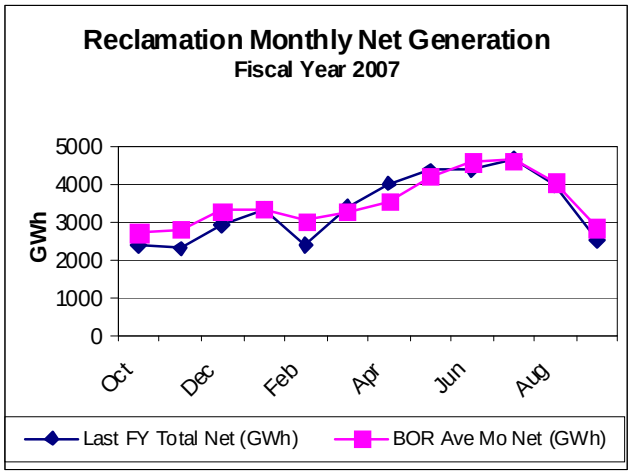
Reclamation Generators

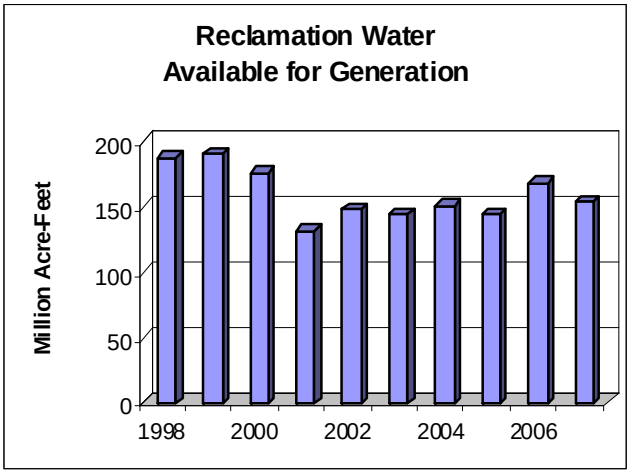
Existing Number and Capacity
Fiscal Year 2007

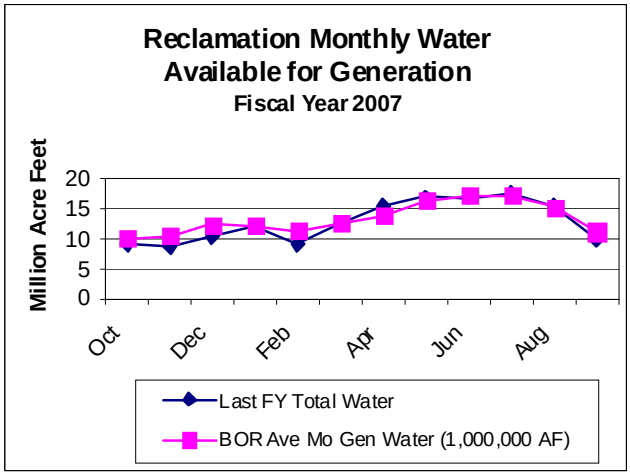
Region	Number of Powerplants	Number of Units	Installed Capacity (MW)	Net Generation (GWh)
PN	10	56	7,537.14	23,754.07
PN	12	40	2,031.82	4,465.80
PN	3	28	2,453.80	5,408.11
PN	12	26	1,832.36	4,618.29
PN	21	44	1,003.79	2,283.02
Reclamation Total	**58**	**194**	**14,858.91**	**40,529.30**

Generation



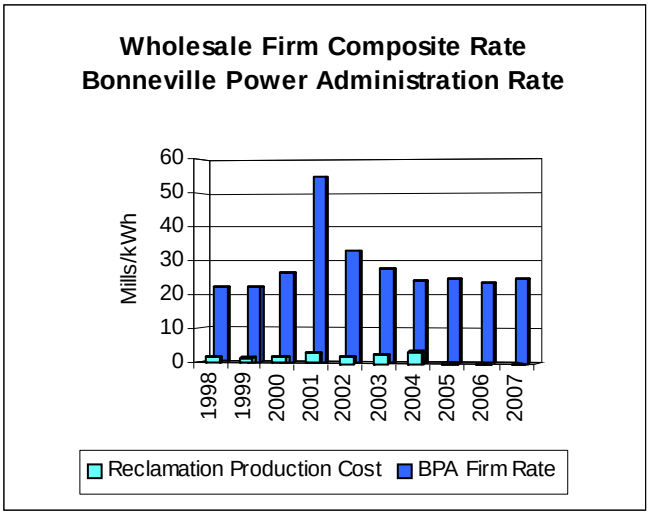


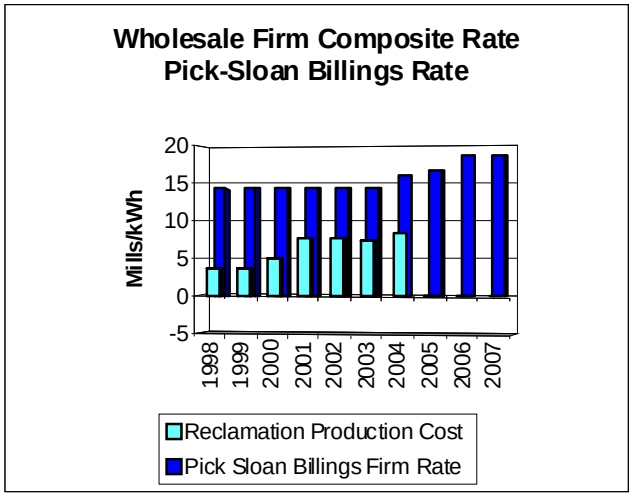


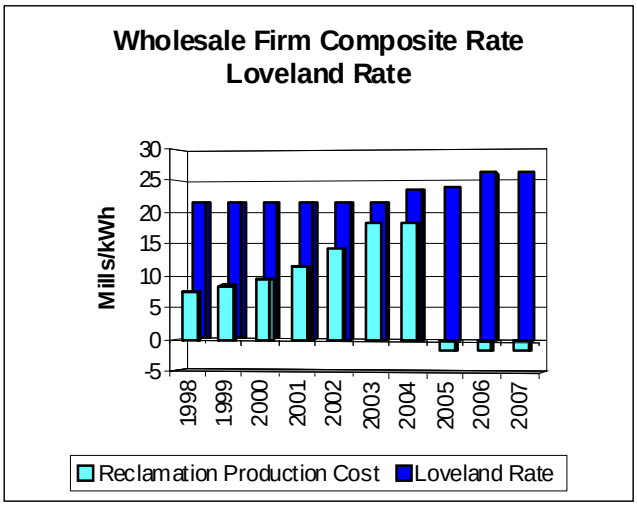


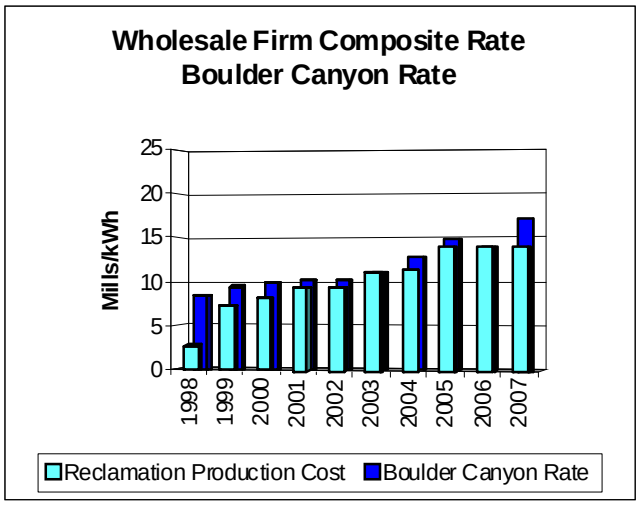
Prime Laboratory Benchmarks

Benchmark 1
Wholesale Firm Rate









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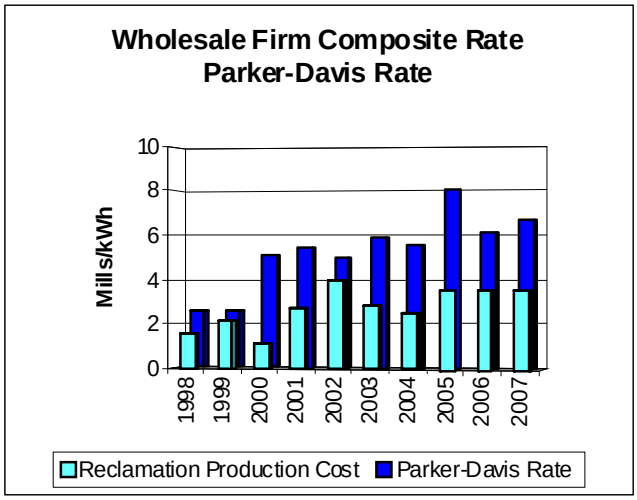
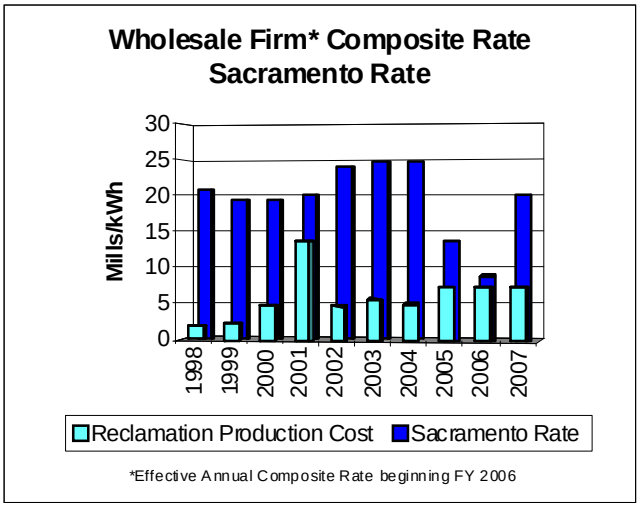
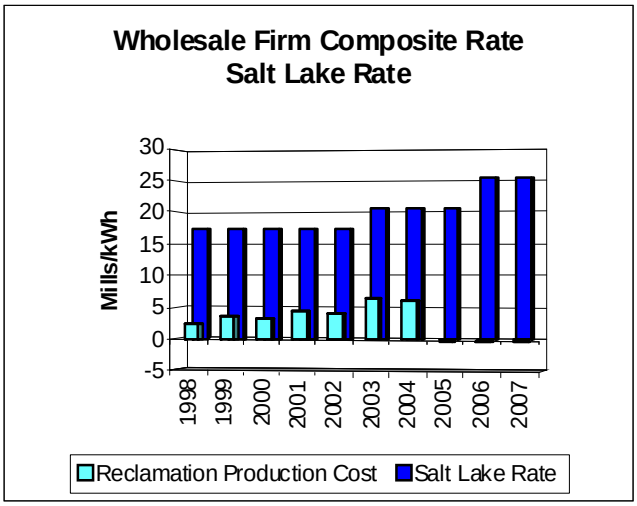
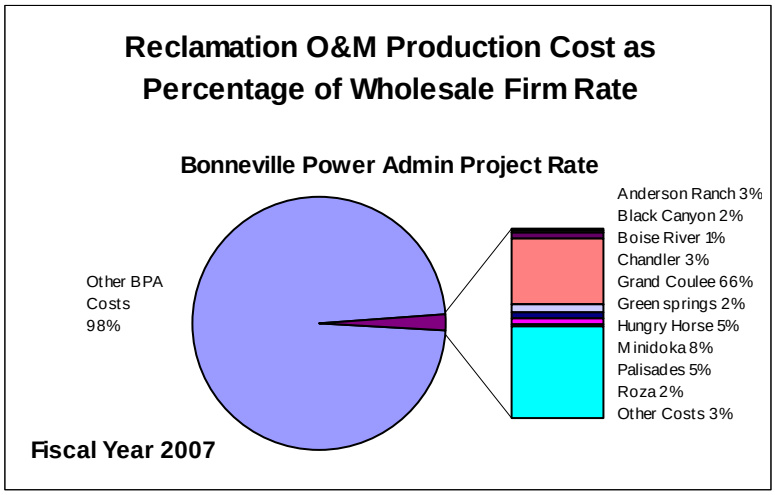






Benchmark 2
Reclamation's Production Cost as Percentage of Wholesale Firm Rate



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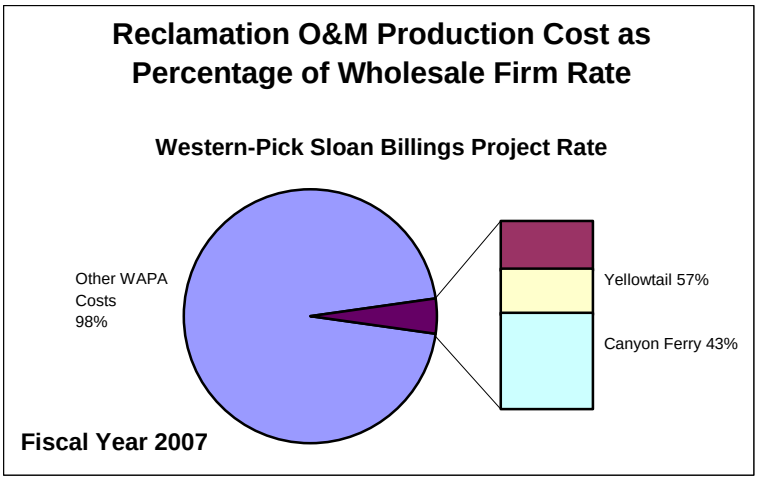

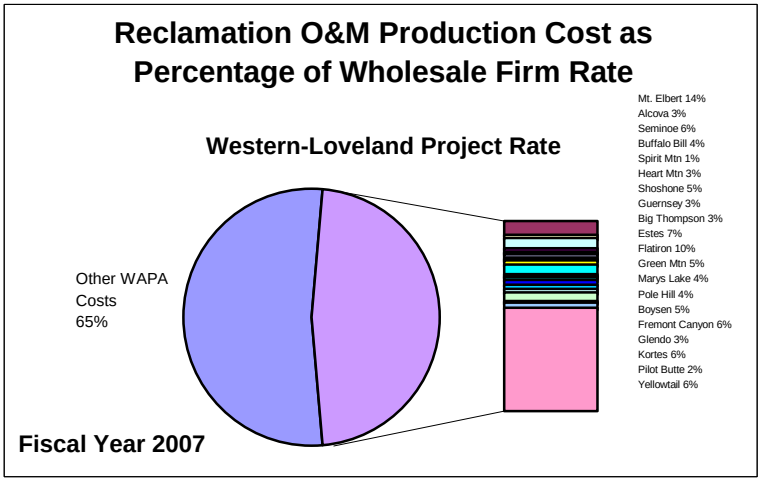

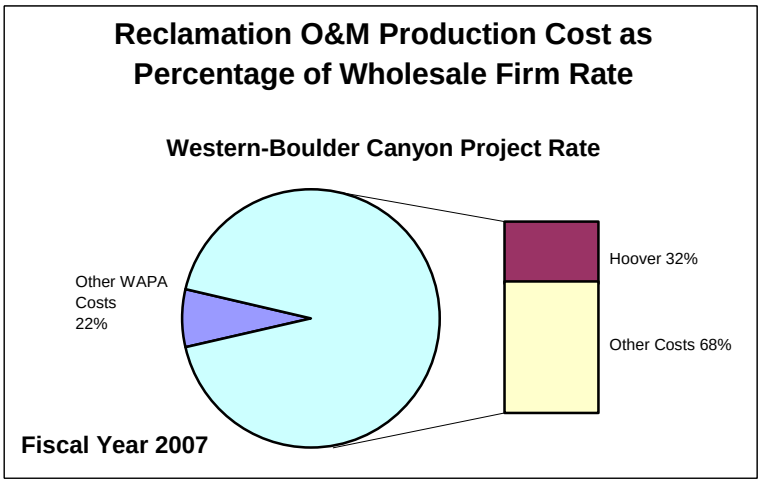

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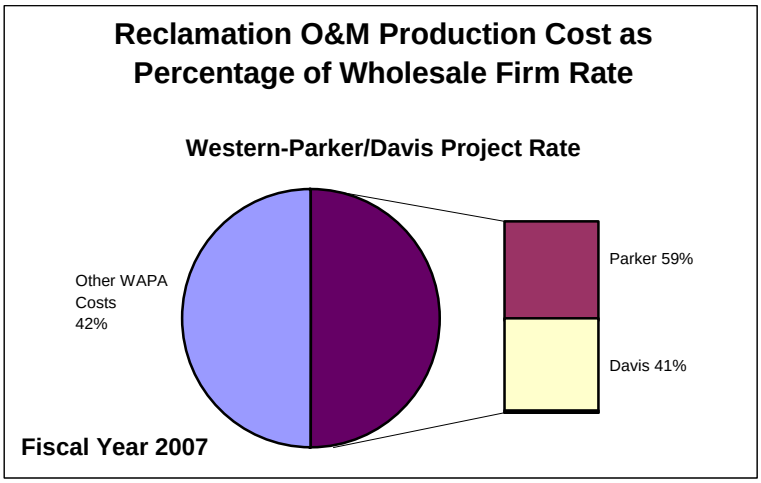
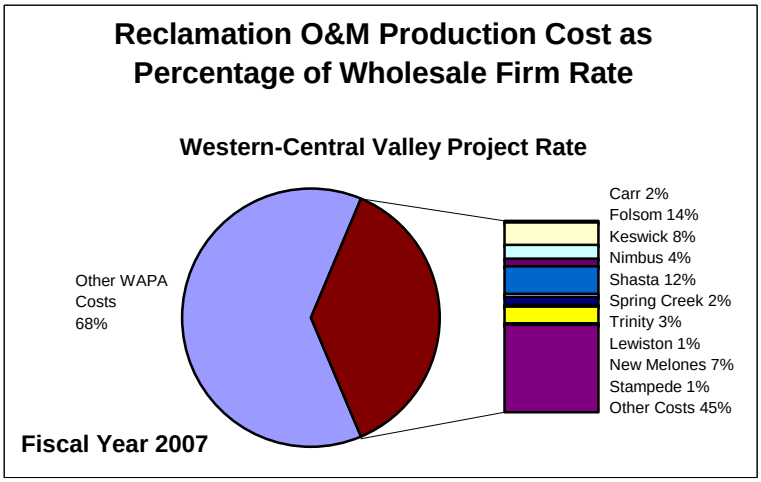
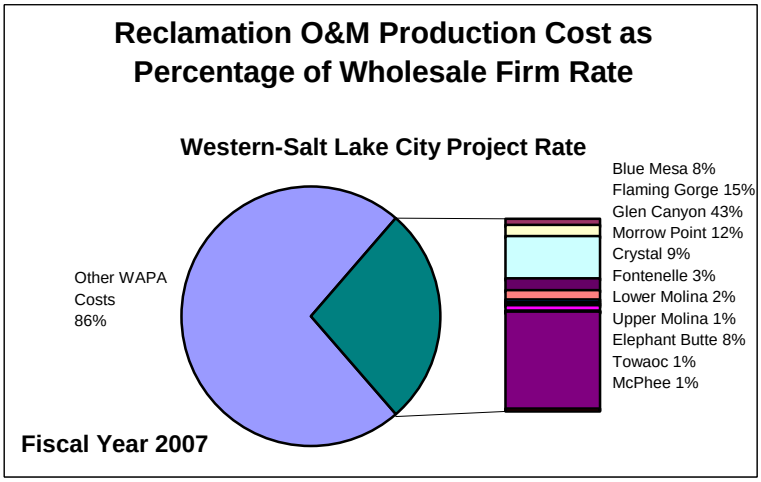
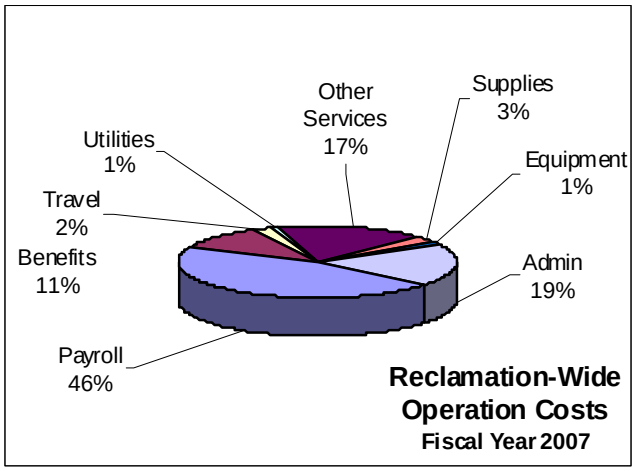
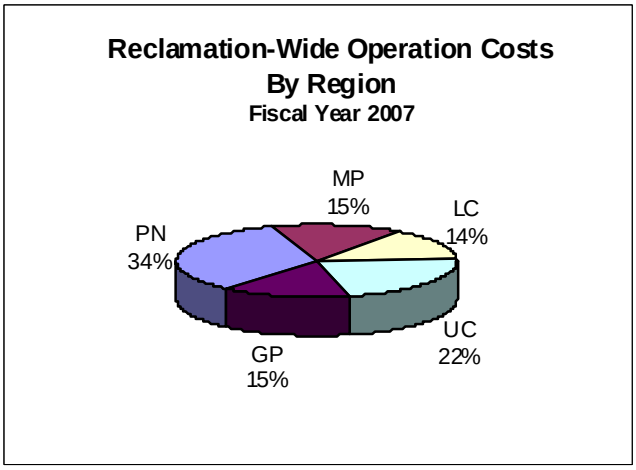


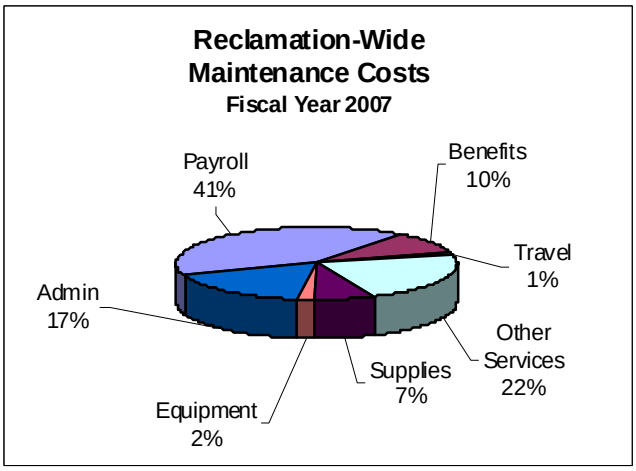


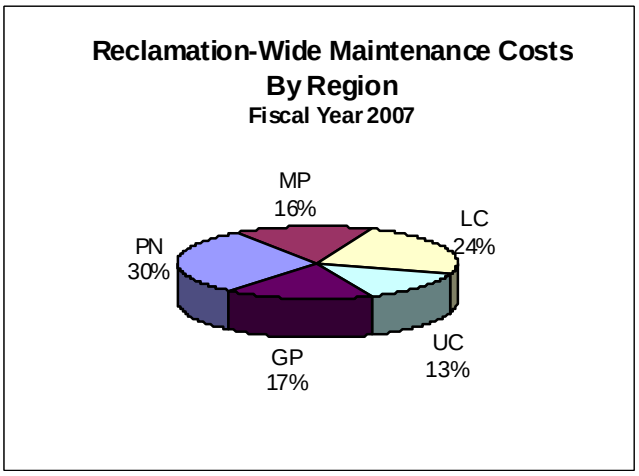


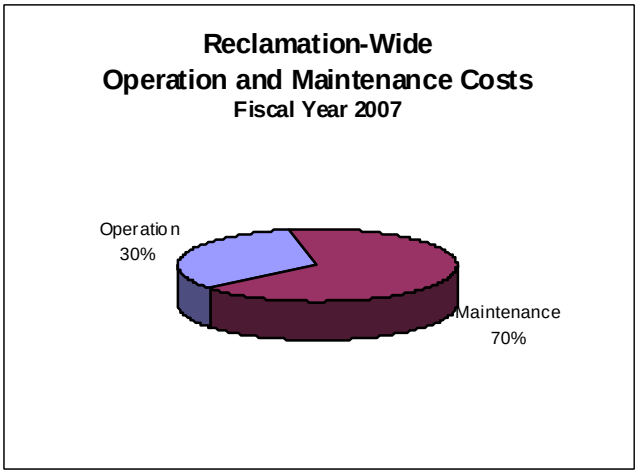
Benchmark 3
Production Cost

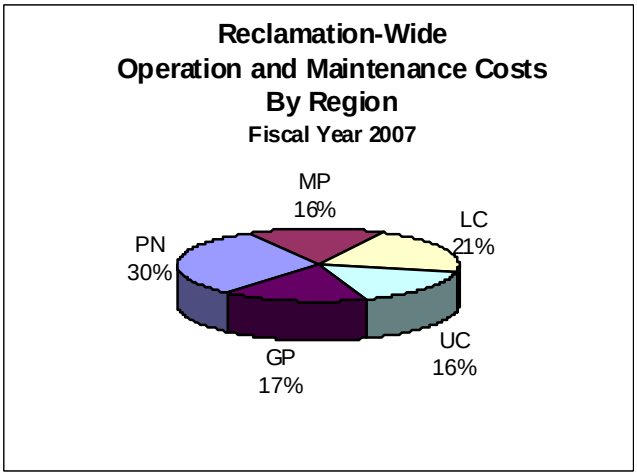








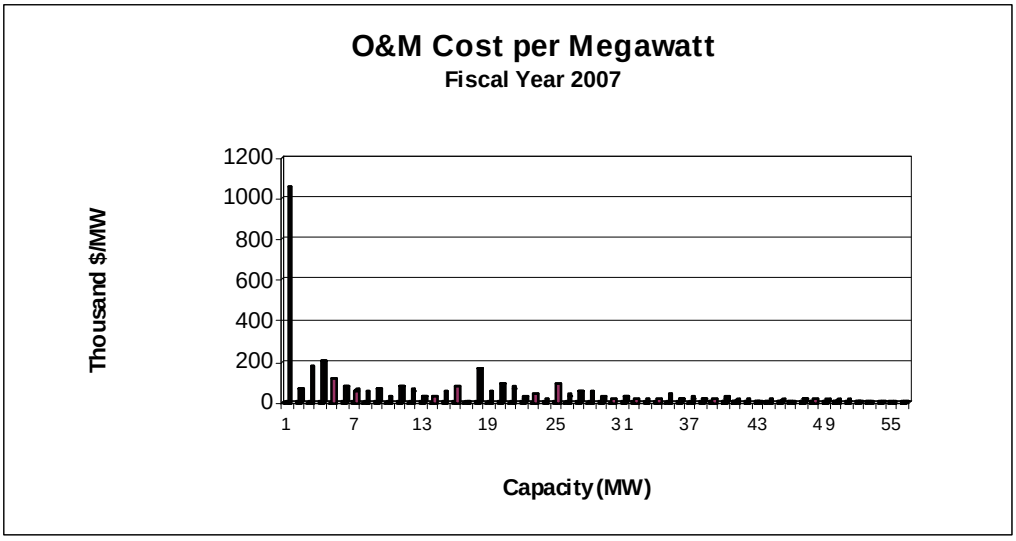




Benchmark 3
Production Cost

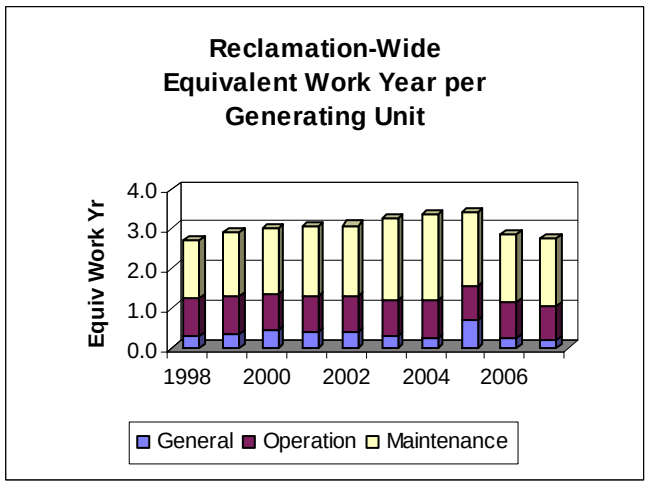
Plant	Capacity (MW)	O&M $/MW		Plant	Capacity (MW)	O&M $/MW
Lewiston	0.4	1,053,668		Glendo	38.0	21,285
McPhee	1.3	66,594		Pole Hill	38.2	13,037
Pilot Butte	1.6	176,449		Anderson Ranch	40.0	27,231
Shoshone	3.0	198,590		Alcova	41.4	18,745
Boise River Diversion	3.5	118,543		Estes	45.0	19,046
Stampede	3.7	74,902		Canyon Ferry	50.0	20,802
Big Thompson	4.5	60,739		Seminoe	51.8	42,530
Spirit Mountain	4.5	51,068		Fremont Canyon	66.8	13,832
Lower Molina	4.9	68,514		Flatiron (Unit 1, 2)	86.0	24,628
Deer Creek	5.0	25,360		Blue Mesa	86.4	18,953
Heart Mountain	5.0	75,126		Keswick	117.0	19,878
Guernsey	6.4	60,458		Parker	120.0	24,288
Marys Lake	8.1	28,728		Trinity	140.0	8,941
Upper Molina	8.6	31,804		Flaming Gorge	152.0	14,171
Fontenelle	10.0	53,929		Judge Francis Carr	154.4	4,450
Black Canyon	10.2	76,928		Morrow Point	173.3	12,941
Towaoc	11.5	5,406		Palisades	176.6	11,362
Chandler	12.0	165,987		Spring Creek	180.0	2,897
Roza	12.9	55,950		Folsom	198.7	18,346
Nimbus	13.5	89,353		Mt. Elbert PS	200.0	17,932
Boysen	15.0	71,112		Yellowtail	250.0	9,536
Green Springs	17.3	23,610		Davis	255.0	10,574
Buffalo Bill	18.0	45,071		New Melones	300.0	9,020
Green Mountain	26.0	20,517		Hungry Horse	428.0	5,240
Minidoka	27.7	88,738		Shasta	682.8	6,576
Elephant Butte	27.9	36,484		Glen Canyon	1,320.0	6,043
Crystal	31.5	52,516		Hoover	2,078.8	8,224
Kortes	36.0	53,564		Grand Coulee	6,495.0	3,368

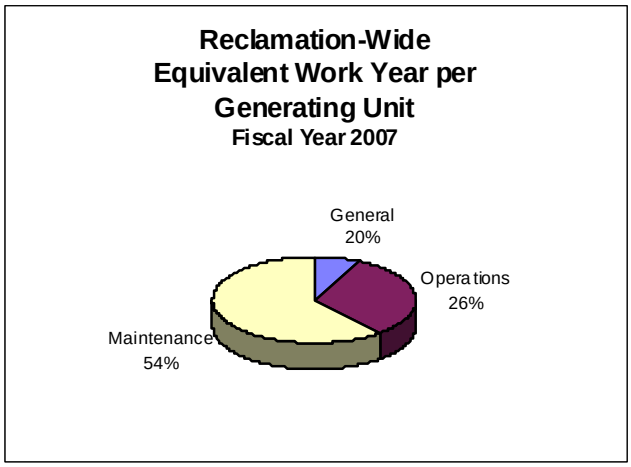
A plot of O&M cost per kilowatt-hour by plant capacity is shown below.

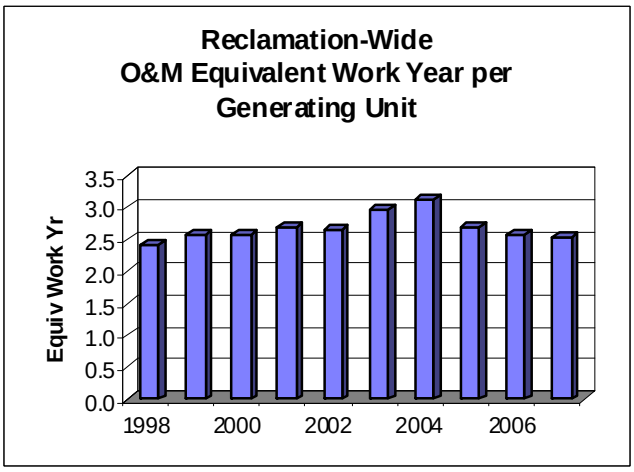


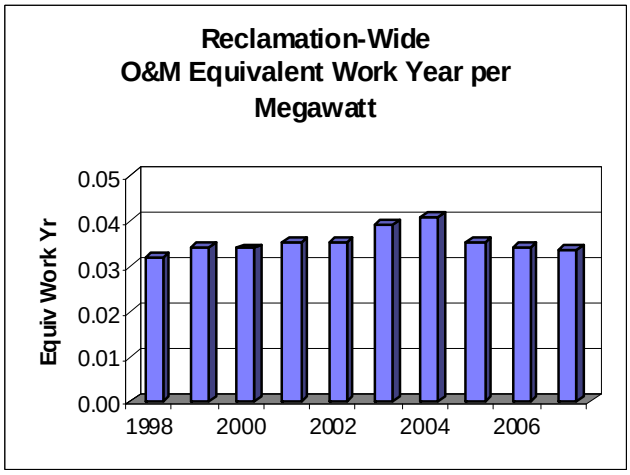
Benchmark 4
Workforce Deployment

Reclamation-Wide FY 2007 Equivalent Work Staffing Year Levels					
	Equivalent Work Year Staffing Charged to Powerplant	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	43.89	3.80	47.69	0.25	0.00
Operation	173.32	0.00	173.32	0.89	0.01
Maintenance	328.55	0.00	328.55	1.69	0.02
Total Staffing	545.76	3.80	549.56	2.83	0.04

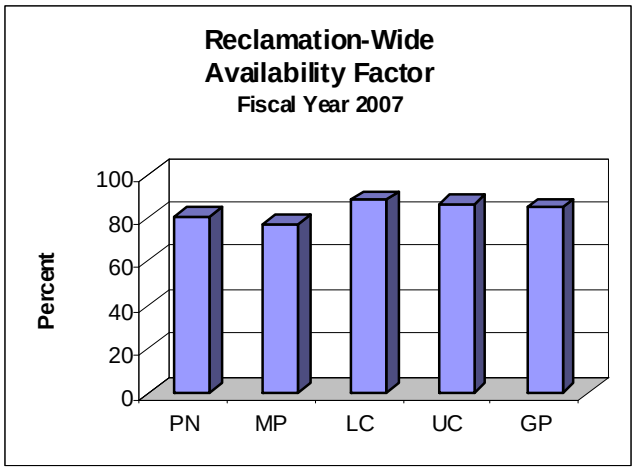




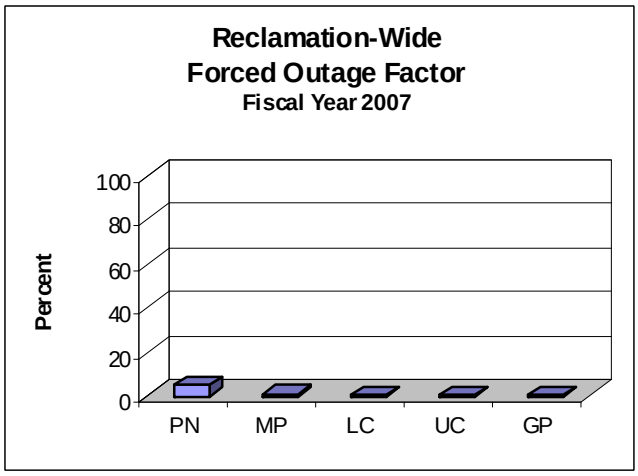




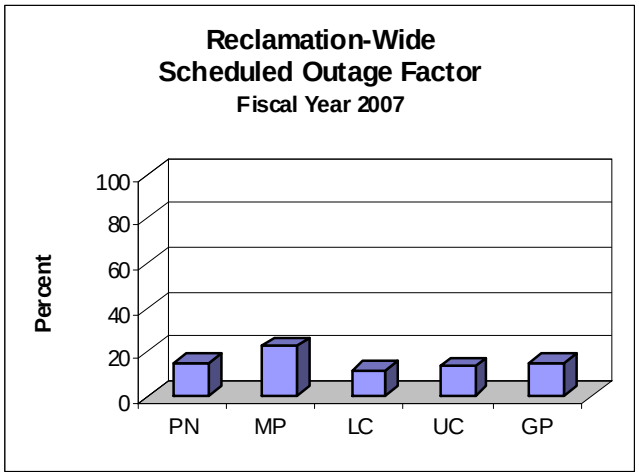
Benchmark 5
Availability Factor



Benchmark 6
Forced Outage Factor



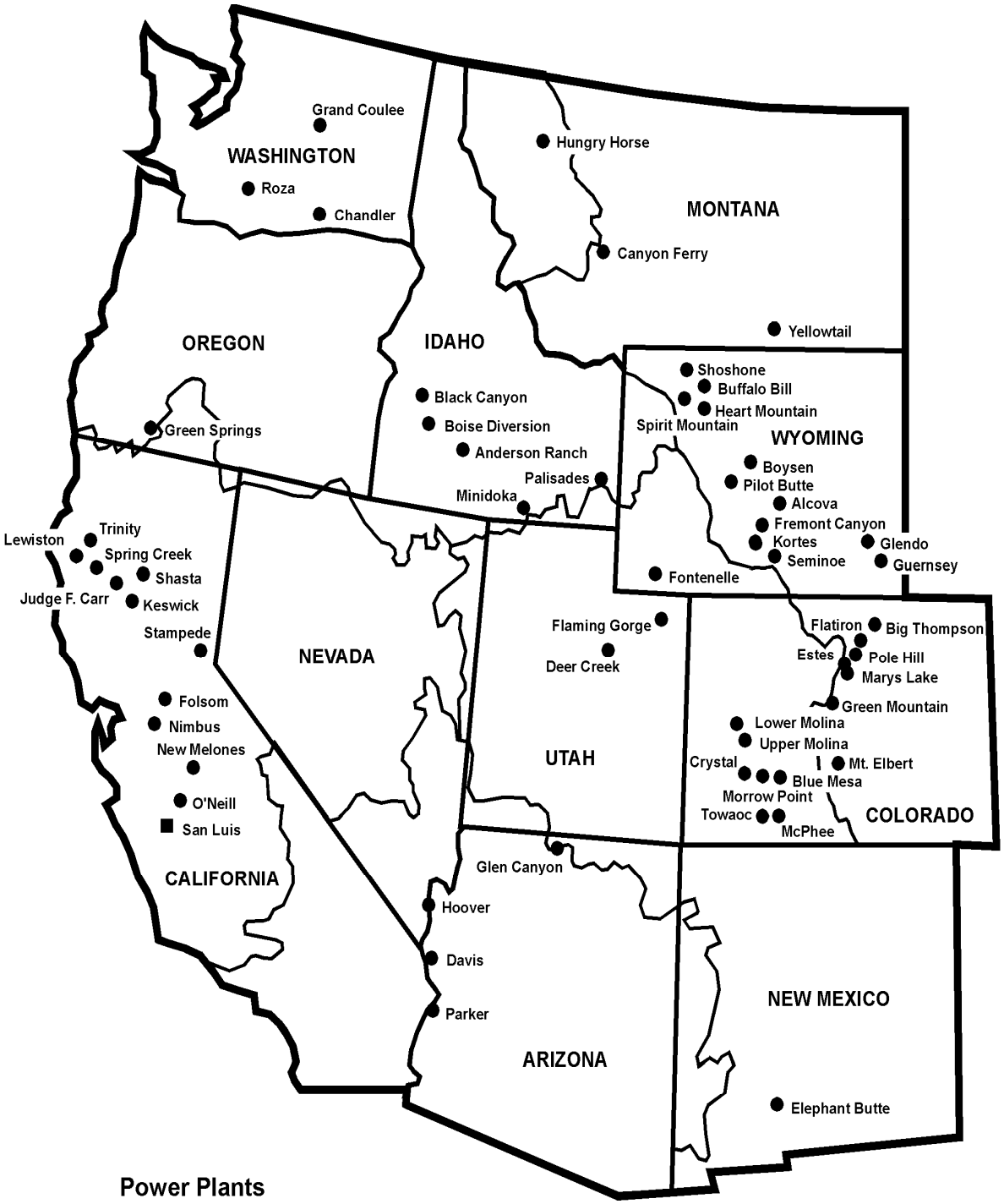
Benchmark 7
Scheduled Outage Factor



Benchmark Data Comparison			
Fiscal Year 2007	**Total Reclamation Average**	**Industry Average**	**Best Performers**
Wholesale Firm Rate Mills/kWh	*22.45	Not Available	Not Available
Production Cost as Percentage of Wholesale Firm Rate	0.0%	Not Applicable	Not Applicable
O&M Cost $/MWh	2.76	5.41	1.0
O&M Costs $/MW	7,847	19,807	2,897
O&M Equiv Work Year per MW	0.03	Not Available	0
Availability Factor	82.3	**88.64	98.54
Forced Outage Factor	2.6	**2.61	0.0
Scheduled Outage Factor	15.1	**8.74	0.0

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

Reclamation-Wide Power Performance

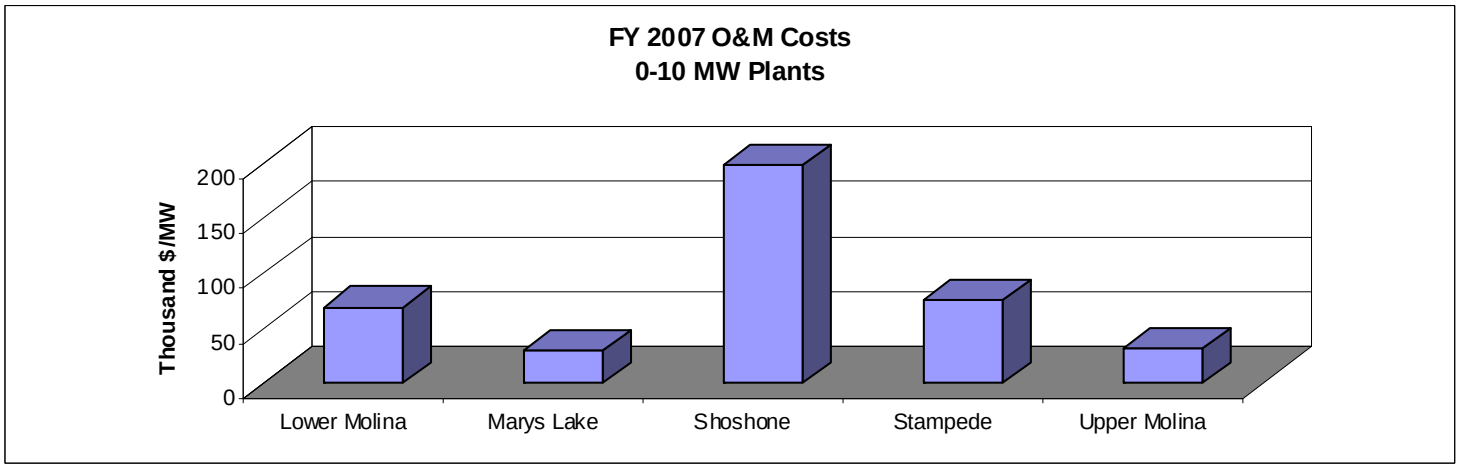


0-10 MW Group Information

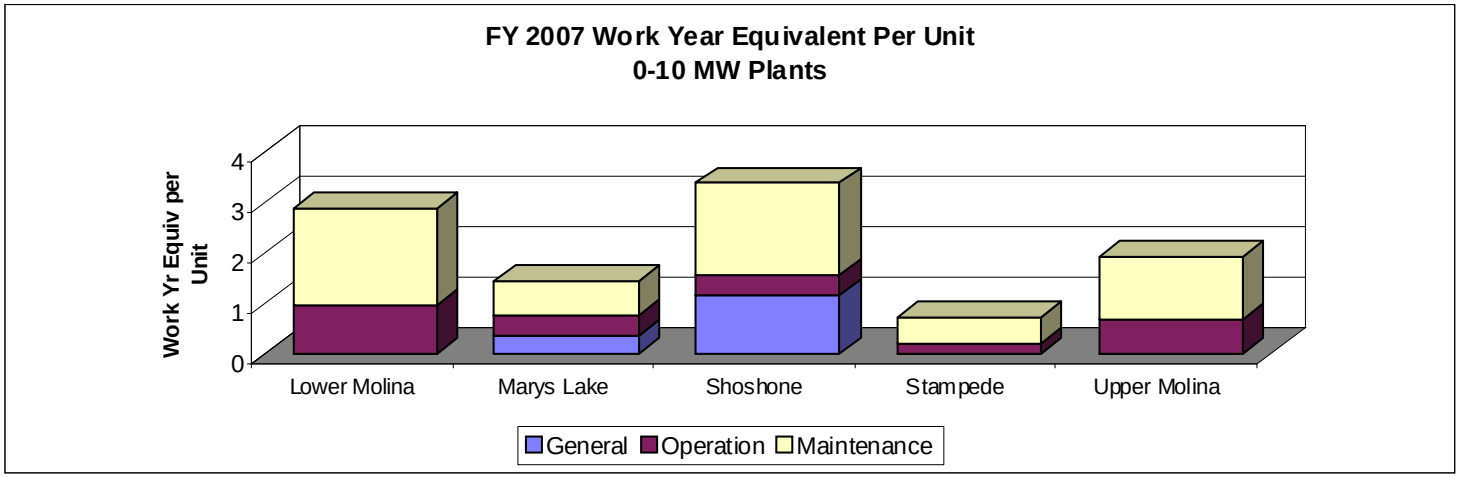
0-10 MW group plants include:

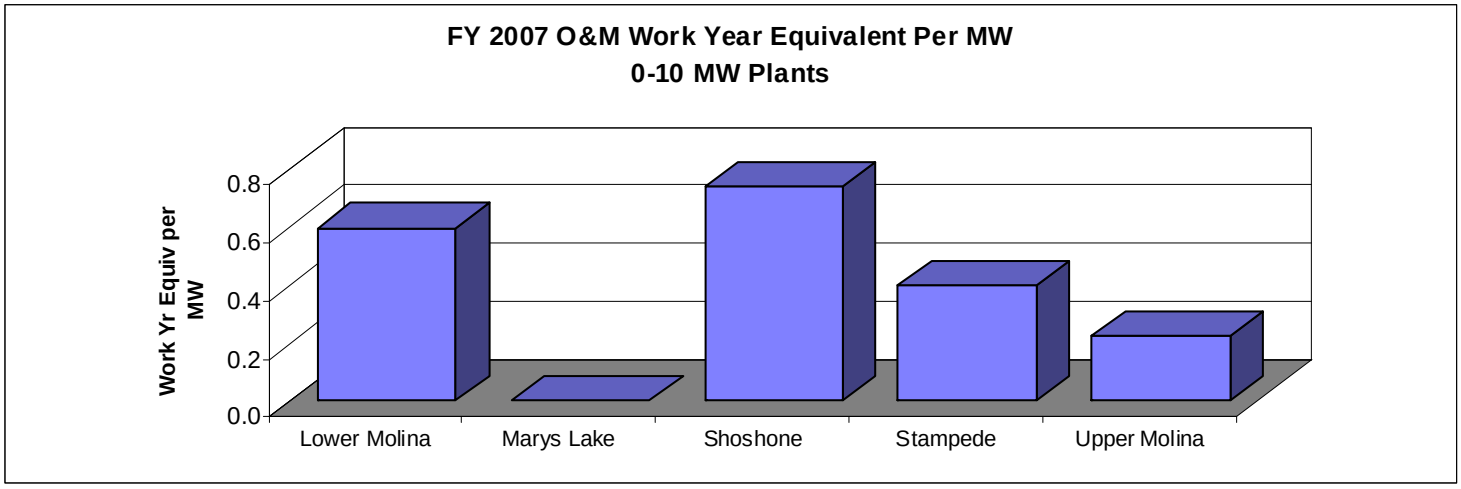
- Lower Molina, Upper Colorado Region
- Marys Lake, Great Plains Region
- Shoshone, Great Plains Region
- Stampede, Mid-Pacific Region
- Upper Molina, Upper Colorado Region

Cost Data

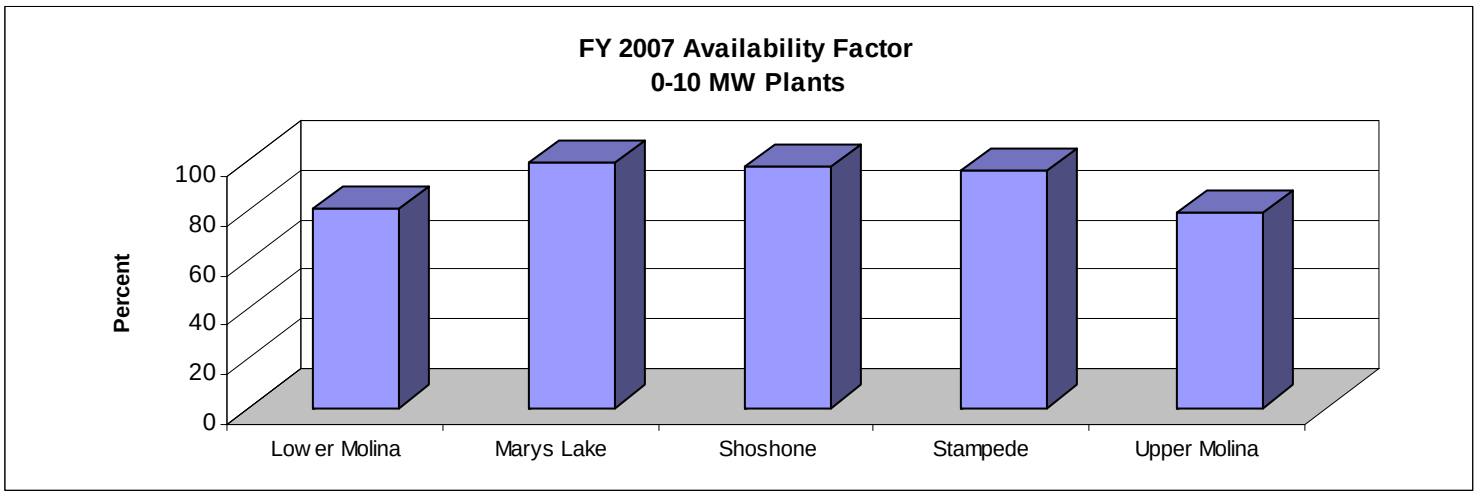


Equivalent Work Year Data

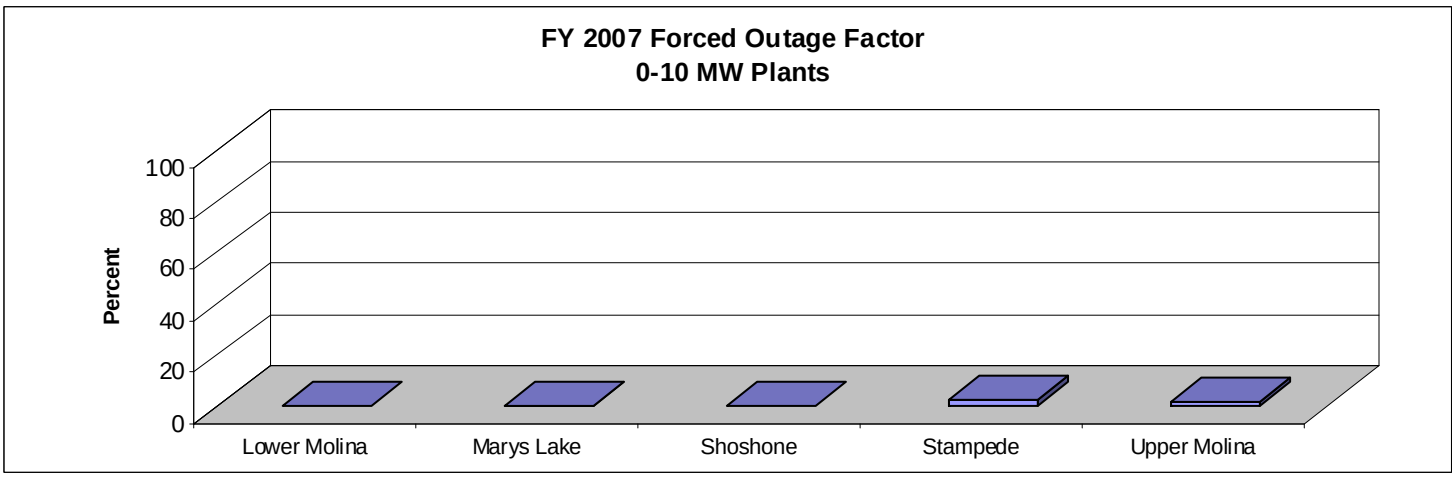




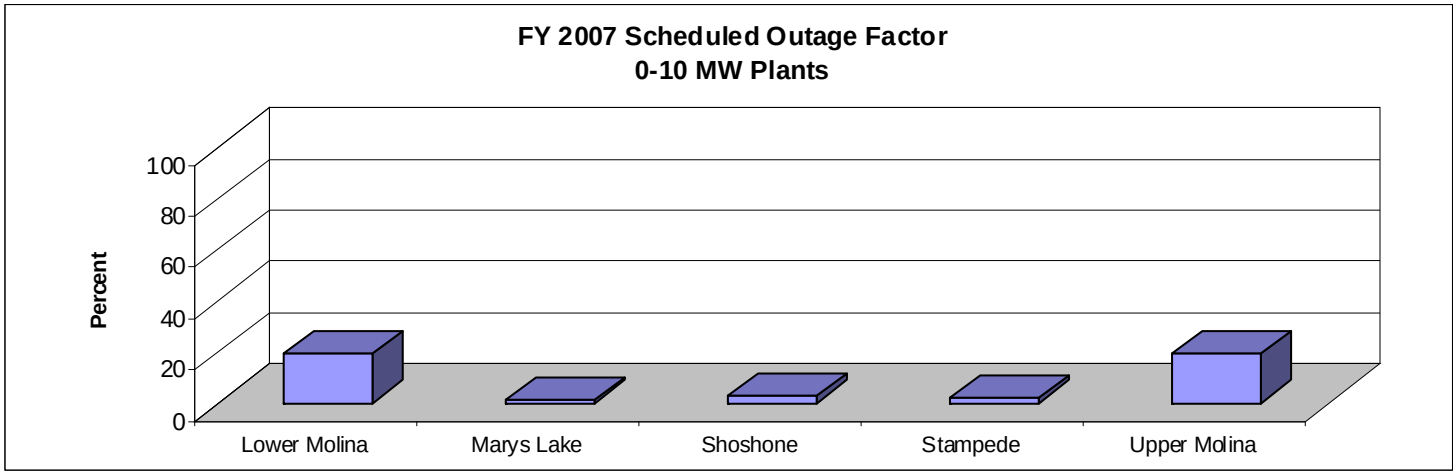
Availability Factor



Forced Outage Factor



Scheduled Outage Factor

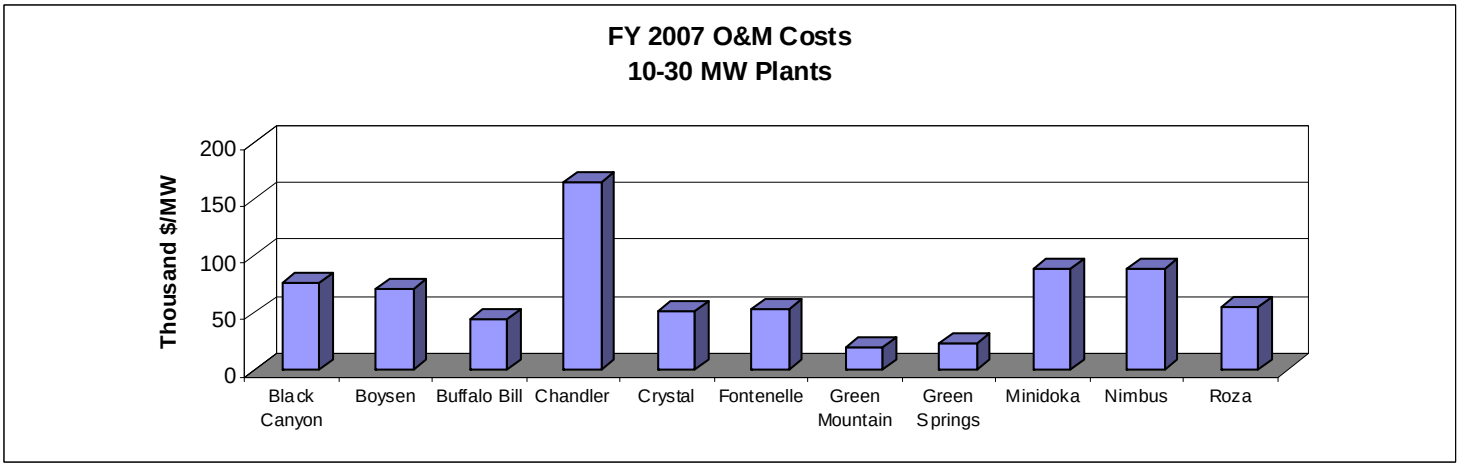


10-30 MW Group Information

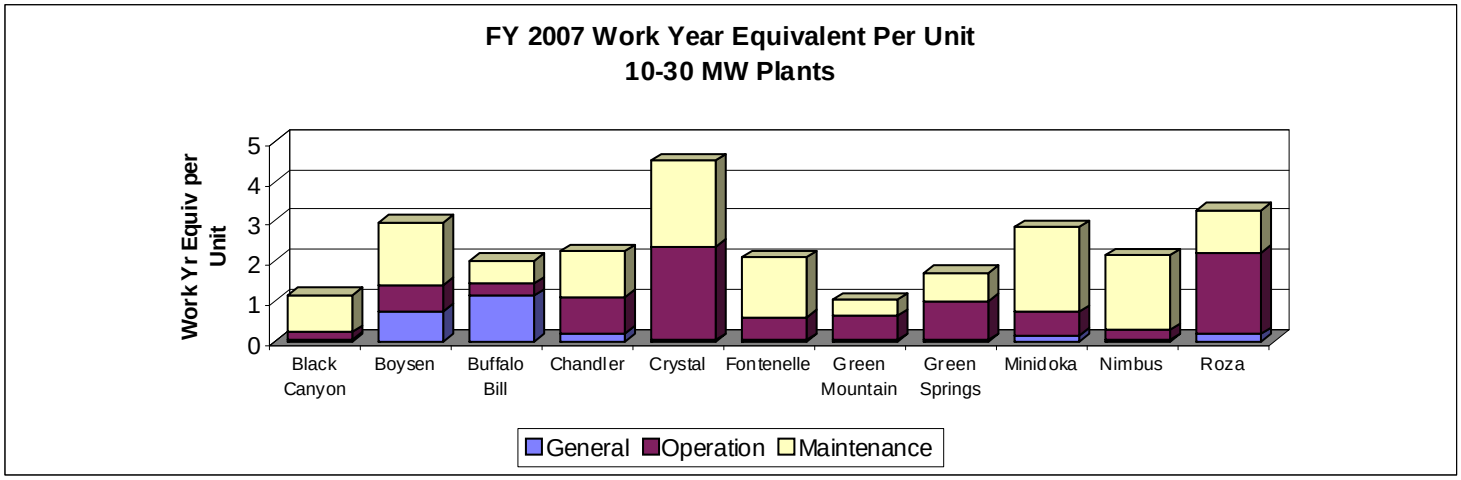
10-30 MW group plants include:

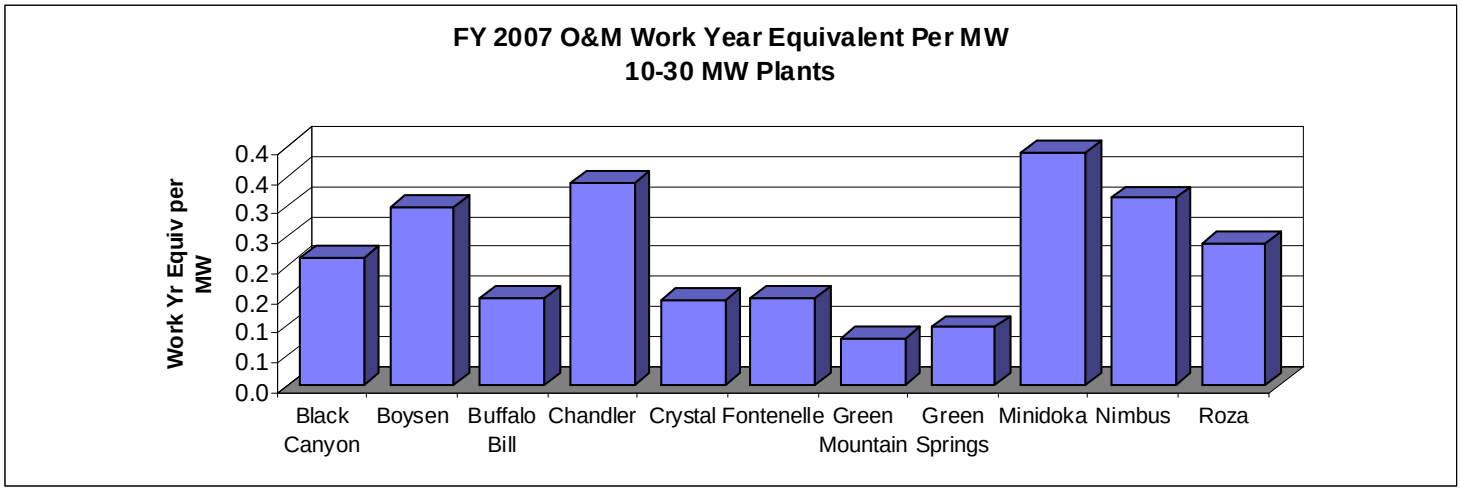
- Black Canyon, Pacific Northwest Region
- Boysen, Great Plains Region
- Buffalo Bill, Great Plains Region
- Chandler, Pacific Northwest Region
- Crystal, Upper Colorado Region
- Fontenelle, Upper Colorado Region
- Green Mountain, Great Plains Region
- Green Springs, Pacific Northwest Region
- Minidoka, Pacific Northwest Region
- Nimbus, Mid-Pacific Region
- Roza, Pacific Northwest Region

Cost Data

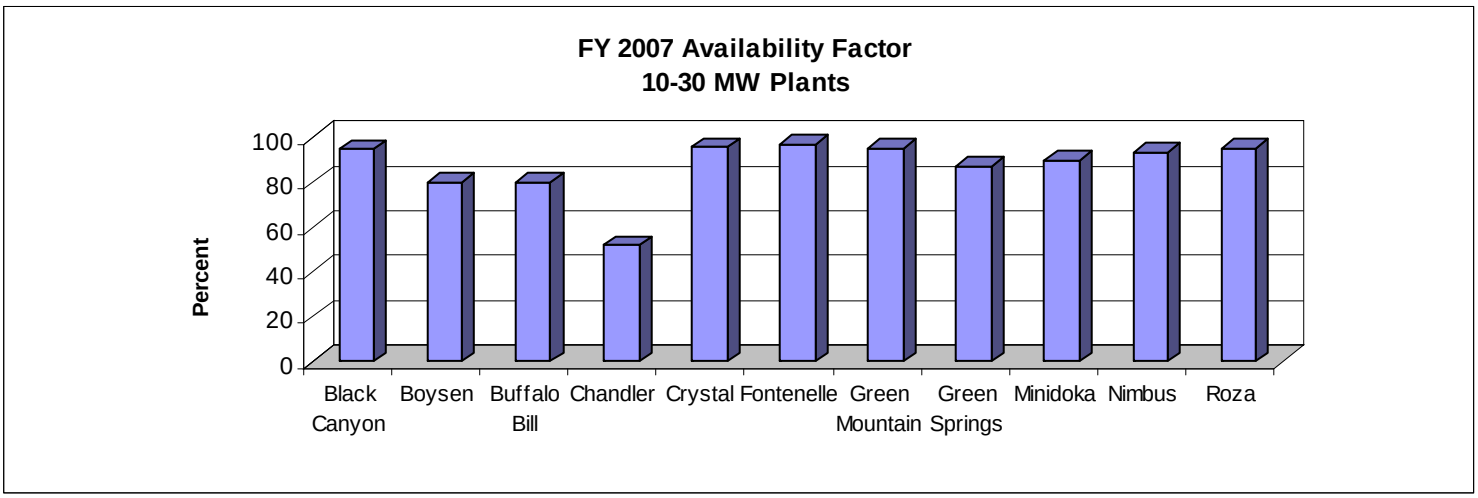


Equivalent Work Year Data





Availability Factor



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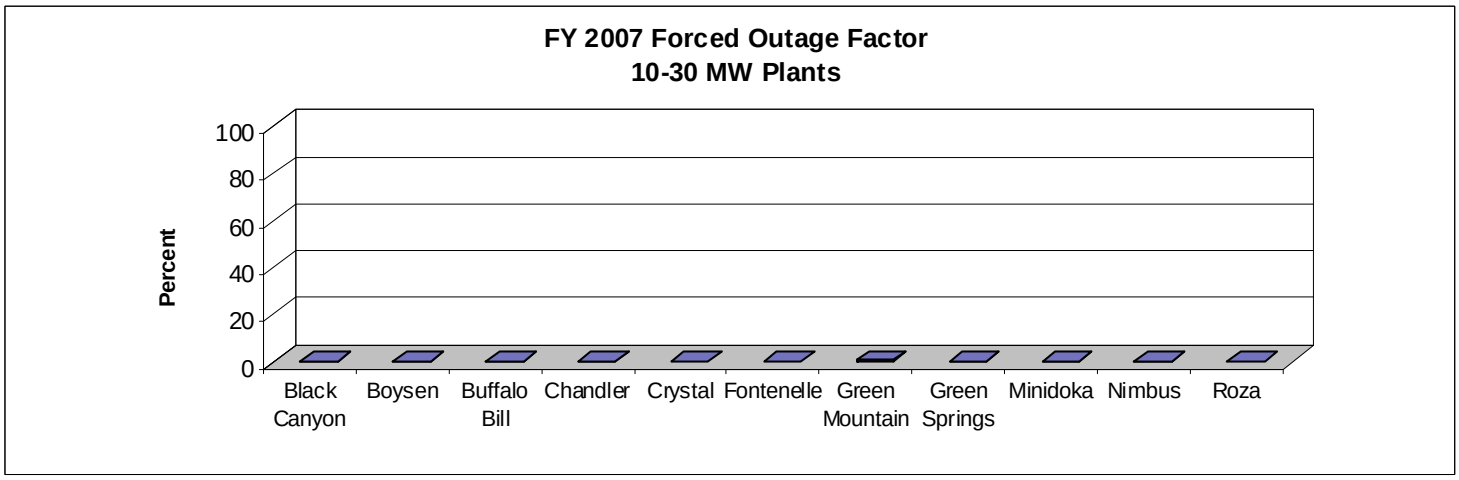
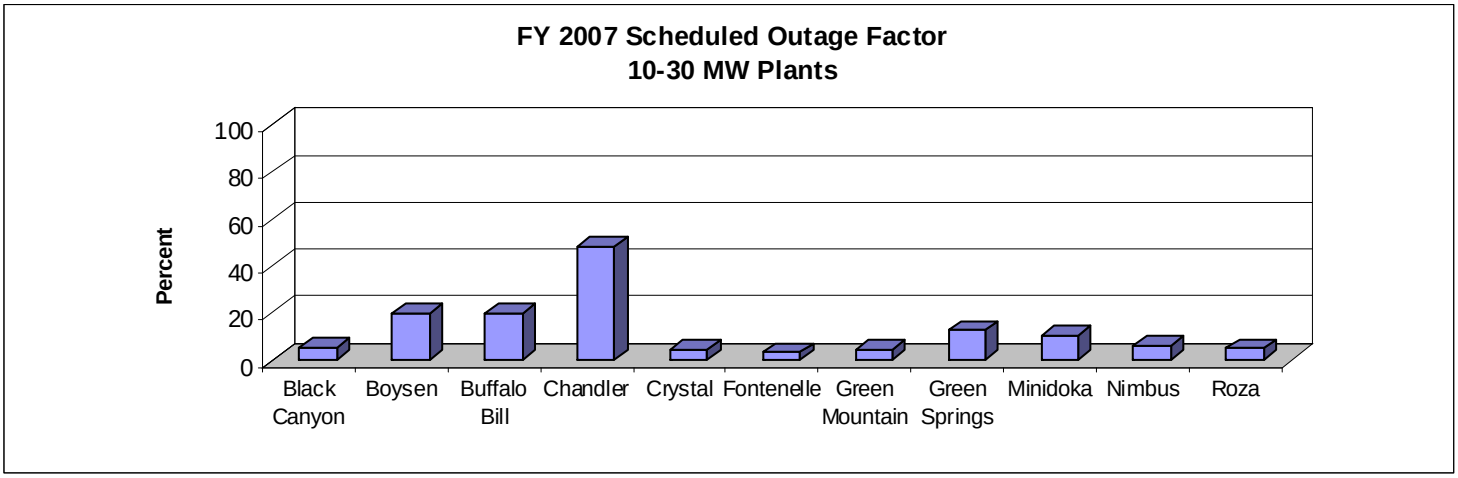


Scheduled Outage Factor

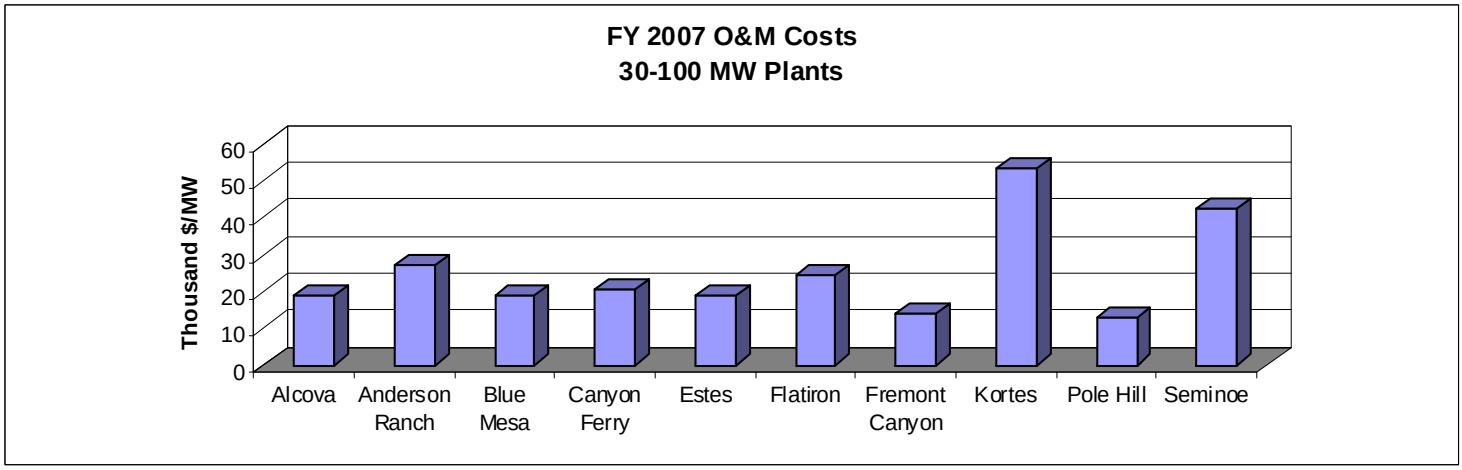


30-100 MW Group Information

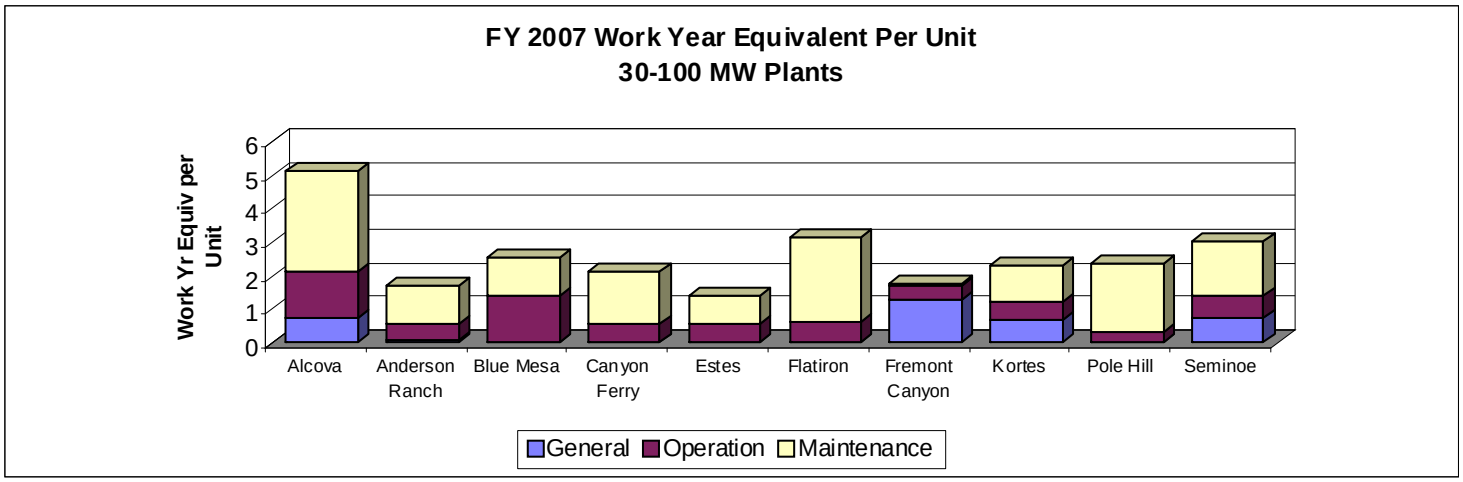
30-100 MW group plants include:

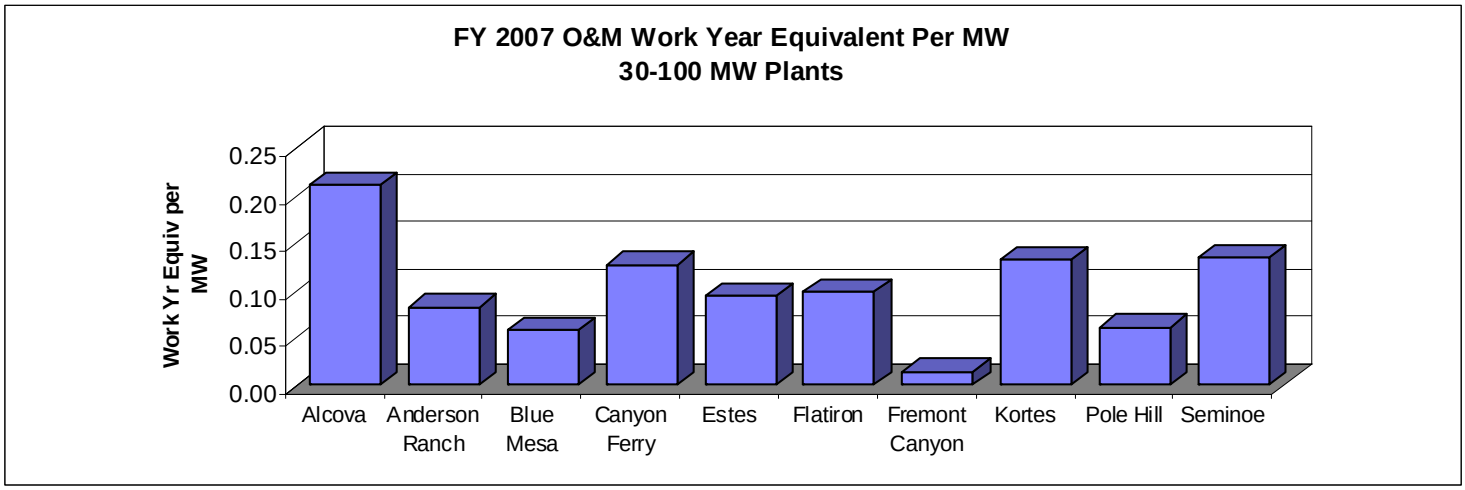
- Alcova, Great Plains Region
- Anderson Ranch, Pacific Northwest Region
- Blue Mesa, Upper Colorado Region
- Canyon Ferry, Great Plains Region
- Estes, Great Plains Region
- Flatiron, Great Plains Region
- Fremont Canyon, Great Plains Region
- Kortes, Great Plains Region
- Pole Hill, Great Plains Region
- Seminoe, Great Plains Region

Cost Data

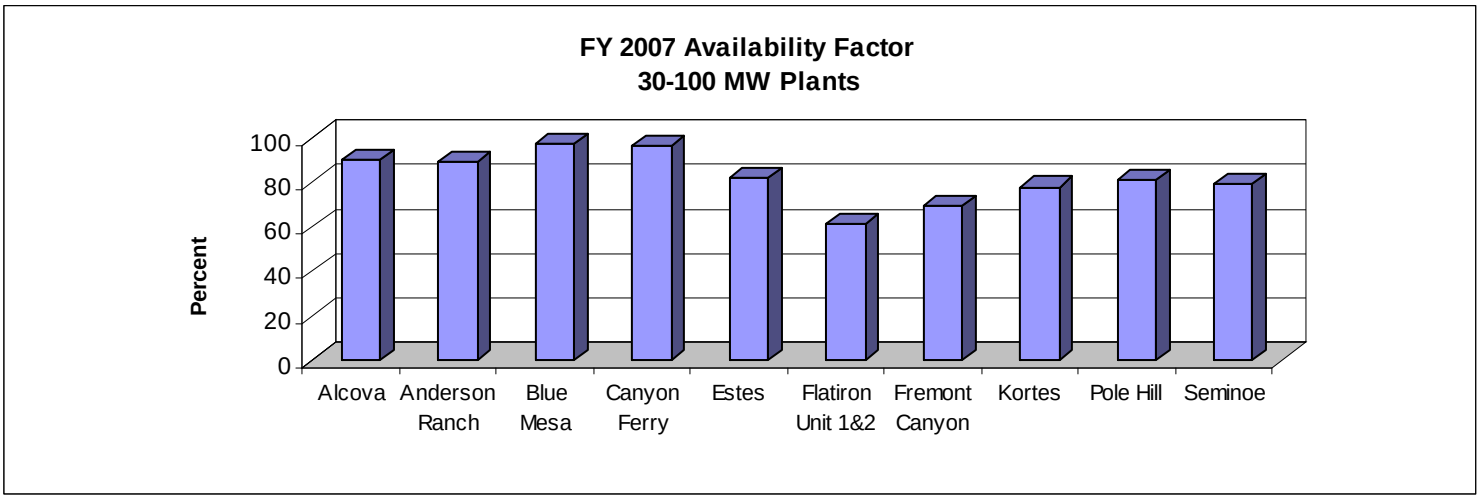


Equivalent Work Year Data





Availability Factor



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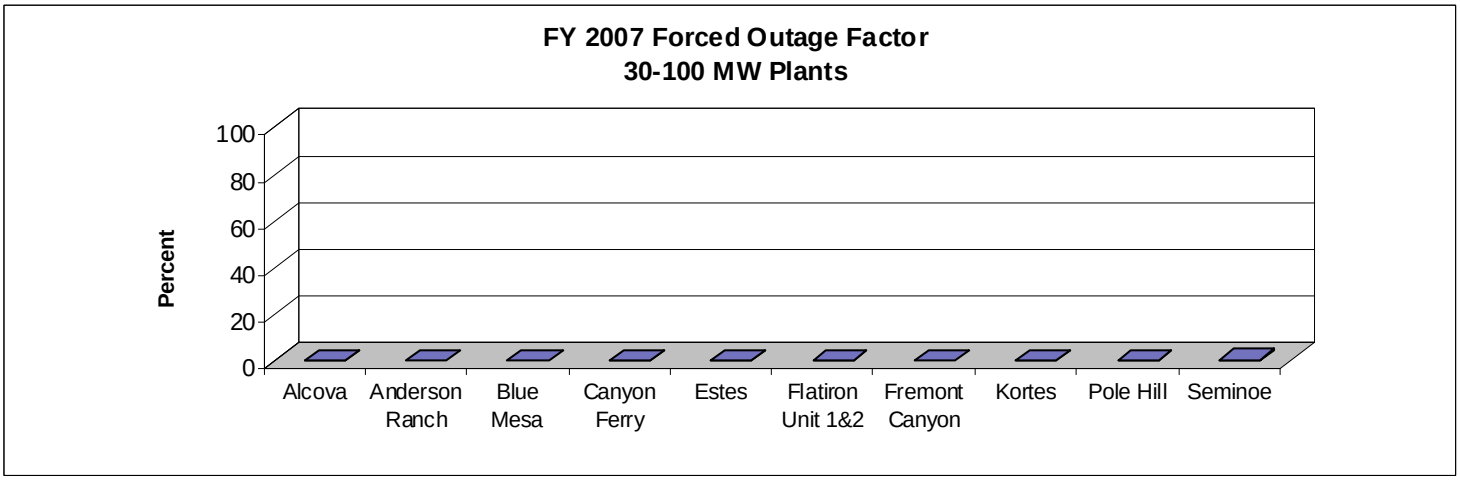
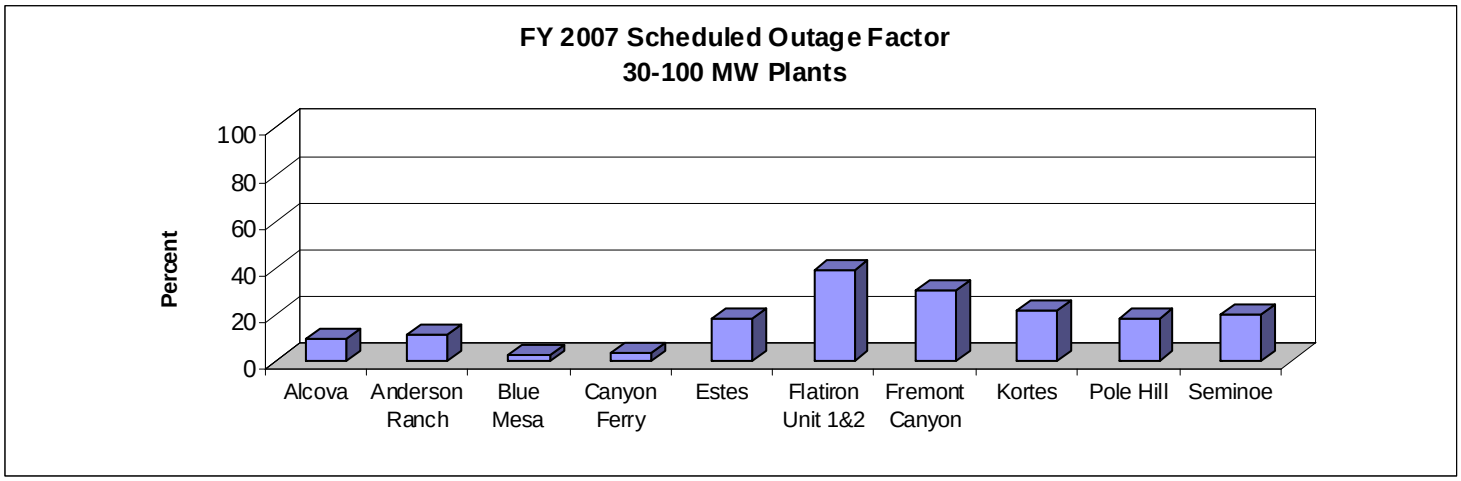


Scheduled Outage Factor

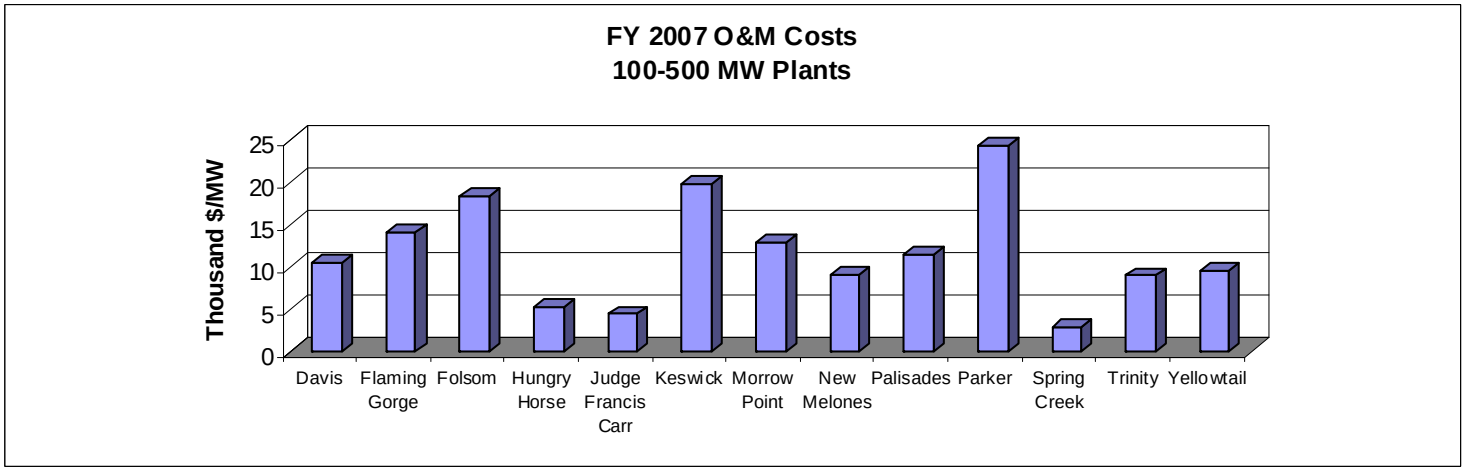


100-500 MW Group Information

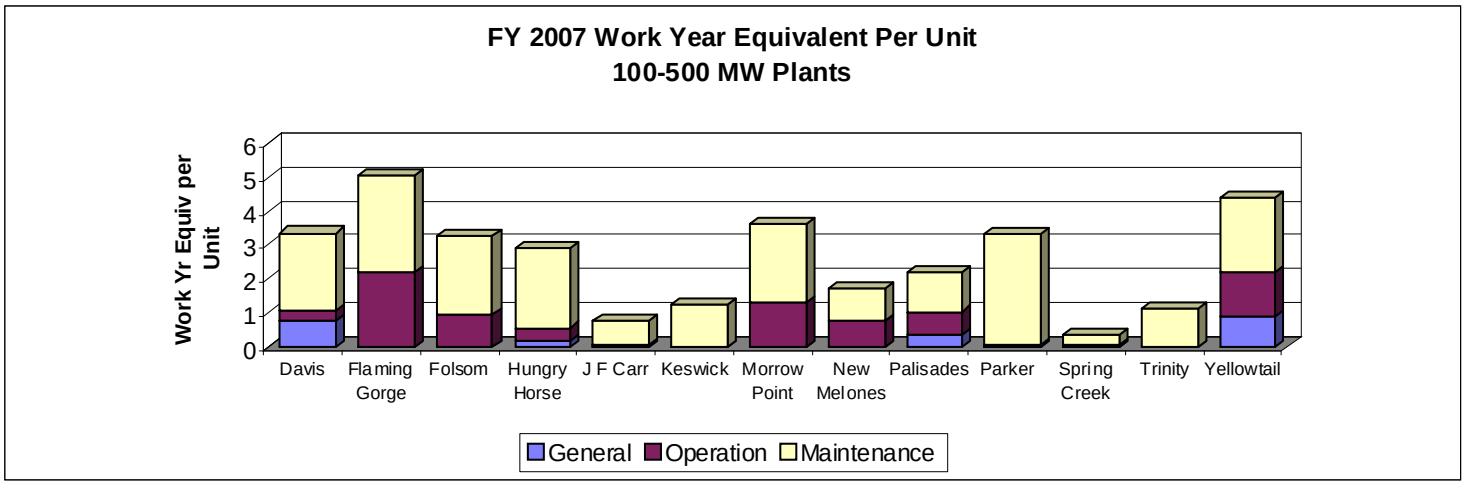
100-500 MW group plants include:

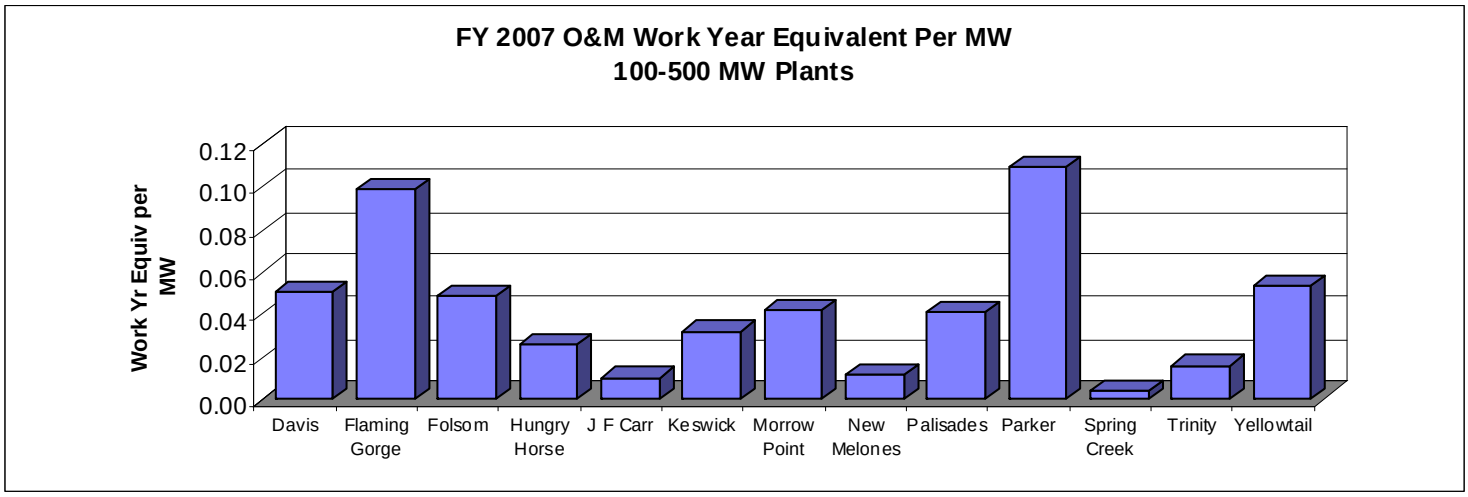
- Davis, Lower Colorado Region
- Flaming Gorge, Upper Colorado Region
- Folsom, Mid-Pacific Region
- Hungry Horse, Pacific Northwest Region
- Judge Francis Carr, Mid-Pacific Region
- Keswick, Mid-Pacific Region
- Morrow Point, Upper Colorado Region
- New Melones, Mid-Pacific Region
- Palisades, Pacific Northwest Region
- Parker, Lower Colorado Region
- Spring Creek, Mid-Pacific Region
- Trinity, Mid-Pacific Region
- Yellowtail, Great Plains Region

Cost Data

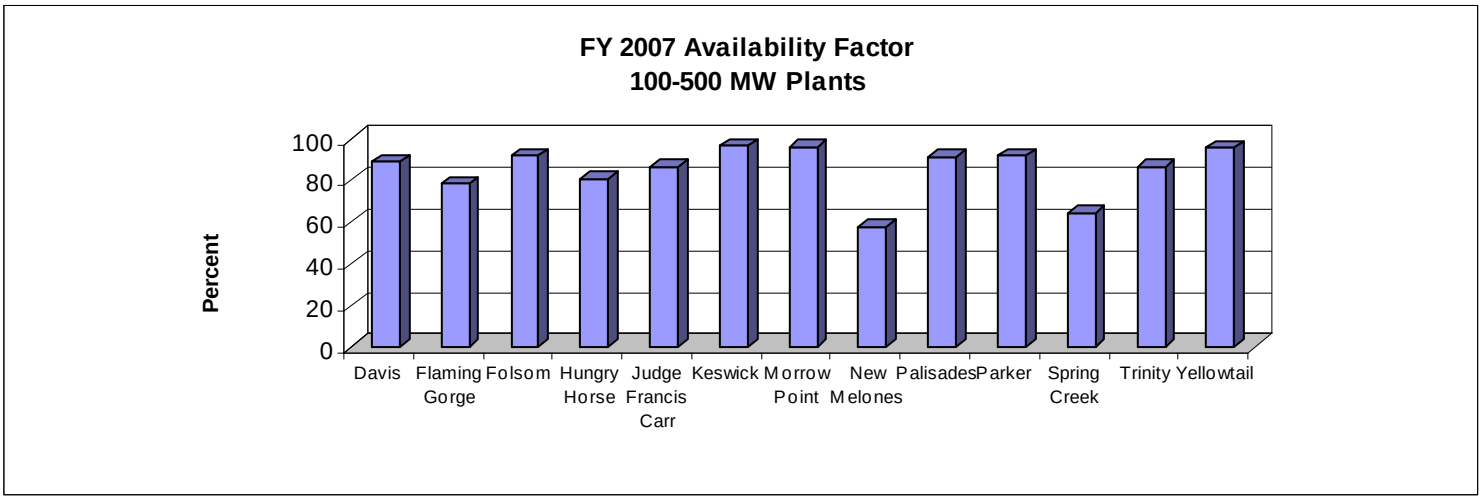


Equivalent Work Year Data





Availability Factor



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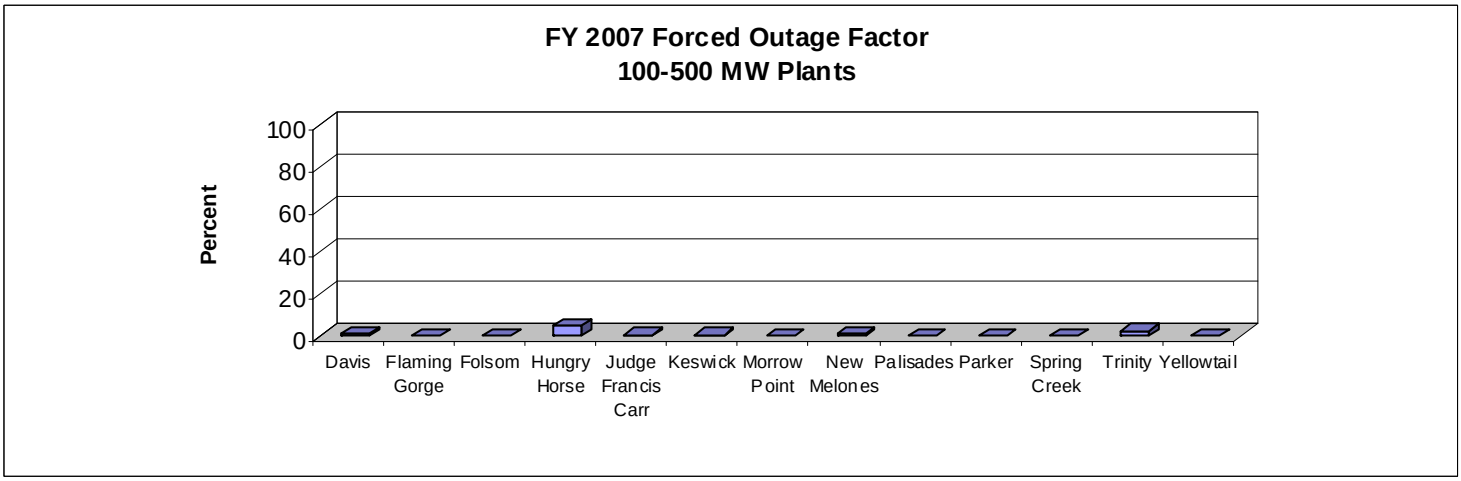
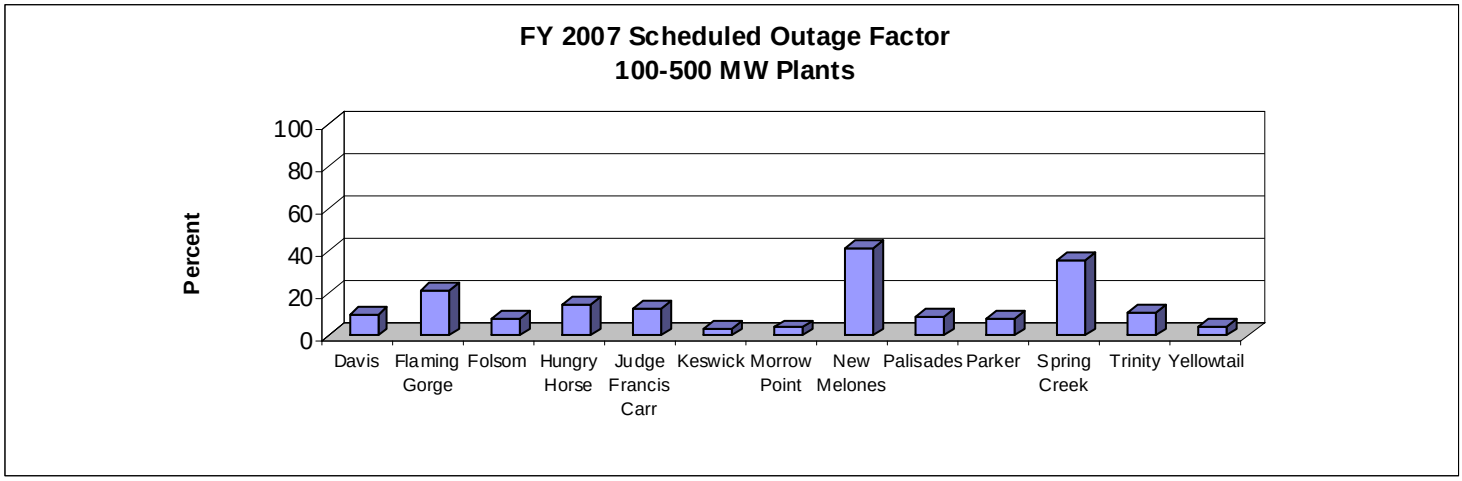


Scheduled Outage Factor

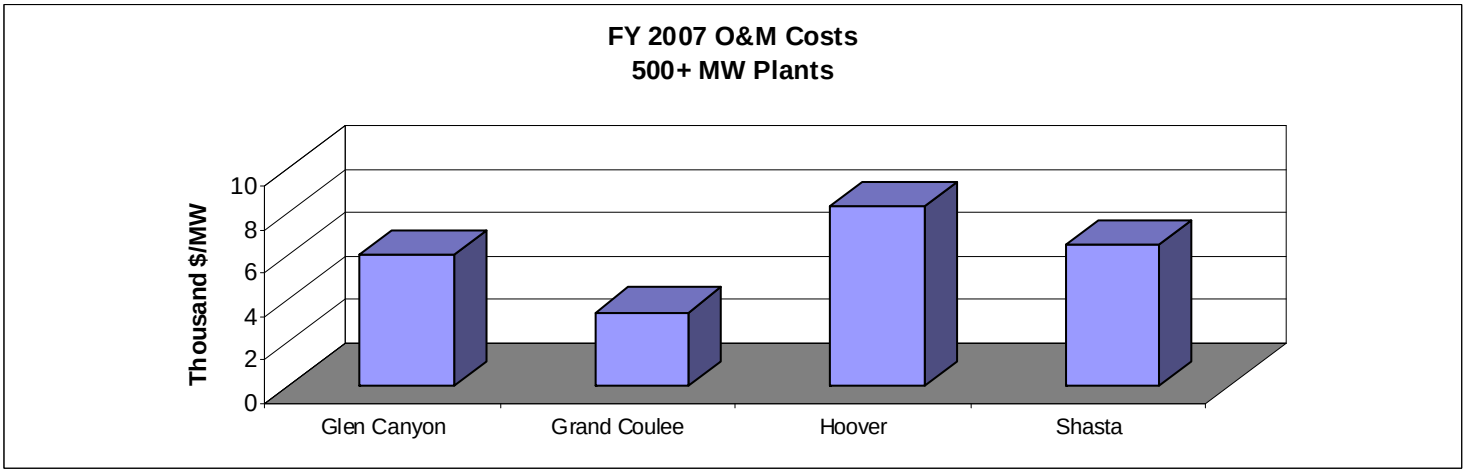


500+ MW Group Information

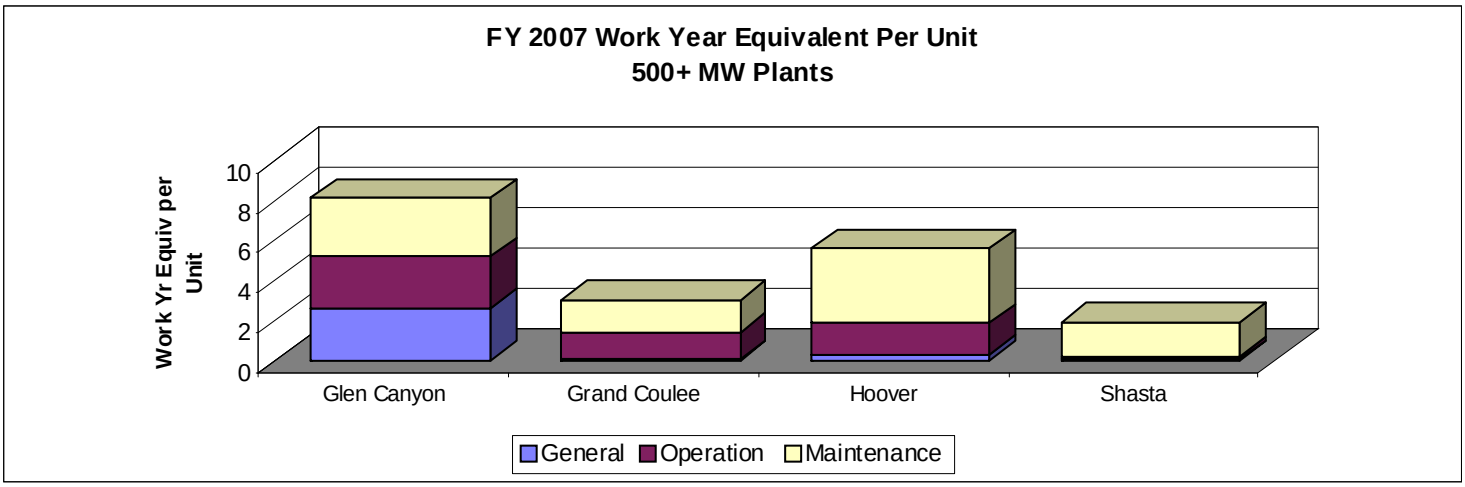
500+ MW group plants include:

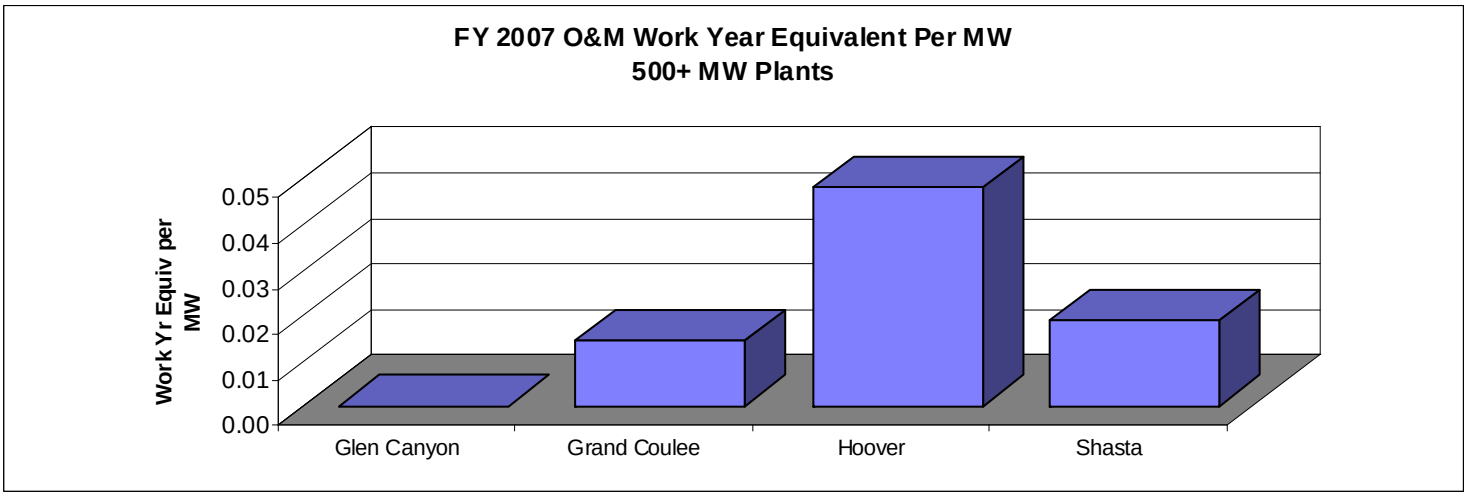
- Glen Canyon, Upper Colorado Region
- Grand Coulee, Pacific Northwest Region
- Hoover, Lower Colorado Region
- Shasta, Mid-Pacific Region

Cost Data

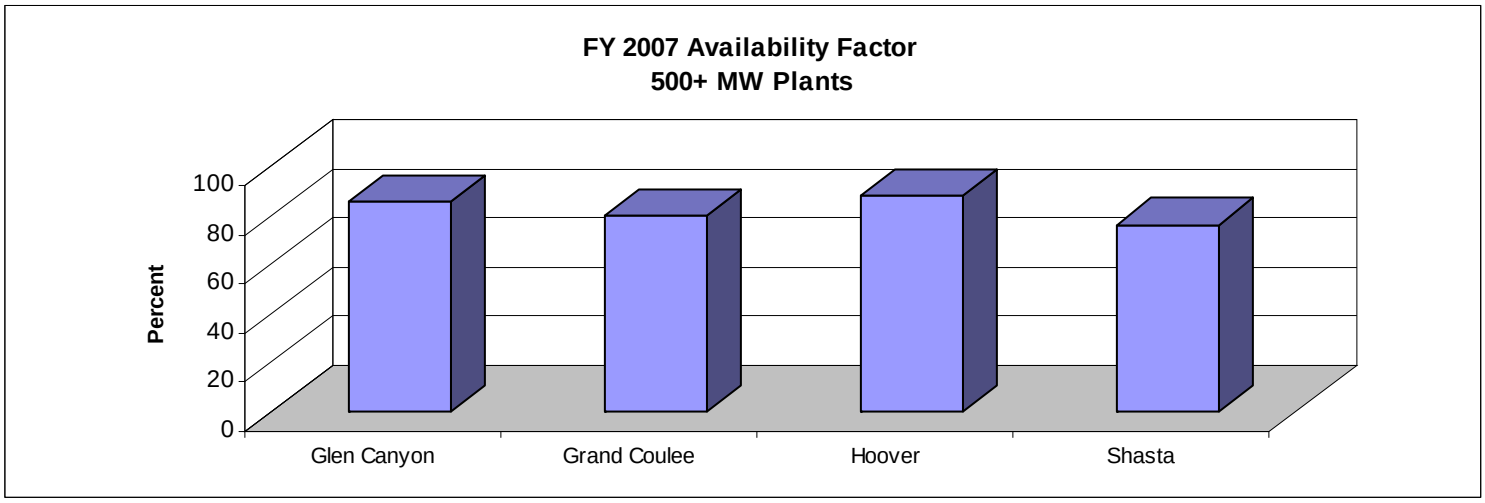


Equivalent Work Year Data





Availability Factor



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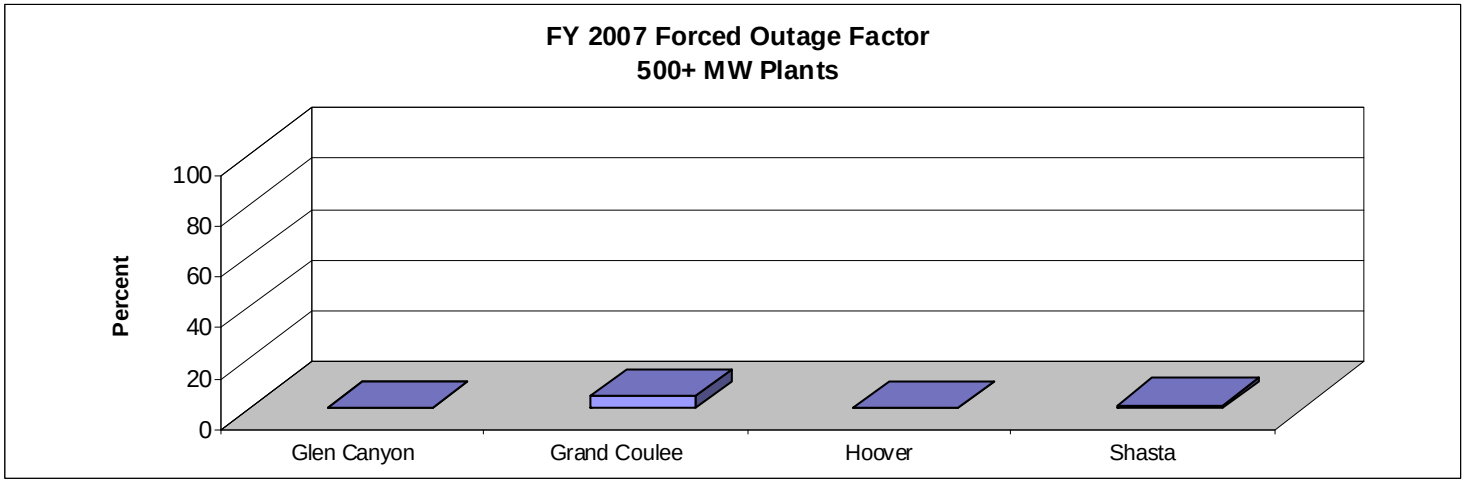
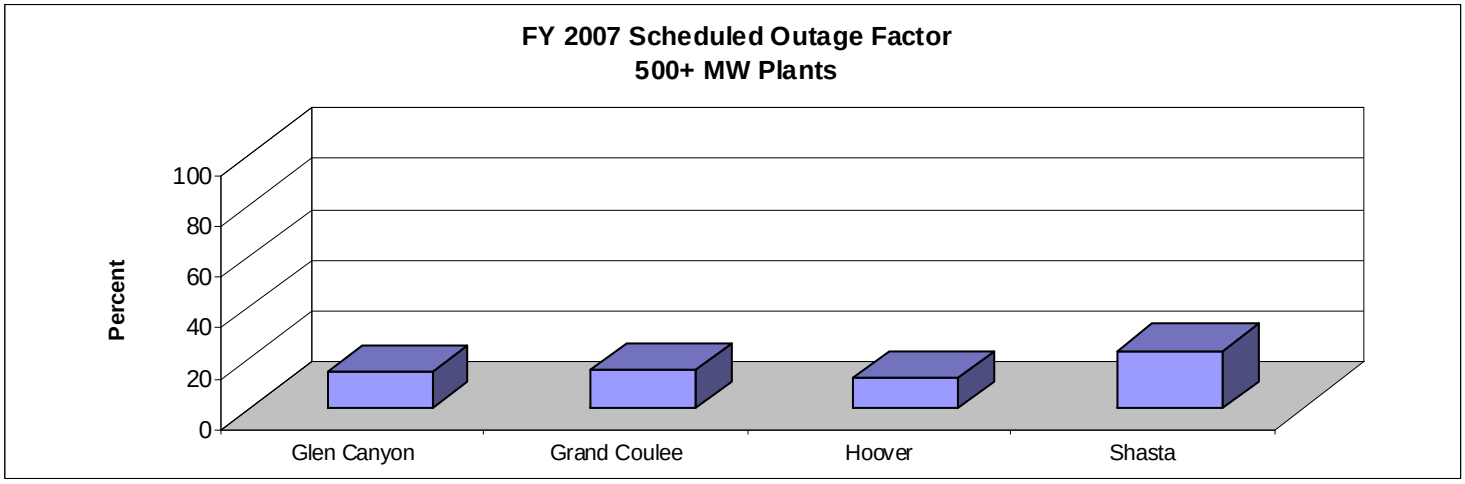


Scheduled Outage Factor



North American Electric Reliability Council

ECAR
East Central Area Reliability Coordination Agreement

ERCOT
Electric Reliability Council of Texas

MAAC
Mid-Atlantic Area Council

MAIN
Mid-America Interconnected Network

MAPP
Mid-Continent Area Power Pool

Affiliate

ASCC
Alaska Systems Coordinating Council

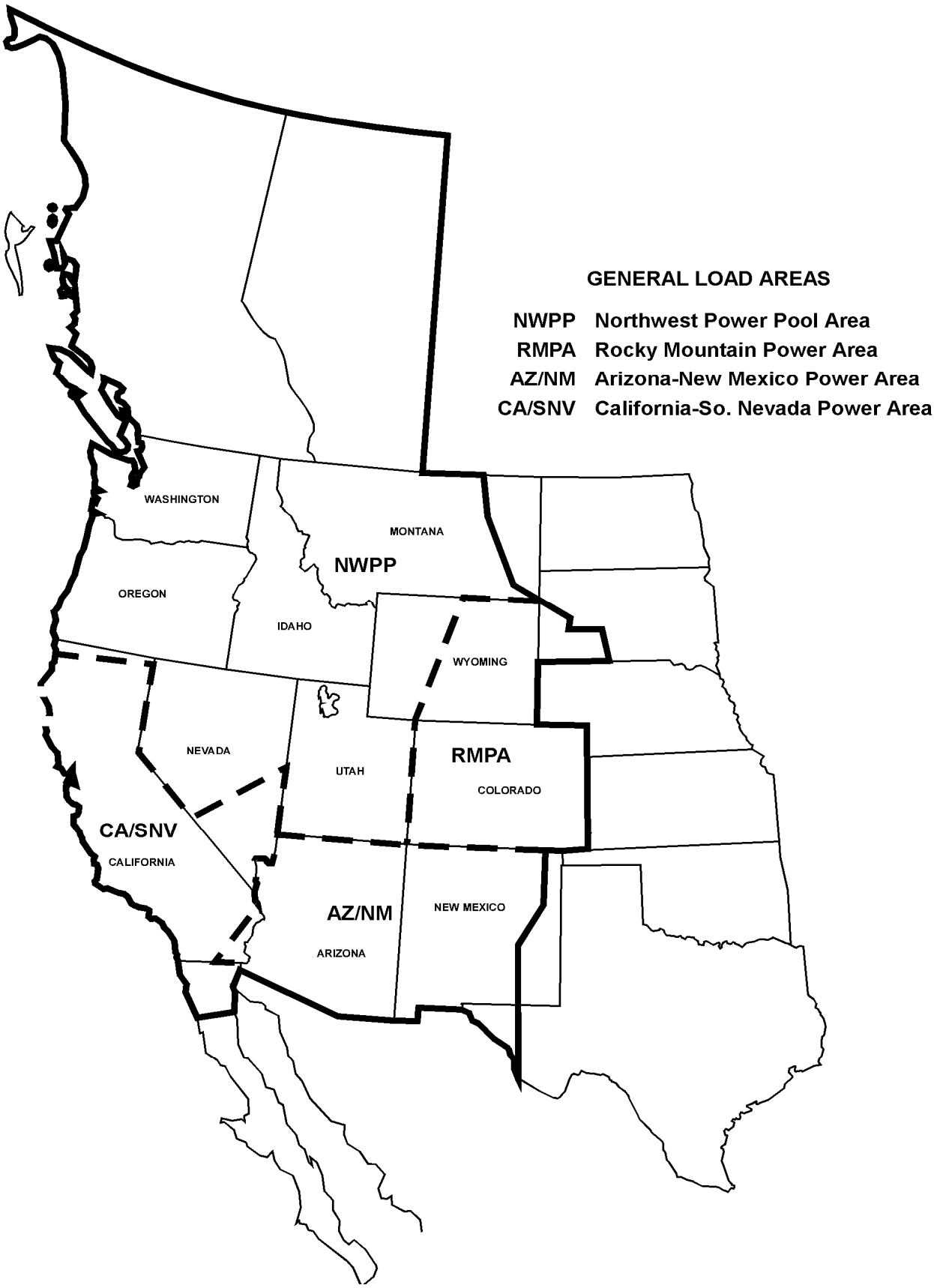
NPCC
Northeast Power Coordinating Council

SERC
Southeastern Electric Reliability Council

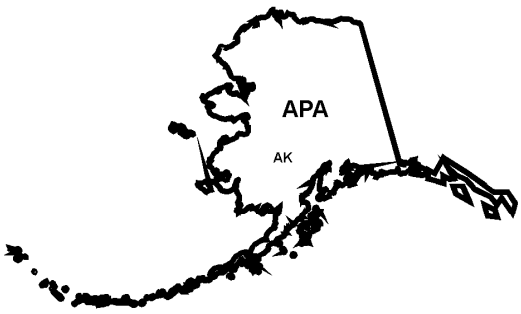
SPP
Southwest Power Pool

WSCC
Western Systems Coordinating Council

Western Systems Coordinating Council



Power Marketing Administrations



WAPA	Western Area Power Administration
APA	Alaska Power Administration
BPA	Bonneville Power Administration
SEPA	Southeastern Power Administration
SWPA	Southwestern Power Administration

***Note: Both Western and Southwestern market power in Kansas**

Bureau of Reclamation Regions

RECLAMATION

Managing Water in the West

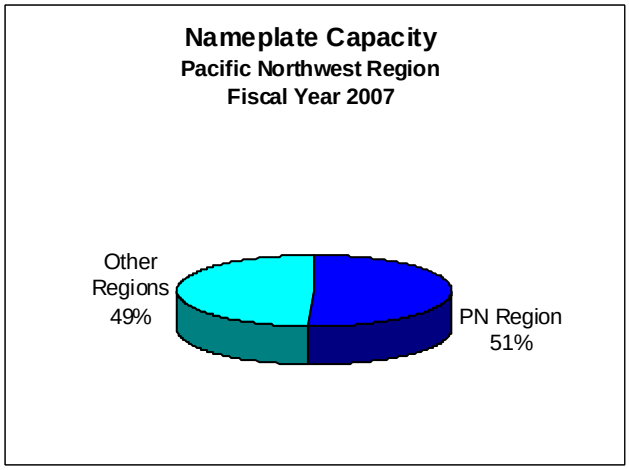
Pacific Northwest Region Power Performance

For Fiscal Year 2007

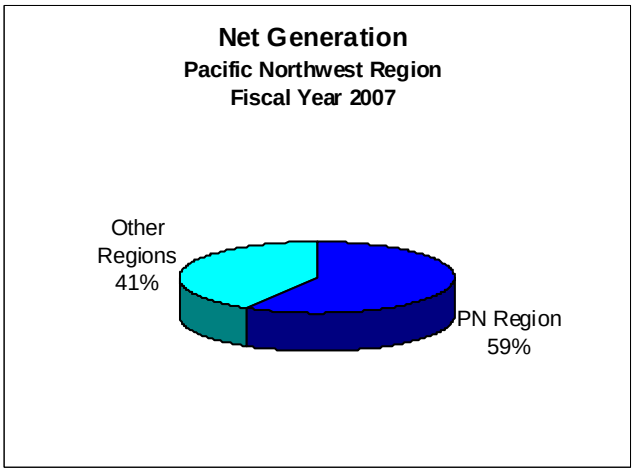
U.S. Department of the Interior
Bureau of Reclamation

Pacific Northwest Regional Power Overview

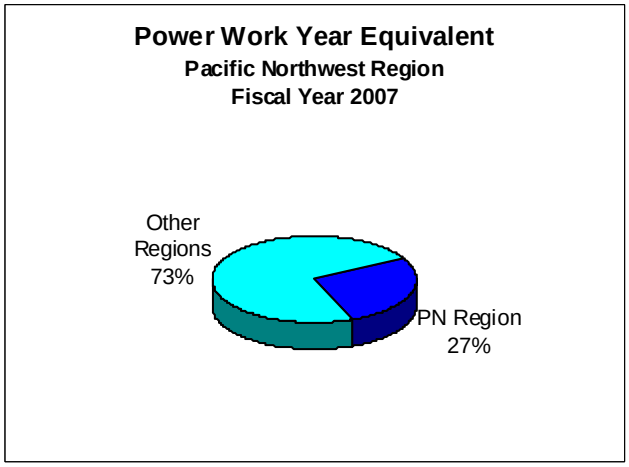
The Pacific Northwest Regional Office is located in Boise, Idaho. The regional office oversees the operation of ten powerplants: Anderson Ranch, Black Canyon, Boise River Diversion, Chandler, Grand Coulee, Green Springs, Hungry Horse, Minidoka, Palisades, and Roza.



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



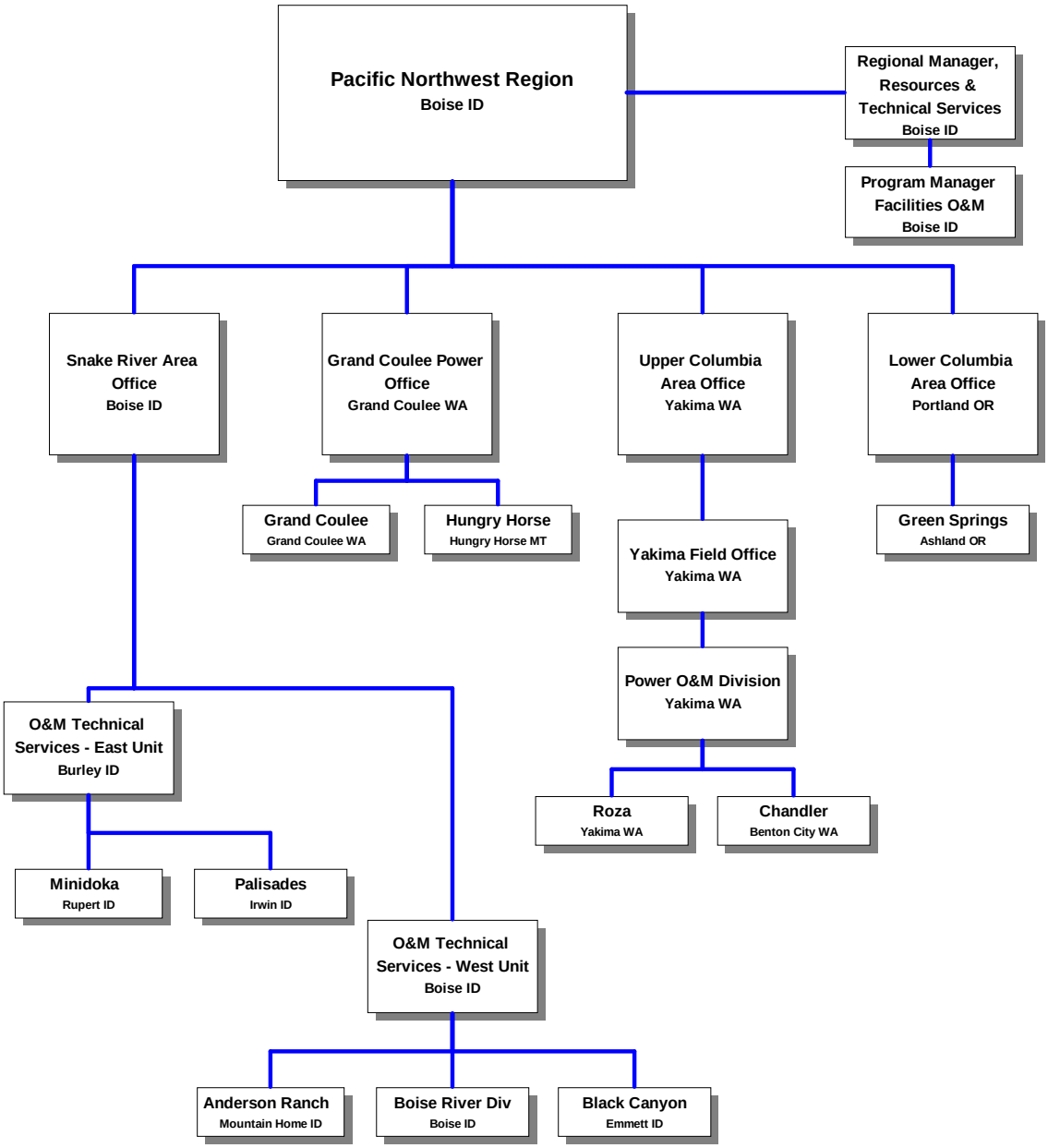
In 2007, this region produced 23,754 net gigawatt-hour. This comprises 54 percent of the total net generation for Reclamation in 2007.



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

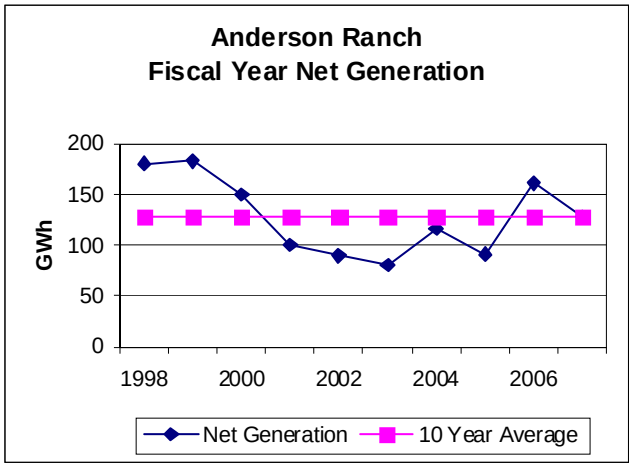
Spinning Reserve	Yes
Non-Spinning Reserve	Yes
Replacement Reserve	Yes
Regulation/Load Following	Yes
Black Start	Yes
Voltage Support	Yes

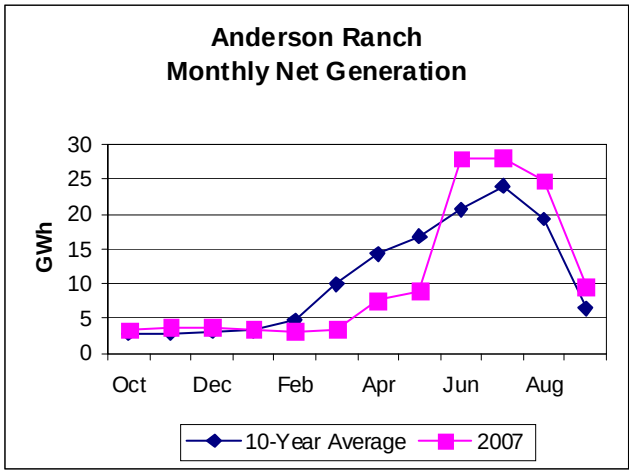
Generators

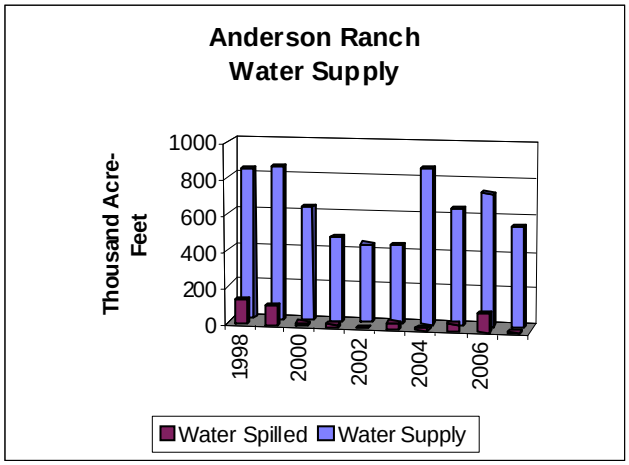
Anderson Ranch Generators
Existing Number and Capacity

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

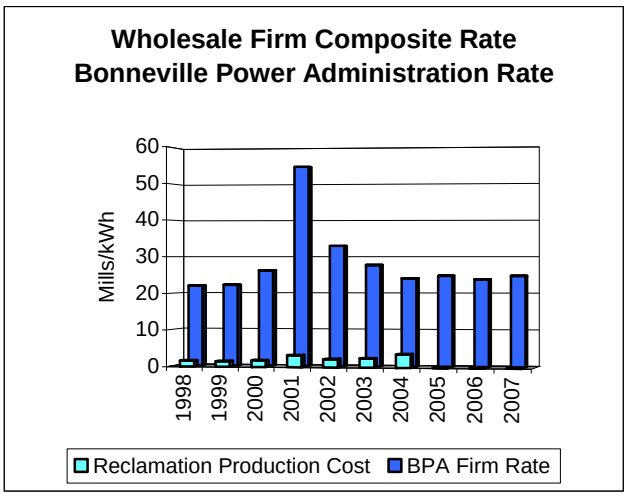

Anderson Ranch
Fiscal Year Net Generation
GWh
200
150
100
50
0
1998
2000
2002
2004
2006
Net Generation
10 Year Average


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

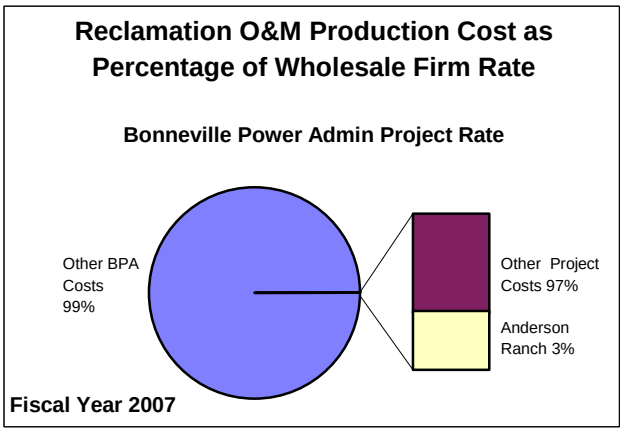

Anderson Ranch
Water Supply
Thousand Acre-Feet
1000
800
600
400
200
0
1998
2000
2002
2004
2006
Water Spilled
Water Supply

Prime Laboratory Benchmarks

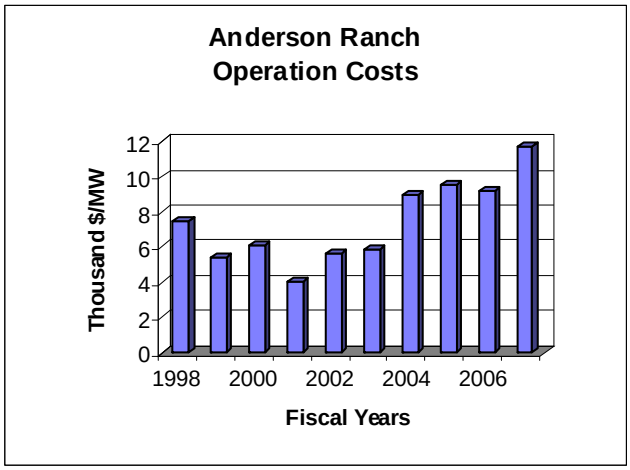
Benchmark 1
Wholesale Firm Rate

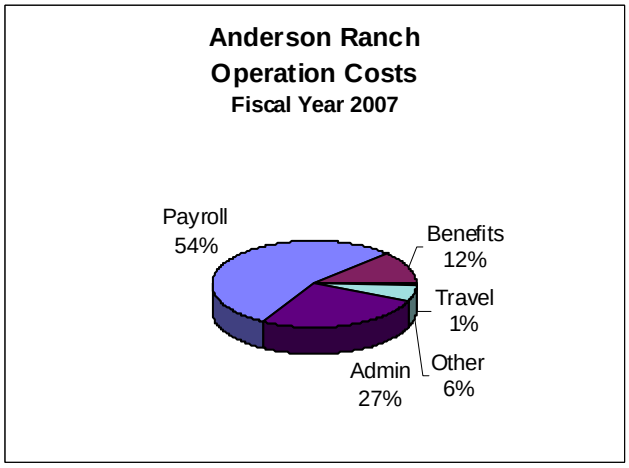


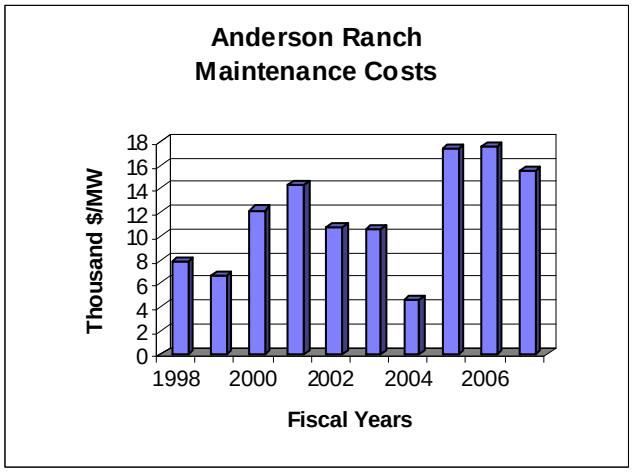
Benchmark 2
Reclamation's Production Cost as Percentage of Wholesale Firm Rate

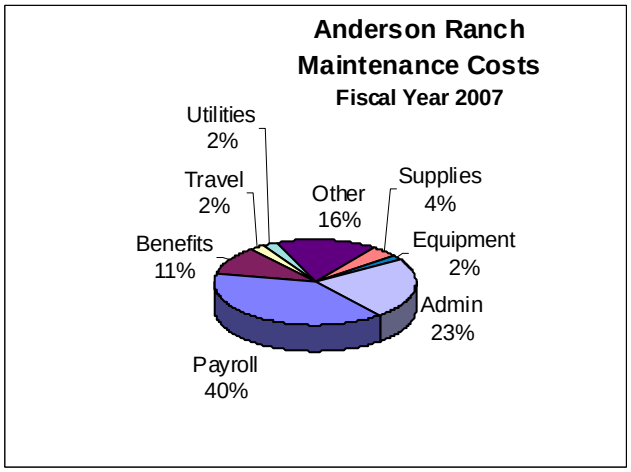


Benchmark 3
Production Cost

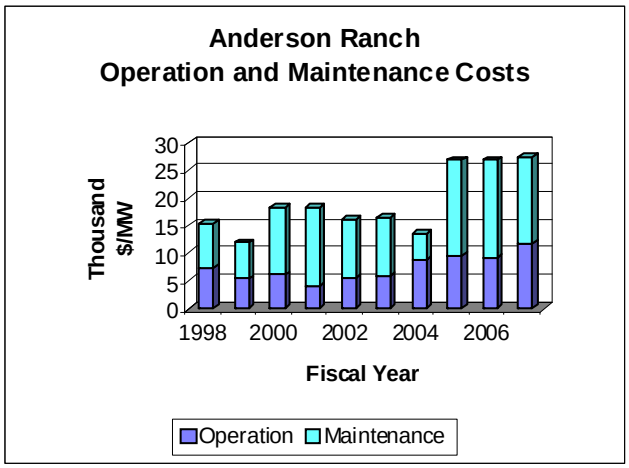


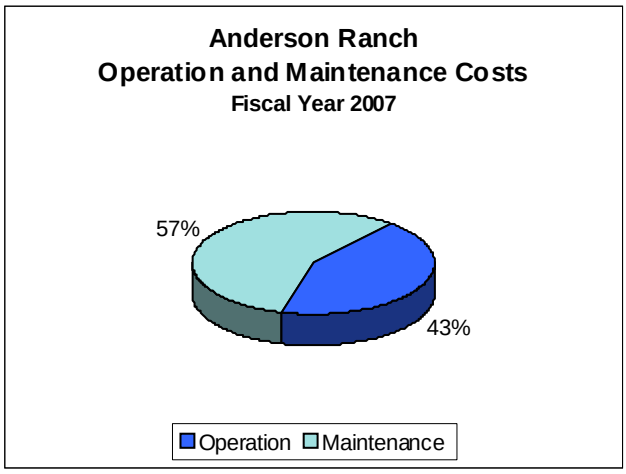


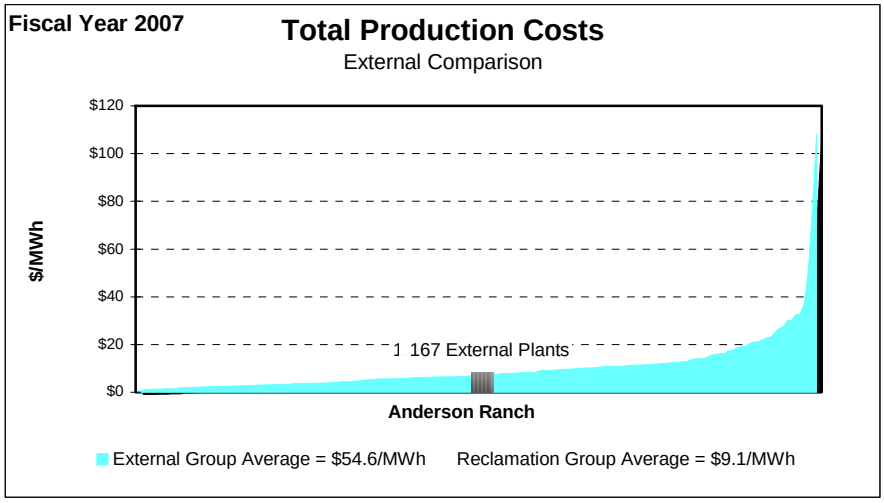


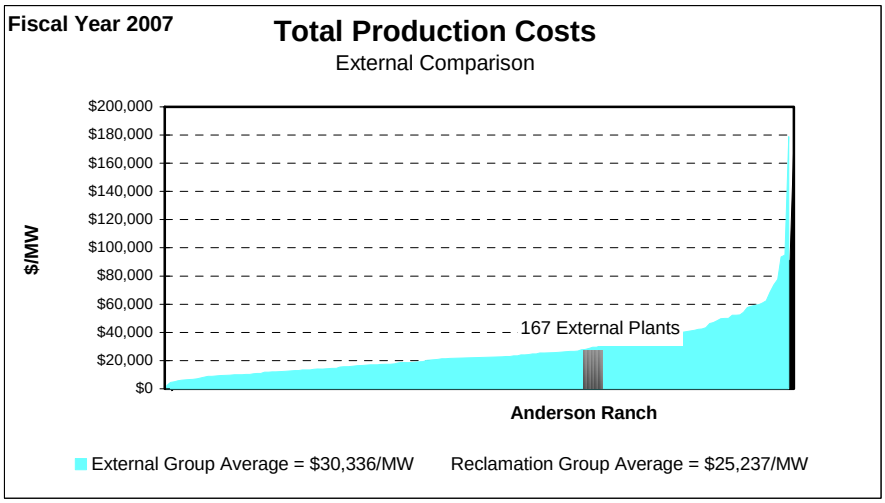


Benchmark 3
Production Costs





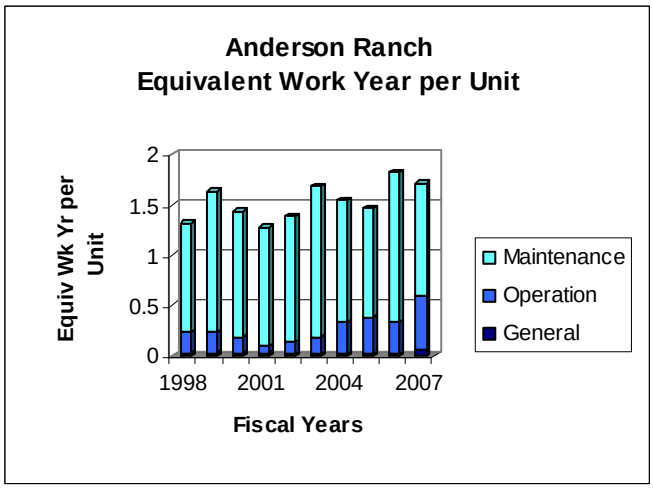


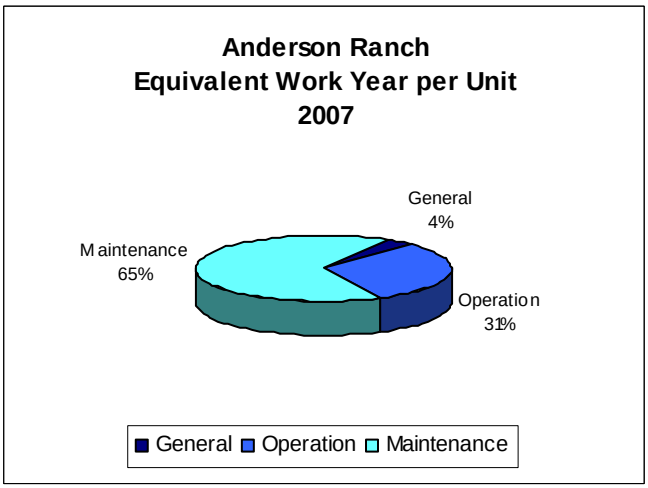


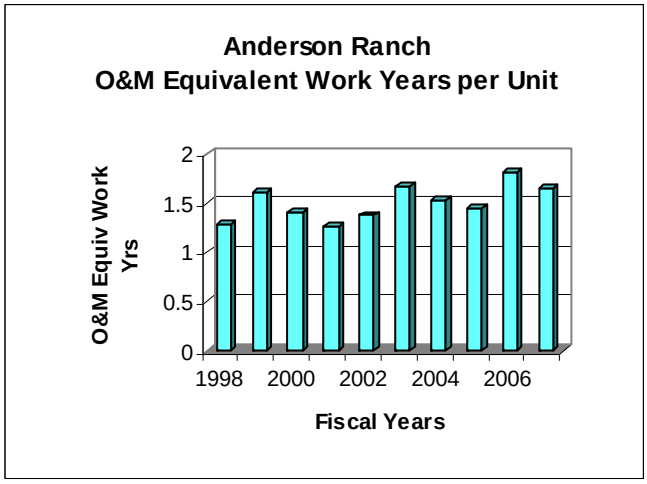
Benchmark 4
Workforce Deployment

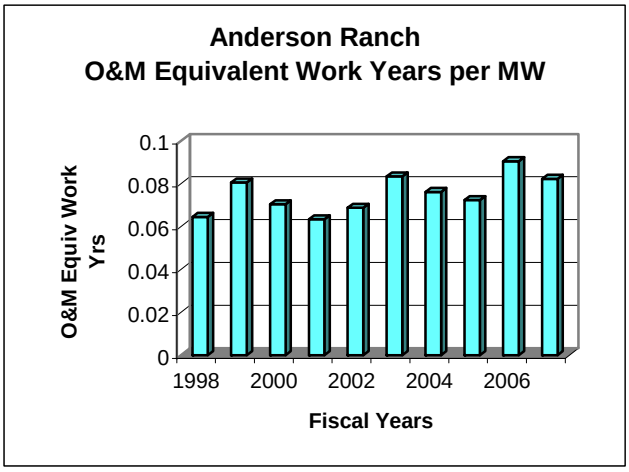
Anderson Ranch FY 2007 Equivalent Work Staffing Year Levels

	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

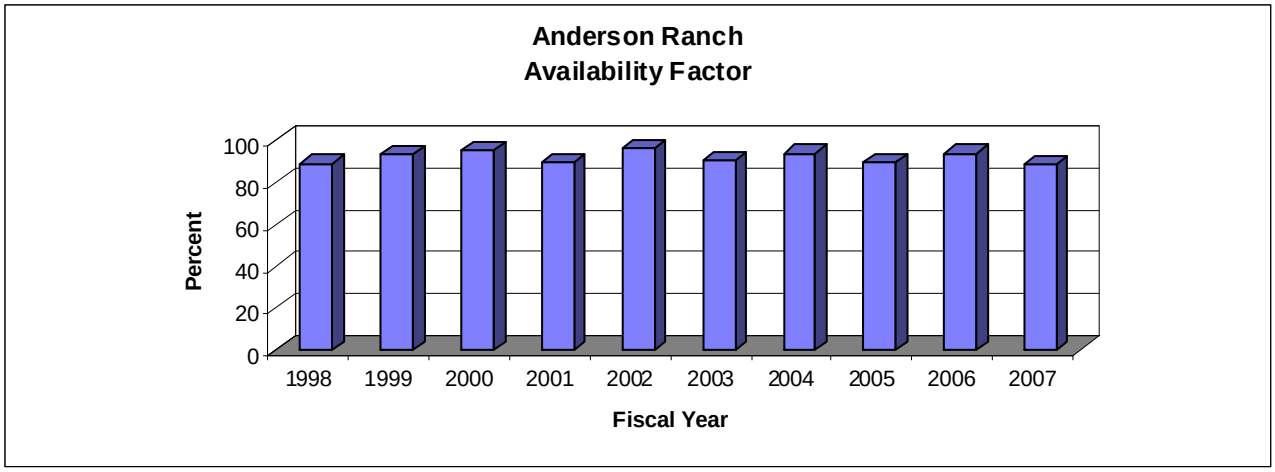




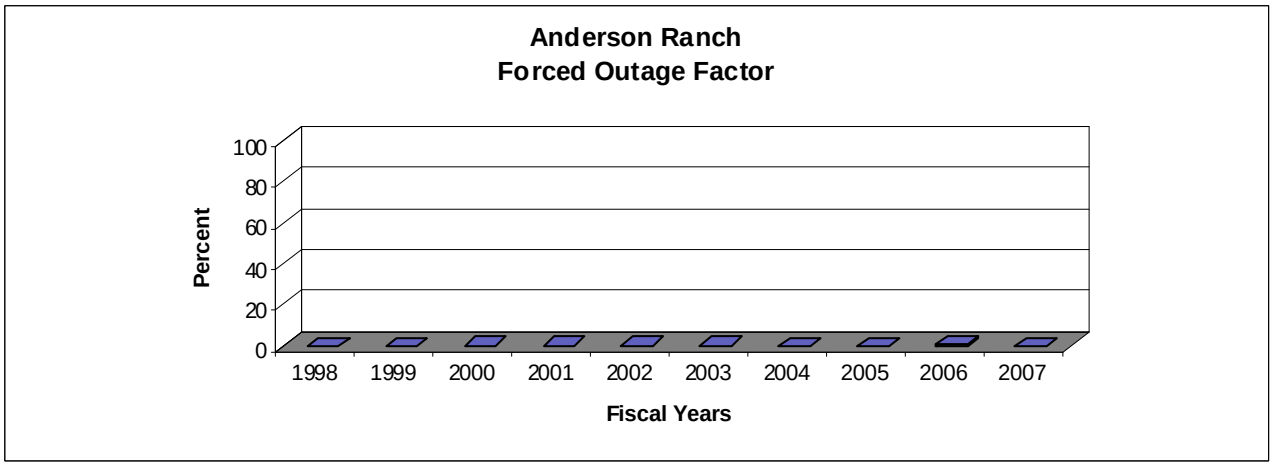




Benchmark 5
Availability Factor

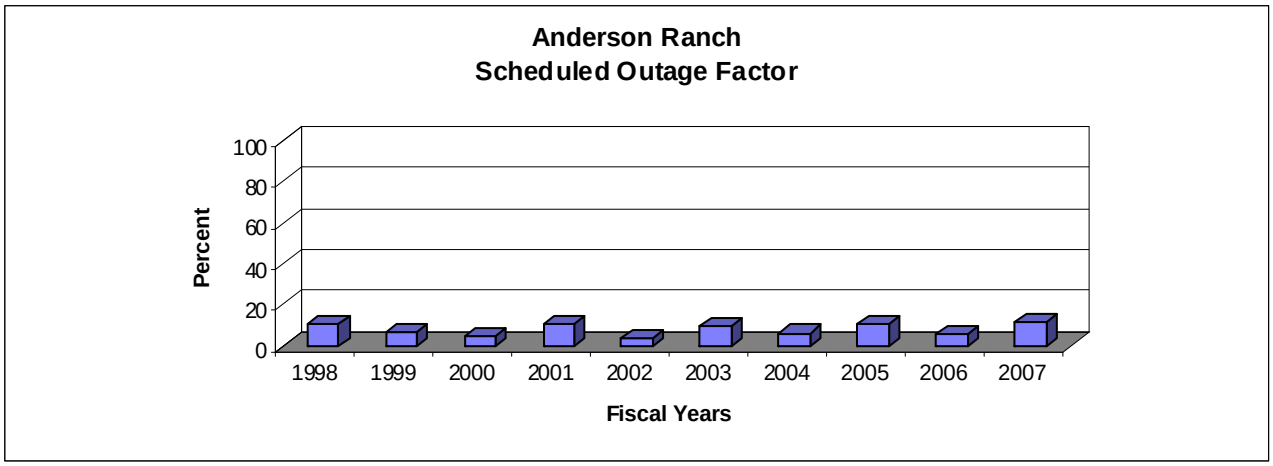


Benchmark 6
Forced Outage Factor

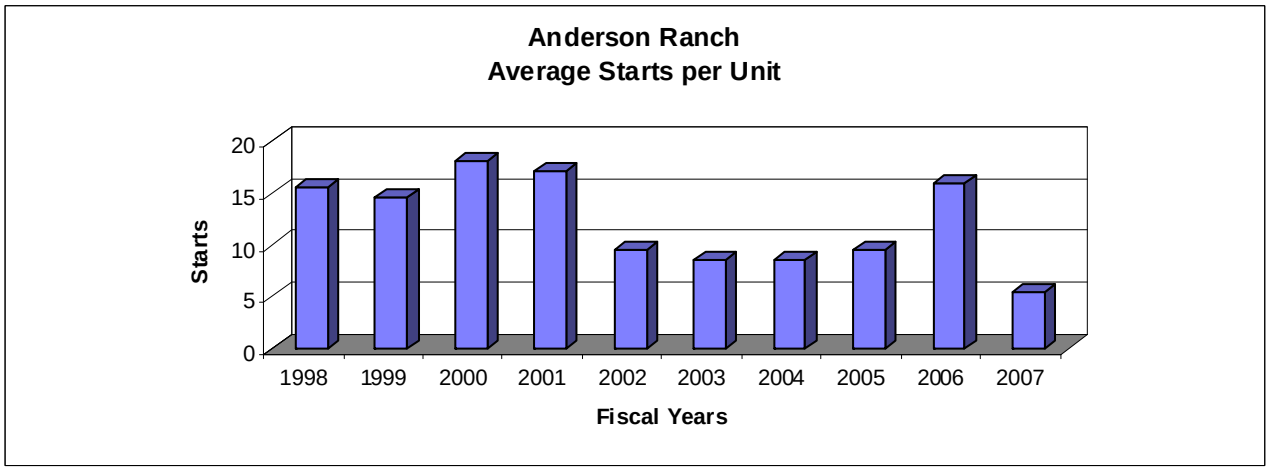


FY-97 Unit 1 out for generator cooling coil leak repair and Unit 2 out for two transformer differential trips

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

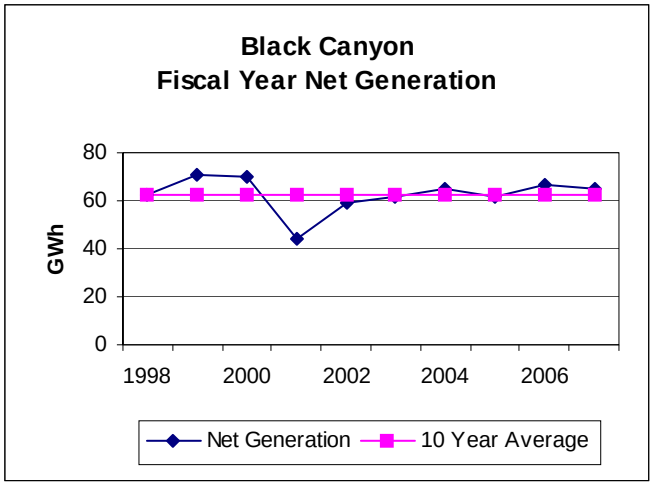
Generators

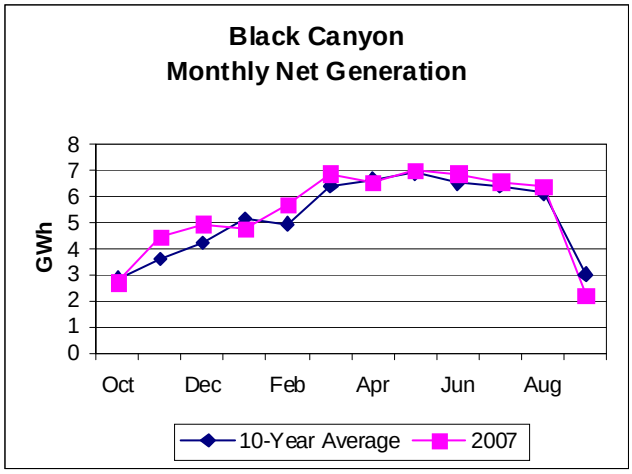
Black Canyon Generators

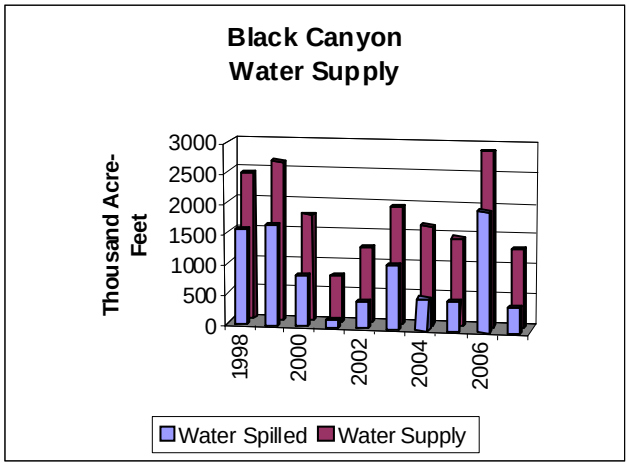
Existing Number and Capacity

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

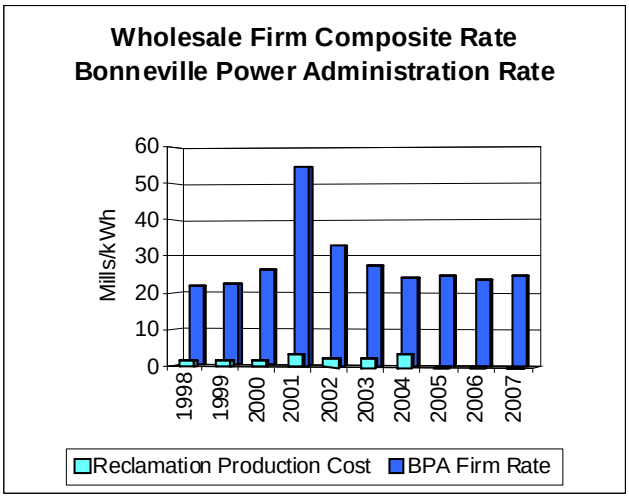

Black Canyon
Fiscal Year Net Generation
GWh
80
60
40
20
0
1998
2000
2002
2004
2006
Net Generation
10 Year Average


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

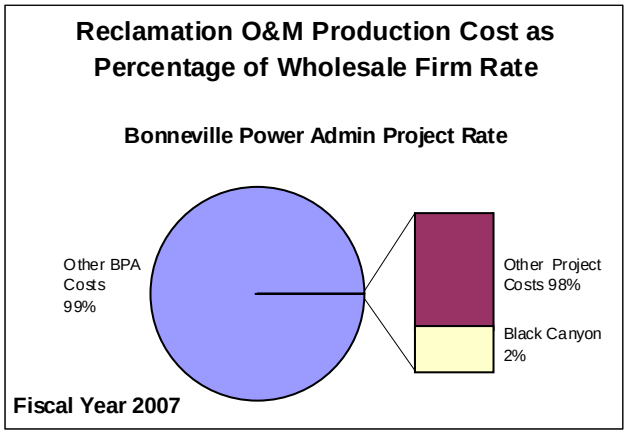

Black Canyon
Water Supply
Thousand Acre-Feet
3000
2500
2000
1500
1000
500
0
1998
2000
2002
2004
2006
Water Spilled
Water Supply

Prime Laboratory Benchmarks

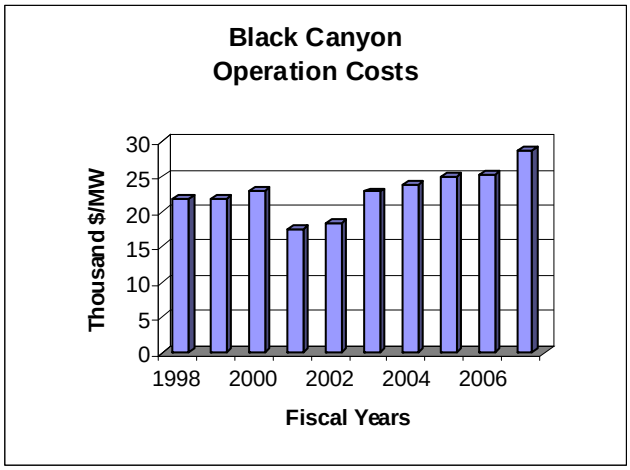
Benchmark 1
Wholesale Firm Rate

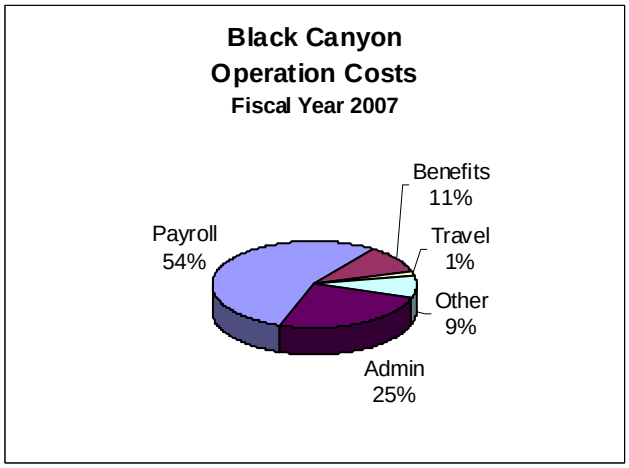


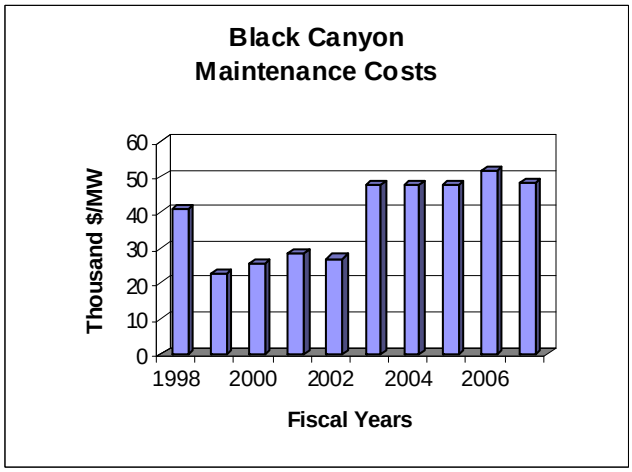
Benchmark 2
Reclamation's Production Cost as Percentage of Wholesale Firm Rate

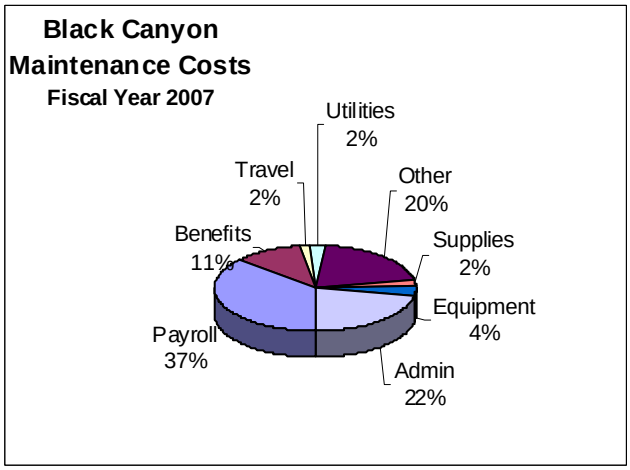


Benchmark 3
Production Cost

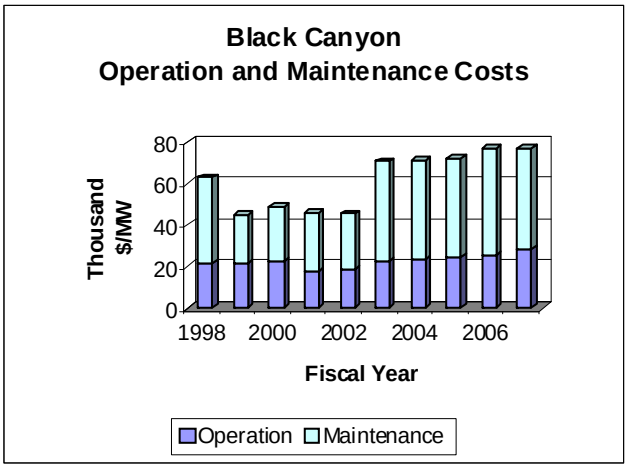


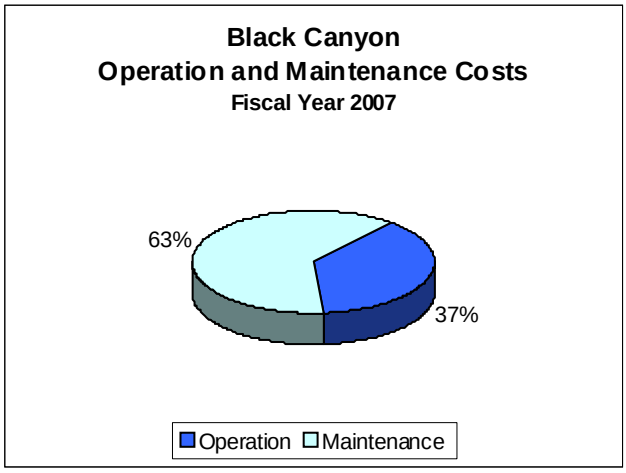


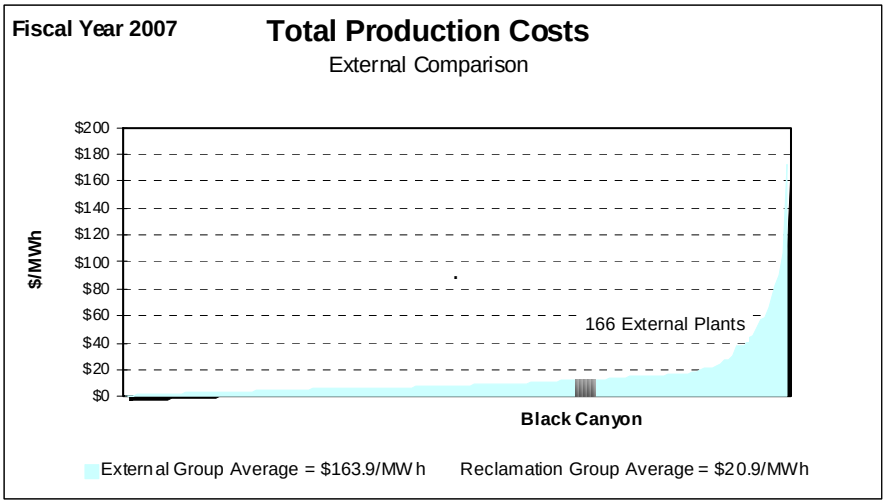


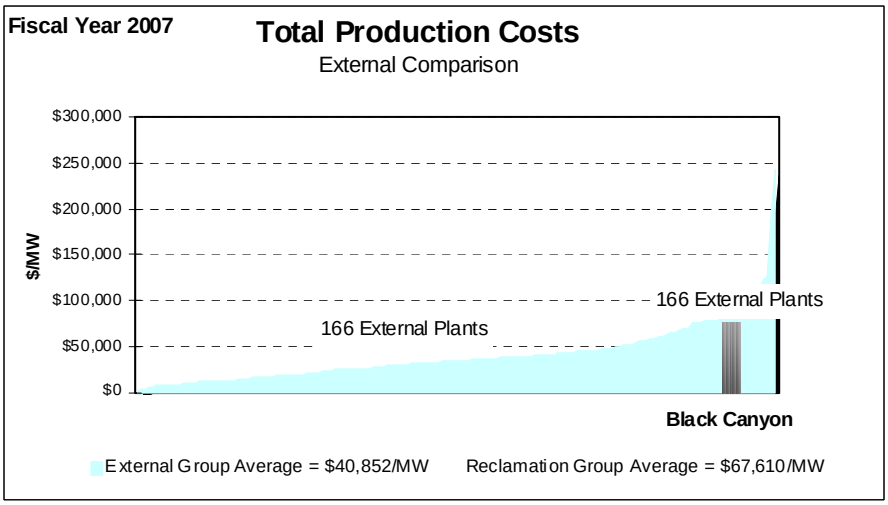


Benchmark 3
Production Cost



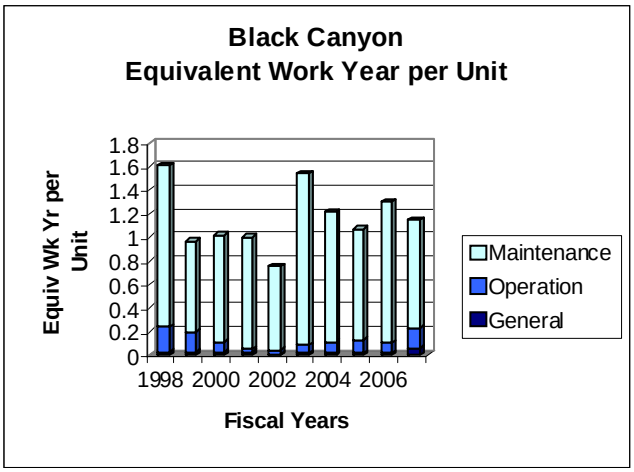


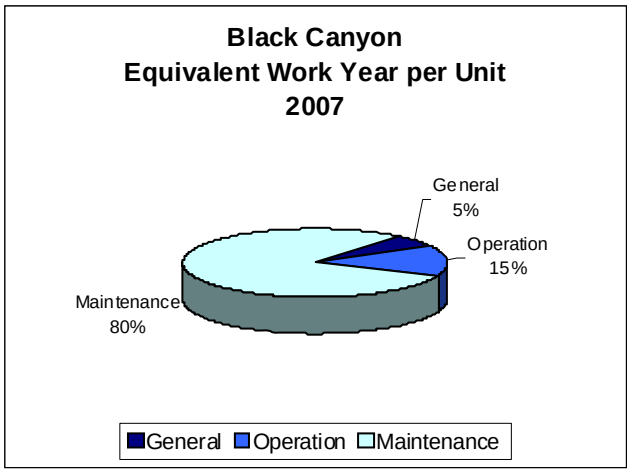


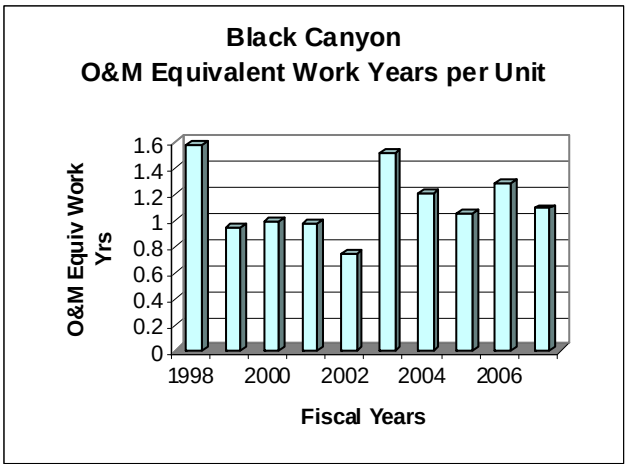


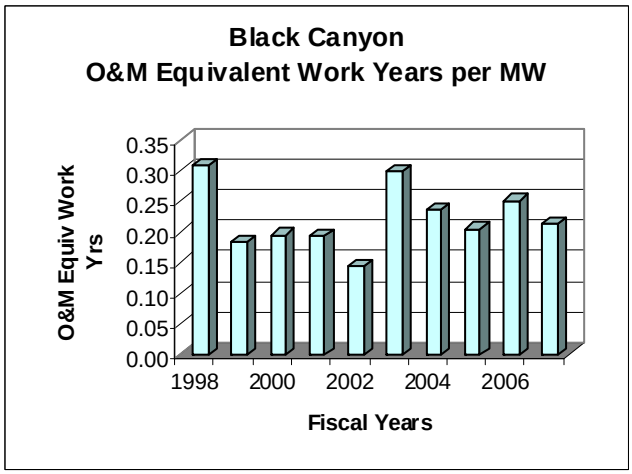
Benchmark 4
Workforce Deployment

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

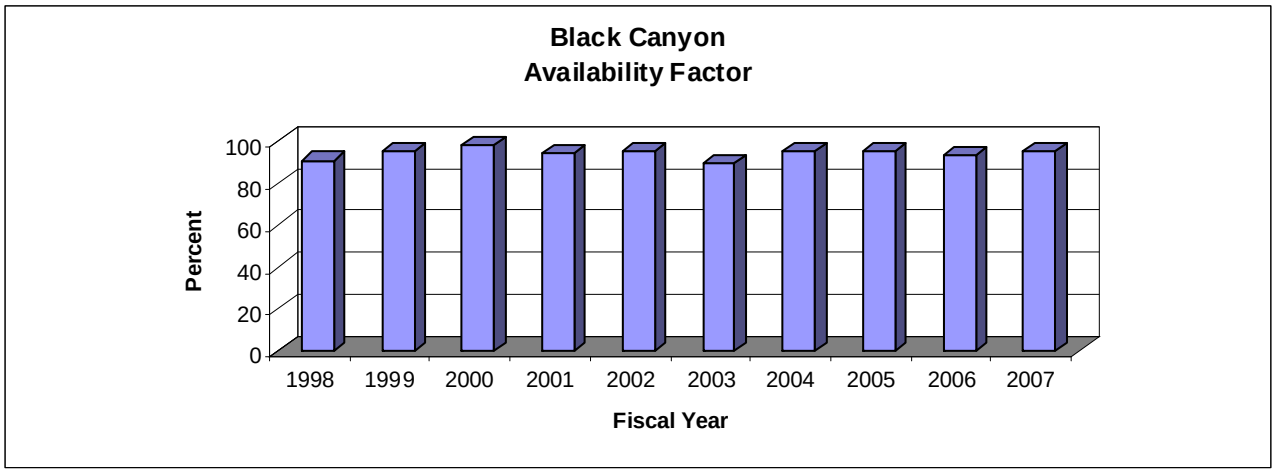




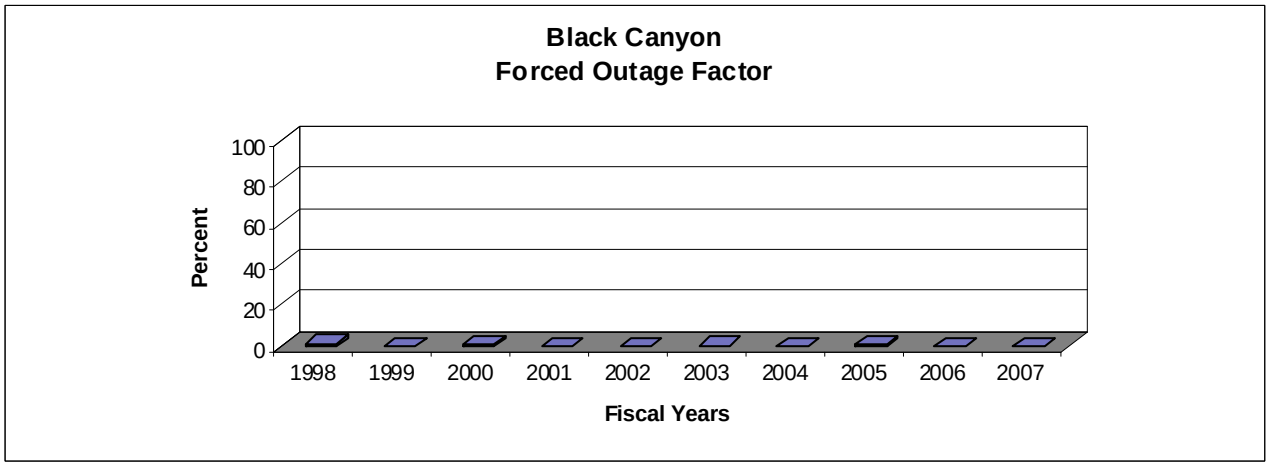




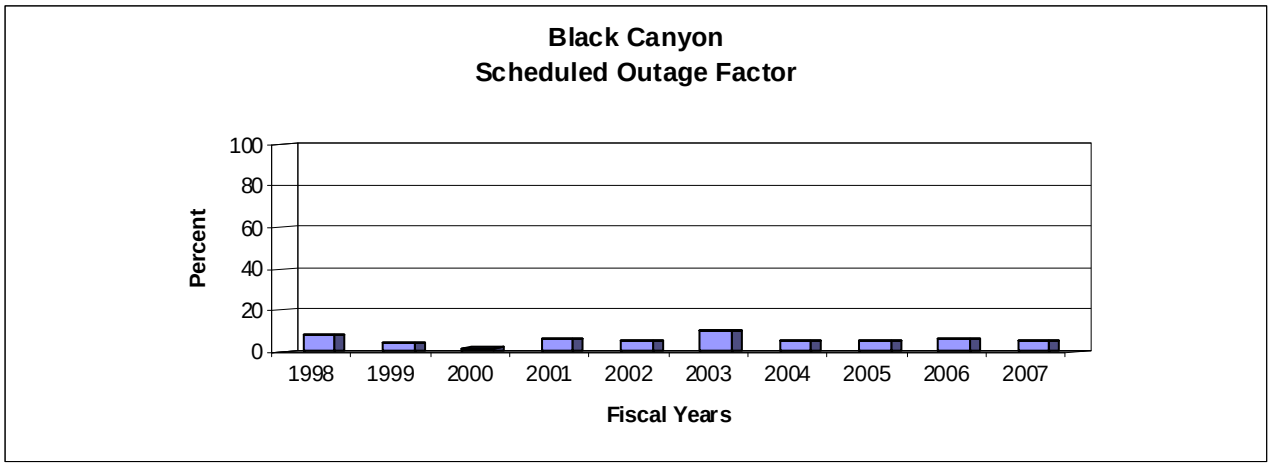
Benchmark 5
Availability Factor



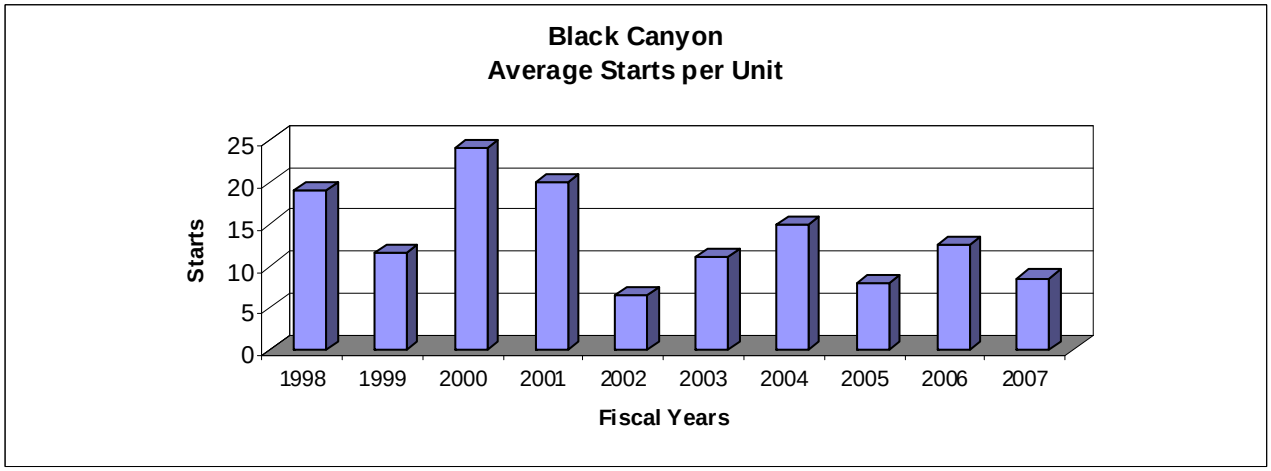
Benchmark 6
Forced Outage Factor



Benchmark 7
Scheduled Outage Factor



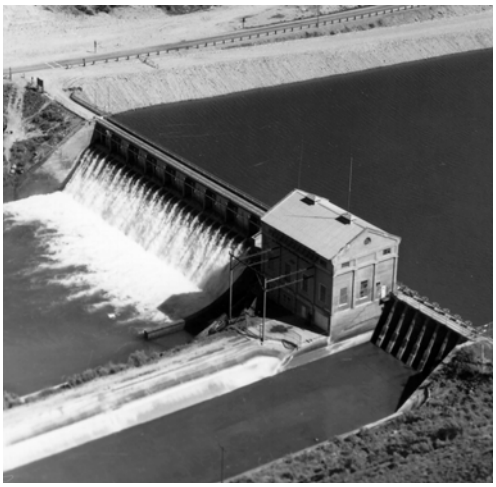
Starts



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

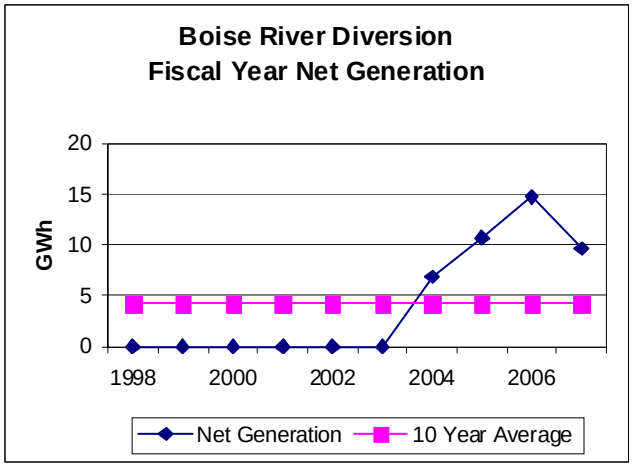
Spinning Reserve	No
Non-Spinning Reserve	No
Replacement Reserve	No
Regulation/Load Following	No
Black Start	No
Voltage Support	No

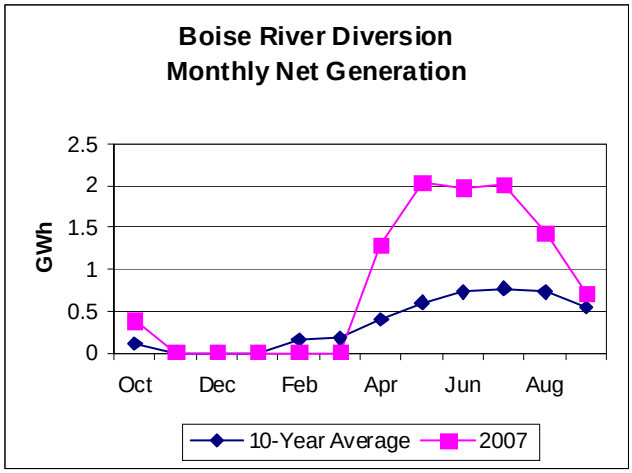
Generators

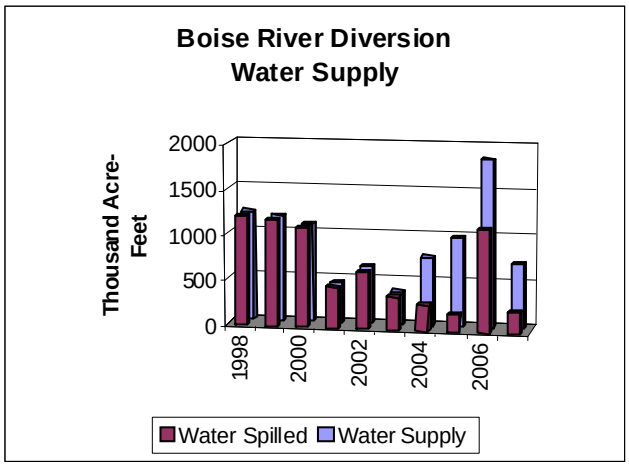
Boise River Diversion Generators
Existing Number and Capacity

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



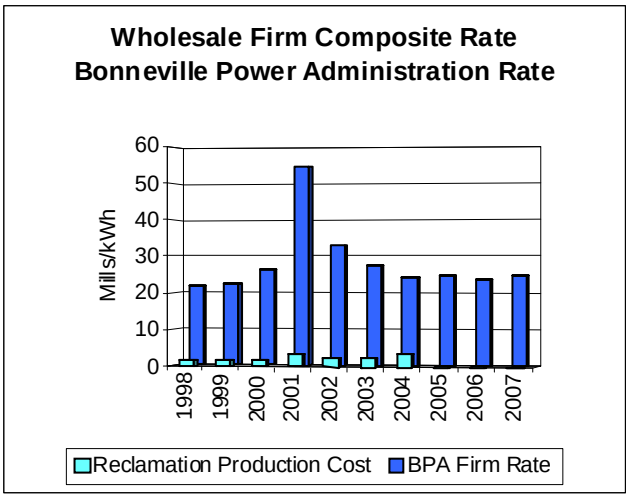




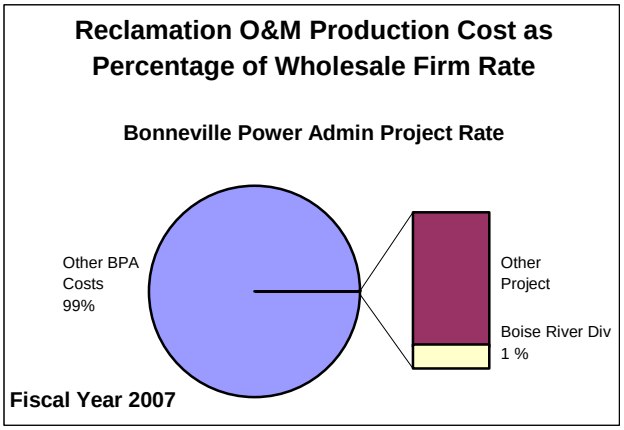
All three units at Boise River Diversion came online during FY 2004

Prime Laboratory Benchmarks

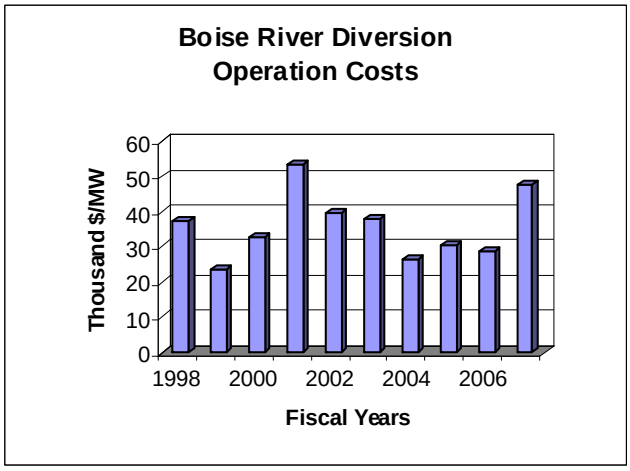
Benchmark 1
Wholesale Firm Rate

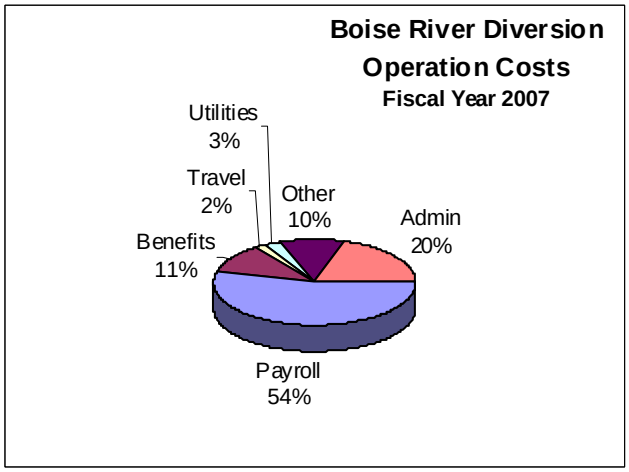


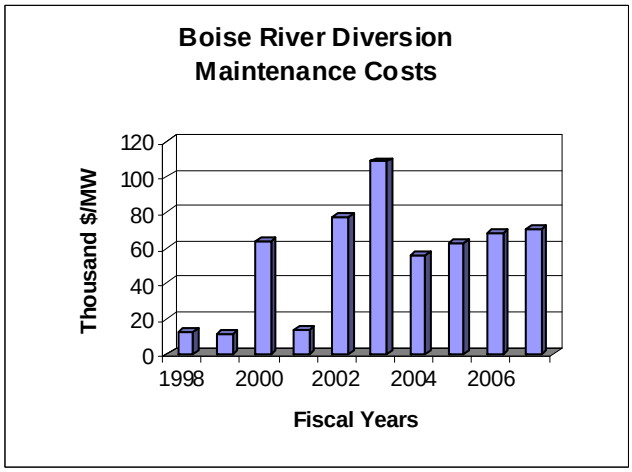
Benchmark 2
Reclamation's Production Cost as Percentage of Wholesale Firm Rate

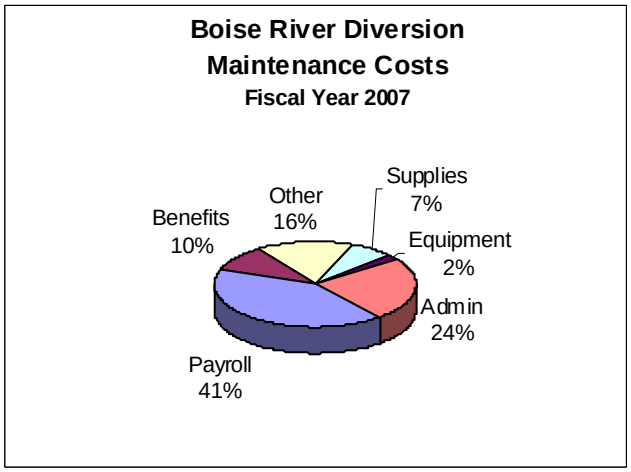


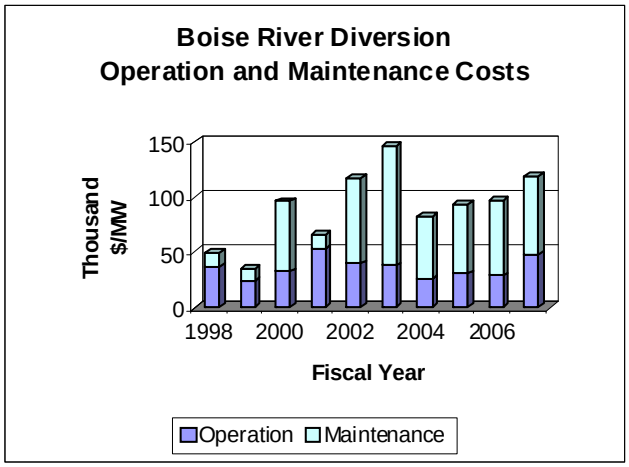
Benchmark 3
Production Cost

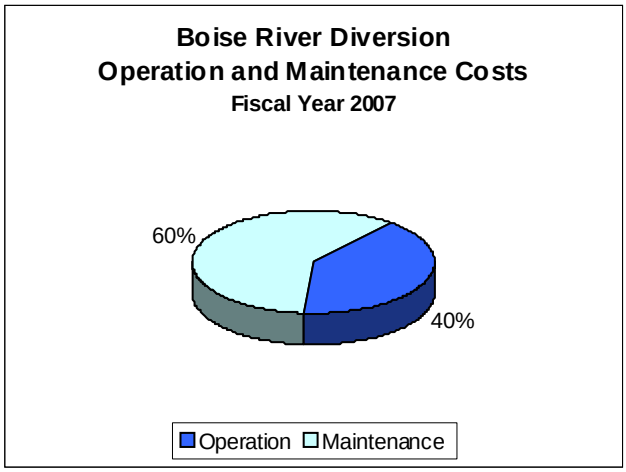






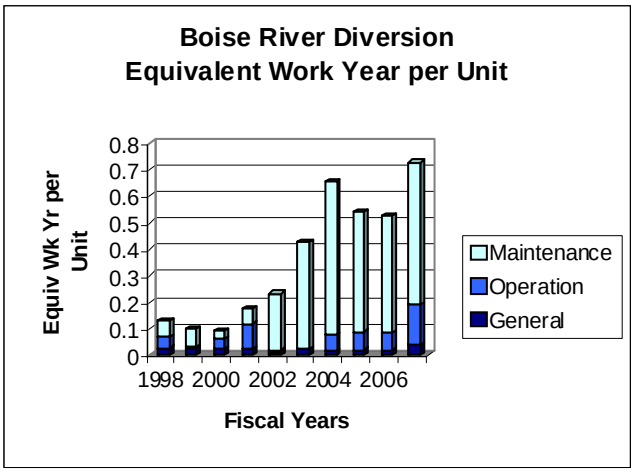


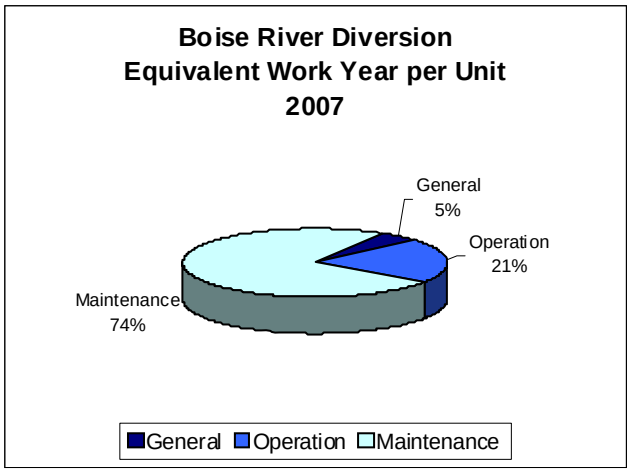


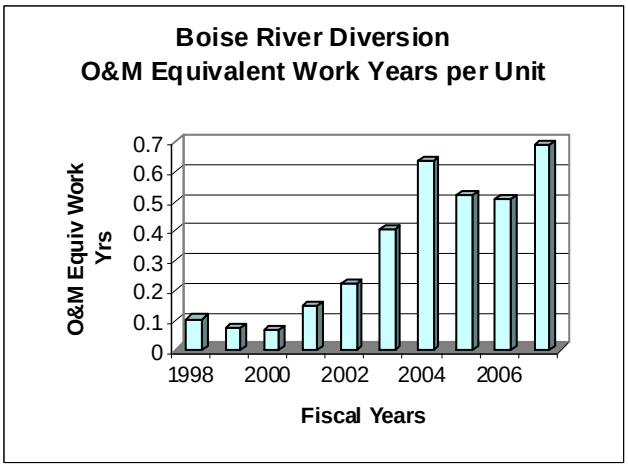


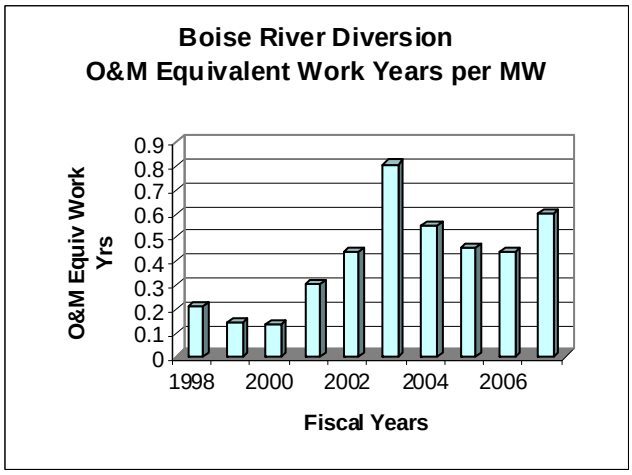
Benchmark 4
Workforce Deployment

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

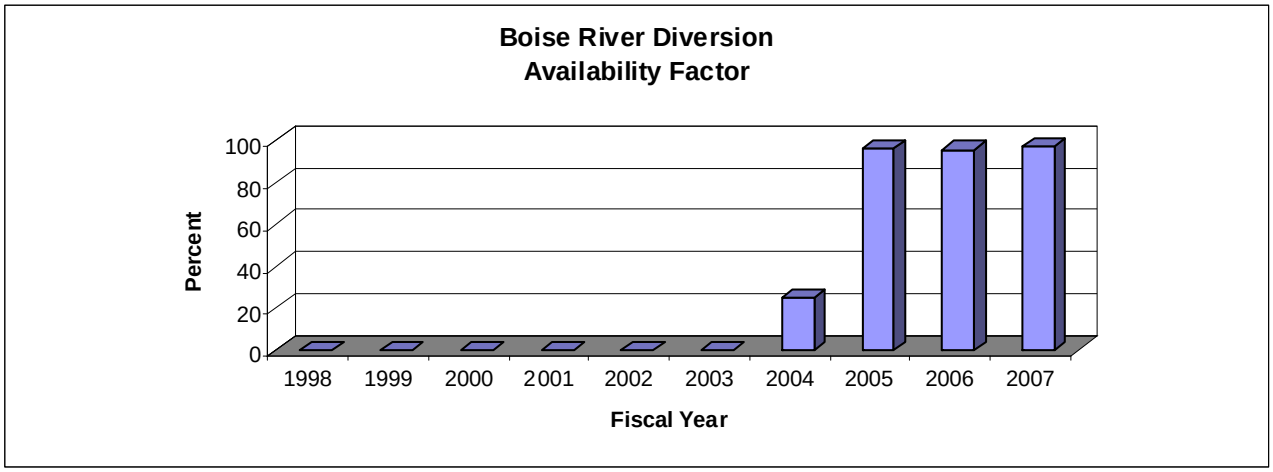






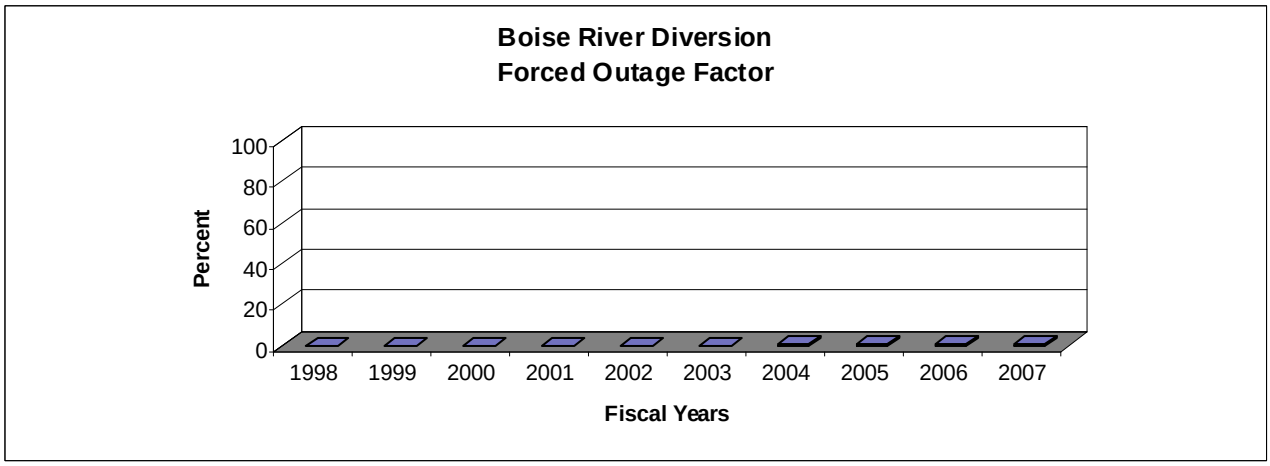


Benchmark 5
Availability Factor

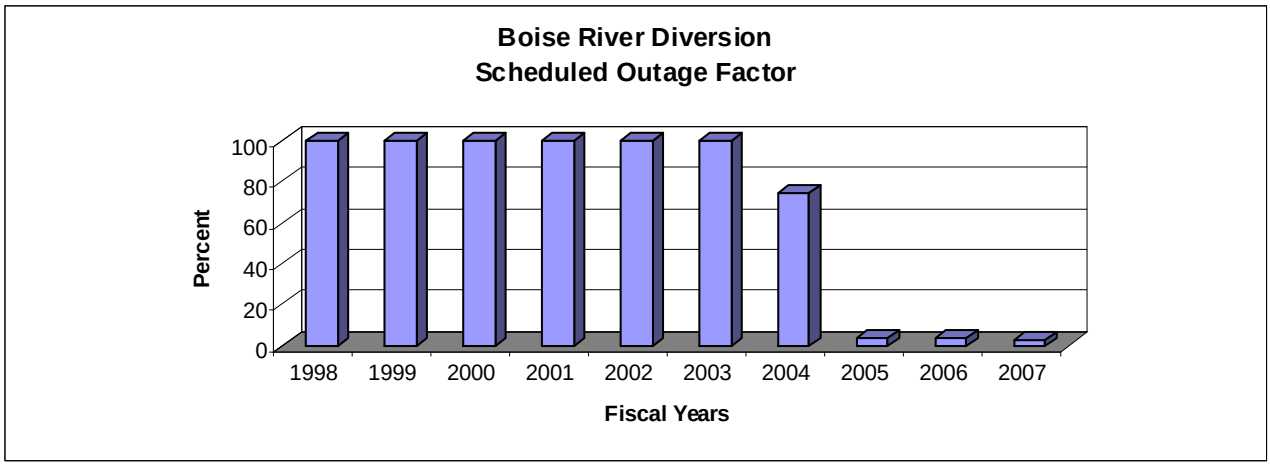


FY-04 – Three units on line.

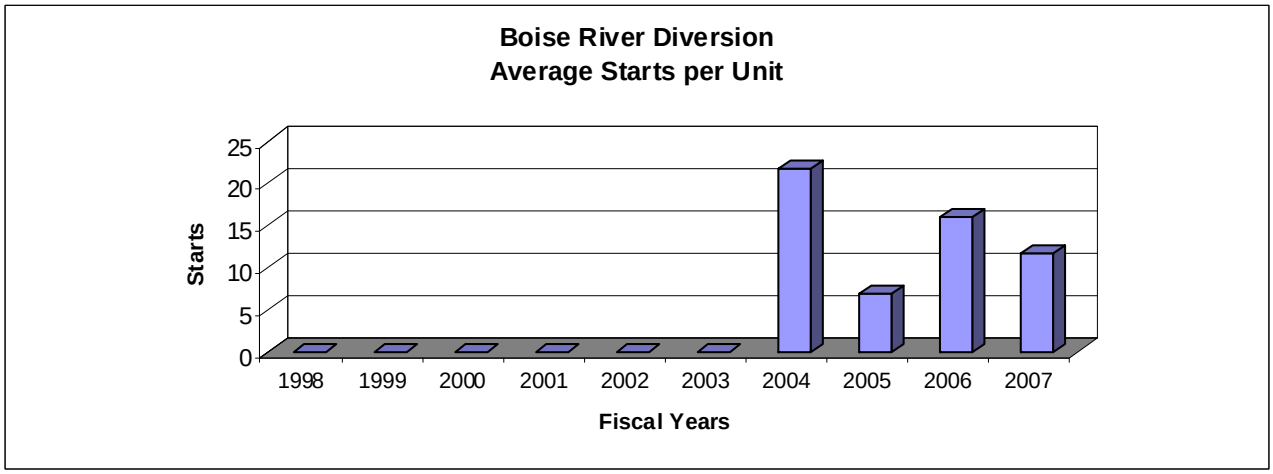
Benchmark 6
Forced Outage Factor



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

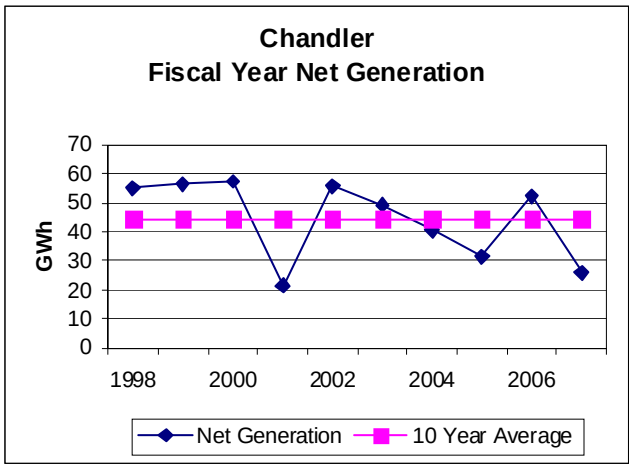
Black start possible, but it would never be done because of power line constraints.

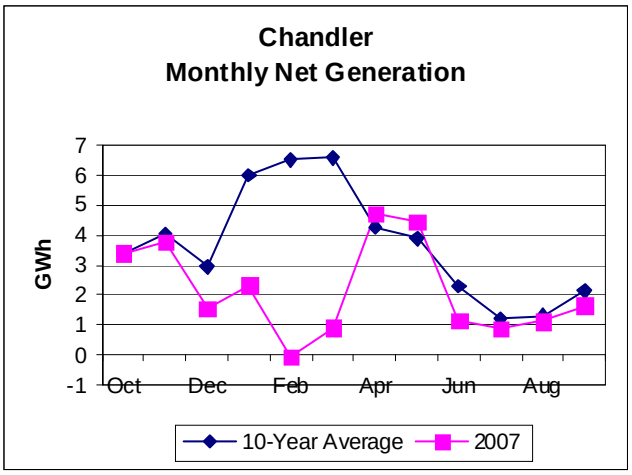
Generators

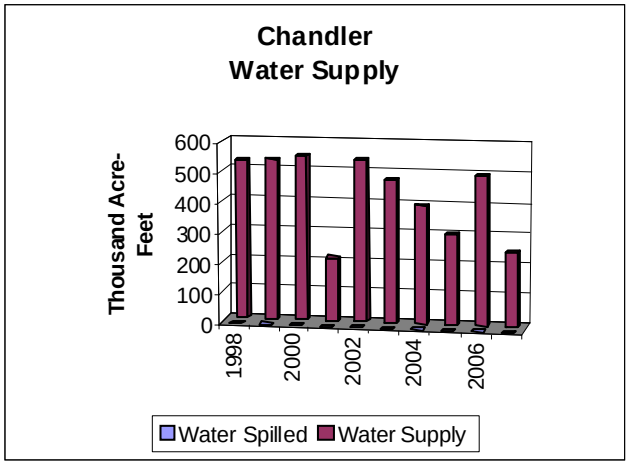
Chandler Generators
Existing Number and Capacity

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

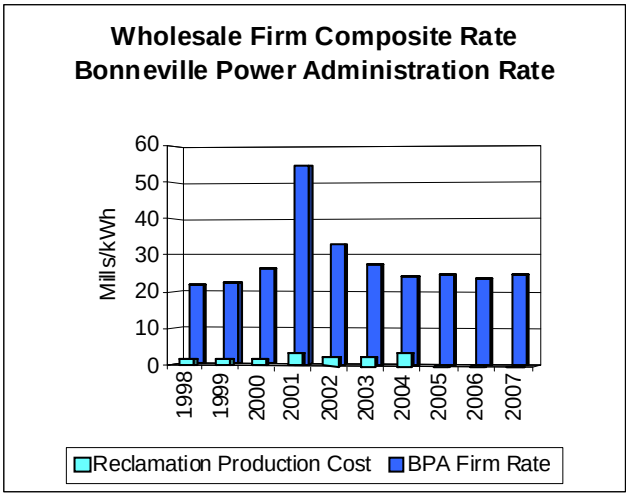

Chandler
Fiscal Year Net Generation
GWh
70
60
50
40
30
20
10
0
1998
2000
2002
2004
2006
Net Generation
10 Year Average


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

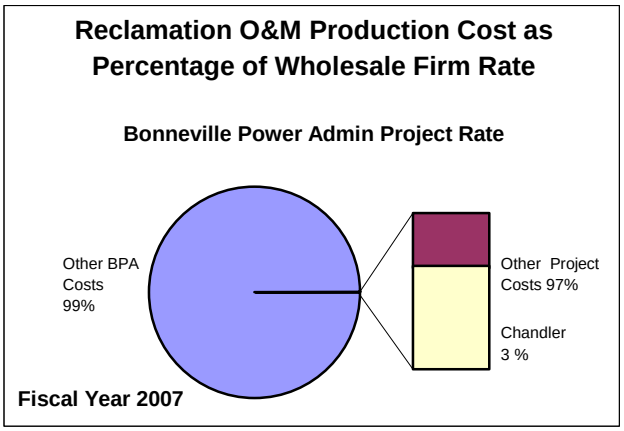

Chandler
Water Supply
Thousand Acre-Feet
600
500
400
300
200
100
0
1998
2000
2002
2004
2006
Water Spilled
Water Supply

Prime Laboratory Benchmarks

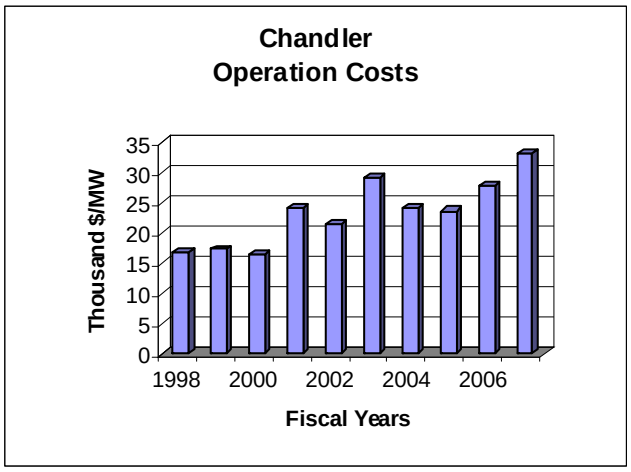
Benchmark 1
Wholesale Firm Rate

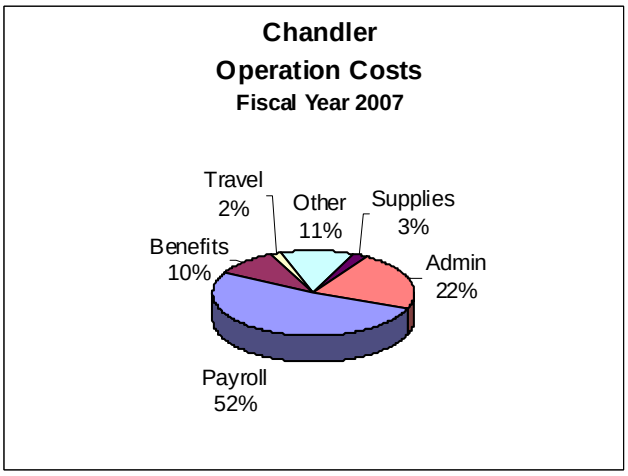


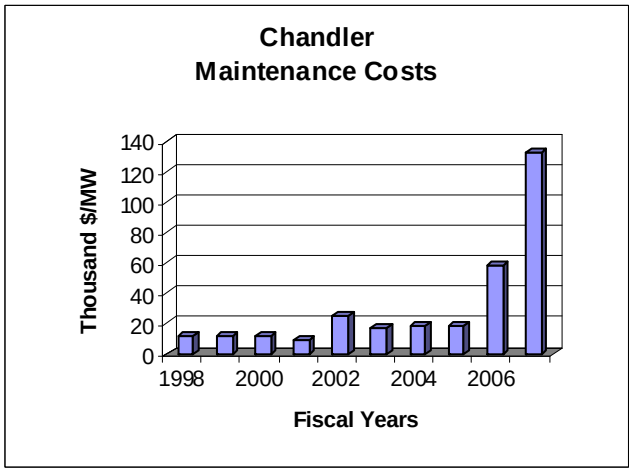
Benchmark 2
Reclamation's Production Cost as Percentage of Wholesale Firm Rate

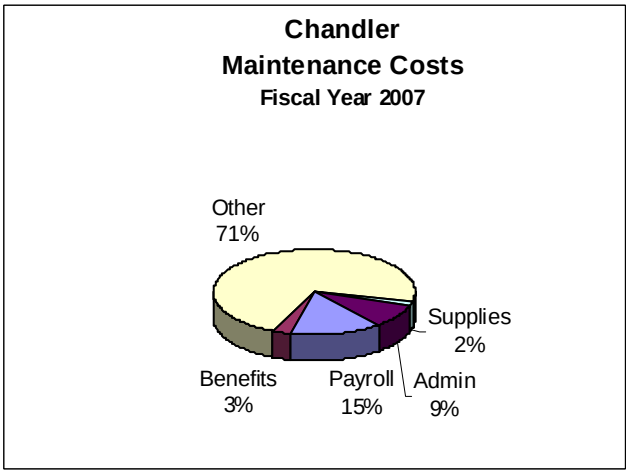


Benchmark 3
Production Cost

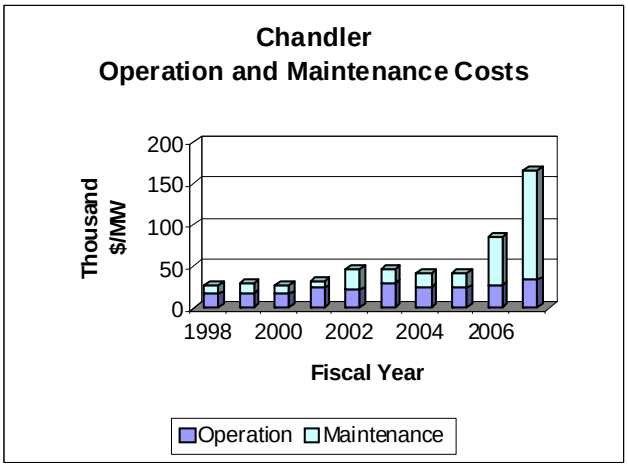


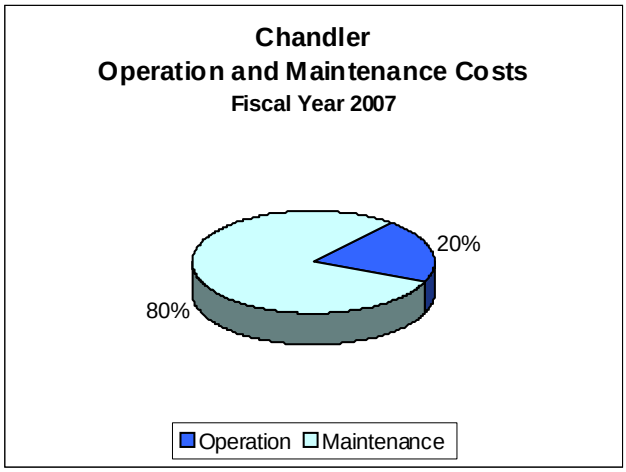


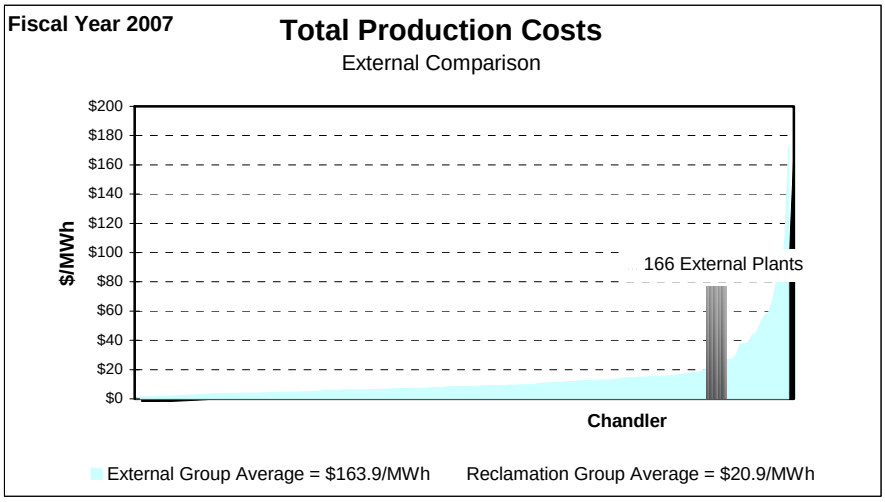


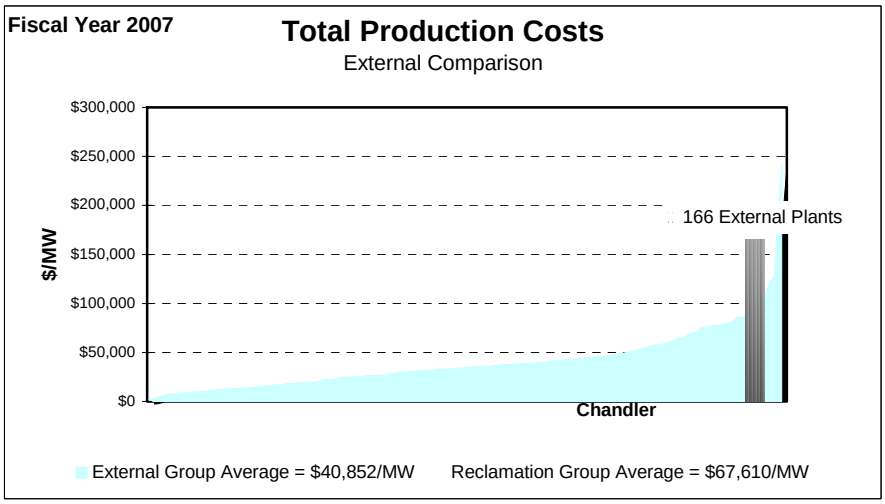


Benchmark 3
Production Cost



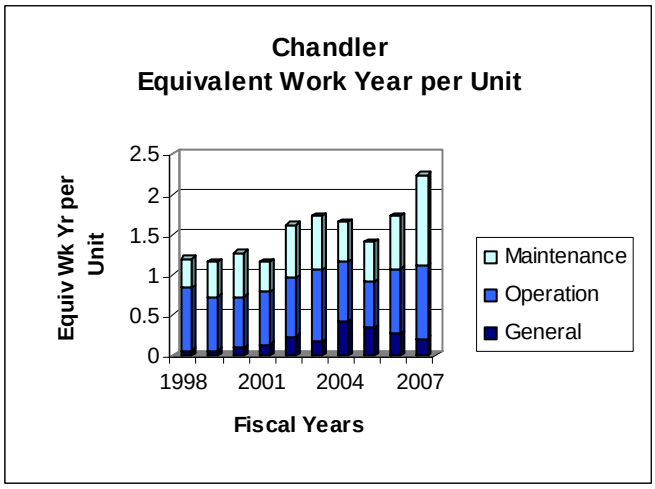


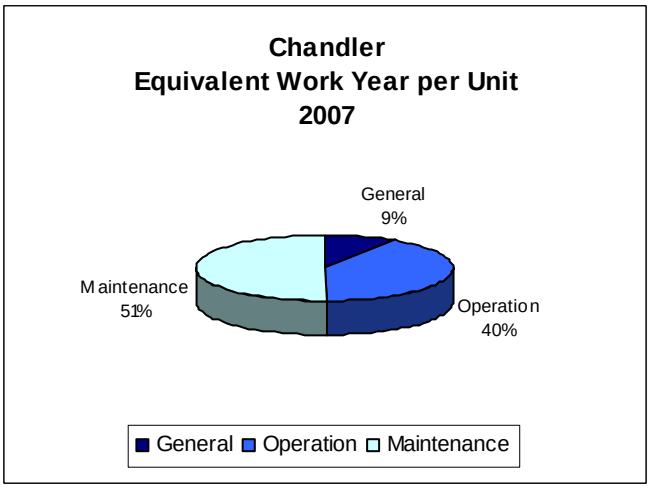


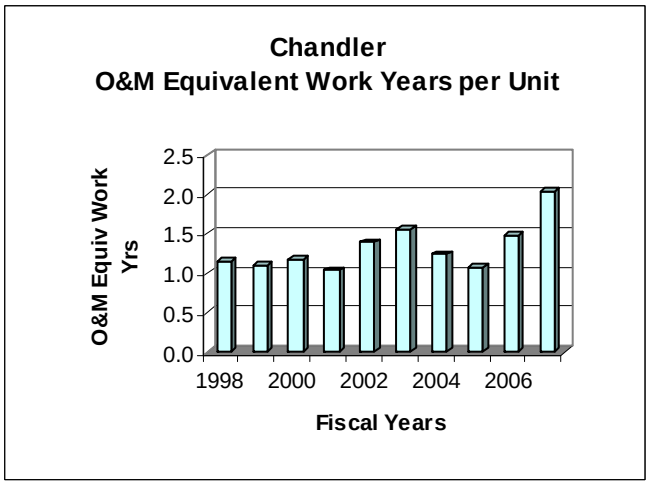


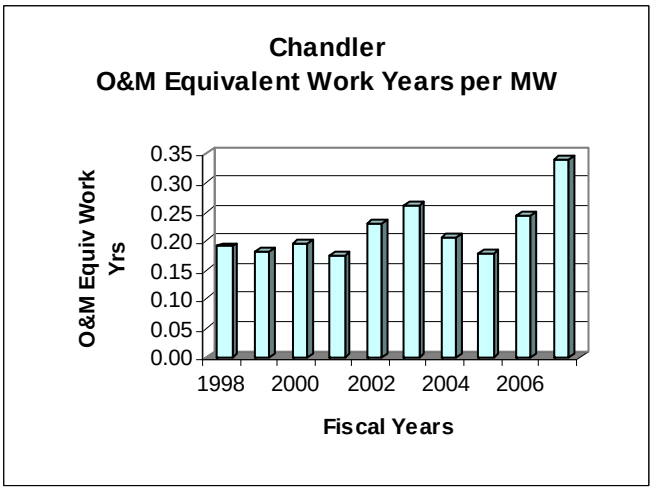
Benchmark 4
Workforce Deployment

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

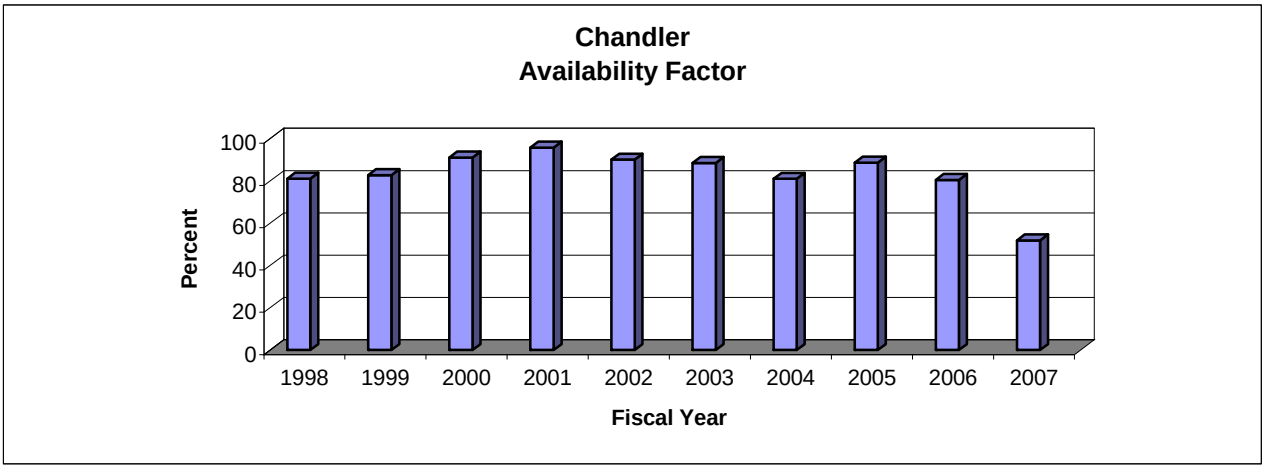




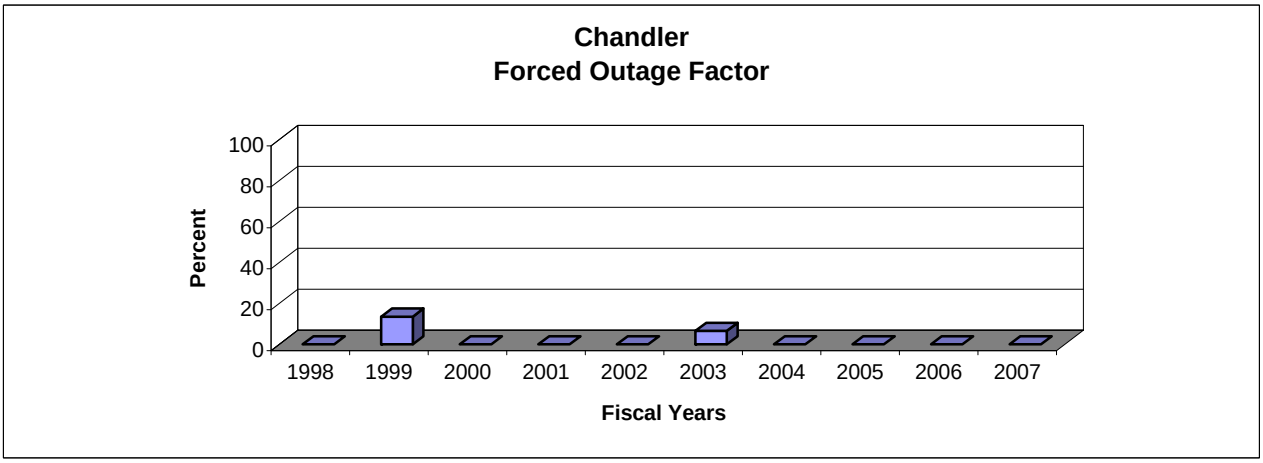




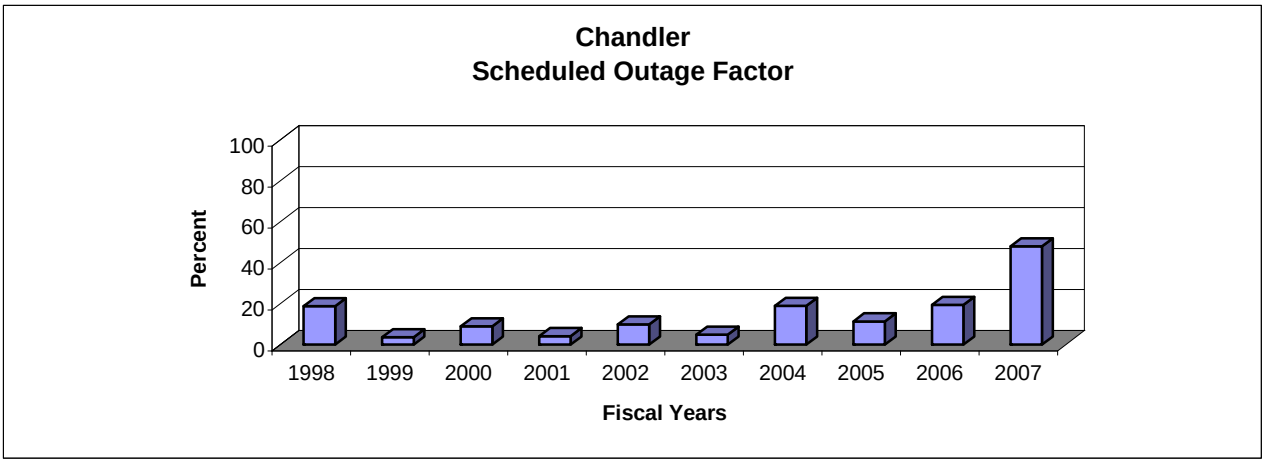
Benchmark 5
Availability Factor



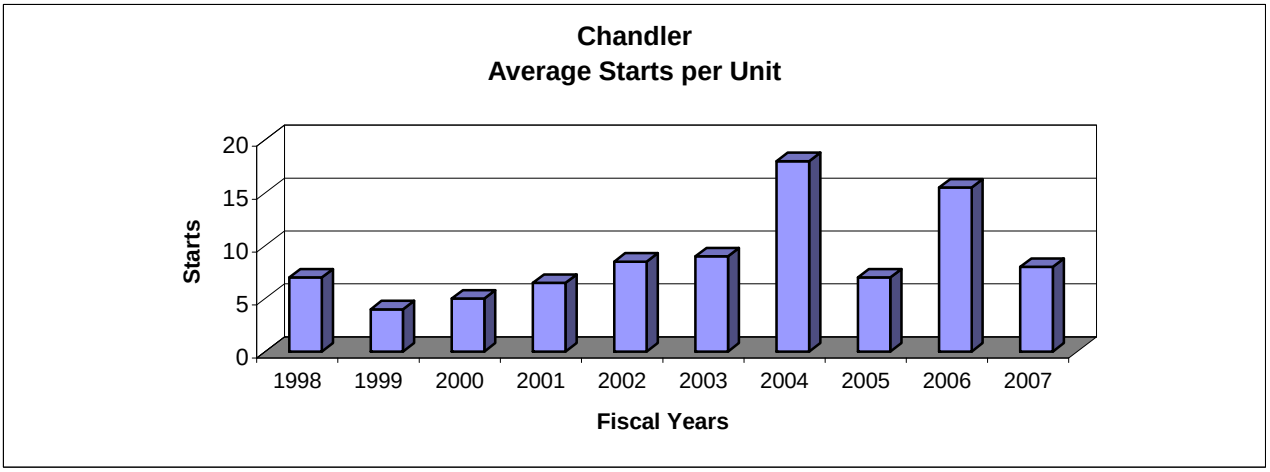
Benchmark 6
Forced Outage Factor



Benchmark 7
Scheduled Outage Factor



Starts

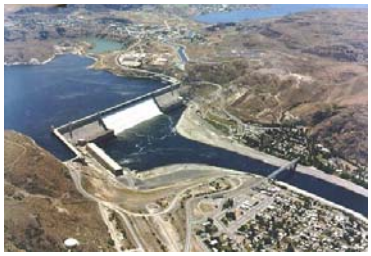


Benchmark Data Comparison

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

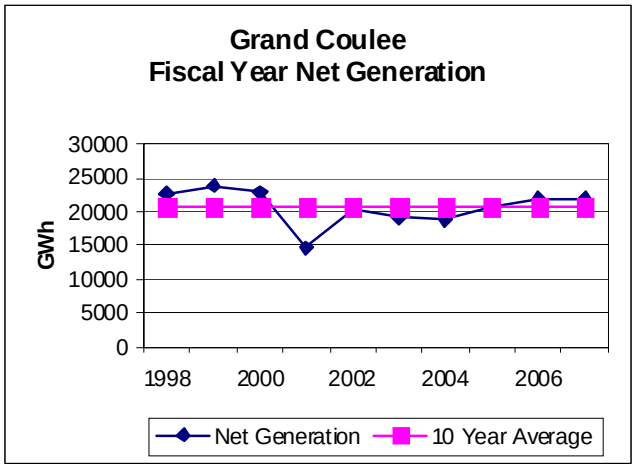
Spinning Reserve	Yes
Non-Spinning Reserve	Yes
Replacement Reserve	Yes
Regulation/Load Following	Yes
Black Start	Yes
Voltage Support	Yes

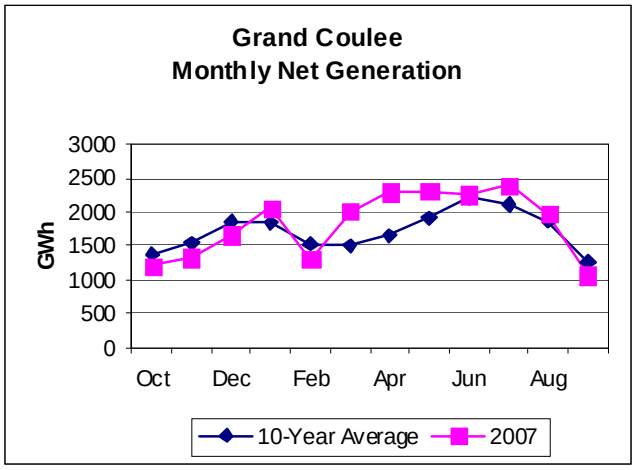
Grand Coulee Generators Existing Number and Capacity			
Unit #	Original Capacity (kW)	Capacity Increased (kW)	Present Capacity (kW)
01	108,000	17,000	125,000
02	108,000	17,000	125,000
03	108,000	17,000	125,000
04	108,000	17,000	125,000
05	108,000	17,000	125,000
06	108,000	17,000	125,000
07	108,000	17,000	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

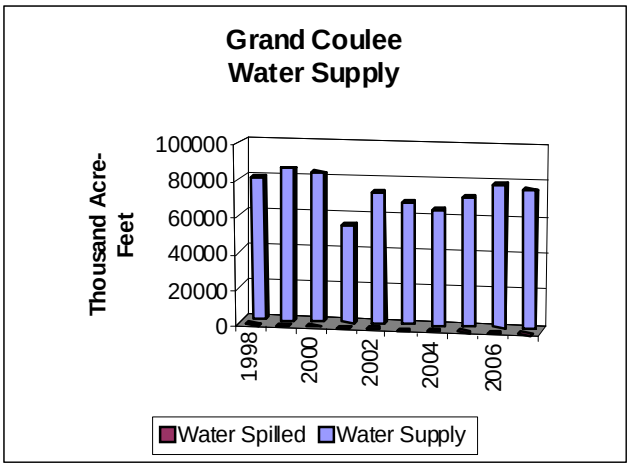
G-19, G-20, G-21 have an operating capability of 690 MW.

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

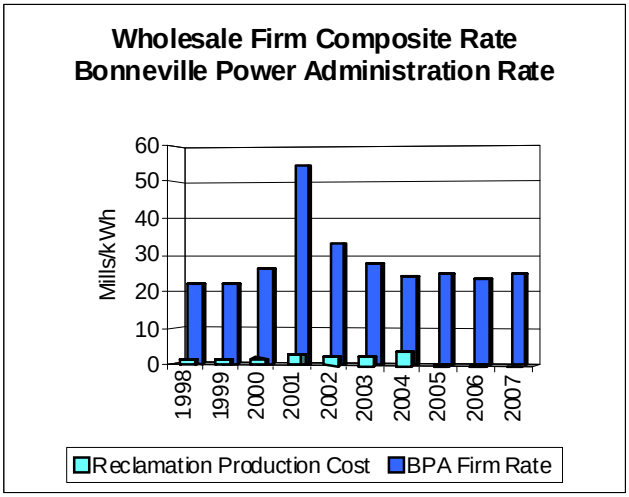




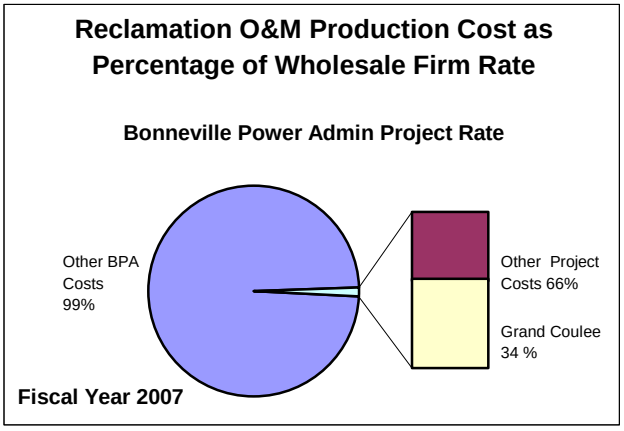


Prime Laboratory Benchmarks

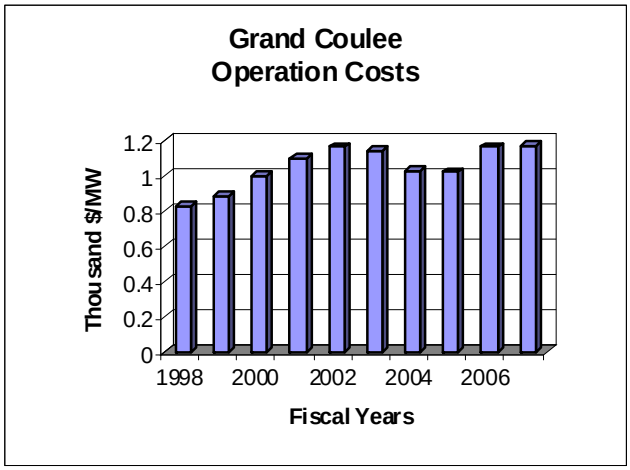
Benchmark 1
Wholesale Firm Rate

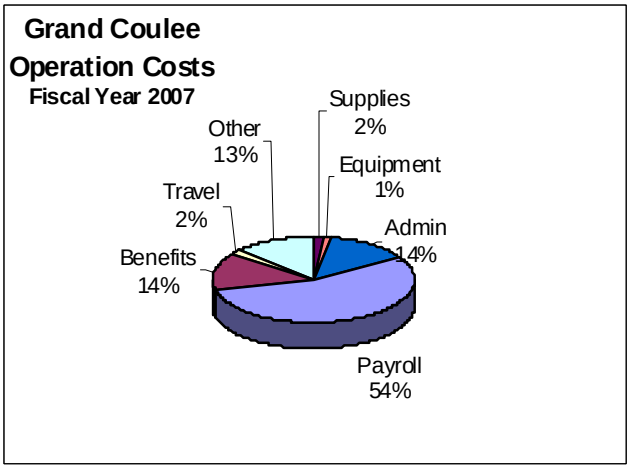


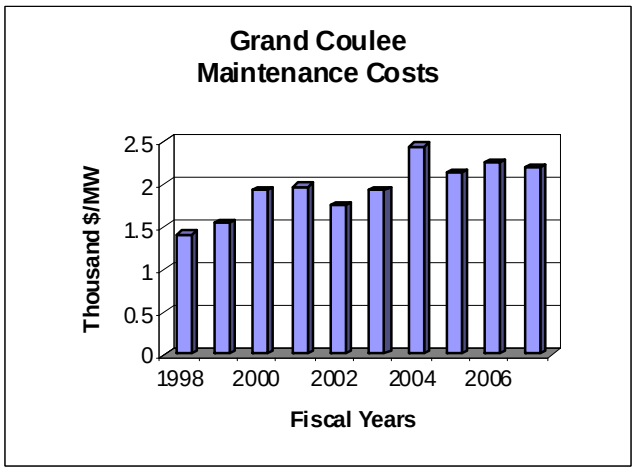
Benchmark 2
Reclamation=s Production Cost as Percentage of Wholesale Firm Rate

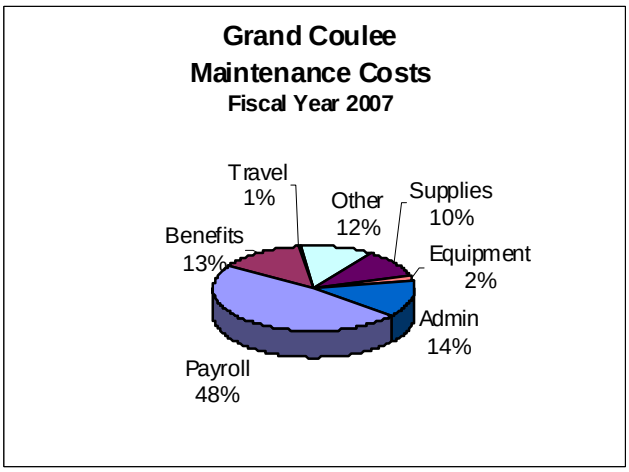


Benchmark 3
Production Cost









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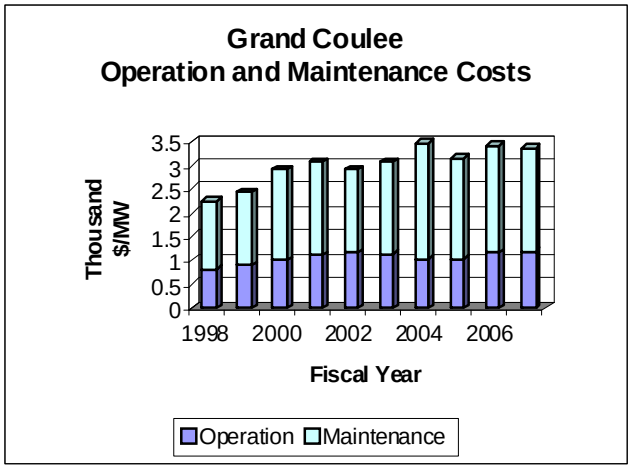
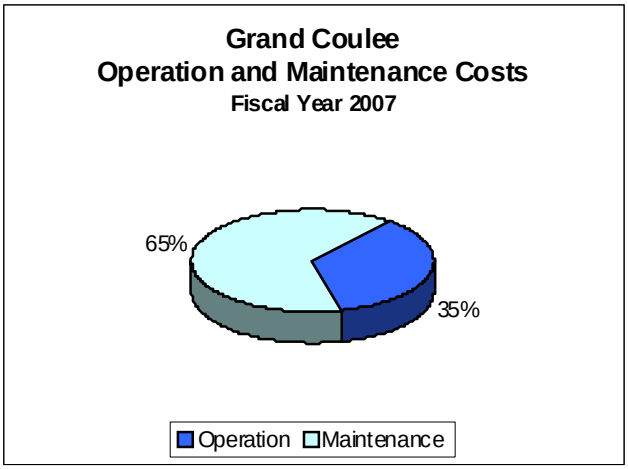
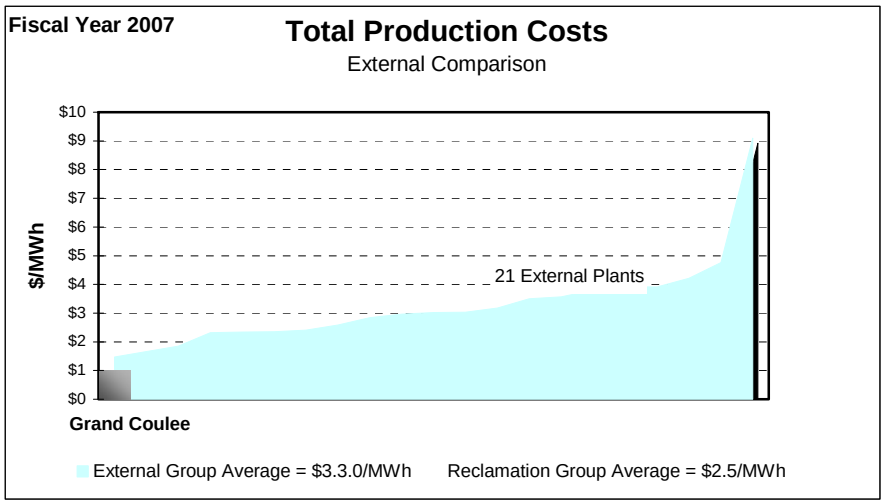
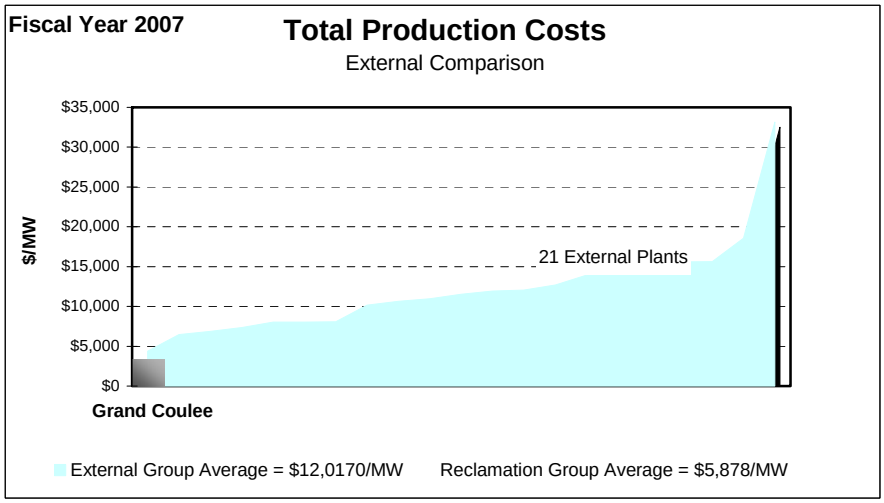


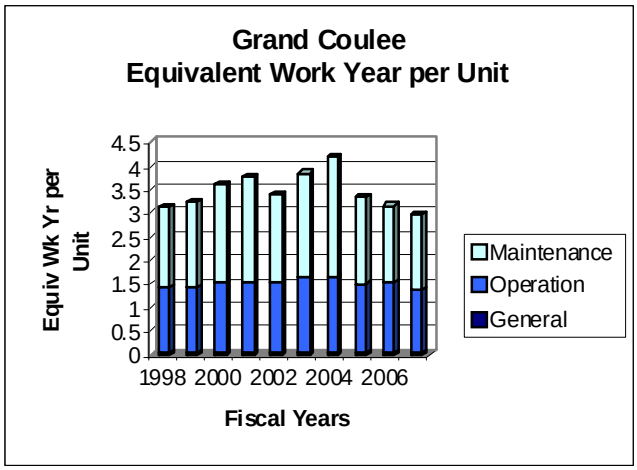


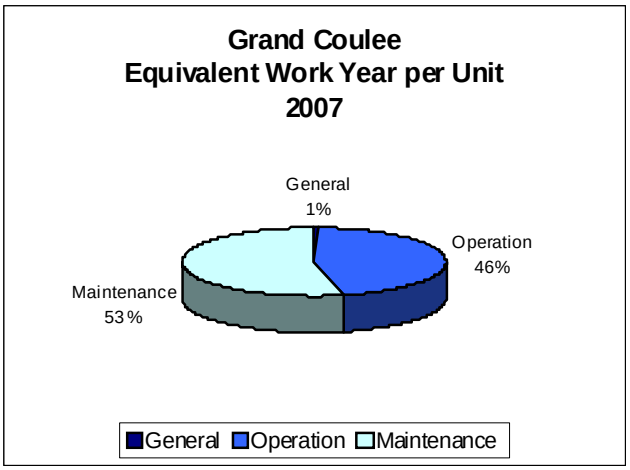


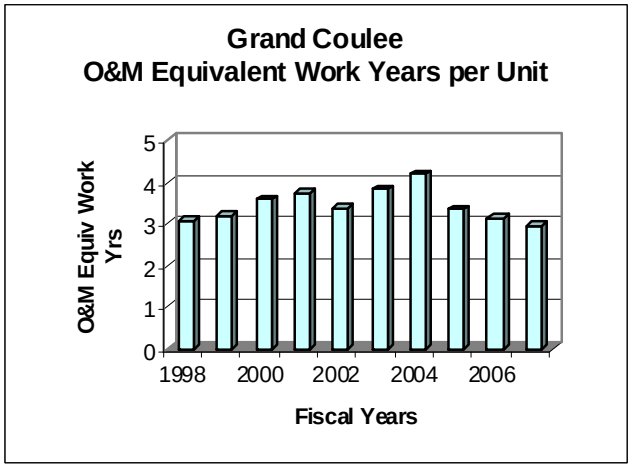


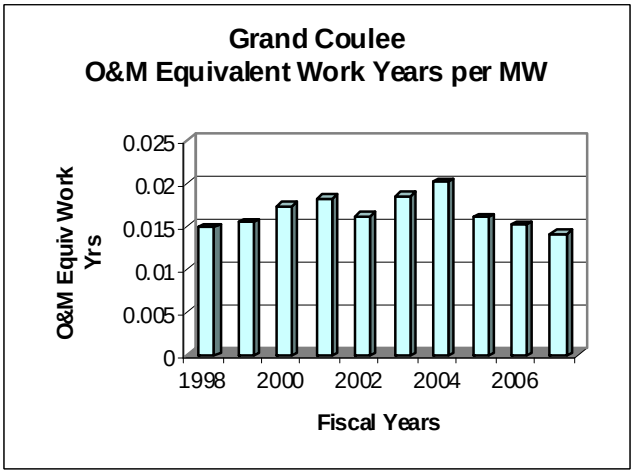
Benchmark 4
Workforce Deployment

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

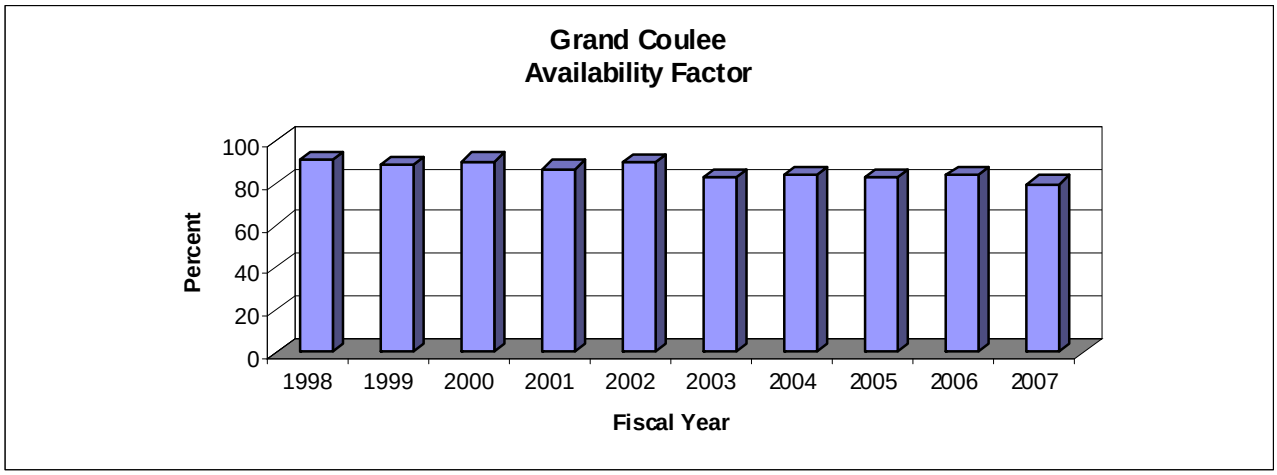




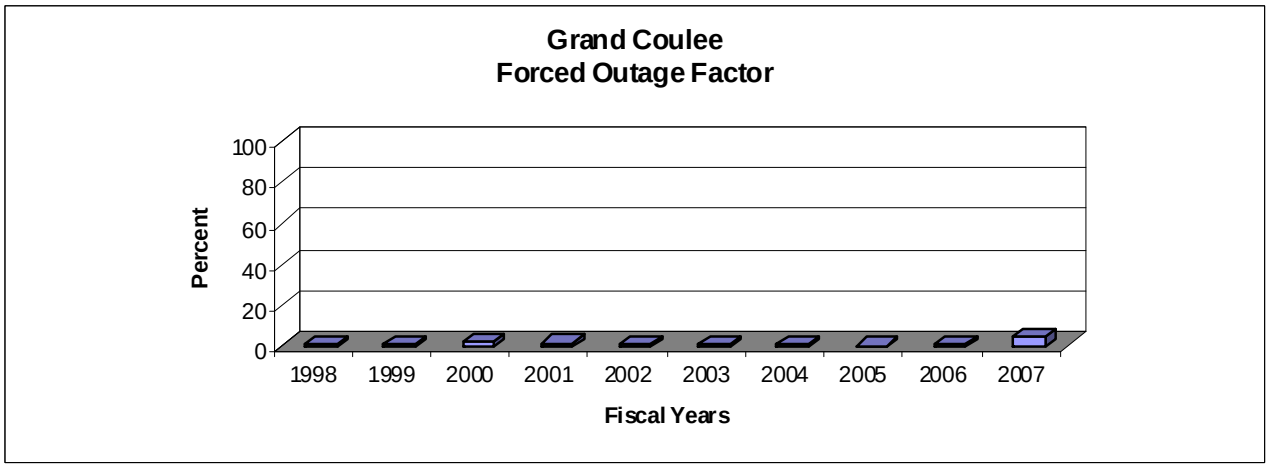




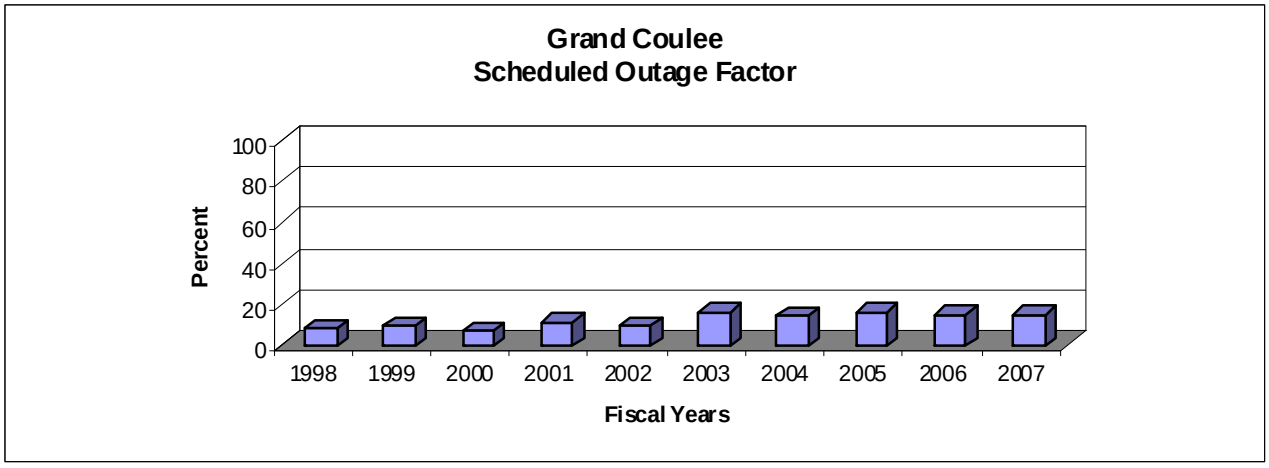
Benchmark 5
Availability Factor



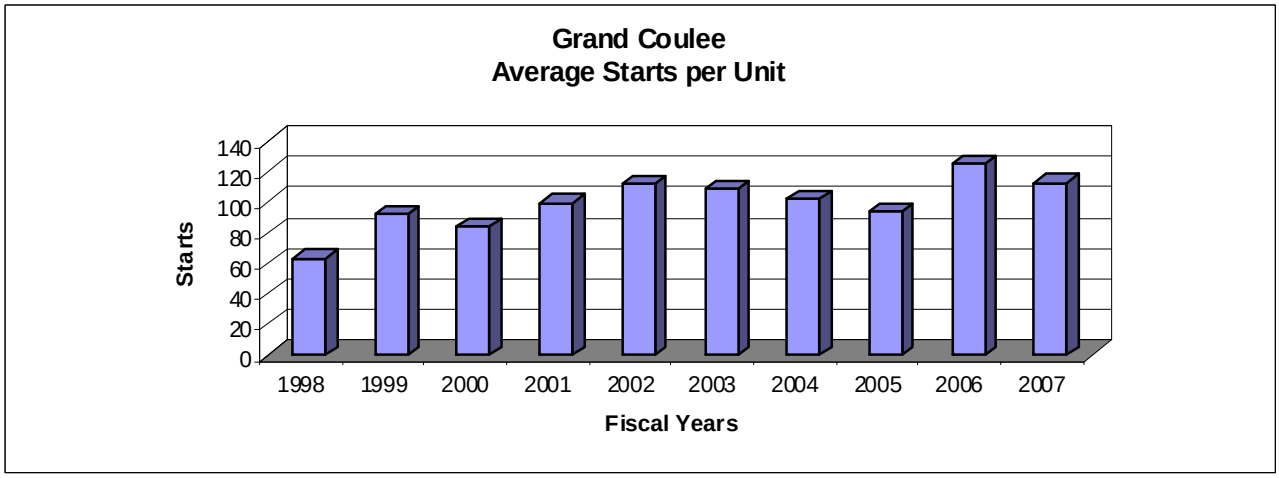
Benchmark 6
Forced Outage Factor



Benchmark 7
Scheduled Outage Factor



Starts

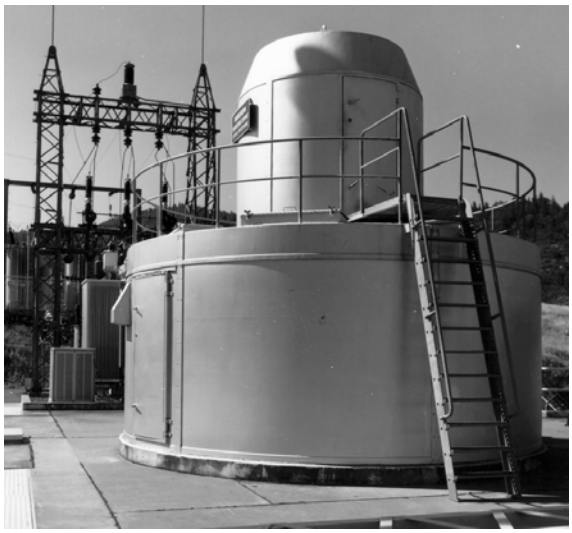


Benchmark Data Comparison

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

Plant Address:
Green Springs Powerplant
1500 Buckhorn Springs Road
Ashland OR 97520

Telephone Numbers:
Phone: 208-378-5290
Fax: 208-378-5205

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

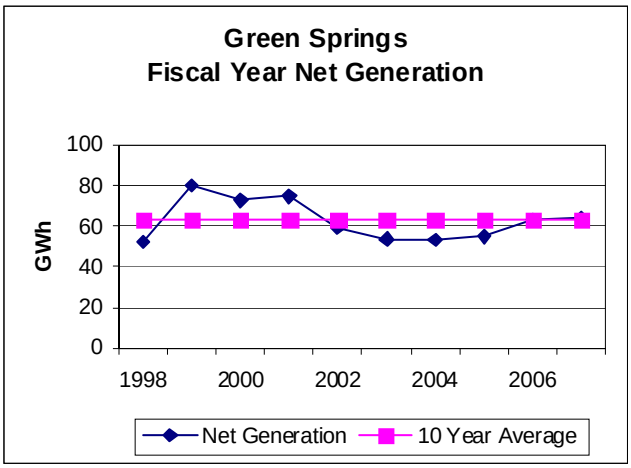
Spinning Reserve	No
Non-Spinning Reserve	No
Replacement Reserve	No
Regulation/Load Following	No
Black Start	No
Voltage Support	Yes

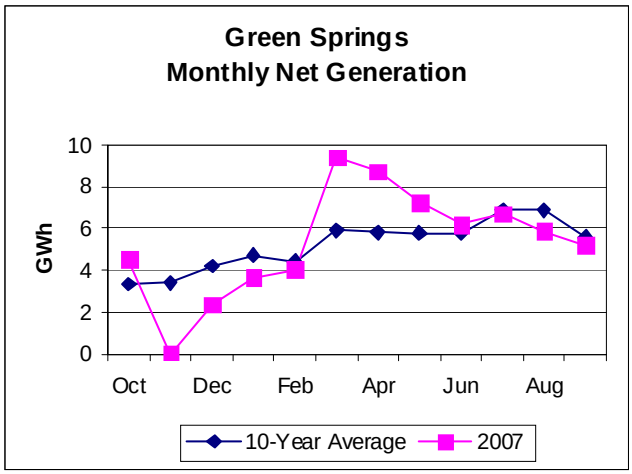
Generators

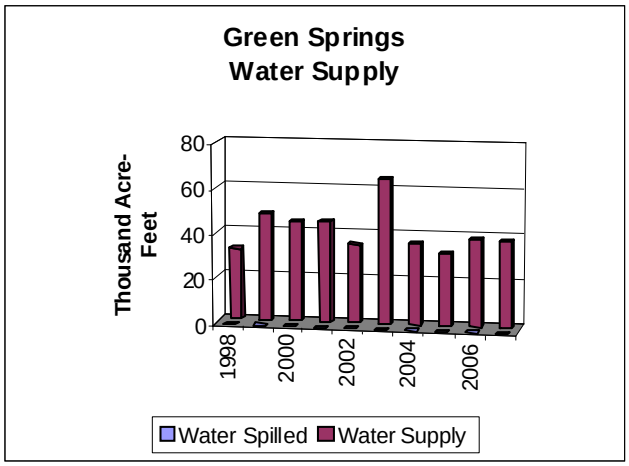
Green Springs Generators
Existing Number and Capacity

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

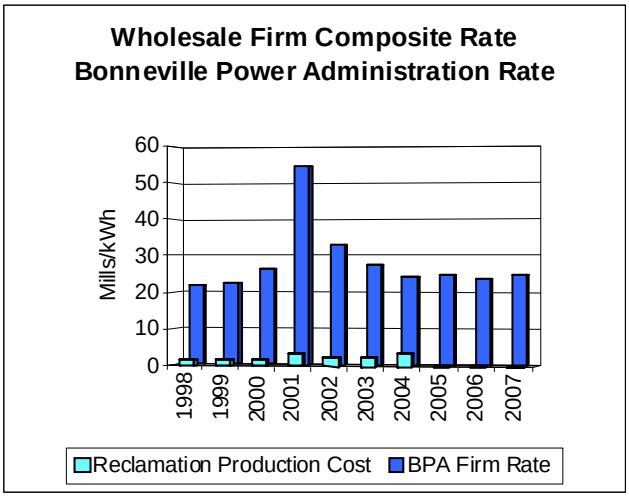

Green Springs
Fiscal Year Net Generation
GWh
100
80
60
40
20
0
1998
2000
2002
2004
2006
Net Generation
10 Year Average


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

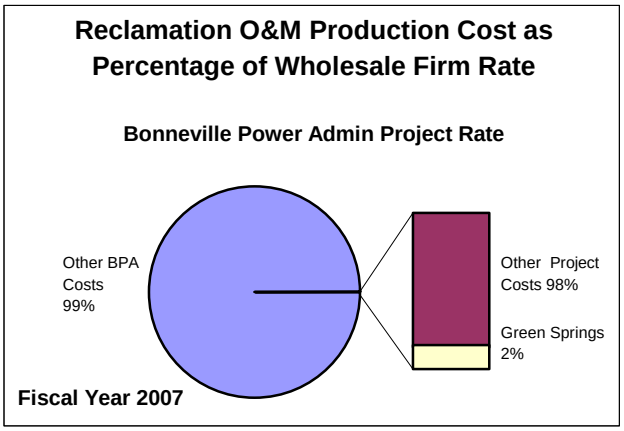

Green Springs
Water Supply
Thousand Acre-Feet
80
60
40
20
0
1998
2000
2002
2004
2006
Water Spilled
Water Supply

Prime Laboratory Benchmarks

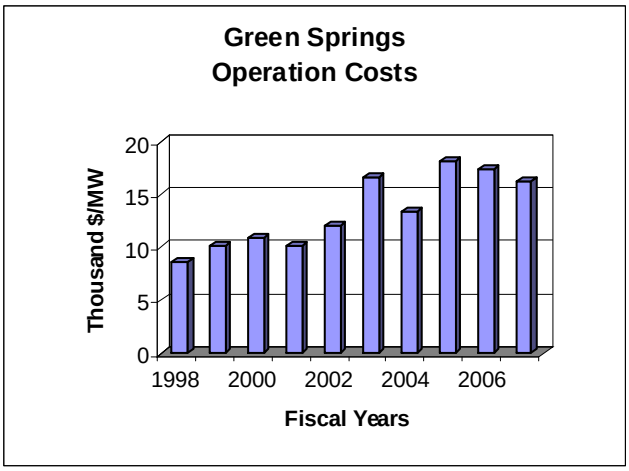
Benchmark 1
Wholesale Firm Rate

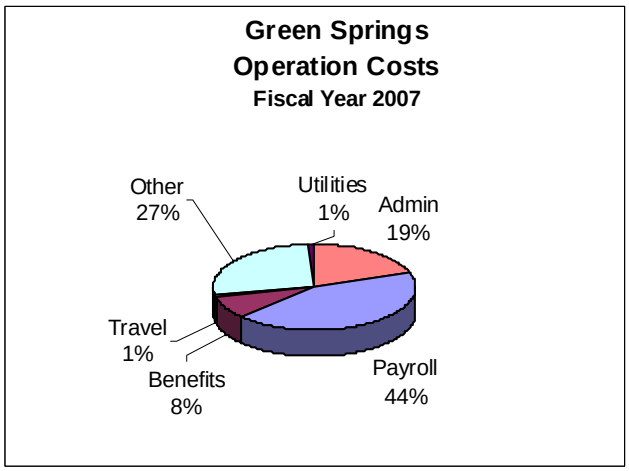


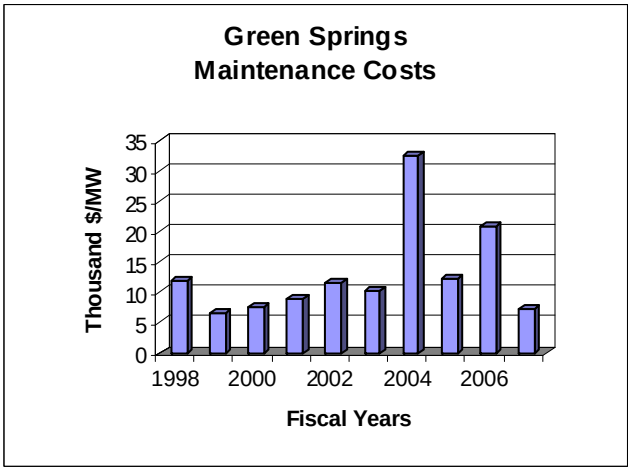
Benchmark 2
Reclamation's Production Costs as Percentage of Wholesale Firm Rate

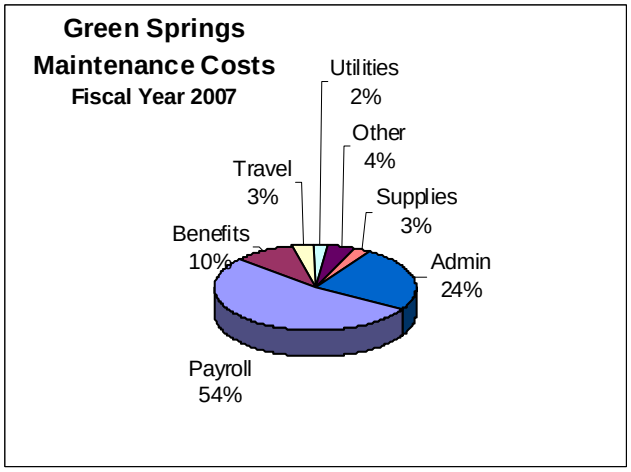


Benchmark 3
Production Cost

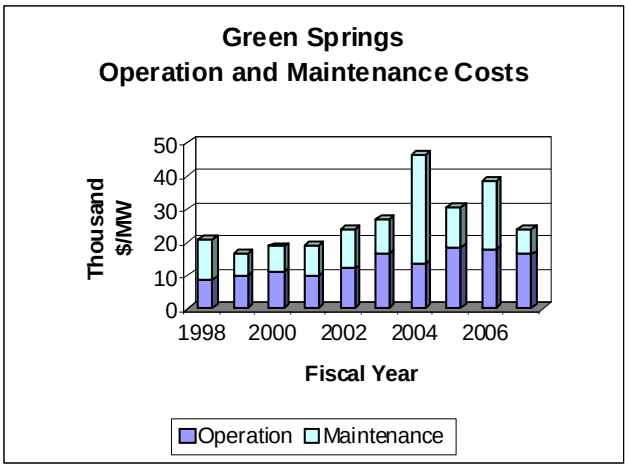


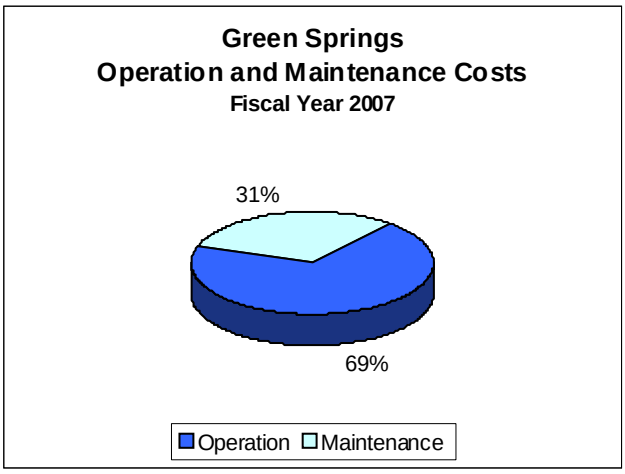


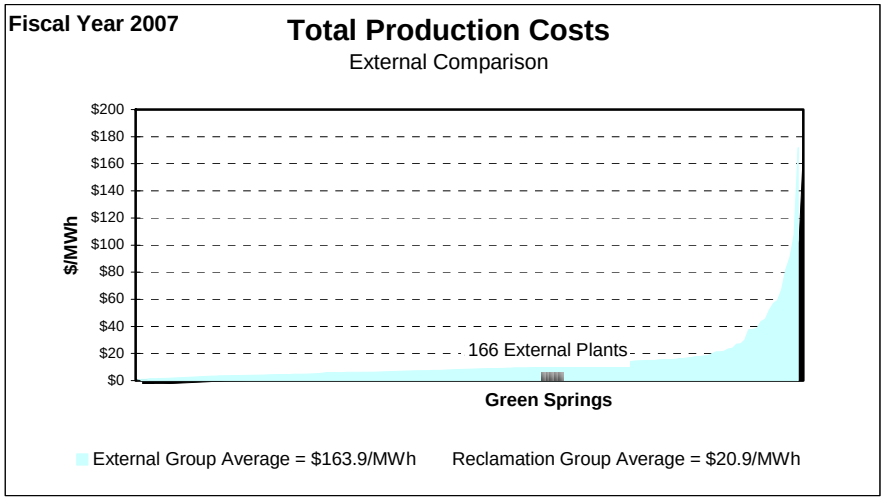


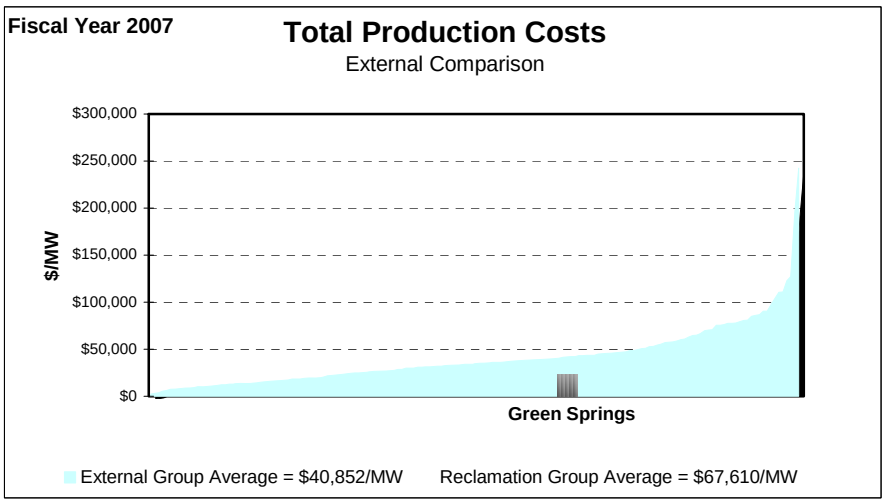


Benchmark 3
Production Cost



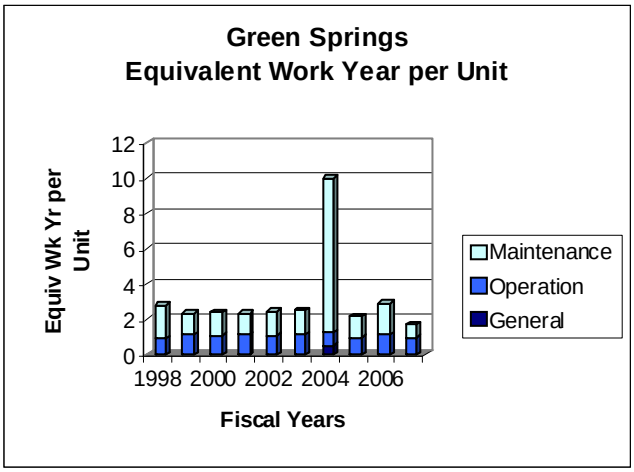


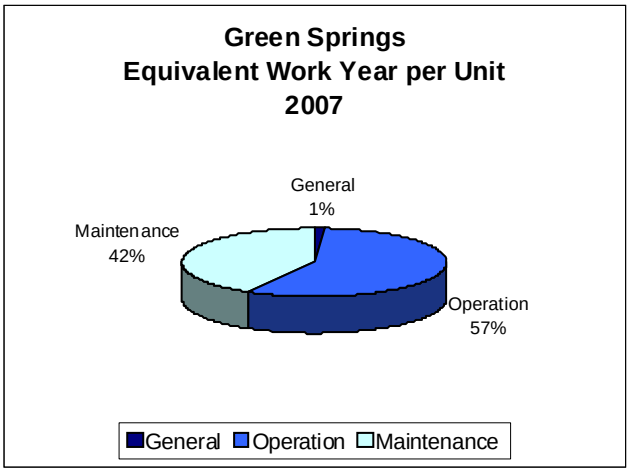


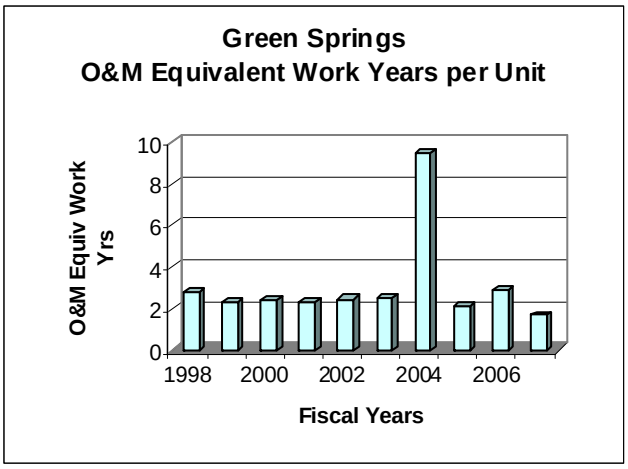


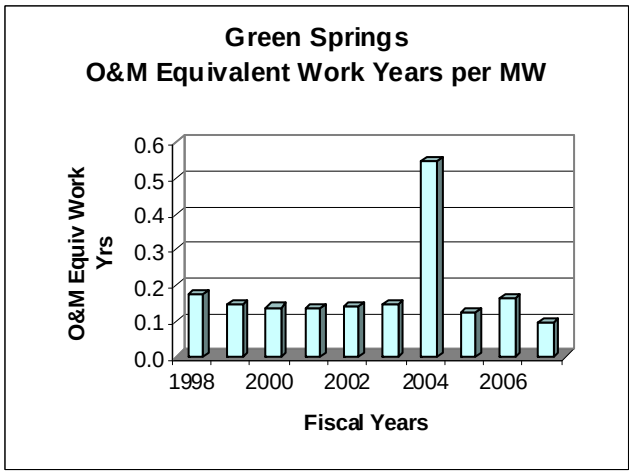
Benchmark 4
Workforce Deployment

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

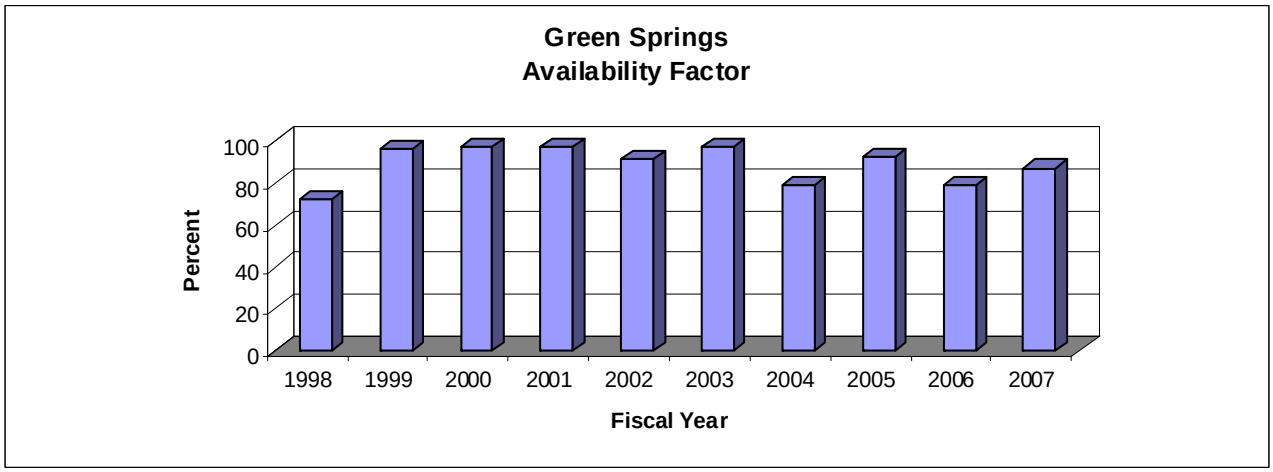




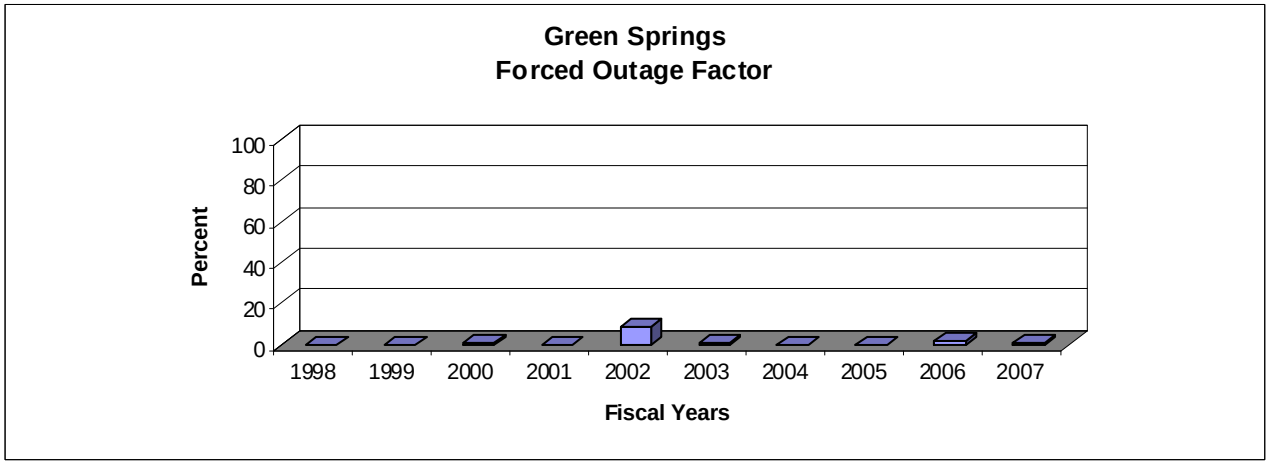




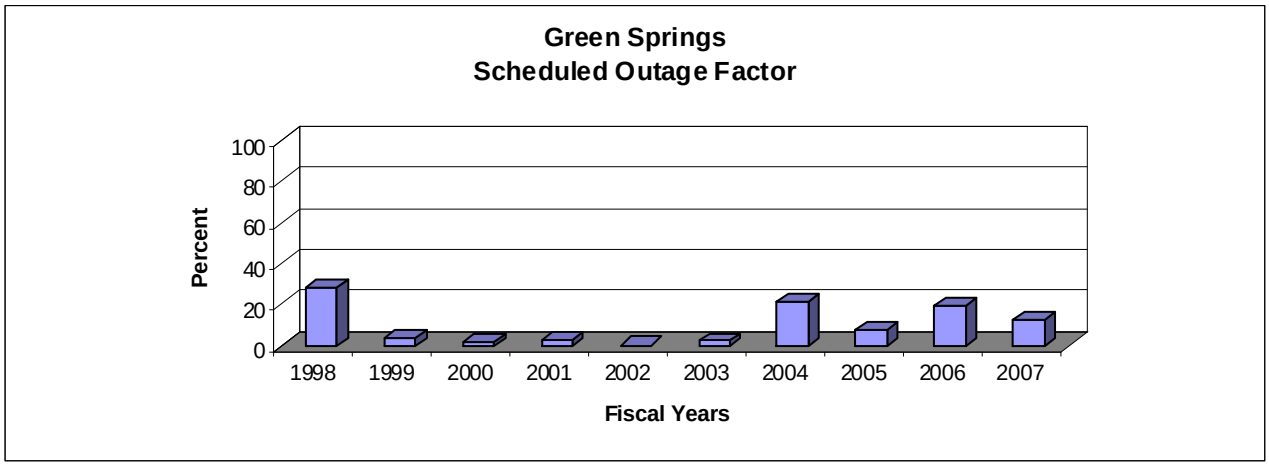
Benchmark 5
Availability Factor



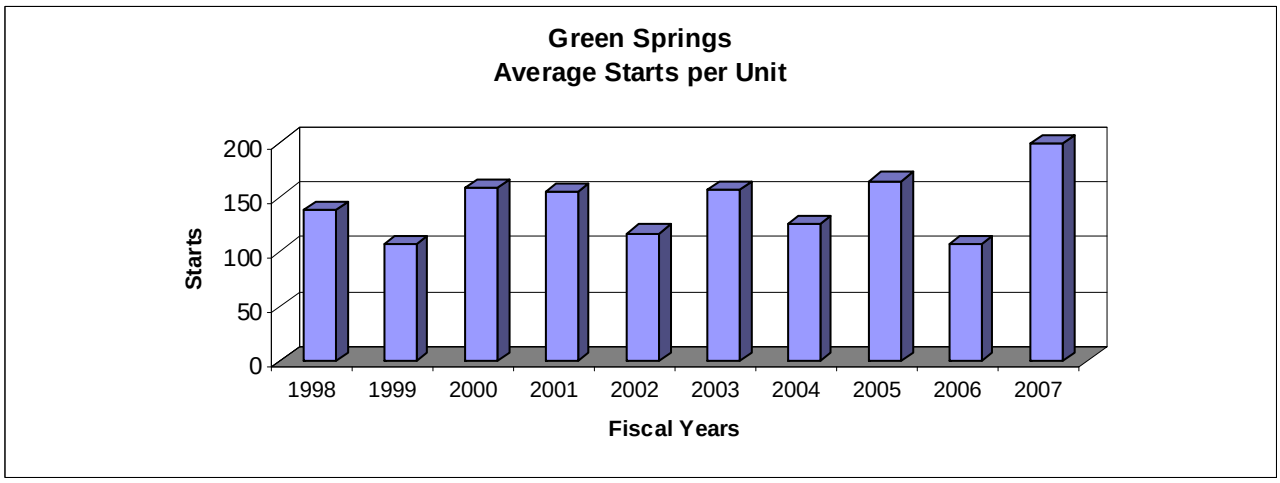
Benchmark 6
Forced Outage Factor



Benchmark 7
Scheduled Outage Factor



Starts

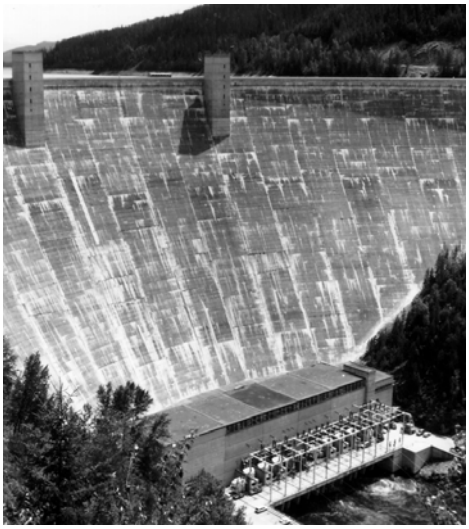


Benchmark Data Comparison

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

Plant Address:
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Hungry Horse MT 59919

Telephone Numbers:
Phone: (406) 387-5241
Fax: (406) 387-4012

E-Mail Address:
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

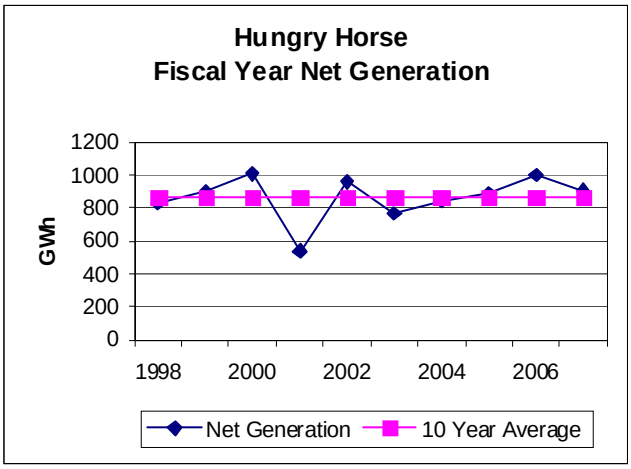
Generators

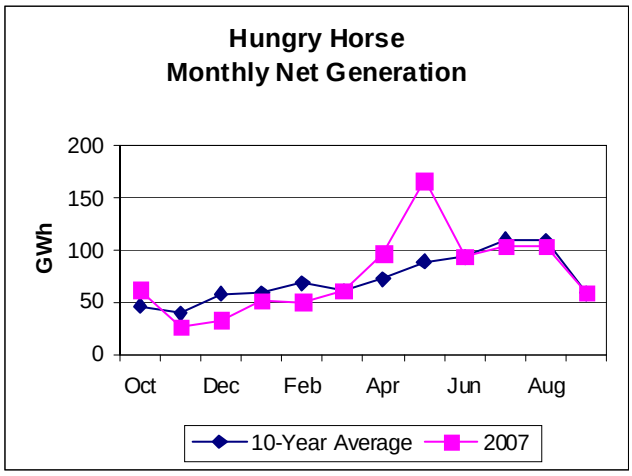
Hungry Horse Generators

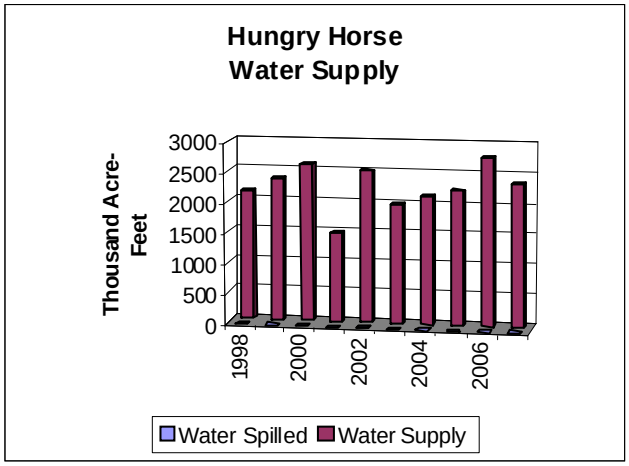
Existing Number and Capacity

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

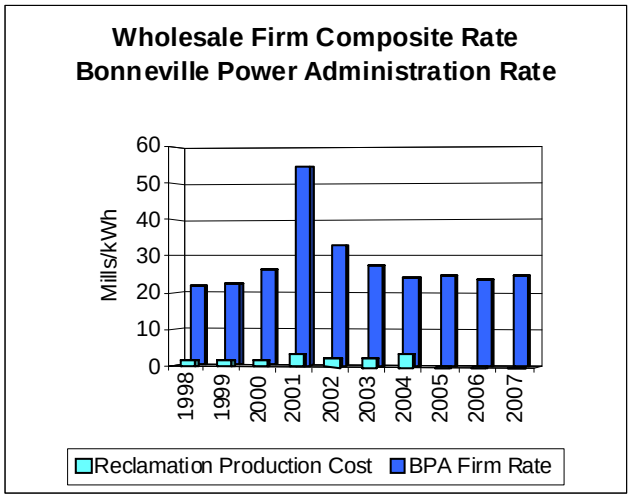

Hungry Horse
Fiscal Year Net Generation
GWh
1200
1000
800
600
400
200
0
1998
2000
2002
2004
2006
Net Generation
10 Year Average


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

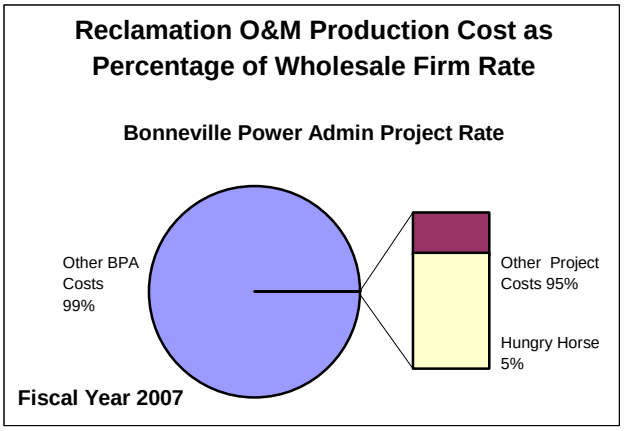

Hungry Horse
Water Supply
Thousand Acre-Feet
3000
2500
2000
1500
1000
500
0
1998
2000
2002
2004
2006
Water Spilled
Water Supply

Prime Laboratory Benchmarks

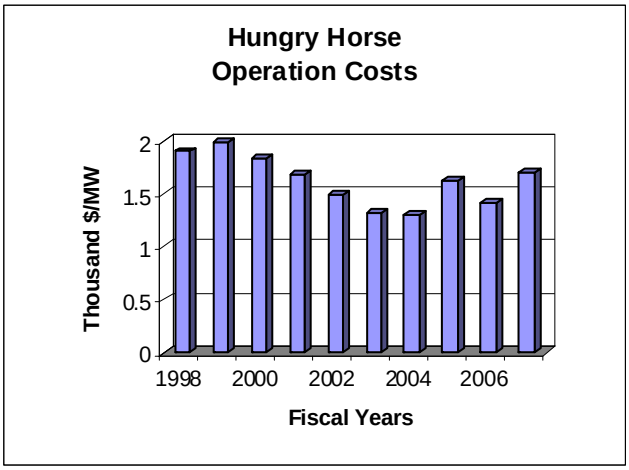
Benchmark 1
Wholesale Firm Rate

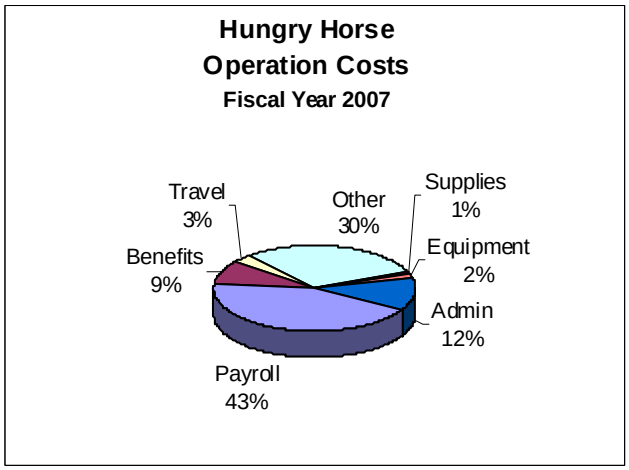


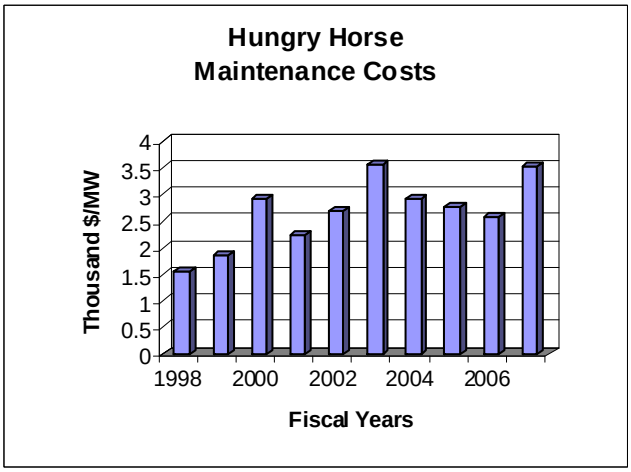
Benchmark 2
Reclamation's Production Cost as Percentage of Wholesale Firm Rate

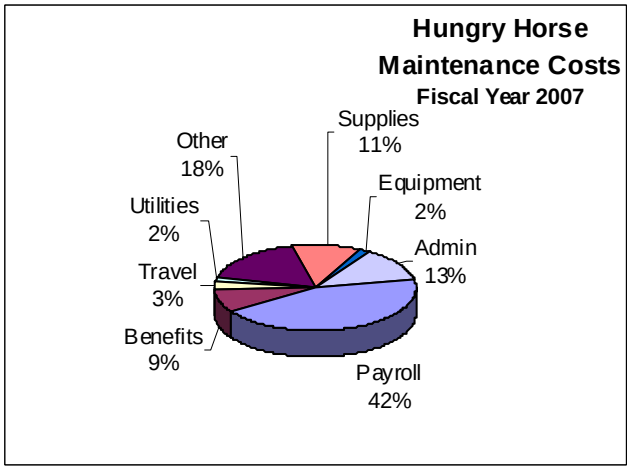


Benchmark 3
Production Cost

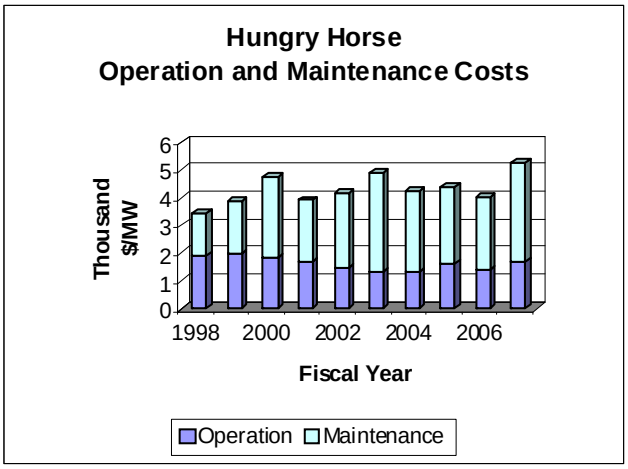


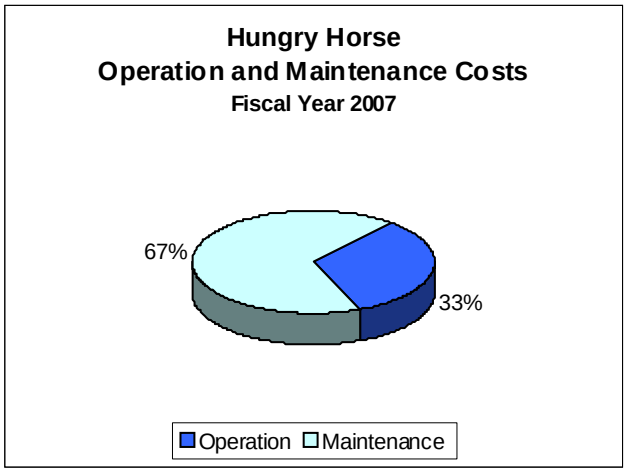


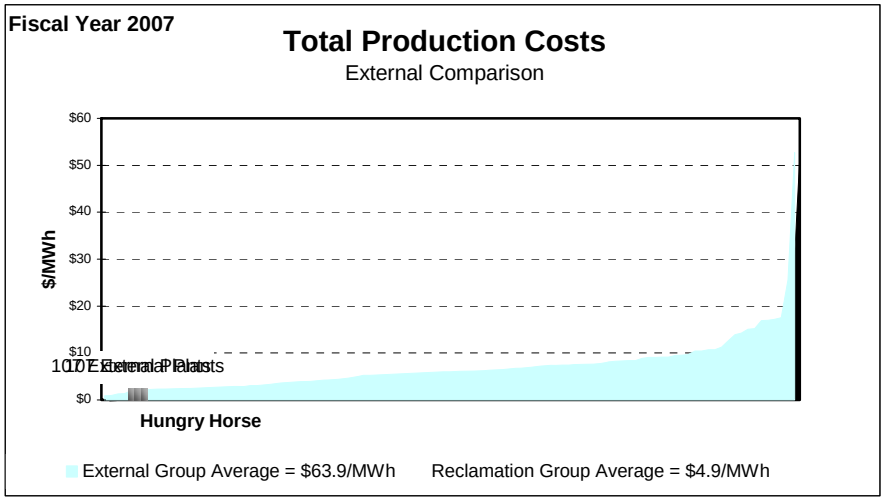


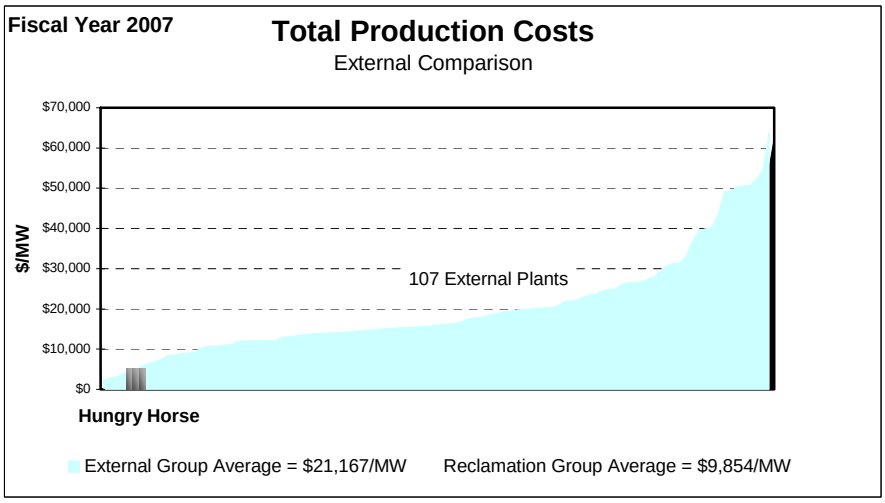


Benchmark 3
Production Cost



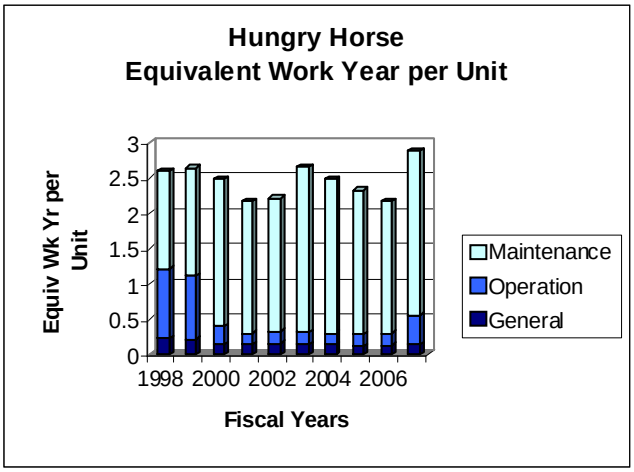


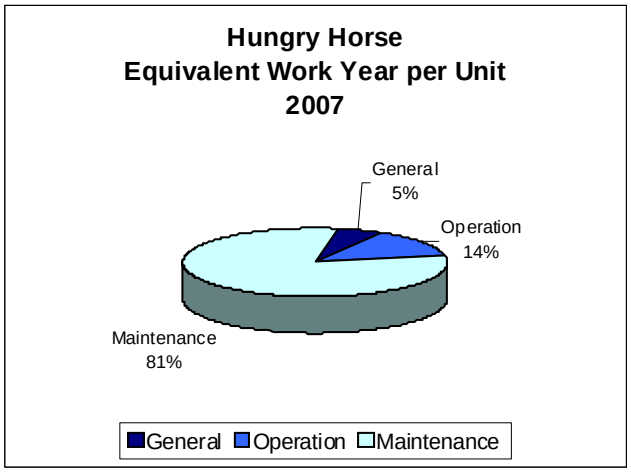


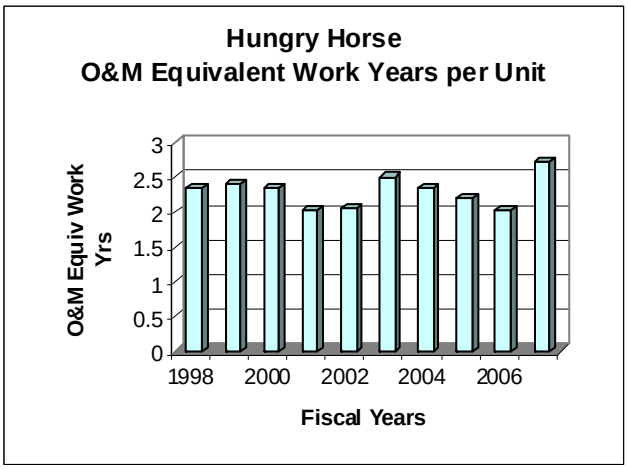


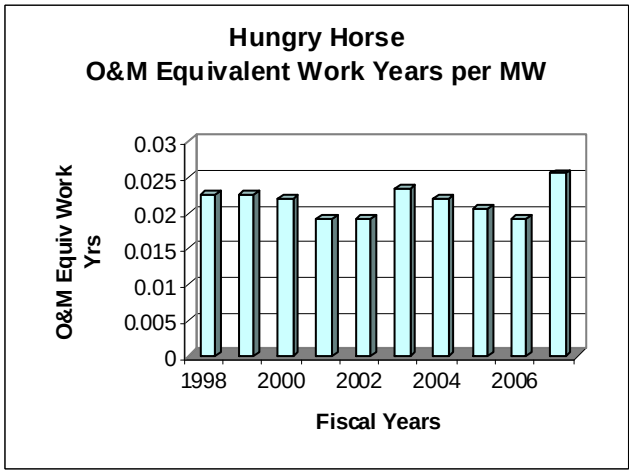
Benchmark 4
Workforce Deployment

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

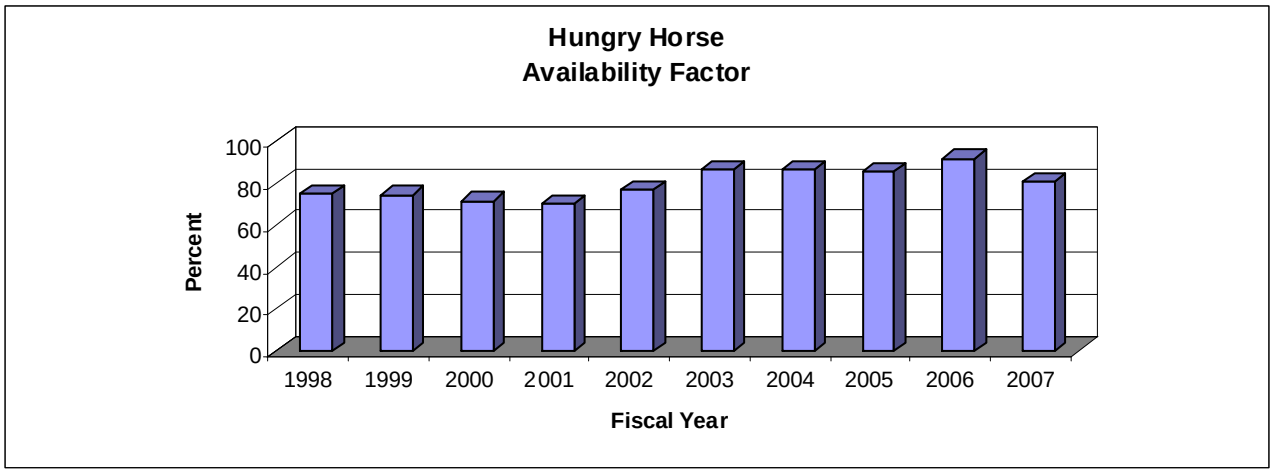




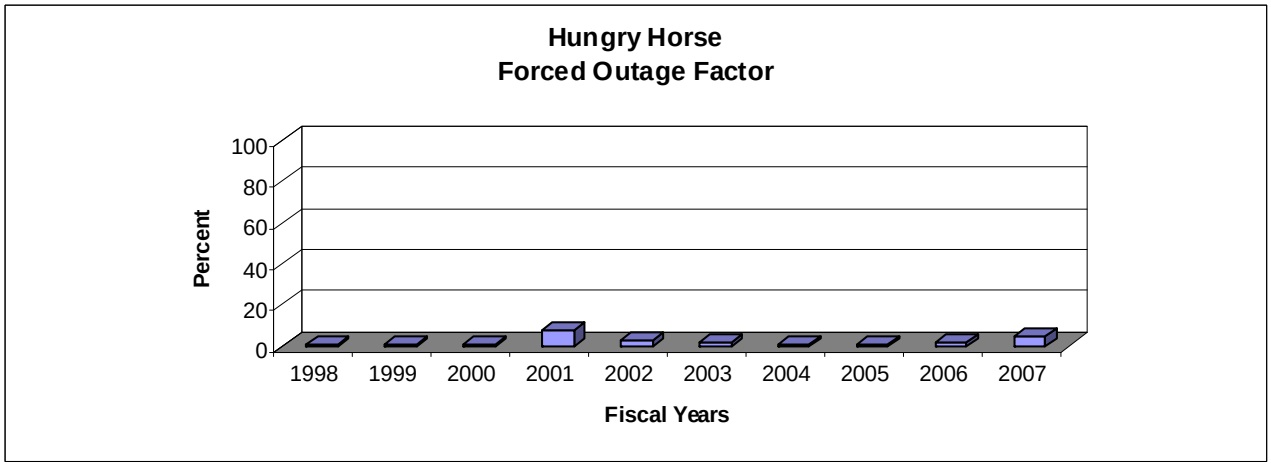




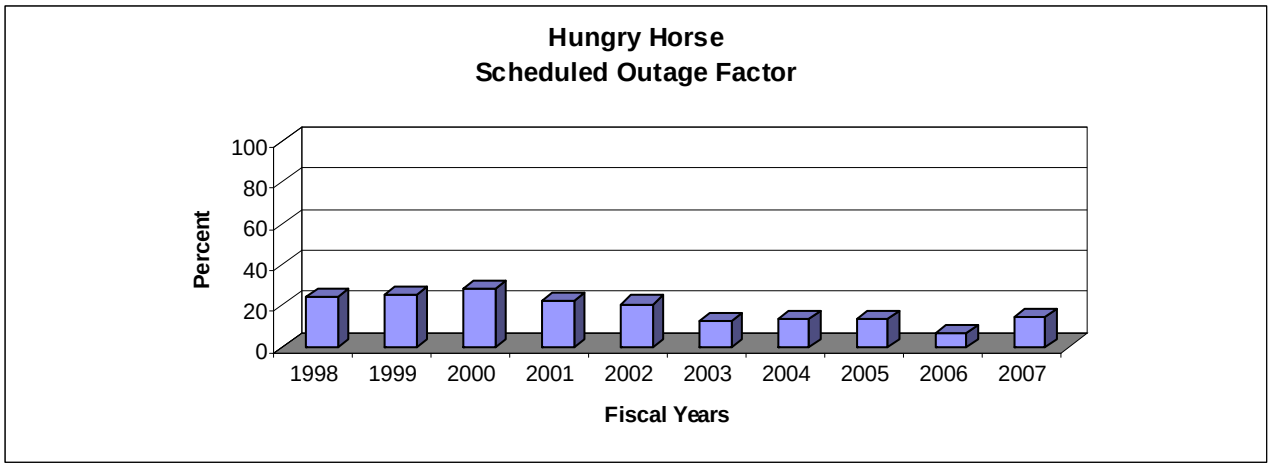
Benchmark 5
Availability Factor



Benchmark 6
Forced Outage Factor

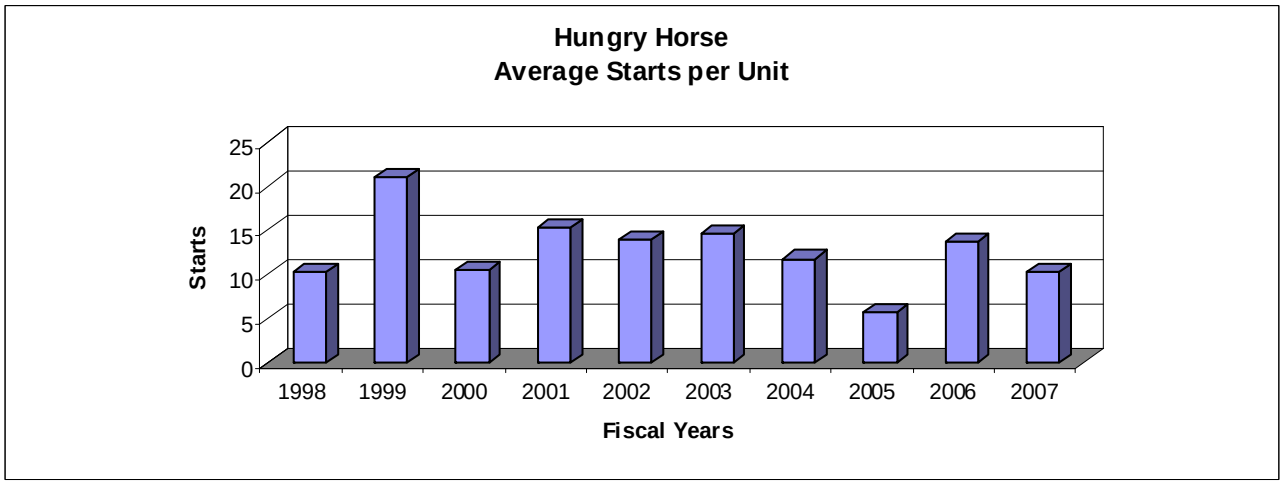


Benchmark 7
Scheduled Outage Factor



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

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Facility Manager

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Rupert ID 83350

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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

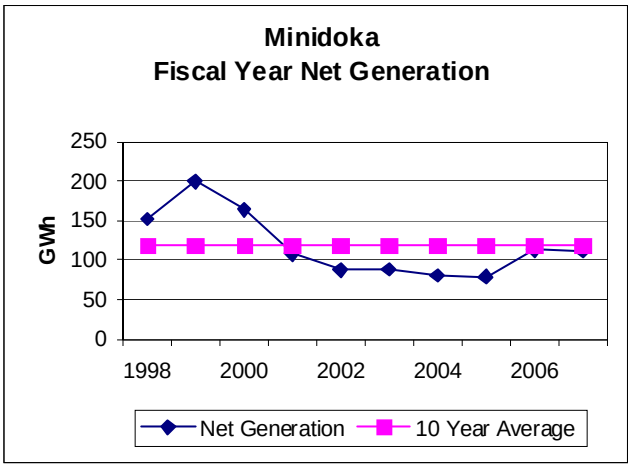
Minidoka Generators

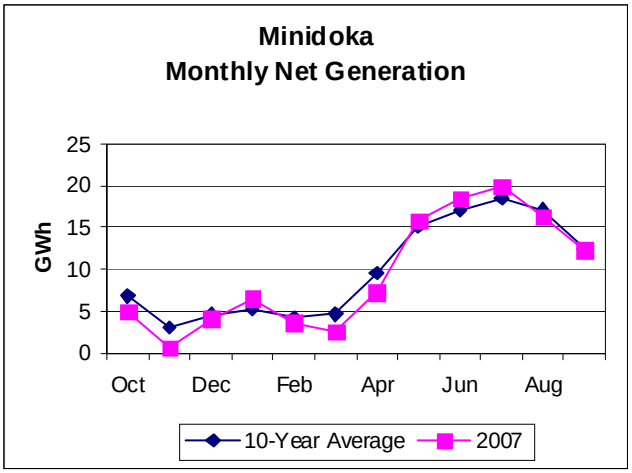
Existing Number and Capacity

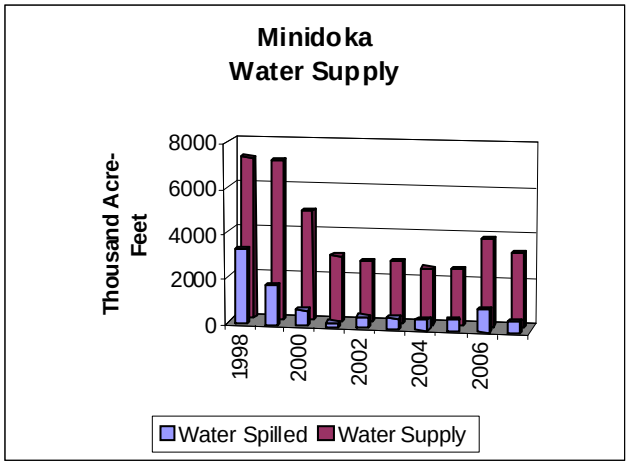
Unit #	Original Capacity (kW)	Original Capacity New Units	Capacity Increased (kW)	Present Capacity (kW)
1	1,200		0	Retired
2	1,200		0	Retired
3	1,200		0	Retired
4	1,200		0	Retired
5	1,200		0	Retired
6		2,400	300	2,700
7		5,000	0	5,000
8*		10,000	0	10,000
9*		10,000	0	10,000
1 Unit	6,000	27,400	300	27,700

*Renamed Allen E. Inman Powerplant May 6, 1998

Generation

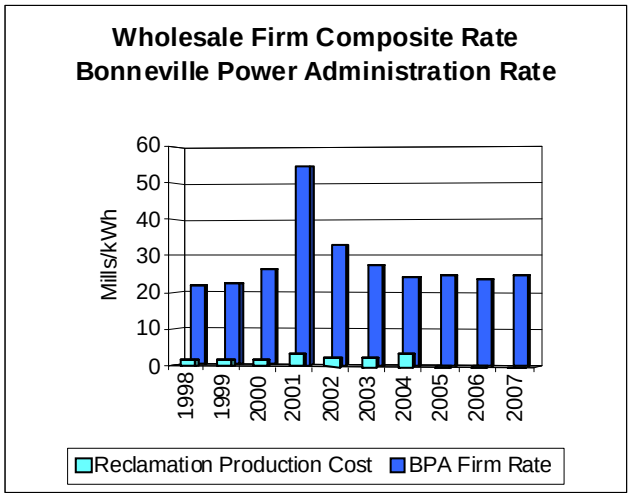

Minidoka
Fiscal Year Net Generation
GWh
250
200
150
100
50
0
1998
2000
2002
2004
2006
Net Generation
10 Year Average


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

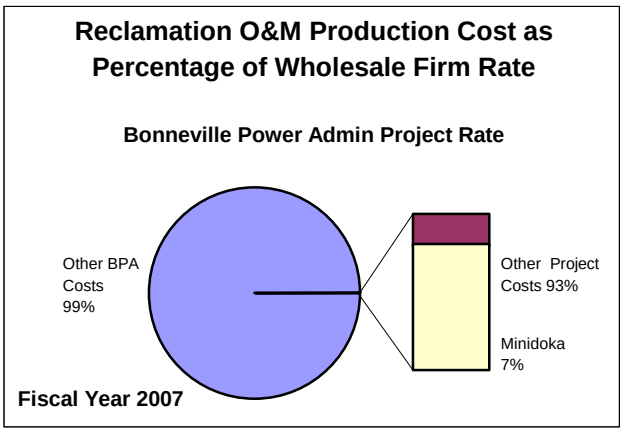

Minidoka
Water Supply
Thousand Acre-Feet
8000
6000
4000
2000
0
1998
2000
2002
2004
2006
Water Spilled
Water Supply

Prime Laboratory Benchmarks

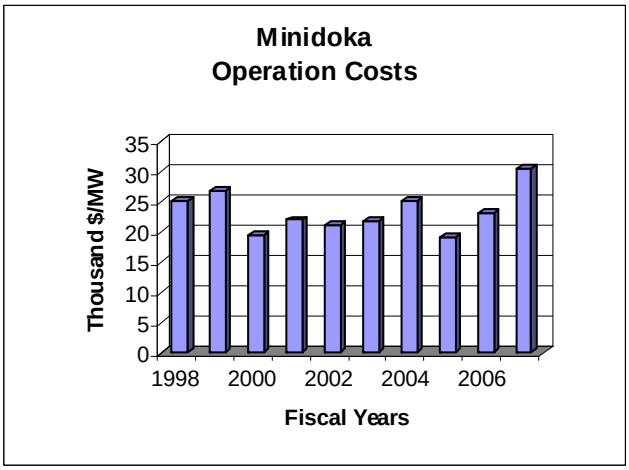
Benchmark 1
Wholesale Firm Rate

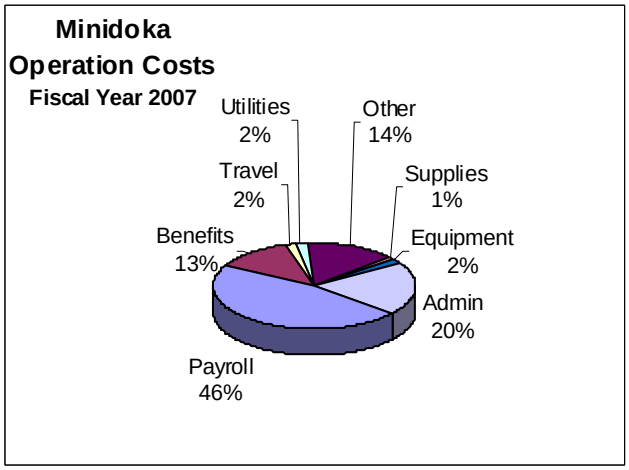


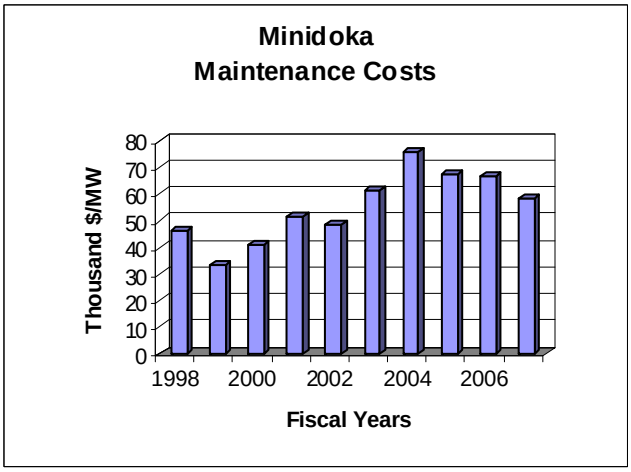
Benchmark 2
Reclamation's Production Costs as Percentage of Wholesale Firm Rate

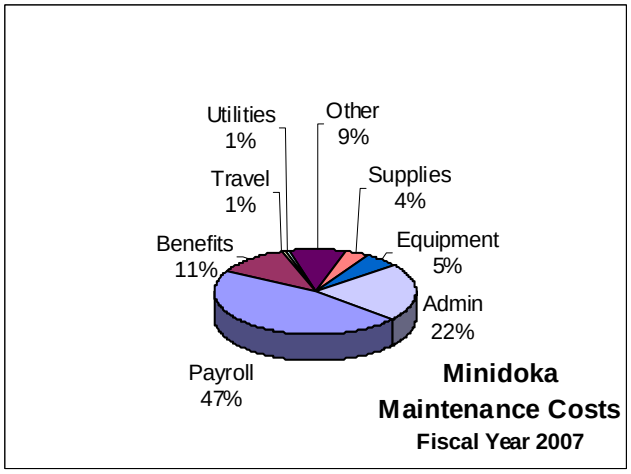


Benchmark 3
Production Costs

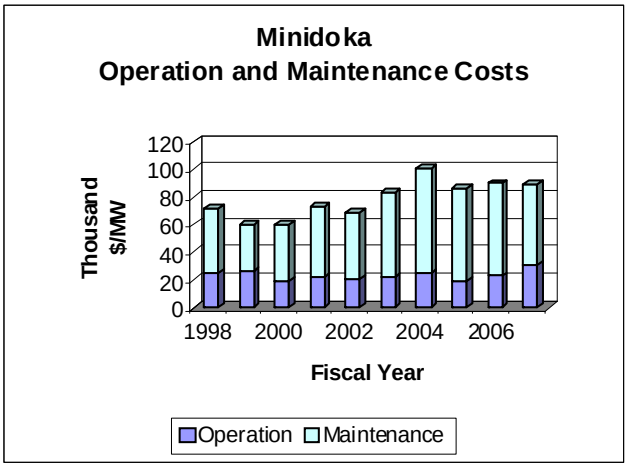


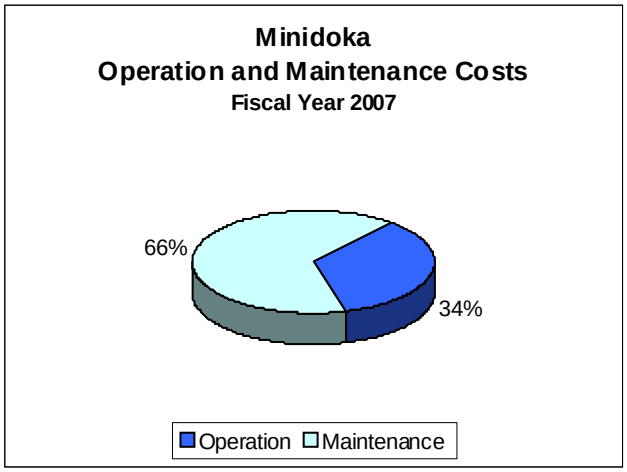


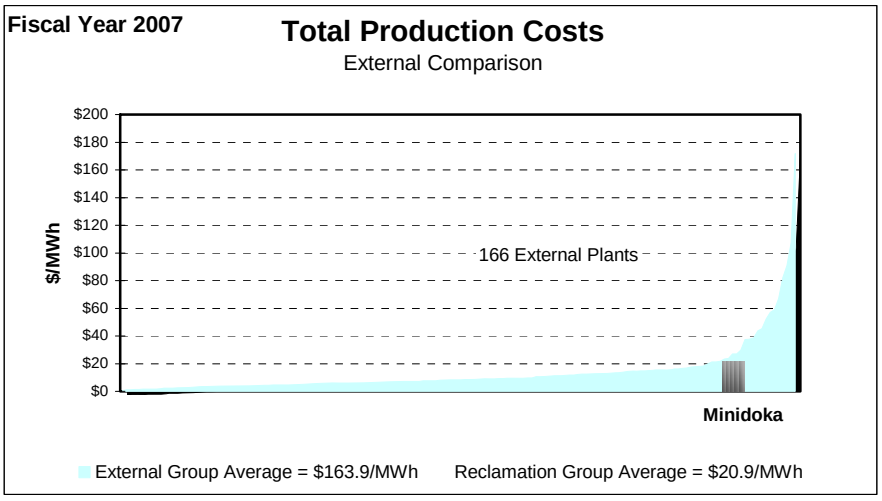


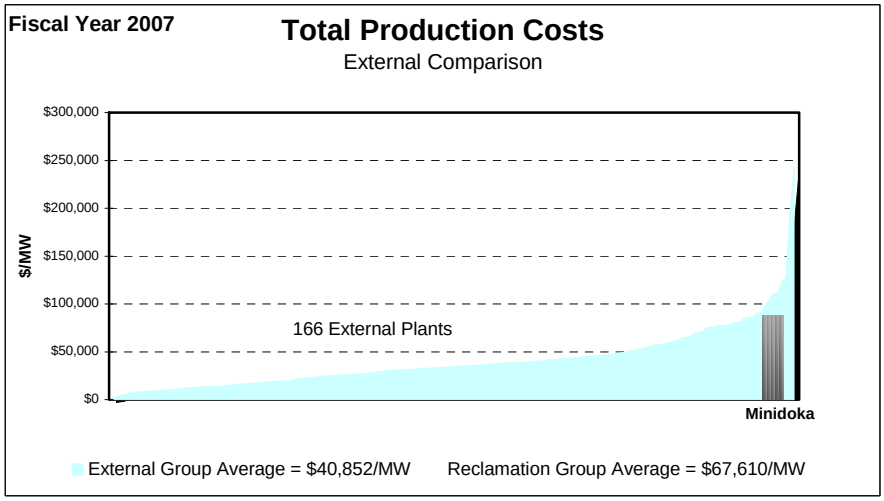


Benchmark 3
Production Cost



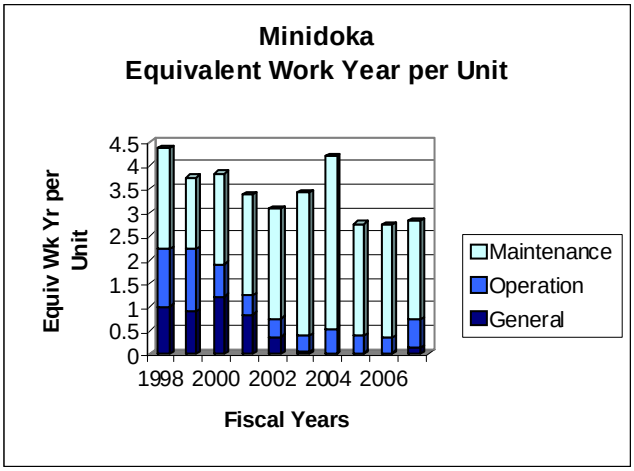


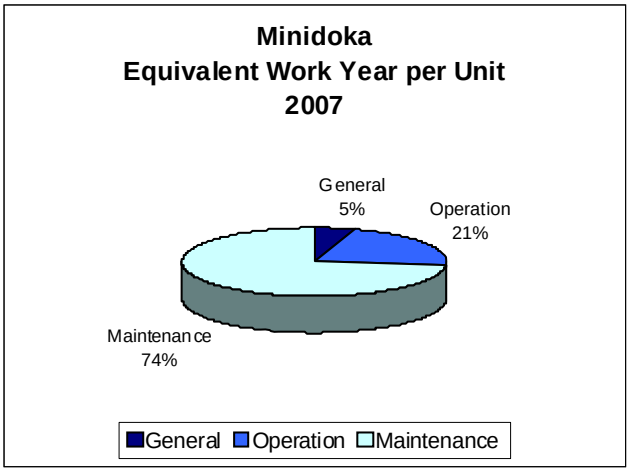


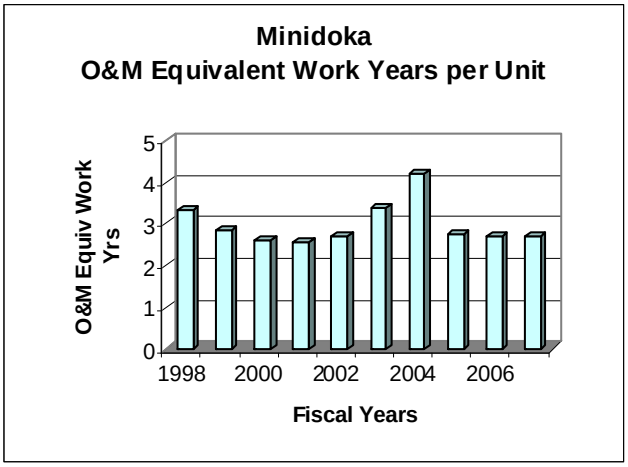


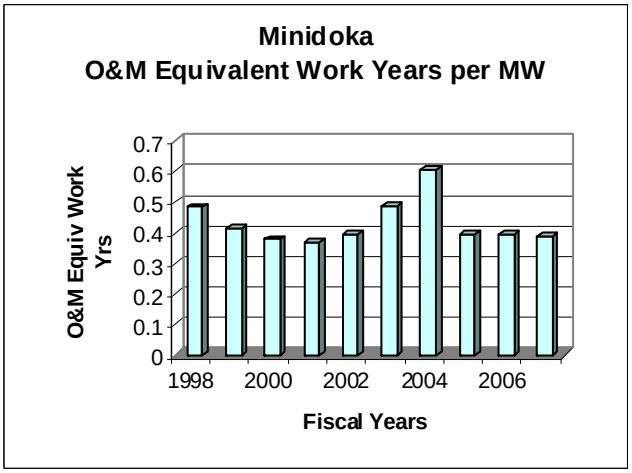
Benchmark 4
Workforce Deployment

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

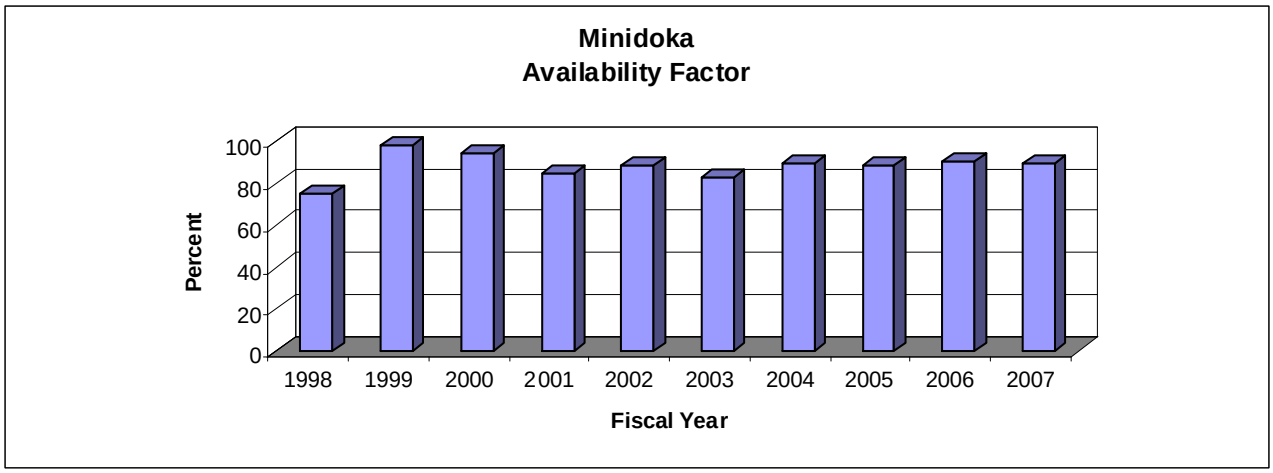




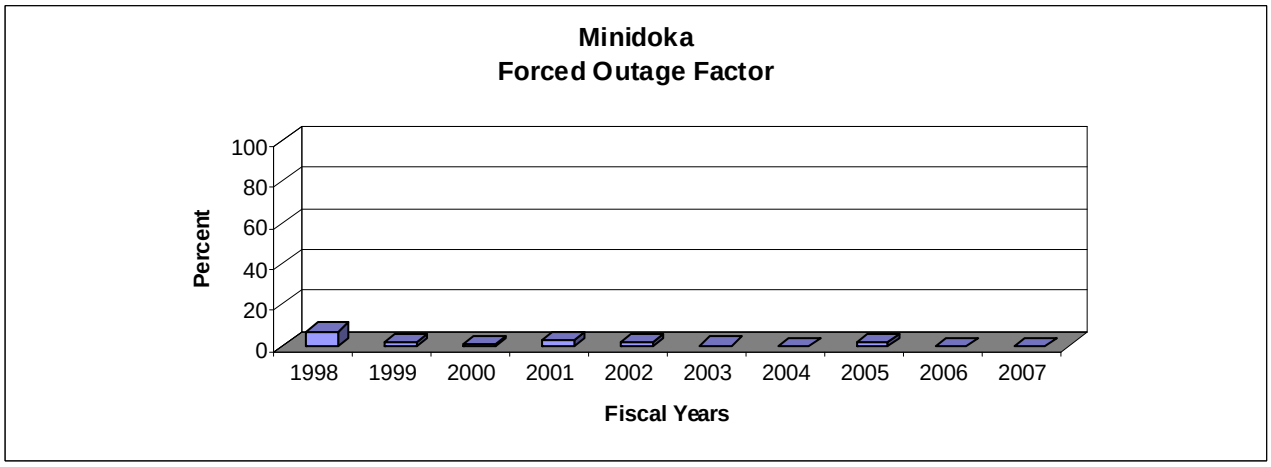




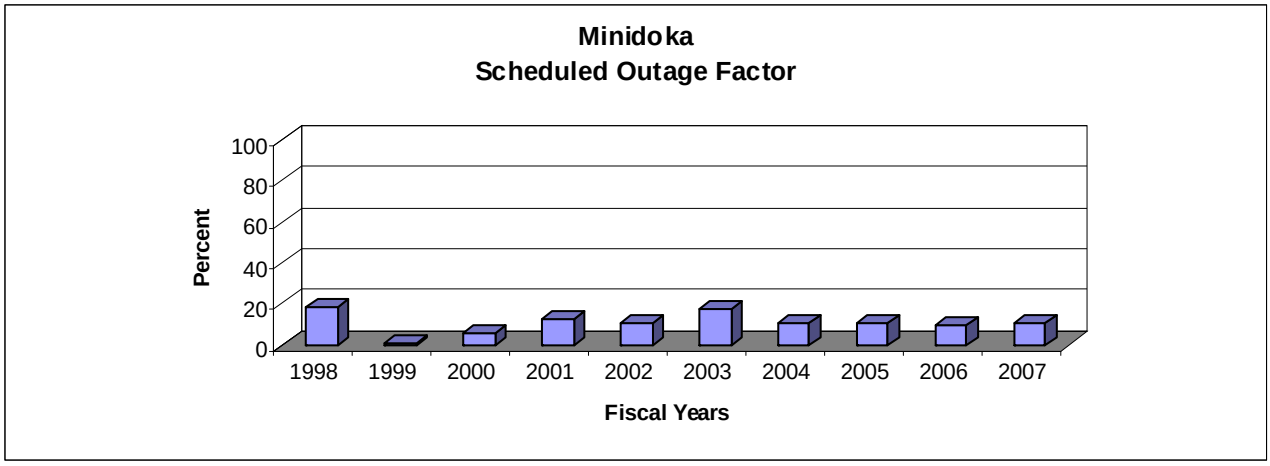
Benchmark 5
Availability Factor



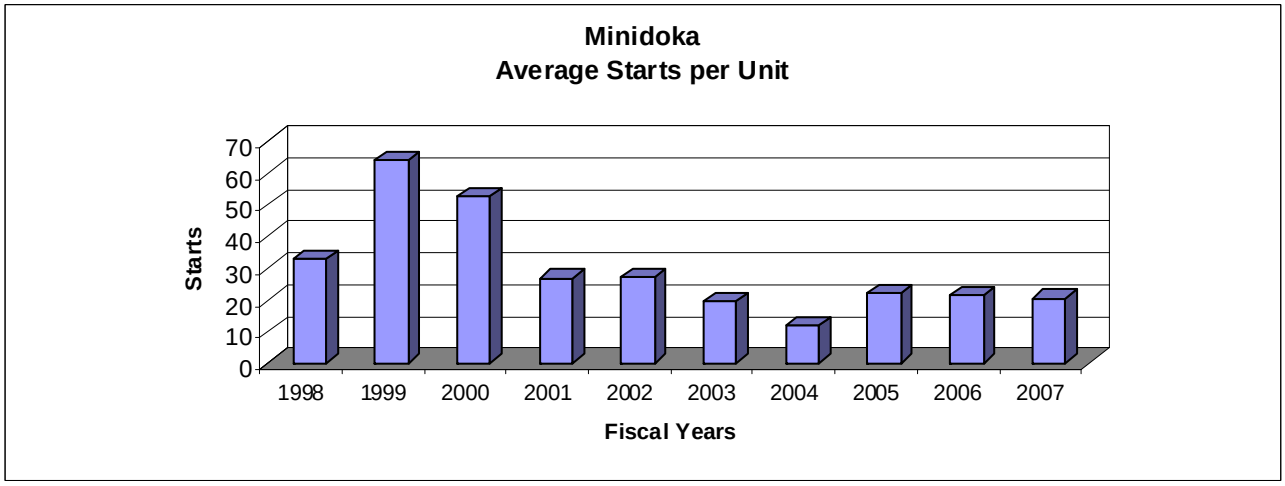
Benchmark 6
Force Outage Factor



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

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Facility Manager

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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

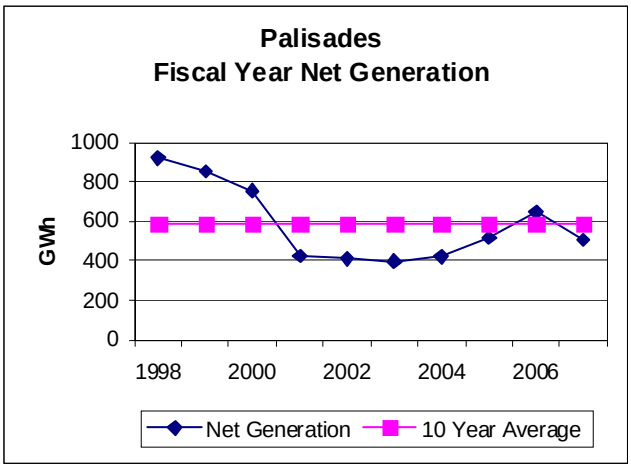
Spinning Reserve	Yes
Non-Spinning Reserve	Yes
Replacement Reserve	Yes
Regulation/Load Following	Yes
Black Start	Yes
Voltage Support	Yes

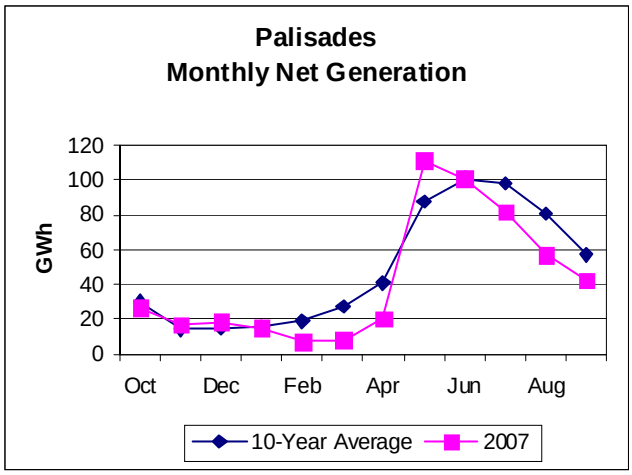
Generators

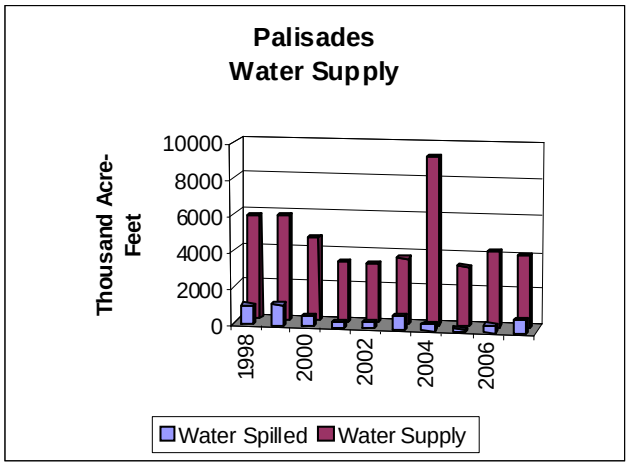
Palisades Generators
Existing Number and Capacity

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

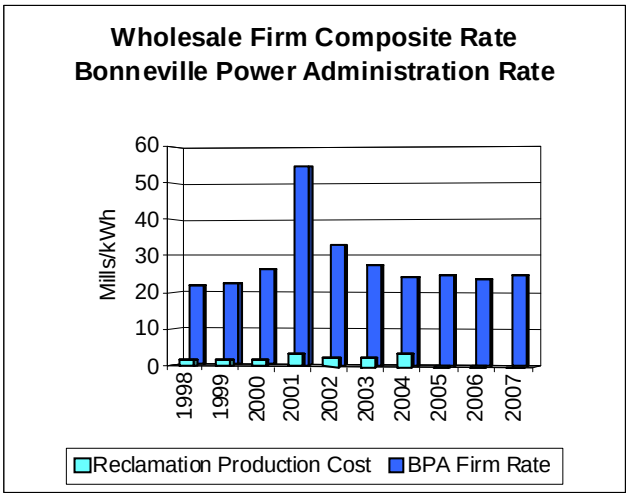

Palisades
Fiscal Year Net Generation
GWh
1000
800
600
400
200
0
1998
2000
2002
2004
2006
Net Generation
10 Year Average


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

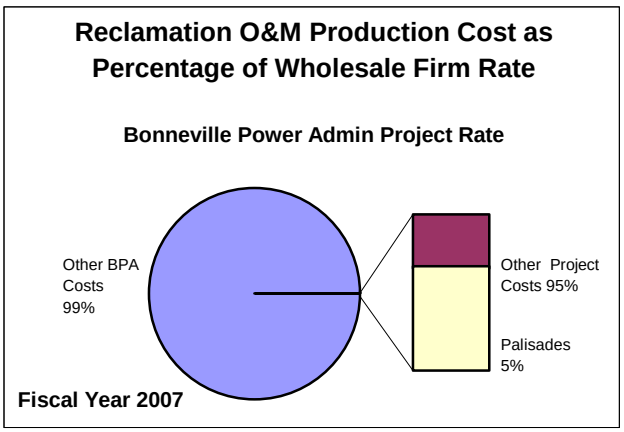

Palisades
Water Supply
Thousand Acre-Feet
10000
8000
6000
4000
2000
0
1998
2000
2002
2004
2006
Water Spilled
Water Supply

Prime Laboratory Benchmarks

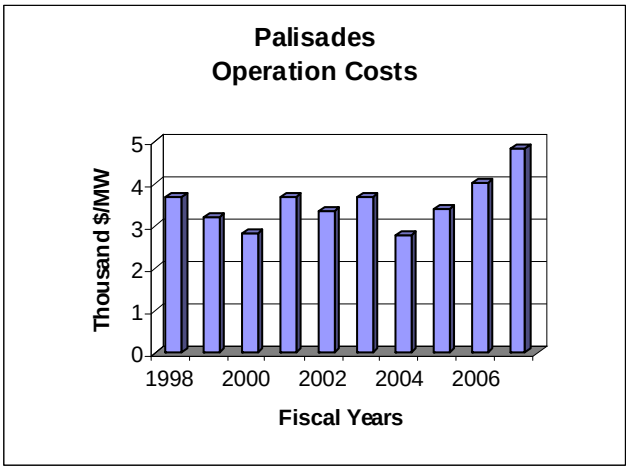
Benchmark 1
Wholesale Firm Rate

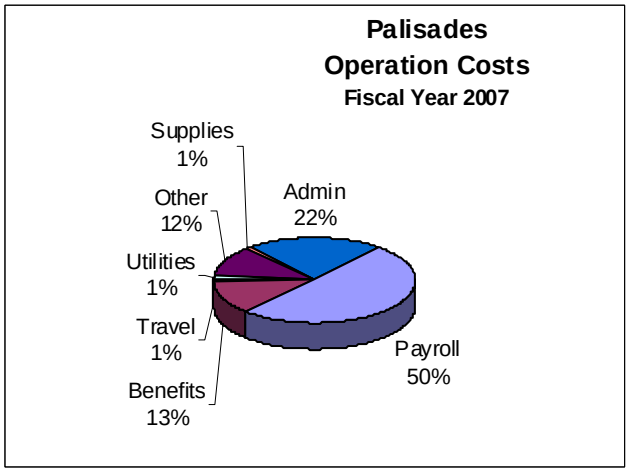


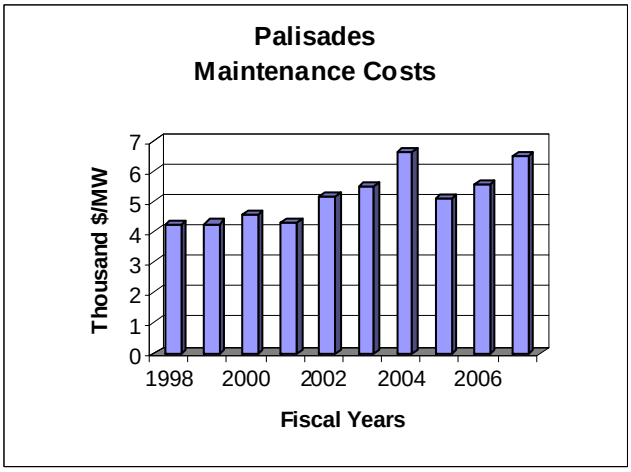
Benchmark 2
Reclamation's Production Cost as Percentage of Wholesale Firm Rate

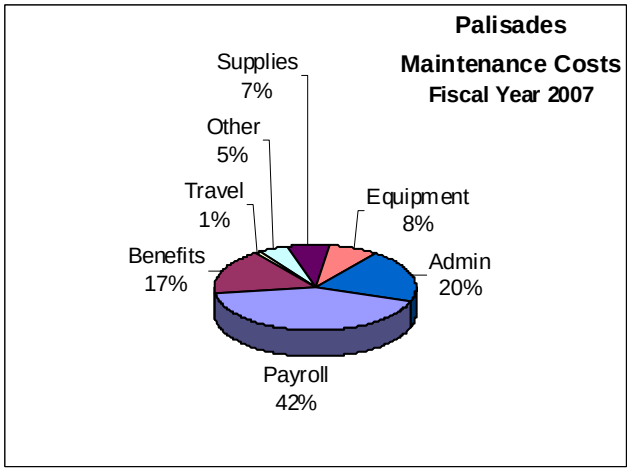


Benchmark 3
Production Cost

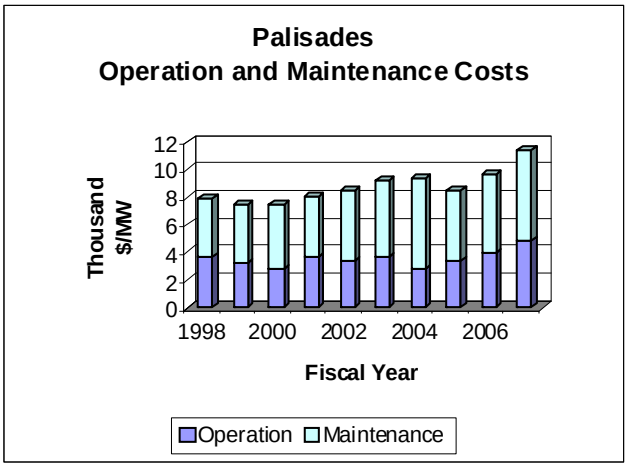


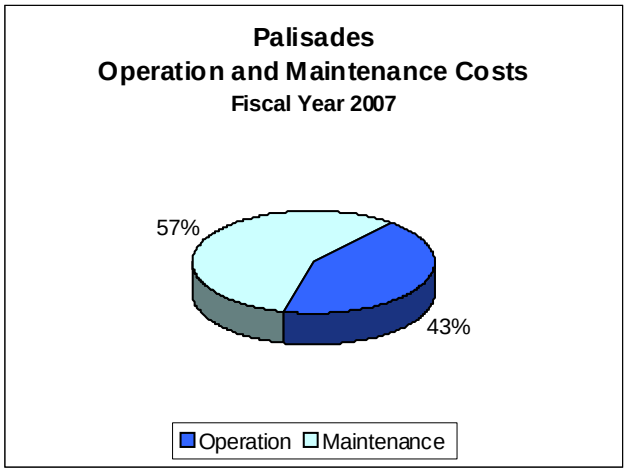


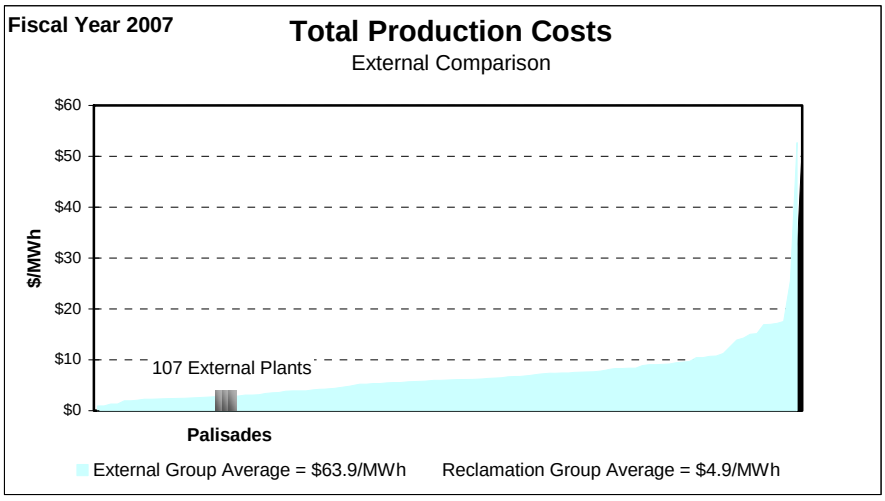


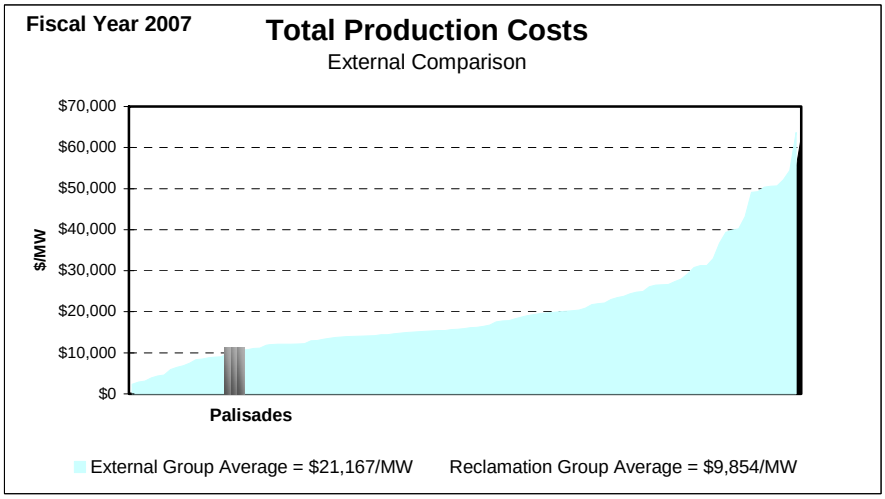


Benchmark 3
Production Cost



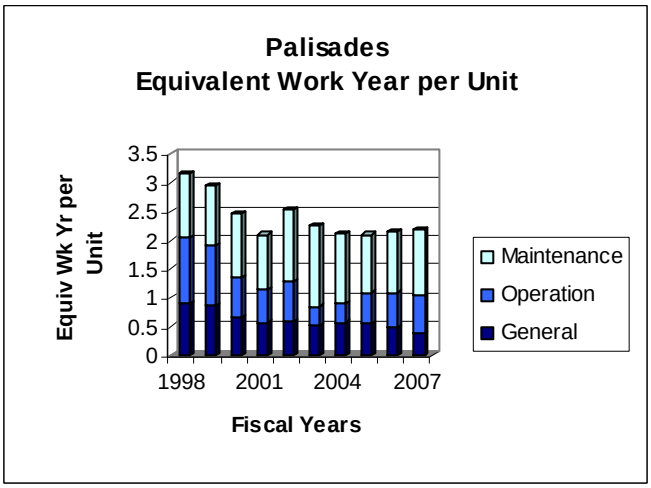


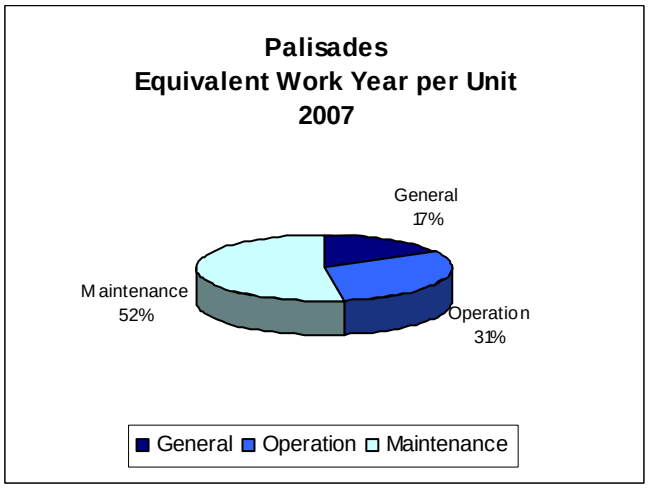


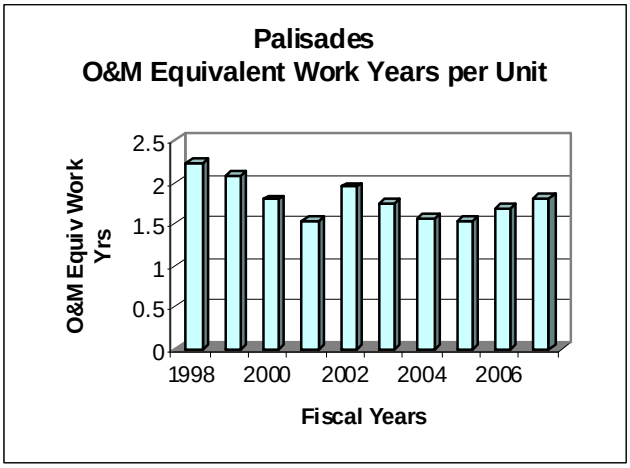


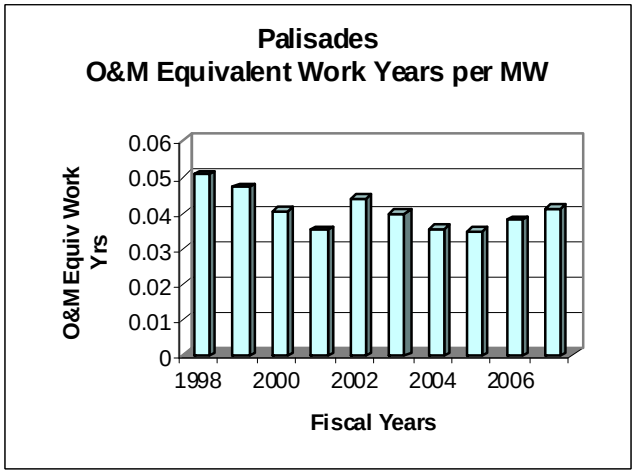
Benchmark 4
Workforce Deployment

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

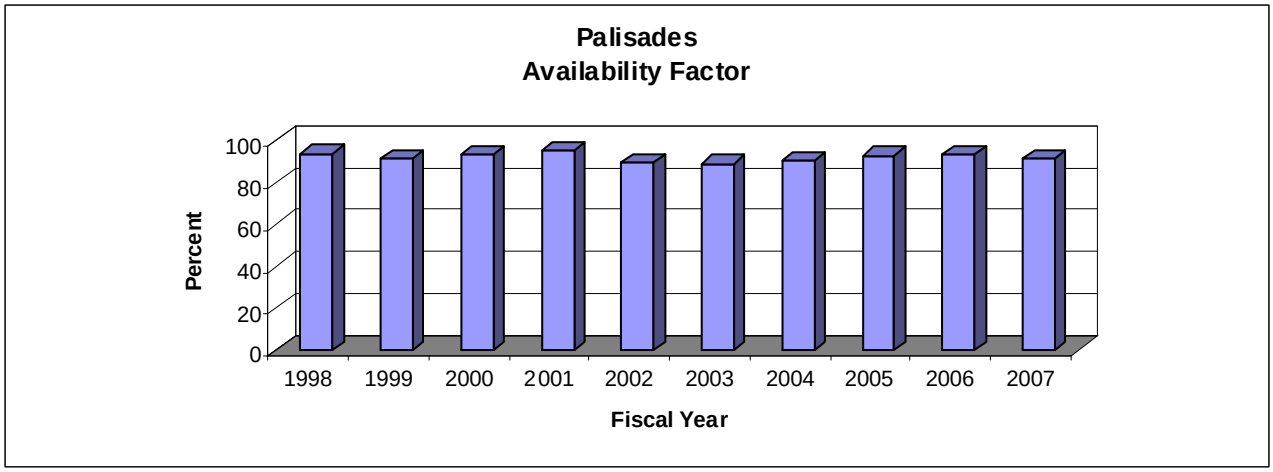




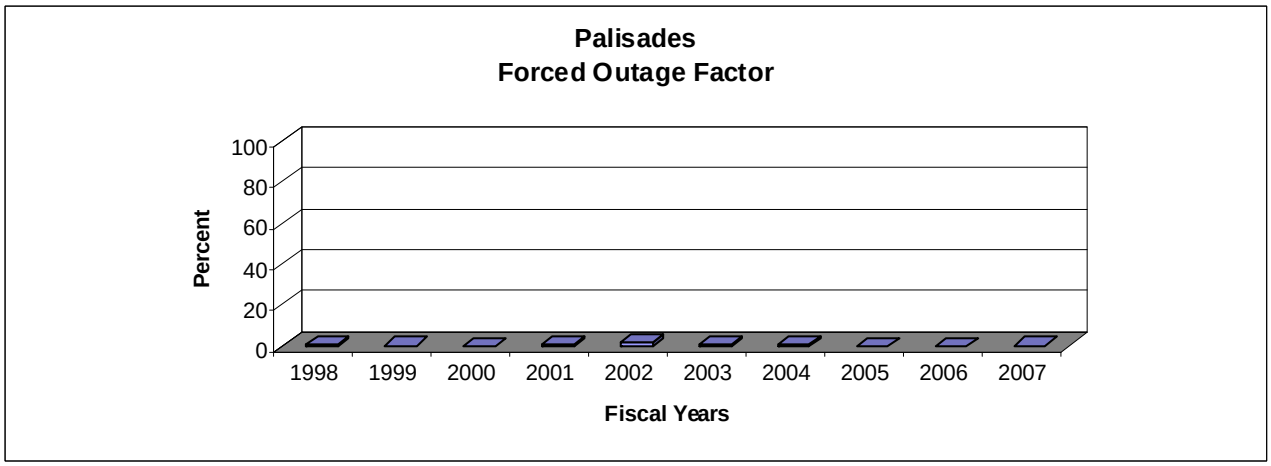




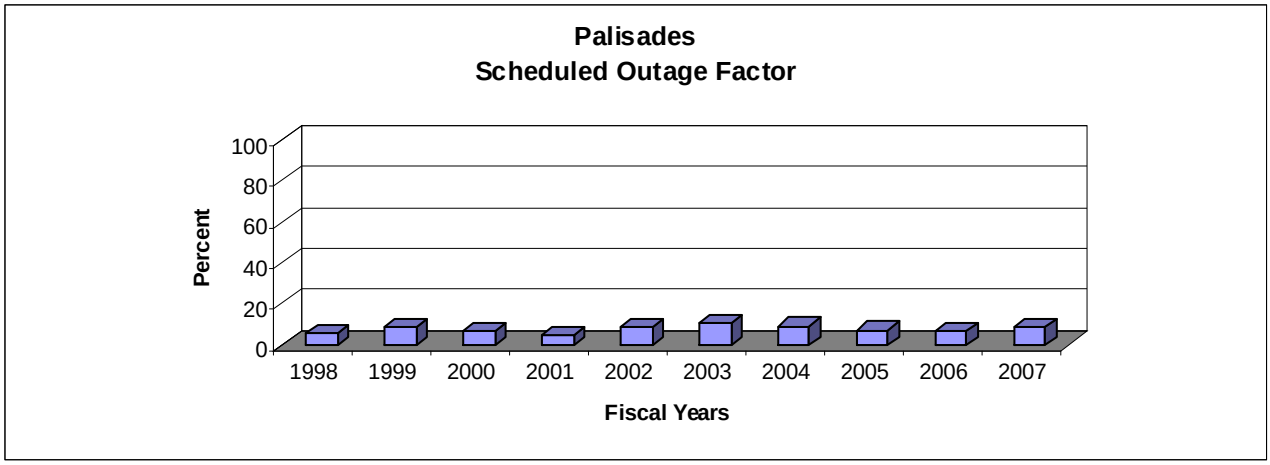
Benchmark 5
Availability Factor



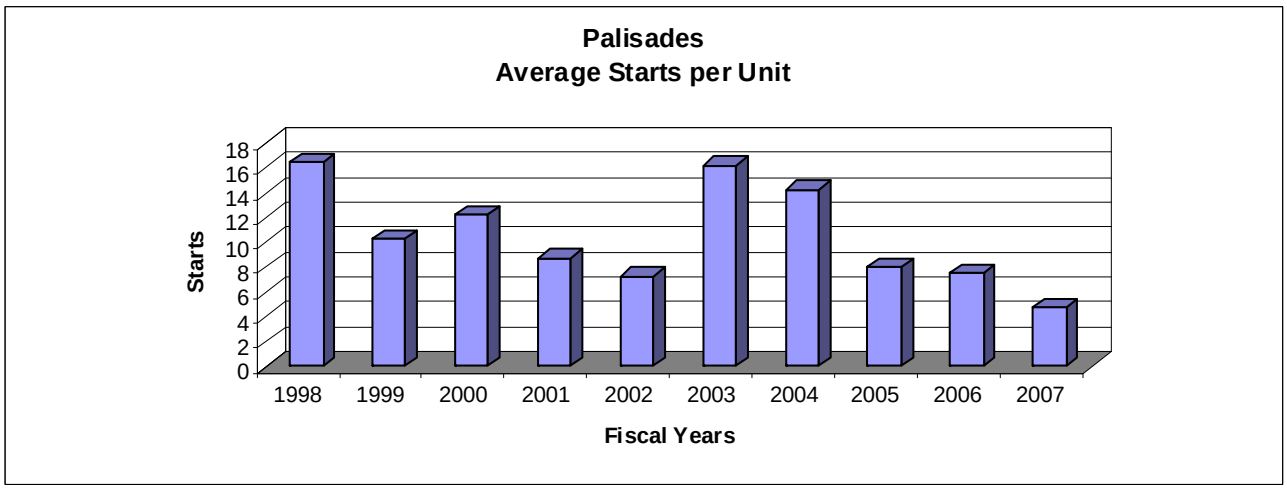
Benchmark 6
Forced Outage Factor



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

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

Plant Address:
Roza Powerplant – Yakima Project
1917 Marsh Rd
Yakima WA 98901

Telephone Numbers:
Phone: (509) 575-5848
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.

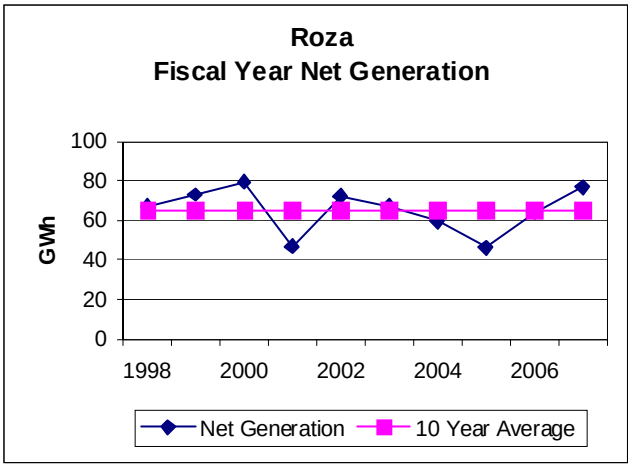
Generators

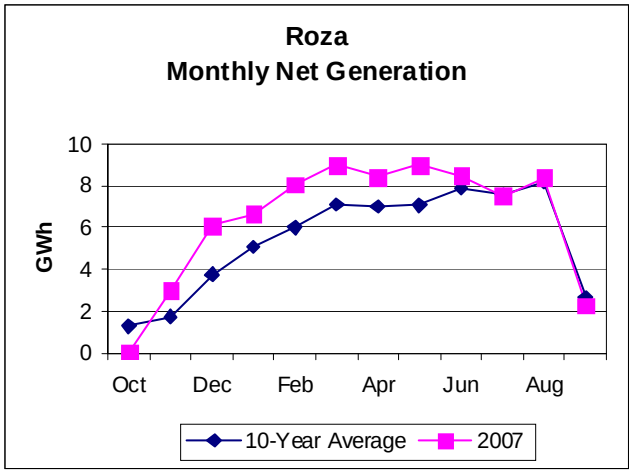
Roza Generators
Existing Number and Capacity

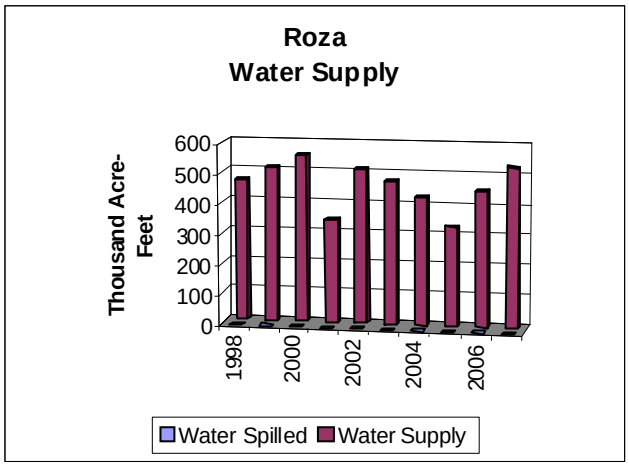
Unit #	Original Capacity (kW)	Capacity Increased (kW)	Present Capacity (kW)
1	11,250	1,687	12,937
1 unit	11,250	1,687	12,937

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

Generation

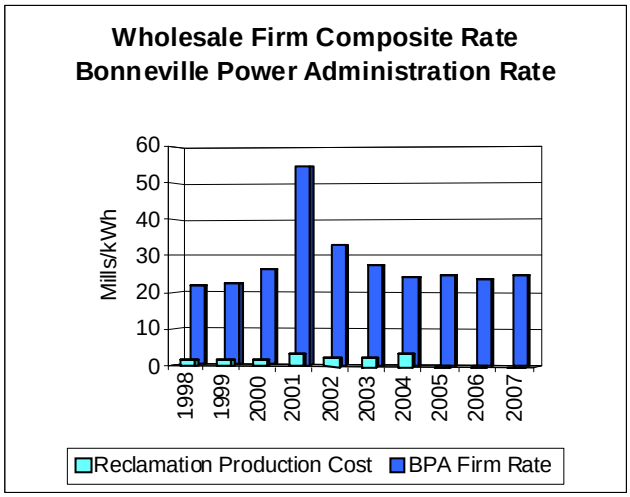

Roza
Fiscal Year Net Generation
GWh
100
80
60
40
20
0
1998
2000
2002
2004
2006
Net Generation
10 Year Average


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

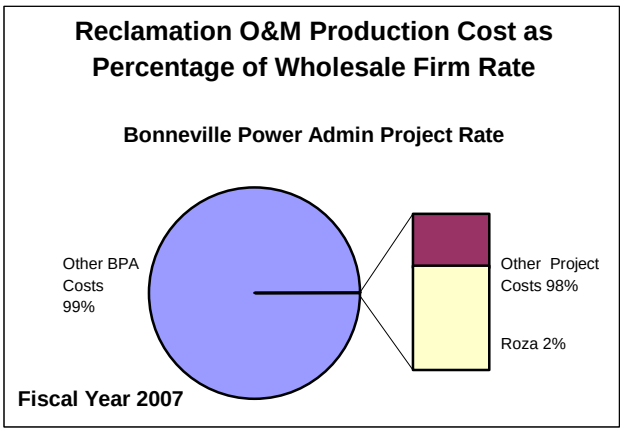

Roza
Water Supply
Thousand Acre-Feet
600
500
400
300
200
100
0
1998
2000
2002
2004
2006
Water Spilled
Water Supply

Prime Laboratory Benchmarks

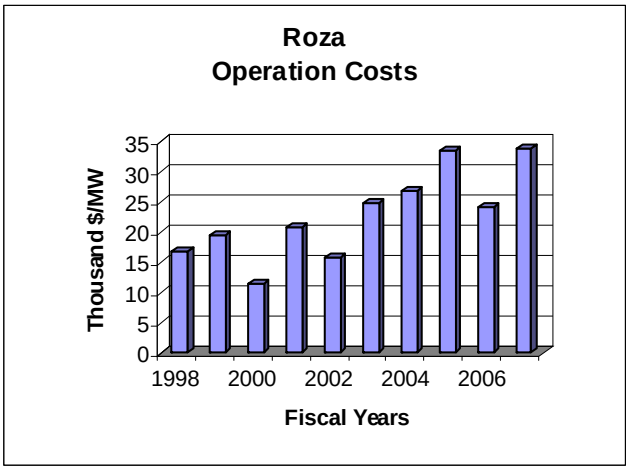
Benchmark 1
Wholesale Firm Rate

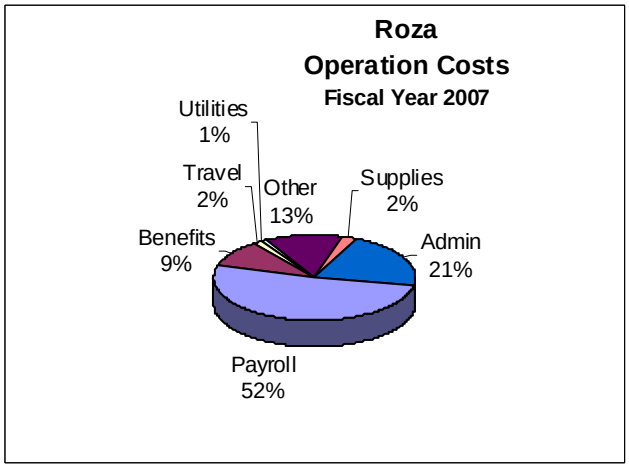


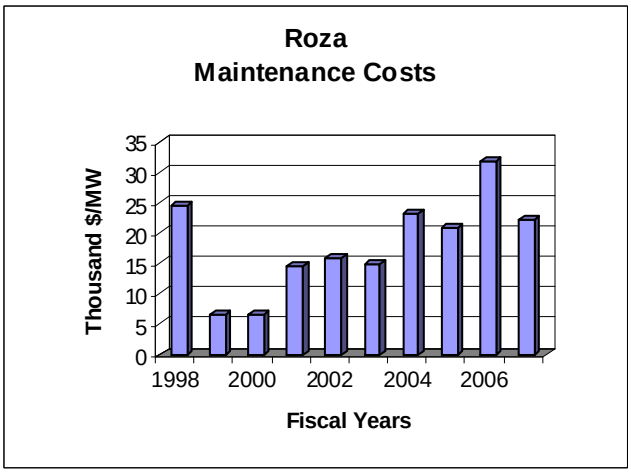
Benchmark 2
Reclamation's Production Costs as Percentage of Wholesale Firm Rate

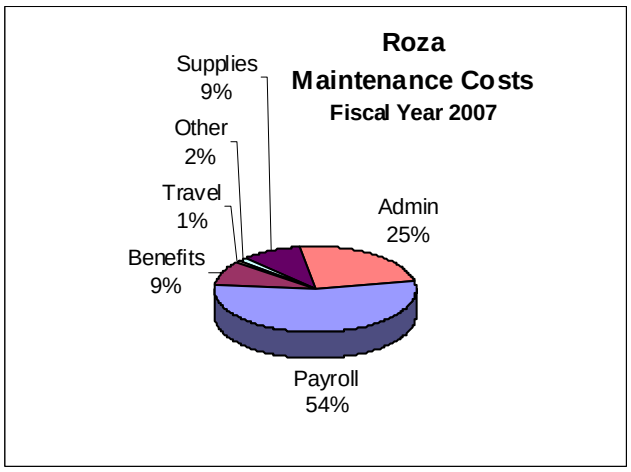


Benchmark 3
Production Costs

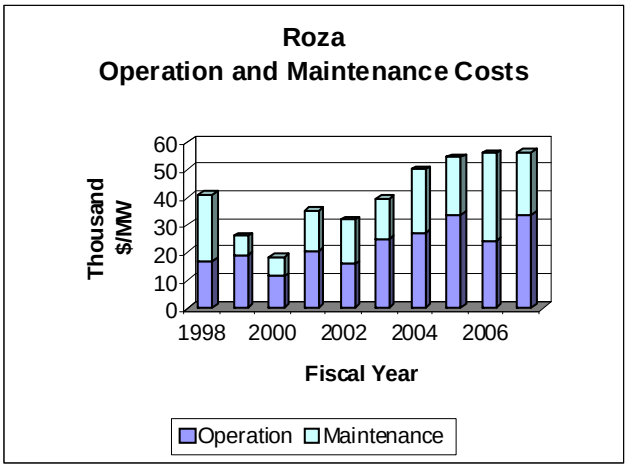


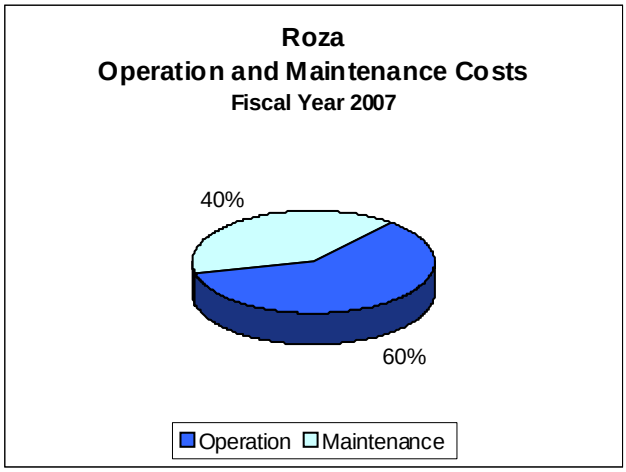


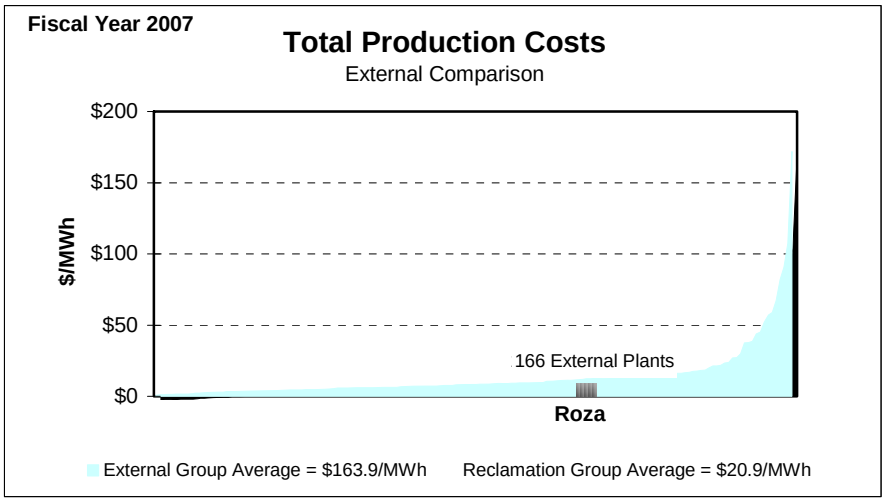


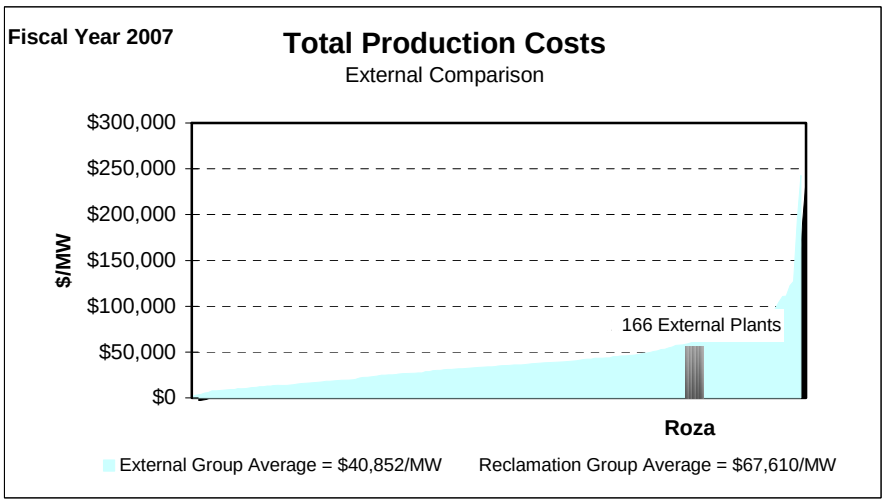


Benchmark 3
Production Cost



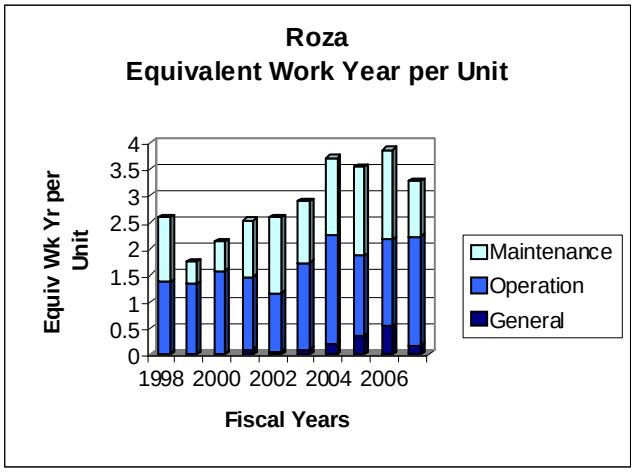


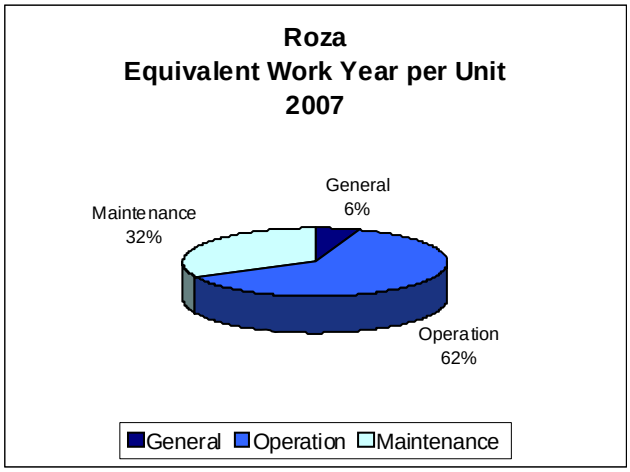


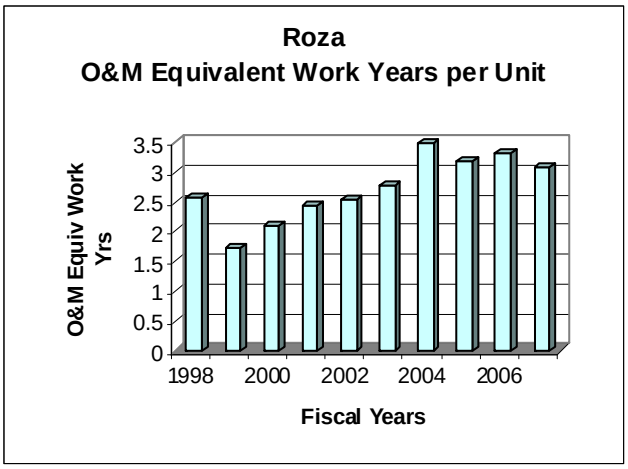


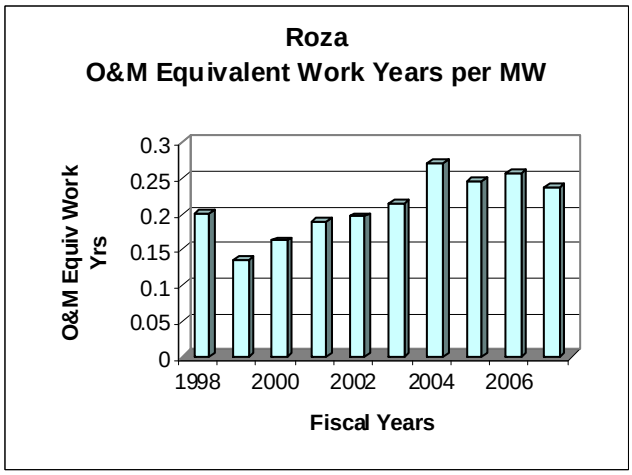
Benchmark 4
Workforce Deployment

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

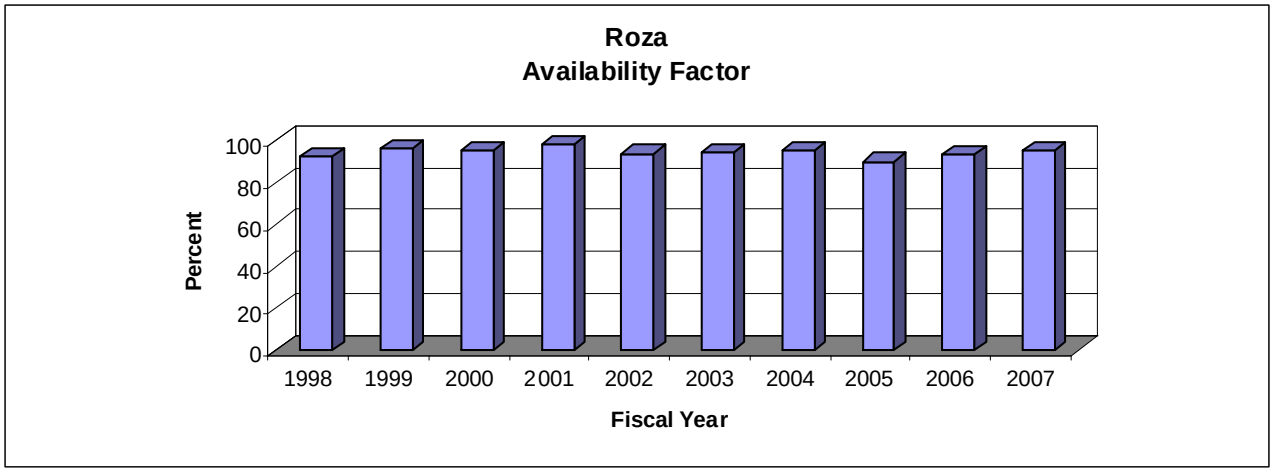




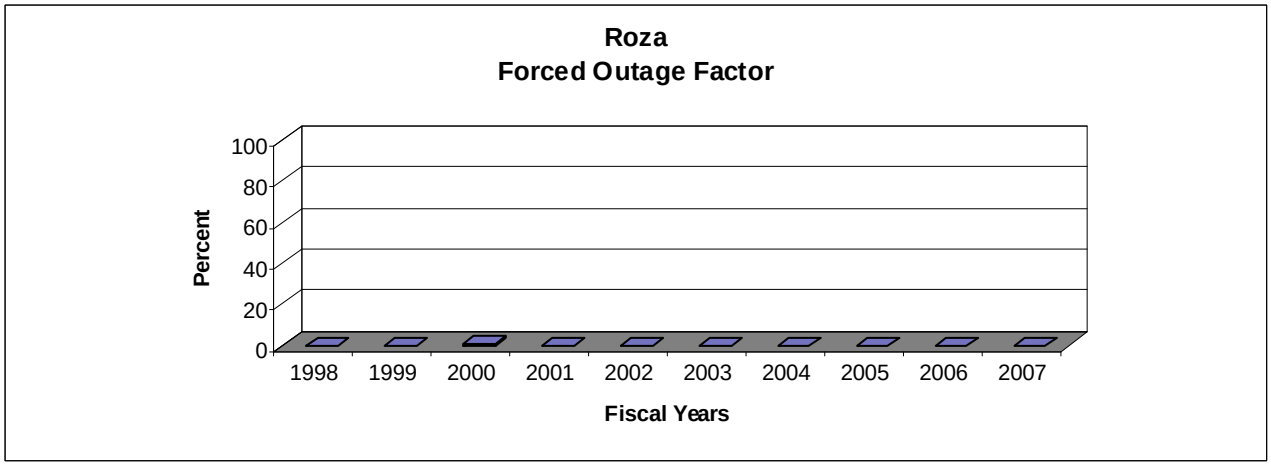




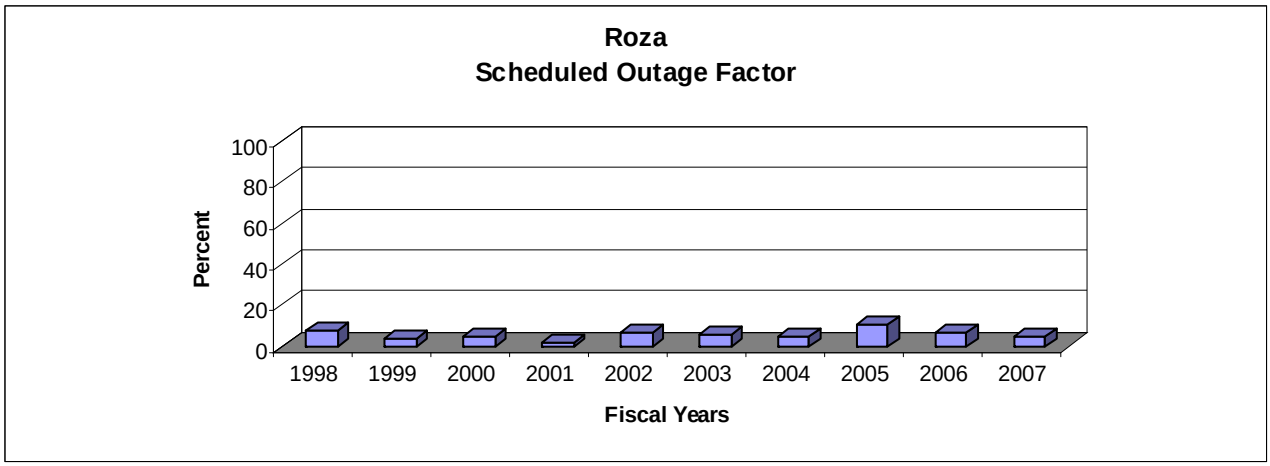
Benchmark 5
Availability Factor



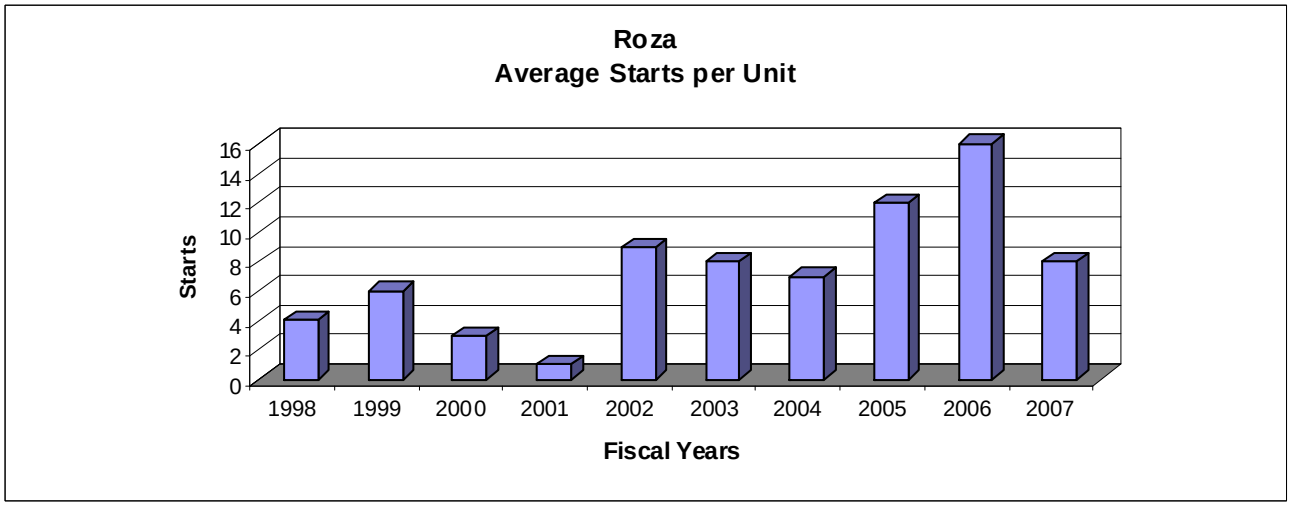
Benchmark 6
Force Outage Factor



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

RECLAMATION
Managing Water in the West

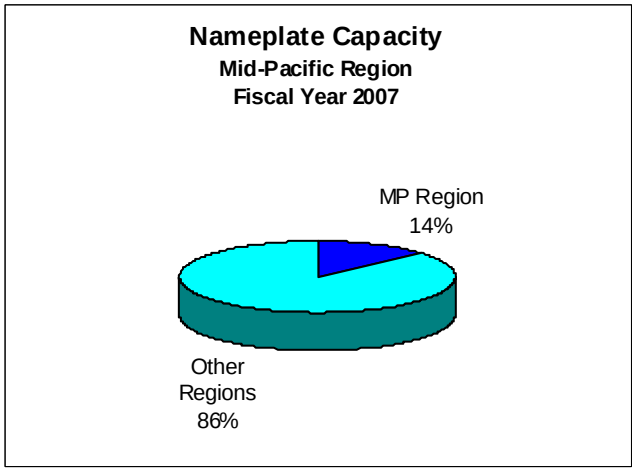
Mid-Pacific Region Power Performance

For Fiscal Year 2007

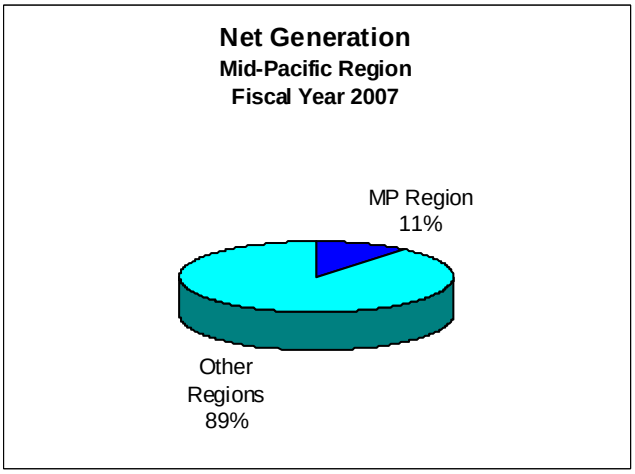
U.S. Department of the Interior
Bureau of Reclamation

Mid-Pacific Regional Power Overview

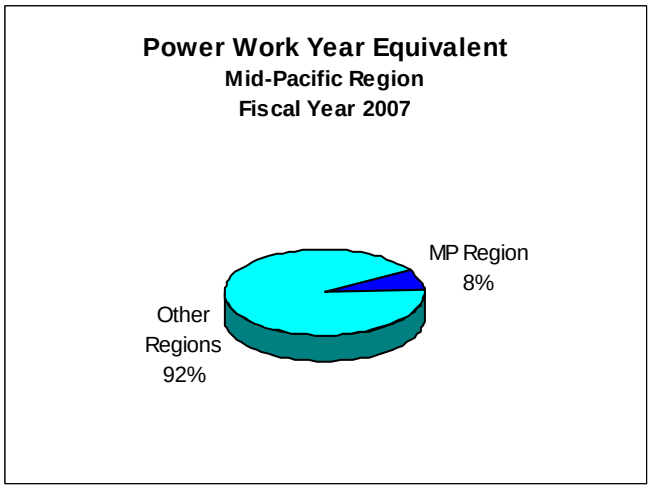
The Mid-Pacific Regional Office is located in Sacramento, California. The regional office oversees the operation of 12 powerplants: Folsom, Judge Francis Carr, Keswick, Lewiston, New Melones, Nimbus, O'Neill, San Luis, Shasta, Spring Creek, Stampede, and Trinity.



The total capacity for this region is 2,032 megawatts, which comprises 14 percent of the Reclamation total capacity.

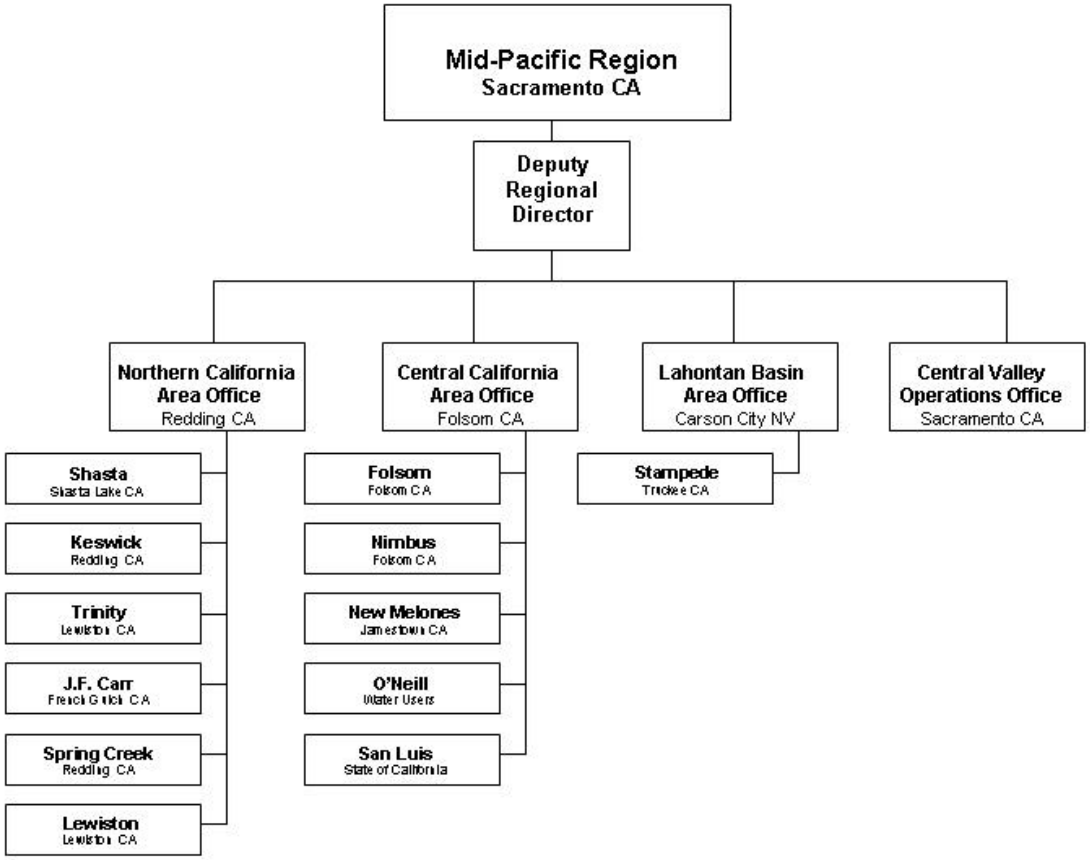


In 2007, this region produced 4,466 net gigawatt-hour. This comprises 17 percent of the total net generation for Reclamation in 2007.



In 2007, this region consisted of 9 percent of the total work year equivalent worked at power facilities. Of the 12 facilities located in this region, 8 have no staff assigned on site.

Organizational structure:



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

Regional Office:

Bureau of Reclamation
Mid-Pacific Regional Office
2800 Cottage Way
Sacramento CA 95825-1898

Donald Glaser, Regional Director
MP-100
(916) 979-2200

Central Valley Operations Office:	Ron Milligan, Office Manager (916) 979-2199 Barry Mortimeyer, CVO-600 (916) 979-3001
North Central California Area Office:	Central California Area Office 7794 Folsom Dam Road Folsom CA 95630-1799 Mike Finnegan Area Manager, NCC-100 (916) 988-7213
Northern California Area Office:	Northern California Area Office 16349 Shasta Dam Boulevard Shasta Dam Shasta Lake CA 96019-8400 Brian Person Area Manager, NC-100 (530) 275-1554
Lahontan Basin Area Office:	Lahontan Basin Area Office PO Box 640 Carson City NV 89702-0640 Betsy Rieke Area Manager, LO-100 (775) 882-3436

Bureau of Reclamation
Bureau of Reclamation and State of California
WASHINGTON
MONTANA
OREGON
IDAHO
WYOMING
Trinity
Lewiston
Spring Creek
Shasta
Judge F. Carr
Keswick
Stampede
NEVADA
UTAH
COLORADO
Folsom
Nimbus
New Melones
O'Neill
San Luis
CALIFORNIA
NEW MEXICO
ARIZONA

Judge Francis Carr Powerplant
Central Valley Project

Plant Contact:
Brian Person
Area Manager

Plant Address:
Judge Francis Carr Powerplant
Lewiston CA

Telephone Numbers:
Phone: (530) 275-1554
Fax: (530) 275-2441

E-Mail Address:
bperson@mp.usbr.gov

Reclamation Region: Mid-Pacific

NERC Region: Western Electricity Coordinating Council, California-Southern Nevada Power Area

PMA Service Area: Western Area Power Administration, Sierra Nevada Region

Project Authorization: Funds for construction of the initial features of the Central Valley Project were provided by the Emergency Relief Appropriation Act of 1935 (49 Stat. 115). The Secretary of the Interior authorized the project and the President approved it on December 2, 1935.

The Trinity River Division was authorized by Public Law 386, 84th Congress, and 1st Session, approved August 12, 1955.

Project Purposes: The Central Valley Project, one of the Nation=s major water conservation developments, extends from the Cascade Range on the north to the semiarid but fertile plains along the Kern River on the south. Initial features of the project were built primarily to protect the Central Valley from crippling water shortages and menacing floods. New project units were built to provide water and power to match the continued growth of the State.

Although developed primarily for irrigation, this multiple-purpose project also provides flood control, improves Sacramento River navigation, supplies domestic and industrial water, generates electric power, conserves fish and wildlife, creates opportunities for recreation, and enhances water quality.

Plant Location: Judge Francis Carr Powerplant is located on Clear Creek in Shasta County, California, at the outlet of Clear Creek Tunnel on the northwestern extremity of Whiskeytown Lake.

Plant Purpose: Judge Francis Carr Powerplant is a peaking plant that is dedicated first to meeting the energy requirements of the project facilities. The remaining energy is marketed to various preference customers in northern California.

Plant Facts: The Judge Francis Carr Powerhouse has two generators with a total capacity of 154,400 kilowatts.

Plant History: Judge Francis Carr was originally designated Clear Creek Powerplant. The units were up rated in 1984.

Present Activities: Generation of power from water exported from the Trinity River Basin.

Future Planned Activities: Generator rewinds and turbine replacement is expected to start in 2009.

Special Issues: Plant power production has a degree of fluctuation from tunnel wall organic and mineral coating. Trinity County has first preference to the power benefit for the Central Valley Project from the Judge Francis Carr Powerplant.

River:	Clear Creek Tunnel	**Plant Type:**	Conventional
Powerhouse Type:	Above Ground	**Turbine Type:**	Francis
Original Nameplate Capacity:	143,680 kW	**Installed Capacity:**	154,400 kW
Year of Initial Operation:	1963	**Age:**	44 years
Net Generation (FY-2007):	288.1 GWh	**Rated Head:**	535 feet
Average Plant Factor (FY-2007):	21.4 percent	**Remotely Operated:**	Yes
Production Mode:	Peaking		

Ancillary Services

Judge Francis Carr
Ancillary Services

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

Generators

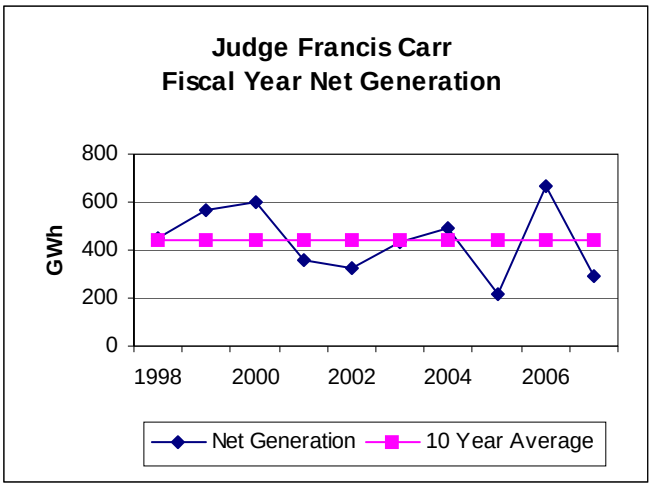
Judge Francis Carr Generators

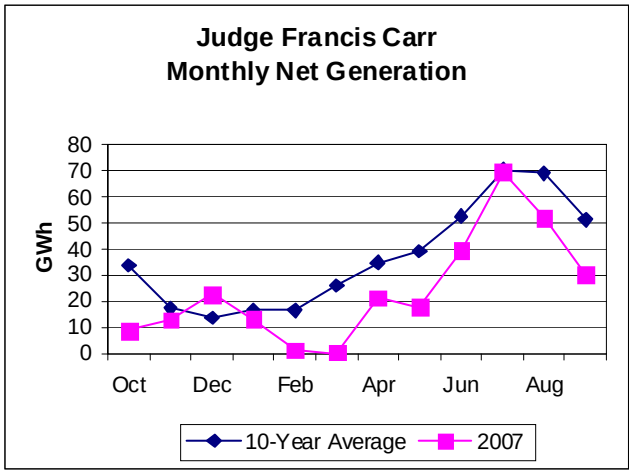
Existing Number and Capacity

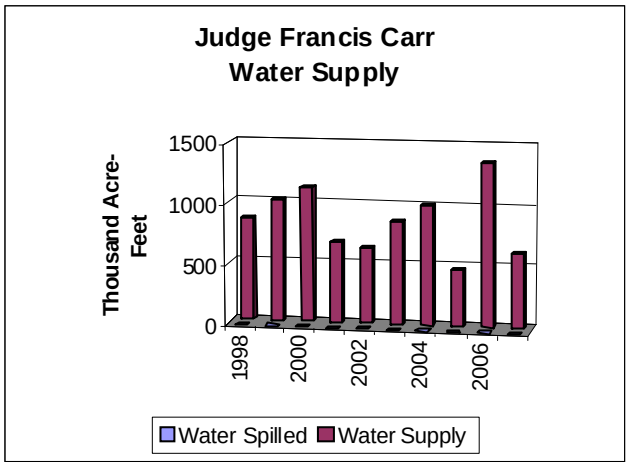
Unit #	Original Capacity (kW)	Capacity Increased (kW)	Present Capacity (kW)
1	70,722	6,478	77,200
2	70,722	6,478	77,200
1 units	141,444	12,956	154,400

The maximum operational capacity is restricted to 150,000 kW due to the tunnel.

Generation

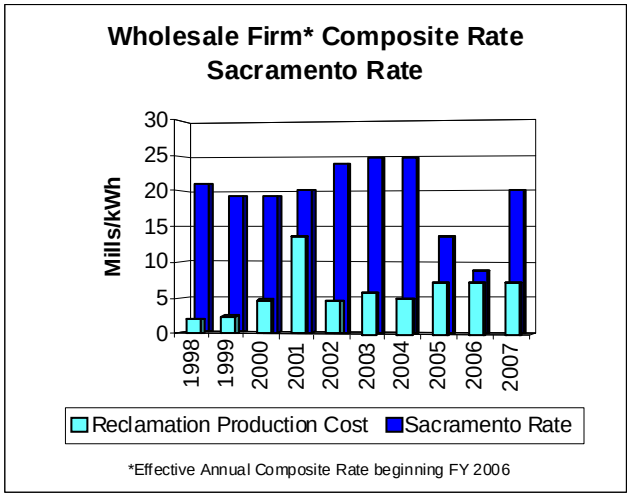

Judge Francis Carr
Fiscal Year Net Generation
GWh
800
600
400
200
0
1998
2000
2002
2004
2006
Net Generation
10 Year Average


Judge Francis Carr
Monthly Net Generation
GWh
80
70
60
50
40
30
20
10
0
Oct
Dec
Feb
Apr
Jun
Aug
10-Year Average
2007

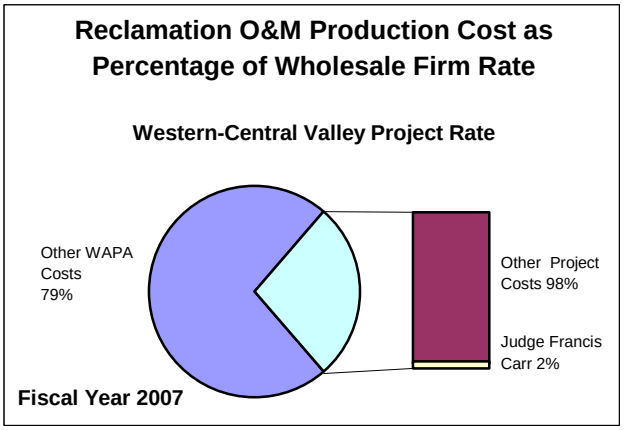

Judge Francis Carr
Water Supply
Thousand Acre-Feet
1500
1000
500
0
1998
2000
2002
2004
2006
Water Spilled
Water Supply

Prime Laboratory Benchmarks

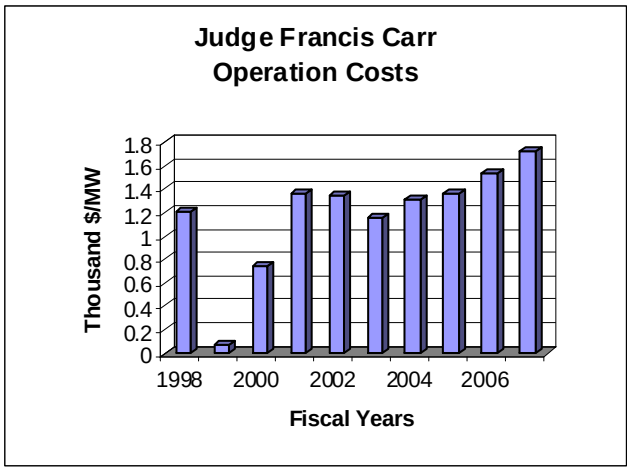
Benchmark 1
Wholesale Firm Rate

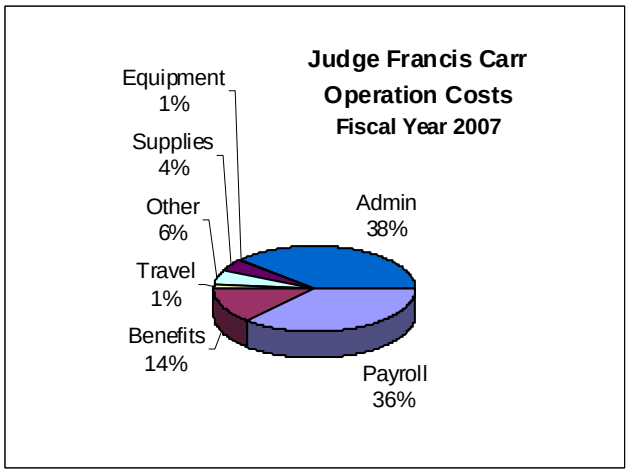


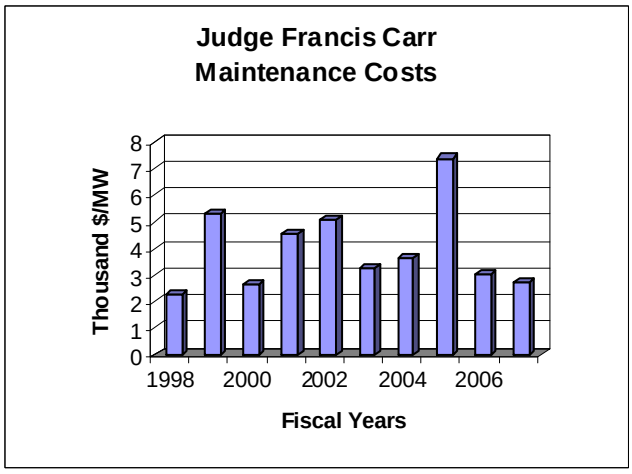
Benchmark 2
Reclamation's Production Cost as Percentage of Wholesale Firm Rate

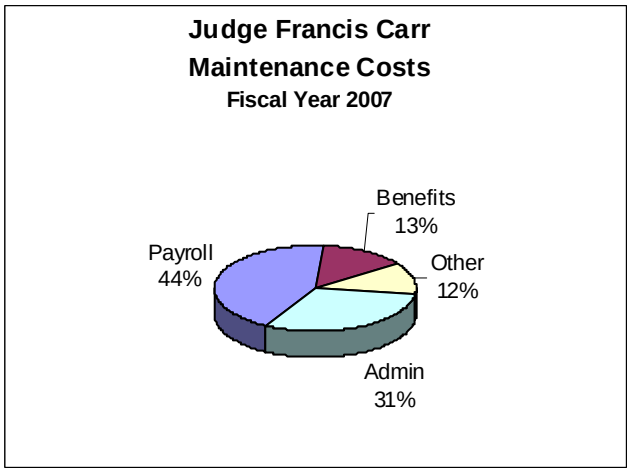


Benchmark 3
Production Cost

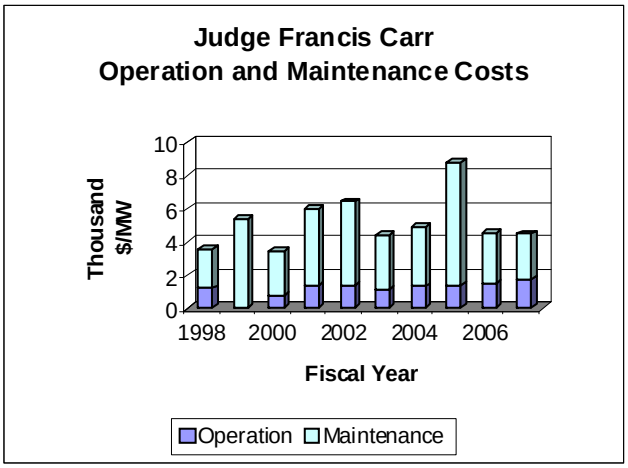


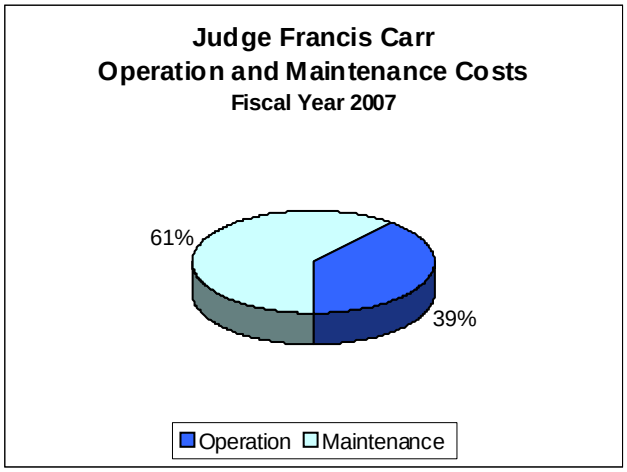


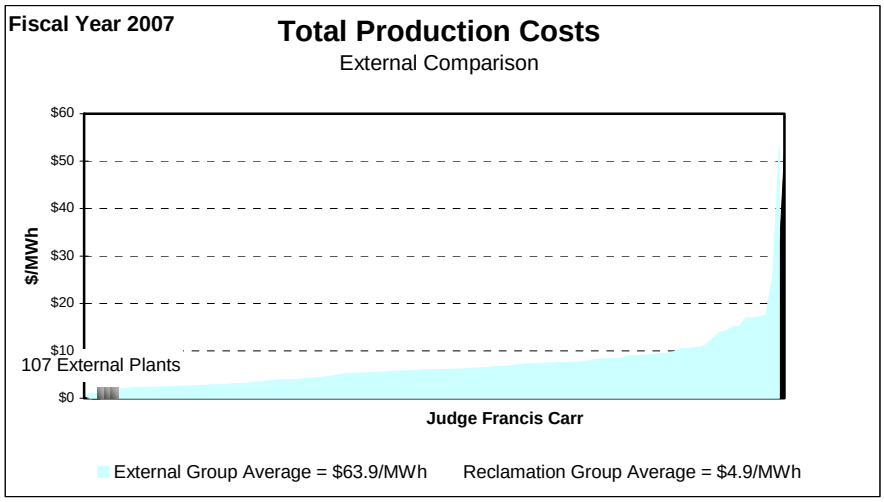


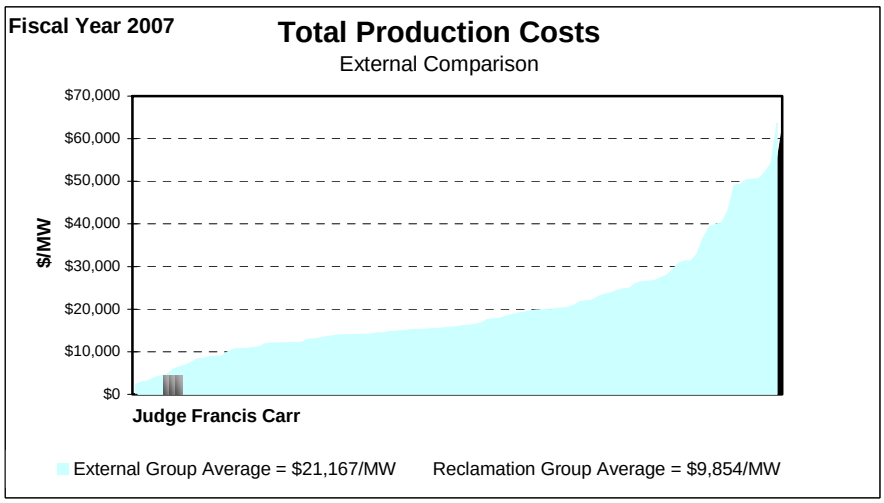


Benchmark 3
Production Cost



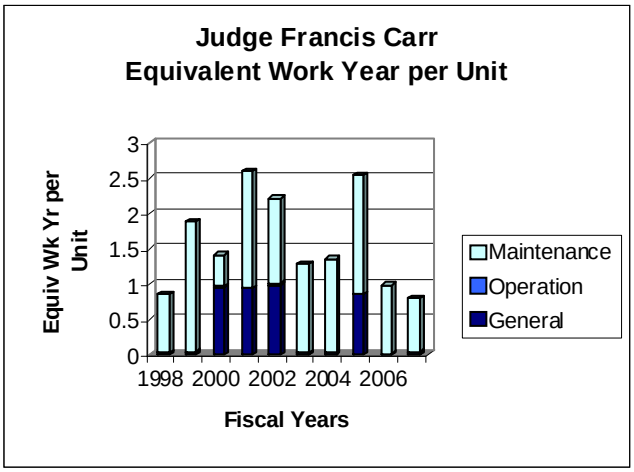


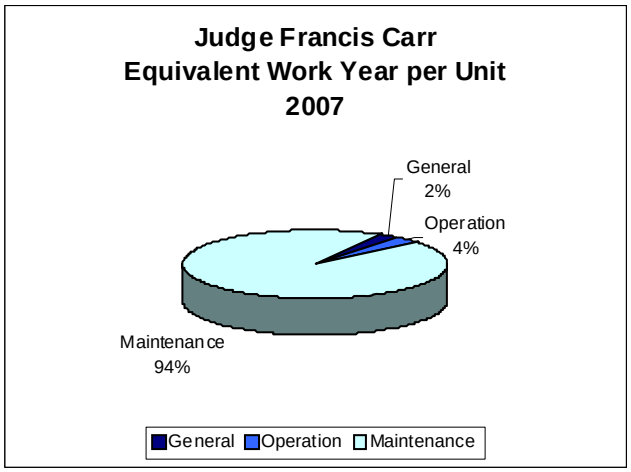


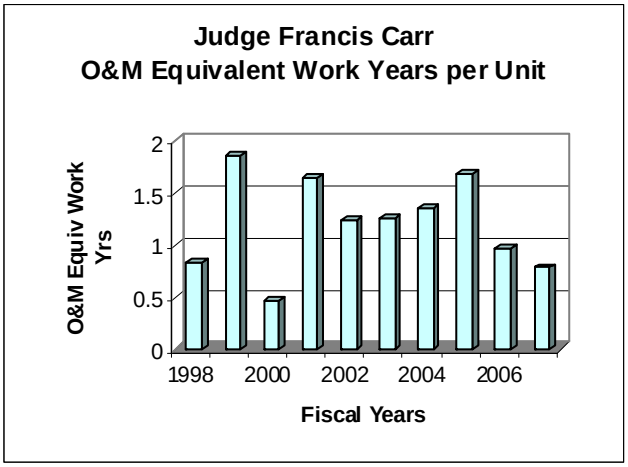


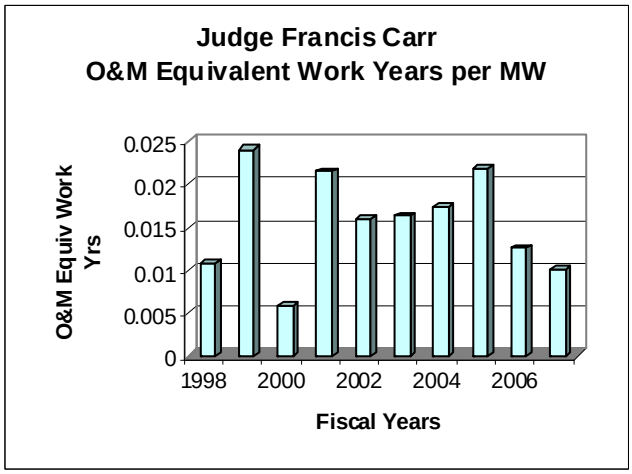
Benchmark 4
Workforce Deployment

JF Carr 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	0.00	0.00	0.04	0.04	0.02	0.00
Operation	0.05	0.01	0.00	0.06	0.03	0.00
Maintenance	1.37	0.13	0.00	1.51	0.75	0.01
Total Staffing	1.43	0.14	0.04	1.60	0.80	0.01

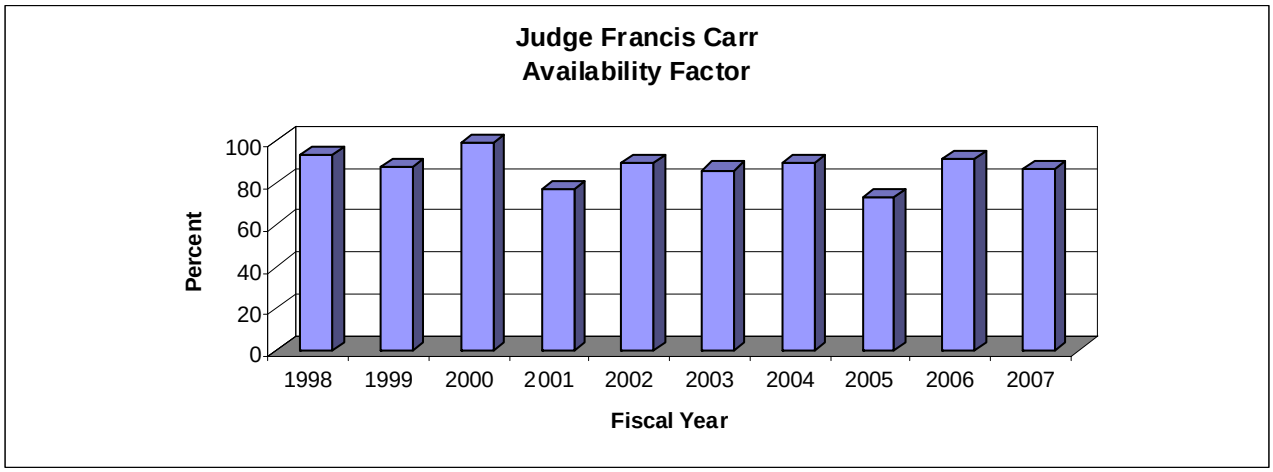




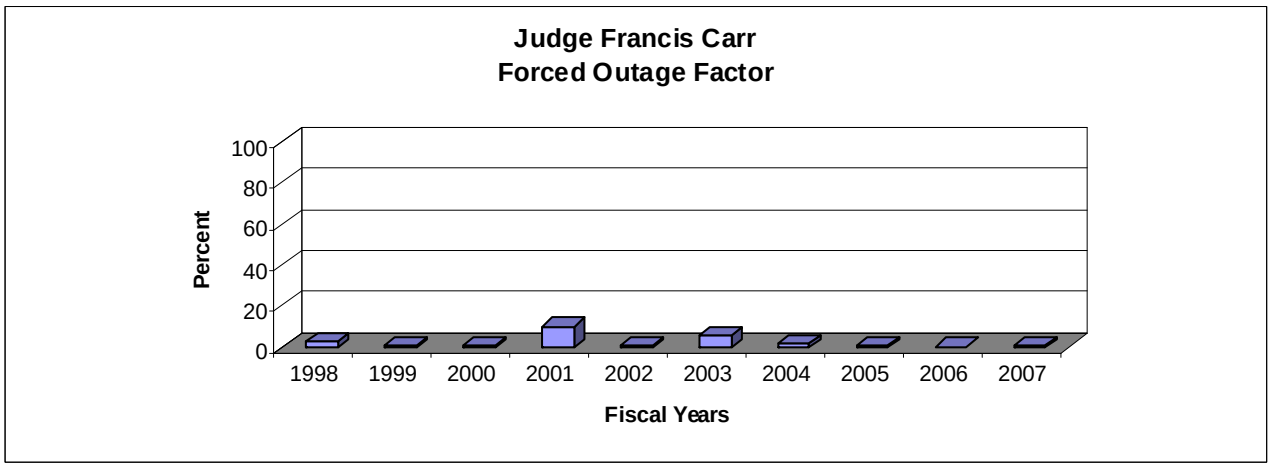




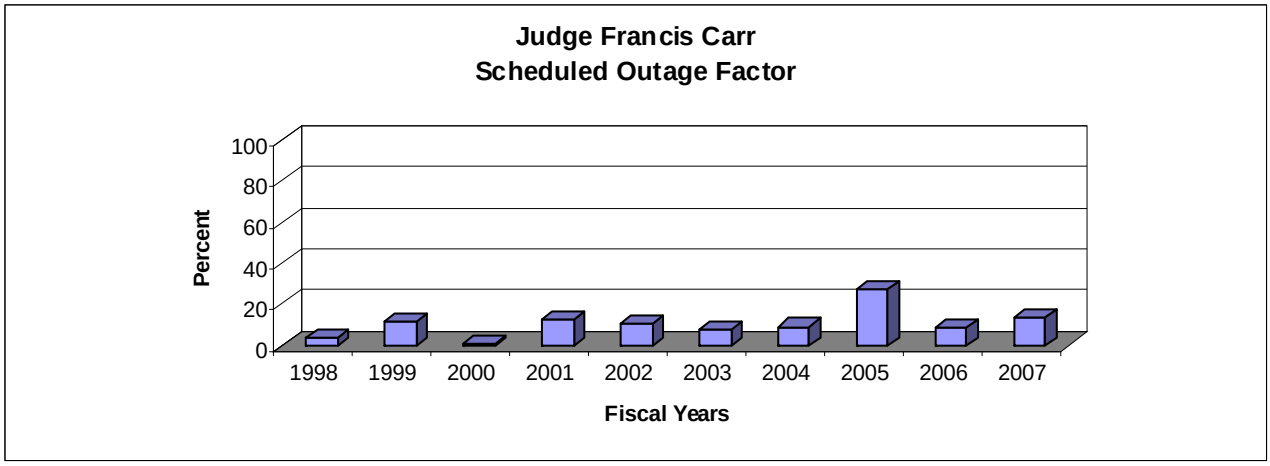
Benchmark 5
Availability Factor



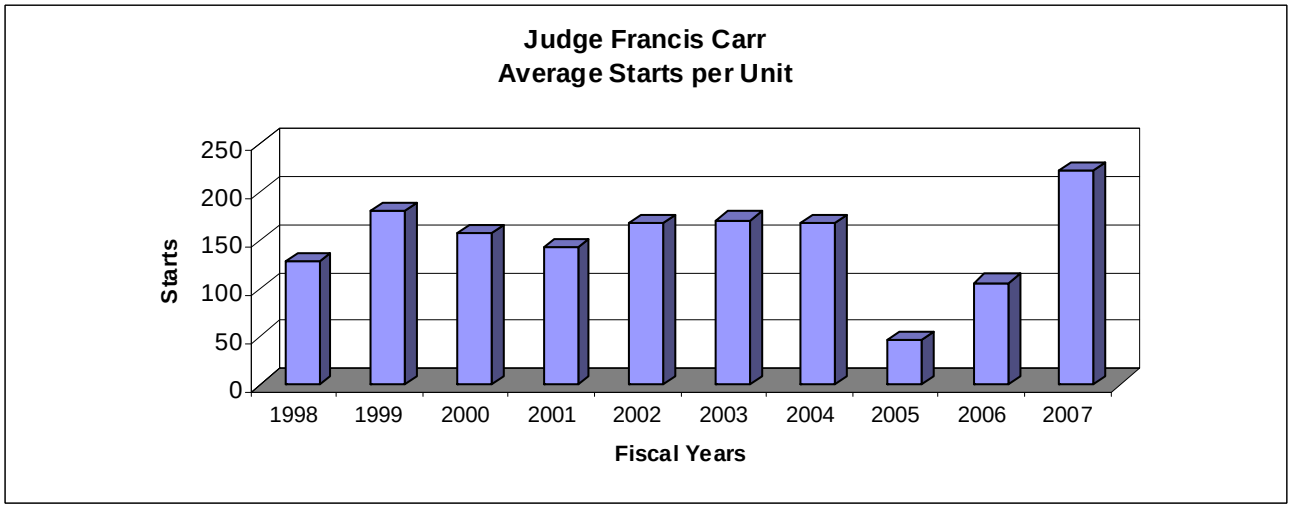
Benchmark 6
Forced Outage Factor



Benchmark 7
Scheduled Outage Factor



Starts



Benchmark Data Comparison

Fiscal Year 2007	Judge Francis Carr Powerplant	Reclamation Average 100-500 MW Group	Total Reclamation Average	Industry Average	Best Performers
Wholesale Firm Rate Mills/kWh	13.7	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	2.38	4.44	2.76	***63.88	1.00
O&M Costs $/MW	4,450	10,502	7,847	***21,167	2,897
O&M Equiv Work Year per MW	0.01	0.04	0.03	Not Available	0.0
Availability Factor	86.7	83.5	82.3	**88.64	98.5
Forced Outage Factor	0.1	1.2	2.6	**2.61	0.0
Scheduled Outage Factor	13.1	15.4	15.1	**8.74	0.0

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

Folsom Powerplant
Central Valley Project

Plant Contact:
Mike Finnegan, Area Manager
Central California Area Office

Plant Address:
Folsom Powerplant
Central California Area Office
7794 Folsom Dam Road
Folsom CA 95630

Telephone Numbers:
Phone: (916) 989-7200
Fax: (916) 989-7208

E-Mail Address:
mfinnegan@mp.usbr.gov

Reclamation Region: Mid-Pacific

NERC Region: Western Electricity Coordinating Council, California-Southern Nevada Power Area

PMA Service Area: Western Area Power Administration, Sierra Nevada Region

Project Authorization: Funds for construction of the initial features of the Central Valley Project were provided by the Emergency Relief Appropriation Act of 1935 (49 Stat. 115). The Secretary of the Interior authorized the project and the President approved it on December 2, 1935.

Project Purposes: The Central Valley Project, one of the Nation's major water conservation developments, extends from the Cascade Range on the north to the semiarid but fertile plains along the Kern River on the south. Initial features of the project were built primarily to protect the Central Valley from crippling water shortages and menacing floods. New project units were built to provide water and power to match the continued growth of the State.

Although the Folsom Unit, American River Division, was developed primarily for irrigation, this multiple-purpose project also provides flood control, improves Sacramento River navigation, supplies domestic and industrial water, generates electric power, conserves fish and wildlife, creates opportunities for recreation, and enhances water quality.

Plant Location: Folsom Power plant is located on the American River in Sacramento County, California, about 20 miles northeast of Sacramento, California

Plant Purpose: Folsom is a peaking powerplant which is dedicated first to meeting the requirements of the project facilities. The remaining energy is marketed to various preference customers in northern California. This plant also provides power for the pumping plant, which supplies the local domestic water supply.

Plant Facts: Folsom Dam is a concrete gravity structure 340 feet high and 36 feet wide at the crest. The crest is 1,400 feet long. Folsom Powerplant, constructed by Reclamation, is located at the foot of Folsom Dam on the north side of the river. Water from the dam is released through three 15-foot-diameter penstocks to three generating units.

Plant History: Folsom Dam was constructed by the Corps of Engineers and upon completion was transferred to the Bureau of Reclamation for coordinated operation as an integral part of the Central Valley Project. Construction of the dam began in October 1948 and was completed in May 1955. The units were up rated in 1972.

Present Activities: Folsom Powerplant is an integral component of the Reservoir Flood Control Operation. The power plant is used to augment early flood control releases and peaking operations.

Future Planned Activities: The powerplant will continue to be used to augment early flood control releases from the reservoir. Continued peaking operation is planned as releases permit. Folsom is providing a larger degree of local voltage control.

Special Issues: Folsom is being increasingly relied upon to support local loads during system disturbances.

River:	American River	**Plant Type:**	Conventional
Powerhouse Type:	Above Ground	**Turbine Type:**	Francis
Original Nameplate Capacity:	162,000 kW	**Installed Capacity:**	198,720 kW
Year of Initial Operation:	1955	**Age:**	52 years
Net Generation (FY-2007):	425.9 GWh	**Rated Head:**	300 feet
Average Plant Factor (FY-2007):	24.6 percent	**Remotely Operated:**	Yes
Production Mode:	Intermediate		

Ancillary Services

Folsom
Ancillary Services

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

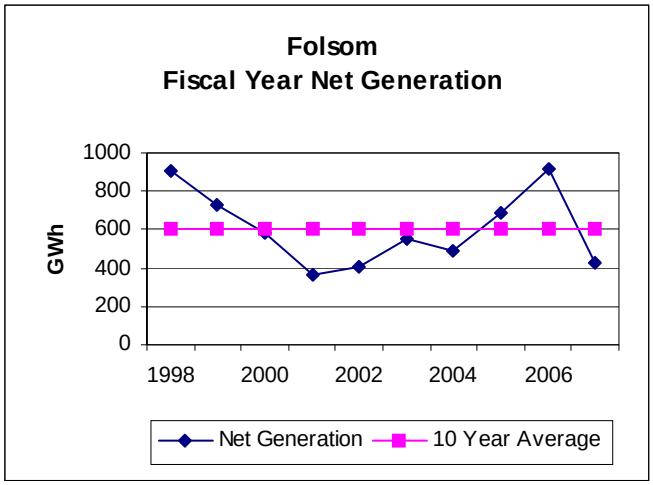
Generators

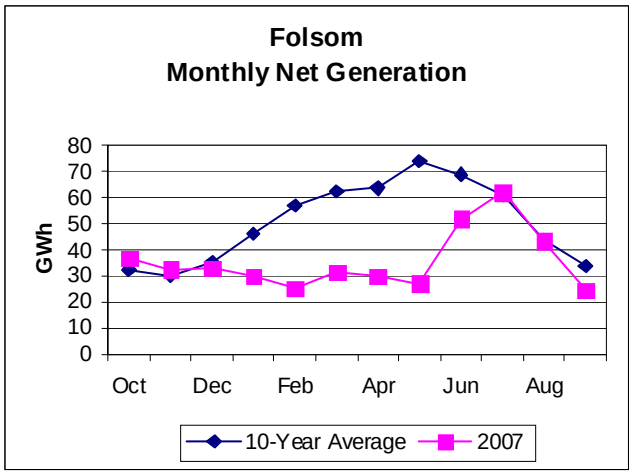
Folsom Generators
Existing Number and Capacity

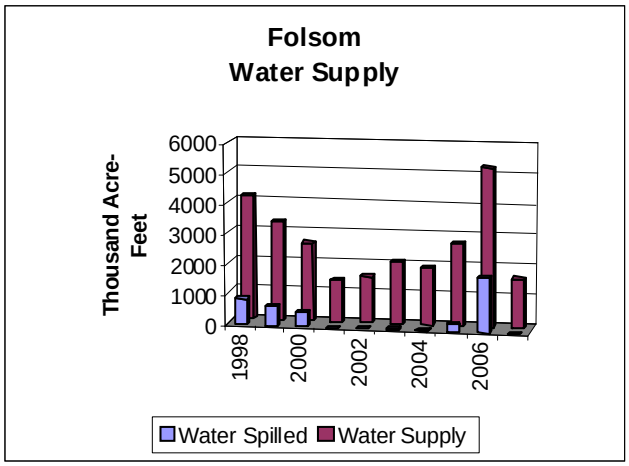
Unit #	Original Capacity (kW)	Capacity Increased (kW)	Present Capacity (kW)
1	54,000	12,240	66,240
2	54,000	12,240	66,240
3	54,000	12,240	66,240
3 units	162,000	36,720	198,720

The maximum operational capacity is 210,000 kW

Generation

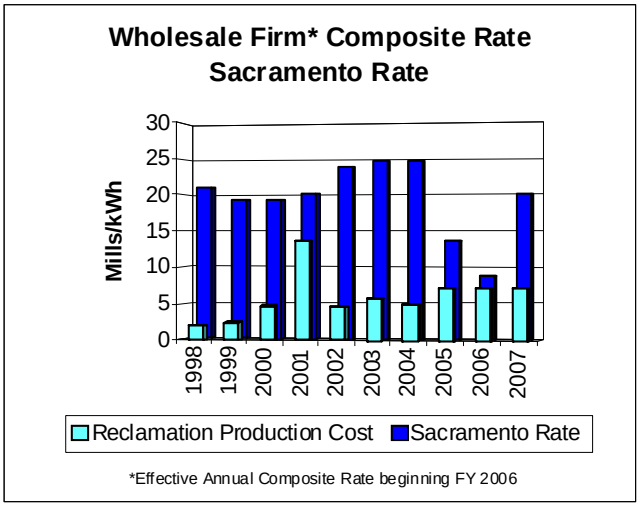

Folsom
Fiscal Year Net Generation
GWh
1000
800
600
400
200
0
1998
2000
2002
2004
2006
Net Generation
10 Year Average


Folsom
Monthly Net Generation
GWh
80
70
60
50
40
30
20
10
0
Oct
Dec
Feb
Apr
Jun
Aug
10-Year Average
2007

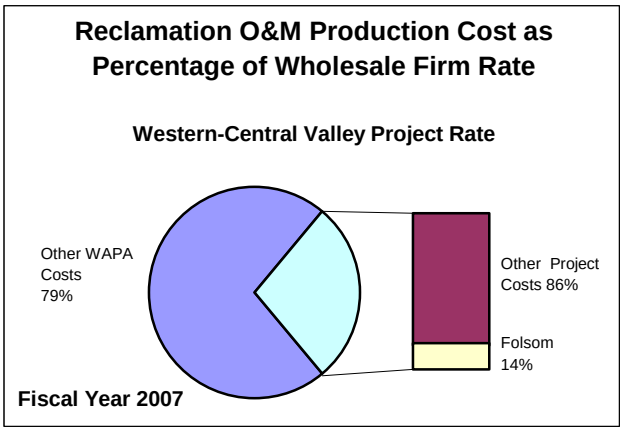

Folsom
Water Supply
Thousand Acre-Feet
6000
5000
4000
3000
2000
1000
0
1998
2000
2002
2004
2006
Water Spilled
Water Supply

Prime Laboratory Benchmarks

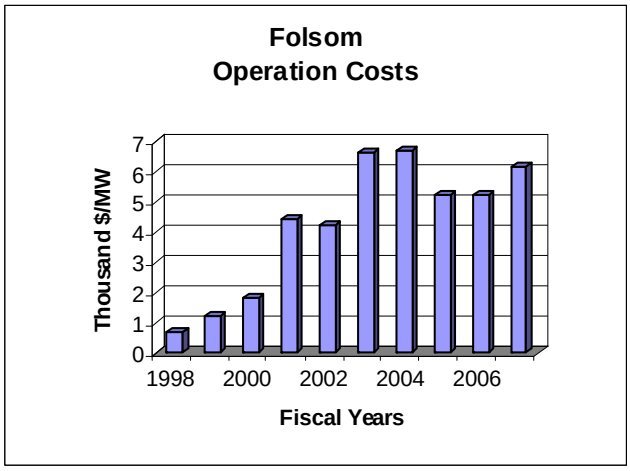
Benchmark 1
Wholesale Firm Rate

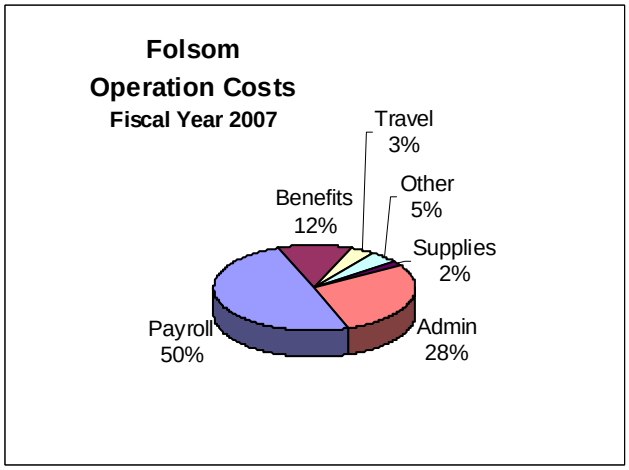


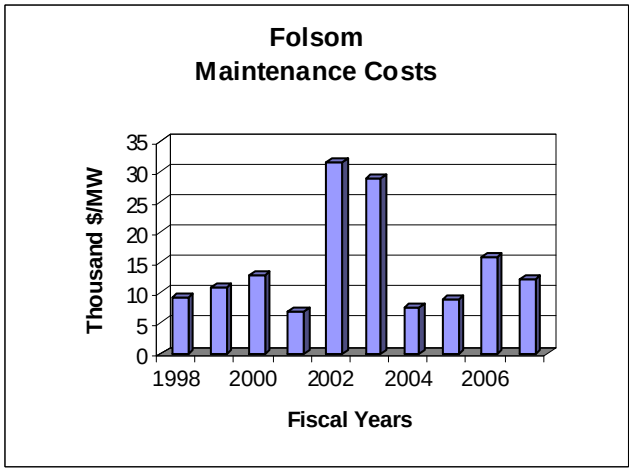
Benchmark 2
Reclamation's Production Cost as Percentage of Wholesale Firm Rate

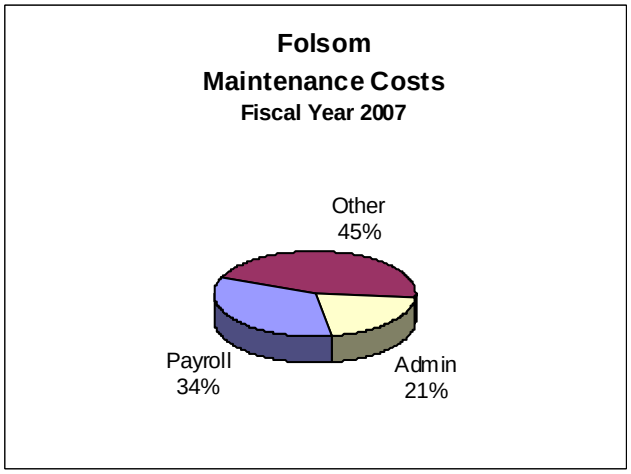


Benchmark 3
Production Cost

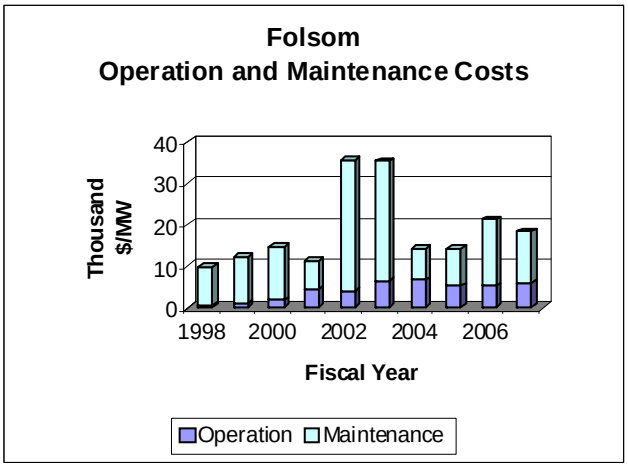


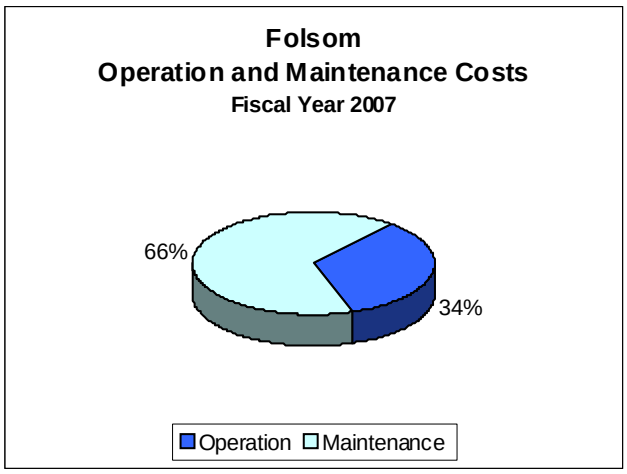


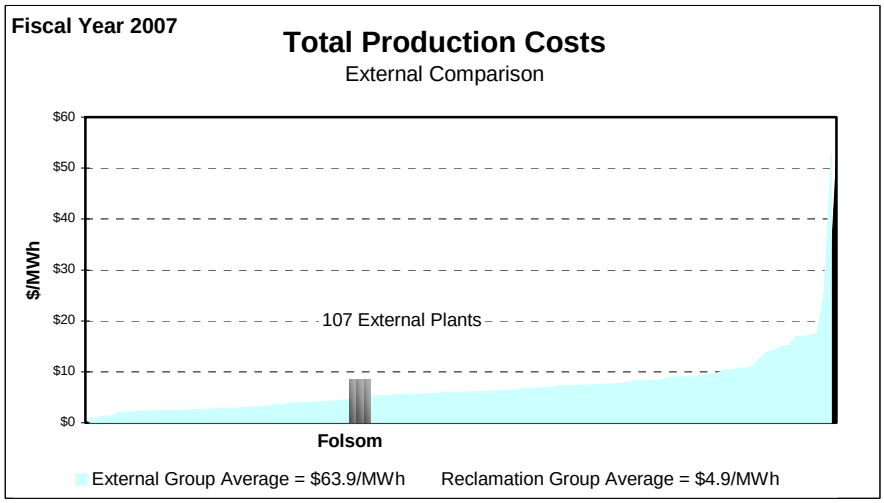


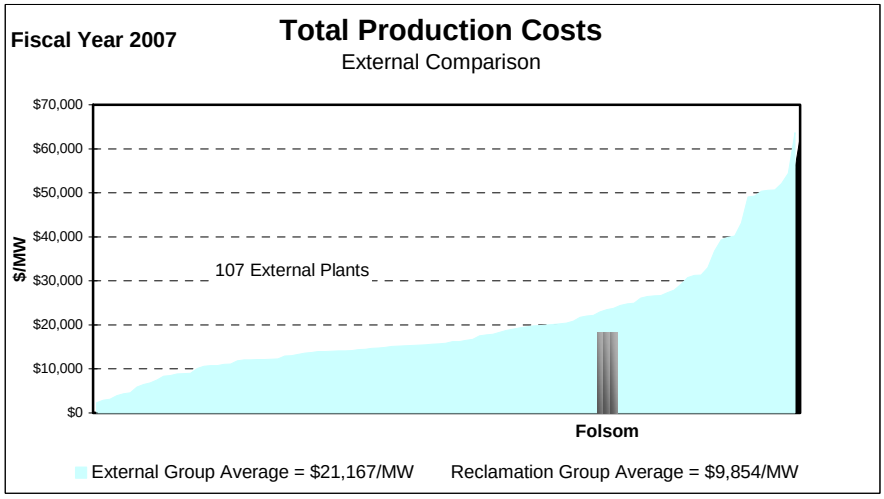


Benchmark 3
Production Cost



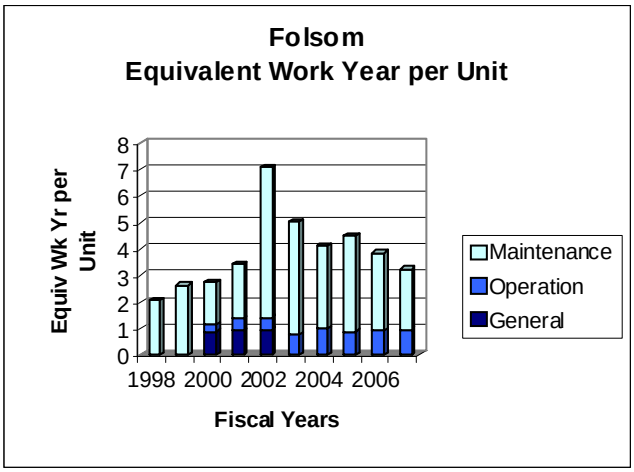


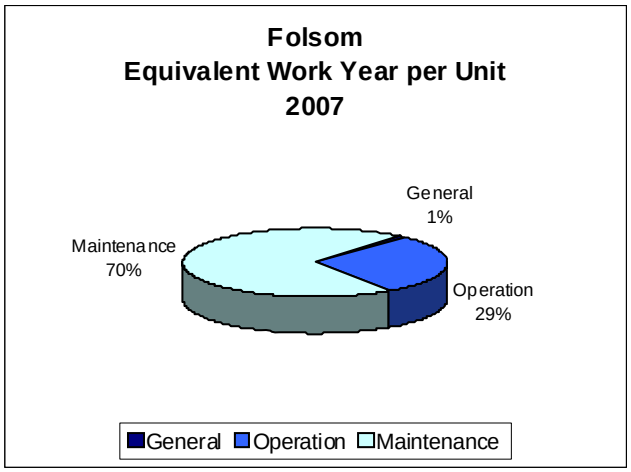


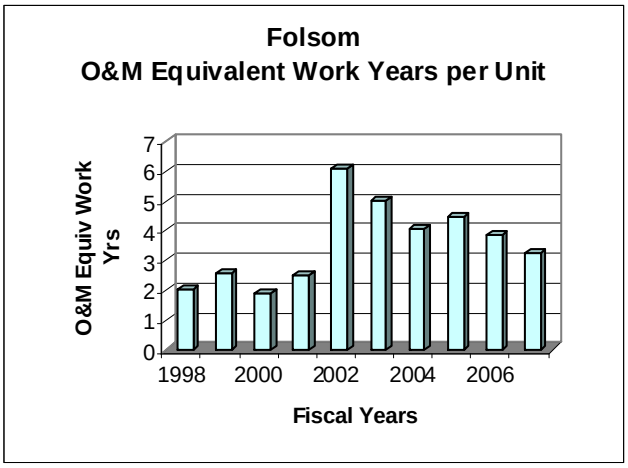


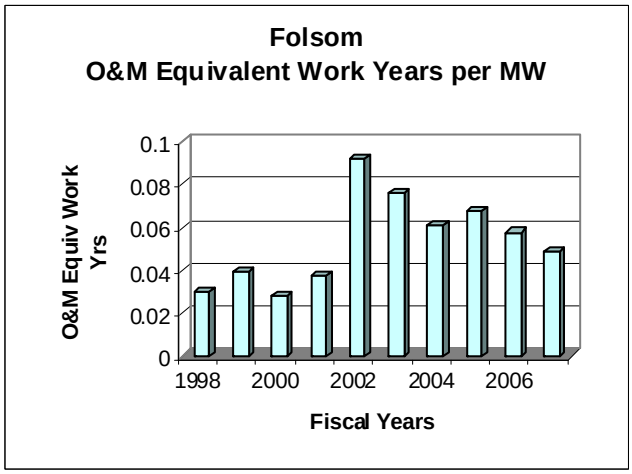
Benchmark 4
Workforce Deployment

Folsom 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	0.00	0.00	0.05	0.05	0.02	0.00
Operation	2.55	0.25	0.00	2.80	0.93	0.01
Maintenance	6.26	0.60	0.00	6.87	2.29	0.03
Total Staffing	8.82	0.85	0.05	9.72	3.24	0.05

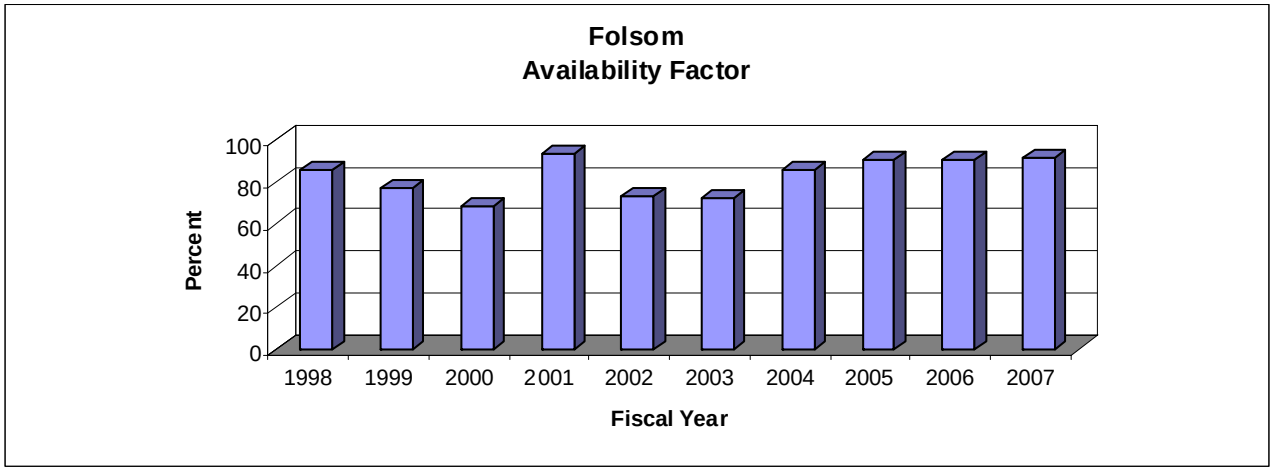




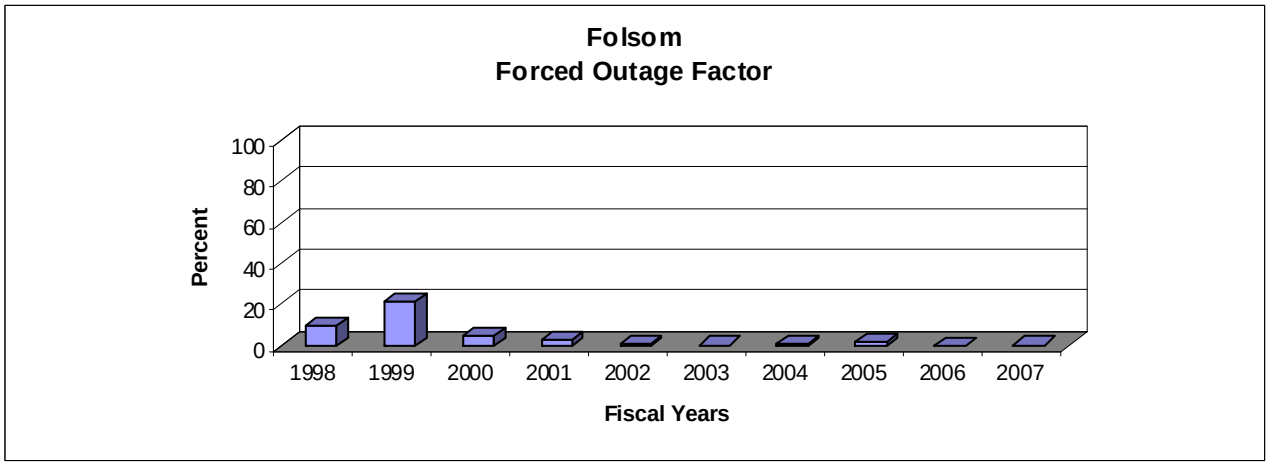




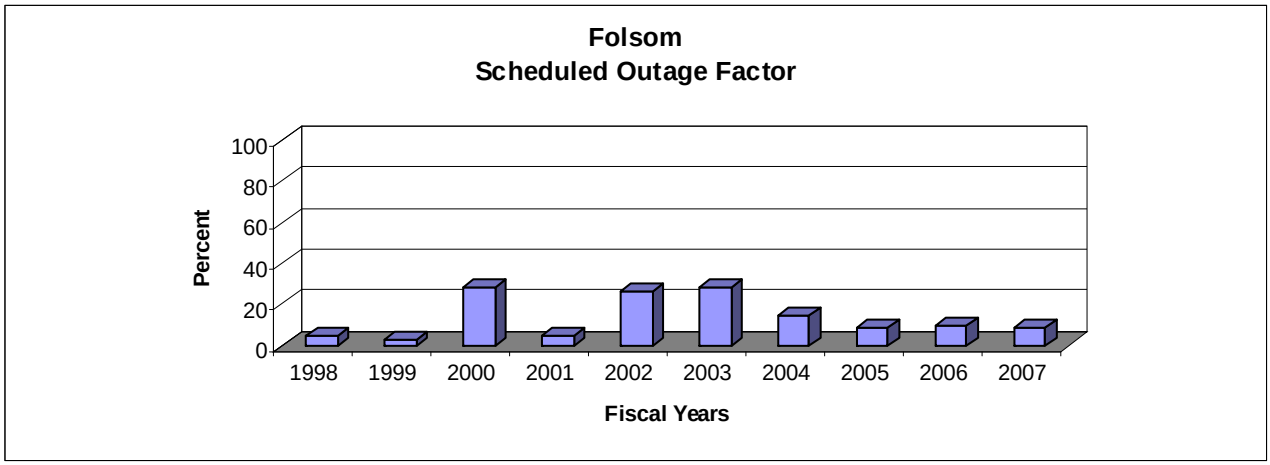
Benchmark 5
Availability Factor



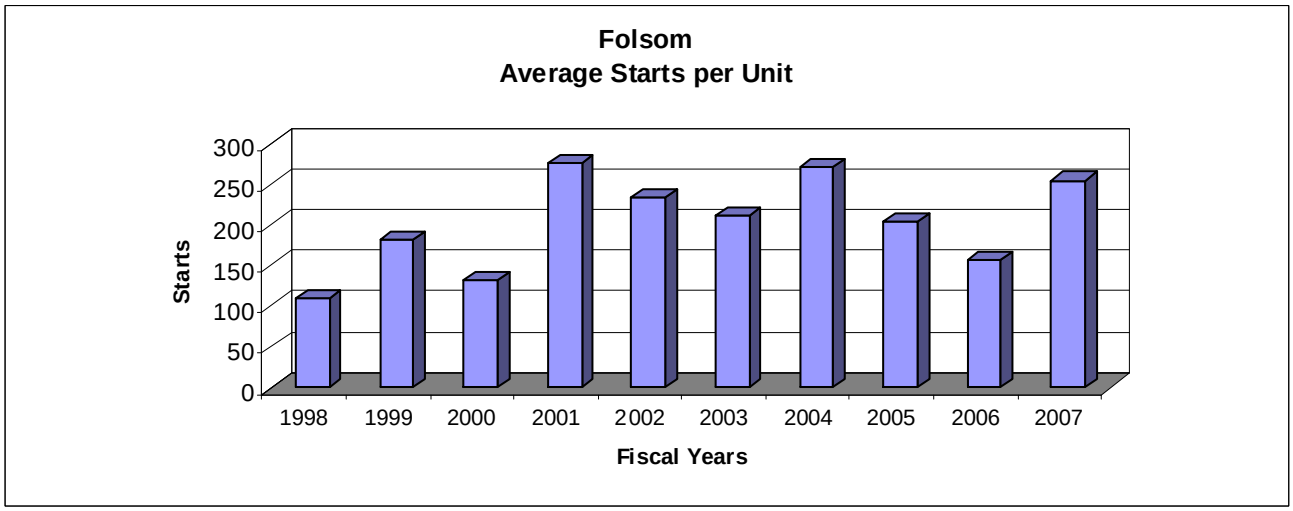
Benchmark 6
Forced Outage Factor



Benchmark 7
Scheduled Outage Factor



Starts



Benchmark Data Comparison					
Fiscal Year 2007	**Folsom Powerplant**	**Reclamation Average 100-500 MW Group**	**Total Reclamation Average**	**Industry Average**	**Best Performers**
Wholesale Firm Rate Mills/kWh	13.7	Not Applicable	*22.45	Not Available	Not Available
Production Cost as Percentage of Wholesale Firm Rate	4.3%	Not Applicable	12.1%	Not Applicable	Not Applicable
O&M Cost $/MWh	8.56	4.44	2.76	***63.88	1.00
O&M Costs $/MW	18,346	10,502	7,847	***21,167	2,897
O&M Equiv Work Year per MW	0.05	0.04	0.03	Not Available	0.00
Availability Factor	91.9	83.5	82.3	**88.64	98.5
Forced Outage Factor	0.1	1.2	2.6	**2.61	0.0
Scheduled Outage Factor	8.0	15.4	15.1	**8.74	0.0

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

Keswick Powerplant
Central Valley Project

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Reclamation Region: Mid-Pacific

NERC Region: Western Electricity Coordinating Council, California - Southern Nevada Power Area

PMA Service Area: Western Area Power Administration, Sierra Nevada Region.

Project Authorization: Funds for construction of the initial features of the Central Valley Project were provided by the Emergency Relief Appropriation Act of 1935 (49 Stat. 115). The Secretary of the Interior authorized the project and the President approved it on December 2, 1935.

The Trinity River Division was authorized by Public Law 386, 84th Congress, 1st Session, approved August 12, 1955.

Project Purposes: The Central Valley Project, one of the Nation's major water conservation developments, extends from the Cascade Range on the north to the semiarid but fertile plains along the Kern River on the south. Initial features of the project were built primarily to protect the Central Valley from crippling water shortages and menacing floods. New project units were built to provide water and power to match the continued growth of the State.

Although developed primarily for irrigation, this multiple-purpose project also provides flood control, improves Sacramento River navigation, supplies domestic and industrial water, generates electric power, conserves fish and wildlife, creates opportunities for recreation, and enhances water quality.

Plant Location: Keswick Powerplant is located on the Sacramento River in Shasta County, California, 9 miles downstream from Shasta Dam about 4 miles west of Redding, California.

Plant Facts: Keswick Dam is a concrete gravity structure 157 feet high and 20 feet wide at the crest. The crest is 1,046 feet long. The Keswick Powerplant, located at Keswick Dam, has three generating units with a total capacity of 117,000 kilowatts.

Plant Purpose: Keswick Powerplant is a run-of-the-river plant, which is dedicated first to meeting the energy requirements of the project facilities. The remaining energy is marketed to various preference customers in northern California.

Plant History: Units were up rated in 1992.

Present Activities: Normal operations. Maintain and regulate river releases.

Future Planned Activities: Studies are being conducted to determine if flashboards can be added to the spillway gates.

Special Issues: Plant augments local loads during system disturbances.

River:	Sacramento River	**Plant Type:**	Conventional
Powerhouse Type:	Above Ground	**Turbine Type:**	Francis
Original Nameplate Capacity:	75,000 kW	**Installed Capacity:**	117,000 kW
Year of Initial Operation:	1949	**Age:**	58 years
Net Generation (FY- 2007):	419.0 GWh	**Rated Head:**	78 feet
Average Plant Factor (FY-2007):	41.0 percent	**Remotely Operated:**	No
Production Mode:	Intermediate		

Ancillary Services

Keswick
Ancillary Services

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

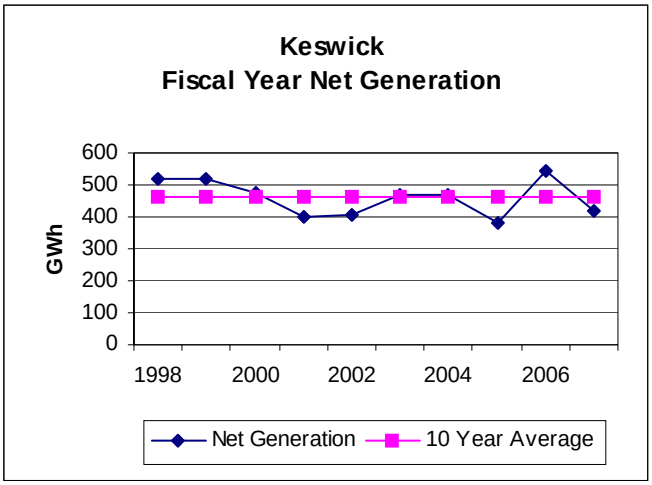
Generators

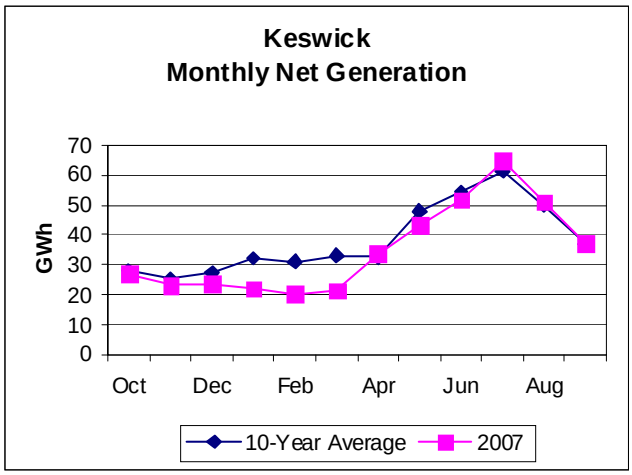
Keswick Generators

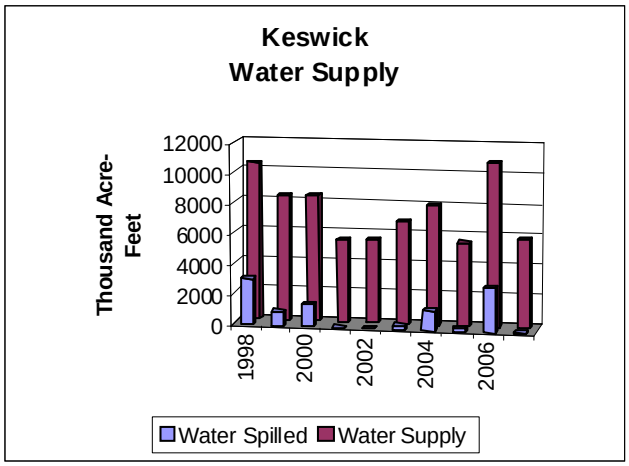
Existing Number and Capacity

Unit #	Original Capacity (kW)	Capacity Increased (kW)	Present Capacity (kW)
1	25,000	14,000	39,000
2	25,000	14,000	39,000
3	25,000	14,000	39,000
3 units	75,000	42,000	117,000

Generation

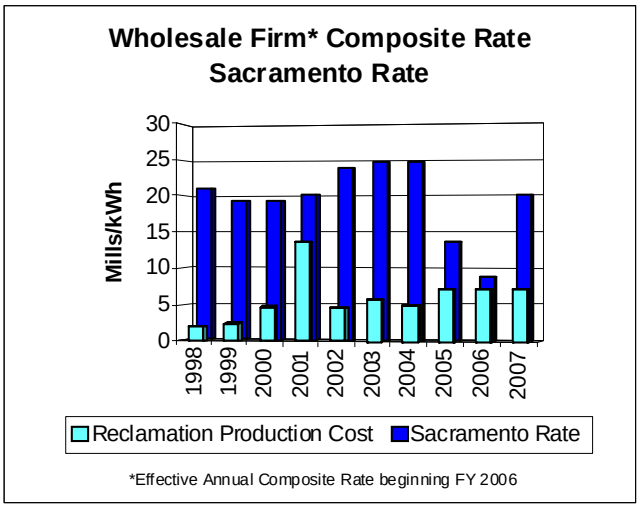

Keswick
Fiscal Year Net Generation
GWh
600
500
400
300
200
100
0
1998
2000
2002
2004
2006
Net Generation
10 Year Average


Keswick
Monthly Net Generation
GWh
70
60
50
40
30
20
10
0
Oct
Dec
Feb
Apr
Jun
Aug
10-Year Average
2007

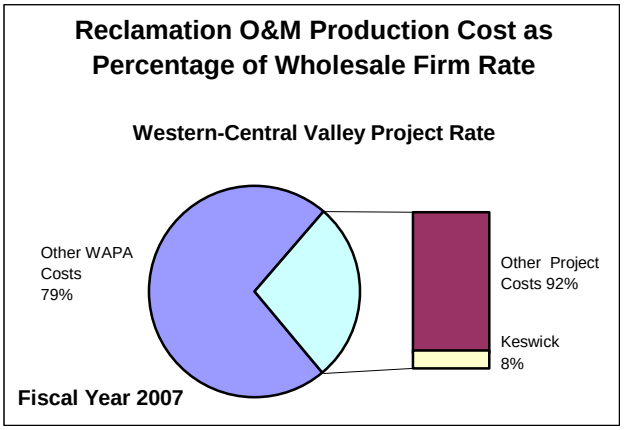

Keswick
Water Supply
Thousand Acre-Feet
12000
10000
8000
6000
4000
2000
0
1998
2000
2002
2004
2006
Water Spilled
Water Supply

Prime Laboratory Benchmarks

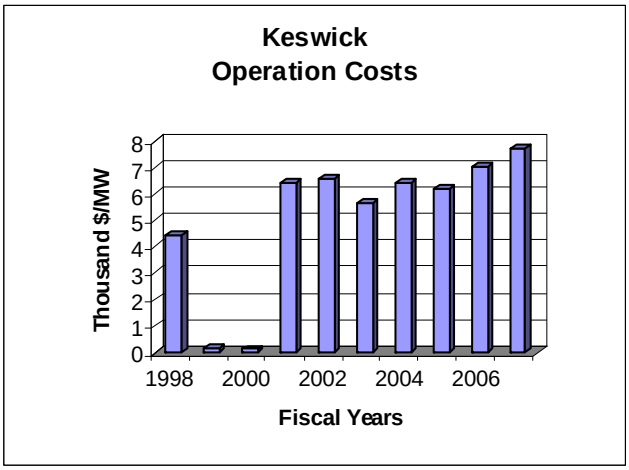
Benchmark 1
Wholesale Firm Rate

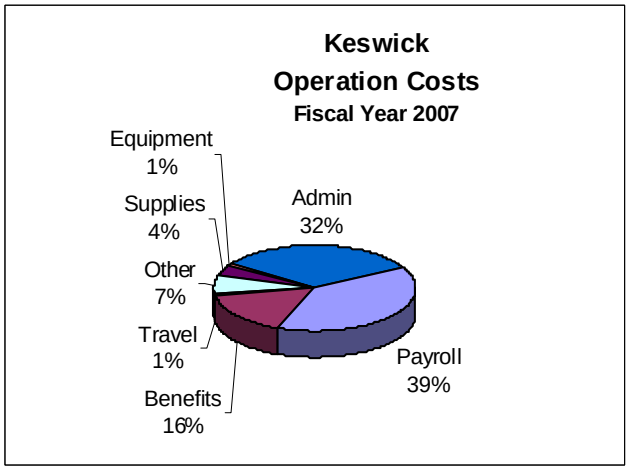


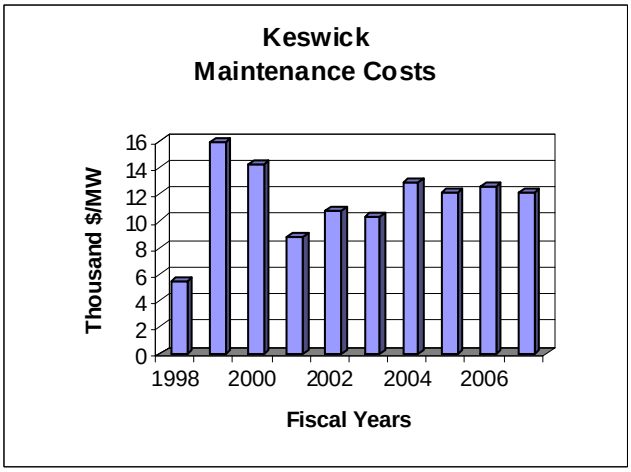
Benchmark 2
Reclamation's Production Cost as Percentage of Wholesale Firm Rate

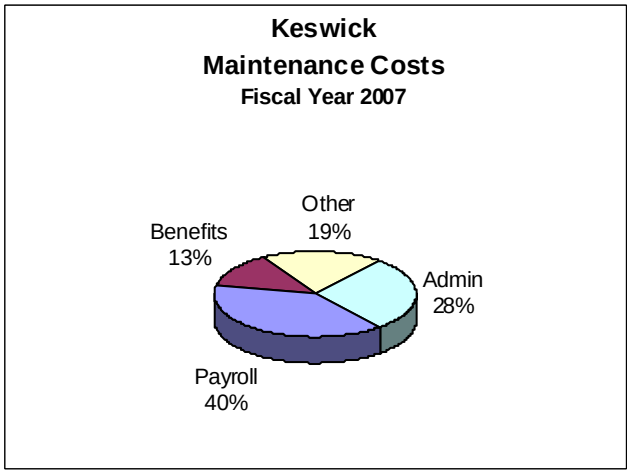


Benchmark 3
Production Cost

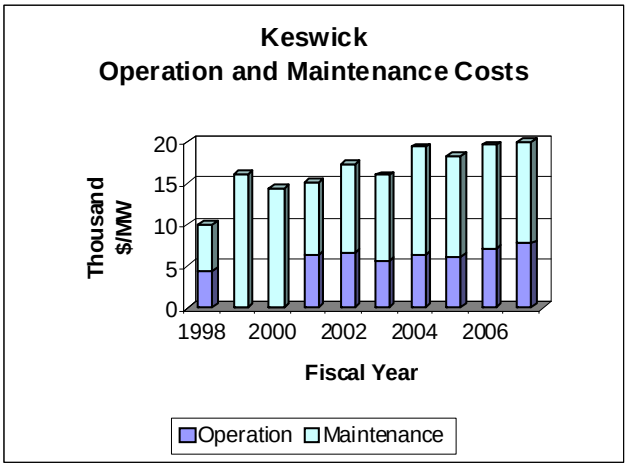


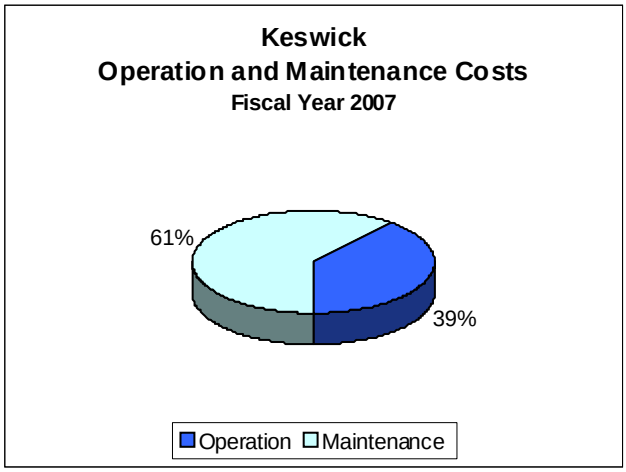


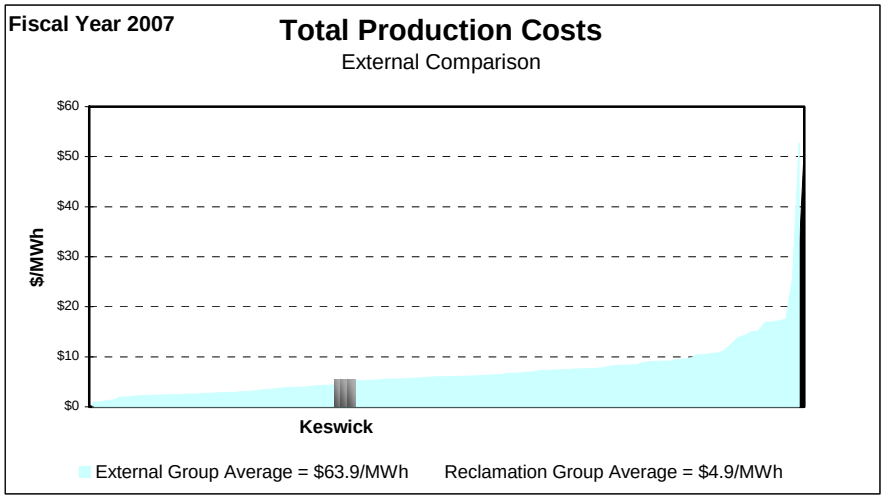


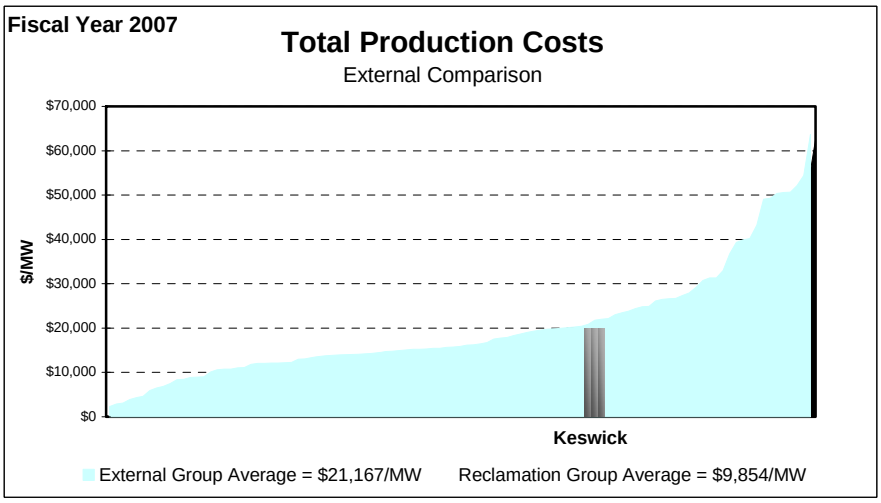


Benchmark 3
Production Cost



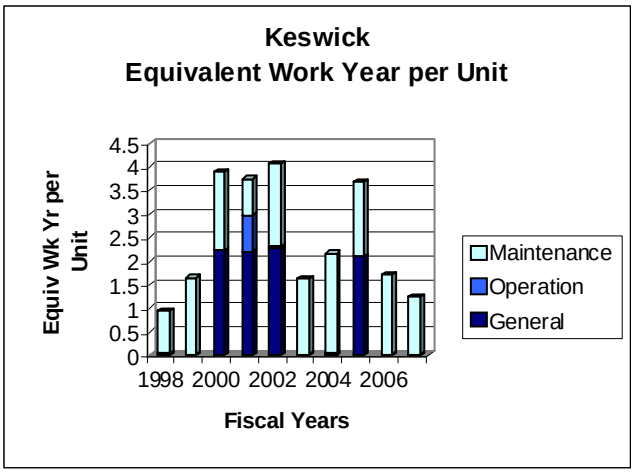


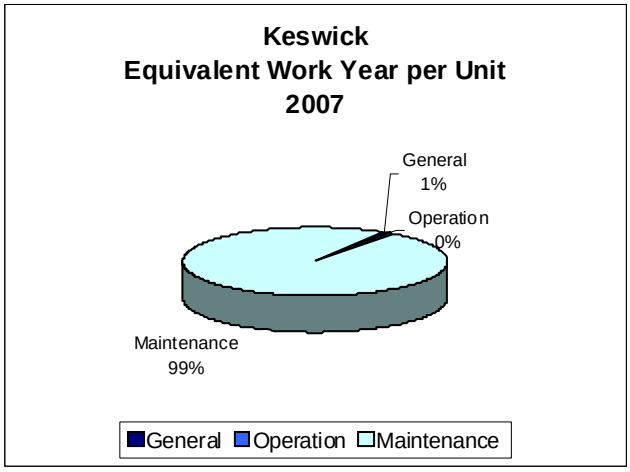


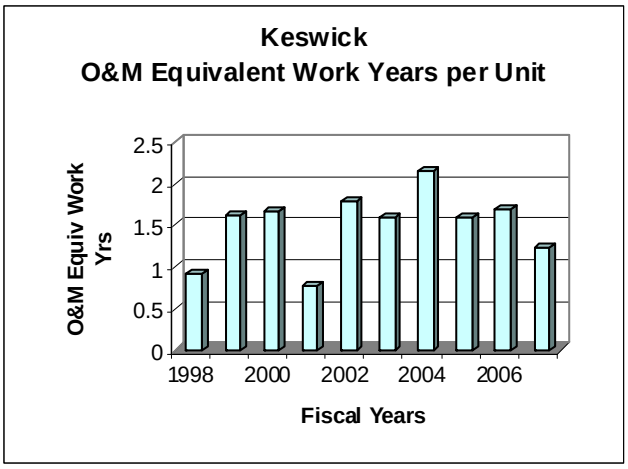


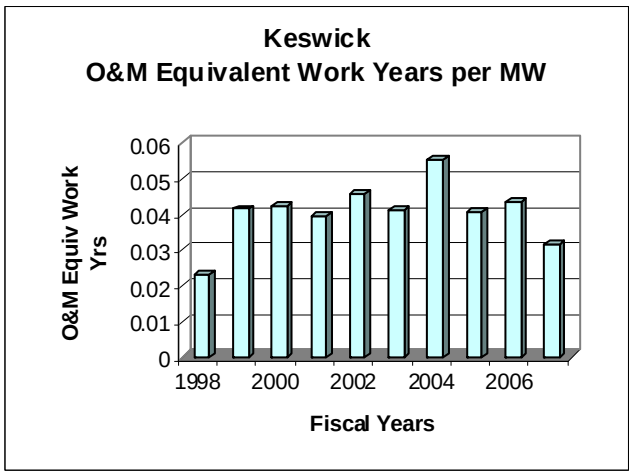
Benchmark 4
Workforce Deployment

Keswick 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	0.00	0.00	0.05	0.05	0.02	0.00
Operation	0.01	0.00	0.00	0.01	0.00	0.00
Maintenance	3.38	0.33	0.00	3.71	1.24	0.03
Total Staffing	3.39	0.33	0.05	3.77	1.26	0.03

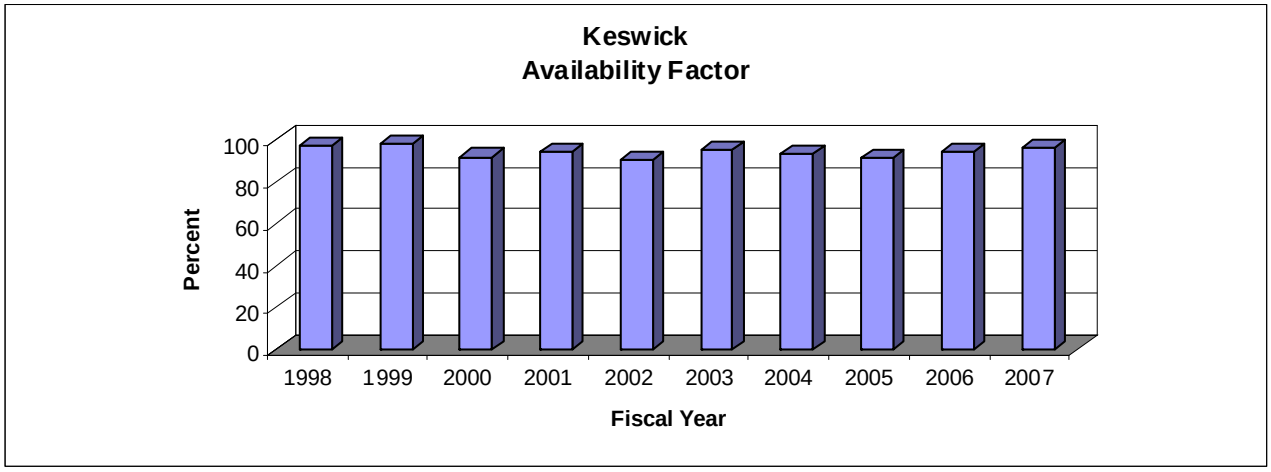




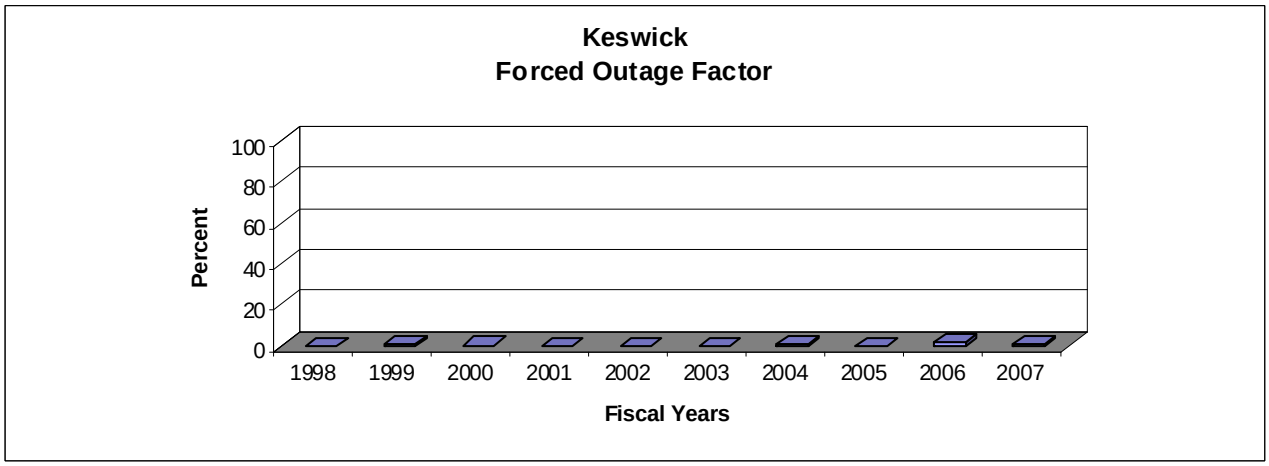




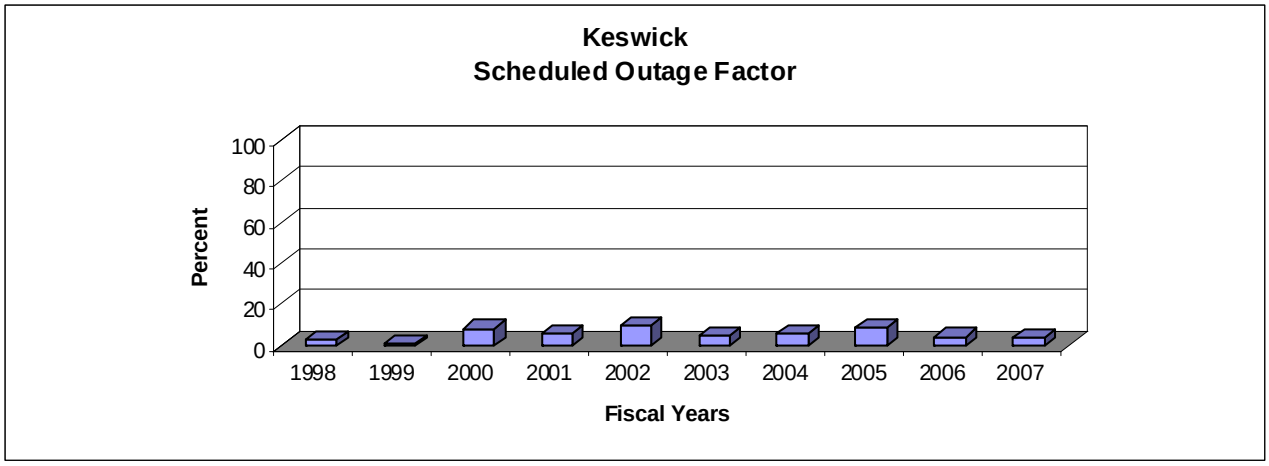
Benchmark 5
Availability Factor



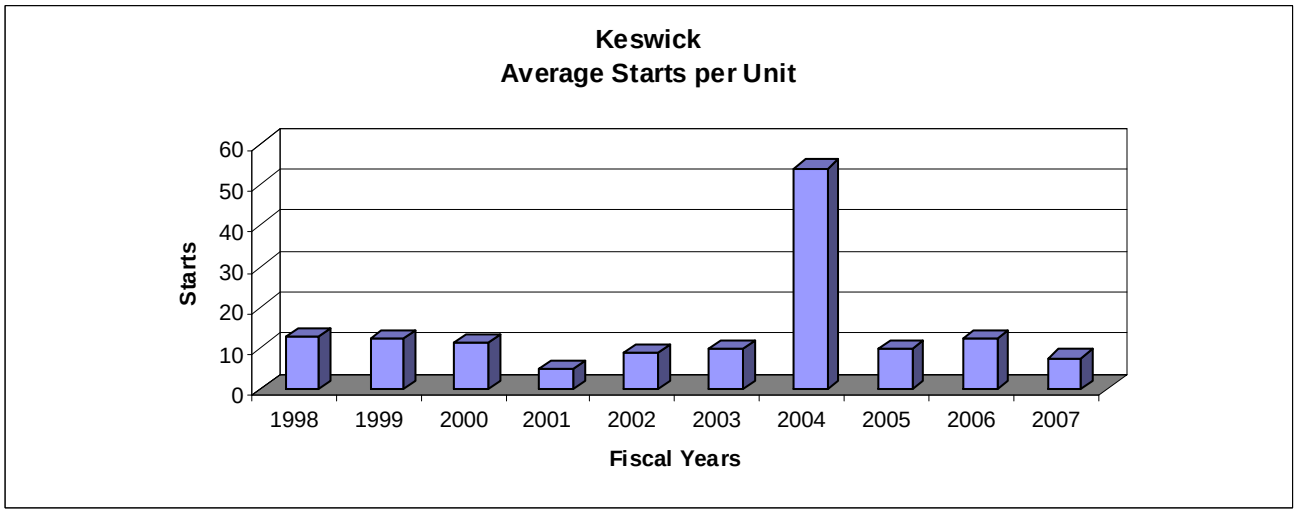
Benchmark 6
Forced Outage Factor



Benchmark 7
Scheduled Outage Factor



Starts



Benchmark Data Comparison

Fiscal Year 2007	Keswick Powerplant	Reclamation Average 100-500 MW Group	Total Reclamation Average	Industry Average	Best Performers
Wholesale Firm Rate Mills/kWh	13.7	Not Applicable	*22.45	Not Available	Not Available
Production Cost as Percentage of Wholesale Firm Rate	2.7%	Not Applicable	12.1%	Not Applicable	Not Applicable
O&M Cost $/MWh	5.55	4.44	2.76	***63.88	1.00
O&M Costs $/MW	19,878	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	96.4	83.5	82.3	**88.64	98.5
Forced Outage Factor	0.2	1.2	2.6	**2.61	0.0
Scheduled Outage Factor	3.3	15.4	15.1	**8.74	0.0

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

Lewiston Powerplant
Central Valley Project

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Reclamation Region: Mid-Pacific

NERC Region: Western Electricity Coordinating Council, California-Southern Nevada Power Area.

PMA Service Area: Western Area Power Administration, Sierra Nevada Region.

Project Authorization: Funds for construction of the initial features of the Central Valley Project were provided by the Emergency Relief Appropriation Act of 1935 (49 Stat. 115). The Secretary of the Interior authorized the project and the President approved it on December 2, 1935.

The Shasta and Trinity River Division of the Central Valley Project was authorized by Public Law 386, 84th Congress, 1st Session, approved August 12, 1955.

Project Purposes: The Central Valley Project, one of the Nation's major water conservation developments, extends from the Cascade Range on the north to the semiarid but fertile plains along the Kern River on the south. Initial features of the project were built primarily to protect the Central Valley from crippling water shortages and menacing floods. New project units were built to provide water and power to match the continued growth of the State.

Although developed primarily for irrigation, this multiple-purpose project also provides flood control, improves Sacramento River navigation, supplies domestic and industrial water, generates electric power, conserves fish and wildlife, creates opportunities for recreation, and enhances water quality.

The Trinity River Division consists of Trinity Dam and Clair Engle Lake, Trinity Powerplant, Lewiston Dam and Lake, Lewiston Powerplant, Clear Creek Tunnel, Judge Francis Carr Powerhouse, Whiskeytown Dam and Lake, Spring Creek Tunnel and Powerplant, Spring Creek Debris Dam and Reservoir, and related pumping and distribution facilities. These facilities were built and are operated by the Bureau of Reclamation.

Plant Location: Lewiston Powerplant is located on the Trinity River about 7 miles downstream from Trinity Dam.

Plant Facts: Lewiston Dam is a zoned earth fill structure 91 feet high and 25 feet wide at the crest. The crest is 754 feet long. Transmission lines were constructed and operated by the Bureau of Reclamation until October 1, 1977, when they were transferred to the Western Area Power Administration, Department of Energy.

Plant Purpose: Lewiston Power plant is operated in conjunction with the spillway gates to maintain the minimum flow in the Trinity River downstream of the dam. The turbine is normally set at maximum output with the spillway gates adjusted to regulate river flow. It provides power to the adjacent fish hatchery.

Plant History: The powerplant served hatchery loads and station service requirements for Trinity and Judge Francis Carr Power plants. Administration of the contract was transferred to Western in 1977 and the interconnection contract with Pacific Gas and Electric was canceled in 1989. A new interconnection contract was signed in 1990.

Present Activities: Lewiston maintains and regulates river releases. Energy in excess of hatchery loads is sold to Pacific Gas and Electric at 15 mills per kilowatt-hour.

Future Planned Activities: The Record of Decision (ROD) for the Trinity River Restoration Project has increased the base flows downstream from the Lewiston Dam. These flows exceed the maximum flows through the existing turbine. The Trinity County Public Utility District is considering the possible upgrade or replacement of the plant to take advantage of the increased generation potential due to the RODs increased flow.

Special Issues: The turbine capacity is exceeded by the Trinity River minimum flow established by the ROD.

River:	Trinity River	**Plant Type:**	Conventional
Powerhouse Type:	Above Ground	**Turbine Type:**	Francis
Original Nameplate Capacity:	350 kW	**Installed Capacity:**	350 kW
Year of Initial Operation:	1964	**Age:**	44 years
Net Generation (FY-2007):	3.3 GWh	**Rated Head:**	60 feet
Average Plant Factor (FY-2007):	108.8 percent	**Remotely Operated:**	Yes
Production Mode:	Base Load		

Ancillary Services

Lewiston
Ancillary Services

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

Generators

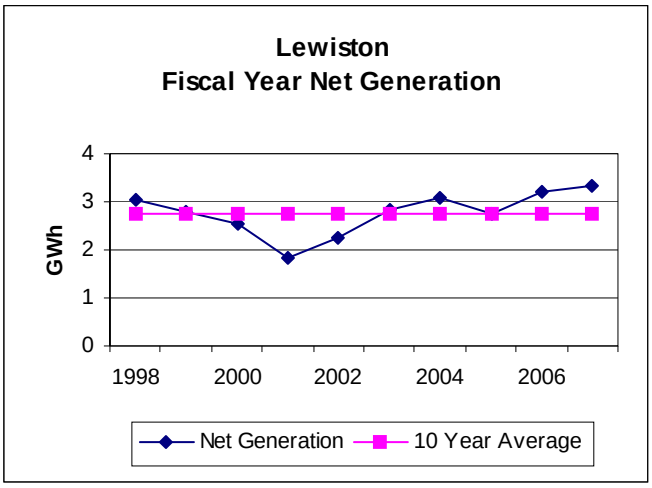
Lewiston Generators

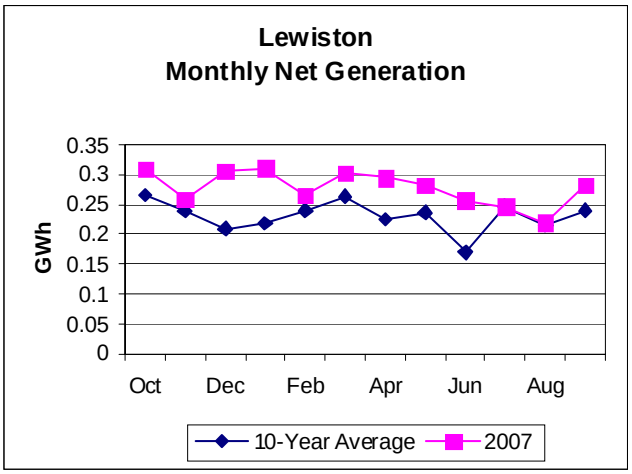
Existing Number and Capacity

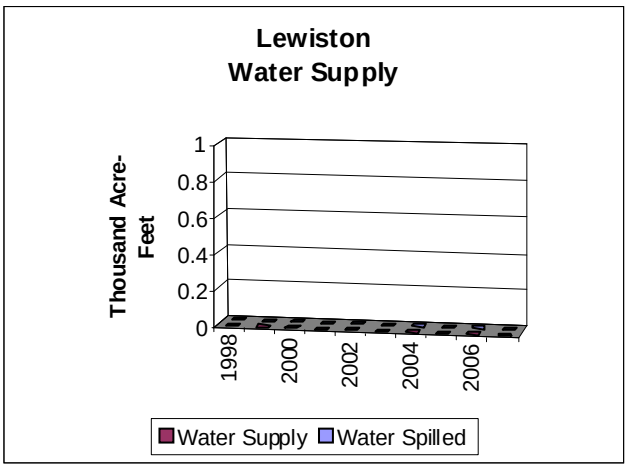
Unit #	Original Capacity (kW)	Capacity Increased (kW)	Present Capacity (kW)
1	350	-	350
1 Unit	350	-	350

The maximum operational capacity is 504 kW.

Generation

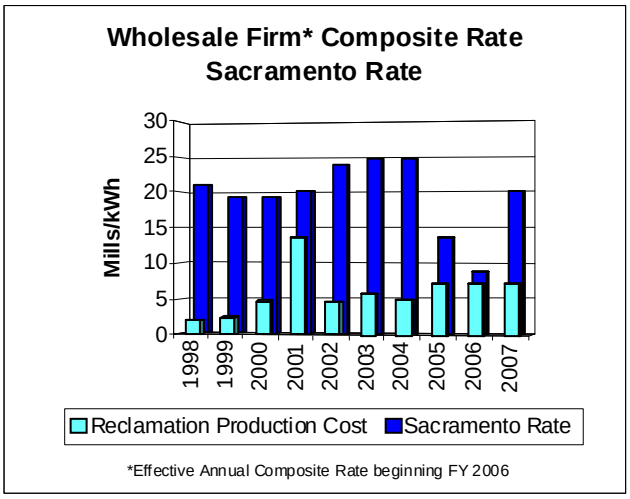

Lewiston
Fiscal Year Net Generation
GWh
4
3
2
1
0
1998
2000
2002
2004
2006
Net Generation
10 Year Average


Lewiston
Monthly Net Generation
GWh
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
Oct
Dec
Feb
Apr
Jun
Aug
10-Year Average
2007

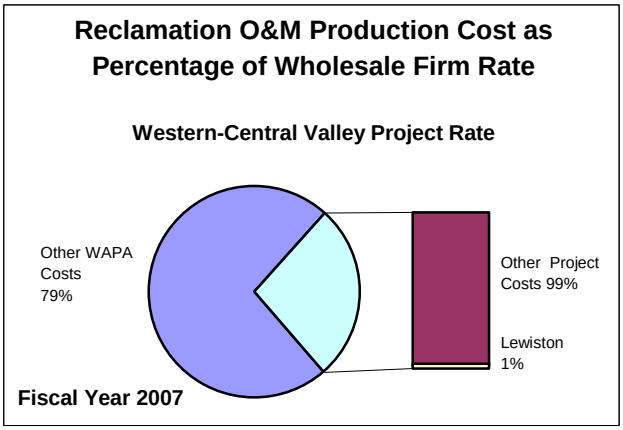

Lewiston
Water Supply
Thousand Acre-Feet
1
0.8
0.6
0.4
0.2
0
1998
2000
2002
2004
2006
Water Supply
Water Spilled

Prime Laboratory Benchmarks

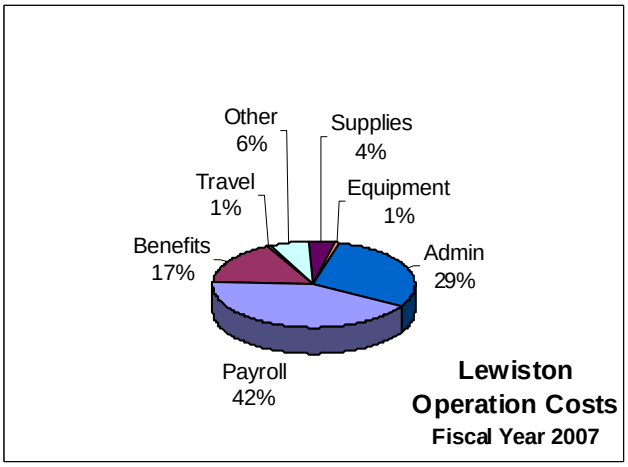
Benchmark 1
Wholesale Firm Rate

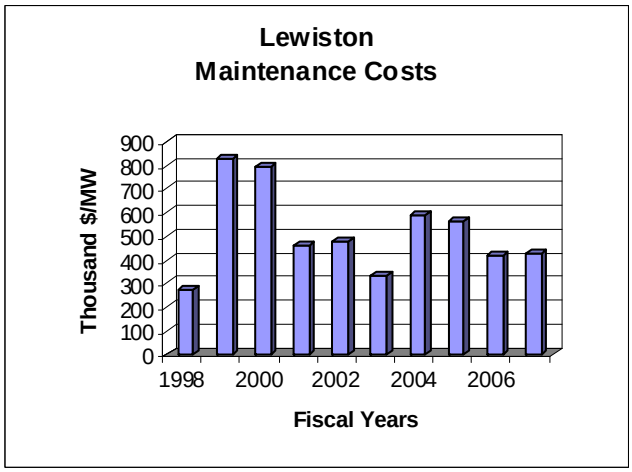


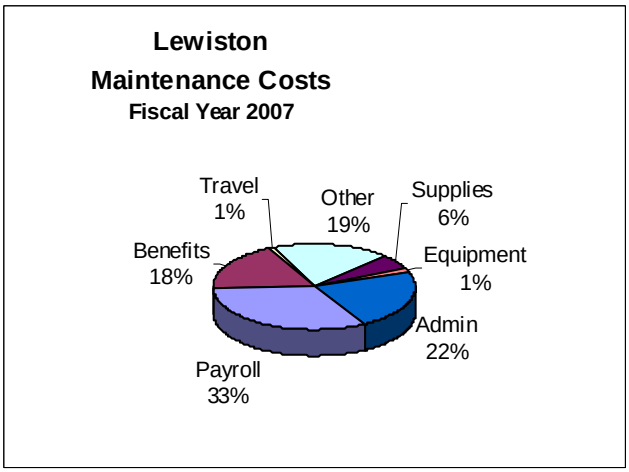
Benchmark 2
Reclamation's Production Cost as Percentage of Wholesale Firm Rate

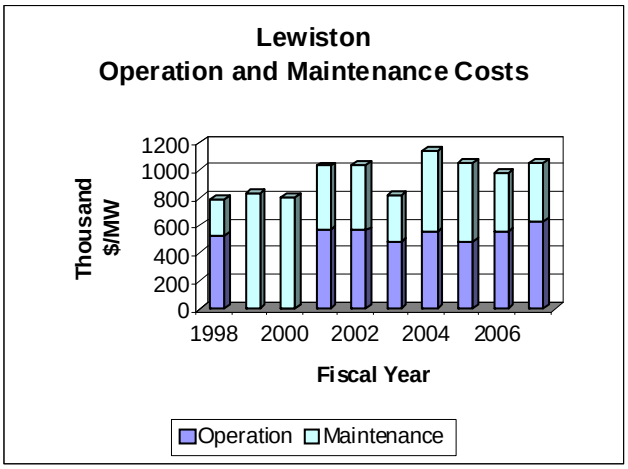


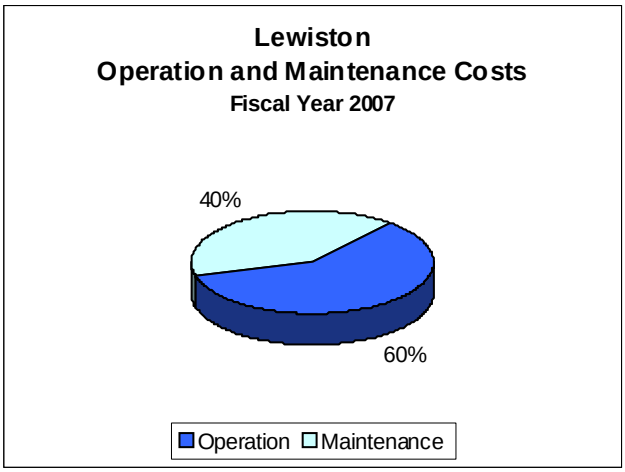
Benchmark 3
Production Cost





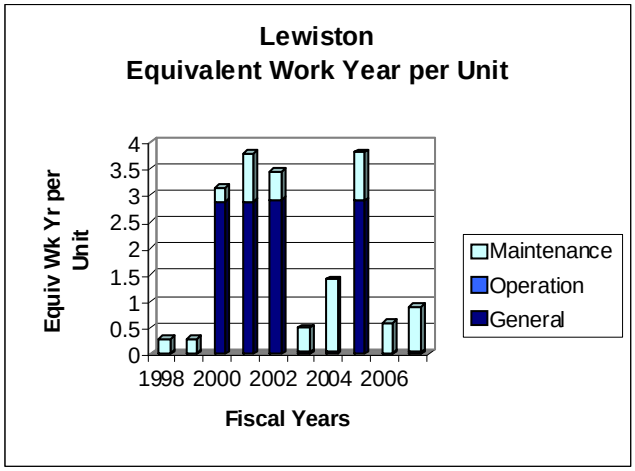


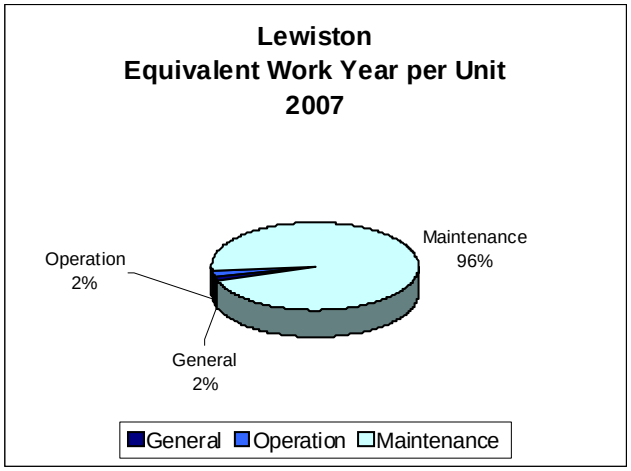


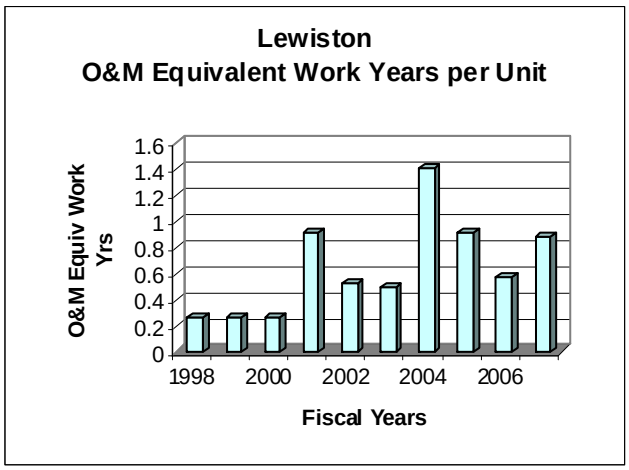


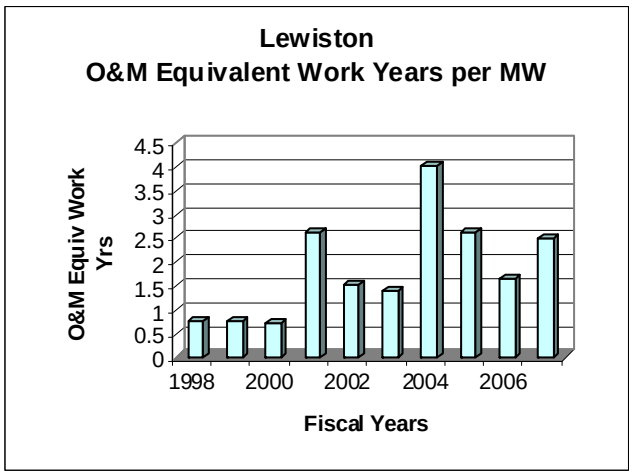
Benchmark 4
Workforce Deployment

Lewiston 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	0.00	0.00	0.02	0.02	0.02	0.05
Operation	0.02	0.00	0.00	0.02	0.02	0.06
Maintenance	0.78	0.08	0.00	0.86	0.86	2.46
Total Staffing	0.80	0.08	0.02	0.90	0.90	2.57

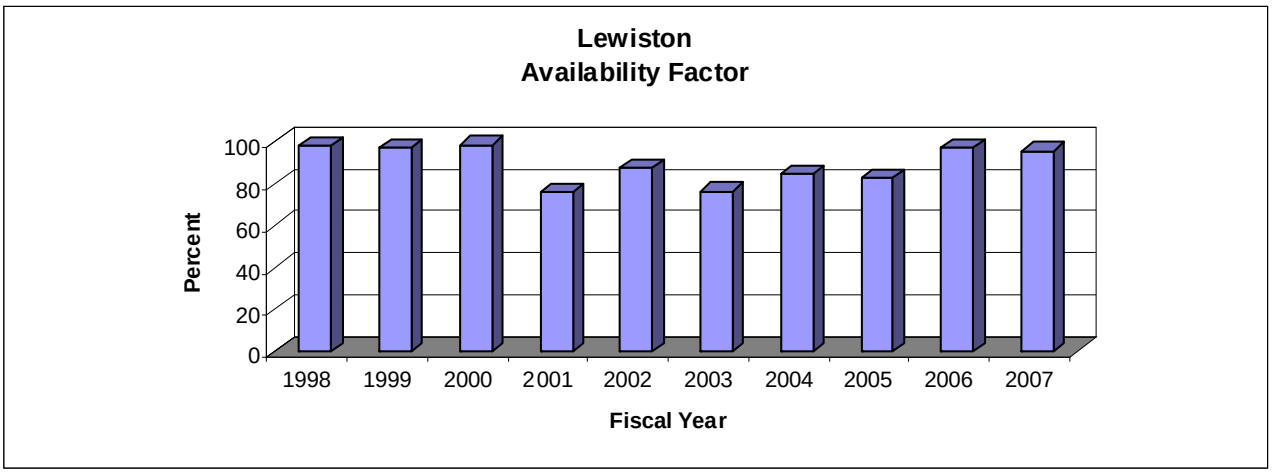




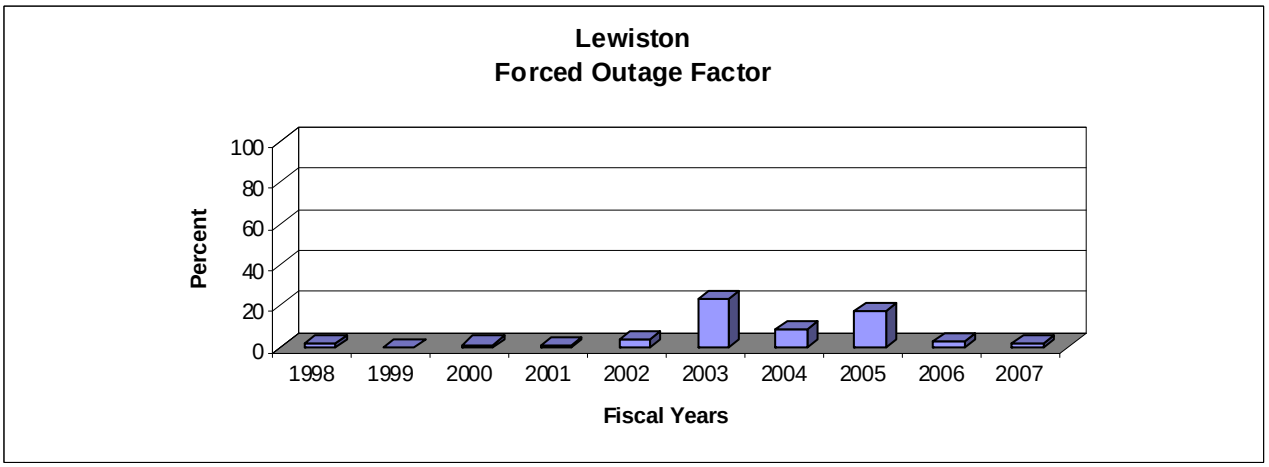




Benchmark 5
Availability Factor

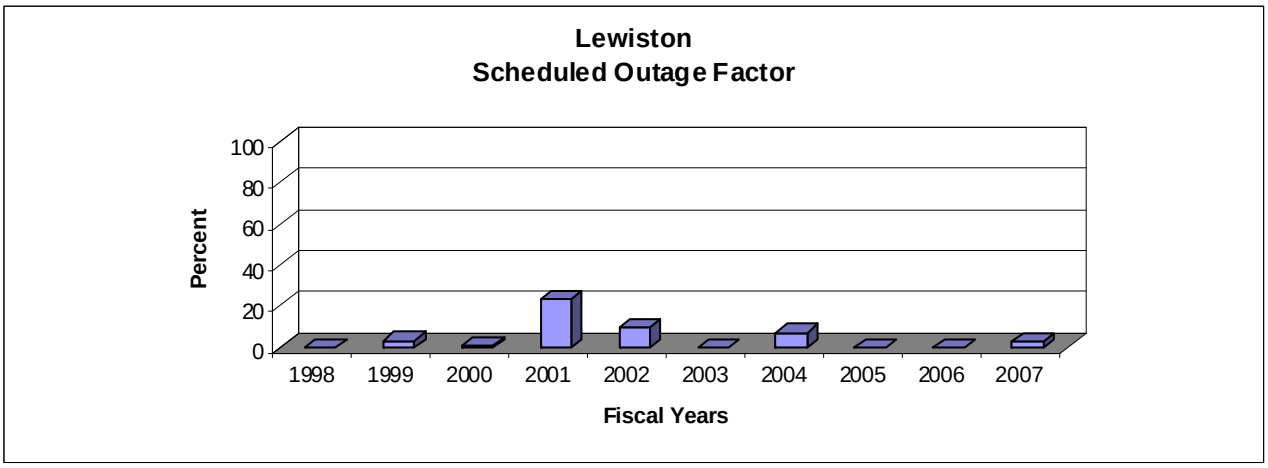


Benchmark 6
Forced Outage Factor

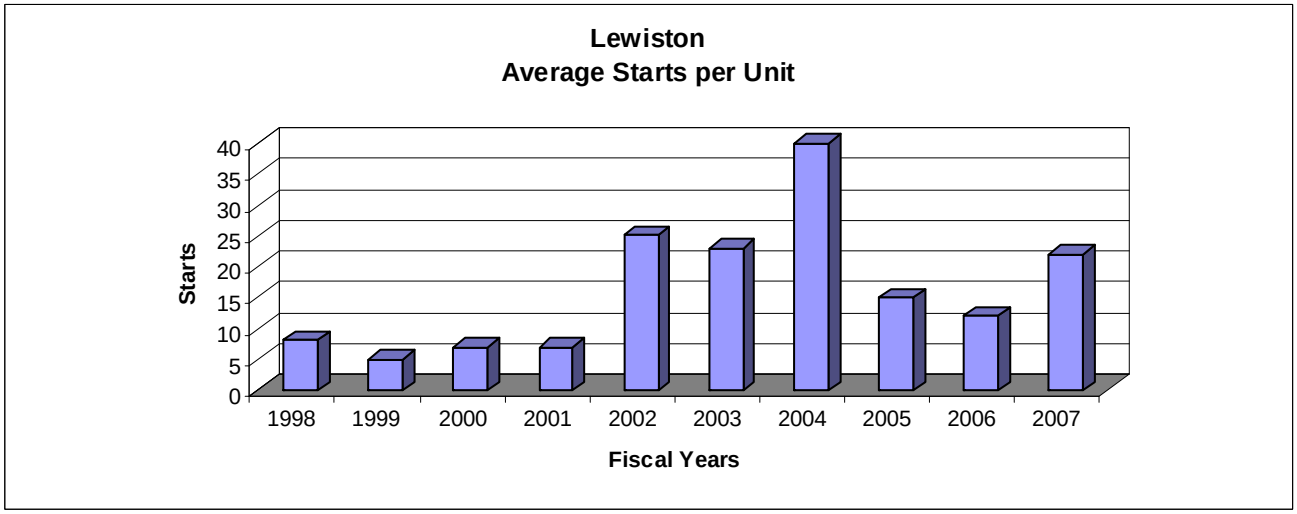


FY 03 – Several forced outages were the result of severe weather (lightning storms) and problems in the Trinity County Public Utility District distribution system. The remoteness of the site and the age of the equipment also contributed to the length of these outages.

Benchmark 7
Scheduled Outage Factor



Starts



Benchmark Data Comparison				
Fiscal Year 2007	**Lewiston Powerplant**	**Total Reclamation Average**	**Industry Average**	**Best Performers**
Wholesale Firm Rate Mills/kWh	13.7	*22.45	Not Available	Not Available
Production Cost as Percentage of Wholesale Firm Rate	0.4%	12.1%	Not Applicable	Not Applicable
O&M Cost $/MWh	110.58	2.76	Not Applicable	1.00
O&M Costs $/MW	1,053,668	7,847	Not Applicable	2,897
O&M Equiv Work Year per MW	0.00	0.03	Not Available	0.00
Availability Factor	95.8	82.3	**88.64	98.5
Forced Outage Factor	1.82	2.6	**2.61	0.0
Scheduled Outage Factor	2.3	15.1	**8.74	0.0

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

At 350 kW, Lewiston is the smallest powerplant in Reclamation. As a result, the cost indicators are out of line compared to 40 MW units and larger.

New Melones Powerplant
Central Valley Project

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Mike Finnegan, Area Manager
Central California Area Office

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Central California Area Office
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Jamestown CA 95327-9749

Telephone Numbers:
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Fax: (916) 989-7208

E-Mail Address:
mfinnegan@mp.usbr.gov

Reclamation Region: Mid-Pacific

NERC Region: Western Electricity Coordinating Council, California-Southern Nevada Power Area

PMA Service Area: Western Area Power Administration, Sierra Nevada Region

Project Authorization: Funds for construction of the initial features of the Central Valley Project were provided by the Emergency Relief Appropriation Act of 1935 (49 Stat. 115). The Secretary of the Interior authorized the project and the President approved it on December 2, 1935.

Project Purposes: The Central Valley Project, one of the Nation's major water conservation developments, extends from the Cascade Range on the north to the semiarid but fertile plains along the Kern River on the south. Initial features of the project were built primarily to protect the Central Valley from crippling water shortages and menacing floods. New project units were built to provide water and power to match the continued growth of the State.

Although New Melones Unit, East Side Division, was developed primarily for irrigation, this multiple-purpose project also provides flood control, improves Sacramento River navigation, supplies domestic and industrial water, generates electric power, conserves fish and wildlife, creates opportunities for recreation, and enhances water quality.

Plant Location:	The New Melones Powerplant is located in Tuolumne County, California, on the Stanislaus River.
Plant Facts:	New Melones Dam is an earth and rock fill structure 625 feet high and 40 feet wide at the crest. The crest is 1,560 feet long.
Plant Purpose:	New Melones Powerplant is a peaking plant. The power generated at this plant is dedicated first to meeting the requirements of the project facilities. The remaining energy is marketed to various preference customers in northern California.
Plant History:	In November 1979, the New Melones Unit, East Side Division, was officially transferred to Reclamation from the Corps of Engineers by Public Law 87-874.
Present Activities:	Normal operations. Primary and peaking reservoir releases are made through the powerplant.
Future Planned Activities:	The powerplant will continue to provide normal operations and peaking generation as releases permit.
Special Issues:	None

River:	Stanislaus River	**Plant Type:**	Conventional
Powerhouse Type:	Above Ground	**Turbine Type:**	Francis
Original Nameplate Capacity:	300,000 kW	**Installed Capacity:**	300,000 kW
Year of Initial Operation:	1979	**Age:**	28 years
Net Generation (FY-2007):	524.3 GWh	**Rated Head:**	460 feet
Average Plant Factor (FY-2007):	20.0 percent	**Remotely Operated:**	Yes
Production Mode:	Peaking		

Ancillary Services

New Melones
Ancillary Services

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

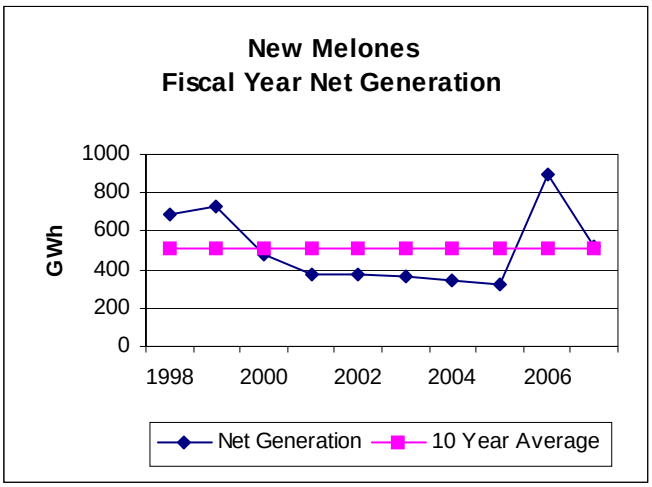
Generators

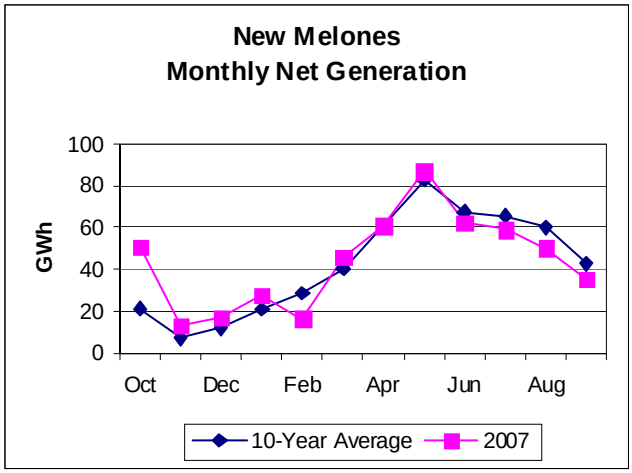
New Melones Generators
Existing Number and Capacity

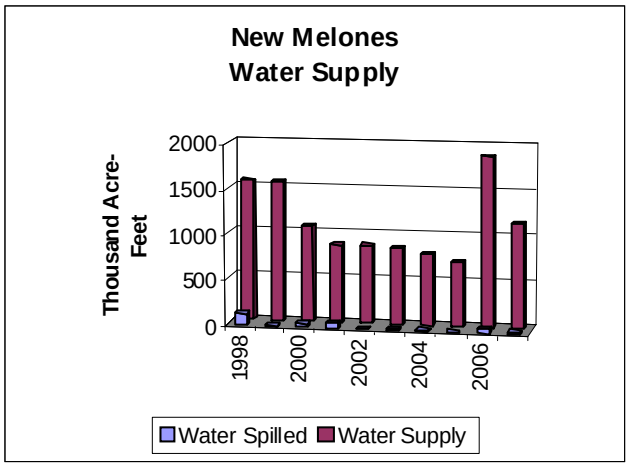
Unit #	Original Capacity (kW)	Capacity Increased (kW)	Present Capacity (kW)
1	150,000	-	150,000
2	150,000	-	150,000
4 units	300,000	-	300,000

The maximum operational capacity is 380,000 kW

Generation

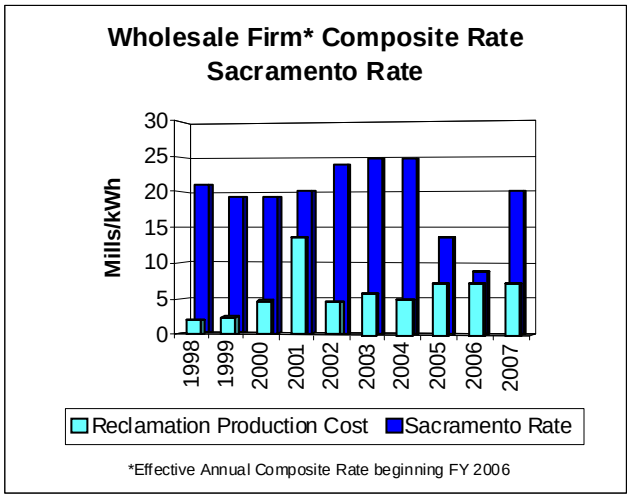

New Melones
Fiscal Year Net Generation
GWh
1000
800
600
400
200
0
1998
2000
2002
2004
2006
Net Generation
10 Year Average


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

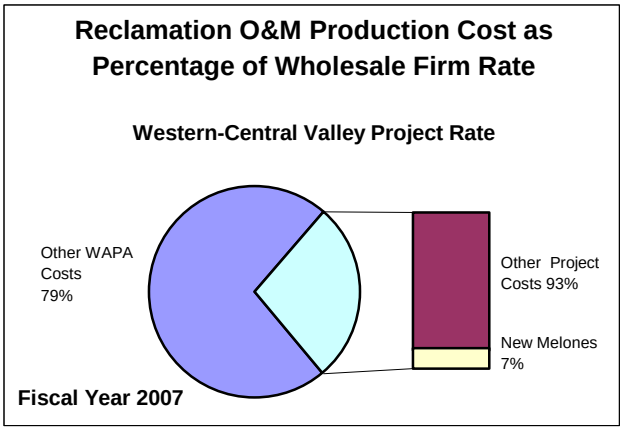

New Melones
Water Supply
Thousand Acre-Feet
2000
1500
1000
500
0
1998
2000
2002
2004
2006
Water Spilled
Water Supply

Prime Laboratory Benchmarks

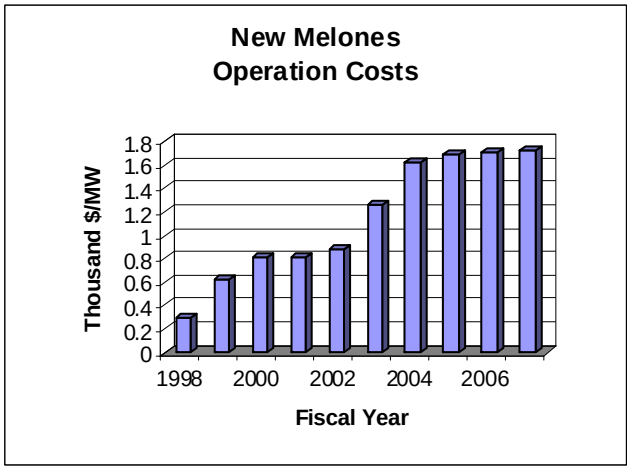
Benchmark 1
Wholesale Firm Rate

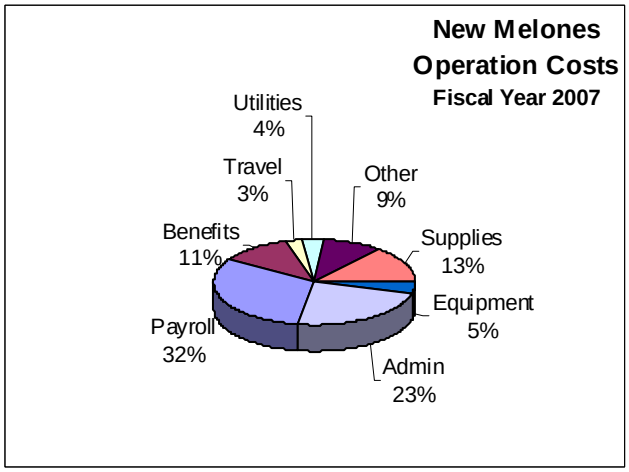


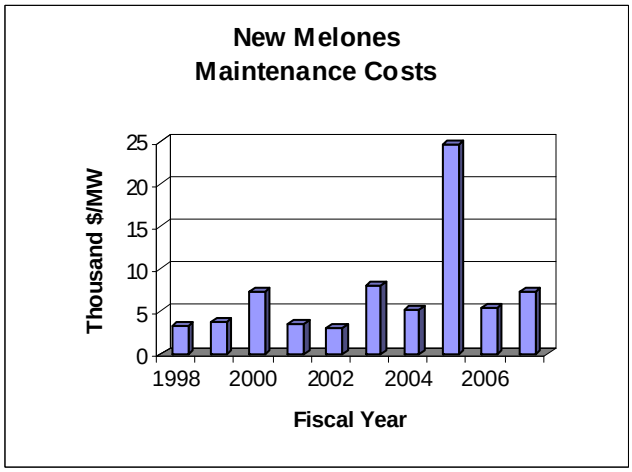
Benchmark 2
Reclamation's Production Cost as Percentage of Wholesale Firm Rate

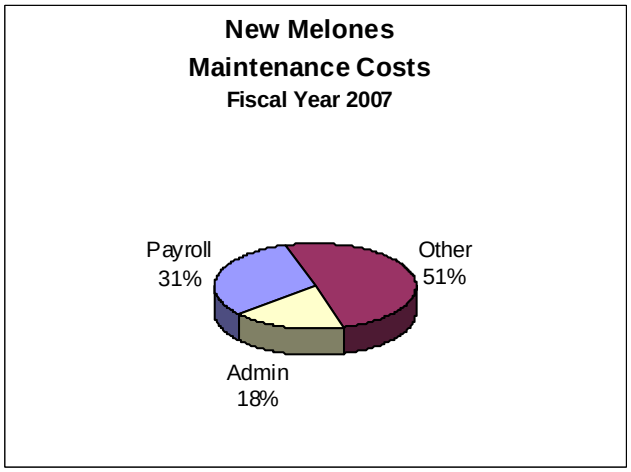


Benchmark 3
Production Cost

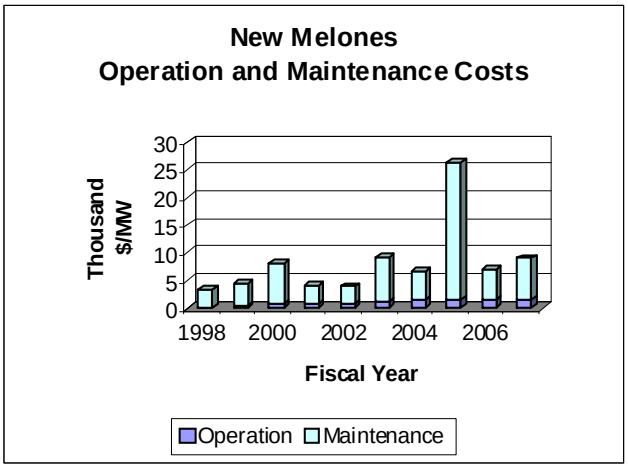


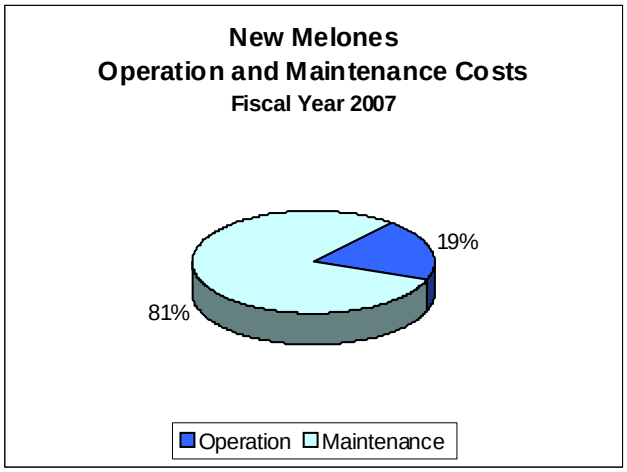


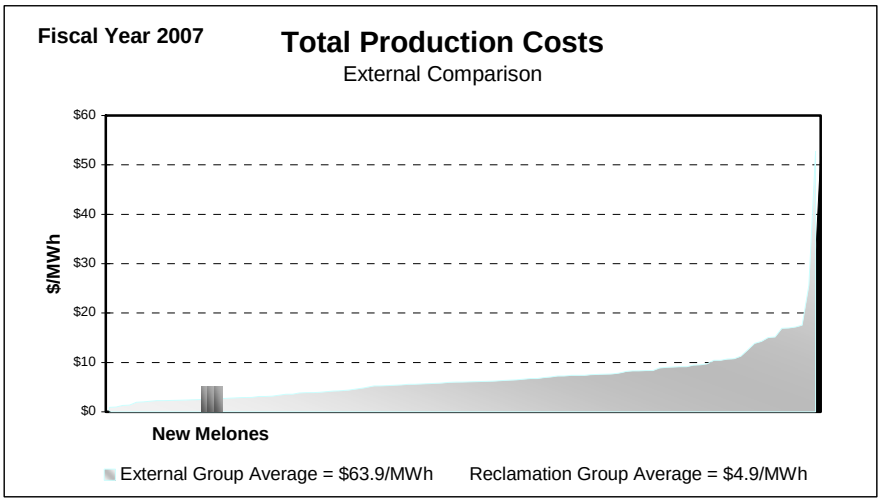


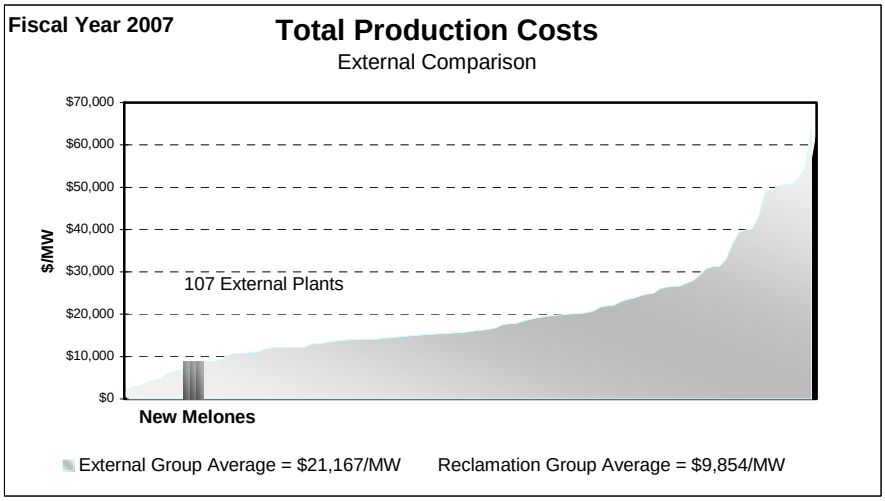


Benchmark 3
Production Cost



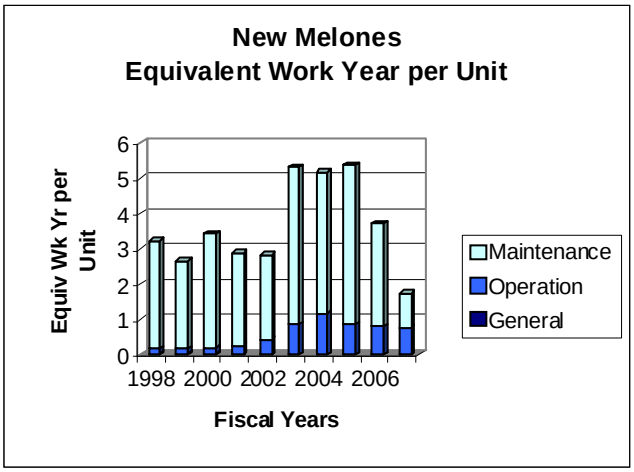


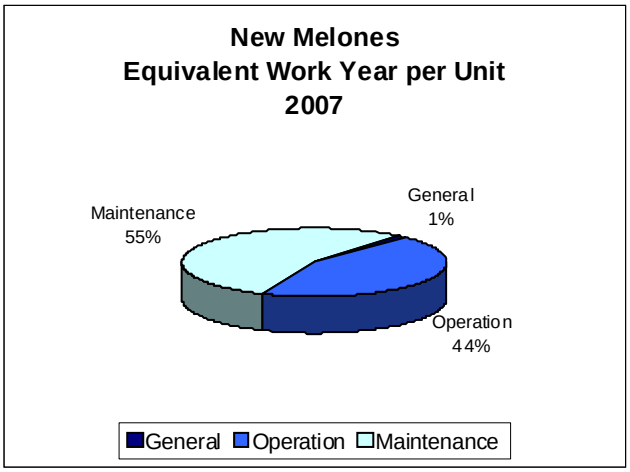


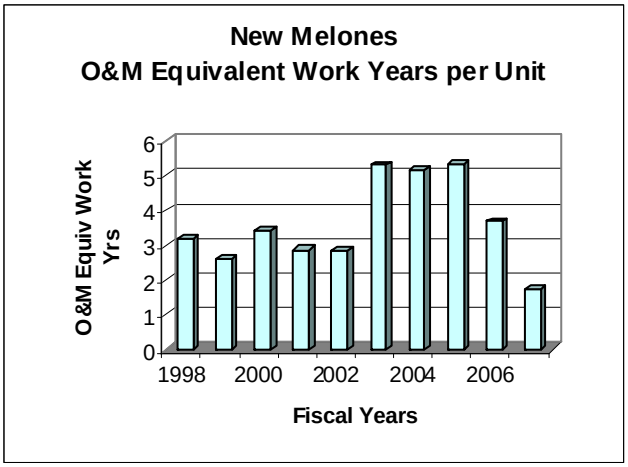


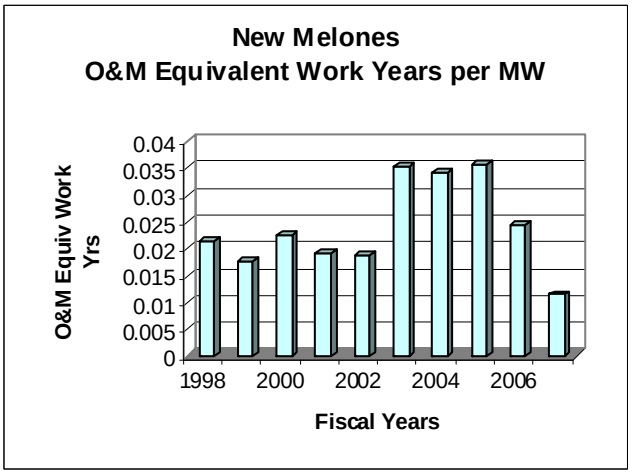
Benchmark 4
Workforce Deployment

New Melones 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	0.00	0.00	0.04	0.04	0.02	0.00
Operation	1.40	0.14	0.00	1.54	0.77	0.01
Maintenance	1.73	0.17	0.00	1.90	0.95	0.01
Total Staffing	3.13	0.30	0.04	3.47	1.73	0.01

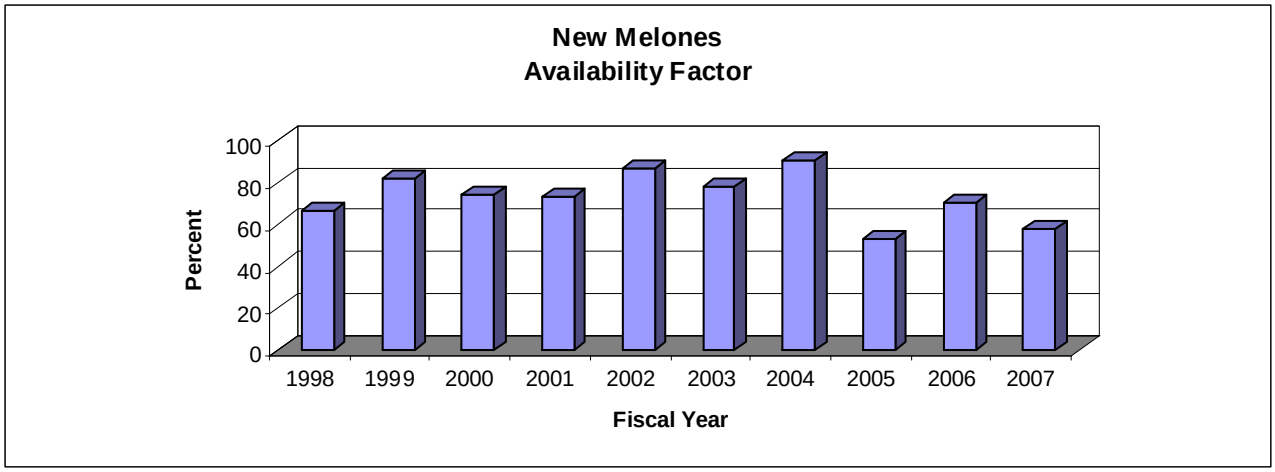




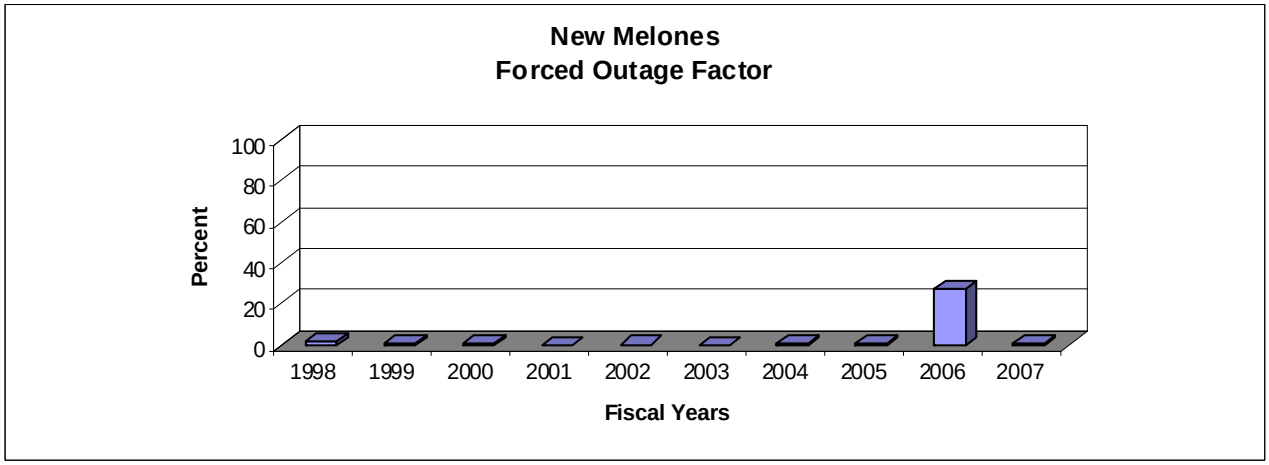




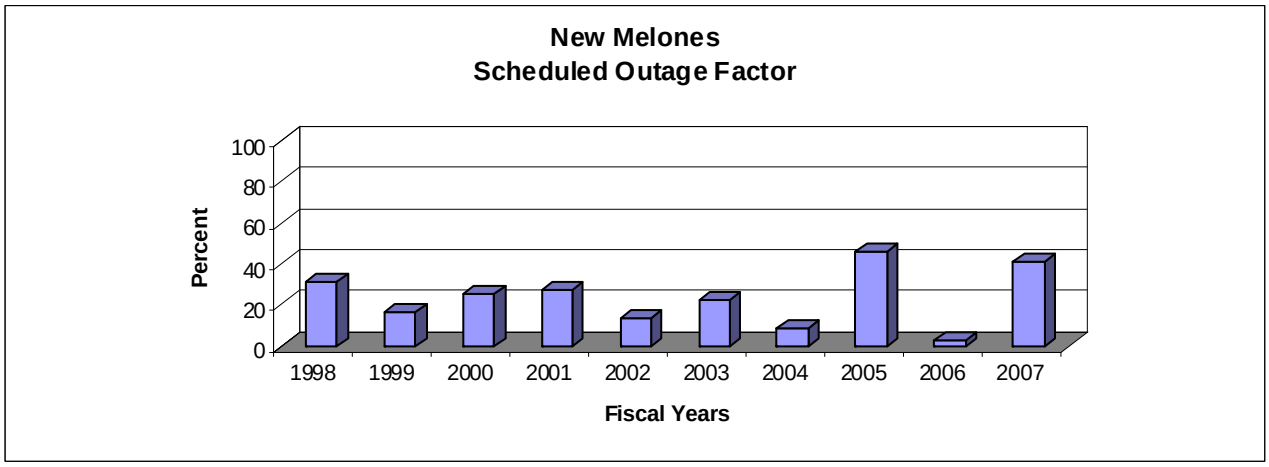
Benchmark 5
Availability Factor



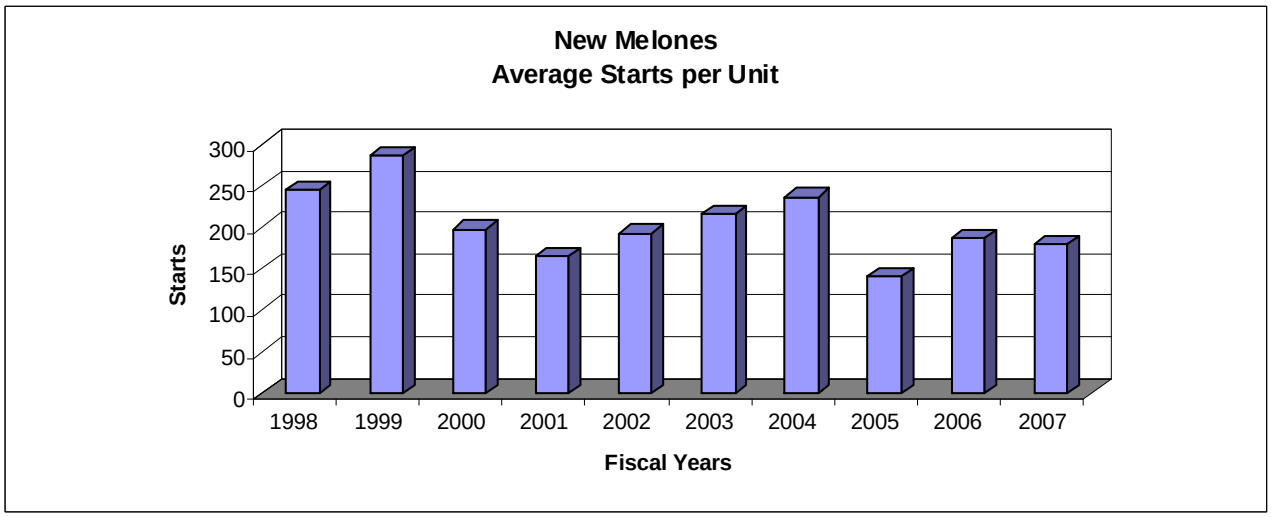
Benchmark 6
Forced Outage Factor



Benchmark 7
Scheduled Outage Factor



Starts



Benchmark Data Comparison

Fiscal Year 2007	New Melones Powerplant	Reclamation Average 100-500 MW Group	Total Reclamation Average	Industry Average	Best Performers
Wholesale Firm Rate Mills/kWh	13.7	Not Applicable	*22.45	Not Available	Not Available
Production Cost as Percentage of Wholesale Firm Rate	3.2%	Not Applicable	12.1%	Not Applicable	Not Applicable
O&M Cost $/MWh	5.16	4.44	2.76	***63.88	1.00
O&M Costs $/MW	9,020	10,502	7,847	***21,167	2,897
O&M Equiv Work Year per MW	0.01	0.04	0.03	Not Available	0.0
Availability Factor	57.8	83.5	82.3	**88.64	98.5
Forced Outage Factor	0.8	1.2	2.6	**2.61	0.0
Scheduled Outage Factor	41.3	15.4	15.1	**8.74	0.0

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

Nimbus Powerplant
Central Valley Project

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Central California Area Office

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E-Mail Address:
mfinnegan@mp.usbr.gov

Reclamation Region: Mid-Pacific

NERC Region: Western Electricity Coordinating Council, California-Southern Nevada Power Area

PMA Service Area: Western Area Power Administration, Sierra Nevada Region

Project Authorization: Funds for construction of the initial features of the Central Valley Project were provided by the Emergency Relief Appropriation Act of 1935 (49 Stat. 115). The Secretary of the Interior authorized the project and the President approved it on December 2, 1935.

Project Purposes: The Central Valley Project, one of the Nation's major water conservation developments, extends from the Cascade Range on the north to the semiarid but fertile plains along the Kern River on the south. Initial features of the project were built primarily to protect the Central Valley from crippling water shortages and menacing floods. New project units were built to provide water and power to match the continued growth of the State.

Although the American River Project, Nimbus Dam Unit, was developed primarily for irrigation, this multiple-purpose project also provides flood control, improves Sacramento River navigation, supplies domestic and industrial water, generates electric power, conserves fish and wildlife, creates opportunities for recreation, and enhances water quality.

Plant Location:	The Nimbus Powerplant is located on the American River in Sacramento County, California, 7 miles downstream from Folsom Dam. The powerplant is located on the right abutment of Nimbus Dam on the north side of the river.
Plant Facts:	Nimbus Dam forms Lake Natoma to reregulate the releases for power made through Folsom Powerplant. Nimbus Dam is a concrete gravity structure 87 feet high and 28 feet wide at the crest. The crest is 1,093 feet long.
Plant Purpose:	Nimbus Powerplant is a run-of-the-river plant and provides station service backup for Folsom Powerplant.
Plant History:	None
Present Activities:	Normal operations. Maintain and regulate American River releases. Provide base-load generation.
Future Planned Activities:	Continue to regulate the American River releases and provide base-load generation.
Special Issues:	None

River:	American River	**Plant Type:**	Conventional
Powerhouse Type:	Above Ground	**Turbine Type:**	Kaplan
Original Nameplate Capacity:	13,500 kW	**Installed Capacity:**	13,500 kW
Year of Initial Operation:	1955	**Age:**	52 years
Net Generation (FY-2007):	51.1 GWh	**Rated Head:**	20 feet
Average Plant Factor (FY-2007):	43.4 percent	**Remotely Operated:**	Yes
Production Mode:	Base Load		

Ancillary Services

Nimbus
Ancillary Services

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

Generators

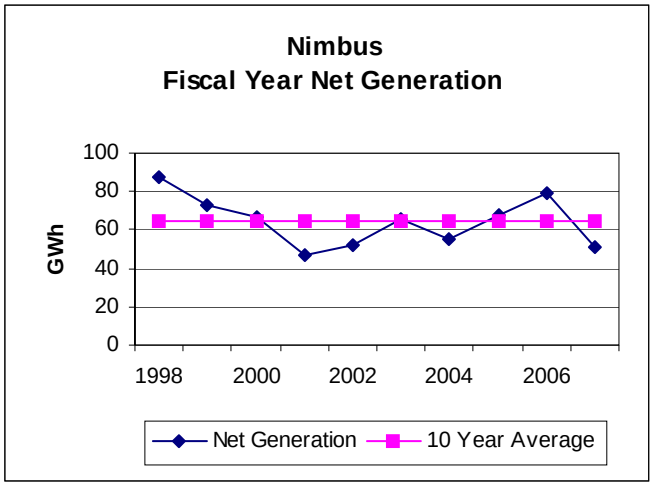
Nimbus Generators

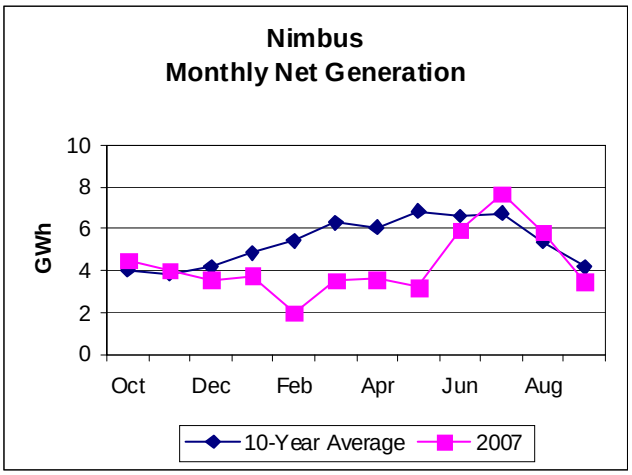
Existing Number and Capacity

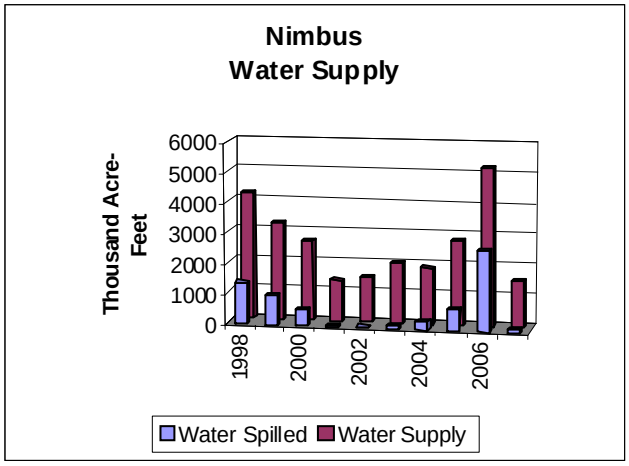
Unit #	Original Capacity (kW)	Capacity Increased (kW)	Present Capacity (kW)
1	6,750	-	6,750
2	6,750	-	6,750
4 units	13,500	-	13,500

The maximum operational capacity is limited to 12,00 kW due to head.

Generation

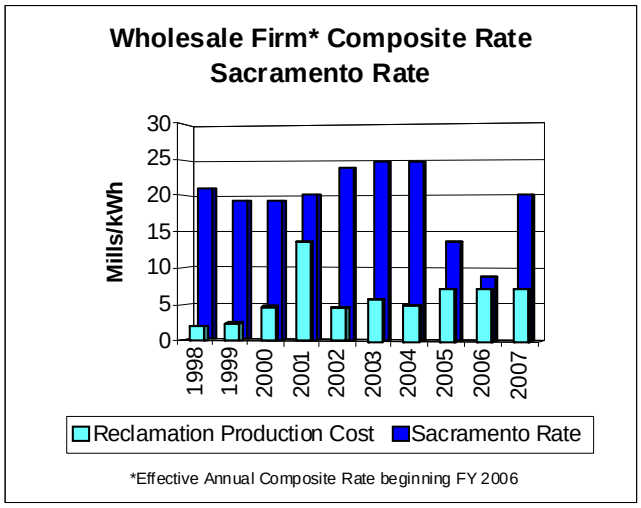

Nimbus
Fiscal Year Net Generation
GWh
100
80
60
40
20
0
1998
2000
2002
2004
2006
Net Generation
10 Year Average


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

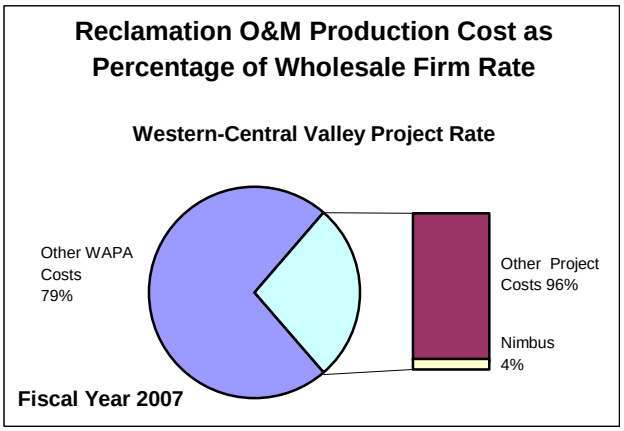

Nimbus
Water Supply
Thousand Acre-Feet
6000
5000
4000
3000
2000
1000
0
1998
2000
2002
2004
2006
Water Spilled
Water Supply

Prime Laboratory Benchmarks

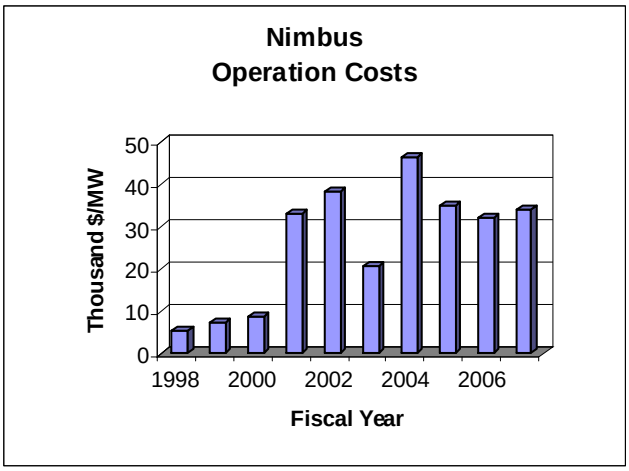
Benchmark 1
Wholesale Firm Rate

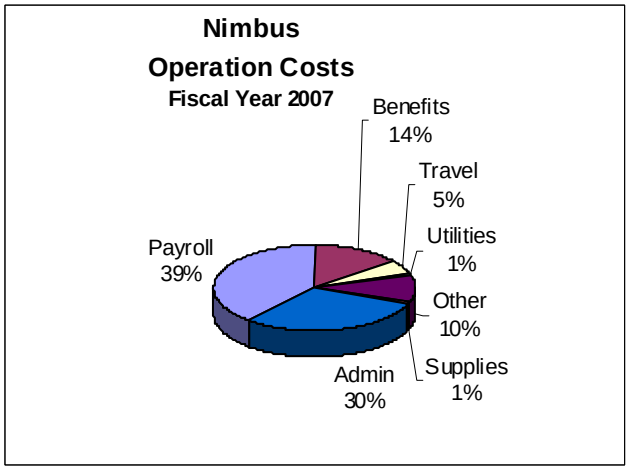


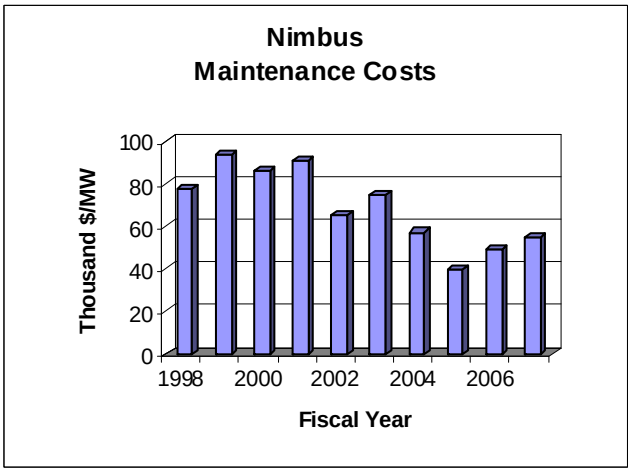
Benchmark 2
Reclamation's Production Cost as Percentage of Wholesale Firm Rate

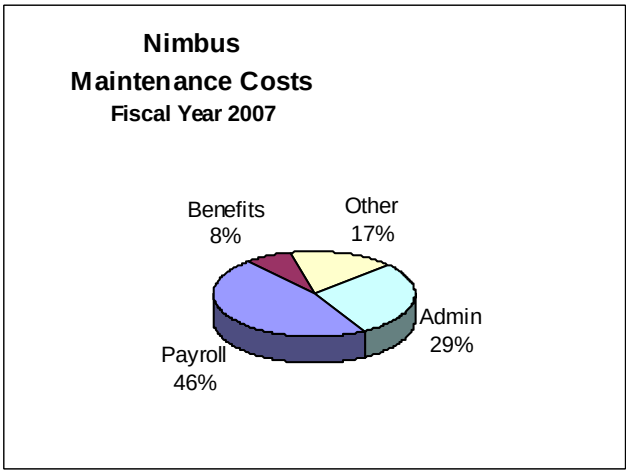


Benchmark 3
Production Cost

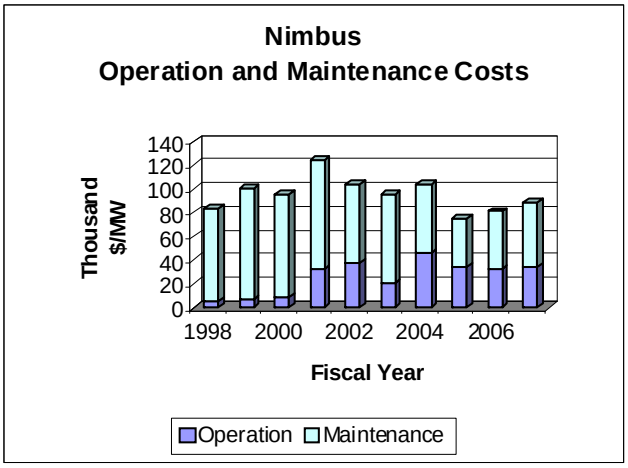


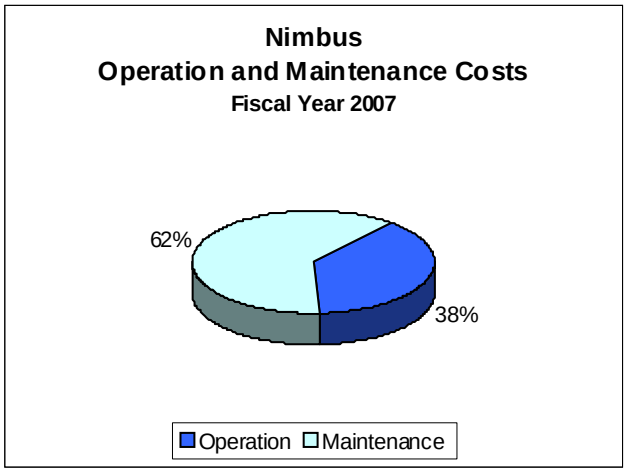


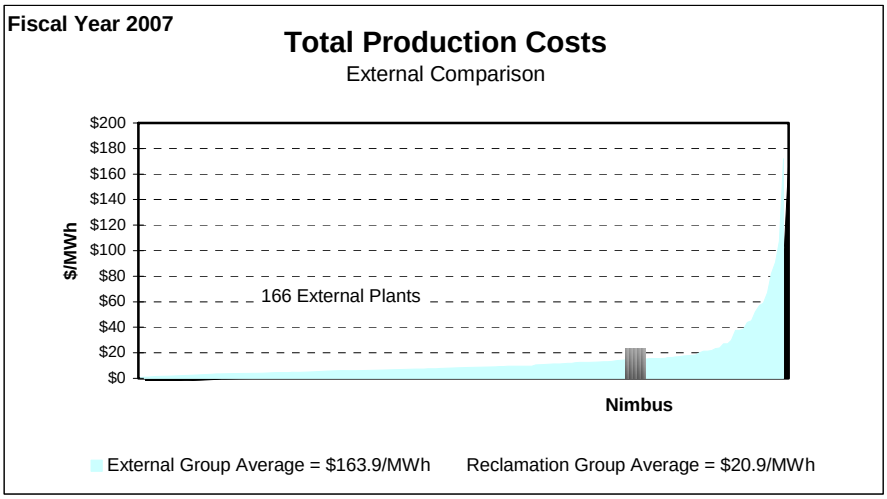


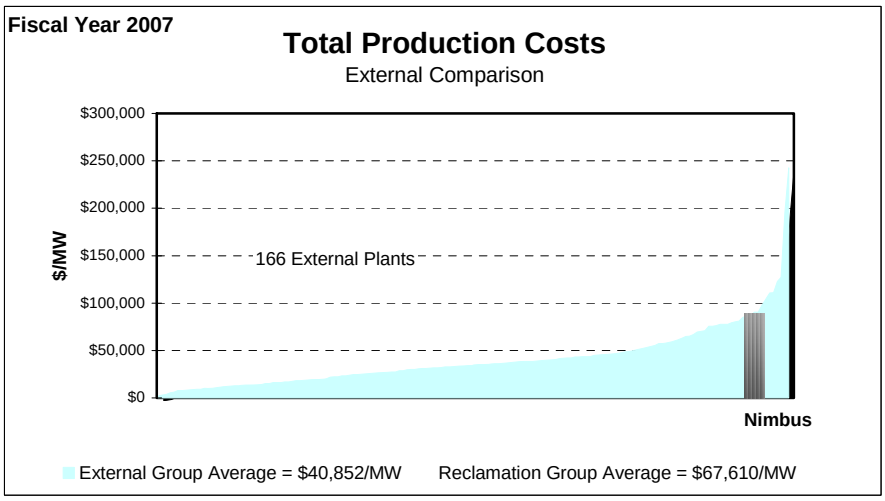


Benchmark 3
Production Cost



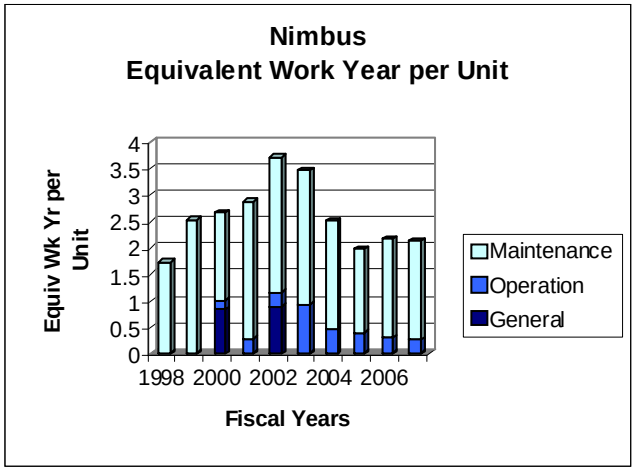


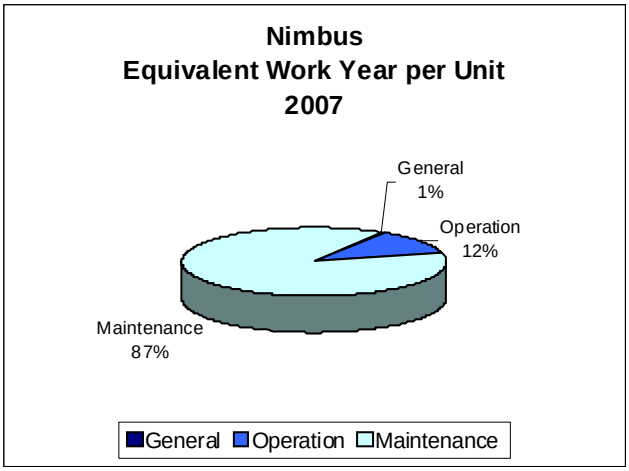


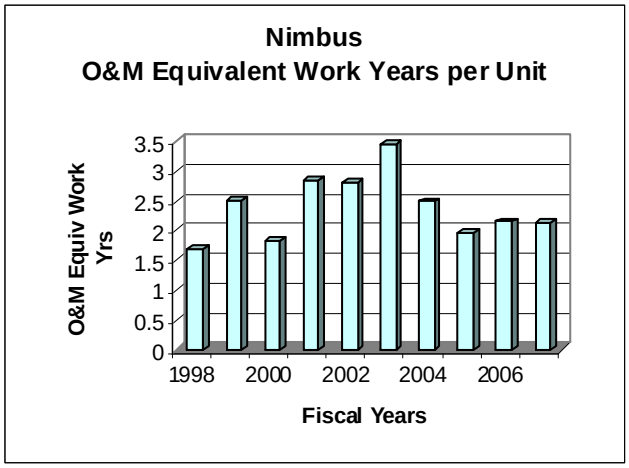


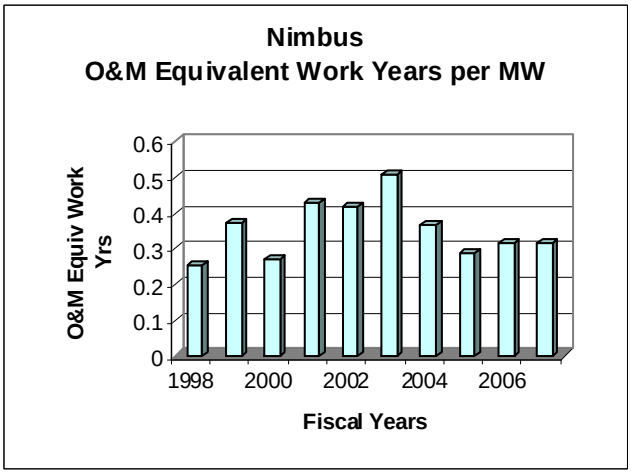
Benchmark 4
Workforce Deployment

Nimbus 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	0.00	0.00	0.04	0.04	0.02	0.00
Operation	0.47	0.05	0.00	0.52	0.26	0.04
Maintenance	3.40	0.33	0.00	3.72	1.86	0.28
Total Staffing	3.87	0.37	0.04	4.28	2.14	0.32

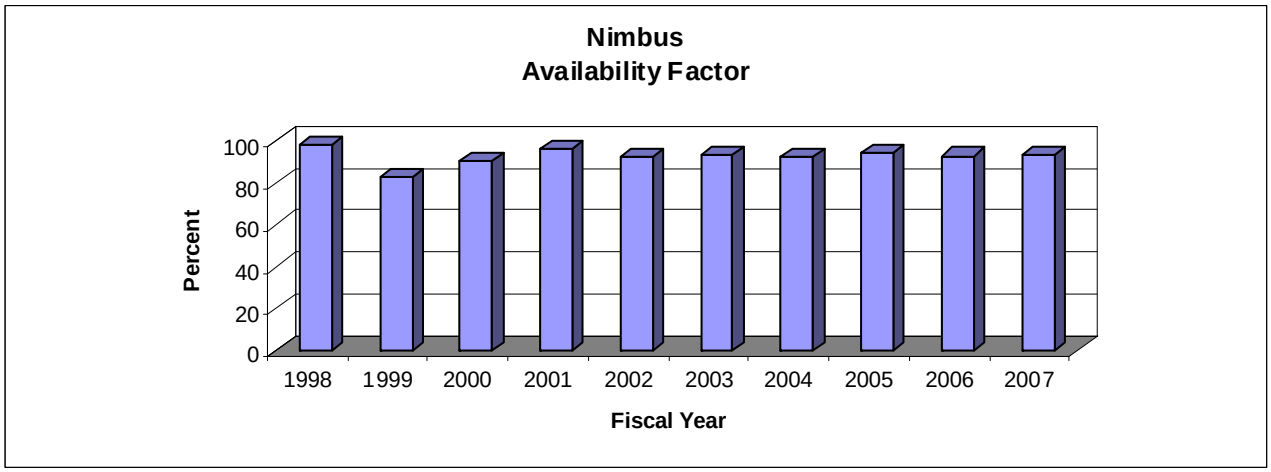




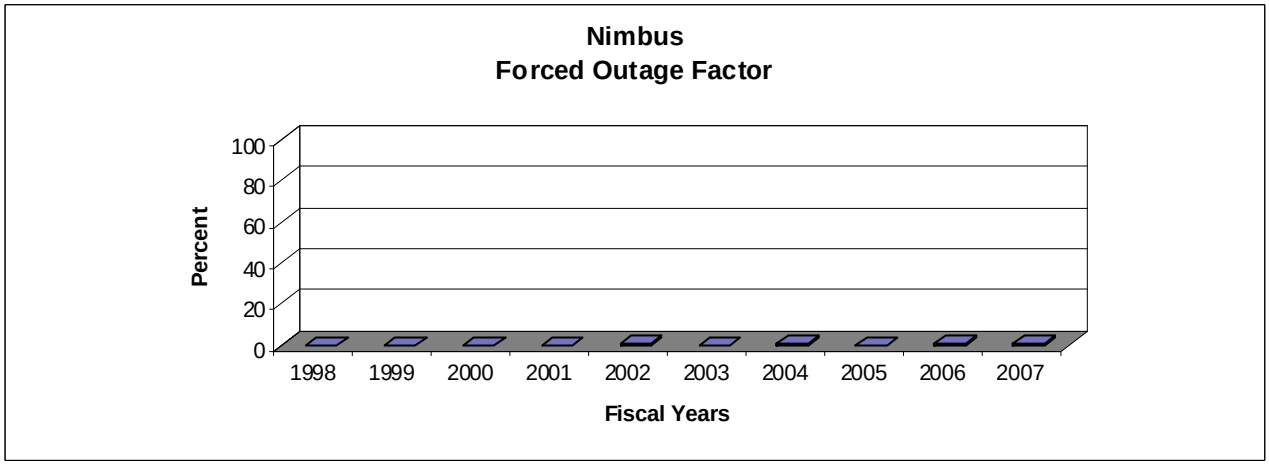




Benchmark 5
Availability Factor

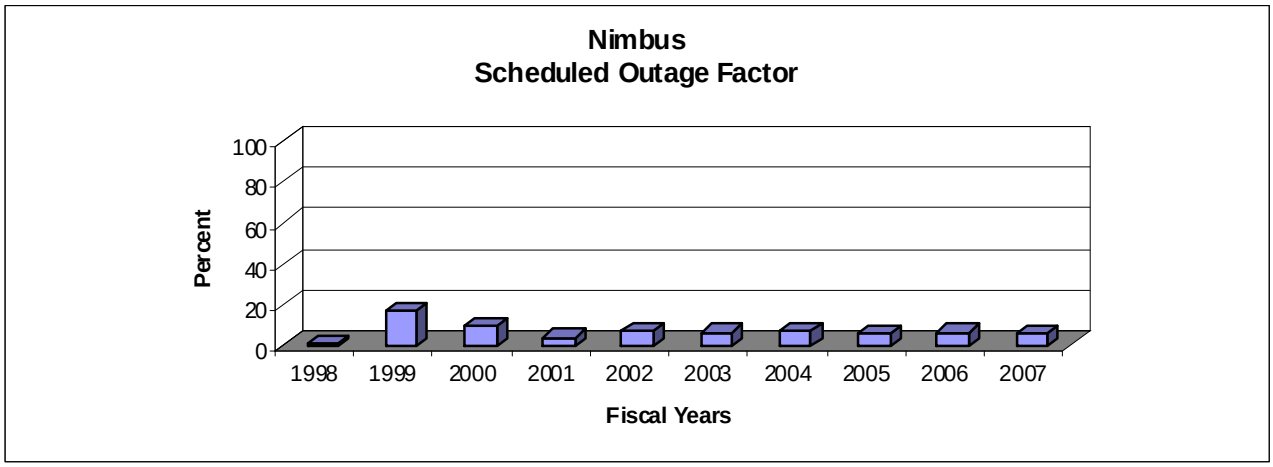


Benchmark 6
Forced Outage Factor

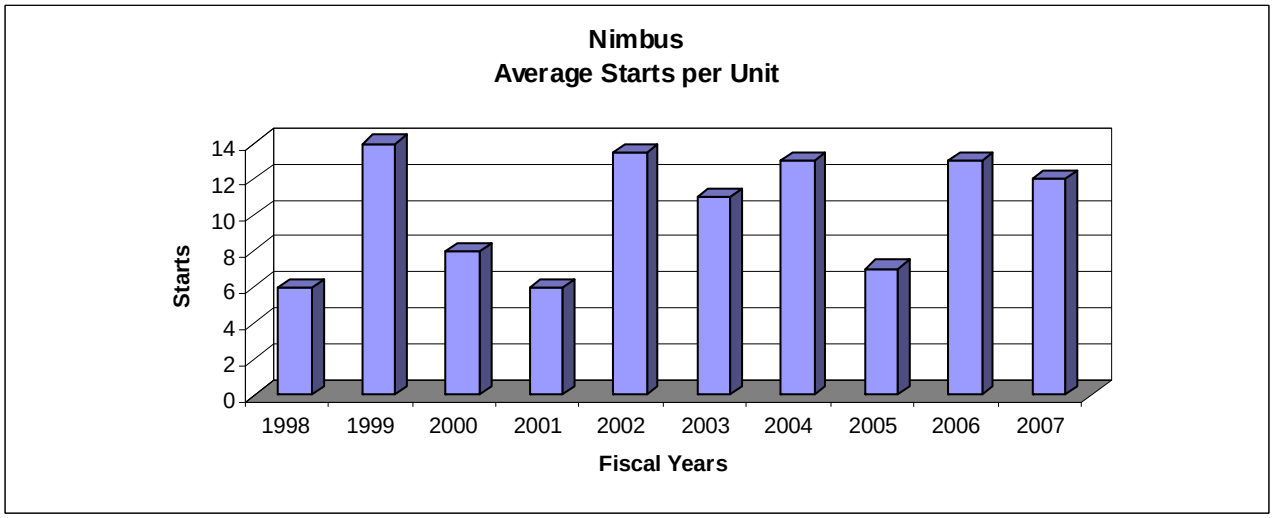


FY-97 - Oil leak in Unit 1 Kaplan wheel control line

Benchmark 7
Scheduled Outage Factor



Starts



Benchmark Data Comparison

Fiscal Year 2007	Nimbus Powerplant	Reclamation Average 10-30 MW Group	Total Reclamation Average	Industry Average	Best Performers
Wholesale Firm Rate Mills/kWh	13.7	Not Applicable	*22.45	Not Available	Not Available
Production Cost as Percentage of Wholesale Firm Rate	1.42%	Not Applicable	12.1%	Not Applicable	Not Applicable
O&M Cost $/MWh	23.61	16.40	2.76	***163.95	1.00
O&M Costs $/MW	89,353	62,731	7,847	***40,852	2,897
O&M Equiv Work Year per MW	0.31	0.22	0.03	Not Available	0.00
Availability Factor	93.7	88.5	82.3	**88.64	98.5
Forced Outage Factor	0.2	0.1	2.6	**2.61	0.0
Scheduled Outage Factor	6.1	11.4	15.1	**8.74	0.0

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

O'Neill Pump-Generating Plant
Central Valley Project

Plant Contact:
San Luis-Delta Mendota Water Authority

Plant Address:
O'Neill Pumping - Generating Plant
Los Banos, CA

Telephone Numbers:
Phone: (209) 836-6297

Reclamation Region: Mid-Pacific

NERC Region: Western Systems Coordinating Council, California-Southern Nevada Power Area

PMA Service Area: Western Area Power Administration, Sierra Nevada Region

Project Authorization: Funds for construction of the initial features of the Central Valley Project were provided by the Emergency Relief Appropriation Act of 1935 (49 Stat. 115). The Secretary of the Interior authorized the project and the President approved it on December 2, 1935.

The San Luis Unit, West San Joaquin Division, was authorized as a part of the Central Valley Project on June 3, 1960, Public Law 86-488.

Project Purposes: The Central Valley Project, one of the Nation's major water conservation developments, extends from the Cascade Range on the north to the semiarid but fertile plains along the Kern River on the south. Initial features of the project were built primarily to protect the Central Valley from crippling water shortages and menacing floods. New project units were built to provide water and power to match the continued growth of the State.

Although developed primarily for irrigation, this multiple-purpose project also provides flood control, improves Sacramento River navigation, supplies domestic and industrial water, generates electric power, conserves fish and wildlife, creates opportunities for recreation, and enhances water quality.

Plant Location: O'Neill Pump-Generating Plant is located in Merced County, California, 70 miles from the Tracy Pumping Plant and 12 miles west of Los Banos, California. O'Neill Dam and Forebay are joint Federal-State facilities located on the San Luis Creek, 2.5 miles downstream from San Luis Dam.

Plant Facts: The O'Neill Pump-Generating Plant consists of an intake channel leading off the Delta-Mendota Canal and six pump-generating units. Normally these units operate as pumps to lift water from 44 to 55 feet into the O'Neill Forebay. Water is occasionally released from the forebay to the Delta-Mendota Canal, and these units then operate as generators. When operating as pumps and motors, each unit can discharge 700 cubic feet per second and has a rating of 6,000 horsepower. When operating as turbines and generators, each unit has a generating capacity of about 4,200 kilowatts.

Plant Purpose: The O'Neill Pump-Generating Plant pumps Central Valley Project water for off-stream storage.

Plant History: The pump-generating plant was turned over to Delta-Mendota Canal Authority for maintenance in 1994.

Present Activities: Normal operations. The plant pumps water from Delta-Mendota Canal to O'Neill Forebay. It offsets Central Valley Project pumping loads with generating during releases to Delta-Mendota Canal.

Future Planned Activities: None

Special Issues: O'Neill, which operates primarily as a pumping plant only generates part of the year. The authorizing legislation for O'Neill states that power generated at the facility cannot be used for commercial purposes. Therefore, the generation produced at O'Neill is allocated as project-use power for the Central Valley Project and the cost associated with generation is allocated to the irrigation component of Central Valley Project.

River:	San Luis Creek	**Plant Type:**	Conventional
Powerhouse Type:	Above Ground	**Turbine Type:**	VIP Pitch
Original Nameplate Capacity:	25,200 kW	**Installed Capacity:**	25,200 kW
Year of Initial Operation:	1967	**Age:**	40 years
Net Generation (FY-2007):	5.4 MWh	**Rated Head:**	50 feet
Average Plant Factor (FY-2007):	2.7 percent	**Remotely Operated:**	Yes
Production Mode:	Peaking		

Ancillary Services

O'Neill
Ancillary Services

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

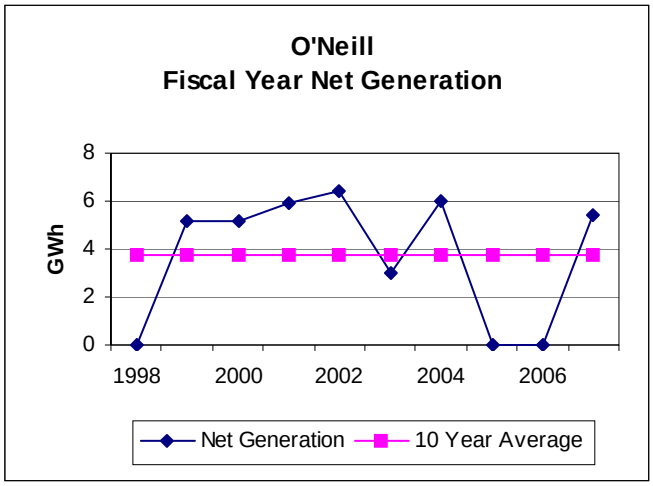
Generators

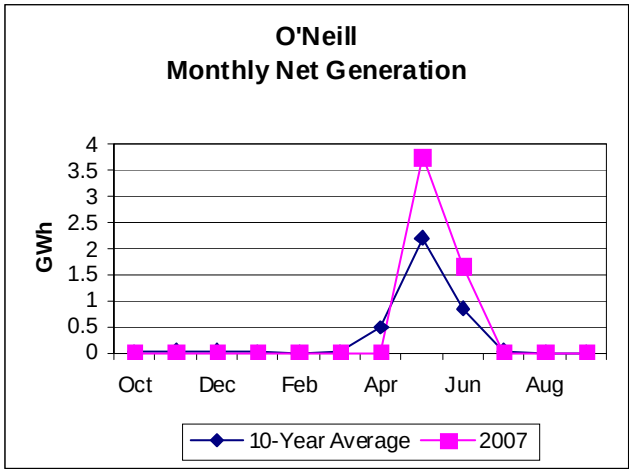
O'Neill Generators

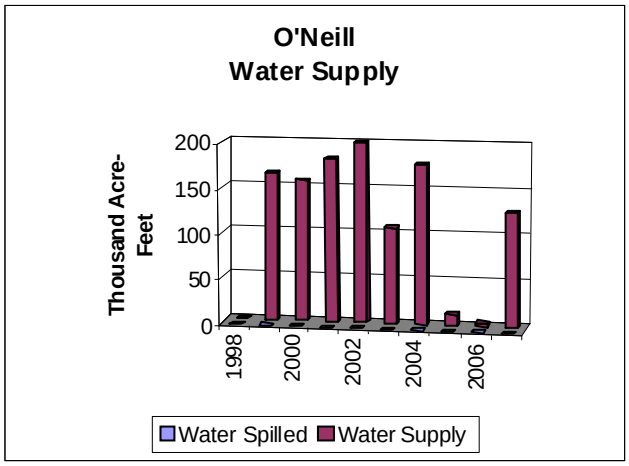
Existing Number and Capacity

Unit #	Original Capacity (kW)	Capacity Increased (kW)	Present Capacity (kW)
1	4,200	-	4,200
2	4,200	-	4,200
3	4,200	-	4,200
4	4,200	-	4,200
5	4,200	-	4,200
6	4,200	-	4,200
6 units	25,200	-	25,200

Generation

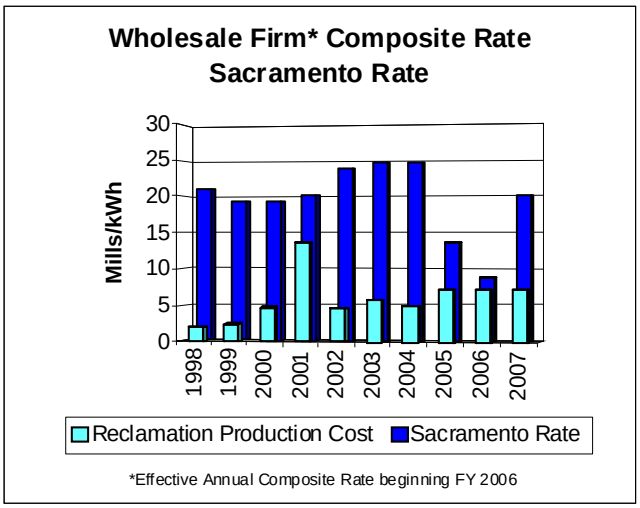

O'Neill
Fiscal Year Net Generation
GWh
8
6
4
2
0
1998
2000
2002
2004
2006
Net Generation
10 Year Average


O'Neill
Monthly Net Generation
GWh
4
3.5
3
2.5
2
1.5
1
0.5
0
Oct
Dec
Feb
Apr
Jun
Aug
10-Year Average
2007


O'Neill
Water Supply
Thousand Acre-Feet
200
150
100
50
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

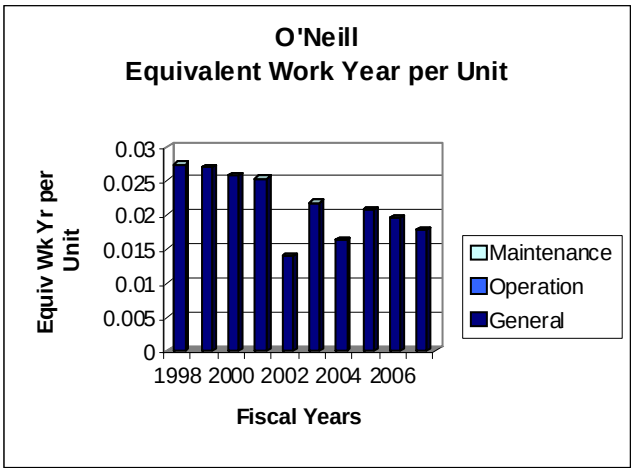
No Cost Data Available

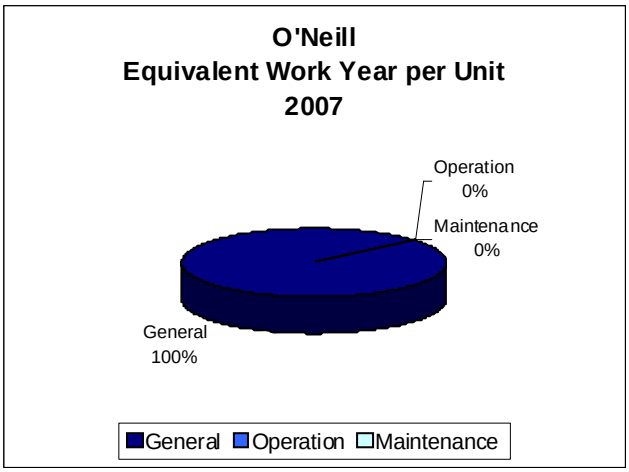
Benchmark 3
Production Cost

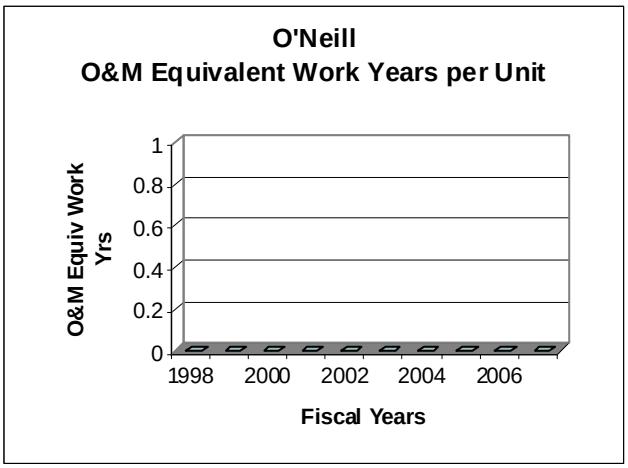
No Cost Data Available

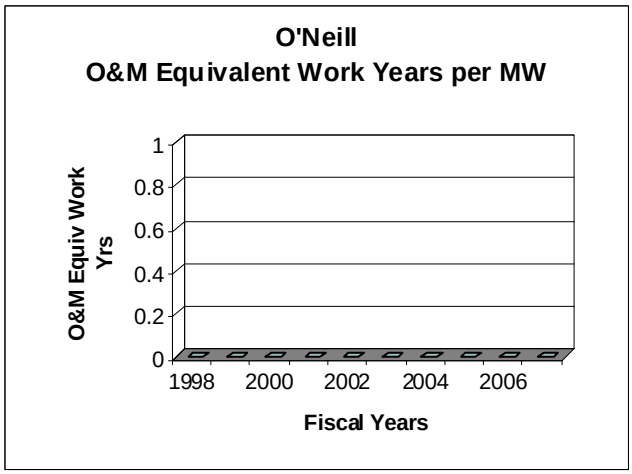
Benchmark 4
Workforce Deployment

O'Neill 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	0.00	0.00	0.11	0.11	0.02	0.00
Operation	0.00	0.00	0.00	0.00	0.00	0.00
Maintenance	0.00	0.00	0.00	0.00	0.00	0.00
Total Staffing	0.00	0.00	0.11	0.11	0.02	0.00

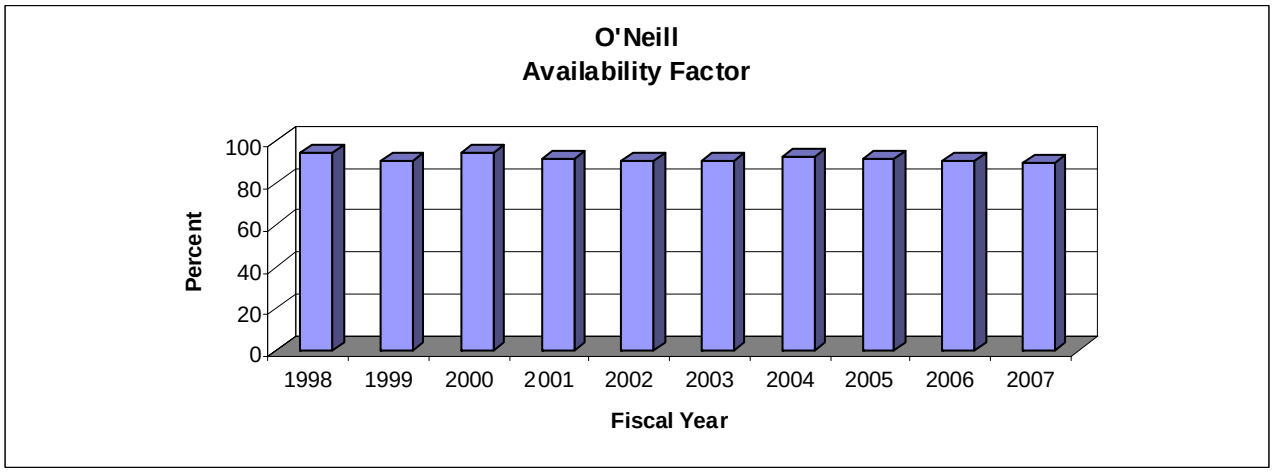




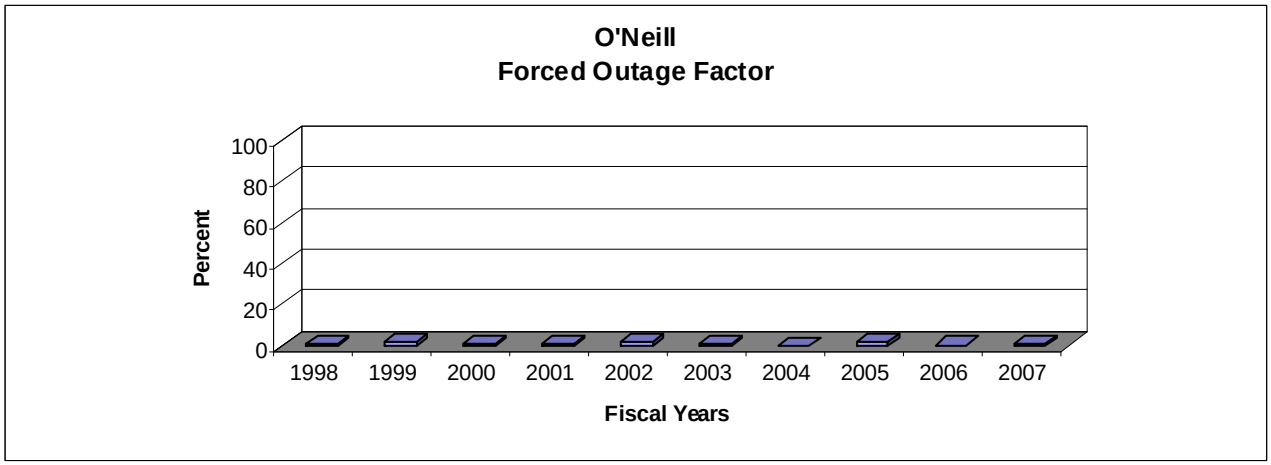




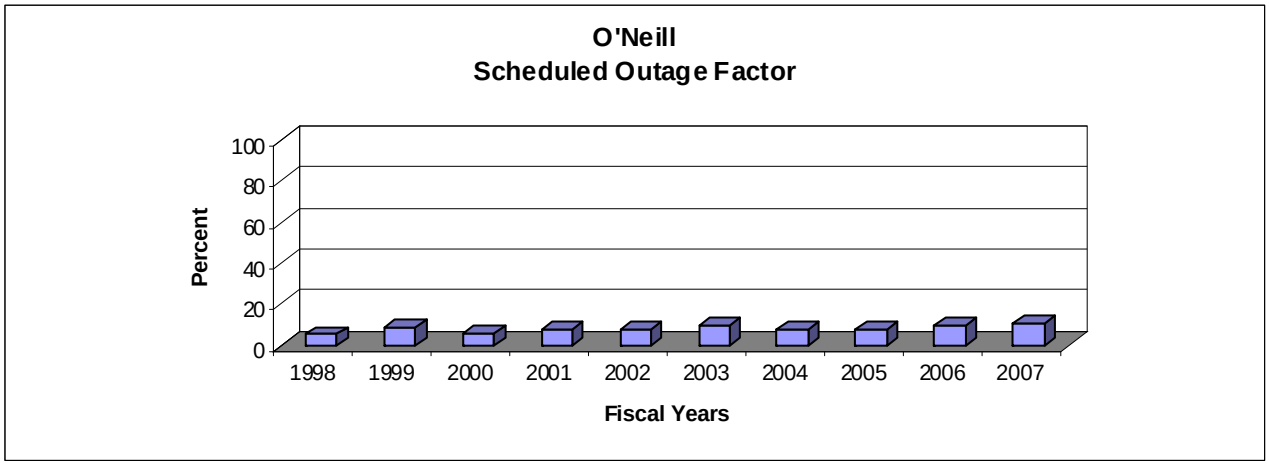
Benchmark 5
Availability Factor



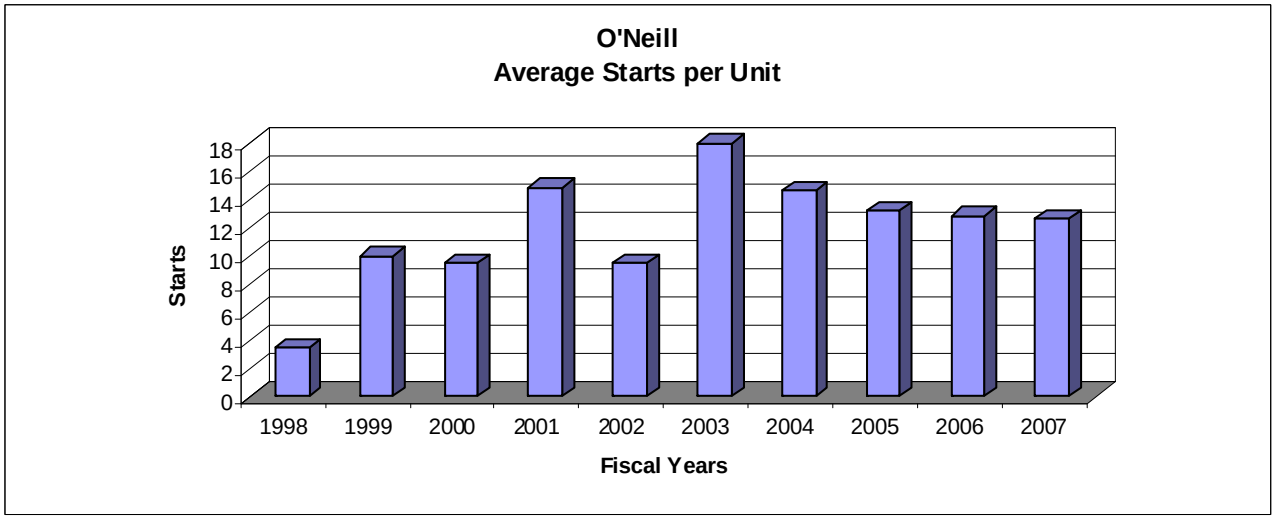
Benchmark 6
Forced Outage Factor



Benchmark 7
Scheduled Outage Factor



Starts



Benchmark Data Comparison				
Fiscal Year 2007	**O'Neill Powerplant**	**Total Reclamation Average**	**Industry Average**	**Best Performers**
Wholesale Firm Rate Mills/kWh	Not Applicable	*22.45	Not Available	Not Available
Production Cost as Percentage of Wholesale Firm Rate	Not Applicable	12.1%	Not Applicable	Not Applicable
O&M Cost $/MWh	Not Applicable	2.76	Not Applicable	1.00
O&M Costs $/MW	Not Applicable	7,847	Not Applicable	2,897
O&M Equiv Work Year per MW	0.00	0.03	Not Available	0.00
Availability Factor	89.6	82.3	**88.64	98.54
Forced Outage Factor	0.2	2.6	**2.61	0.00
Scheduled Outage Factor	10.2	15.1	**8.74	0.00

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

San Luis Pump-Generating Plant
Central Valley Project

Plant Contact:
State of California

Plant Address:
San Luis Pumping-Generating Plant
Los Banos, CA

Telephone Numbers:
Phone: (209) 826-1277

Reclamation Region: Mid-Pacific

NERC Region: Western Electricity Coordinating Council, California-Southern Nevada Power Area

PMA Service Area: Western Area Power Administration, Sierra Nevada Region

Project Authorization: Funds for construction of the initial features of the Central Valley Project were provided by the Emergency Relief Appropriation Act of 1935 (49 Stat. 115). The Secretary of the Interior authorized the project and the President approved it on December 2, 1935.

The San Luis Unit, West San Joaquin Division, was authorized as a part of the Central Valley Project on June 3, 1960, Public Law 86-488.

Project Purposes: The Central Valley Project, one of the Nation's major water conservation developments, extends from the Cascade Range on the north to the semiarid but fertile plains along the Kern River on the south. Initial features of the project were built primarily to protect the Central Valley from crippling water shortages and menacing floods. New project units were built to provide water and power to match the continued growth of the State.

Although developed primarily for irrigation, this multiple-purpose project also provides flood control, improves Sacramento River navigation, supplies domestic and industrial water, generates electric power, conserves fish and wildlife, creates opportunities for recreation, and enhances water quality.

Plant Location: San Luis Pump-Generating Plant is located in Merced County, California, on the San Luis Creek, 12 miles west of Los Banos, California.

Plant Facts: This joint Federal-State facility, located at San Luis Dam, lifts water by pump-turbines from the O'Neill forebay into the San Luis Reservoir. During the irrigation season, water is released from San Luis Reservoir back through the pump-turbines to the forebay and energy is reclaimed. Each of the eight pumping-generating units has a capacity of 63,000 horsepower as a motor and 53,000 kilowatts as a generator. As a pumping station to fill San Luis Reservoir, each unit lifts 1,375 cubic feet per second at 290 feet total head. As a generating plant, each unit passes 1,628 cubic feet per second at 197 foot head and 120 rpm.

Each unit can pump or generate at either 120 rpm or 150 rpm in order to efficiently accommodate the large variations in operating head. Unit's 1 and 5 can operate at 120 rpm or 156.5 rpm. The higher speed on those units operates more efficiently when the reservoir is above EL 480.

Plant Purpose: The San Luis Pump-Generating Plant pumps Central Valley Project water for off-stream storage.

Plant History: The powerplant is operated and maintained by the State of California under an operation and maintenance agreement with Reclamation. The powerplant name has been changed to Gianelli.

Present Activities: Normal operations. The pump-generating plant pumps water from O'Neill to San Luis Reservoir. Offsets Central Valley Project pumping loads with generation during releases to O'Neill Forebay.

Future Planned Activities: None

Special Issues: Speed changes on two units have resulted in increased efficiency above 300 foot head. California State has requested that one to two more units be reconfigured for operation at higher speeds.

River:	San Luis Creek	**Plant Type:**	Conventional
Powerhouse Type:	Above Ground	**Turbine Type:**	Francis
Original Nameplate Capacity:	424,000 kW	**Installed Capacity:**	424,000 kW
Original Nameplate Capacity Owned by Reclamation:	202,000 kW	**Installed Capacity Owned by Reclamation:**	202,000 kW
Year of Initial Operation:	1968	**Age:**	40 years
Net Generation (FY-2007)	126.4 GWh	**Rated Head:**	323 feet
Average Plant Factor (FY-2007):	7.1 percent	**Remotely Operated:**	No
Production Mode:	Seasonal Base		

Ancillary Services

San Luis
Ancillary Services

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

Generators

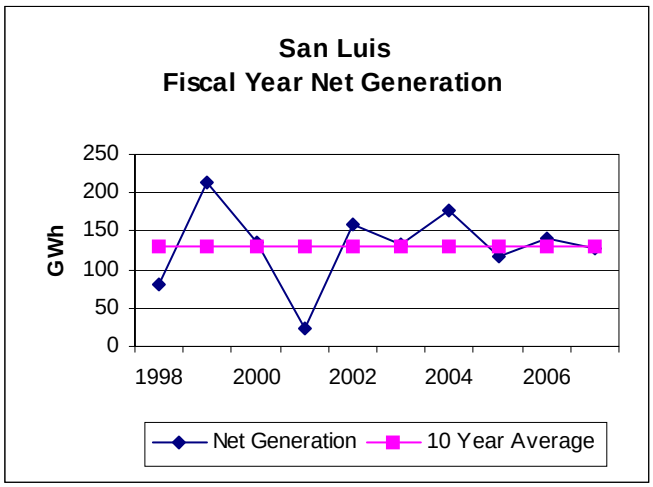
San Luis CA & US Generators

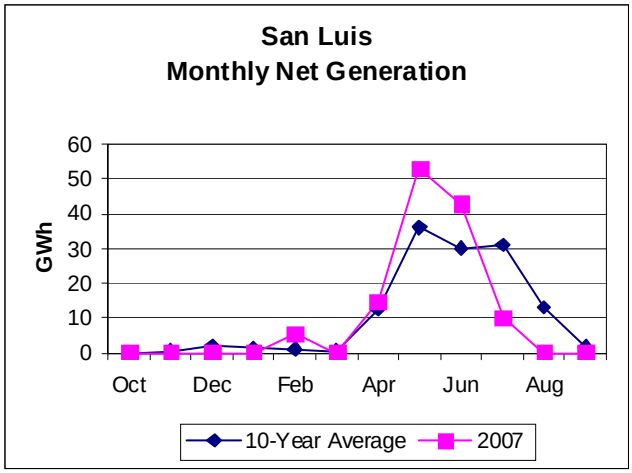
Existing Number and Capacity

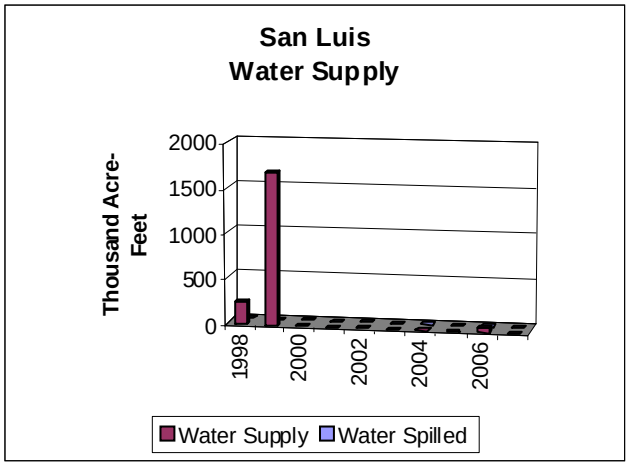
Unit #	Original Capacity (kW)	Capacity Increased (kW)	Present Capacity (kW)
1	53,000	-	53,000
2	53,000	-	53,000
3	53,000	-	53,000
4	53,000	-	53,000
5	53,000	-	53,000
6	53,000	-	53,000
7	53,000	-	53,000
8	53,000	-	53,000
8 units	424,000	-	424,000

Reclamation Owns 202,000 kW

Generation

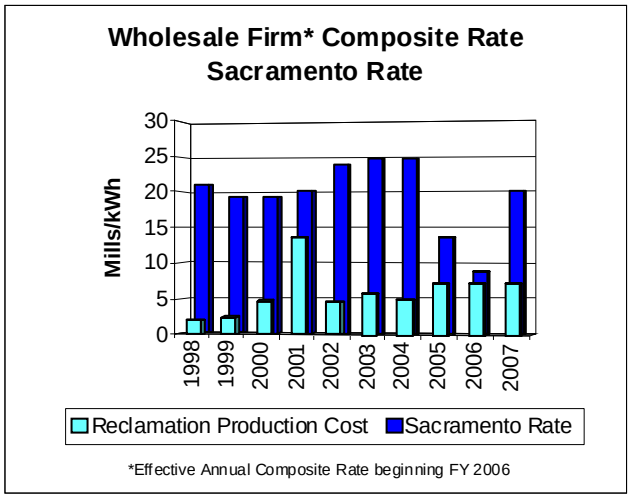

San Luis
Fiscal Year Net Generation
GWh
250
200
150
100
50
0
1998
2000
2002
2004
2006
Net Generation
10 Year Average


San Luis
Monthly Net Generation
GWh
60
50
40
30
20
10
0
Oct
Dec
Feb
Apr
Jun
Aug
10-Year Average
2007


San Luis
Water Supply
Thousand Acre-Feet
2000
1500
1000
500
0
1998
2000
2002
2004
2006
Water Supply
Water Spilled

Prime Laboratory Benchmarks

Benchmark 1
Wholesale Firm Rate



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

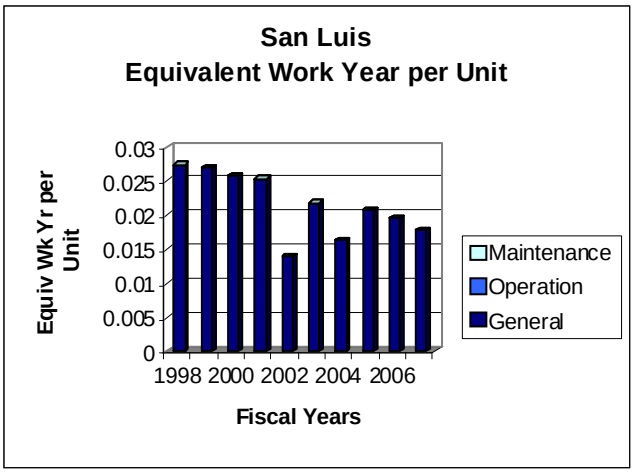
No Cost Data is Available

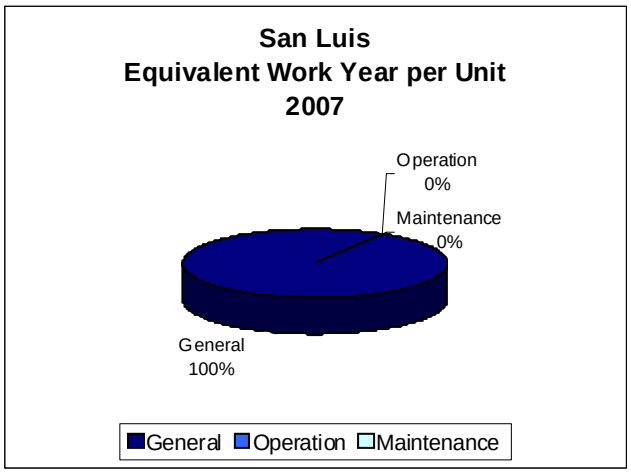
Benchmark 3
Production Cost

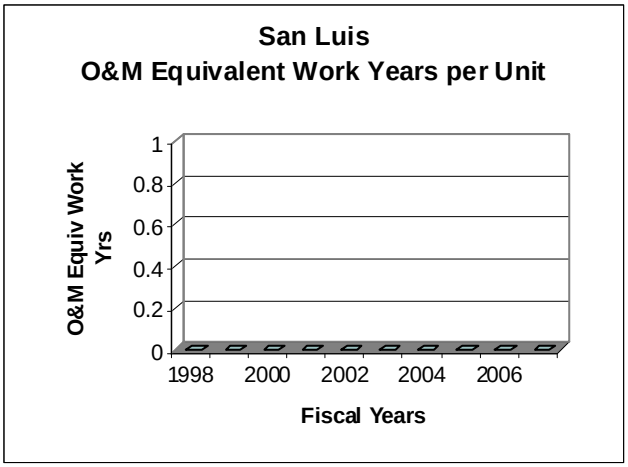
No Cost Data is Available

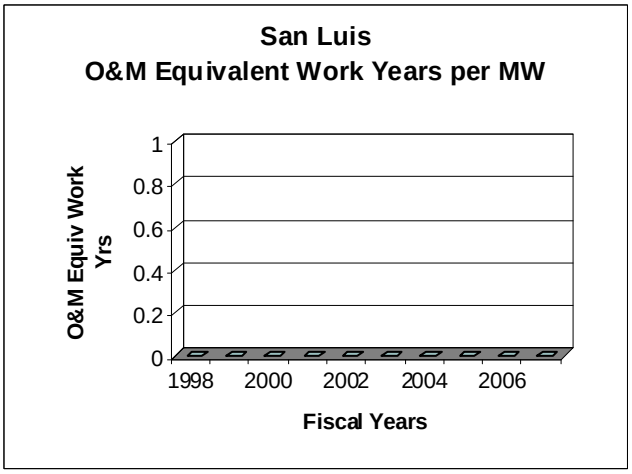
Benchmark 4
Workforce Deployment

San Luis 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	0.00	0.00	0.14	0.14	0.02	0.00
Operation	0.00	0.00	0.00	0.00	0.00	0.00
Maintenance	0.00	0.00	0.00	0.00	0.00	0.00
Total Staffing	0.00	0.00	0.14	0.14	0.02	0.00

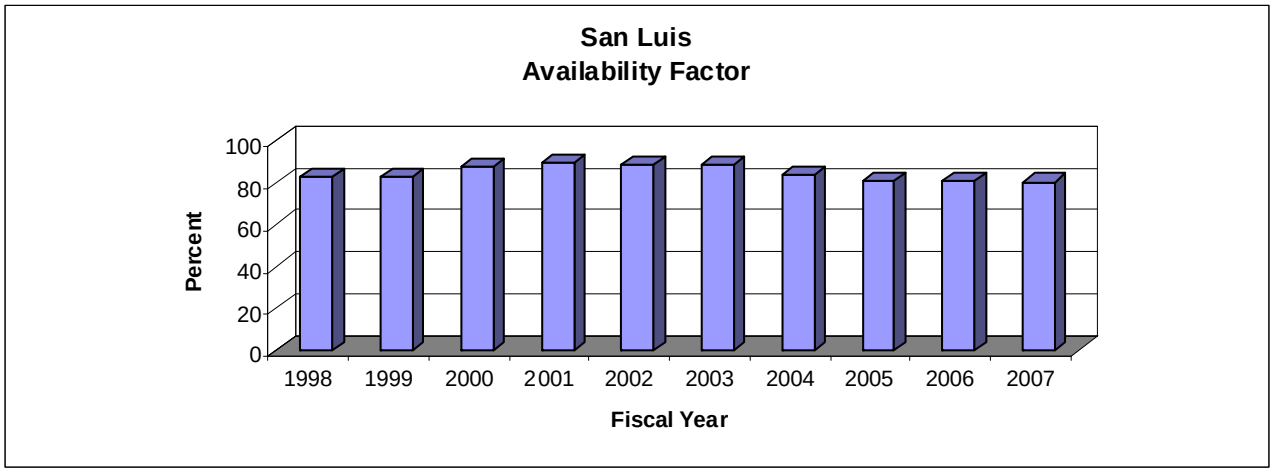




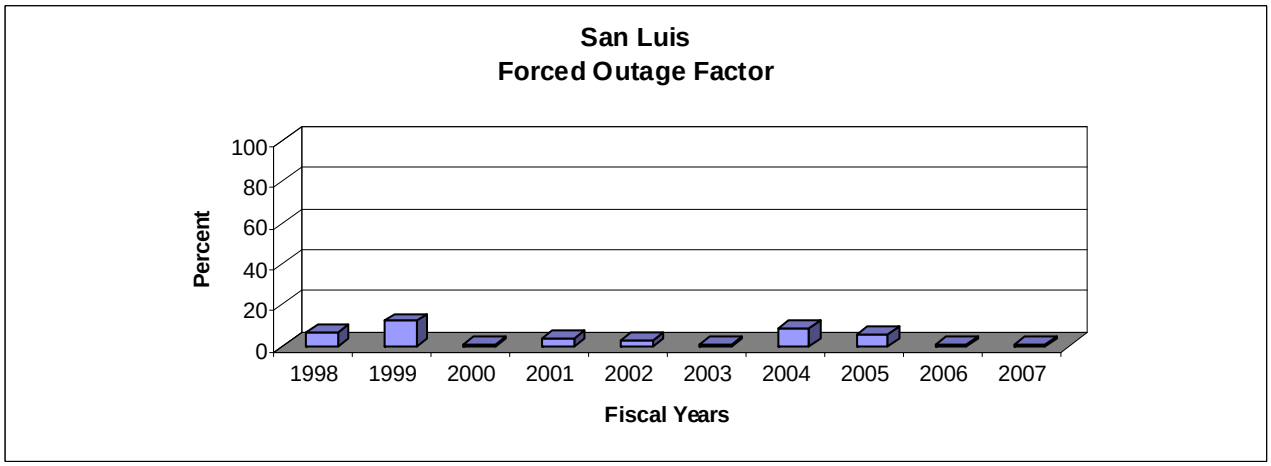




Benchmark 5
Availability Factor

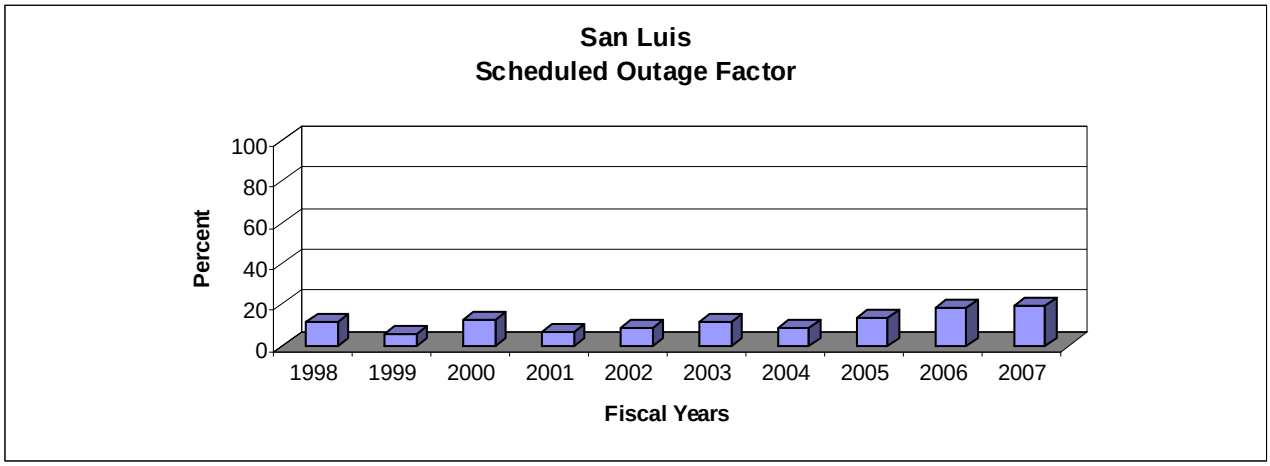


Benchmark 6
Forced Outage Factor

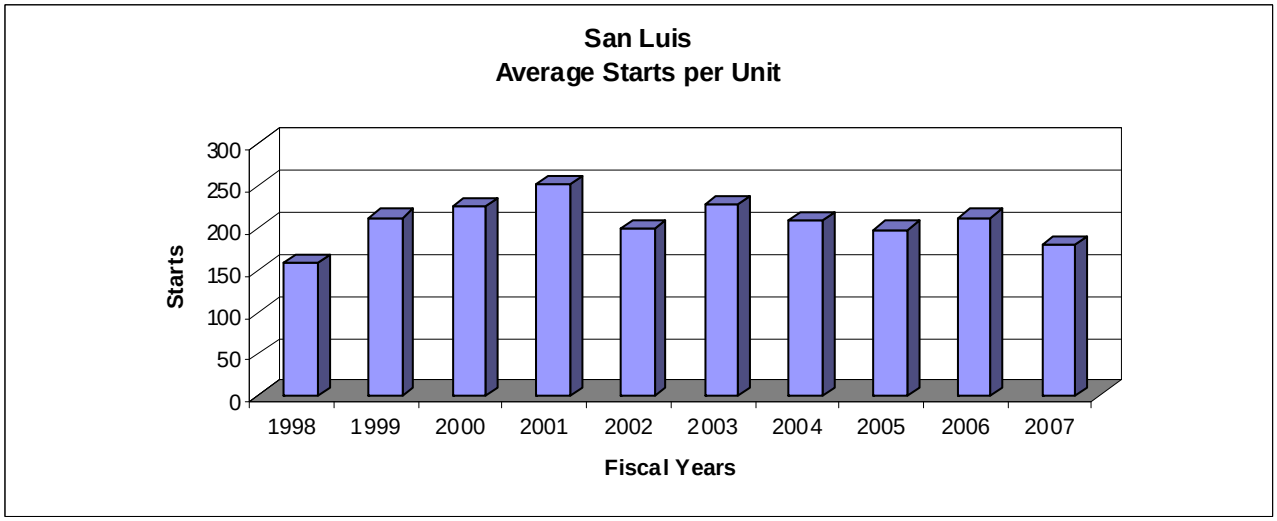


FY-98 - Fire in motor housing stator burned

Benchmark 7
Scheduled Outage Factor



Starts

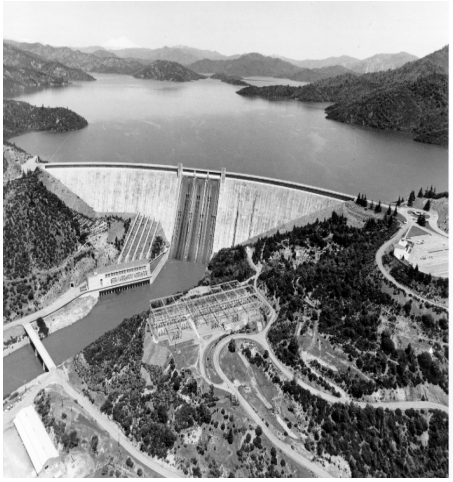


Benchmark Data Comparison

Fiscal Year 2007	San Luis Powerplant	Total Reclamation Average	Industry Average	Best Performers
Wholesale Firm Rate Mills/kWh	Not Applicable	*22.45	Not Available	Not Available
Production Cost as Percentage of Wholesale Firm Rate	Not Applicable	12.1%	Not Applicable	Not Applicable
O&M Cost $/MWh	Not Applicable	2.76	Not Applicable	1.00
O&M Costs $/MW	Not Applicable	7,847	Not Applicable	2,897
O&M Equiv Work Year per MW	0.00	0.03	Not Available	0.000
Availability Factor	80.3	82.3	**88.64	98.54
Forced Outage Factor	0.5	2.6	**2.61	0.00
Scheduled Outage Factor	19.2	15.1	**8.74	0.00

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

Shasta Powerplant
Central Valley Project



Plant Contact:
Brian Person
Area Manager

Plant Address:
Shasta Powerplant
Shasta Lake City, CA 96003

Telephone Numbers:
Phone: (530) 275-1554
Fax: (530) 275-2441

E-Mail Address:
bperson@mp.usbr.gov

Reclamation Region: Mid-Pacific

NERC Region: Western Electricity Coordinating Council, California-So. Nevada Power Area.

PMA Service Area: Western Area Power Administration, Sierra Nevada Region.

Project Authorization: Funds for construction of the initial features of the Central Valley Project were provided by the Emergency Relief Appropriation Act of 1935 (49 Stat. 115). The Secretary of the Interior authorized the project and the President approved it on December 2, 1935.

The Shasta and Trinity River Division was authorized by Public Law 386, 84th Congress, 1st Session, approved August 12, 1955.

Project Purposes: The Central Valley Project, one of the Nation's major water conservation developments, extends from the Cascade Range on the north to the semiarid but fertile plains along the Kern River on the south. Initial features of the project were built primarily to protect the Central Valley from crippling water shortages and menacing floods. New project units were built to provide water and power to match the continued growth of the State.

Although developed primarily for irrigation, this multiple-purpose project also provides flood control, improves Sacramento River navigation, supplies domestic and industrial water, generates electric power, conserves fish and wildlife, creates opportunities for recreation, and enhances water quality.

Plant Location: Shasta Power plant is located on the Sacramento River in Shasta County, California, 9 miles northwest of Redding, California.

Plant Purpose: The Shasta Powerplant is a peaking plant. Its power is dedicated first to meeting the requirements of the project facilities. The remaining energy is marketed to various preference customers in northern California.

Plant Fact: The Shasta Powerplant is located just below Shasta Dam. Water from the dam is released through five 15-foot penstocks leading to the five main generating units and two station service units.

Plant History: Transmission lines were operated by Reclamation until October 1, 1977, when they were transferred to the Western Area Power Administration, Department of Energy. Unit 4 and 5 were up rated to 142 MW in 1998 and 1999, respectively.

Units 1 and 2 were up rated to 125 MW each in 1980. Units 3, 4, and 5 were up rated in 1968-1974.

Present Activities: All five generators have been uprated to 142 MW and turbine replacements have been completed. Rehabilitation of the two station service units starts was completed in 2007.

Future Planned Activities: Rewind and uprating of unit 2 will start in 2006, unit 1 will follow in 2007.

Special Issues: Shasta Powerplant penstocks provide water supply for Livingston Stone National Fish Hatchery, which is located .125 miles south of Shasta Powerplant.

River:	Sacramento River	**Plant Type:**	Conventional
Powerhouse Type:	Above Ground	**Turbine Type:**	Francis
Original Nameplate Capacity:	379,000 kW	**Installed Capacity:**	697,000 kW
Year of Initial Operation:	1944	**Age:**	63 years
Net Generation (FY-2007):	1,978.0 GWh	**Rated Head:**	330 feet
Average Plant Factor (FY-2007):	32.5 percent	**Remotely Operated:**	Yes
Production Mode:	Peaking		

Ancillary Services

Shasta
Ancillary Services

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

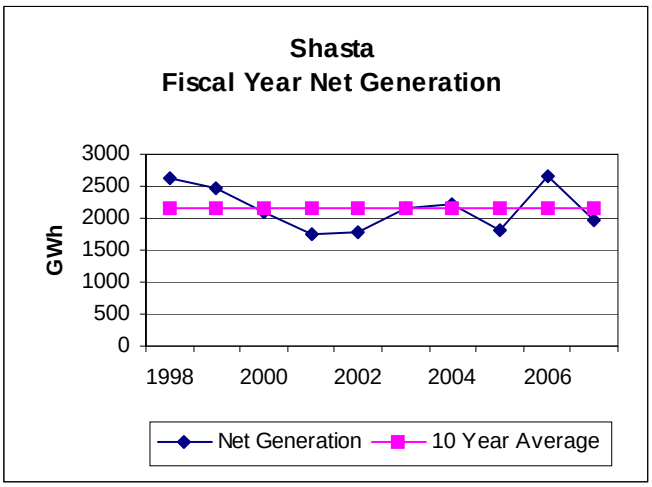
Generators

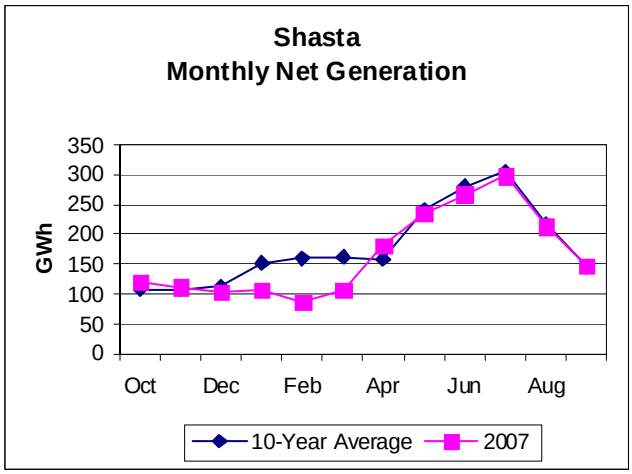
Shasta Generators
Existing Number and Capacity

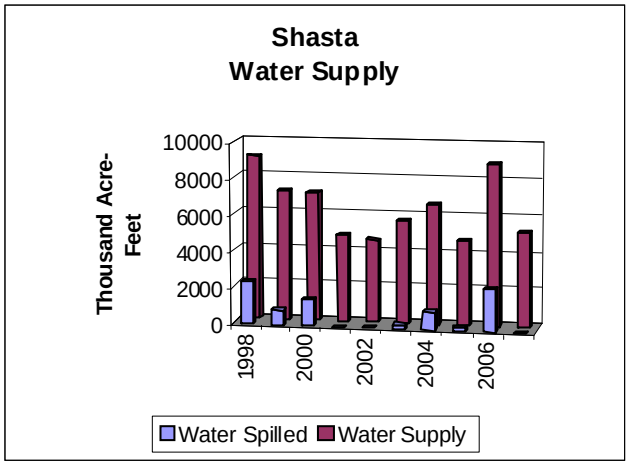
Unit #	Original Capacity (kW)	Capacity Increased (kW)	Present Capacity (kW)
1	75,000	67,000	142,000
2	75,000	50,000	125,000
3	75,000	67,000	142,000
4	75,000	67,000	142,000
5	75,000	67,000	142,000
S1	2,000	-	2,000
S2	2,000	-	2,000
7 Units	379,000	318,000	697,000

The maximum operational capacity is 612,000 kW.
Units 3, 4, and 5 are presently restricted to 125,000 kW because of the turbines which will be replaced in 2001.

Generation

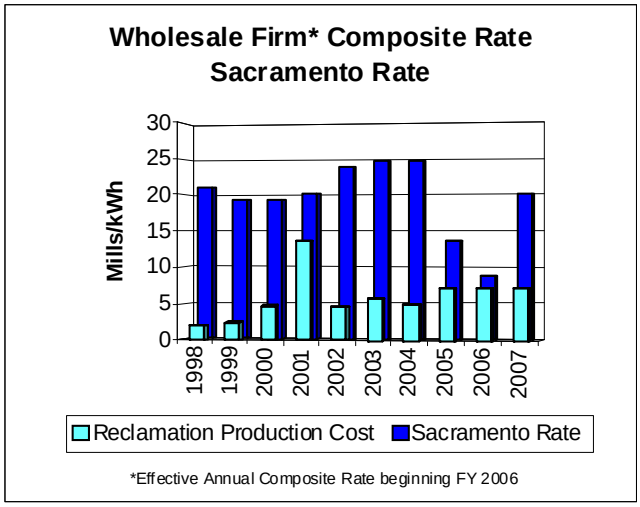

Shasta
Fiscal Year Net Generation
GWh
3000
2500
2000
1500
1000
500
0
1998
2000
2002
2004
2006
Net Generation
10 Year Average


Shasta
Monthly Net Generation
GWh
350
300
250
200
150
100
50
0
Oct
Dec
Feb
Apr
Jun
Aug
10-Year Average
2007

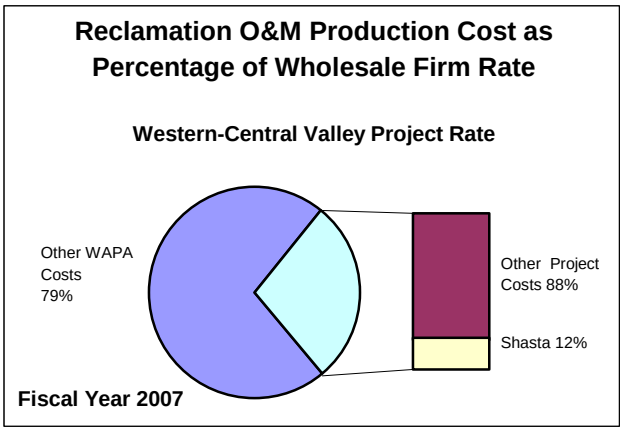

Shasta
Water Supply
Thousand Acre-Feet
10000
8000
6000
4000
2000
0
1998
2000
2002
2004
2006
Water Spilled
Water Supply

Prime Laboratory Benchmarks

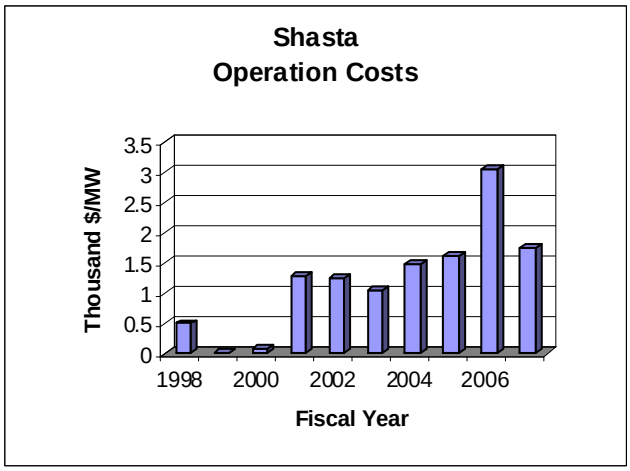
Benchmark 1
Wholesale Firm Rate

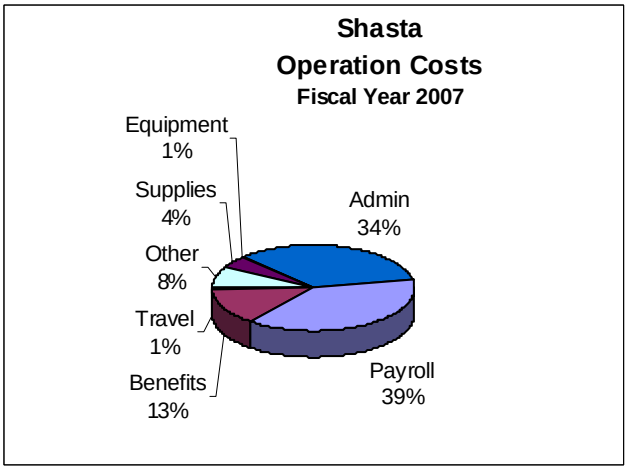


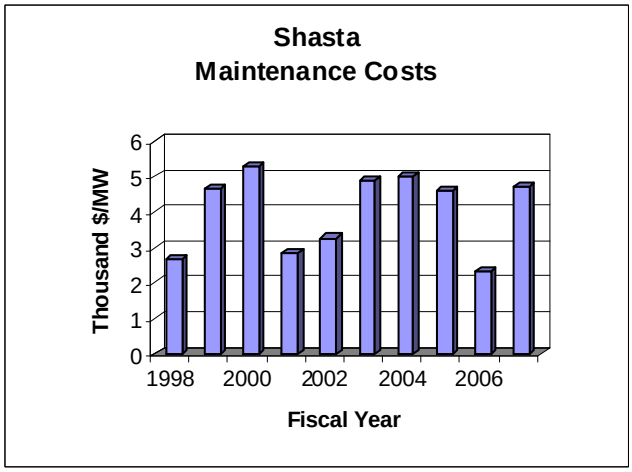
Benchmark 2
Reclamation's Production Cost as Percentage of Wholesale Firm Rate

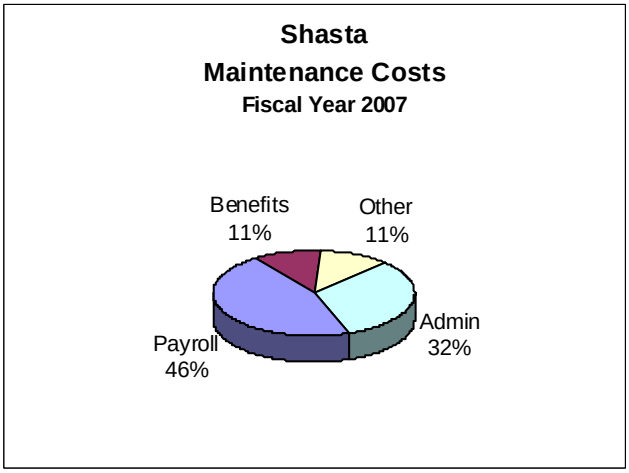


Benchmark 3
Production Cost

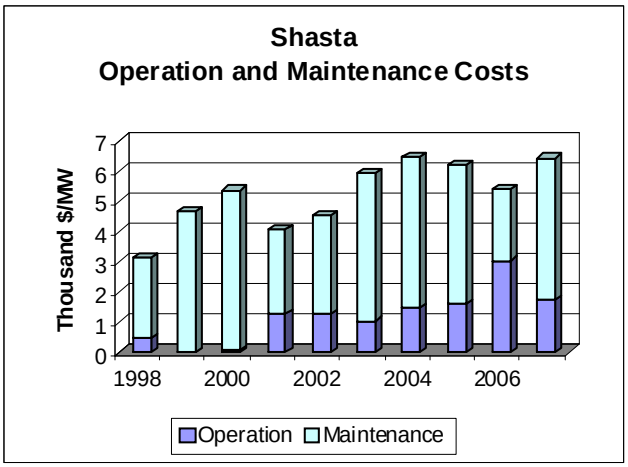


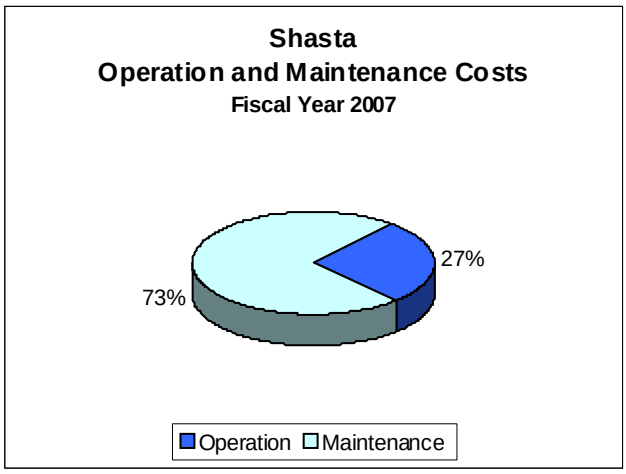


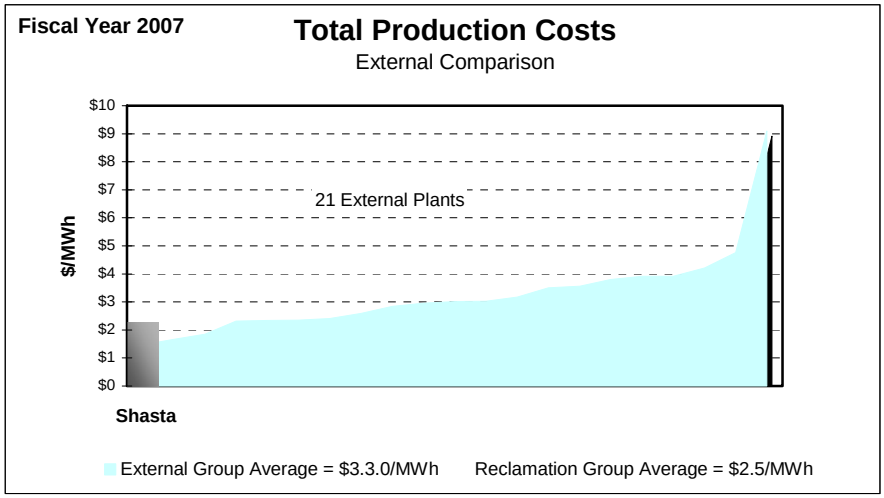


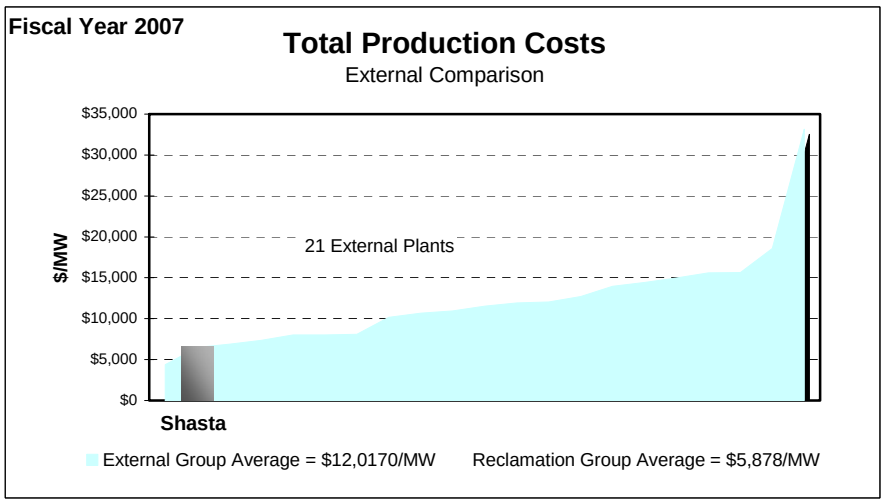


Benchmark 3
Production Cost



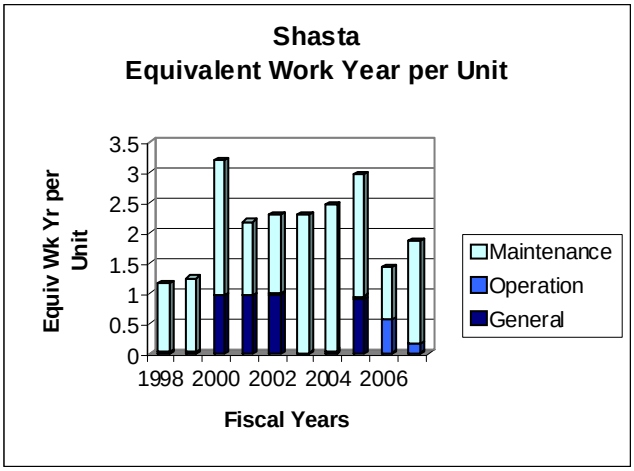


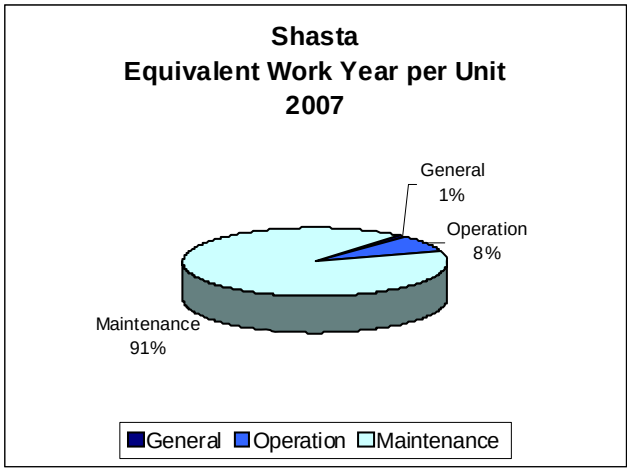


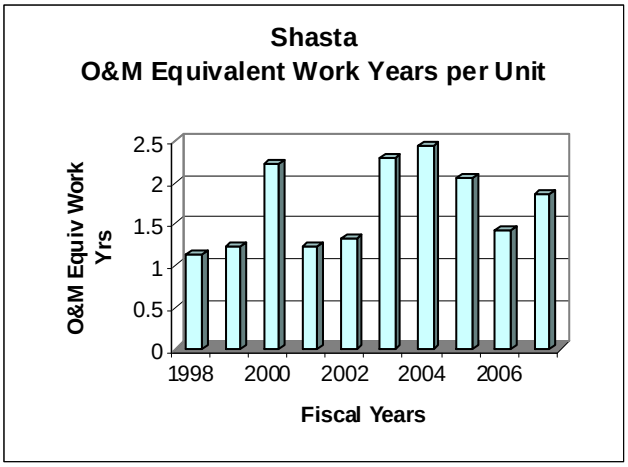


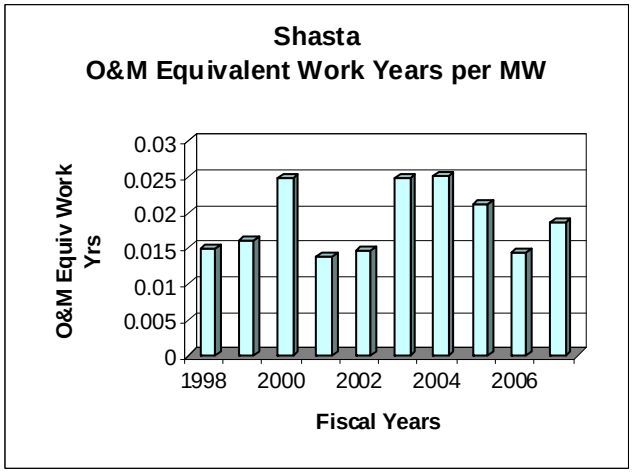
Benchmark 4
Workforce Deployment

Shasta 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	0.00	0.00	0.12	0.12	0.02	0.00
Operation	0.98	0.09	0.00	1.07	0.15	0.00
Maintenance	10.84	1.05	0.00	11.89	1.70	0.02
Total Staffing	11.82	1.14	0.12	13.08	1.87	0.02

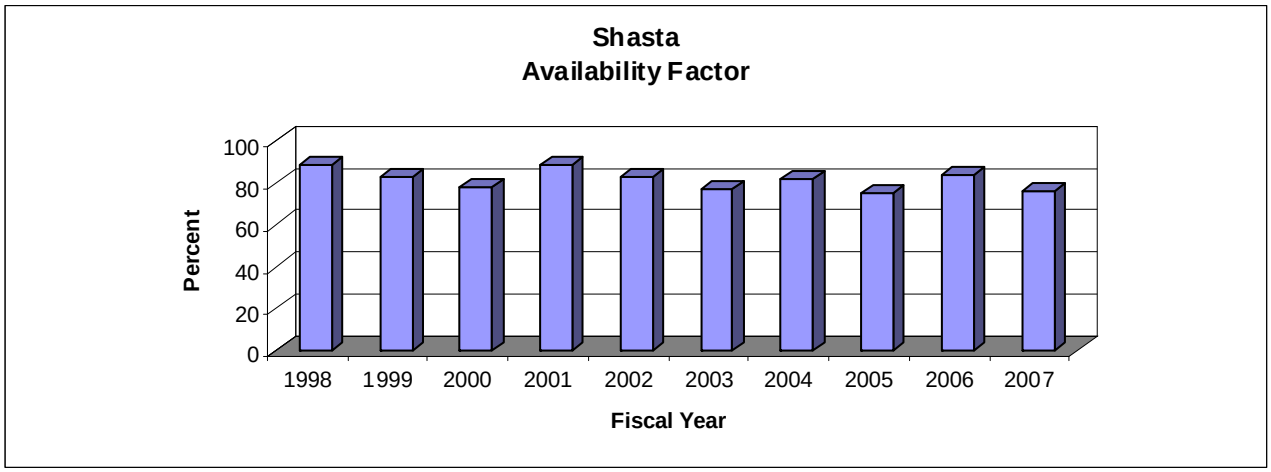




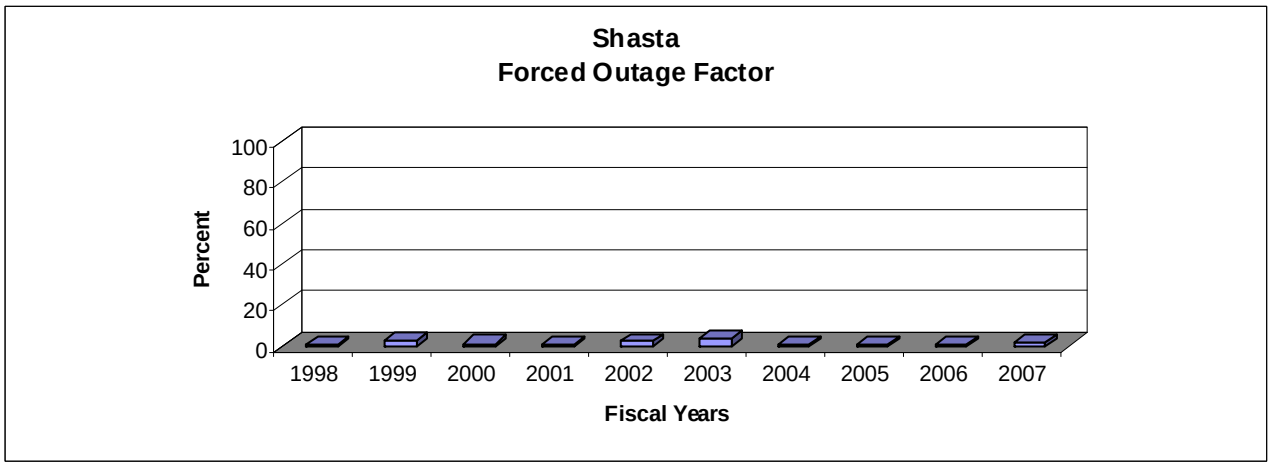




Benchmark 5
Availability Factor

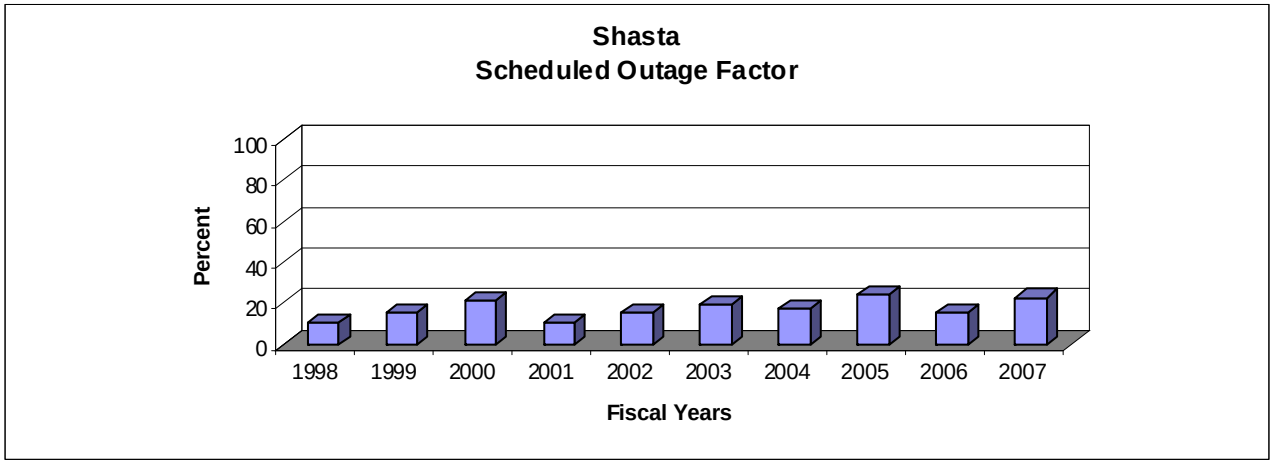


Benchmark 6
Forced Outage Factor



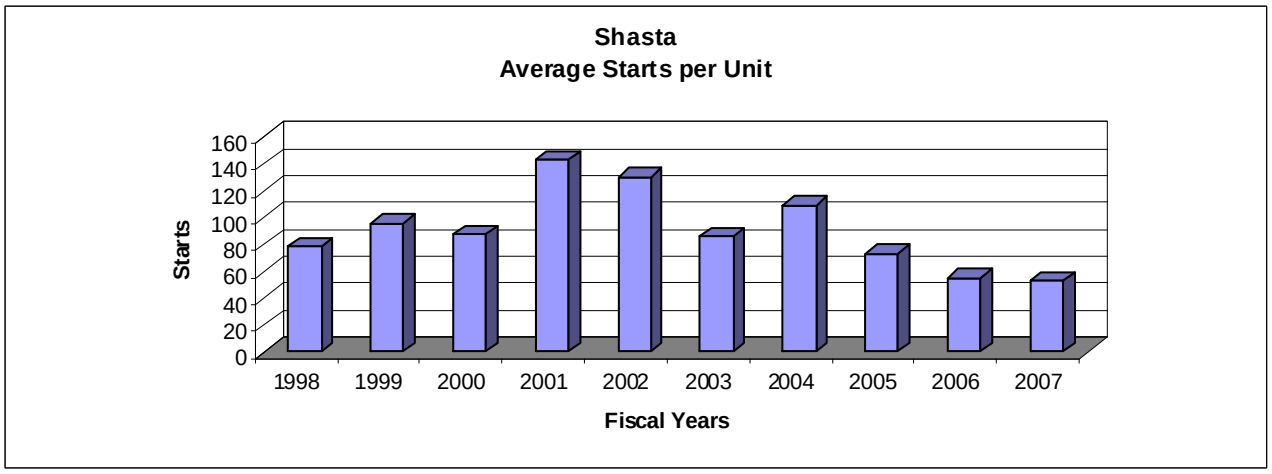
FY-99 – Unit 5 rewound - generator failed due to faulty contractor installation
FY-03 – Unit 5 had in-service failure of a generator field winding that resulted in an outage from November 2002 – January 2003. The failure was due to faulty contract work during the rewind and was repaired under warranty by the contractor.

Benchmark 7
Scheduled Outage Factor



FY-97 - Units out for temperature control device
FY-97 and FY-98 – Unit 4 rewind
FY-99 – Unit 5 rewind
FY-99 to FY02 – Transformer re-gasketing
FY-00 – Unit 3 rewind
FY-03 – Unit 4 turbine runner replacement

Starts



Benchmark Data Comparison

Fiscal Year 2007	Shasta Powerplant	Reclamation Average 500+ MW Group	Total Reclamation Average	Industry Average	Best Performers
Wholesale Firm Rate Mills/kWh	13.7	Not Applicable	*22.45	Not Available	Not Available
Production Cost as Percentage of Wholesale Firm Rate	5.3%	Not Applicable	12.1%	Not Applicable	Not Applicable
O&M Cost $/MWh	2.27	1.65	2.76	***3.28	1.00
O&M Costs $/MW	6,443	4,863	7,847	***12,0170	2,897
O&M Equiv Work Year per MW	0.02	0.02	0.03	Not Available	0.0
Availability Factor	76.0	81.93	82.3	**88.64	98.5
Forced Outage Factor	1.2	3.15	2.6	**2.61	0.0
Scheduled Outage Factor	22.8	14.92	15.1	**8.74	0.0

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

Spring Creek Powerplant
Central Valley Project

Plant Contact:
Brian Person
Area Manager

Plant Address:
Spring Creek Powerplant
Redding, CA 96003

Telephone Numbers:
Phone: (530) 275-1554
Fax: (530) 275-2441

E-Mail Address:
bperson@mp.usbr.gov

Reclamation Region: Mid-Pacific

NERC Region: Western Electricity Coordinating Council, California-Southern Nevada Power Area

PMA Service Area: Western Area Power Administration, Sierra Nevada Region

Project Authorization: Funds for construction of the initial features of the Central Valley Project were provided by the Emergency Relief Appropriation Act of 1935 (49 Stat. 115). The Secretary of the Interior authorized the project and the President approved it on December 2, 1935.

The Shasta and Trinity River Division was authorized by Public Law 386, 84th Congress, 1st Session, approved August 12, 1955.

Project Purposes: The Central Valley Project, one of the Nation's major water conservation developments, extends from the Cascade Range on the north to the semiarid but fertile plains along the Kern River on the south. Initial features of the project were built primarily to protect the Central Valley from crippling water shortages and menacing floods. New project units were built to provide water and power to match the continued growth of the State.

Although developed primarily for irrigation, this multiple-purpose project also provides flood control, improves Sacramento River navigation, supplies domestic and industrial water, generates electric power, conserves fish and wildlife, creates opportunities for recreation, and enhances water quality.

Plant Location: Spring Creek Powerplant is located in Shasta County, California, on the Spring Creek arm of Keswick Reservoir near Redding, California.

Plant Facts: Spring Creek Powerplant is at the foot of Spring Creek Debris Dam. The dam is an earth-fill structure, 196 feet high with a crest length of 1,110 feet. Water for power is received through Spring Creek Tunnel which diverts water from Whiskeytown Lake on Clear Creek. Water from the plant is discharged to Keswick Reservoir.

Plant Purpose: Spring Creek Powerplant is a peaking plant. Its power is dedicated first to meeting the requirements of the project facilities. The remaining energy is marketed to various preference customers in northern California.

Plant History: These facilities were built and are operated by Reclamation. Transmission lines were operated by Reclamation until October 1, 1977, when they were transferred to the Western Area Power Administration, Department of Energy.

Present Activities: Excitation system replacements are in progress. Completion of these systems is expected to be done in 2008.

Future Planned Activities: Generator rewinds and turbine replacements are proposed beginning in 2011.

Special Issues: Spring Creek operation is tied to flow regimes aimed at minimizing the building of metal concentrations in the Spring Creek arm of the Keswick Reservoir. Trinity County has first preference to the power benefit of the Central Valley Project from Spring Creek Powerplant.

River:	Spring Creek	**Plant Type:**	Conventional
Powerhouse Type:	Above Ground	**Turbine Type:**	Francis
Original Nameplate Capacity:	150,000 kW	**Installed Capacity:**	180,000 kW
Year of Initial Operation:	1964	**Age:**	44 years
Net Generation (FY-2007):	274.2 GWh	**Rated Head:**	566 feet
Average Plant Factor (FY-2007):	17.5 percent	**Remotely Operated:**	Yes
Production Mode:	Peaking		

Ancillary Services

Spring Creek
Ancillary Services

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

Generators

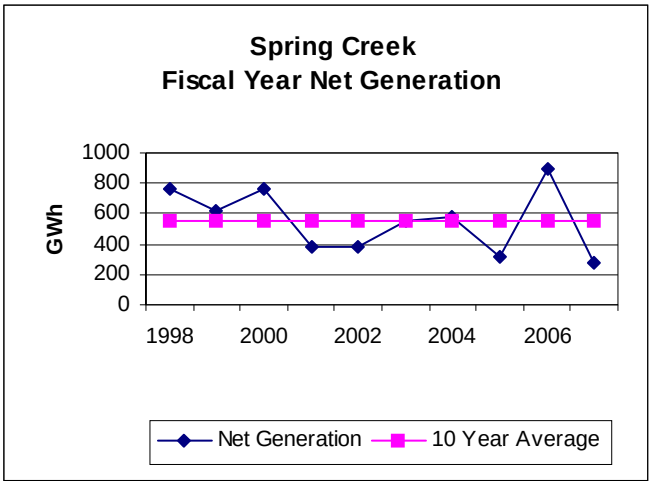
Spring Creek Generators

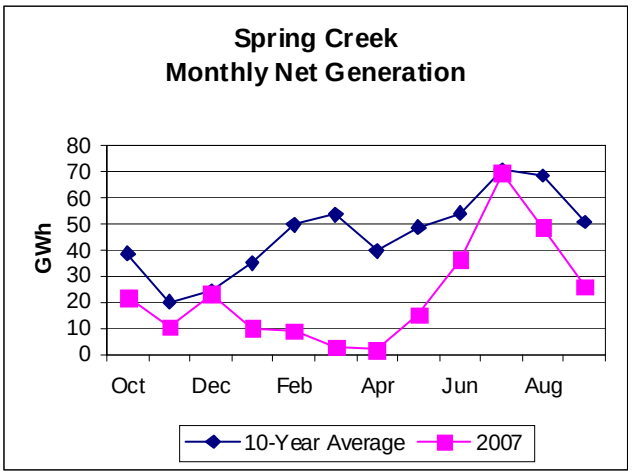
Existing Number and Capacity

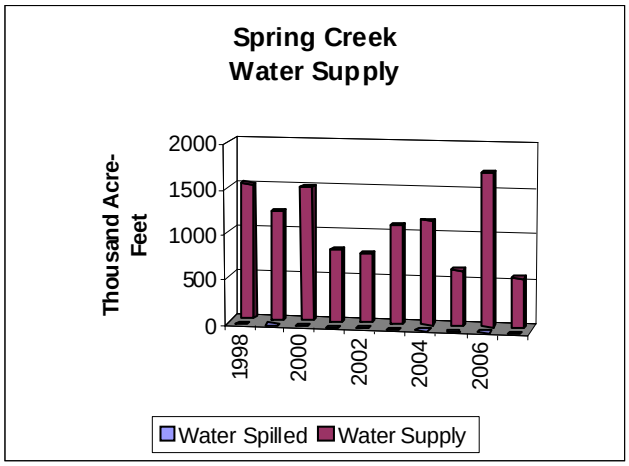
Unit #	Original Capacity (kW)	Capacity Increased (kW)	Present Capacity (kW)
1	75,000	15,000	90,000
2	75,000	15,000	90,000
2 units	150,000	30,000	180,000

The maximum operational capacity is 190,000 kW

Generation

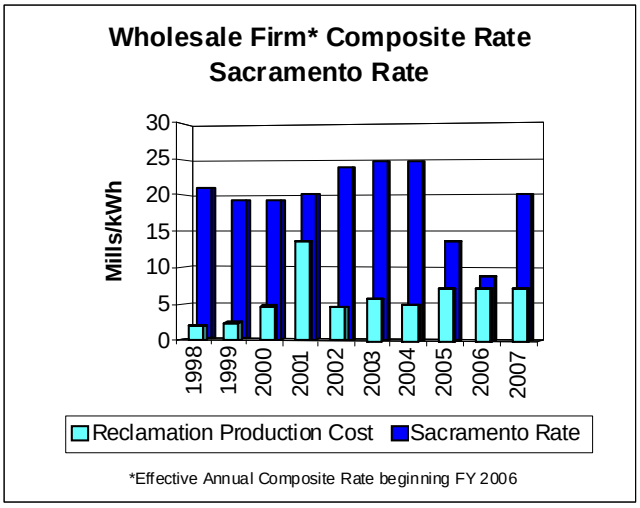

Spring Creek
Fiscal Year Net Generation
GWh
1000
800
600
400
200
0
1998
2000
2002
2004
2006
Net Generation
10 Year Average


Spring Creek
Monthly Net Generation
GWh
80
70
60
50
40
30
20
10
0
Oct
Dec
Feb
Apr
Jun
Aug
10-Year Average
2007

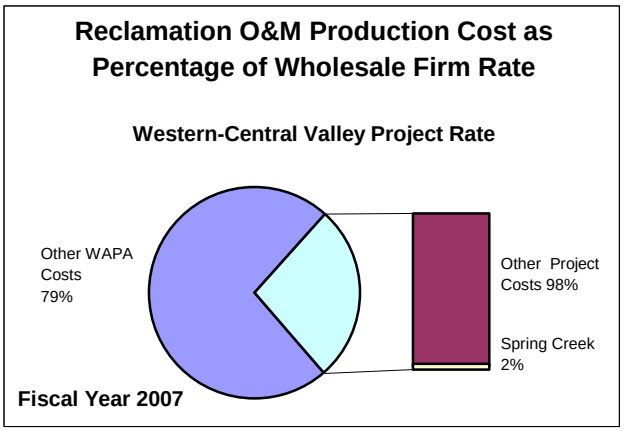

Spring Creek
Water Supply
Thousand Acre-Feet
2000
1500
1000
500
0
1998
2000
2002
2004
2006
Water Spilled
Water Supply

Prime Laboratory Benchmarks

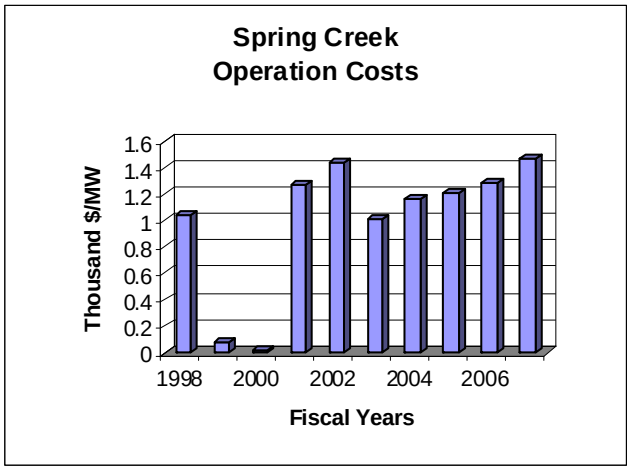
Benchmark 1
Wholesale Firm Rate

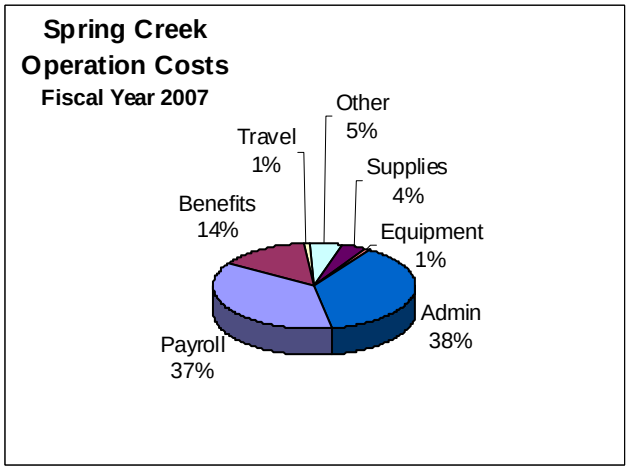


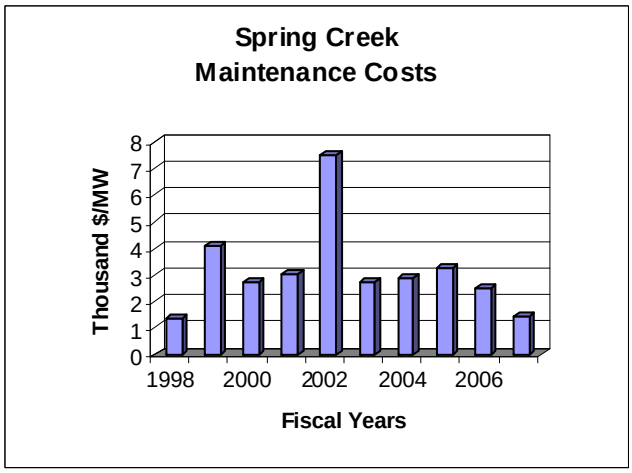
Benchmark 2
Reclamation's Production Cost as Percentage of Wholesale Firm Rate

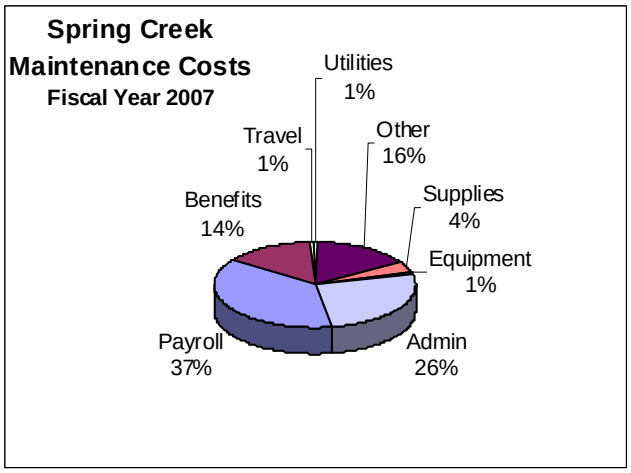


Benchmark 3
Production Cost

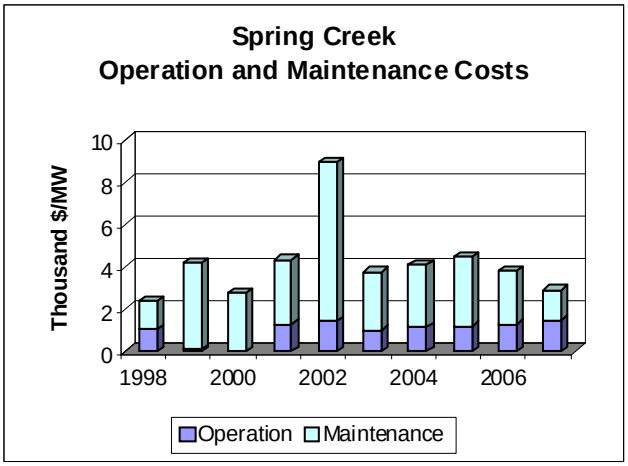


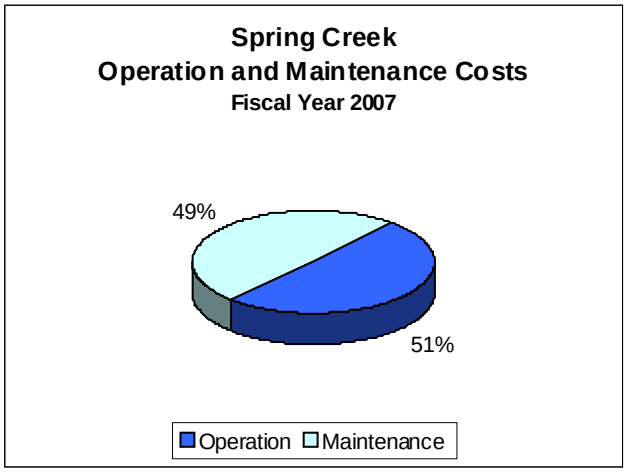


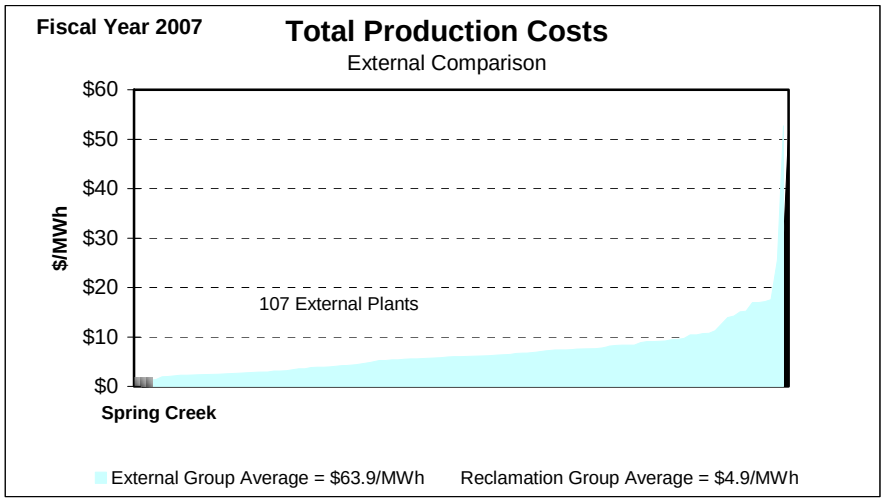


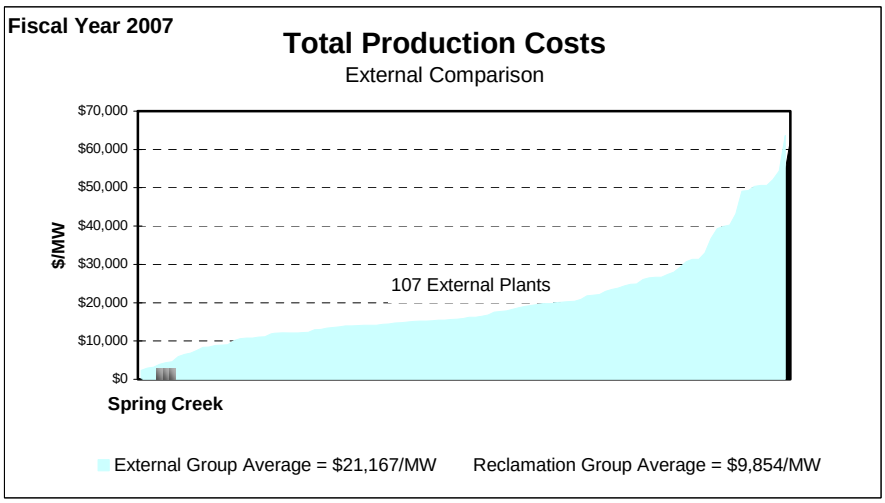


Benchmark 3
Production Cost



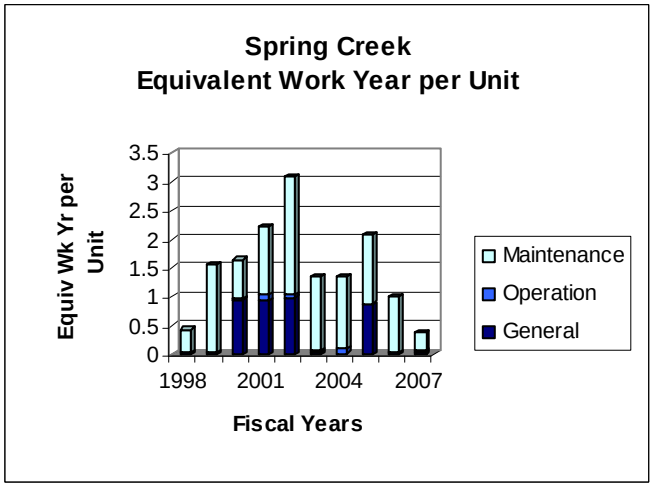


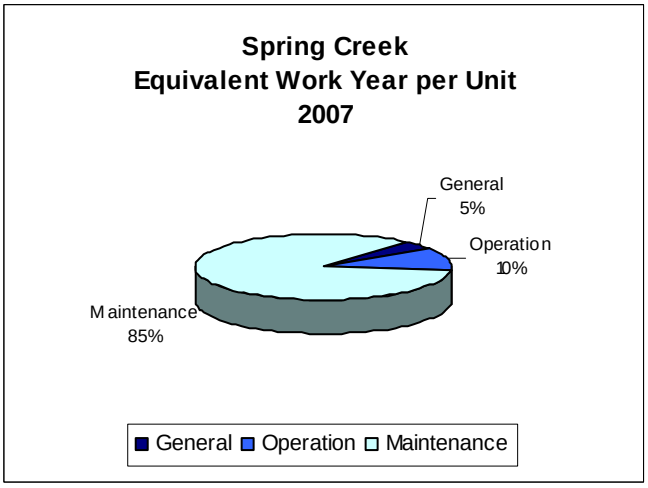


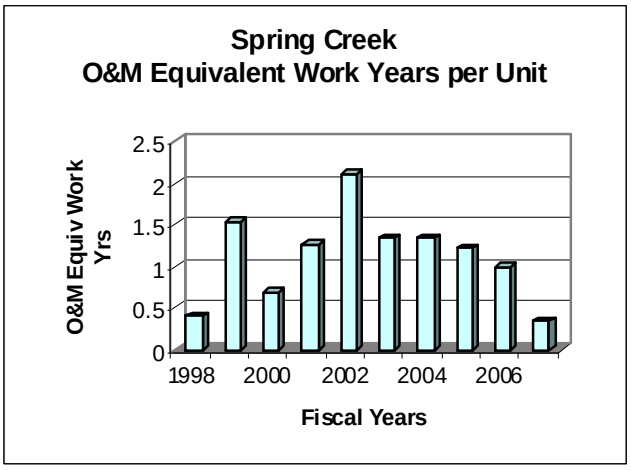


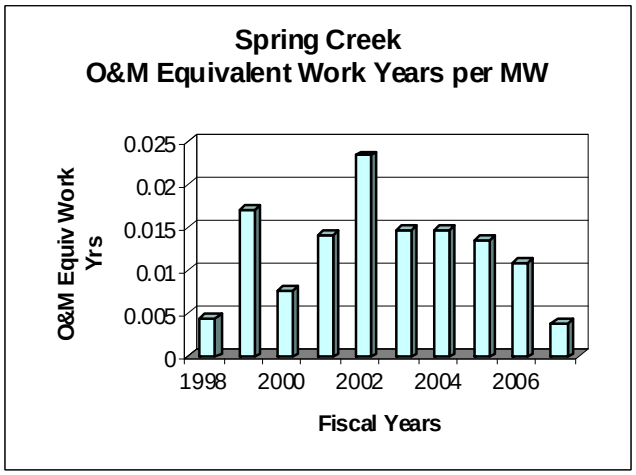
Benchmark 4
Workforce Deployment

Spring Creek 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	0.00	0.00	0.04	0.04	0.02	0.00
Operation	0.07	0.01	0.00	0.08	0.04	0.00
Maintenance	0.57	0.06	0.00	0.63	0.31	0.00
Total Staffing	0.64	0.06	0.04	0.74	0.37	0.00

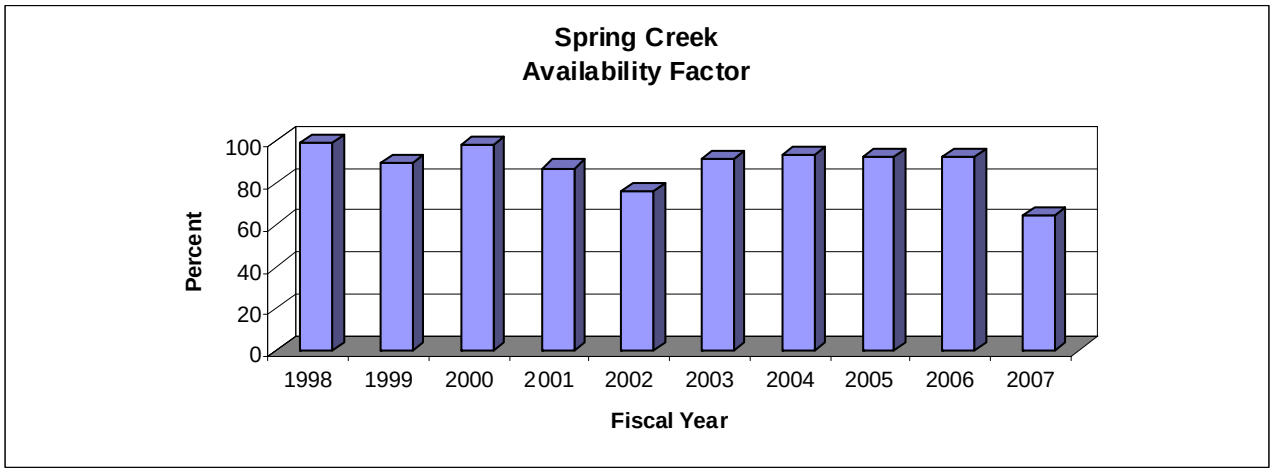




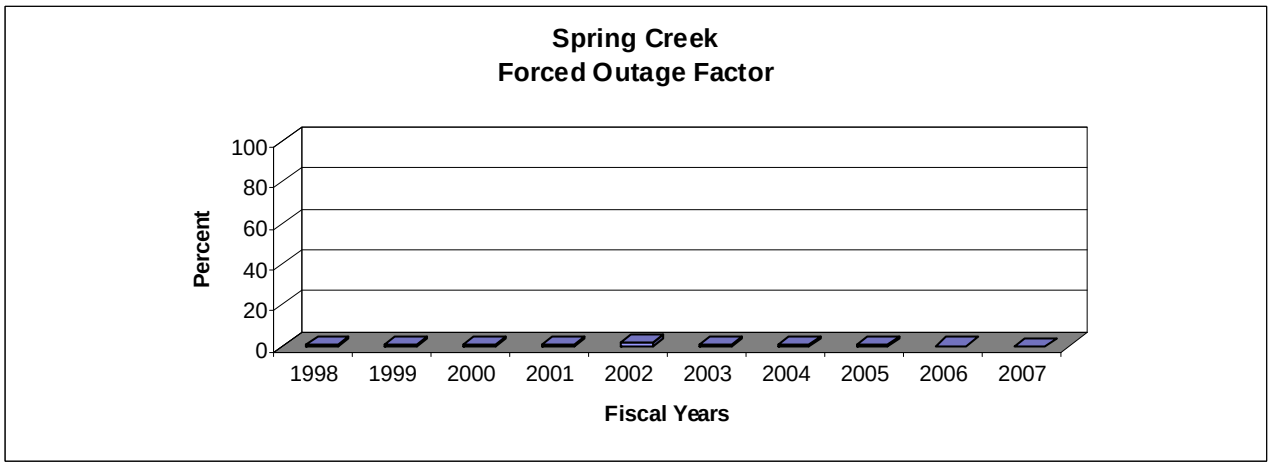




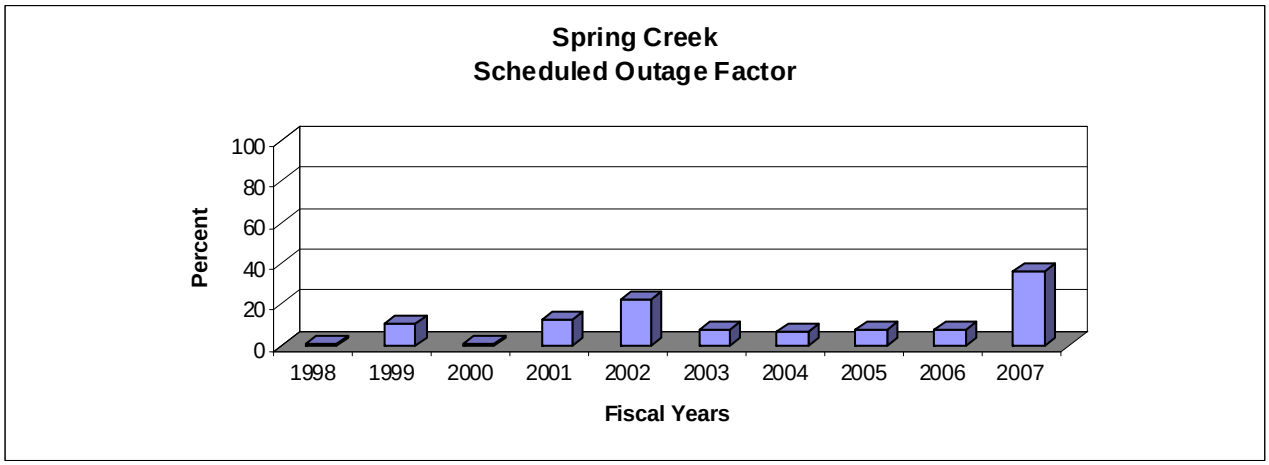
Benchmark 5
Availability Factor



Benchmark 6
Forced Outage Factor

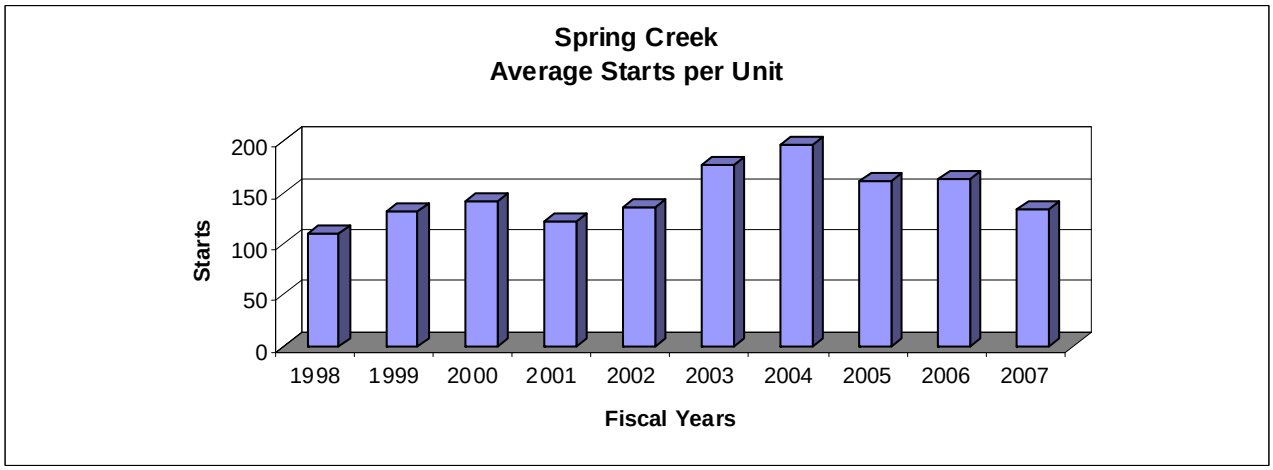


Benchmark 7
Scheduled Outage Factor



FY-01 – Re-gasketed transformers
FY-01 and FY-02 – Re-gasketed transformers and installation of penstock flow meters.

Starts

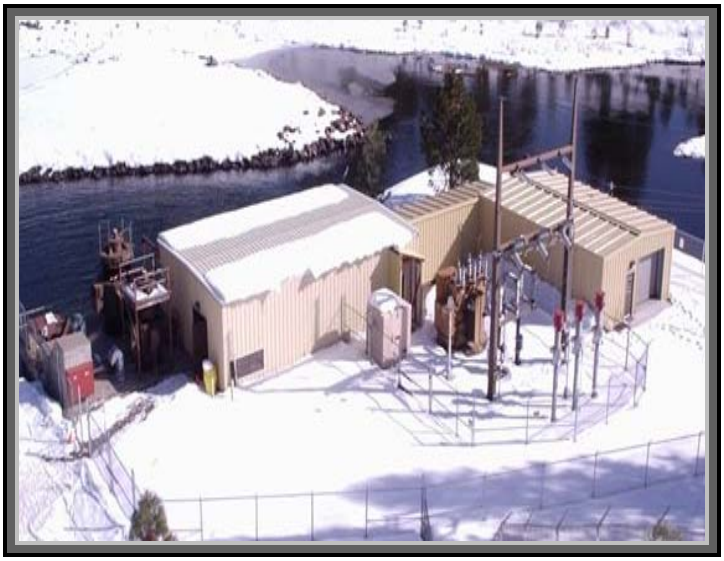


Benchmark Data Comparison

Fiscal Year 2007	Spring Creek Powerplant	Reclamation Average 100-500 MW Group	Total Reclamation Average	Industry Average	Best Performers
Wholesale Firm Rate Mills/kWh	13.7	Not Applicable	*22.45	Not Available	Not Available
Production Cost as Percentage of Wholesale Firm Rate	0.6%	Not Applicable	12.1%	Not Applicable	Not Applicable
O&M Cost $/MWh	1.90	4.44	2.76	***63.88	1.00
O&M Costs $/MW	2,897	10,502	7,847	***21,167	2,897
O&M Equiv Work Year per MW	0.00	0.04	0.03	Not Available	0.00
Availability Factor	64.2	83.5	82.3	**88.64	98.5
Forced Outage Factor	0.1	1.2	2.6	**2.61	0.0
Scheduled Outage Factor	35.7	15.4	15.1	**8.74	0.0

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

Stampede Powerplant
Washoe Project



Plant Contact:
Robert MacDougal, Civil Engineer
Steve Barker Plant Operator
Lahontan Basin Area Office

Plant Address:
Stampede Powerplant
Truckee, CA

Telephone Numbers:
Phone: (702) 882-3436 (LBAO 24 hours)
(530) 587-5087 (Powerplant)
Fax: (702) 882-7592 (LBAO)
(530) 587-5097 (Plant Office)

E-Mail Address:
rmacdougal@mp.usbr.gov
sbarkerl@mp.usbr.gov

Reclamation Region: Mid-Pacific

NERC Region: Western Electricity Coordinating Council, California-Southern Nevada Power Area

PMA Service Area: Western Area Power Administration, Sierra Nevada Region

Project Authorization: The project was authorized by Public Law 858, 84th Congress, 2d Session, August 1, 1956, as amended August 21, 1958, by Public Law 85-706.

Project Purposes: The project was designed to improve the regulation of runoff of the Truckee and Carson River systems and provide supplemental irrigation water and drainage for presently irrigated lands, as well as water for municipal and industrial and fishery uses, flood protection, fish and wildlife benefits, and recreation development.

The Washoe Project was designed to develop water supplies to meet additional needs by conserving excess runoff in project reservoirs, and by saving water now lost to non-beneficial evaporation and transpiration. The plan also called for using storage capability to regulate flows for such non-consumptive purposes as flood control, fishery improvement, and power production.

Plant Location: Stampede Powerplant is located in Sierra County, California, on the Little Truckee River. Stampede Dam and Reservoir are located immediately below the mouth of Davies Creek and approximately 8 miles above the confluence of the Little Truckee and Truckee Rivers.

Plant Facts:	The dam is a zoned earth fill structure with a height of 239 feet, a crest length of 1,511 feet, and an embankment volume of 4.5 million cubic yards. The dam is 40 feet wide at the crest. The reservoir, with a capacity of 226,500 acre-feet, provides flood control, recreation, a new reservoir fishery, and other fishery improvements on the main Truckee River, Little Truckee River, and Boca Reservoir.
Plant Purpose:	Stampede Powerplant is a run-of-the-river plant. The power generated is dedicated first to meeting the requirements of the project facilities. The remaining energy is marketed to various preference customers in northern California.
Plant History:	The powerplant was placed on-line in 1988.
Present Activities:	Normal operations. Maintain and regulate river releases.
Future Planned Activities:	None
Special Issues:	Stampede Powerplant provides the economic equivalent of project-use power to Lahontan and Marble Bluff fish facilities.

River:	Little Truckee River	**Plant Type:**	Conventional
Powerhouse Type:	Above Ground	**Turbine Type:**	Francis
Original Nameplate Capacity:	3,650 kW	**Installed Capacity:**	3,650 kW
Year of Initial Operation:	1987	**Age:**	20 years
Net Generation (FY-2007):	11.1 GWh	**Rated Head:**	183 feet
Average Plant Factor (FY-2007):	35.7 percent	**Remotely Operated:**	No
Production Mode:	Intermediate		

Ancillary Services

Stampede
Ancillary Services

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

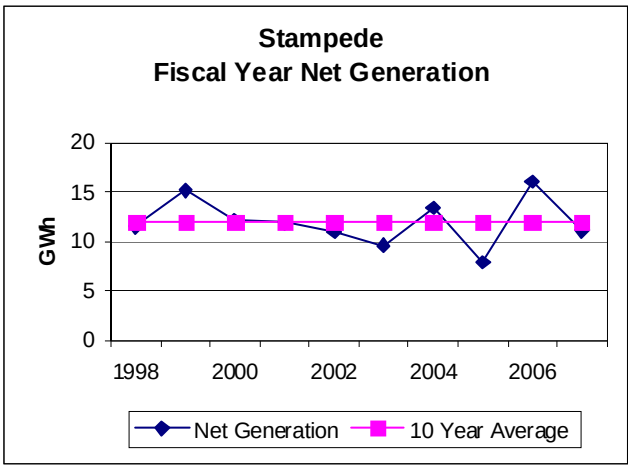
Generators

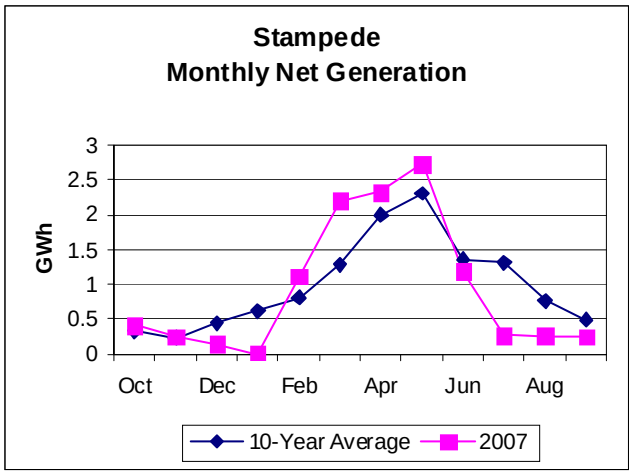
Stampede Generators

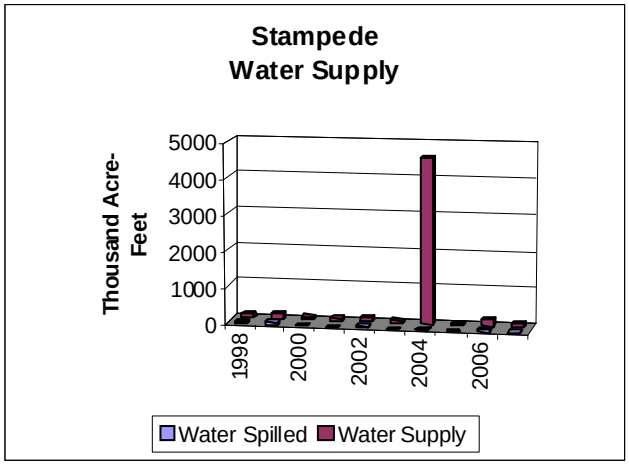
Existing Number and Capacity

Unit #	Original Capacity (kW)	Capacity Increased (kW)	Present Capacity (kW)
1	3,000	-	3,000
2	650	-	650
2 units	3,650	-	3,650

Generation


Stampede
Fiscal Year Net Generation
GWh
20
15
10
5
0
1998
2000
2002
2004
2006
Net Generation
10 Year Average


Stampede
Monthly Net Generation
GWh
3
2.5
2
1.5
1
0.5
0
Oct
Dec
Feb
Apr
Jun
Aug
10-Year Average
2007


Stampede
Water Supply
Thousand Acre-Feet
5000
4000
3000
2000
1000
0
1998
2000
2002
2004
2006
Water Spilled
Water Supply

Prime Laboratory Benchmarks

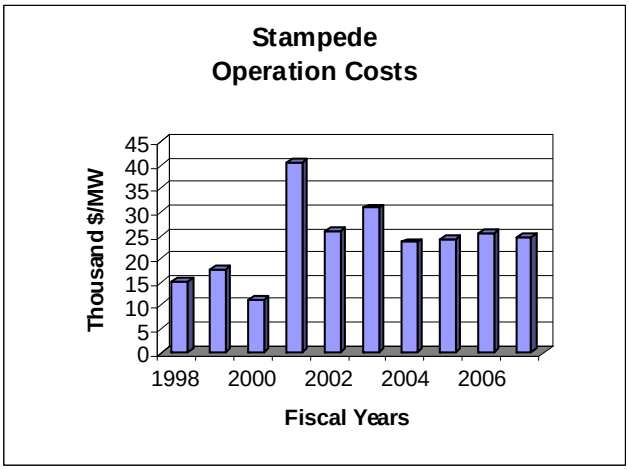
Benchmark 1
Wholesale Firm Rate

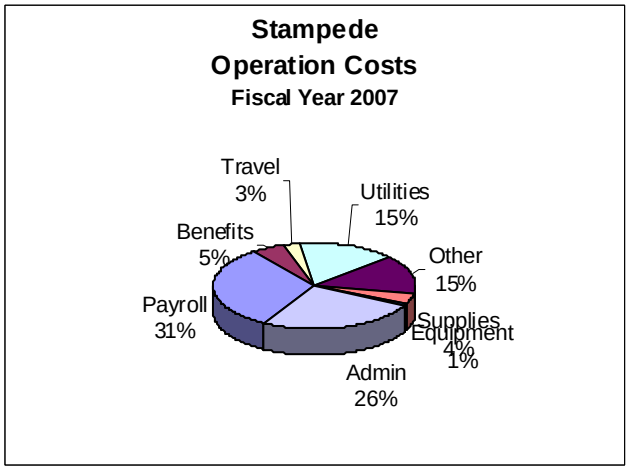
Stampede Powerplant power is not included
in the wholesale firm rate.

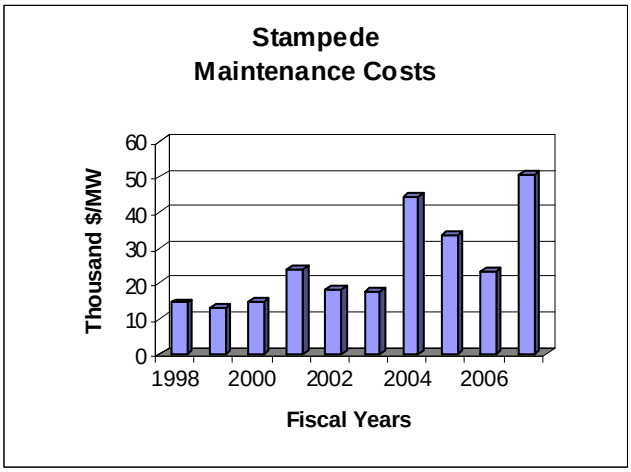
Benchmark 2
Reclamation's Production Cost as Percentage of Wholesale Firm Rate

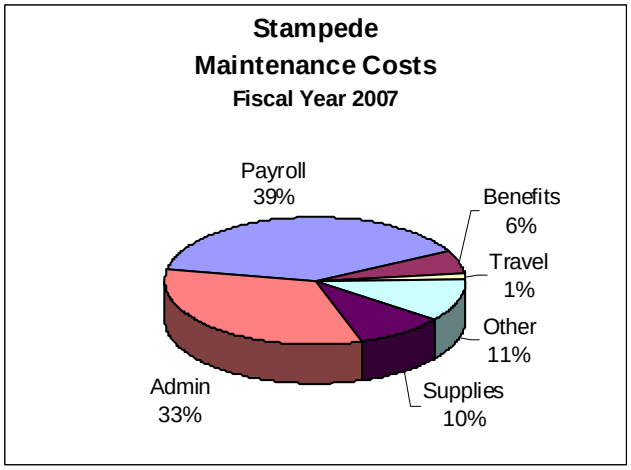
Not Applicable

Benchmark 3
Production Cost

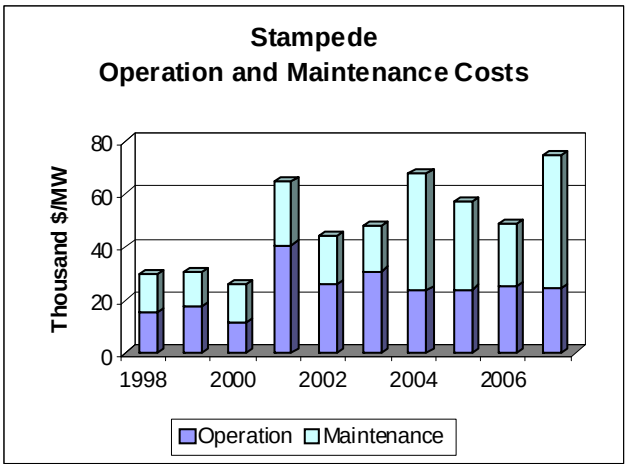


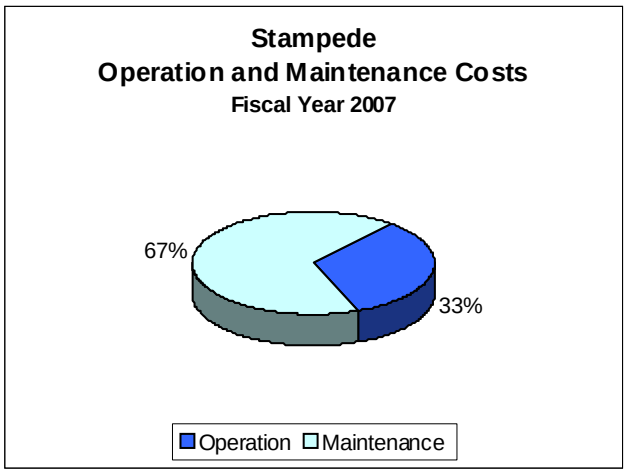


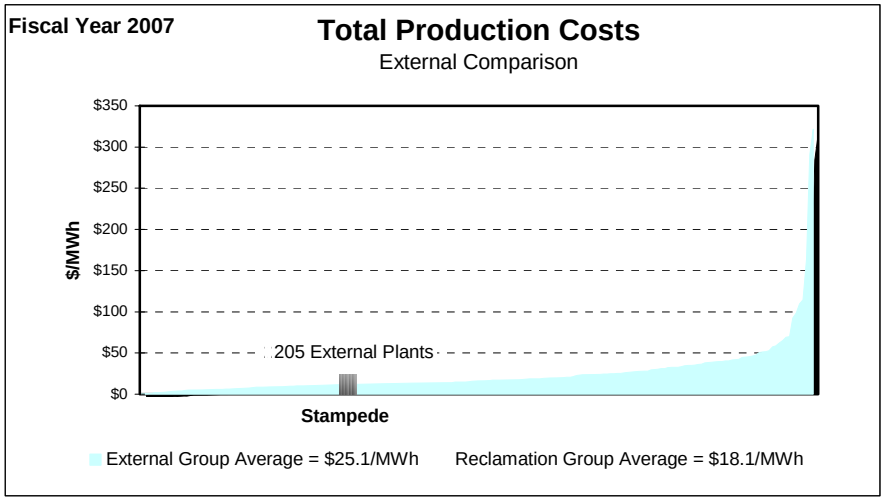


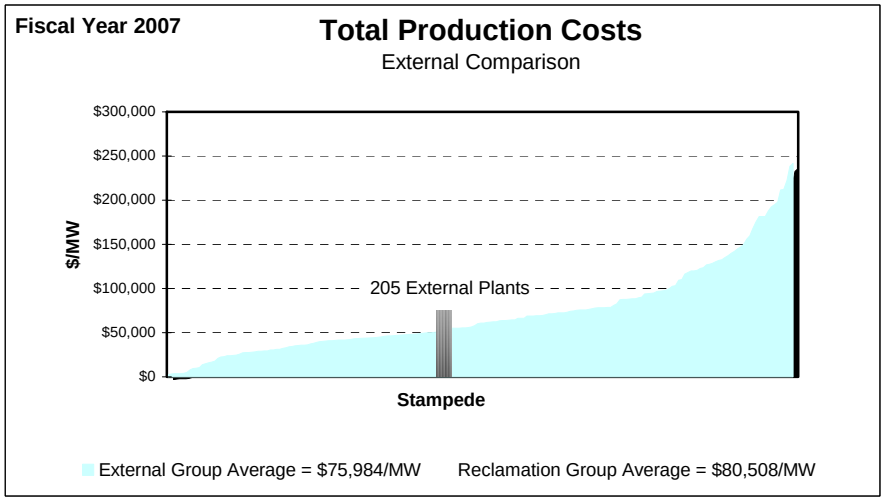


Benchmark 3
Production Cost



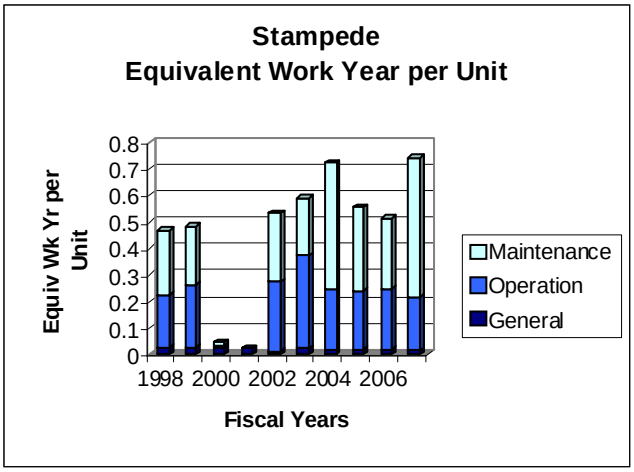


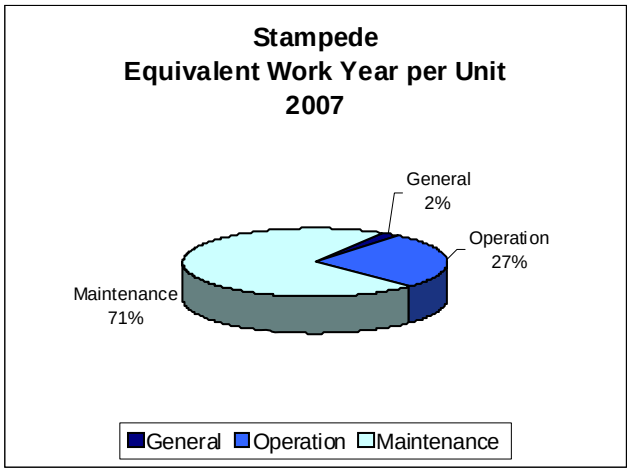


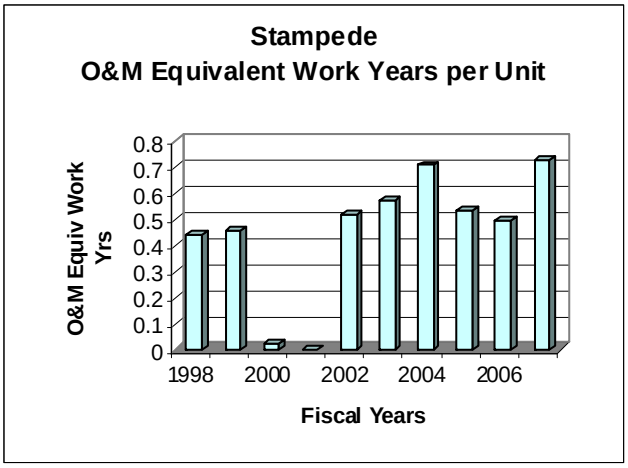


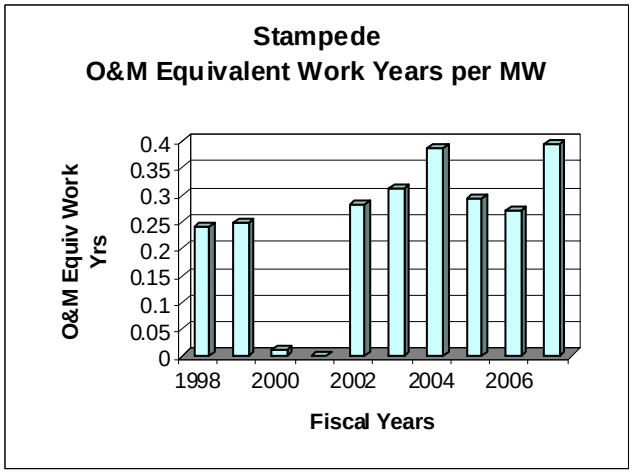
Benchmark 4
Workforce Deployment

Stampede 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	0.00	0.00	0.04	0.04	0.02	0.01
Operation	0.36	0.03	0.00	0.40	0.20	0.11
Maintenance	0.96	0.09	0.00	1.05	0.53	0.29
Total Staffing	1.32	0.13	0.04	1.48	0.74	0.41

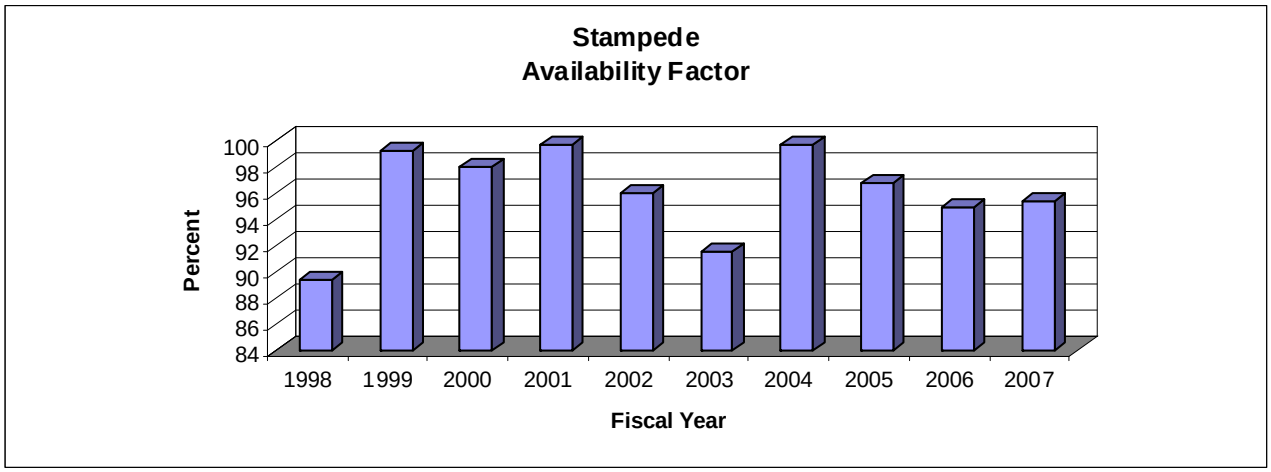




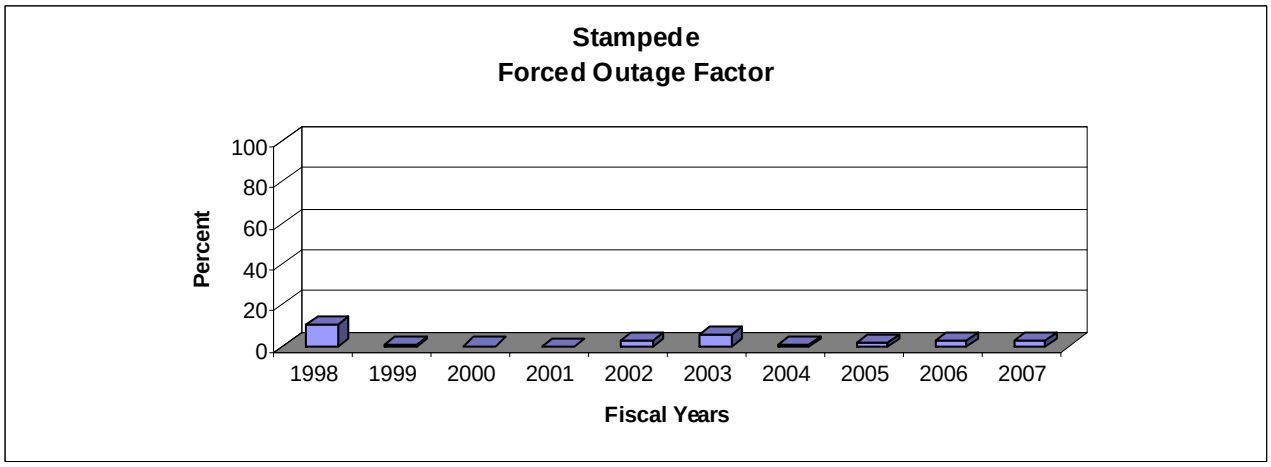




Benchmark 5
Availability Factor

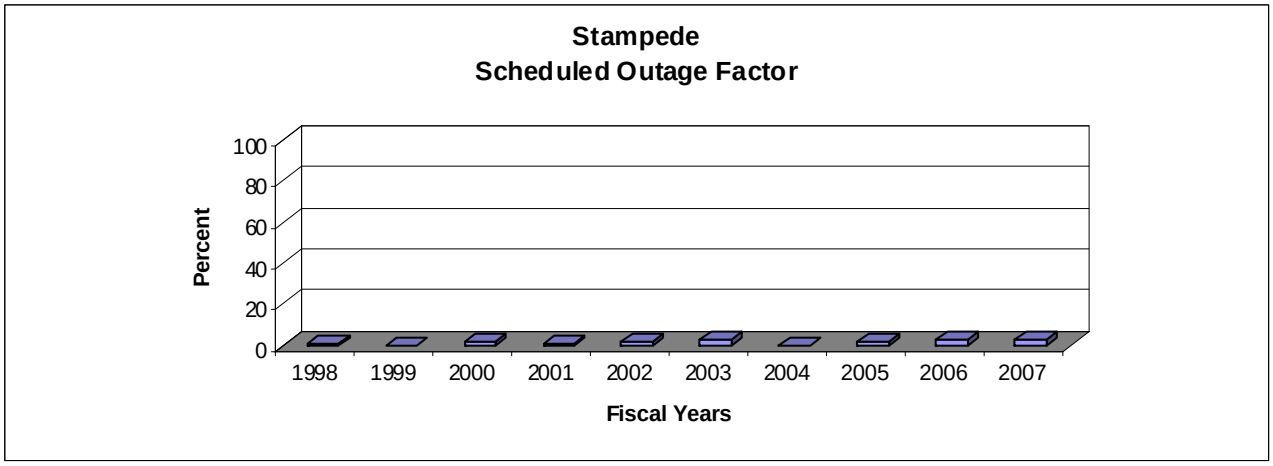


Benchmark 6
Forced Outage Factor

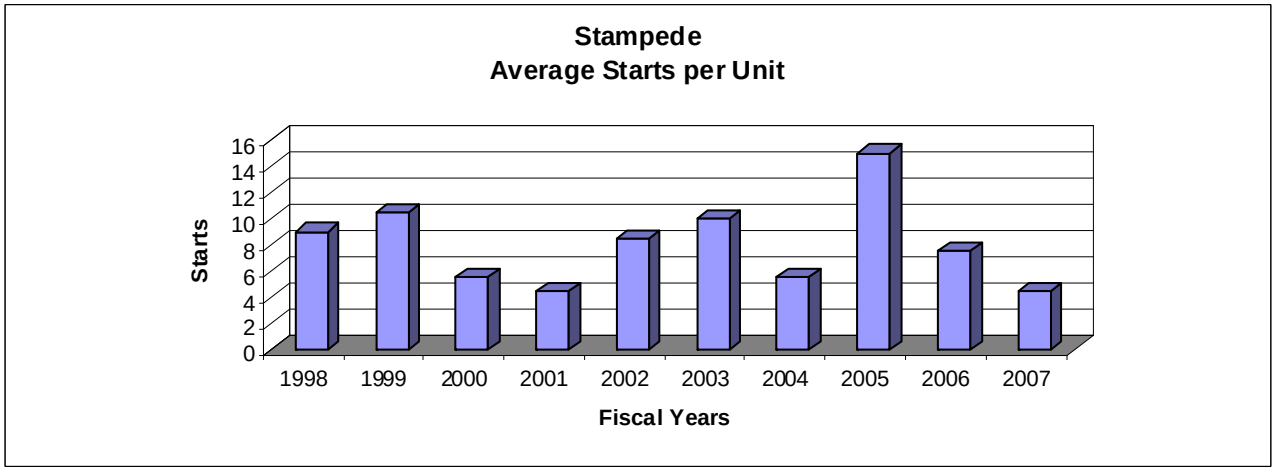


FY-97 - Unit 1 rotor experienced moisture damage during January 1997 floods
FY-98 - Unit 1 arcing in brush housing

Benchmark 7
Scheduled Outage Factor



Starts

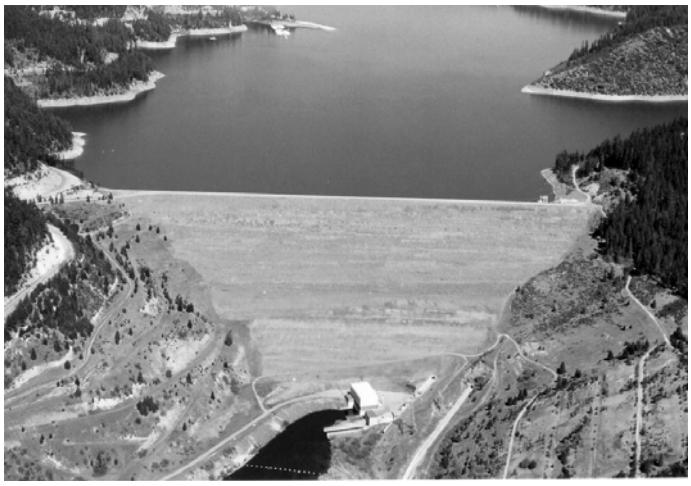


Benchmark Data Comparison

Fiscal Year 2007	Stampede Powerplant	Reclamation Average 0-10 MW Group	Total Reclamation Average	Industry Average	Best Performers
Wholesale Firm Rate Mills/kWh	Not Applicable	Not Applicable	*22.45	Not Available	Not Available
Production Cost as Percentage of Wholesale Firm Rate	Not Applicable	Not Applicable	12.1%	Not Applicable	Not Applicable
O&M Cost $/MWh	24.63	14.71	2.76	***25.9	1.00
O&M Costs $/MW	74,902	60,518	7,847	***75,984	2,897
O&M Equiv Work Year per MW	0.40	0.39	0.03	Not Available	0
Availability Factor	95.4	88.73	82.3	**88.64	98.54
Forced Outage Factor	2.4	0.91	2.6	**2.61	0.00
Scheduled Outage Factor	2.3	10.36	15.1	**8.74	0.00

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

Trinity Powerplant
Central Valley Project



Plant Contact:
Brian Person
Area Manager

Plant Address:
Trinity Powerplant
Lewiston, CA

Telephone Numbers:
Phone: (530) 275-1554
Fax: (530) 275-2441

E-Mail Address:
bperson@mp.usbr.gov

Reclamation Region: Mid-Pacific

NERC Region: Western Electricity Coordinating Council, California-Southern Nevada Power Area

PMA Service Area: Western Area Power Administration, Sierra Nevada Region

Project Authorization: Funds for construction of the initial features of the Central Valley Project were provided by the Emergency Relief Appropriation Act of 1935 (49 Stat. 115). The Secretary of the Interior authorized the project and the President approved it on December 2, 1935.

The Shasta and Trinity River Division was authorized by Public Law 386, 84th Congress, 1st Session, approved August 12, 1955.

Project Purposes: The Central Valley Project, one of the Nation's major water conservation developments, extends from the Cascade Range on the north to the semiarid but fertile plains along the Kern River on the south. Initial features of the project were built primarily to protect the Central Valley from crippling water shortages and menacing floods. New project units were built to provide water and power to match the continued growth of the State.

Although developed primarily for irrigation, this multiple-purpose project also provides flood control, improves Sacramento River navigation, supplies domestic and industrial water, generates electric power, conserves fish and wildlife, creates opportunities for recreation, and enhances water quality.

The Trinity River Division consists of Trinity Dam and Clair Engle Lake, Trinity Powerplant, Lewiston Dam and Lake, Lewiston Powerplant, Clear Creek Tunnel, Judge Francis Carr Powerhouse, Whiskeytown Dam and Lake, Spring Creek Tunnel and Powerplant, Spring Creek Debris Dam and Reservoir, and related pumping and distribution facilities.

Plant Location: Trinity Powerplant is located on the Trinity River in Trinity County, California, 9 miles upstream from Lewiston, California.

Plant Facts: Trinity Dam is a zoned earth fill structure 538 feet high and 40 feet wide at the crest. The crest is 2,600 feet long.

Plant Purpose: Trinity Powerplant is a peaking plant. The power generated is dedicated first to meeting the requirements of the project facilities. The remaining energy is marketed to various preference customers in northern California.

Plant History: These facilities were built and are operated by the Bureau of Reclamation. Transmission lines were constructed and operated by the Bureau of Reclamation until October 1, 1977, when they were transferred to the Western Area Power Administration, Department of Energy.

Present Activities: Normal operations. Primary reservoir releases are made through the powerplant.

Future Planned Activities: Replacement of generator exciters is expected to start in 2008.

Special Issues: Trinity County has first preference to the power benefit to the Central Valley Project from Trinity Powerplant.

River:	Trinity River	**Plant Type:**	Conventional
Powerhouse Type:	Above Ground	**Turbine Type:**	Francis
Original Nameplate Capacity:	100,000 kW	**Installed Capacity:**	140,000 kW
Year of Initial Operation:	1964	**Age:**	44 years
Net Generation (FY-2007):	359.0 GWh	**Rated Head:**	426 feet
Average Plant Factor (FY-2007):	29.4 percent	**Remotely Operated:**	Yes
Production Mode:	Peaking		

Ancillary Services

Trinity
Ancillary Services

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

Generators

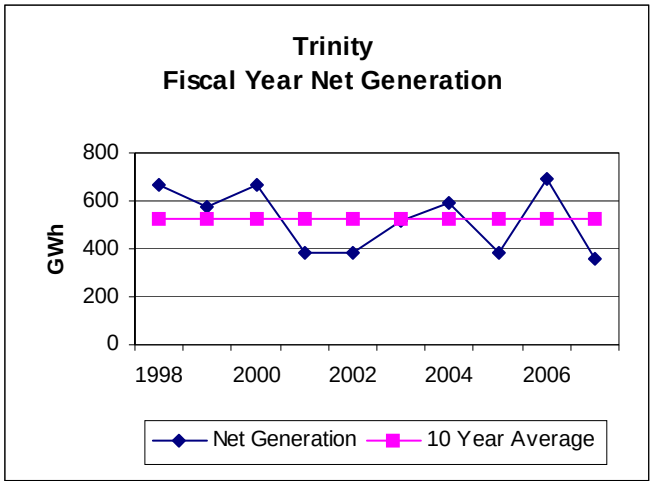
Trinity Generators

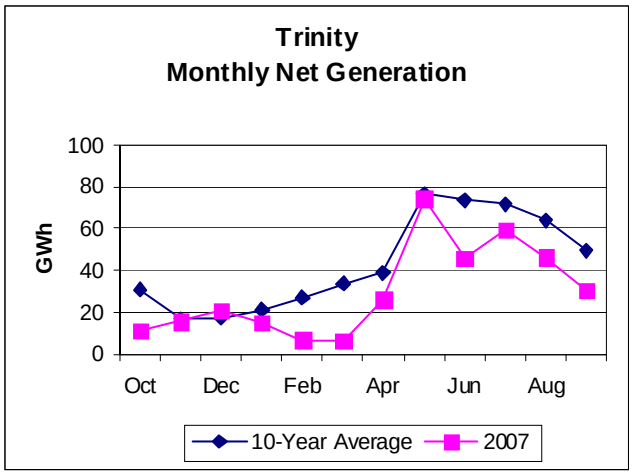
Existing Number and Capacity

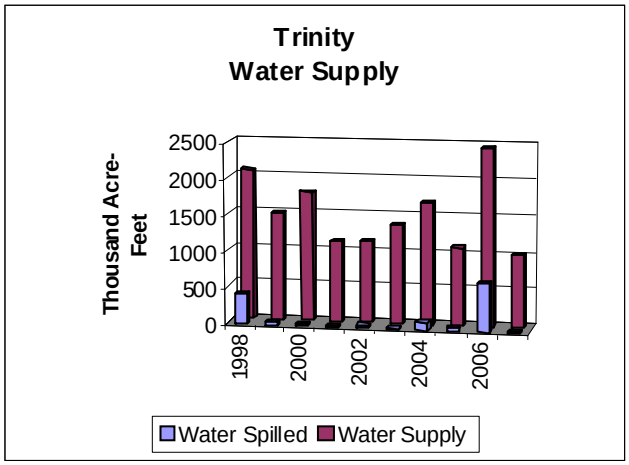
Unit #	Original Capacity (kW)	Capacity Increased (kW)	Present Capacity (kW)
1	50,000	20,000	70,000
2	50,000	20,000	70,000
2 units	100,000	40,000	140,000

The maximum operational capacity is
restricted by transformers to 130,000 kW

Generation

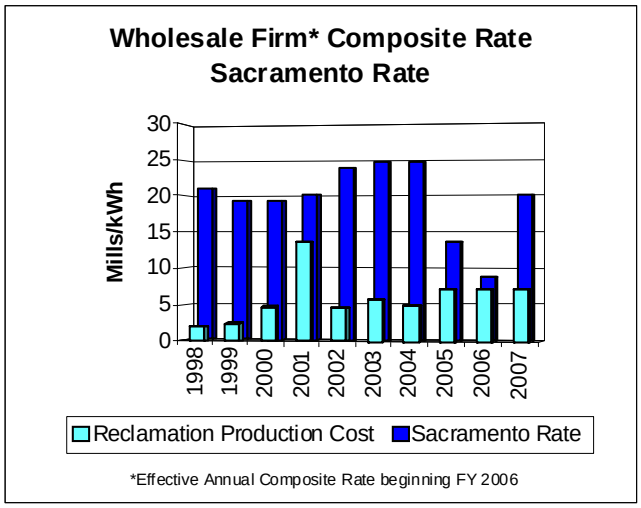

Trinity
Fiscal Year Net Generation
GWh
800
600
400
200
0
1998
2000
2002
2004
2006
Net Generation
10 Year Average


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

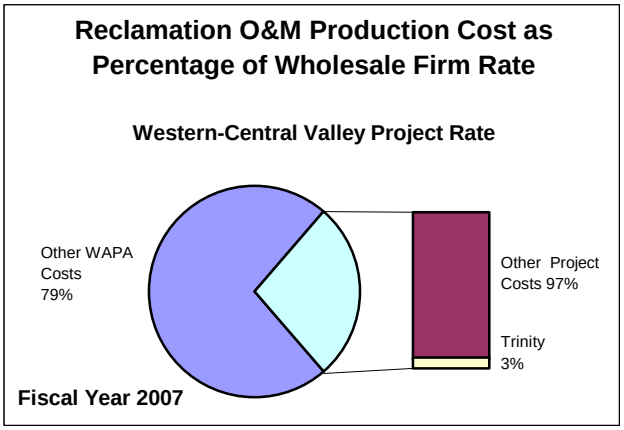

Trinity
Water Supply
Thousand Acre-Feet
2500
2000
1500
1000
500
0
1998
2000
2002
2004
2006
Water Spilled
Water Supply

Prime Laboratory Benchmarks

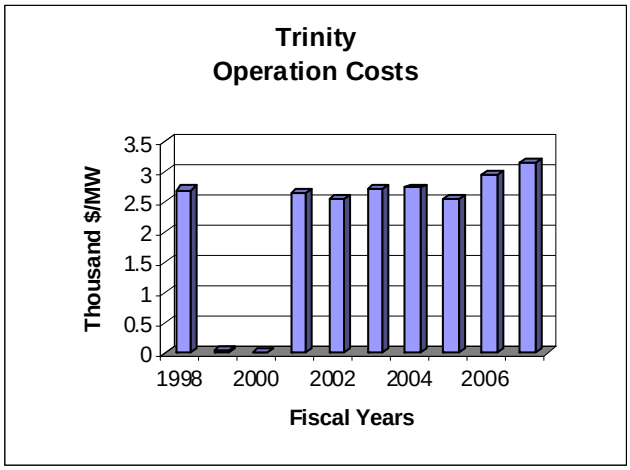
Benchmark 1
Wholesale Firm Rate

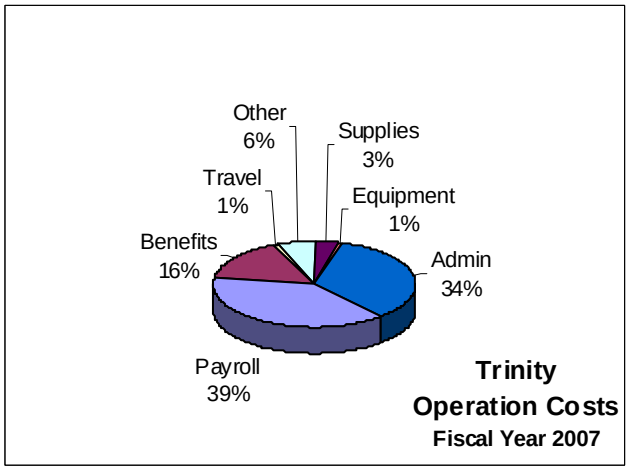


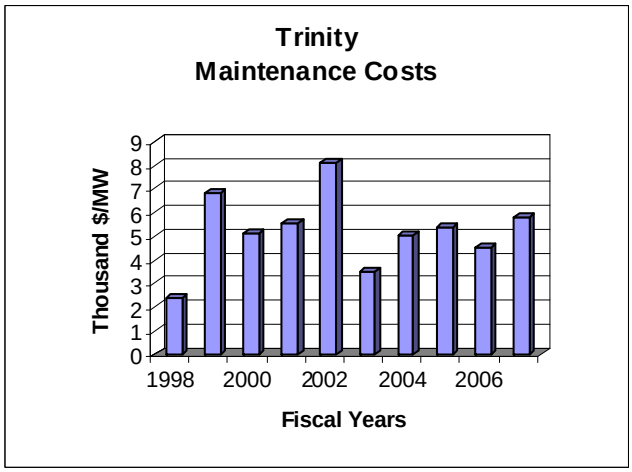
Benchmark 2
Reclamation's Production Cost as Percentage of Wholesale Firm Rate

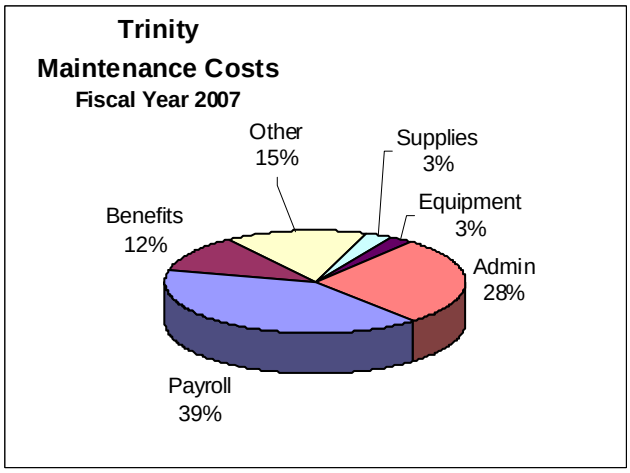


Benchmark 3
Production Cost

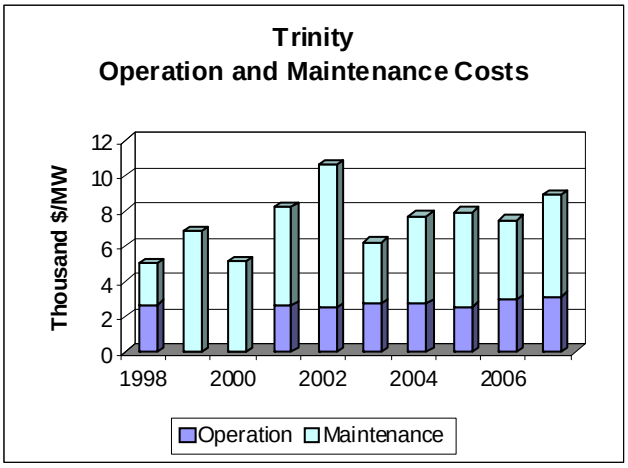


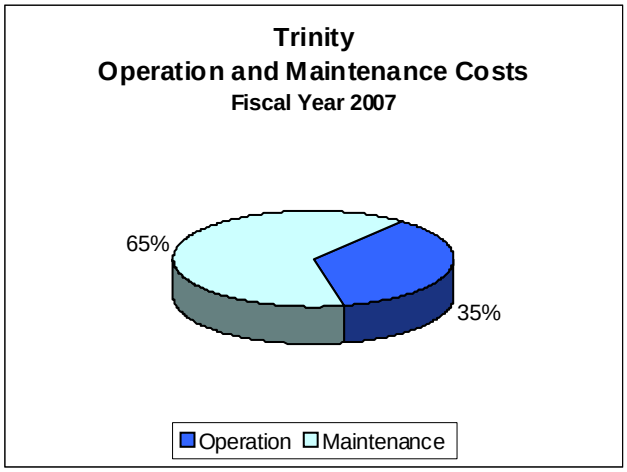


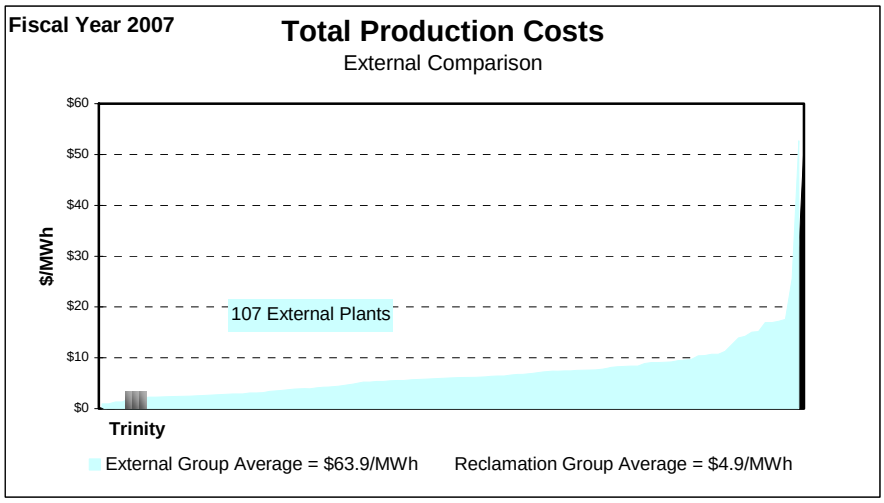


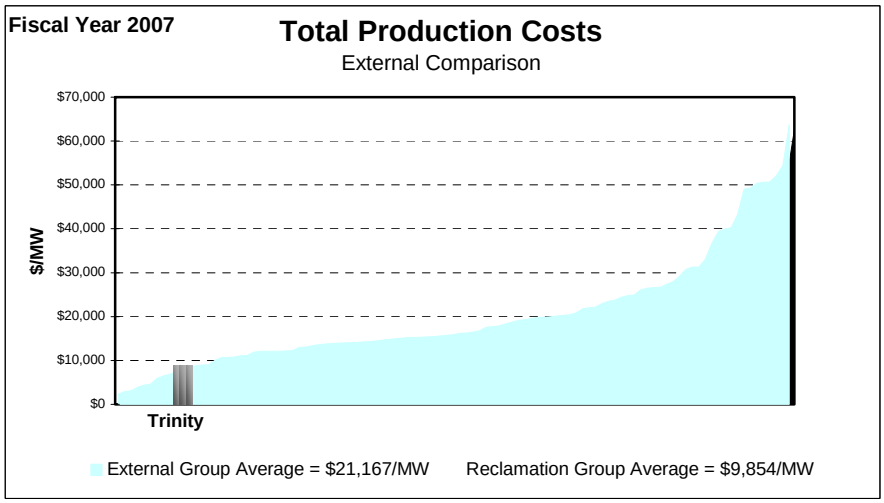


Benchmark 3
Production Cost



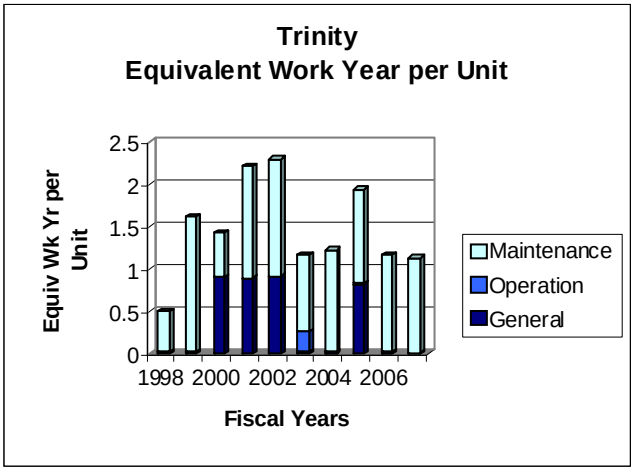


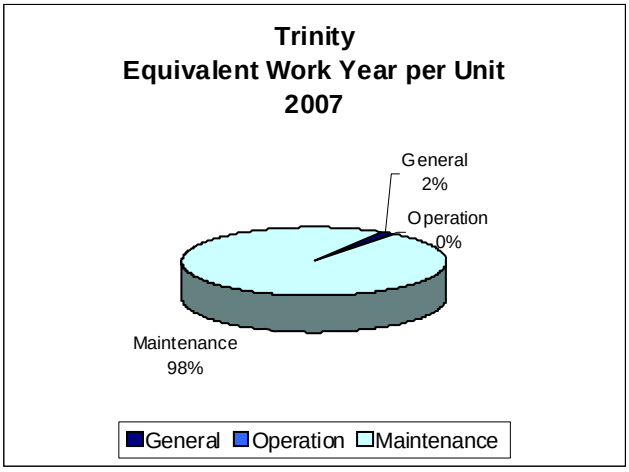


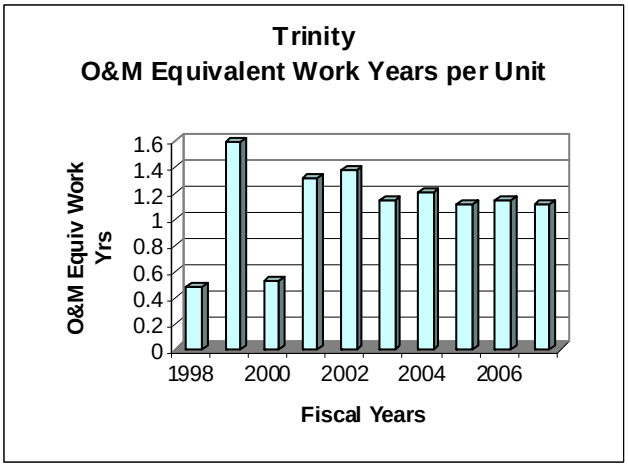


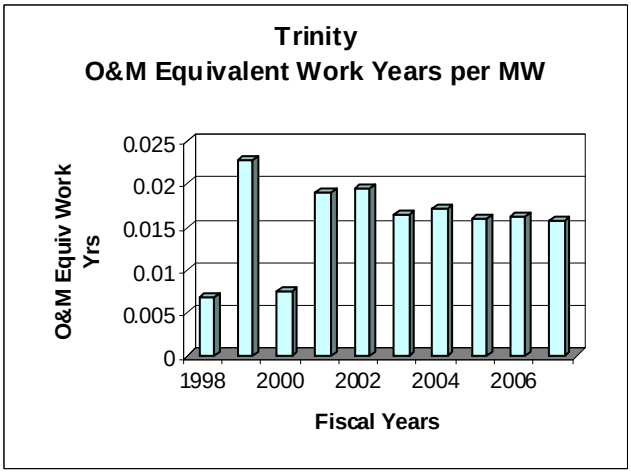
Benchmark 4
Workforce Deployment

Trinity 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	0.00	0.00	0.04	0.04	0.02	0.00
Operation	0.01	0.00	0.00	0.01	0.00	0.00
Maintenance	2.02	0.19	0.00	2.21	1.10	0.02
Total Staffing	2.02	0.20	0.04	2.25	1.13	0.02

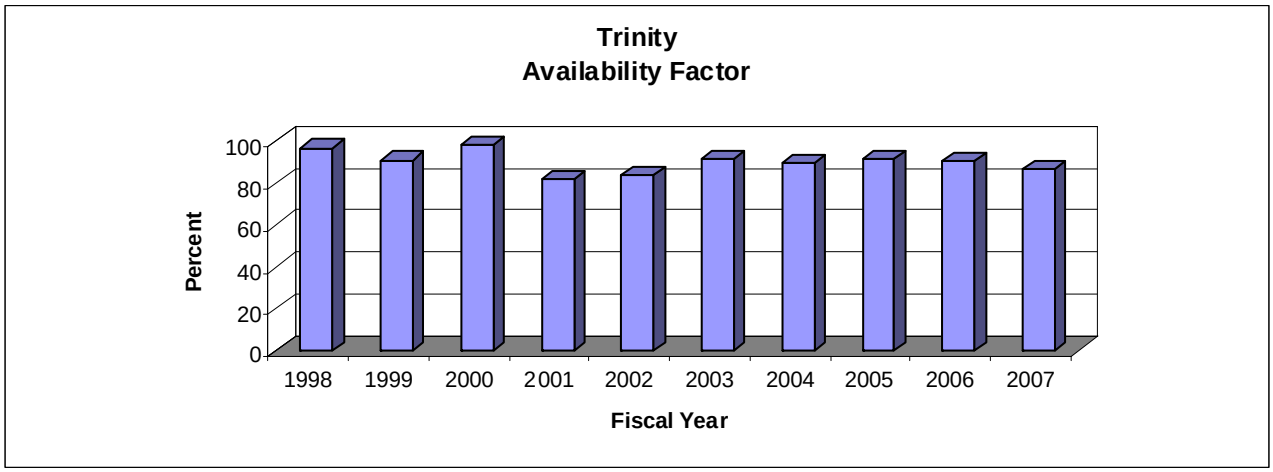




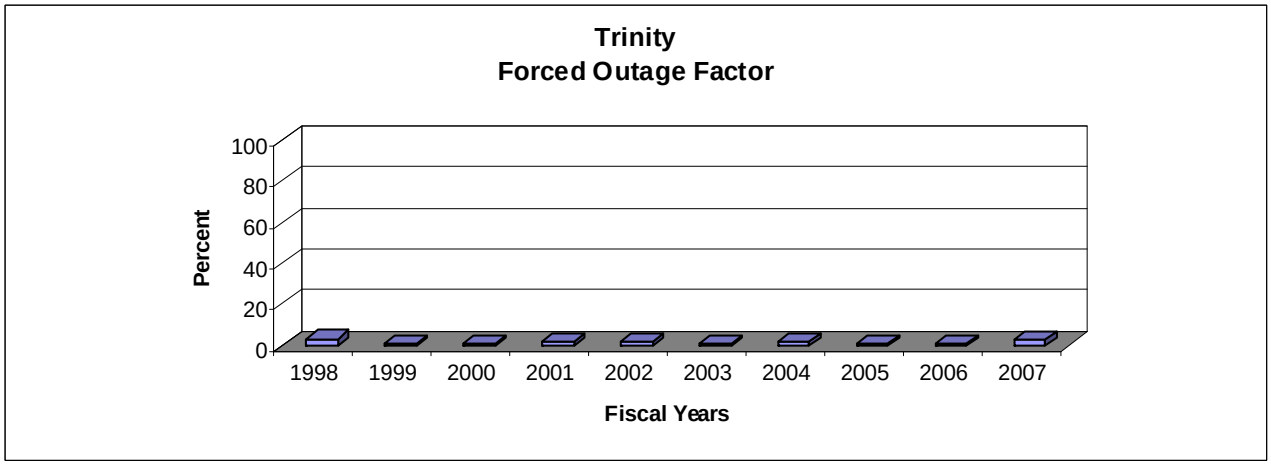




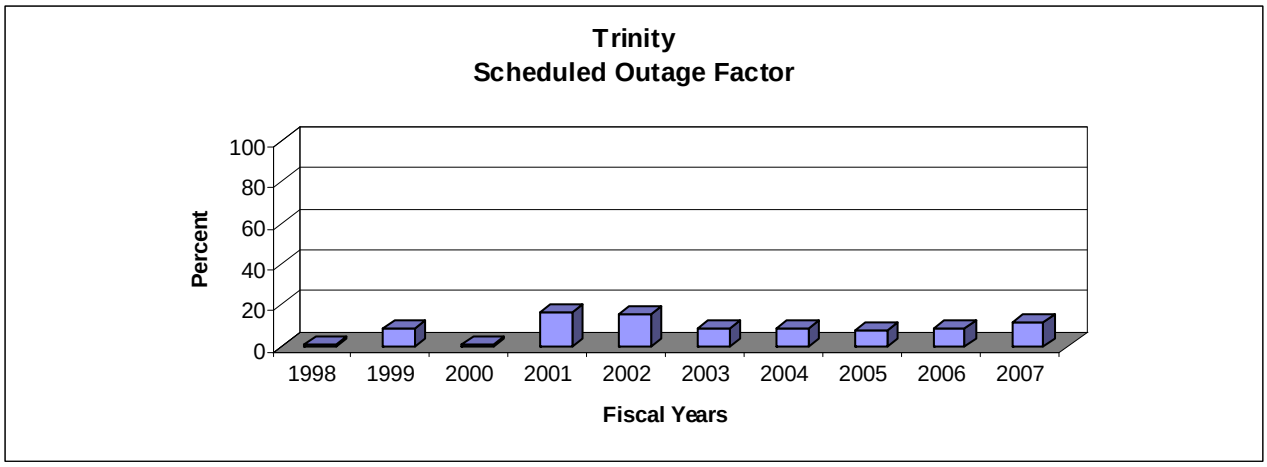
Benchmark 5
Availability Factor



Benchmark 6
Forced Outage Factor

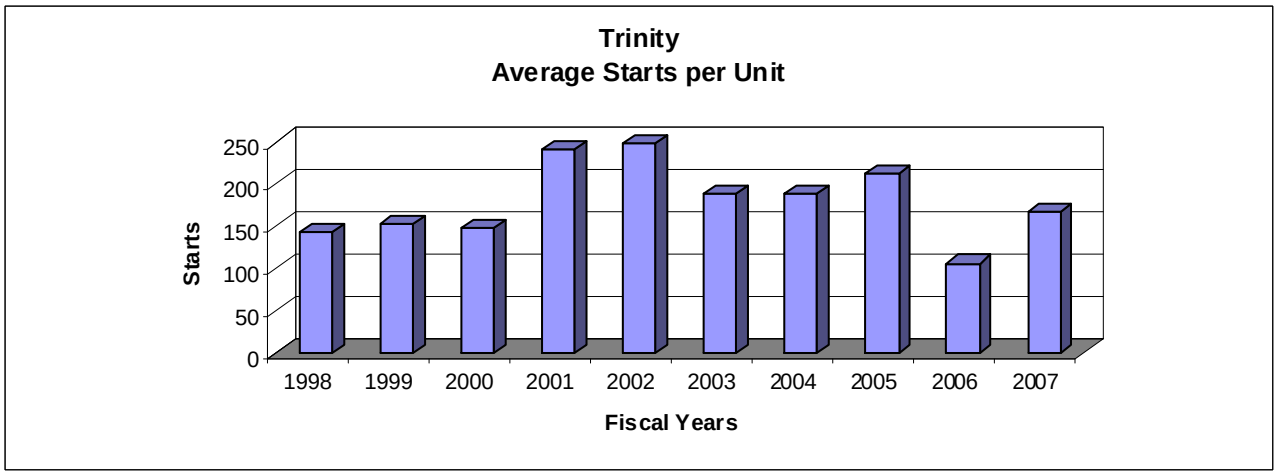


Benchmark 7
Scheduled Outage Factor



FY-01 – Extensive welding for cavitation repair
FY-02 – Replacement of all main unit circuit breakers

Starts



Benchmark Data Comparison

Fiscal Year 2007	Trinity Powerplant	Reclamation Average 100-500 MW Group	Total Reclamation Average	Industry Average	Best Performers
Wholesale Firm Rate Mills/kWh	13.7	Not Applicable	*22.45	Not Available	Not Available
Production Cost as Percentage of Wholesale Firm Rate	1.5%	Not Applicable	12.1%	Not Applicable	Not Applicable
O&M Cost $/MWh	3.49	4.44	2.76	***63.88	1.00
O&M Costs $/MW	8,941	10,502	7,847	***21,167	2,897
O&M Equiv Work Year per MW	0.02	0.04	0.03	Not Available	0.0
Availability Factor	86.5	83.5	82.3	**88.64	98.5
Forced Outage Factor	2.5	1.2	2.6	**2.61	0.0
Scheduled Outage Factor	11.0	15.4	15.1	**8.74	0.0

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

RECLAMATION

Managing Water in the West

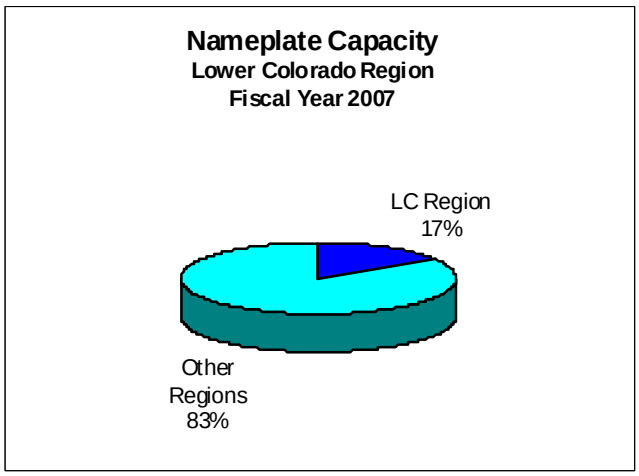
Lower Colorado Region Power Performance

For Fiscal Year 2007

U.S. Department of the Interior
Bureau of Reclamation

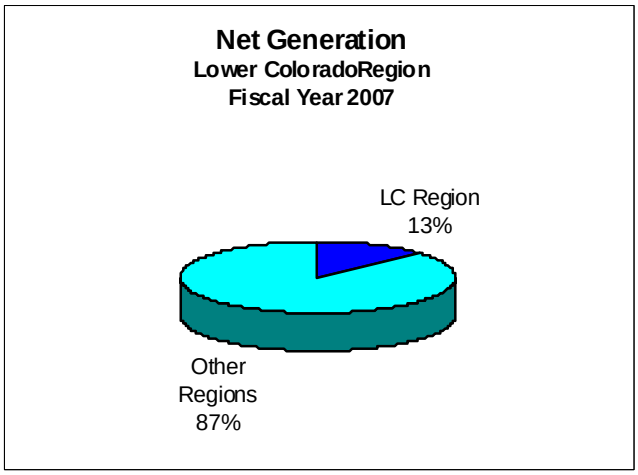
Lower Colorado Regional Power Profile

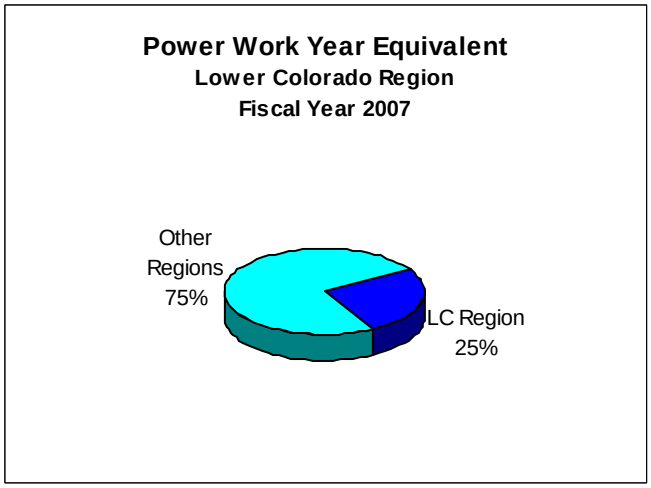
The Lower Colorado Regional Office is located in Boulder City, Nevada. The Lower Colorado Dams Facilities Office oversees the operation of three powerplants: Davis, Hoover, and Parker.



The total installed capacity for this region in fiscal year 2007 was 2,454 megawatts, (2,164 megawatts was the average operational capacity. The reduced capacity was primarily due to the low water elevation in Lake Mead.) This comprised 17 percent of Reclamation's total capacity.

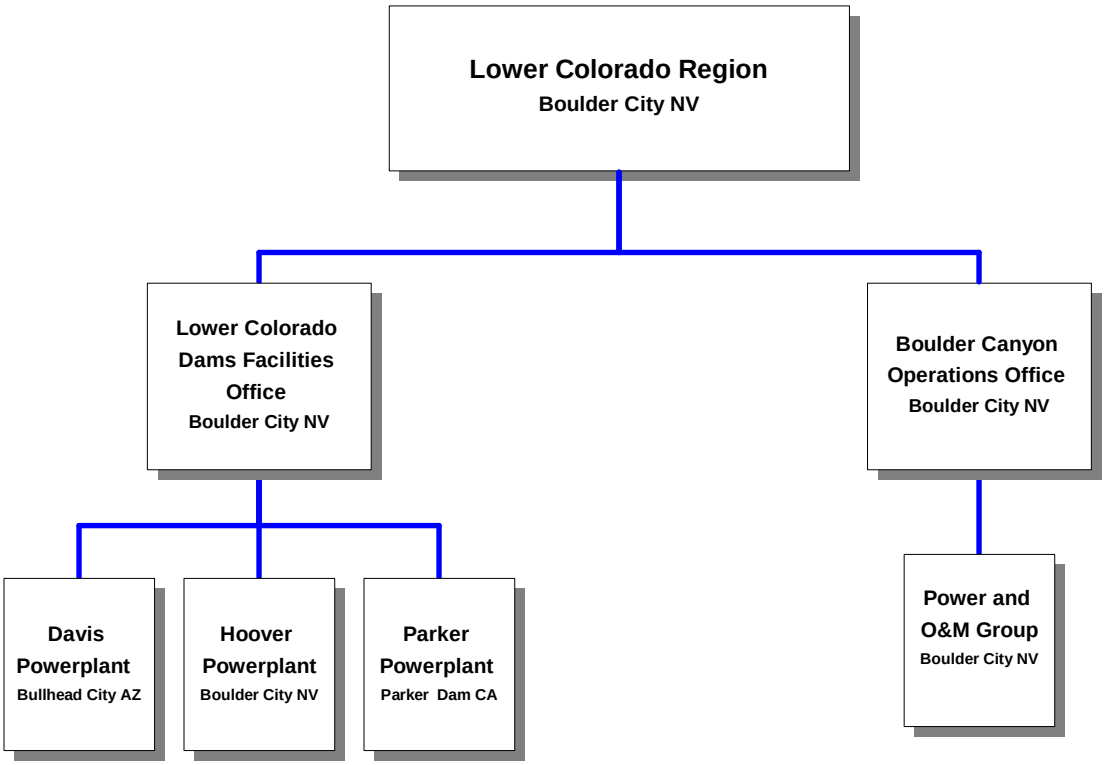
The same year, this region produced 5,408 net gigawatt-hours. This comprised 12 percent of the total net generation for Reclamation in 2007.





In 2007, this region consisted of 24 percent of the total work year equivalents available to power facilities. All three powerplants have personnel located on site.

Organizational structure:



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

Regional Office:

Bureau of Reclamation
Lower Colorado Regional Office
PO Box 61470
Boulder City NV 89006-1470

Lorri Gray
Regional Director
LC-1000
(702) 293-8411

Power and O&M Group:	Boulder Canyon Operations Office PO Box 61470 Boulder City NV 89006-1470 Ron Smith, BCOO-4800 (702)-293-8231 Ellen Rush, BCOO-4821 (702) 293-8101 Gracie Chirieleison, BCOO-4824 (702) 293-8116 Chantal Magaruh-Ough, BCOO-4825 (702) 293-8114 Larry Karr, BCOO-4826 (702) 293-8094 Donald Bryce, BCOO-4840 (702) 293-8102 Brian Kitt, BCOO-4861 (702) 293-8107 Joe Martinez, BCOO-4862 (702) 293-8104
Lower Colorado Dams Facilities Office:	Bureau of Reclamation Lower Colorado Dams Facilities Office PO Box 60400 Boulder City NV 89006-0400 Ken Rice Area Manager, LCD-1000 (702) 293-2302 Bill Bruninga Hoover Facility Manager, LCD-1050 (702) 494-2301 David Arend Davis Facility Manager, LCD-D10 (928) 754-3628 John Steffen Parker Facility Manager, LCD-P10 (760) 663-3712, Ext 3295

WASHINGTON
MONTANA
OREGON
IDAHO
WYOMING
NEVADA
UTAH
COLORADO
CALIFORNIA
Hoover
Davis
Parker
NEW MEXICO
ARIZONA

Davis Powerplant
Parker-Davis Project

Plant Contact:
David Arend
Manager, Davis Dam

Plant Address:
Davis Powerplant
Bullhead City, AZ 86429-9707

Telephone Numbers:
Phone: (928) 754-3626
Fax: (928) 754-3620

E-Mail Address:
darend@lc.usbr.gov

Reclamation Region: Lower Colorado

NERC Region: Western Electricity Coordinating Council

PMA Service Area: Western Area Power Administration, Desert Southwest Region

Project Authorization: The Parker-Davis Project was formed by consolidating the Parker Dam Power Project and the Davis Dam Project under the terms of the Act of May 28, 1954 (68 Stat. 143). The Secretary of the Interior authorized the Davis Dam on April 26, 1941, under provisions of the Reclamation Project Act of 1939 (53 Stat. 1187).

Project Purposes: Davis Dam provides regulation of the Colorado River, produces and transmits electrical energy, contributes to flood control, provides irrigation and municipal water supplies, improves navigation, provides recreation, and incorporates wild waterfowl protection, and related conservation purposes. The Mexican Treaty of 1944 required the United States to construct Davis Dam for regulation of water to be delivered to Mexico. The reservoir formed by the dam, Lake Mohave, is used for that purpose through integrated operations of Hoover and Davis Powerplants.

Plant Location: Davis Dam spans the Colorado River in Pyramid Canyon 67 miles downstream from Hoover Dam and 88 miles upstream from Parker Dam. Davis Dam is in Mohave County, Arizona, on the Nevada-Arizona State line, 2 miles north of Bullhead City, Arizona, and Laughlin, Nevada.

Plant Purpose: The electrical integration and interconnection of Davis, Hoover, and Parker Power plants provide maximum generation of power with efficient use of water resources. The highly developed agricultural base and the complex industrialization of the Pacific Southwest benefit greatly from Colorado River hydroelectric energy.

Plant Facts: Davis Dam is 200 feet above the lowest point of the foundation and about 140 feet above river level. Davis Dam is a zoned earth fill structure with a concrete spillway, intake structure, and powerplant. Crest of the dam is 1,600 feet in length and 50 feet wide at the top. The dam has more than 3.6 million cubic yards of earth and rock fill with 600 thousand cubic yards of concrete and 23 million pounds of reinforcing steel in the spillway, powerplant, and other structures.

Plant History: This was originally authorized as the Bullshead Project by the Interior Department's Appropriation Act of 1942. The name was changed to Davis Dam in honor of Reclamation's first director, Arthur Powell Davis.

Present Activities: Power generated from the power plant is marketed by Western to preference customers in Arizona, Southern California, and Southern Nevada after priority use power obligations have been met. Four of the five generators have been rewound and uprated to 51,750 kW. Unit 3 will not be rewound as partial discharge analysis indicates the unit winding is in good condition.

Future Planned Activities: Performed fixed wheel gate overhaul and overhaul of unit governor on Unit 4 in FY-06. Each subsequent fiscal year, the same maintenance will be done on one unit (i.e., Unit 3 in FY-07, Unit 2 in FY-08, and Unit 1 in FY-09). Unit 5 was completed in FY-05. Starting in FY-10, overhaul of the radial gates will begin. Additionally starting in FY-11, Davis Dam is scheduled to start with installation of the Unit Control Modernizations (UCM) on all five units. The UCM project will improve reliability and performance.

Special Issues: Davis generation is the direct result of downstream irrigation needs, not power generation. Lower irrigation and other water demands during October through April only require a maximum of three generators being operated at an optimum level rather than five units operated inefficiently. This allows for orderly, non-overtime maintenance to be performed. This is consistent with good industry maintenance practices by spreading maintenance work over low-demand periods and reducing the scheduled outage time.

River:	Colorado River	**Plant Type:**	Conventional
Powerhouse Type:	Above Ground	**Turbine Type:**	Francis
Original Nameplate Capacity:	225,000 kW	**Installed Capacity:**	255,000 kW
Year of Initial Operation:	1951	**Age:**	57 years
Net Generation (FY-2007):	1,147.4 GWh	**Rated Head:**	136 feet
Average Plant Factor (FY-2007):	51.5 percent	**Remotely Operated:**	Yes
Production Mode:	Intermediate		

Ancillary Services

Davis
Ancillary Services

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

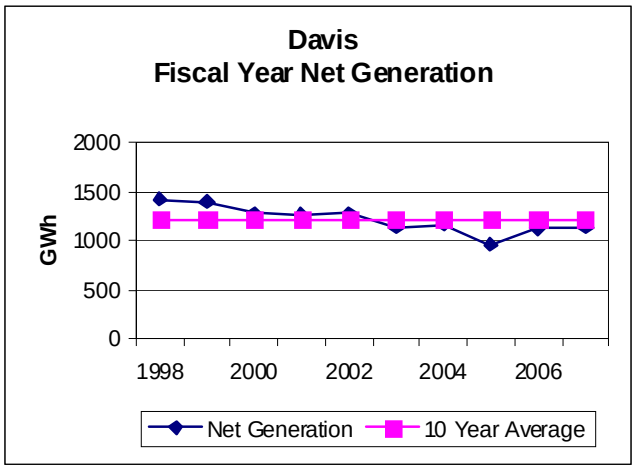
Generator

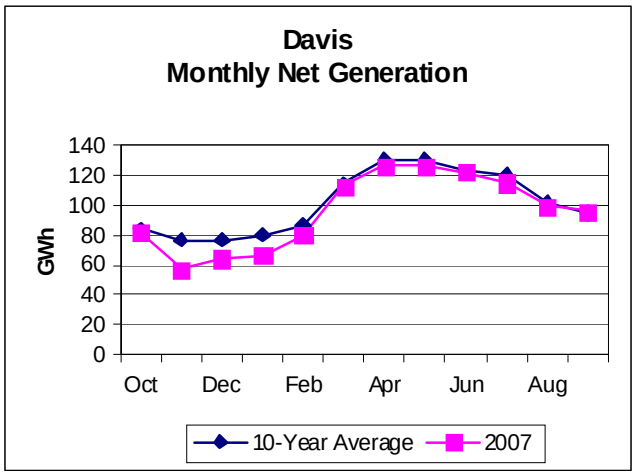
Davis Generators

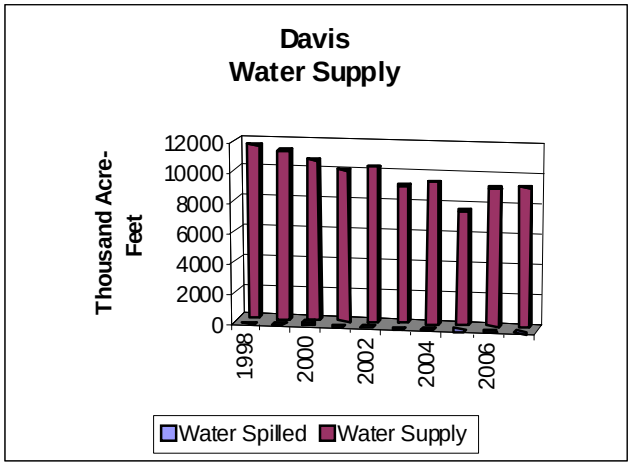
Existing Number and Capacity

Unit #	Original Capacity (kW)	Capacity Increased (kW)	Present Capacity (kW)
1	45,000	6,750	51,750
2	45,000	6,750	51,750
3	45,000	3,000	48,000
4	45,000	6,750	51,750
5	45,000	6,750	51,750
5 units	225,000	30,000	255,000

Generation

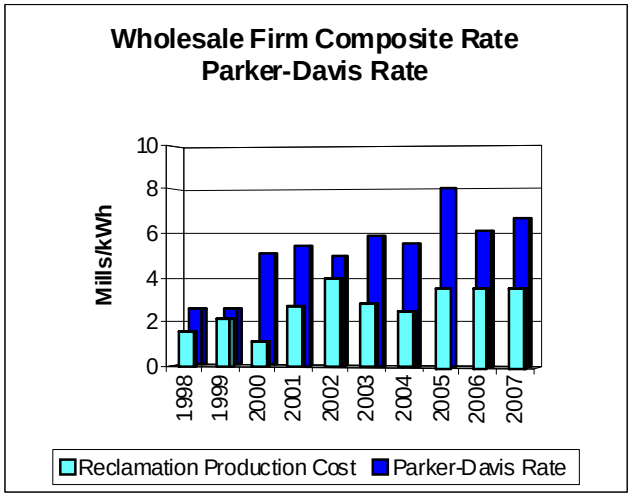

Davis
Fiscal Year Net Generation
GWh
2000
1500
1000
500
0
1998
2000
2002
2004
2006
Net Generation
10 Year Average


Davis
Monthly Net Generation
GWh
140
120
100
80
60
40
20
0
Oct
Dec
Feb
Apr
Jun
Aug
10-Year Average
2007

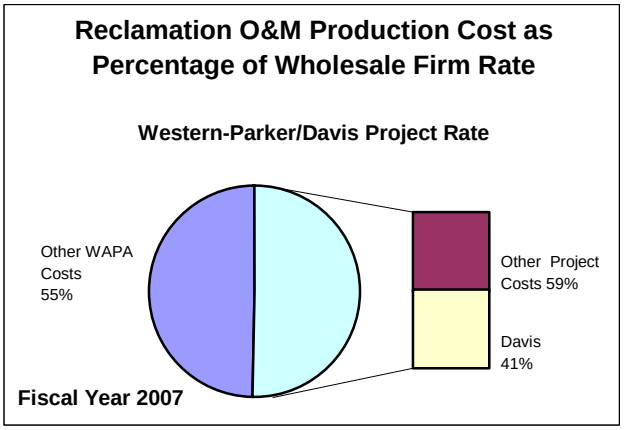

Davis
Water Supply
Thousand Acre-Feet
12000
10000
8000
6000
4000
2000
0
1998
2000
2002
2004
2006
Water Spilled
Water Supply

Prime Laboratory Benchmarks

Benchmark 1
Wholesale Firm Rate

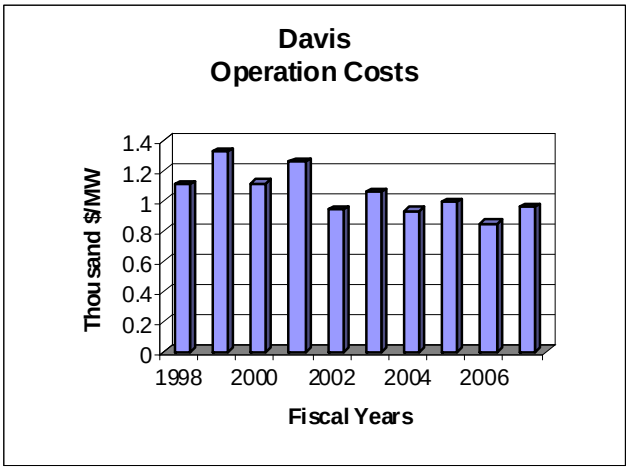


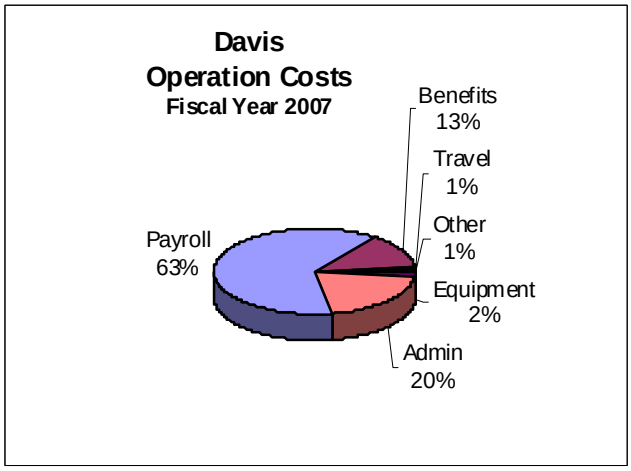
Benchmark 2
Reclamation's Production Cost as Percentage of Wholesale Firm Rate

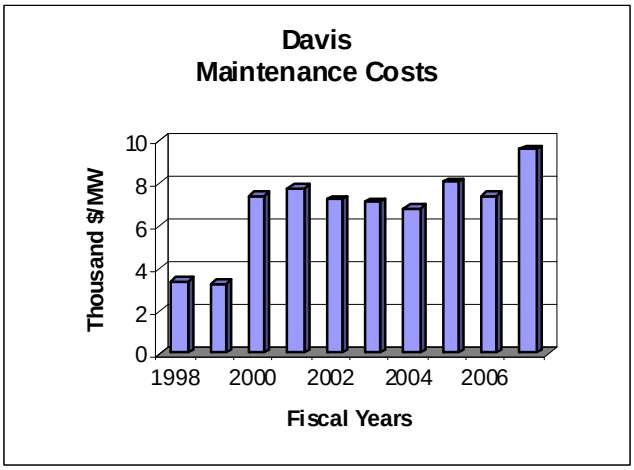


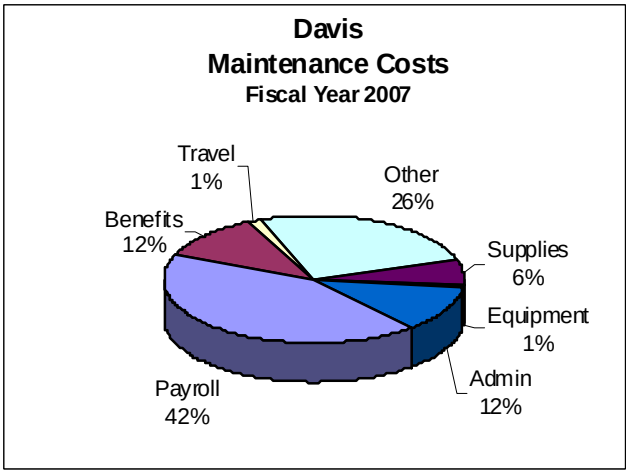
Reclamation expenses as a percentage of the rate do not reflect the total expenditures of this project.

Benchmark 3
Production Cost

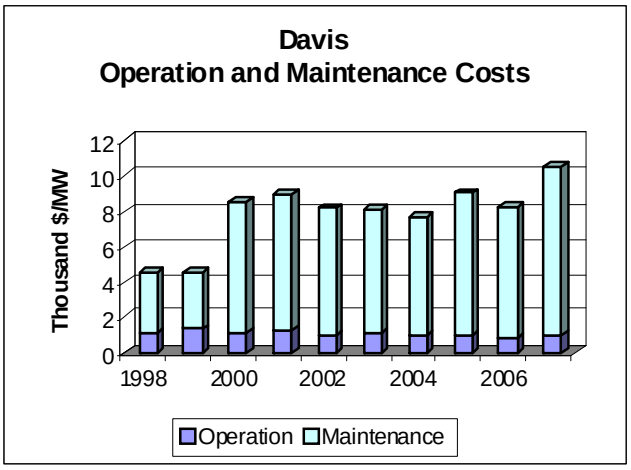


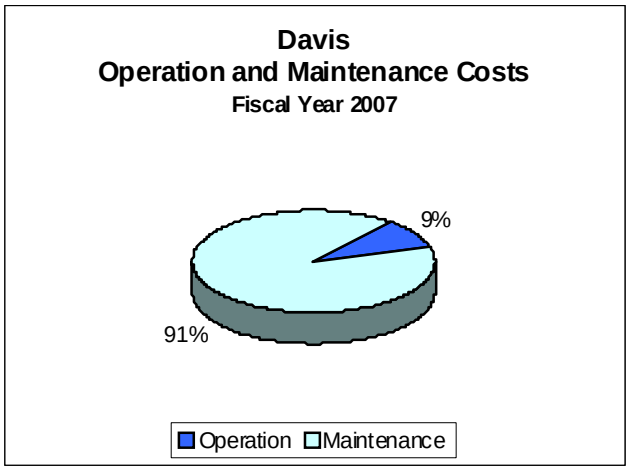


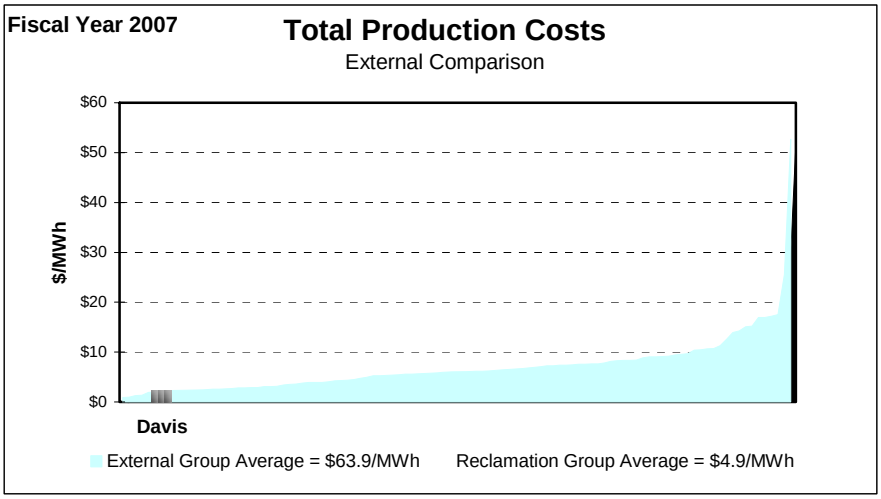


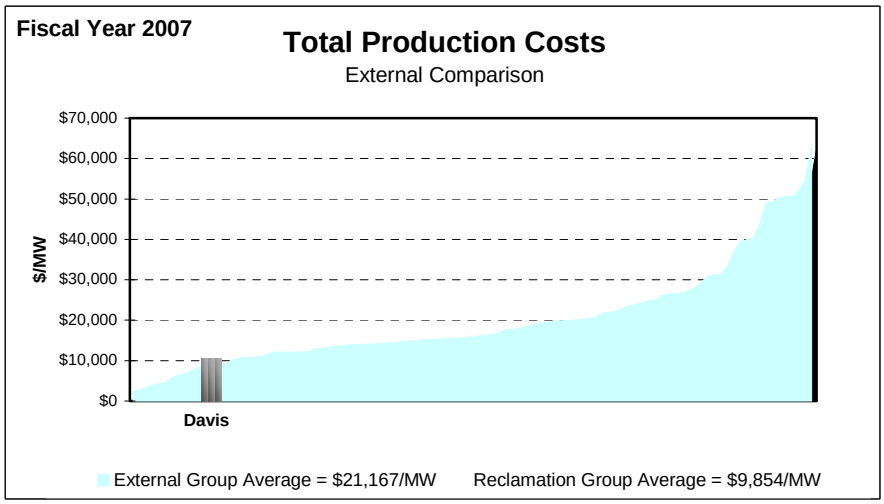


Benchmark 3
Production Cost



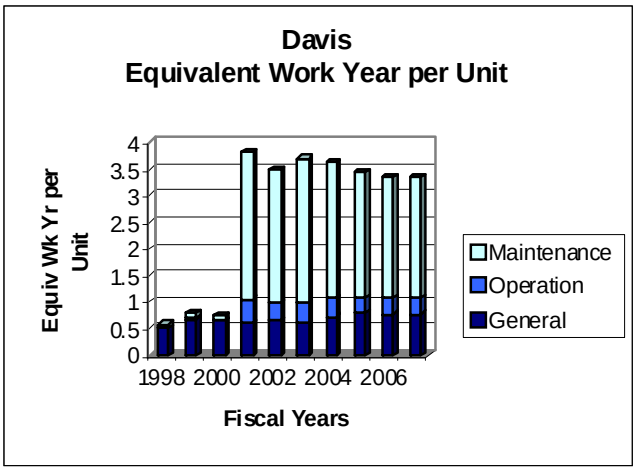


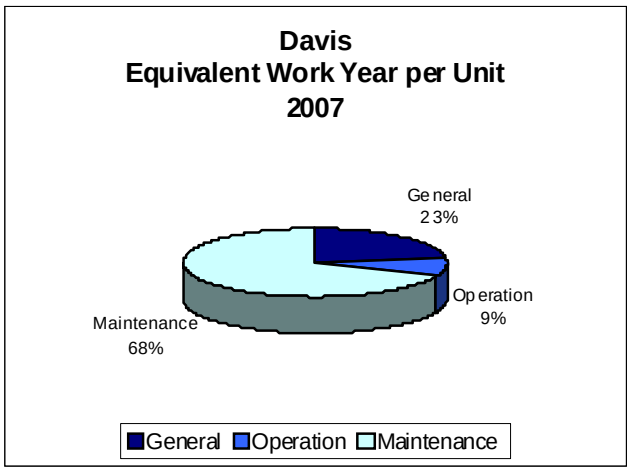


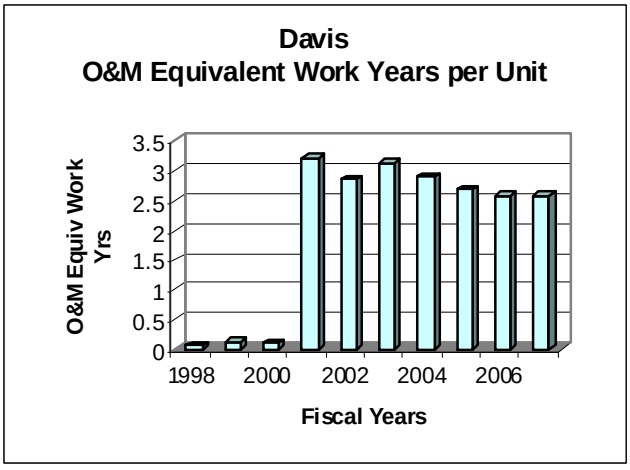


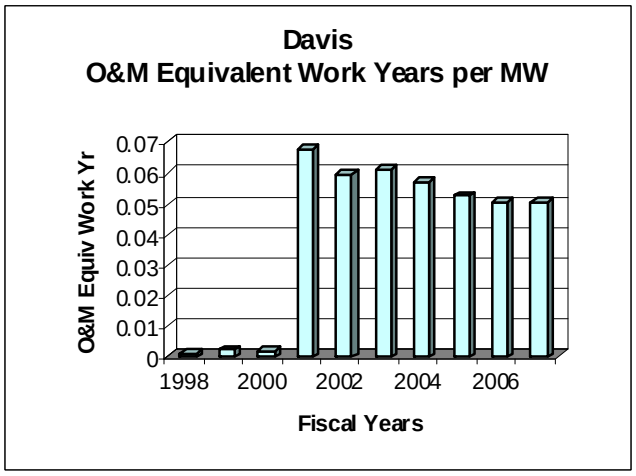
Benchmark 4
Workforce Deployment

Davis 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	3.40	0.35	0.09	3.85	0.77	0.02
Operation	1.33	0.14	0.00	1.47	0.29	0.01
Maintenance	10.36	1.08	0.00	11.44	2.29	0.04
Total Staffing	15.10	1.57	0.09	16.76	3.35	0.07

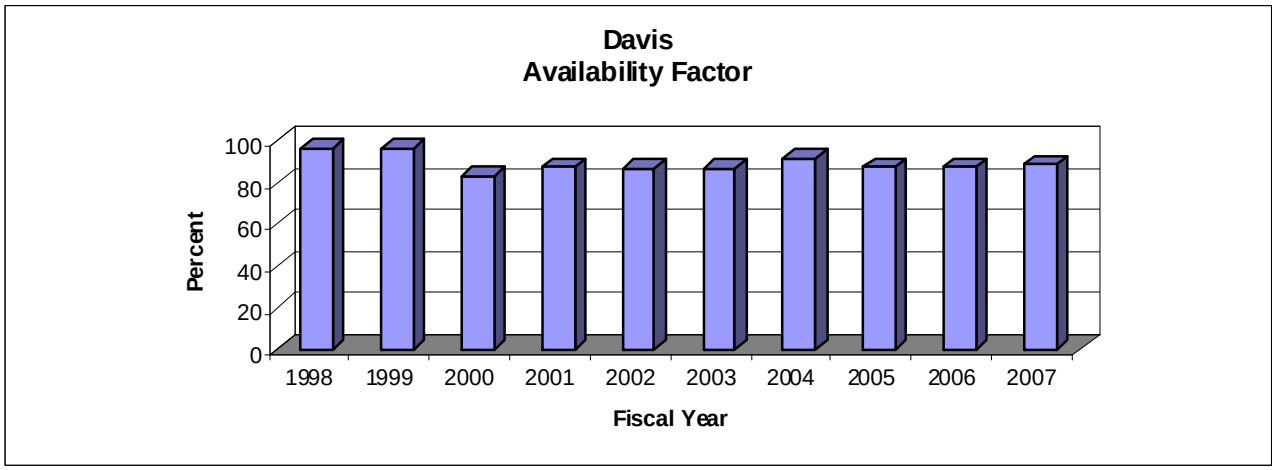




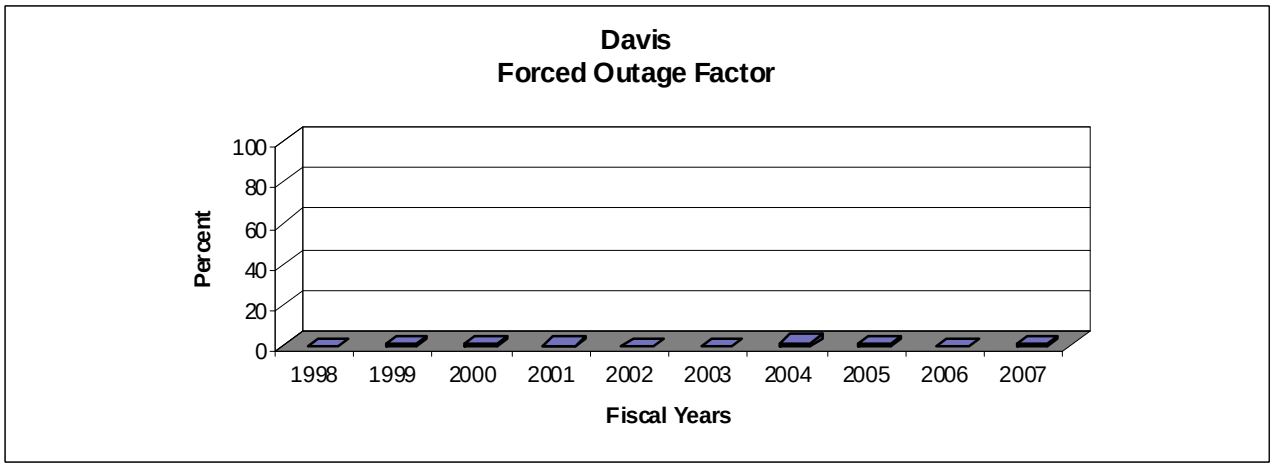




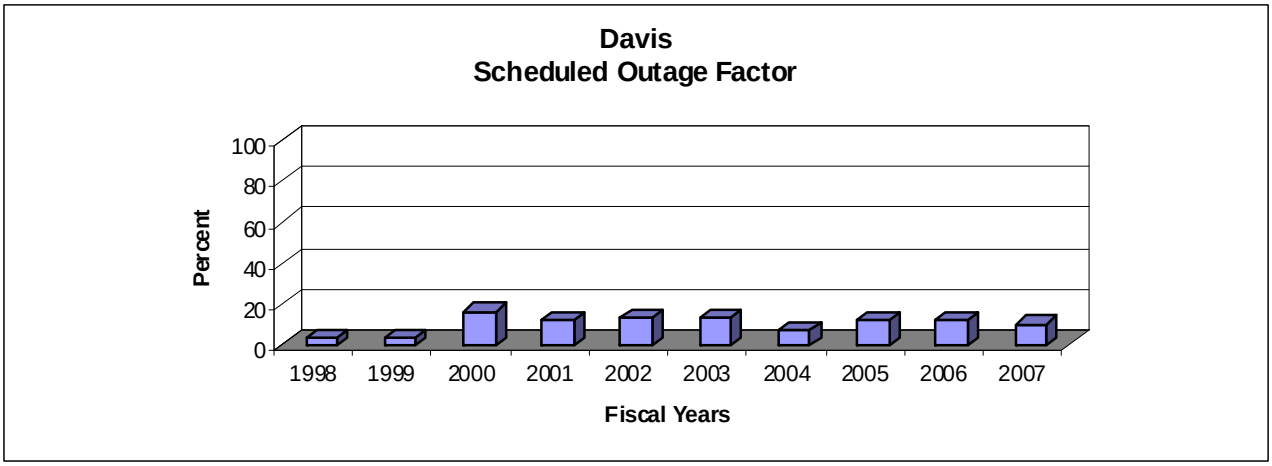
Benchmark 5
Availability Factor



Benchmark 6
Forced Outage Factor

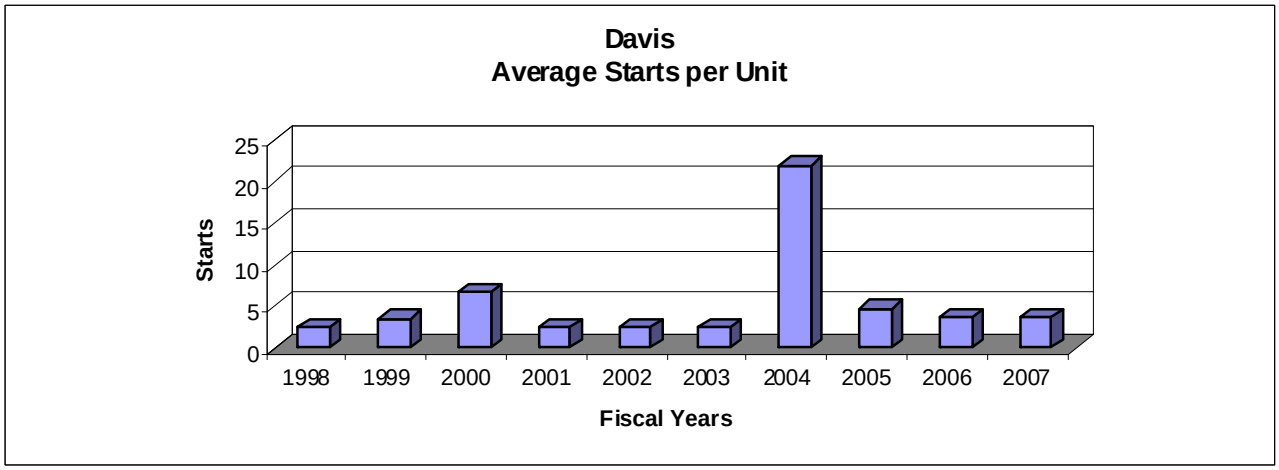


Benchmark 7
Scheduled Outage Factor



FY-05 – Performed fixed wheel gate overhaul and overhaul of unit governor on Unit 5. Same maintenance will continue on Unit 4 in FY-06, Unit 3 in FY-07, Unit 2 in FY-08, and Unit 1 in FY-09.

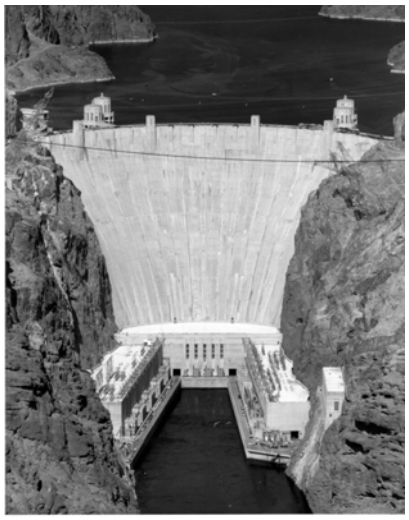
Starts



Benchmark Data Comparison					
Fiscal Year 2007	**Davis Powerplant**	**Reclamation Average 100-500 MW Group**	**Total Reclamation Average**	**Industry Average**	**Best Performers**
Wholesale Firm Rate Mills/kWh	8.0	Not Applicable	*22.45	Not Available	Not Available
Production Cost as Percentage of Wholesale Firm Rate	23.6%	Not Applicable	12.1%	Not Applicable	Not Applicable
O&M Cost $/MWh	2.35	4.44	2.76	***63.88	1.00
O&M Costs $/MW	10,574	10,502	7,847	***21,167	2,897
O&M Equiv Work Year per MW	0.05	0.04	0.03	Not Available	0.0
Availability Factor	89.0	83.5	82.3	**88.64	98.5
Forced Outage Factor	0.8	1.2	2.6	**2.61	0.0
Scheduled Outage Factor	10.2	15.4	15.1	**8.74	0.0

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

Hoover Powerplant
Boulder Canyon Project



Plant Contact:
Ken Rice
Area Manager

Plant Address:
Hoover Powerplant
PO Box 60400
Highway 93, Hoover Dam
Boulder City, NV 89006-0400

Telephone Numbers:
Phone: (702) 494-8301
Fax: (702) 494-8812

E-Mail Address:
krice@lc.usbr.gov

Reclamation Region: Lower Colorado

NERC Region: Western Electricity Coordinating Council

PMA Service Area: Western Area Power Administration, Desert Southwest Region

Project Authorization: The project was authorized by the Boulder Canyon Project Act of December 21, 1928 (45 Stat. 1057), subject to the terms of the Colorado River Compact. The Boulder Canyon Project Adjustment Act (54 Stat. 774), dated July 19, 1940, provided for certain changes to the original plan. The Hoover Powerplant Act of 1984 (98 Stat. 1333) provided for the uprating of the generators and the construction of new visitor facilities.

Project Purposes: Hoover Dam and Powerplant was constructed for the purposes of controlling Colorado River floods, improving navigation and regulating the flow of the Colorado River, providing for storage and for the delivery of the stored waters thereof for reclamation of public lands and other beneficial uses exclusively within the United States, and generation of electrical energy as a means of making the project authorized a self-supporting and financially solvent undertaking.

Floodwaters of the Colorado River are impounded by Hoover Dam and released in response to downstream water orders. The quantity of water available for release through the powerplant is, in part, based upon the water orders. In a hydrologically normal year, 7.5 million acre feet are allotted among the lower basin States (.3 to Nevada, 2.8 to Arizona, and 4.4 to California) with an additional 1.5 million acre feet allotted to Mexico and system losses.

Plant Location:

Hoover Powerplant is located in the Black Canyon of the Colorado River about 36 miles from Las Vegas, Nevada, on the Arizona-Nevada State line.

Plant Purpose:

The primary purpose of the electrical powerplant as a project feature is to generate revenue sufficient to repay the project construction monies advanced by the United States Treasury and to annually fund ongoing operation, maintenance and replacement expenses.

The capacity and operational flexibility of the plant also significantly contribute to the stability and reliability of the California, Arizona, Nevada, Utah, and New Mexico electrical grid. The massive rotating inertia of the generation plant at Hoover provides an unusually high ability to sustain system integrity during moderate to severe system disturbances.

The plant contains the unique ability to black start a main 130 MW unit without the benefit of an external system feed. This means the plant can act as a synchronizing source for the rest of the system in the event of a system separation.

The plant acts as a primary source of spinning and non-spinning reserves for the service area. The electrical integration and interconnection of Davis, Hoover, and Parker Powerplants provide maximum generation of power with efficient use of water resources.

The highly developed agricultural base and the complex industrialization of the Pacific southwest benefit greatly from Colorado River hydroelectric energy.

Plant Facts:

The powerplant consists of 17 main Francis turbine generators and two Pelton Waterwheel station service units (one for each plant wing). The total plant capacity is 2,079 MW.

Hoover Dam is a concrete thick-arch structure, 726.4 feet high and 1,244 feet long at the crest. The dam and appurtenant structures contain 4.4 million cubic yards of concrete. Hoover Dam and Powerplant was the first major concrete thick-arch dam constructed by Reclamation. Water for generation is conveyed through four penstocks from four intake structures immediately upstream and contiguous to the dam.

Spillway structures use eight 16 foot by 100 foot drum gates which provide for an additional 16 vertical feet of storage capacity in Lake Mead, the reservoir impounded upstream of the dam. Lake Mead is the largest reservoir in the United States with a total storage capacity of 29.8 million acre-feet.

Plant History:

The plant was authorized as a Boulder Canyon Project feature (the Act also provided for All American Canal construction) and was a requisite requirement for the Seven State Compact ratification. The first unit to be placed in service was A-0 on August 31, 1936. The last unit to be commercially commissioned was N-8 on December 1, 1961. There were eleven commercially available units by 1939. The plant was operated by Southern California Edison and Los Angeles Department of Water and Power under the supervision of the Bureau of Reclamation until 1987. That was the termination of the original 50-year electric service contracts. Reclamation assumed control of operation and maintenance in 1987.

The Boulder Canyon Project Adjustment Act of 1940 authorized the Secretary of the Interior to promulgate and implement charges for electrical energy generated at Hoover Powerplant. This Act further specified how the revenues resulting from Hoover energy sales were to be applied. The Hoover Powerplant Act of 1984 authorized the uprating of the 17 main generating units and the construction of additional visitor facilities and parking structures and the Hoover Dam bypass bridge. It also changed the funding source from Congressional Appropriations to an Available Receipts Fund (a quasi-revolving fund). The uprating of the units was accomplished through non-Federal funds advanced by 11 power customers.

The dam was originally designated as Hoover Dam by instructions of the Secretary of the Interior dated September 17, 1930. The dam was redesignated Boulder Dam by order of the Secretary dated May 8, 1933. The name Hoover Dam was restored by the Act of April 30, 1947, 61 Stat. 56.

Present Activities:

The upper Nevada (NV) penstock tie-rod test was completed with assistance from Denver personnel. The penstock interior was spot coated and the butterfly valve seals were replaced on all of the upper NV unit lateral penstocks. The entire inside of the pipe (elbow, main, and all four laterals) was spot repaired, along with the inside face of the lower 9-foot cylinder gate. Unit turbine overhauls are currently in progress on units N2 and N6 (to be completed by 4/30/2004). Unit N6 turbine has been reconfigured and balanced. All other unit annual inspections were completed this year. Exciter alignments were completed on units A8 and A9. All units are expected to be available for service by May 1, 2004. SCADA phase 1 upgrades to the “B” side are expected to be completed by this summer.

Currently overhauling the 2300 volt station service breakers and 17 of 38 such breakers have been overhauled. Electrical board functional relay testing is ongoing. Arc flash analysis is also ongoing with assistance from Denver personnel.

Major piping replacements were completed on both units N2 and N6. In the Arizona 2nd floor pipe gallery, the 400 feet of 6-inch fire main was replaced. The unit N2 cooling water eductor system was also replaced. Extensive painting of all powerhouses piping is ongoing.

The installation of the emergency roadway barriers for the top of dam highway was completed. The relocation of the Nevada checkpoint moving it to 400 feet closer to the dam to accommodate the new road construction for the Hoover Dam Bypass was completed.

Additional work items which address present activities are:

1. The emergency closure test for the upstream cylinder gates was completed in September 2003 confirming that the upper cylinder gate on any penstock at Hoover Dam provides a viable emergency shutoff.
2. In October 2003 re-insulation of the thrust bearing systems for units A8, A9, N2, and N3 were completed. The new insulation systems prevent circulating currents to ground which travel through the bearing surface. Units A8, A9, and N3 had high levels of circulating currents. N3 had old micarta insulation which is known to lose insulation value after many years. This work is part of an ongoing effort to eliminate all potential causes of thrust bearing failures at Hoover Dam.
3. The thrust bearing shim pack on the thrust bearing of A8 was replaced due to complete deterioration of a shim in the shim pack. When A8 was disassembled to eliminate high levels of thrust bearing circulating currents, portions of a shim were missing which gave evidence of mechanical “working” of the components. This work is part of an ongoing effort to eliminate all potential causes of thrust bearing failures at Hoover Dam.
4. One hundred percent coating removal and re-coating of N2 and N6 scroll cases stay vanes, and wicket gates were completed. A small improvement in efficiency will result from this work.
5. A contract was awarded with the Western Area Power Administration to replace 230 KV disconnect A781 on the roof of the Arizona Powerhouse.
6. Additional fall protection cables were added at exposed areas such as main bridge cranes, the cableway tail tower, and access ladders.
7. Topographic maps of downstream river channel between the dam and the spillway discharge area was completed.
8. Visitor Center’s security barrier at plaza was completed.

Future Planned Activities:

Elevator hoist ropes on 4 elevators (E1, E2, E5, and E6) will be replaced.

The Arizona penstock lighting contract was awarded which will result in the replacement of the upper and lower AZ penstock lighting systems. Upper AZ will have all new lighting systems which will be completed by September 30, 2004 followed by Lower AZ work to be completed by January 31, 2005.

The contract for the replacement of the station service transformers was awarded and the work is scheduled for the summer of 2004. The contract for scanning and indexing 36,000 drawings and 43,000 documents has been awarded and should be completed by the end of August.

The contract to repair the 150-ton cableway slack carrier systems will be awarded in April 2004 and the work will be completed in September 2004.

During the 2004-2005 maintenance season the upper AZ lateral penstock butterfly seals will be replaced. This will complete the seal replacements of all butterfly valves. Units A1 and A6 are scheduled for turbine overhauls.

The A8 eductor will be replaced in FY 2005.

The unit A1 major overhaul will be completed in FY 2005. The interior painting of the upper AZ penstock will occur during the 2004-2005 penstock outages.

Special Issues:

Hoover Powerplant generators are primarily used for providing a low-cost peaking resource and regulation. Hoover is not a sole source supplier. Contractual arrangements with the power customers provide for Hoover power to be used for ramping, regulating, and reserves.

The demand for Hoover power generation is seasonal, with the winter months as the low-demand period. Hoover's maintenance period is from October through May. Normally Hoover has one unit down for a major overhaul during this time with several weekly outages on other units. Since the penstocks are on a five year maintenance schedule quite often one or more penstocks are taken out per maintenance period. Because four generators are normally supplied from each penstock, when the penstock is out of service, so are four generators.

When not releasing for flood control purposes, Hoover generation is a direct function of downstream water demands. Power production is ancillary to flood control, navigation, and irrigation water delivery.

Hoover dam electrical capacity has been reduced due to the on-going drought and decreased lake elevations.

River:	Colorado River	**Plant Type:**	Conventional
Powerhouse Type:	Above Ground	**Turbine Type:**	Francis
Original Nameplate Capacity:	1,344,800 kW	**Installed Capacity:**	2,078,800 kW
Year of Initial Operation:	1936	**Age:**	71 years
Net Generation (FY-2007):	3,806.9 GWh	**Rated Max Head:**	582 feet
Average Plant Factor (FY-2007):	21.0 percent	**Remotely Operated:**	No
Production Mode:	Intermediate		

Ancillary Services

Hoover
Ancillary Services

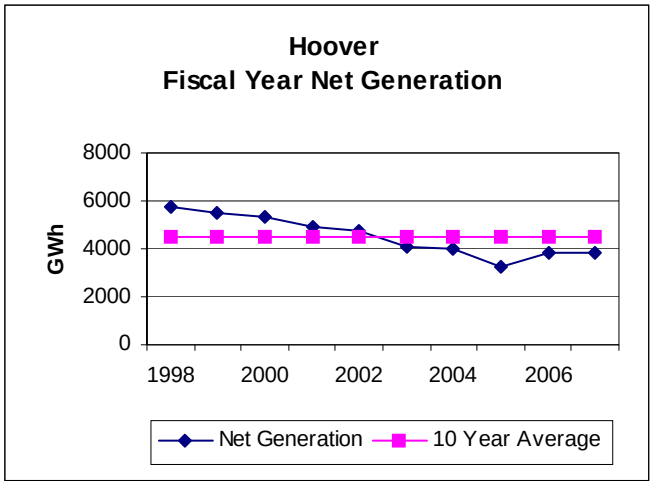
Spinning Reserve	Yes
Non-Spinning Reserve	Yes
Replacement Reserve	Yes
Regulation/Load Following	Yes
Black Start	Yes
Voltage Support*	Yes

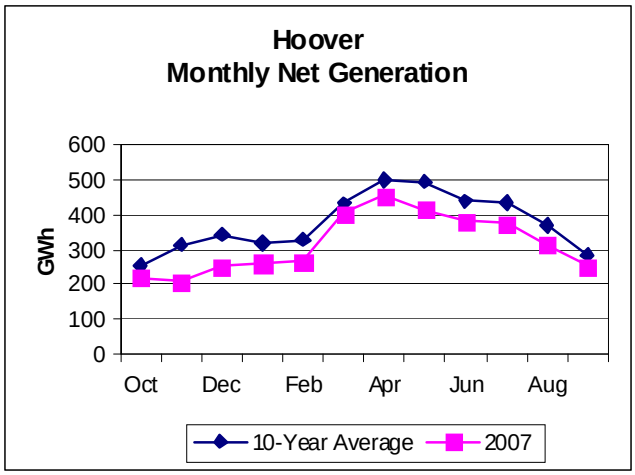
*Customers supply voltage support needed for delivery of capacity and energy to their load centers.

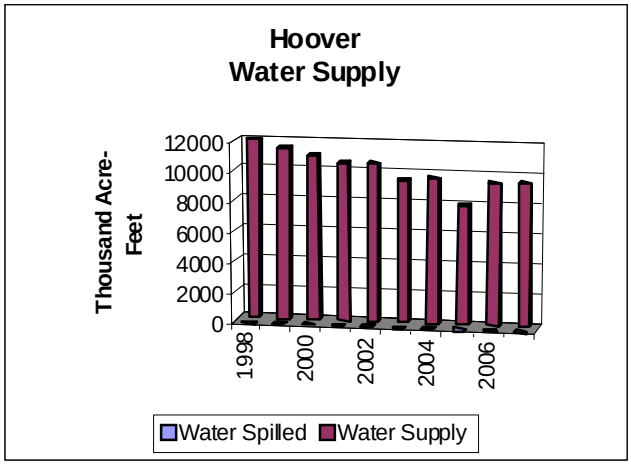
Generators

Hoover Generators Existing Number and Capacity			
Unit #	Original Capacity (kW)	Capacity Increased (kW)	Present Capacity (kW)
A0	2,400	-	2,400
A1	82,500	47,500	130,000
A2	82,500	47,500	130,000
A3	82,500	47,500	130,000
A4	82,500	47,500	130,000
A5	82,500	44,500	127,000
A6	82,500	47,500	130,000
A7	82,500	47,500	130,000
A8	40,000	21,500	61,500
A9	50,000	18,500	68,500
N0	2,400	-	2,400
N1	82,500	47,500	130,000
N2	82,500	47,500	130,000
N3	82,500	47,500	130,000
N4	82,500	47,500	130,000
N5	82,500	47,500	130,000
N6	82,500	47,500	130,000
N7	82,500	44,500	127,000
N8	95,000	35,000	130,000
19 units	1,344,800	734,000	2,078,800

Generation



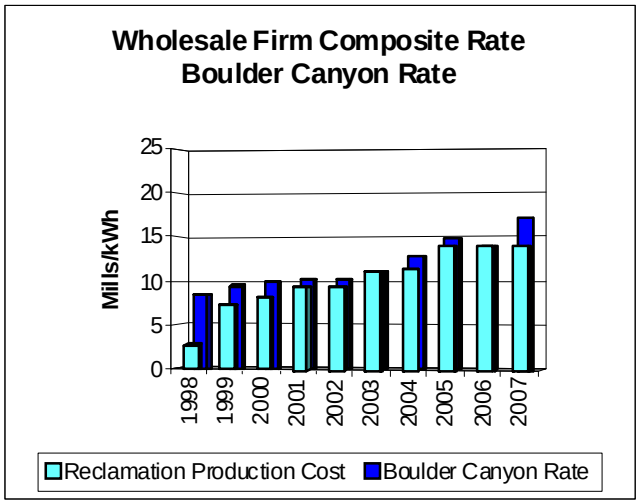




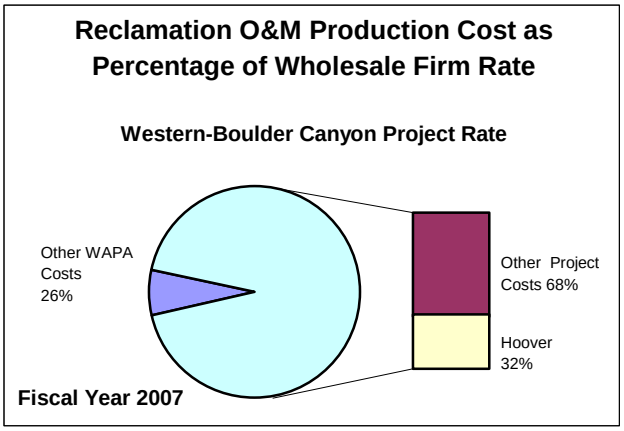
FY 2005 water for generation was 7,934,508 AF
and 190 AF went through the Bypass valves.

Prime Laboratory Benchmarks

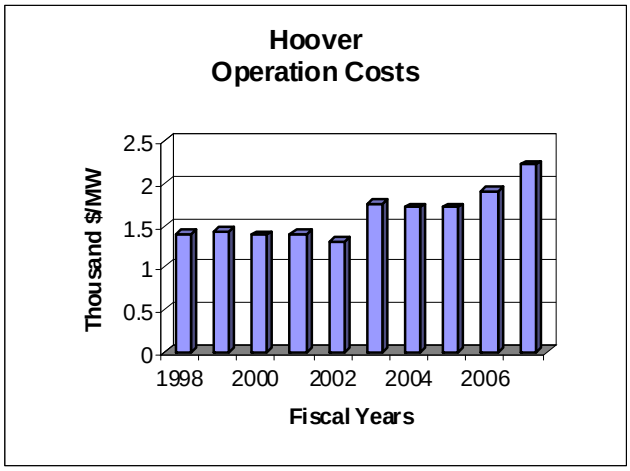
Benchmark 1
Wholesale Firm Rate

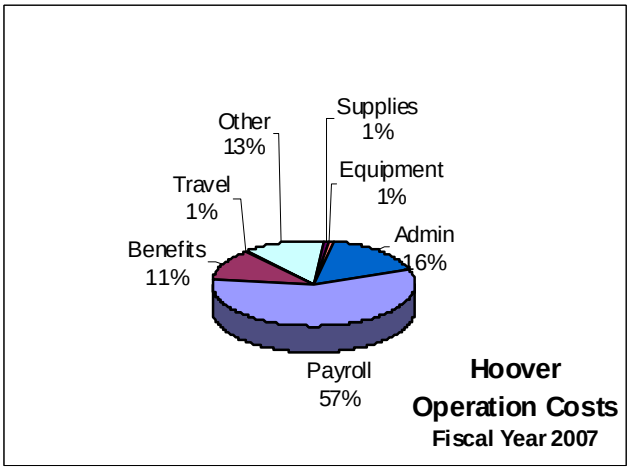


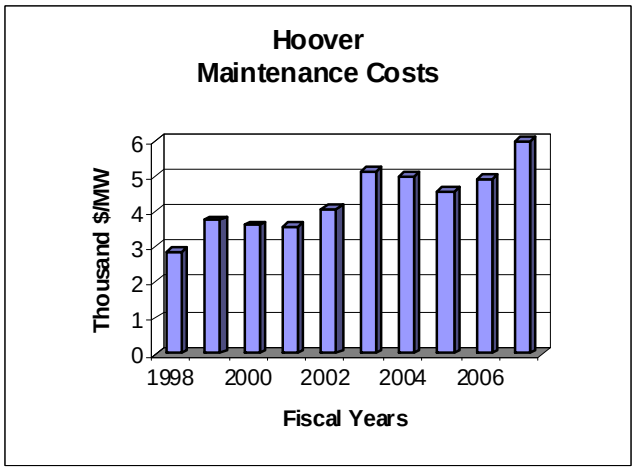
Benchmark 2
Reclamation's Production Cost as Percentage of Wholesale Firm Rate

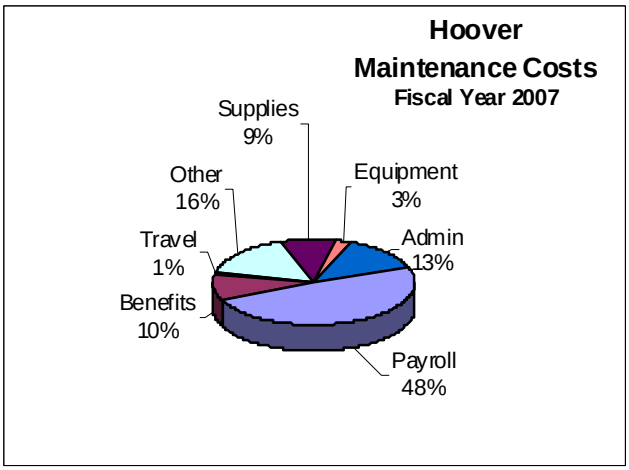


Benchmark 3
Production Cost

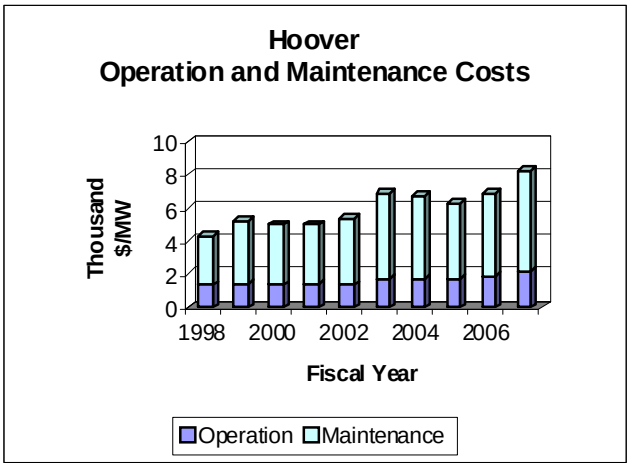


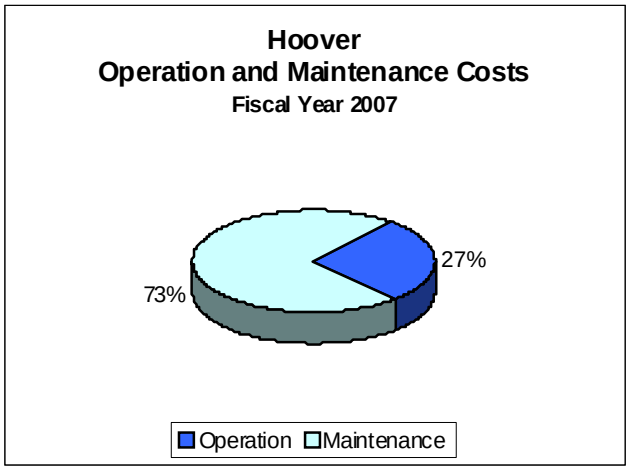


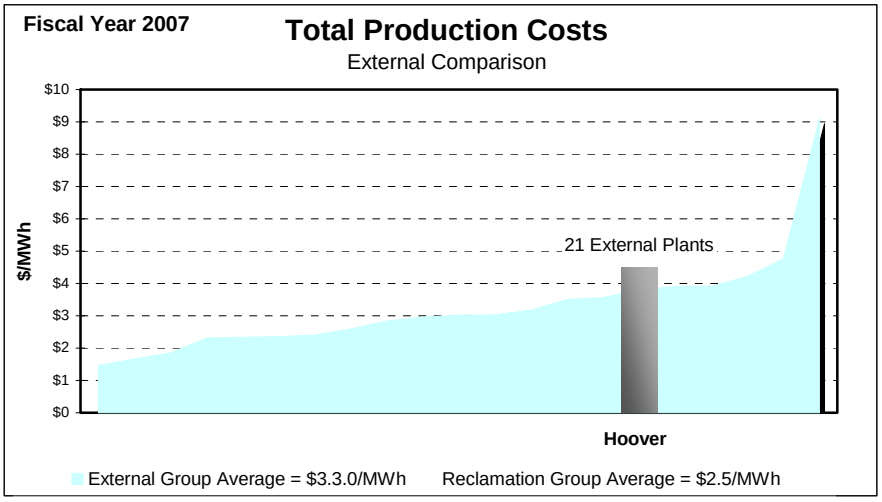


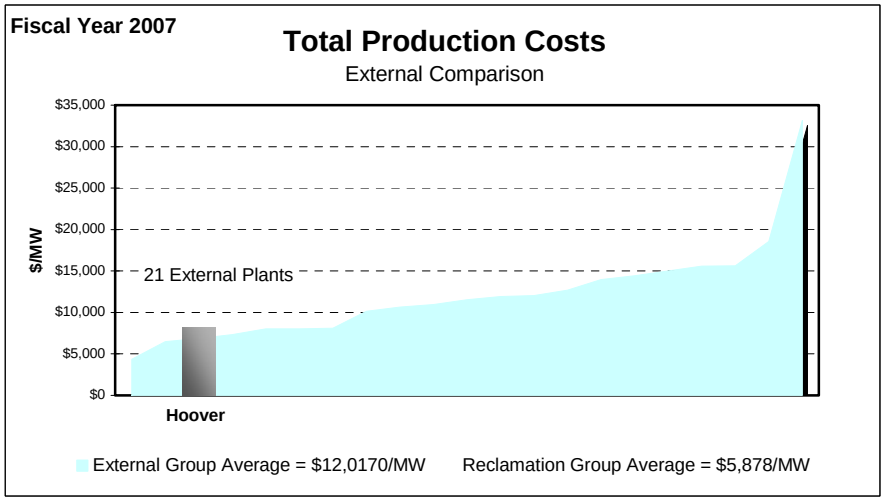


Benchmark 3
Production Cost



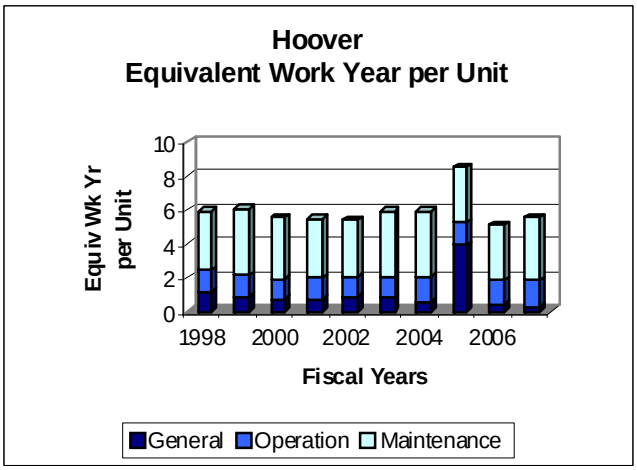


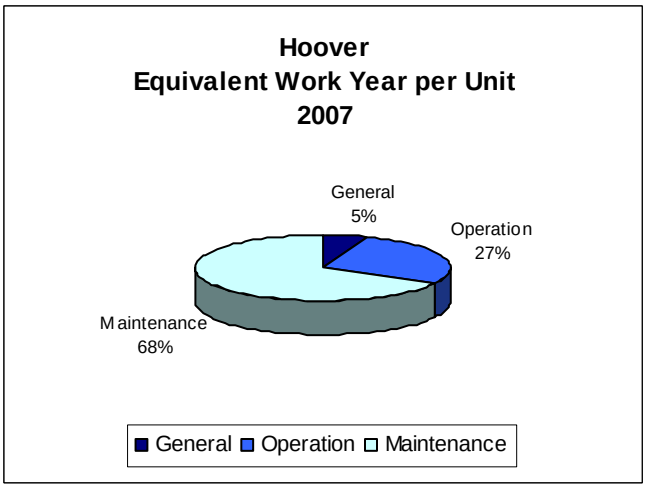


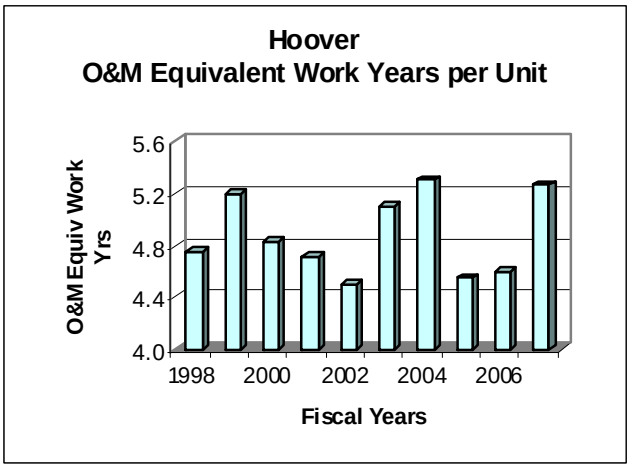


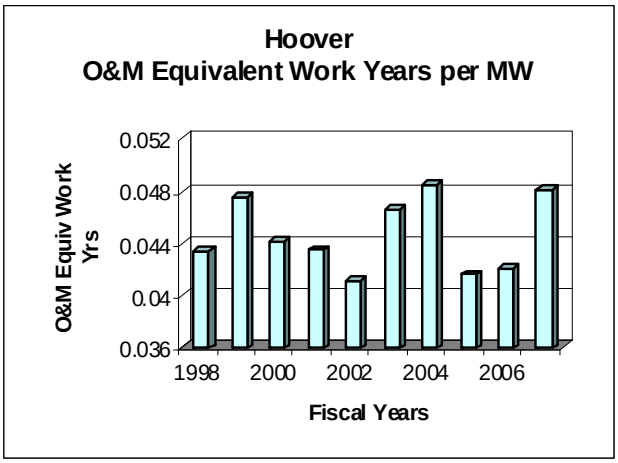
Benchmark 4
Workforce Deployment

Hoover 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	4.96	0.52	0.34	5.81	0.31	0.00
Operation	26.31	2.74	0.00	29.05	1.53	0.01
Maintenance	64.24	6.70	0.00	70.94	3.73	0.03
Total Staffing	95.51	9.96	0.34	105.80	5.57	0.05

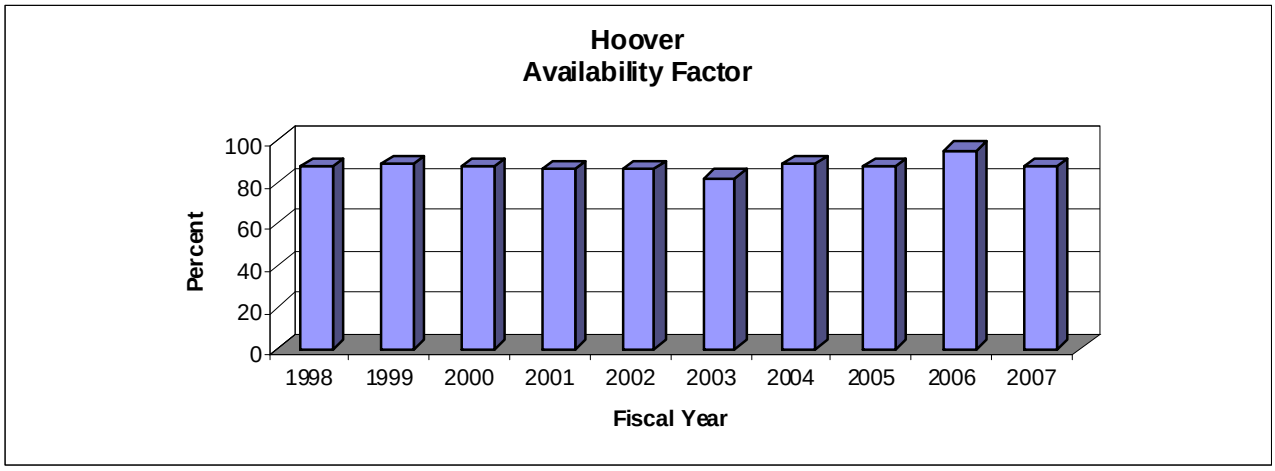






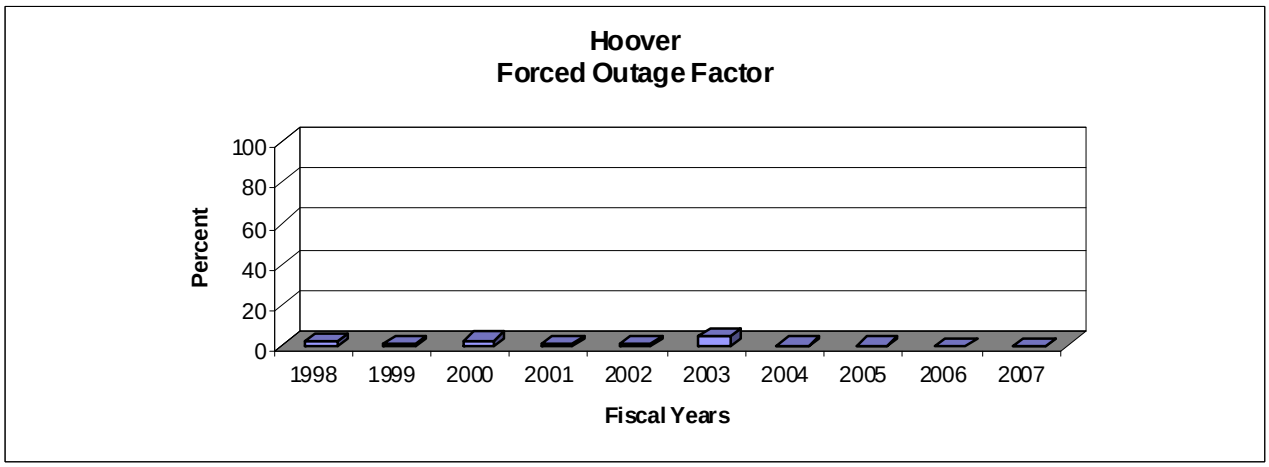


Benchmark 5
Availability Factor

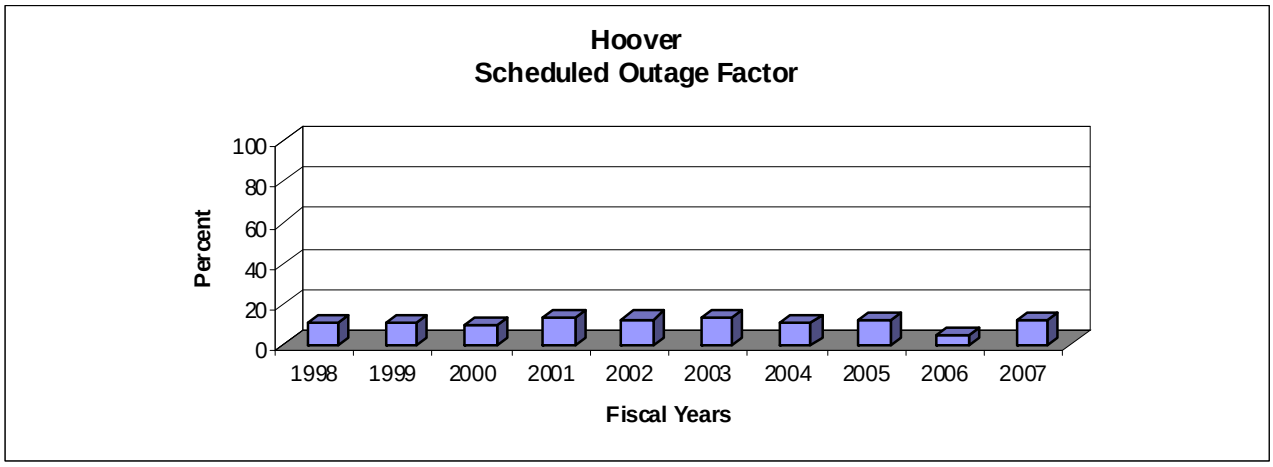


FY-1999 to FY-2012 – Turbine overhauls – Program ongoing

Benchmark 6
Forced Outage Factor

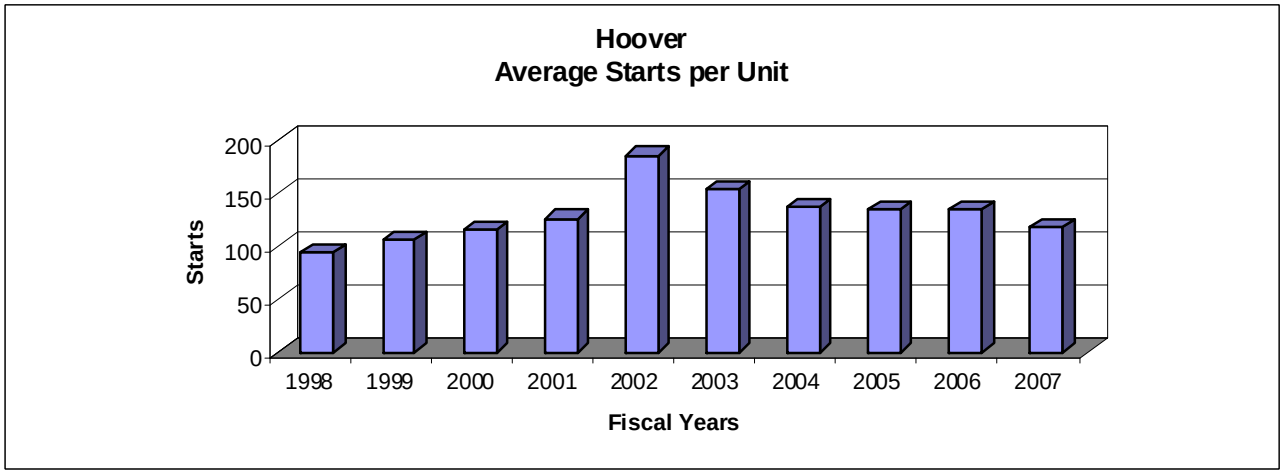


Benchmark 7
Scheduled Outage Factor



FY-1999 to FY-2012 – Turbine overhauls – Program ongoing

Starts

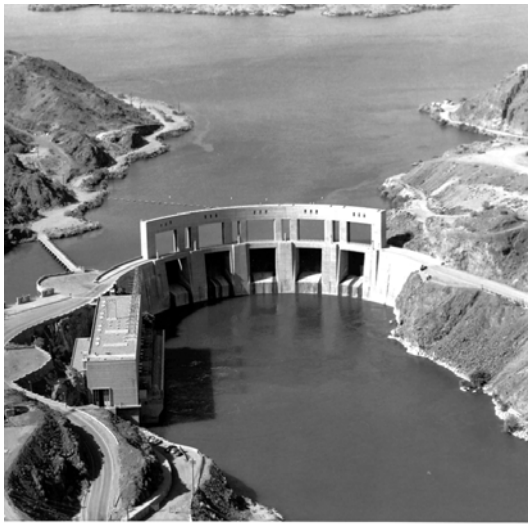


FY-2002 increase due to deregulation.

Benchmark Data Comparison					
Fiscal Year 2007	**Hoover Powerplant**	**Reclamation Average 500+ MW Group**	**Total Reclamation Average**	**Industry Average**	**Best Performers**
Wholesale Firm Rate Mills/kWh	14.8	Not Applicable	*22.45	Not Available	Not Available
Production Cost as Percentage of Wholesale Firm Rate	29.2%	Not Applicable	12.1%	Not Applicable	Not Applicable
O&M Cost $/MWh	4.49	1.65	2.76	***3.28	1.00
O&M Costs $/MW	8,223.91	4,863.16	7,846.62	***12,0170	2,897.28
O&M Equiv Work Year per MW	0.05	0.02	0.03	Not Available	0.0
Availability Factor	87.7	81.93	82.3	**88.64	98.5
Forced Outage Factor	0.2	3.15	2.6	**2.61	0.0
Scheduled Outage Factor	12.1	14.92	15.1	**8.74	0.0

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

Parker Powerplant
Parker-Davis Project



Plant Contact:
John Steffen
Manager, Parker Dam

Plant Address:
Parker Powerplant
PO Box 878
Parker Dam, CA 92267-0878

Telephone Numbers:
Phone: (760) 663-3712
Fax: (760) 663-3212

E-Mail Address:
jsteffen@lc.usbr.gov

Reclamation Region: Lower Colorado

NERC Region: Western Electricity Coordinating Council

PMA Service Area: Western Area Power Administration, Desert Southwest Region

Project Authorization: The Parker-Davis Project was formed by consolidating the Parker Dam Power Project and the Davis Dam Project under the terms of the Act of May 28, 1954 (68 Stat. 143). The Parker Dam Power Project was authorized by the Rivers and Harbors Act of August 30, 1935 (49 Stat.1028).

Project Purposes: Parker Dam and Powerplant was authorized for the purposes of controlling floods, improving navigation, and for the delivery of the stored water thereof, for the reclamation of public lands and Indian reservations, and other beneficial uses, and for the generation of electric energy as a means of financially aiding and assisting the project.

Plant Location: Parker Powerplant is located on the Colorado River about 155 miles downstream from Hoover Dam in San Bernadino County, California, on the California - Arizona State line, 12 miles northeast of Parker, Arizona.

Plant Purpose: The electrical integration and interconnection of Davis, Hoover, and Parker Power plants provides maximum generation of power with efficient use of water resources. The highly developed agricultural base and the complex industrialization of the Pacific Southwest benefit greatly from Colorado River hydroelectric energy.

Plant Facts: The Parker Powerplant includes a penstock gate structure, four penstock tunnels, and a powerplant building which houses four hydroelectric generating units. Each of the four tunnels and the penstocks conveying river water from the forebay to the turbines is 22 feet in diameter and has a water capacity of 5,575 cubic feet per second. Standing Operating Procedures specify a maximum flow of 22,000 cubic feet per second through the powerplant yielding a unit flow of 5,500 cubic feet per second. The units are rated at 80 feet of head. The power plant is remotely operated from the Hoover Control Center.

Plant History: Parker Dam is a concrete arch structure with a volume of 380 thousand cubic yards of concrete. The dam is 320 feet high and 856 feet long at its crest. Parker Dam impounds Lake Havasu including a desilting basin and forebay from which the Metropolitan Water District of Southern California pumps water into its Colorado River Aqueduct. The Central Arizona Project also uses the forebay to pump Colorado River water into its canal system.

With funds advanced by the Metropolitan Water District of Southern California, Reclamation awarded contracts for the construction of Parker Dam and Powerplant beginning in 1939. The Metropolitan Water District of Southern California, by virtue of advancing the funds for constructing Parker Dam and Powerplant, enjoys a perpetual contract with Reclamation which provides that one-half of the powerplant's output is available to be used for the pumping of water into the aqueduct.

Present Activities: The Rehabilitation of unit #3 was completed in 2005.

Future Planned Activities: The rehabilitation of Unit #1 is planned for 2007, Unit #2 rehabilitation is planned for 2009, and Unit #4 rehabilitation is planned for 2010. During 2010 we are also planning the installation of an automatic backup station power generator. This will include generator rewind turbine replacement and the addition of a solid-state excitation system. Partial Discharge equipment will be installed during the rehabilitation.

Special Issues: Maintaining reservoir elevation is critical for proper operation of pumping plants for the Central Arizona Project and the Colorado River Aqueduct. Elevations must be kept within 4-6 feet of the optimal pumping elevation.

Due to river conditions downstream, the tailrace limits total plant throughput to between 104,000 and 108,000 kw.

River:	Colorado River	**Plant Type:**	Conventional
Powerhouse Type:	Above Ground	**Turbine Type:**	Francis
Original Nameplate Capacity:	120,000 kW	**Installed Capacity:**	120,000 kW
Year of Initial Operation:	1942	**Age:**	65 years
Net Generation (FY-2007):	453.8 GWh	**Rated Head:**	80 feet
Average Plant Factor (FY-2007):	43.3 percent	**Remotely Operated:**	Yes
Production Mode:	Intermediate		

Ancillary Services

Parker
Ancillary Services

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

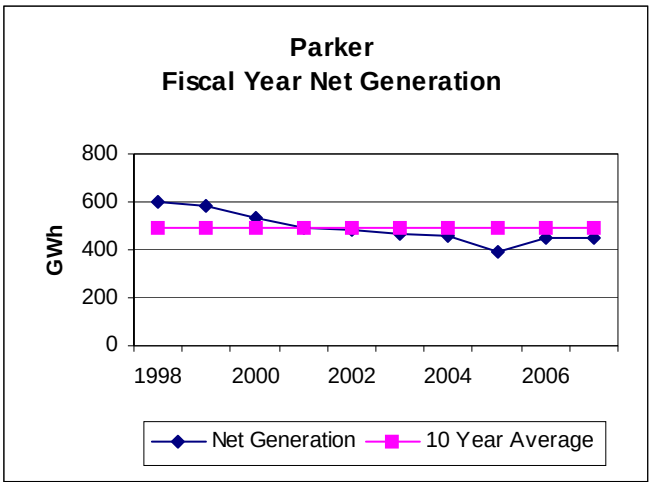
Generators

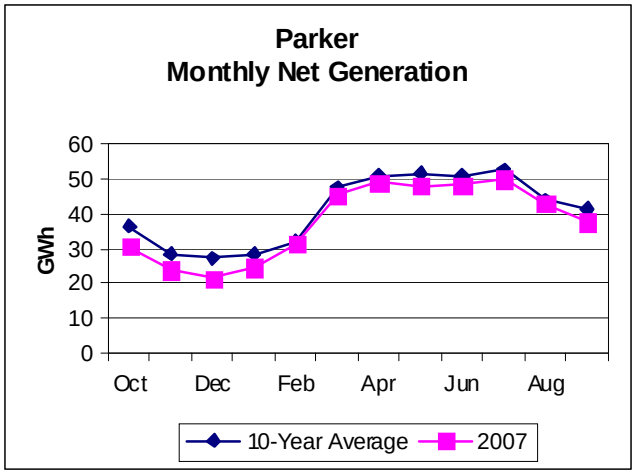
Parker Generators

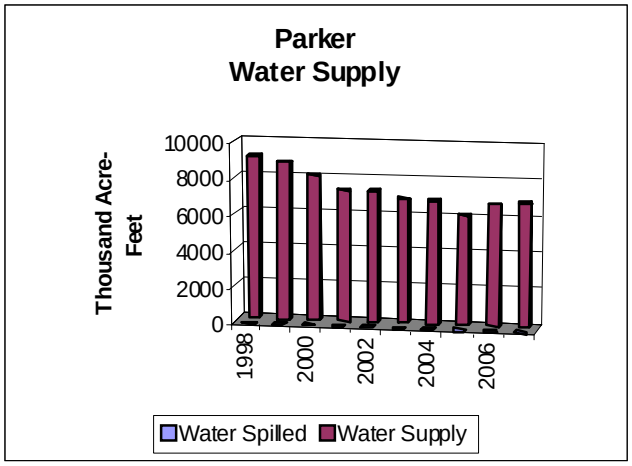
Existing Number and Capacity

Unit #	Original Capacity (kW)	Capacity Increased (kW)	Present Capacity (kW)
1	30,000	-	30,000
2	30,000	-	30,000
3	30,000	-	30,000
4	30,000	-	30,000
4 units	120,000	-	120,000

Generation

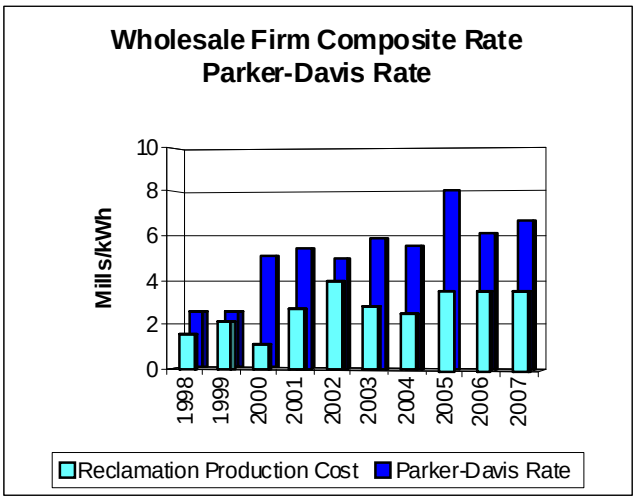

Parker
Fiscal Year Net Generation
GWh
800
600
400
200
0
1998
2000
2002
2004
2006
Net Generation
10 Year Average


Parker
Monthly Net Generation
GWh
60
50
40
30
20
10
0
Oct
Dec
Feb
Apr
Jun
Aug
10-Year Average
2007

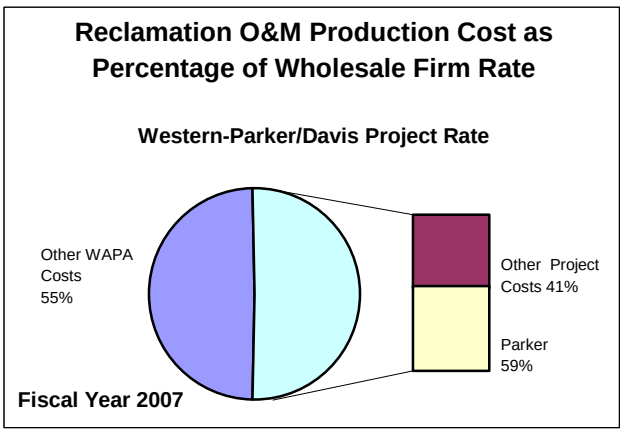

Parker
Water Supply
Thousand Acre-Feet
10000
8000
6000
4000
2000
0
1998
2000
2002
2004
2006
Water Spilled
Water Supply

Prime Laboratory Benchmarks

Benchmark 1
Wholesale Firm Rate

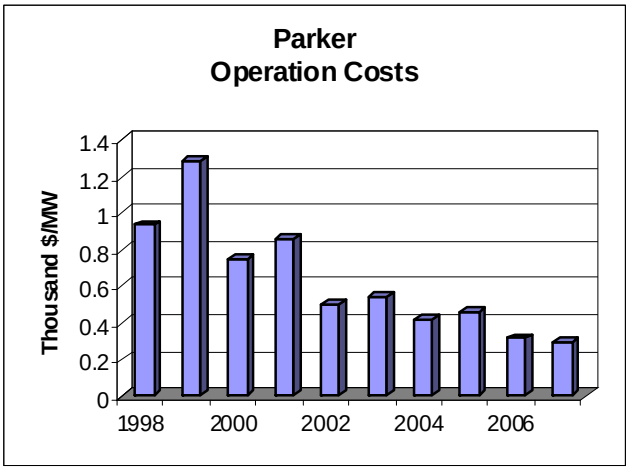


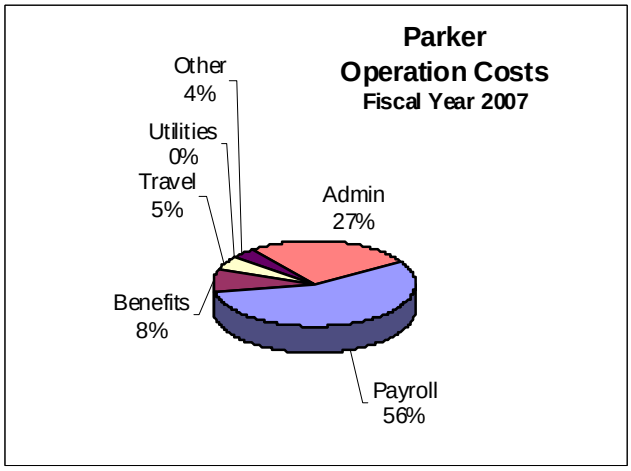
Benchmark 2
Reclamation's Production Cost as Percentage of Wholesale Firm Rate

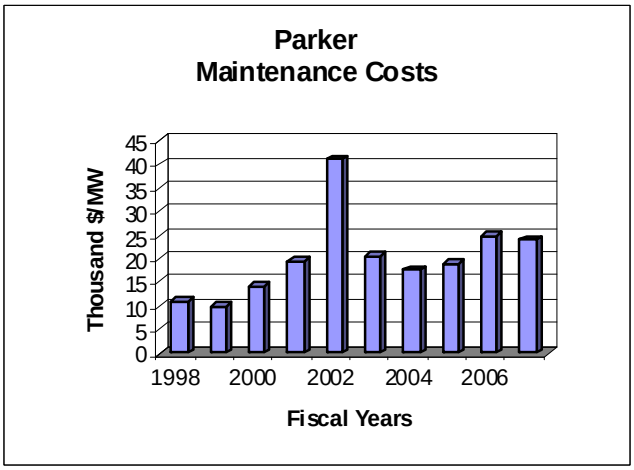


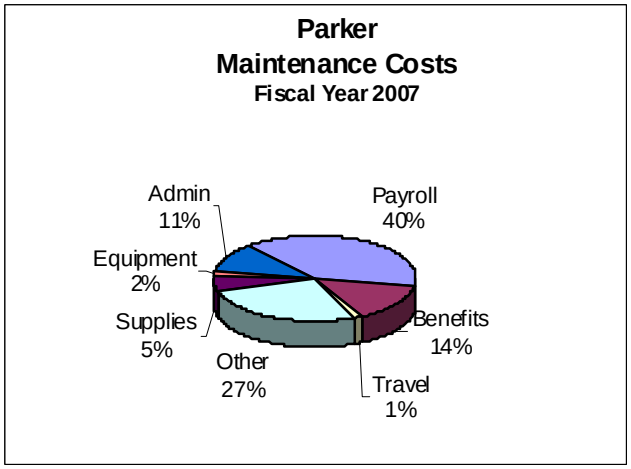
Reclamation expenses, as a percentage of the rate, do not reflect the total expenditures of this project.

Benchmark 3
Production Cost

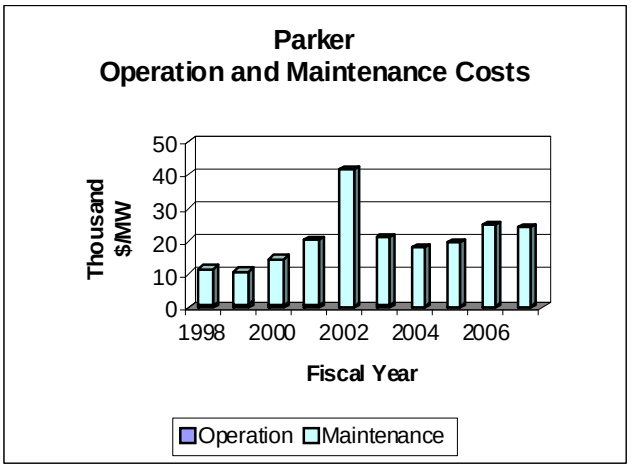


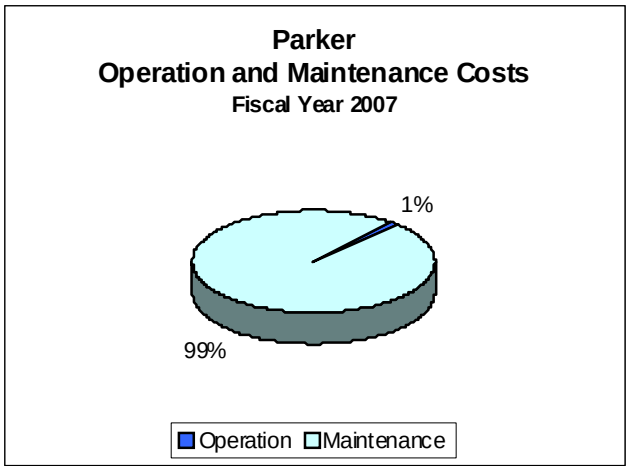


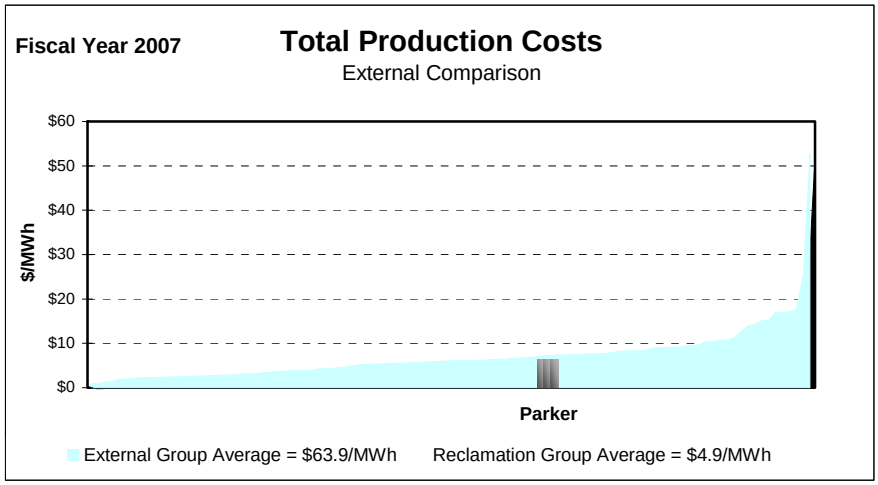


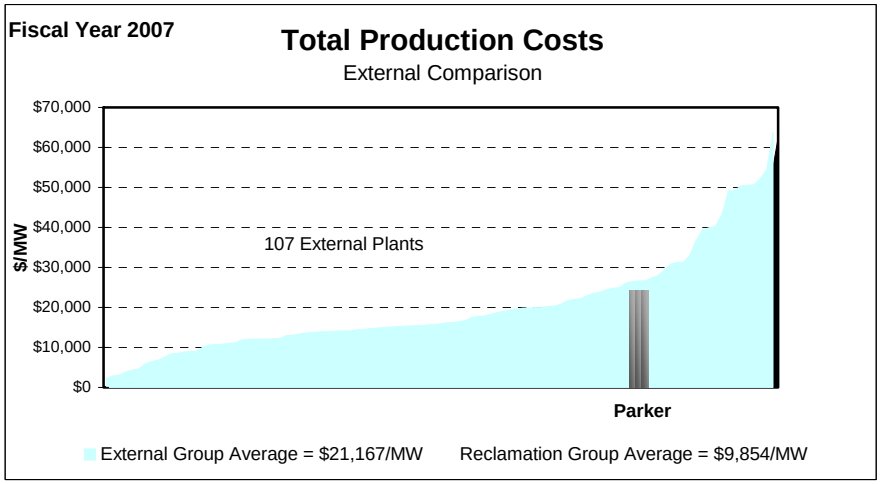


Benchmark 3
Production Cost



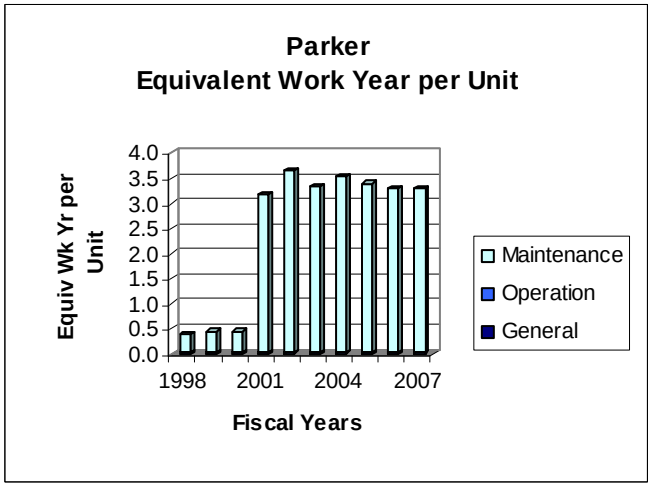


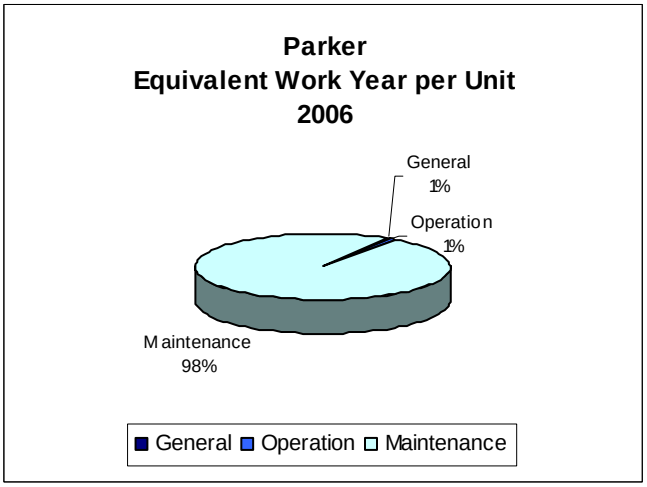


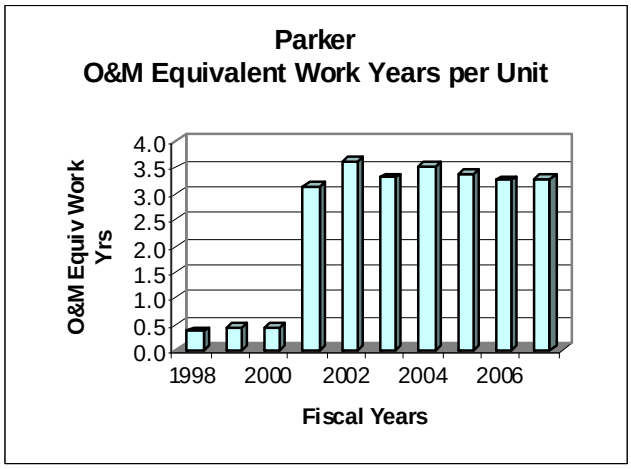


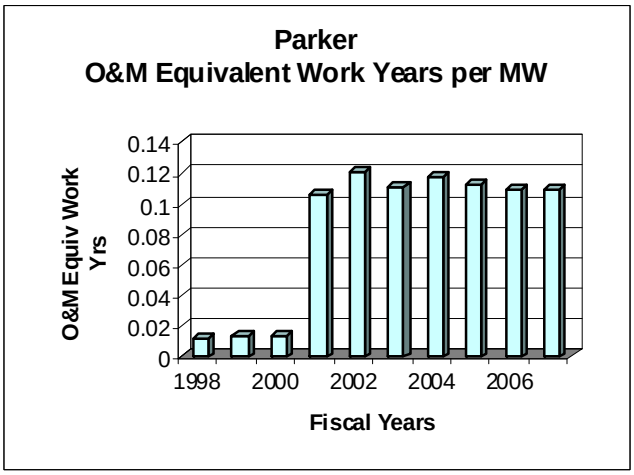
Benchmark 4
Workforce Deployment

Parker 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	0.00	0.00	0.07	0.07	0.02	0.00
Operation	0.06	0.01	0.00	0.07	0.02	0.00
Maintenance	11.82	1.23	0.00	13.05	3.26	0.11
Total Staffing	11.88	1.24	0.07	13.19	3.30	0.11

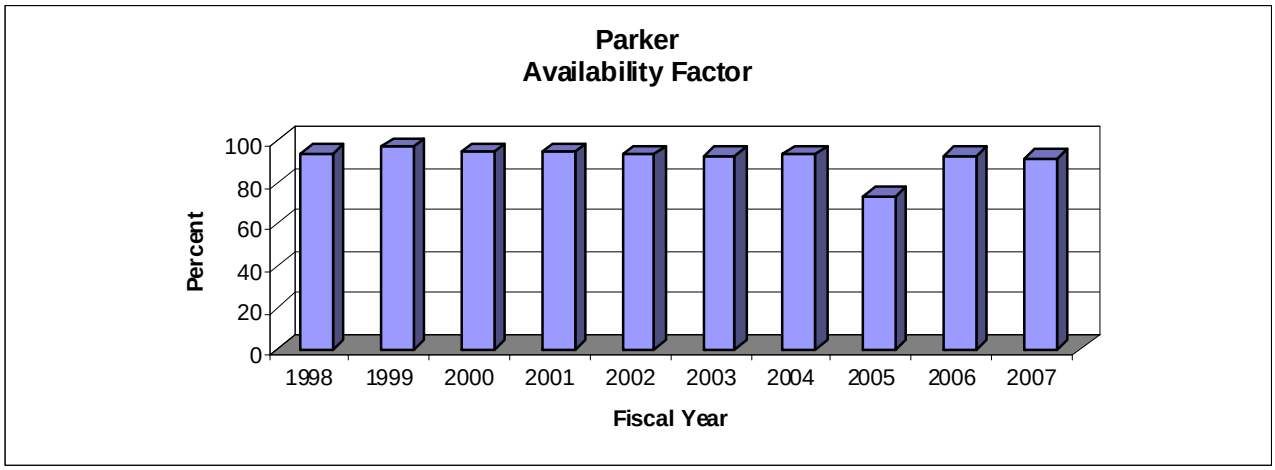




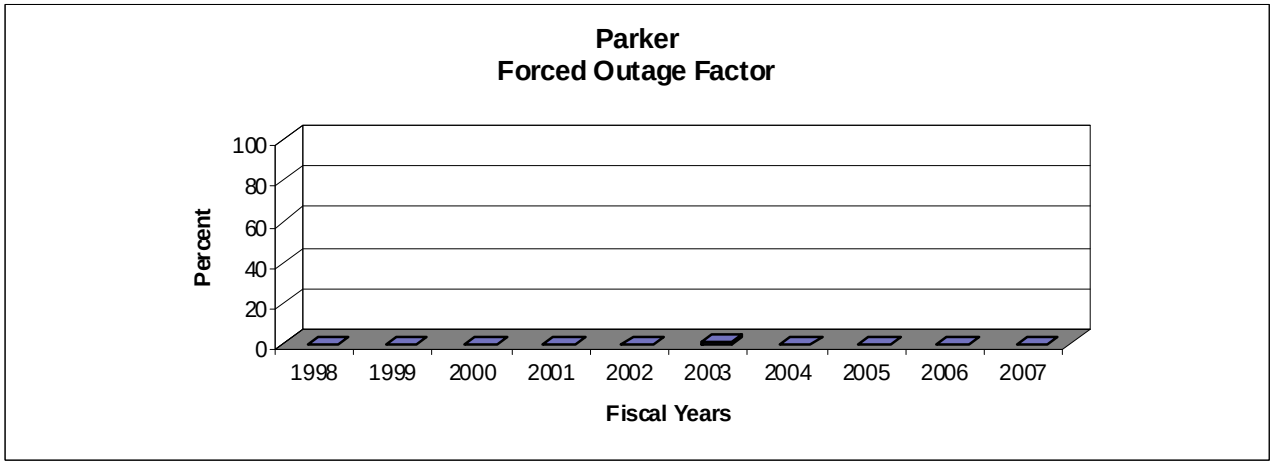




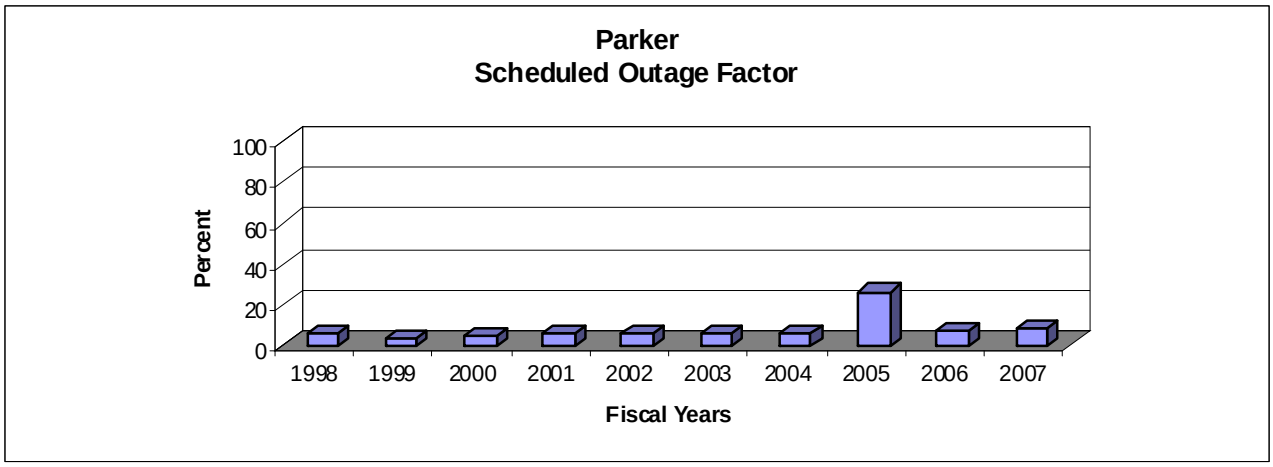
Benchmark 5
Availability Factor



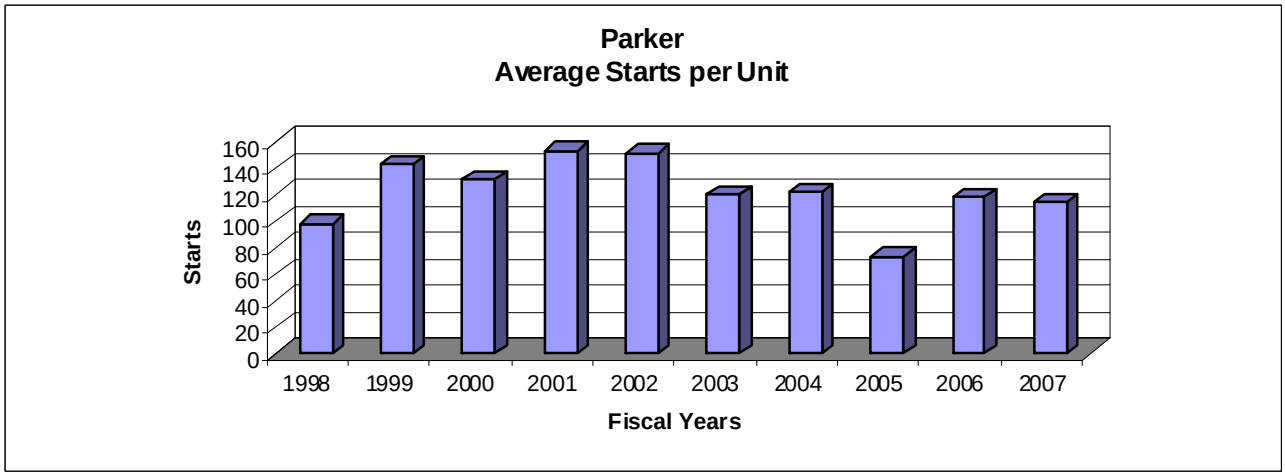
Benchmark 6
Forced Outage Factor



Benchmark 7
Scheduled Outage Factor



Starts



Benchmark Data Comparison					
Fiscal Year 2007	**Parker Powerplant**	**Reclamation Average 100-500 MW Group**	**Total Reclamation Average**	**Industry Average**	**Best Performers**
Wholesale Firm Rate Mills/kWh	8.0	Not Applicable	*22.45	Not Available	Not Available
Production Cost as Percentage of Wholesale Firm Rate	25.5%	Not Applicable	12.1%	Not Applicable	Not Applicable
O&M Cost $/MWh	6.42	4.44	2.76	***63.88	1.00
O&M Costs $/MW	24,288	10,502	7,847	***21,167	2,897
O&M Equiv Work Year per MW	0.11	0.04	0.03	Not Available	0.0
Availability Factor	91.8	83.5	82.3	**88.64	98.5
Forced Outage Factor	0.0	1.2	2.6	**2.61	0.0
Scheduled Outage Factor	8.2	15.4	15.1	**8.74	0.0

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

RECLAMATION

Managing Water in the West

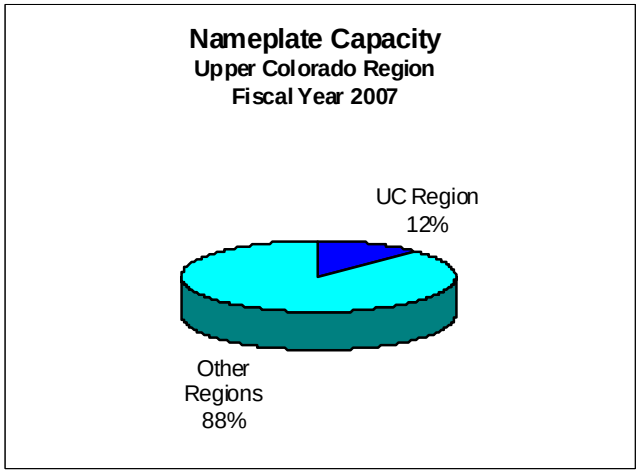
Upper Colorado Region Power Performance

For Fiscal Year 2007

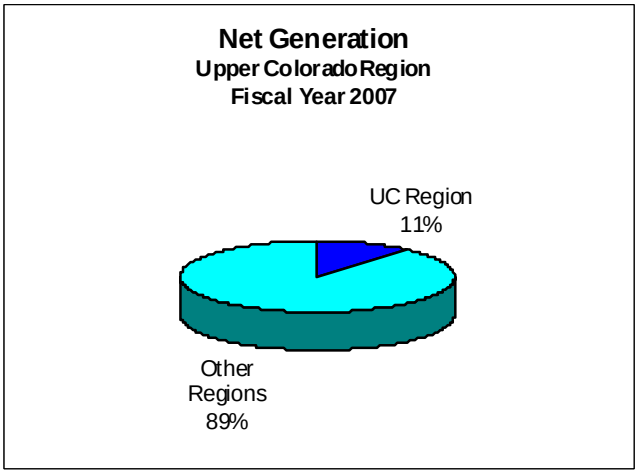
U.S. Department of the Interior
Bureau of Reclamation

Upper Colorado Regional Power Overview

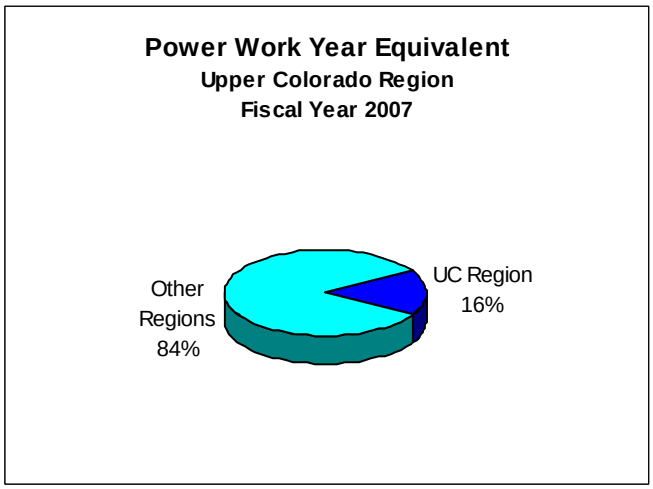
The Upper Colorado Regional Office is located in Salt Lake City, Utah. The regional office oversees and reports on the operation of 12 powerplants: Blue Mesa, Crystal, Deer Creek, Elephant Butte, Flaming Gorge, Fontenelle, Glen Canyon, Lower Molina, McPhee, Morrow Point, Towaoc, and Upper Molina.



The total capacity for this region is 1,832 megawatts, which comprises 12 percent of the Reclamation total capacity.

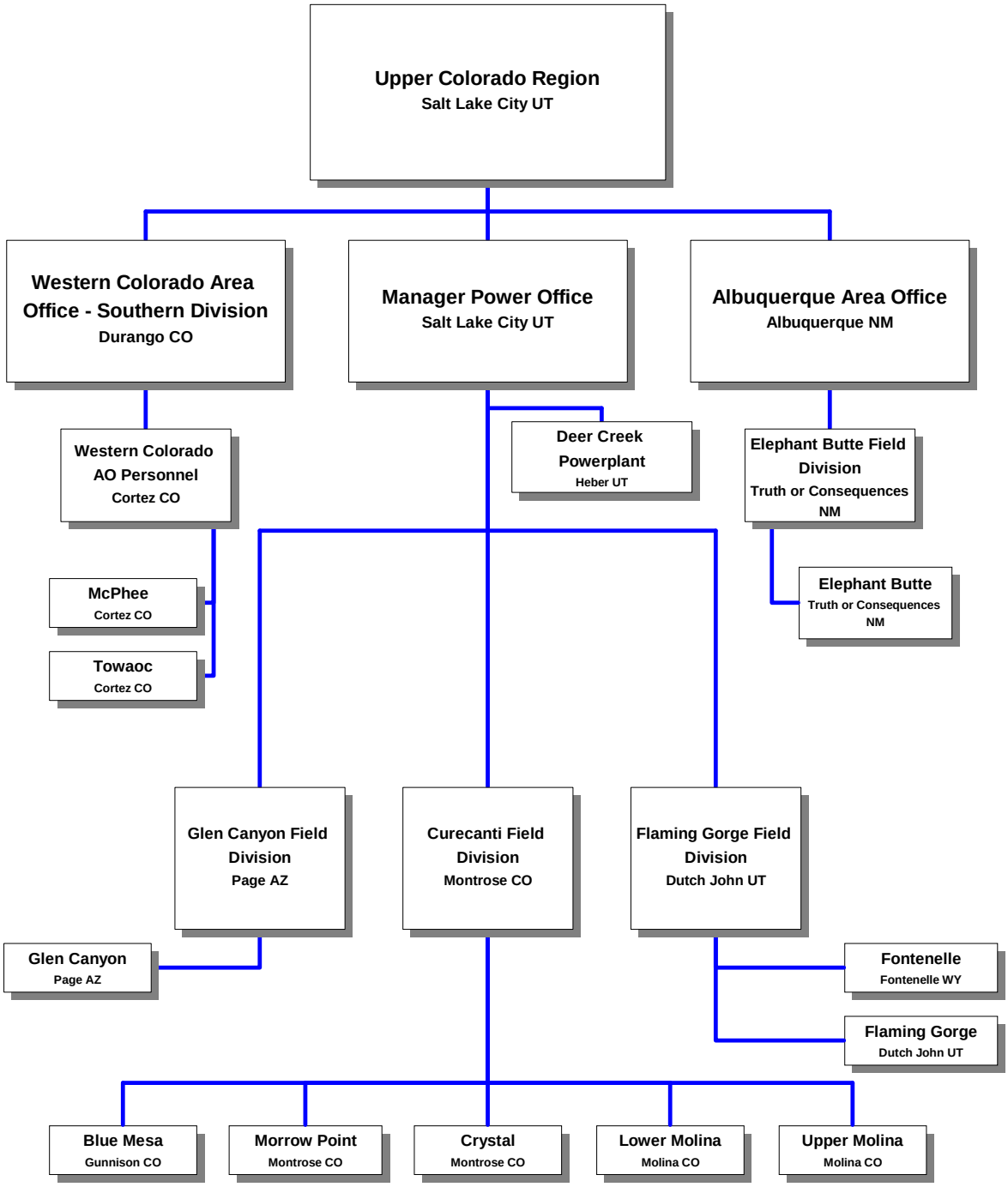


In 2007, this region produced 4,618 net gigawatt-hours. This comprises 11 percent of the total net generation for Reclamation in 2007.



In 2007, this region employed 16 percent of the full time equivalent charged to power facilities. Of the 12 facilities located in this region, 3 have no personnel on site.

Organizational structure:



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

Regional Office: Bureau of Reclamation, Upper Colorado Regional Office

125 South State Street, Room 6107
Salt Lake City UT 84138-1102

Larry Walkoviak,
Regional Director, UC-100

(801) 524-3600

Power Office	Kerry McCalman, UC-600 (801) 524-3612 Max Spiker, UC-622 (801) 524-3745 Jane Blair, UC-606 (801) 524-3628
Glen Canyon Field Division:	Glen Canyon Field Division PO Box 1477 Page AZ 8604-1477 Kerry McCalman, UC-600 (801) 524-3612
Curecanti Field Division:	Curecanti Field Division 1820 S. Rio Grande Avenue Montrose CO 81401-4859 Donald Phillips, CCI-100 (970) 240-6300
Flaming Gorge Field Division:	Flaming Gorge Field Division 5595 Flaming Gorge Visitor Center Dutch John UT 84023-3224 Steve Hulet, FG-100 (435) 885-3231
Albuquerque Area Office:	Albuquerque Area Office 505 Marquette NW, Suite 1313 Albuquerque NM 87102-2162 John Poland, ALB-100 (505) 462-3542
Elephant Butte Power and Storage Division:	Elephant Butte Power and Storage Division HC30, Box 312 Truth or Consequences NM 87901-9802 James Powell, EB-600 (505) 894-6661
Western Colorado Area Office:	Western Colorado Area Office 835 East Second Avenue Southern Division PO Box 640 Durango CO 81302-0640 Brad Dodd (970) 385-6557

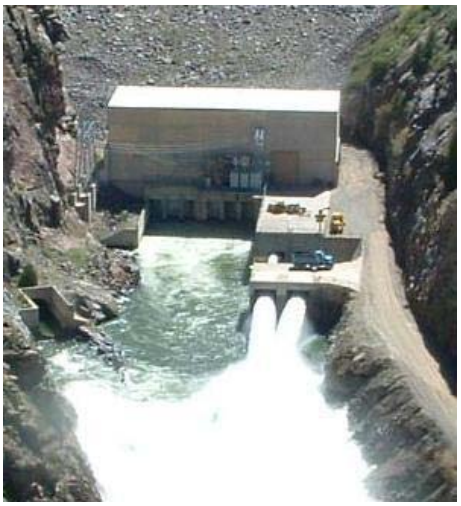
Cortez Field Office:

Bureau of Reclamation
Cortez Field Office
60 South Cactus
Cortez CO 81321

Vern Harrell
(970) 565-0865

WASHINGTON
MONTANA
OREGON
IDAHO
WYOMING
NEVADA
UTAH
COLORADO
CALIFORNIA
ARIZONA
NEW MEXICO
Fontenelle
Flaming Gorge
Deer Creek
Lower Molina
Upper Molina
Crystal
Morrow Point
Blue Mesa
Towaoc
McPhee
Glen Canyon
Elephant Butte

Blue Mesa Powerplant
Colorado River Storage Project
Wayne N. Aspinall Storage Unit



Plant Contact:
Donald Phillips, Manager
Curecanti Field Division

Plant Address:
Blue Mesa Powerplant
Gunnison CO

Telephone Numbers:
Phone: (970) 240-6300
Fax: (970) 240-6304

E-Mail Address:
dphillips@uc.usbr.gov

Reclamation Region: Upper Colorado

NERC Region: Western Electricity Coordinating Council, Rocky Mountain Power Area

PMA Service Area: Western Area Power Administration, Colorado River Storage Project Management Center

Project Authorization: Congress authorized construction of four storage units of the Colorado River Storage Project and 11 participating projects on April 11, 1956, under Public Law 485, 84th Congress, 70 Stat. 105. Additional projects have been added since the original legislation was adopted.

Project Purposes: The Colorado River Storage Project provides for the comprehensive development of the Upper Colorado River Basin. The project furnishes the long-term regulatory storage needed to permit States in the upper basin to meet their flow obligation at Lees Ferry, Arizona, as defined in the Colorado River Compact and still use their apportioned water.

Plant Location: The Blue Mesa Powerplant is located on the Gunnison River in Gunnison County, about 30 miles west of Gunnison, Colorado, and about 1.5 miles below Sapinero, Colorado.

Plant Facts: The Blue Mesa Powerplant consists of two 43,200-kilowatt generators, driven by two 41,500-horsepower turbines. Each turbine is designed to operate at a maximum head of about 360 feet.

One 16-foot-diameter penstock conveys water to the two turbines and also carries water for the outlet works. After branching from the main penstock, each of the penstock laterals is controlled by 156-inch butterfly valves. The main penstock is reduced by a wye branch to the outlet works control valves.

Plant Purpose: Generation of hydroelectric power for the upper basin and adjacent areas.

Plant History: Power generation was initiated in September 1967 at the Blue Mesa Powerplant. Generators were up rated from 30,000 kW to 43,200 kW in 1988. The Governors were replaced in 2001-2002. A new generator step up transformer was installed in 2002. Remote main breaker racking devices are to be installed on both breakers in 2003-2004. Upgrade emergency generator for black start capability and cleaned oil storage tanks in 2005. Repaired powerplant roof in 2006.

Present Activities: Design for draft tube liner repairs.

Future Planned Activities: Replace the runner.

Special Issues: None

River:	Gunnison River	**Plant Type:**	Conventional
Powerhouse Type:	Above Ground	**Turbine Type:**	Francis
Original Nameplate Capacity:	60,000 kW	**Installed Capacity:**	86,400 kW
Year of Initial Operation:	1967	**Age:**	40 years
Net Generation (FY-2007):	237.3 GWh	**Rated Head:**	332 feet
Average Plant Factor (FY-2007):	31.5 percent	**Remotely Operated:**	Yes
Production Mode:	Peaking		

Ancillary Services

Blue Mesa
Ancillary Services

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

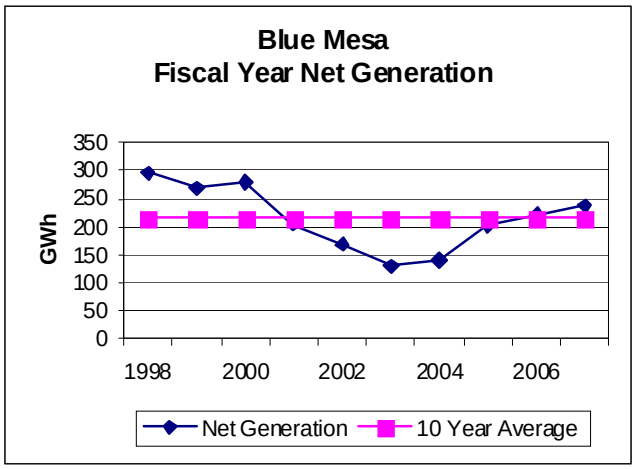
Generators

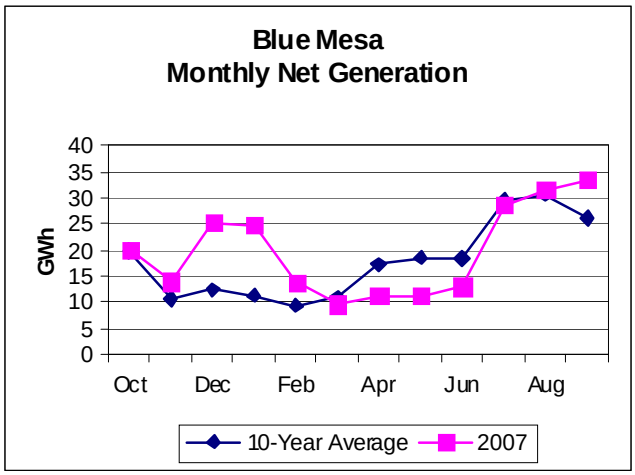
Blue Mesa Generators

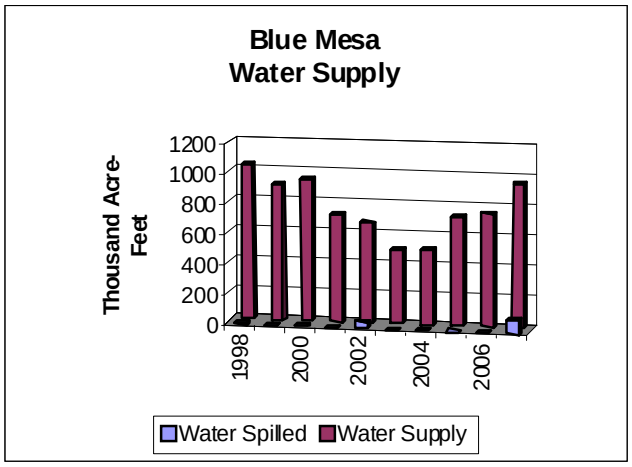
Existing Number and Capacity

Unit #	Original Capacity (kW)	Capacity Increased (kW)	Present Capacity (kW)
1	30,000	13,200	43,200
2	30,000	13,200	43,200
2 units	60,000	26,400	86,400

Generation

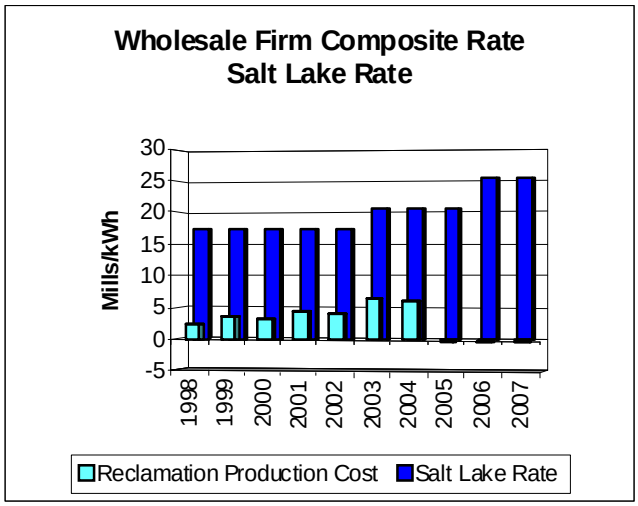

Blue Mesa
Fiscal Year Net Generation
GWh
350
300
250
200
150
100
50
0
1998
2000
2002
2004
2006
Net Generation
10 Year Average


Blue Mesa
Monthly Net Generation
GWh
40
35
30
25
20
15
10
5
0
Oct
Dec
Feb
Apr
Jun
Aug
10-Year Average
2007

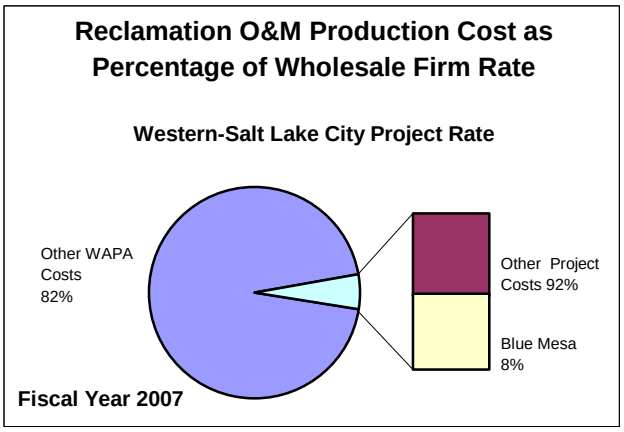

Blue Mesa
Water Supply
Thousand Acre-Feet
1200
1000
800
600
400
200
0
1998
2000
2002
2004
2006
Water Spilled
Water Supply

Prime Laboratory Benchmarks

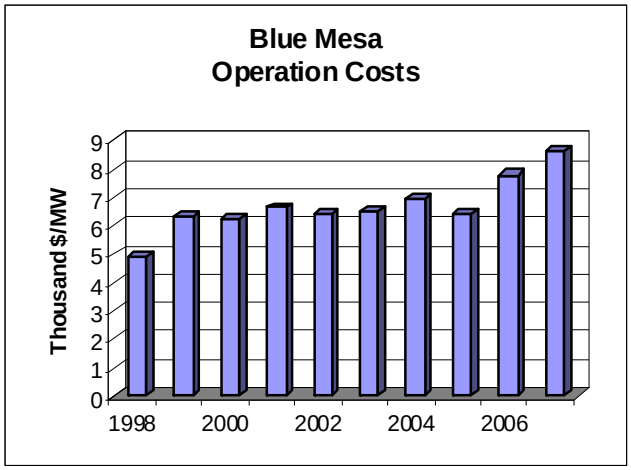
Benchmark 1
Wholesale Firm Rate

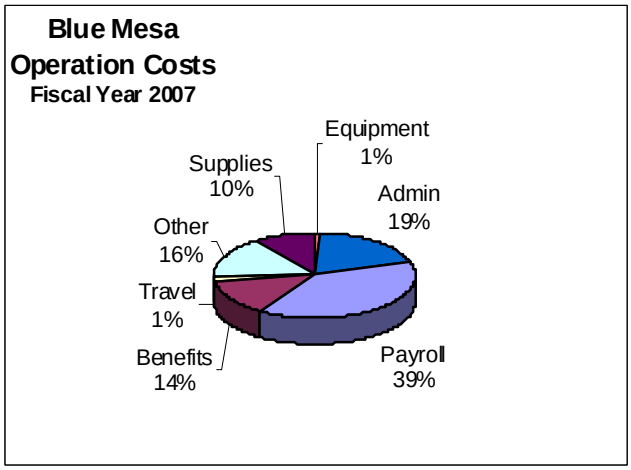


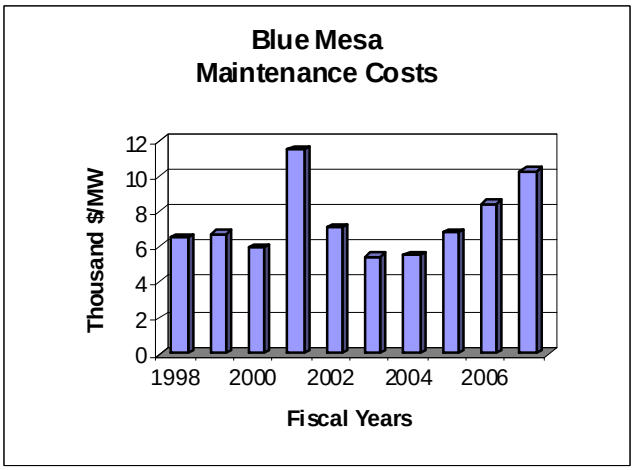
Benchmark 2
Reclamation's Production Cost as Percentage of Wholesale Firm Rate

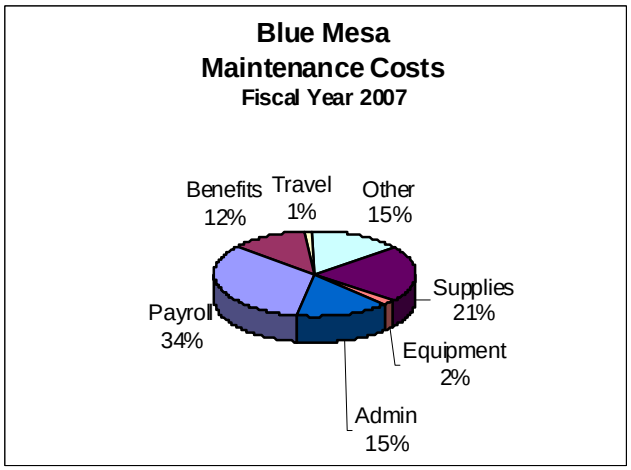


Benchmark 3
Production Cost

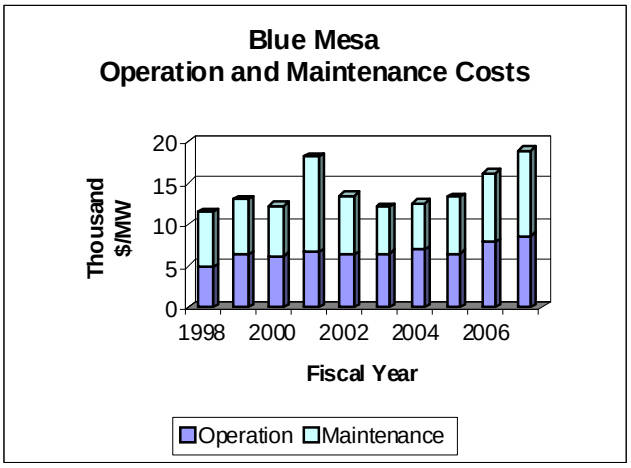


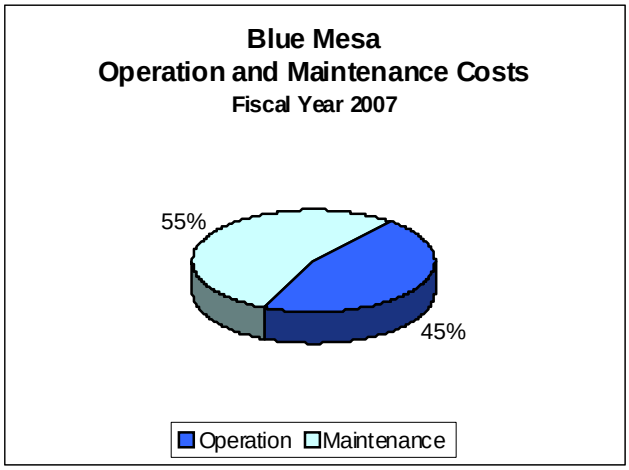


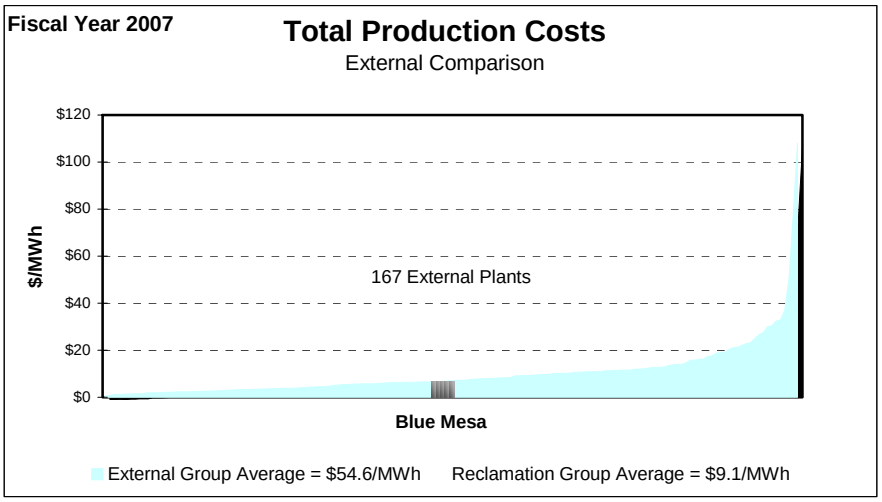


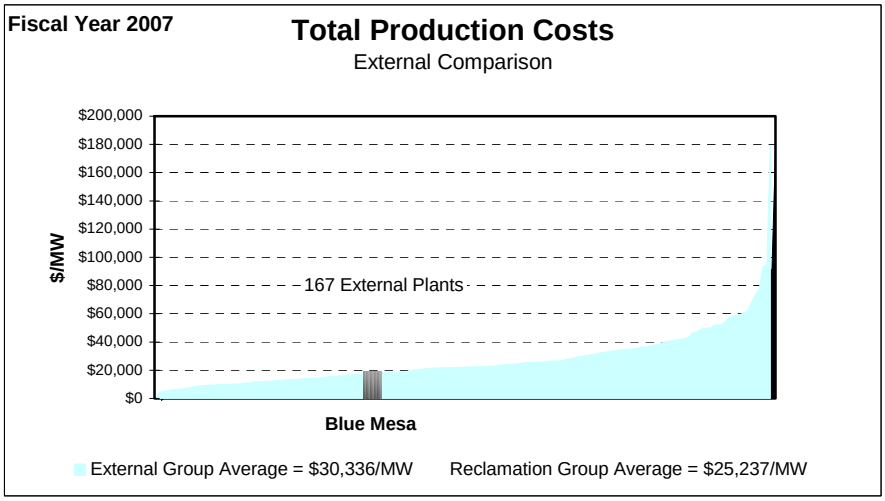


Benchmark 3
Production Cost



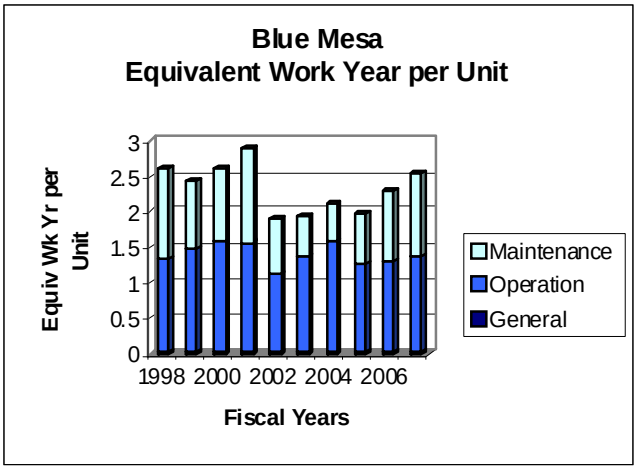


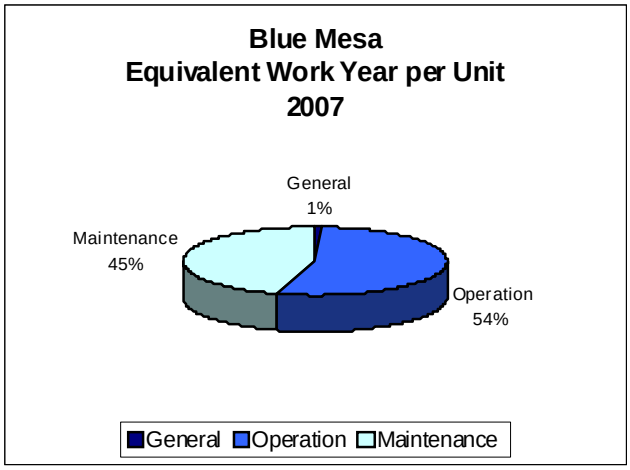


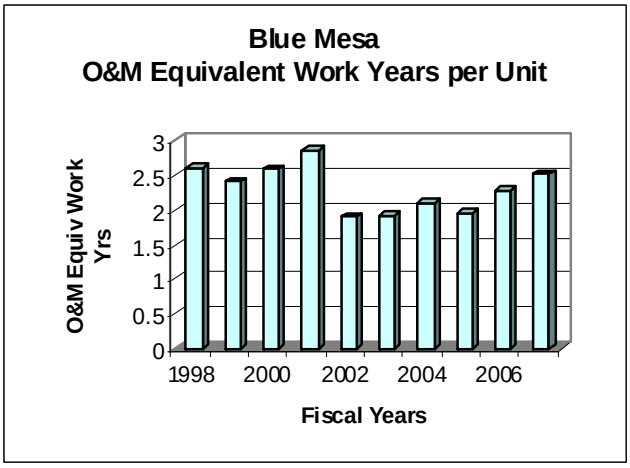


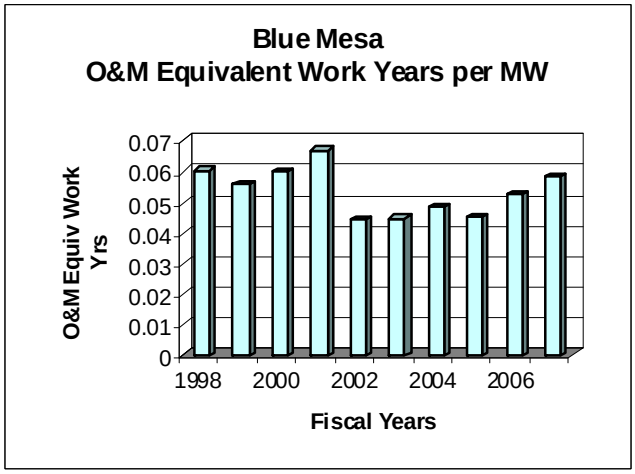
Benchmark 4
Workforce Deployment

Blue Mesa 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	0.00	0.00	0.04	0.04	0.02	0.00
Operation	2.48	0.26	0.00	2.74	1.37	0.03
Maintenance	2.08	0.22	0.00	2.31	1.15	0.03
Total Staffing	4.56	0.49	0.04	5.08	2.54	0.06

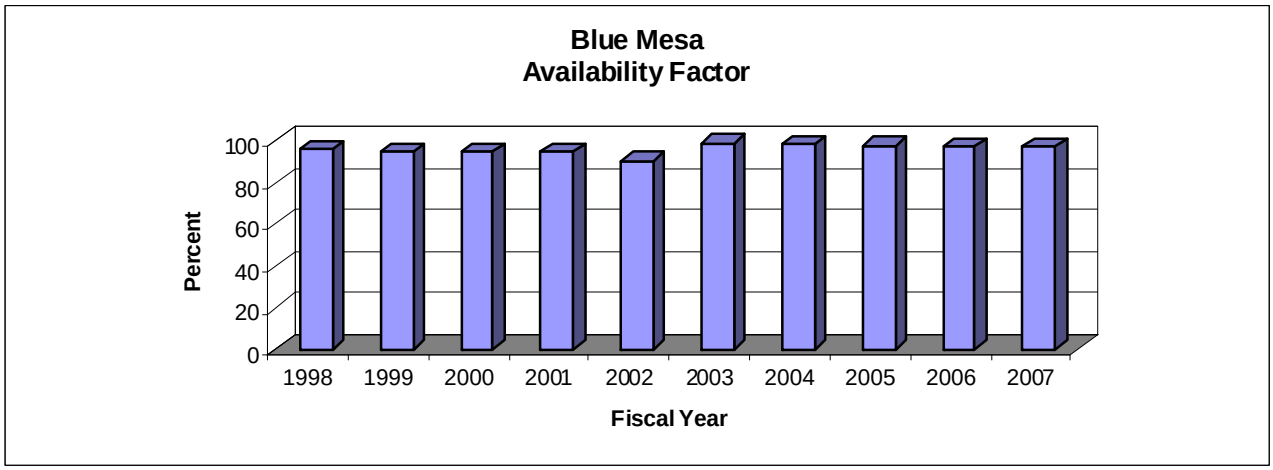




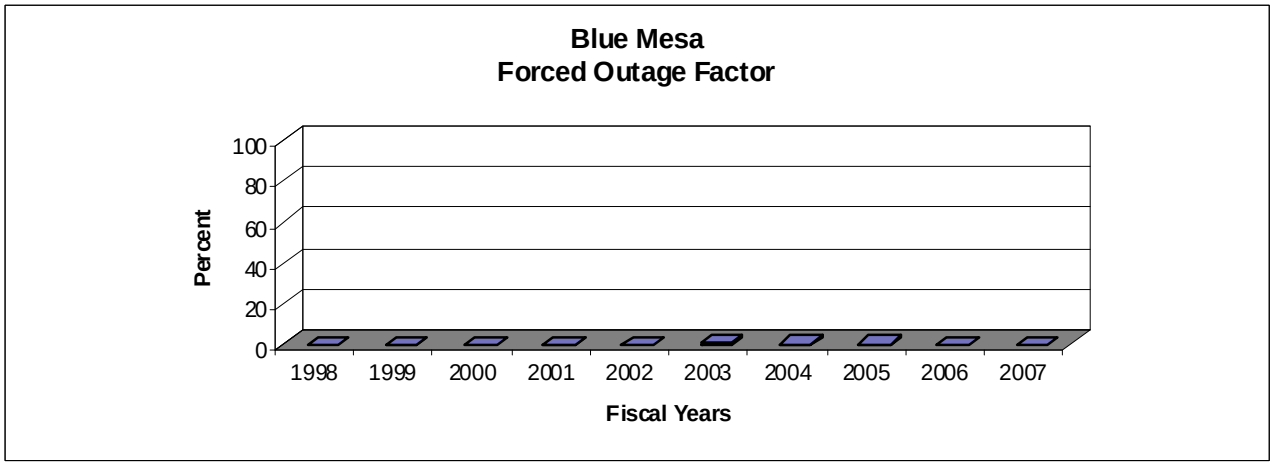




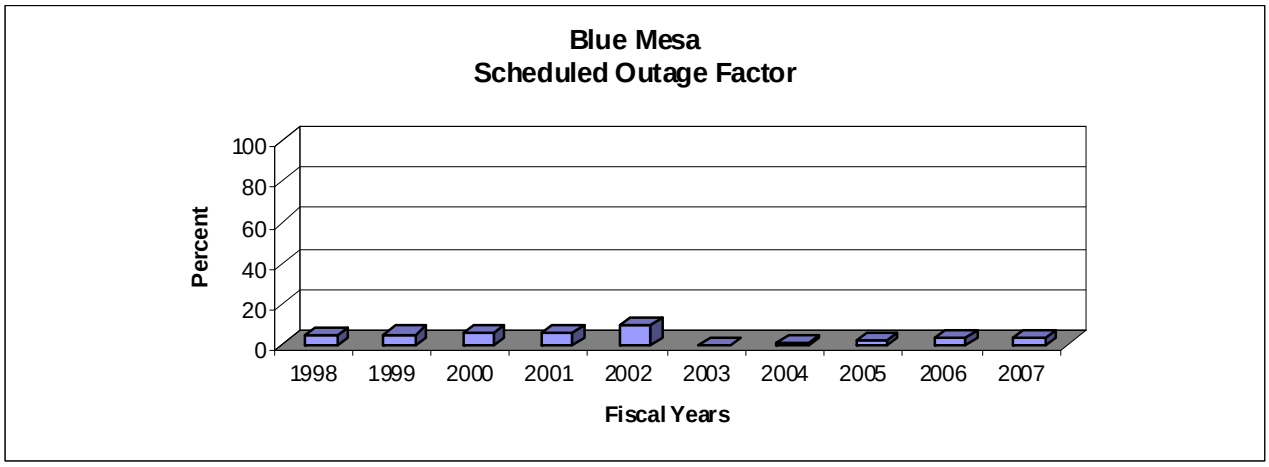
Benchmark 5
Availability Factor



Benchmark 6
Forced Outage Factor

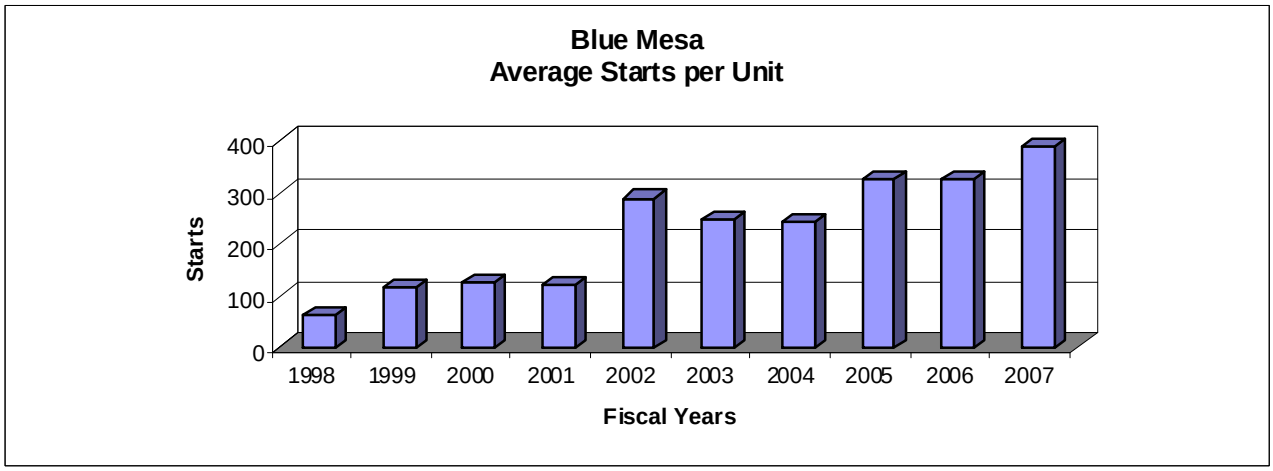


Benchmark 7
Scheduled Outage Factor



FY-97 - Extended maintenance

Starts



Benchmark Data Comparison

Fiscal Year 2007	Blue Mesa Powerplant	Reclamation Average 30-100 MW Group	Total Reclamation Average	Industry Average	Best Performers
Wholesale Firm Rate Mills/kWh	20.7	Not Applicable	*22.45	Not Available	Not Available
Production Cost as Percentage of Wholesale Firm Rate	1.69%	Not Applicable	12.1%	Not Applicable	Not Applicable
O&M Cost $/MWh	6.90	7.85	2.76	***54.63	1.00
O&M Costs $/MW	18,953	24,132	7,847	***30,336	2,897
O&M Equiv Work Year per MW	0.06	0.10	0.03	Not Available	0
Availability Factor	97.0	81.3	82.3	**88.64	98.54
Forced Outage Factor	0.0	0.2	2.6	**2.61	0.00
Scheduled Outage Factor	3.0	18.5	15.1	**8.74	0.00

Benchmark Data Comparison

Fiscal Year 2007	Blue Mesa Powerplant	Reclamation Average 30-100 MW Group	Total Reclamation Average	Industry Average	Best Performers
Wholesale Firm Rate Mills/kWh	20.7	Not Applicable	*22.45	Not Available	Not Available
Production Cost as Percentage of Wholesale Firm Rate	1.69%	Not Applicable	12.1%	Not Applicable	Not Applicable
O&M Cost $/MWh	6.90	7.85	2.76	***54.63	1.00
O&M Costs $/MW	18,953	24,132	7,847	***30,336	2,897
O&M Equiv Work Year per MW	0.06	0.10	0.03	Not Available	0
Availability Factor	97.0	81.3	82.3	**88.64	98.54
Forced Outage Factor	0.0	0.2	2.6	**2.61	0.00
Scheduled Outage Factor	3.0	18.5	15.1	**8.74	0.00

*Weighted by Net Generation
**2006 NERC Average

***Energy Information Administration Data

Crystal Powerplant
Colorado River Storage Project
Wayne N. Aspinall Storage Unit

Plant Contact:
Donald Phillips, Manager
Curecanti Field Division

Plant Address:
Crystal Powerplant
Montrose CO

Telephone Numbers:
Phone: (970) 240-6300
Fax: (970) 240-6304

E-Mail Address:
dphillips@uc.usbr.gov

Reclamation Region: Upper Colorado

NERC Region: Western Electricity Coordinating Council, Rocky Mountain Power Area

PMA Service Area: Western Area Power Administration, Colorado River Storage Project Management Center

Project Authorization: The Congress authorized construction of four storage units in the Colorado River Storage Project and 11 participating projects on April 11, 1956, under Public Law 485, 84th Congress, 70 Stat. 105. Additional projects have been added since the original legislation was adopted.

Project Purposes: The Colorado River Storage Project provides for the comprehensive development of the Upper Colorado River Basin. The project furnishes the long-time regulatory storage needed to permit States in the upper basin to meet their flow obligation at Lees Ferry, Arizona, as defined in the Colorado River Compact and still use their apportioned water.

Plant Location: The Crystal Powerplant is located on the Gunnison River in Montrose County, Colorado, 6 miles downstream of Morrow Point Powerplant and approximately 20 miles east of Montrose, Colorado.

Plant Facts: The Crystal Powerplant was completed in 1978. It has a generating capacity of 28,000 kilowatts from one unit driven by a 39,000-horsepower hydraulic turbine. It is connected to the main Colorado River Storage Project transmission system at the Curecanti substation by a 115-kilovolt line.

Plant Purpose: Generation of hydroelectric power for use in the project.

Plant History: Transformer KRA was replaced in fiscal year 1996. Outlet tube No.2 was repaired in 2001. Governor and the station service transformer were replaced in 2002 and 2003 respectively. Generator was shut down during the winter of 2002-2003 due to lack of water. Generator rewind upgrade, turbine repairs, control and protective relay upgrade, design and repair of penstock gate stem holding system, lightning arrestors on the 115 KV cable changed, and remote main breaker racking devices installed in 2003-2004. Updated domestic water system, replaced UPS system , and Battery Chargers in 2005.

Present Activities: Repaired powerplant roof, cleaned dam drains, purchase replacement for emergency generator, and rebuilt reservoir boat dock in 2006.

Future Planned Activities: None

Special Issues: This plant is used for control of the water flow in the Gunnison River. At least 1 MW is used to control flow variations caused by reservoir level changes.

River:	Gunnison River	**Plant Type:**	Conventional
Powerhouse Type:	Above Ground	**Turbine Type:**	Francis
Original Nameplate Capacity:	28,000 kW	**Installed Capacity:**	31,500 kW
Year of Initial Operation:	1978	**Age:**	29 years
Net Generation (FY-2007):	168.2 GWh	**Rated Head:**	207 feet
Average Plant Factor (FY-2007):	61.5 percent	**Remotely Operated:**	Yes
Production Mode:	Base Load		

Ancillary Services

Crystal
Ancillary Services

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

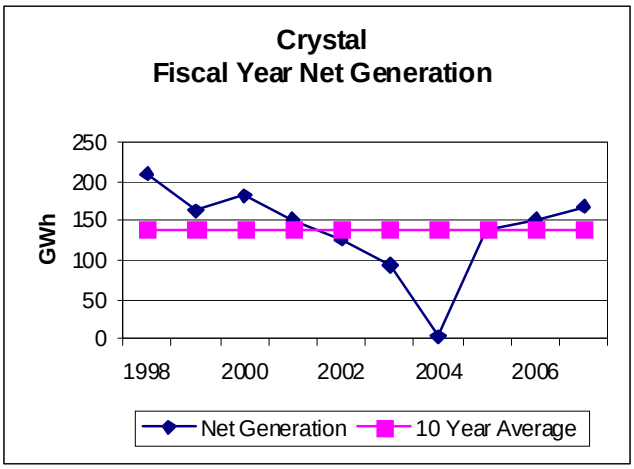
Generators

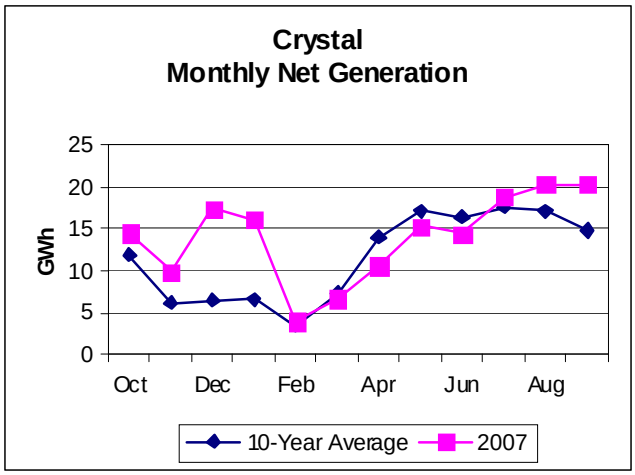
Crystal Generators

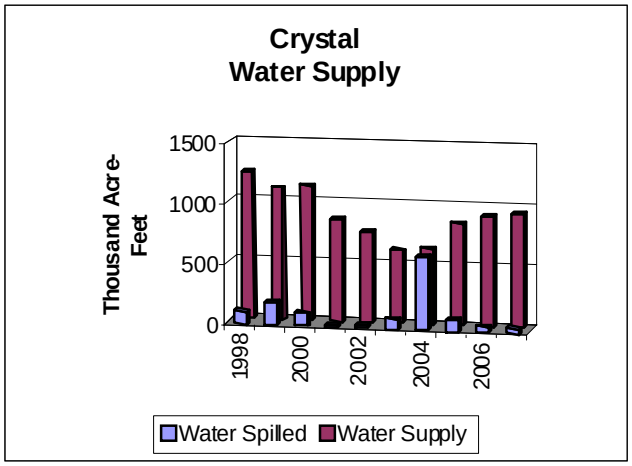
Existing Number and Capacity

Unit #	Original Capacity (kW)	Capacity Increased (kW)	Present Capacity (kW)
1	28,000	3,500	31,500
1 Unit	28,000	3,500	31,500

Generation

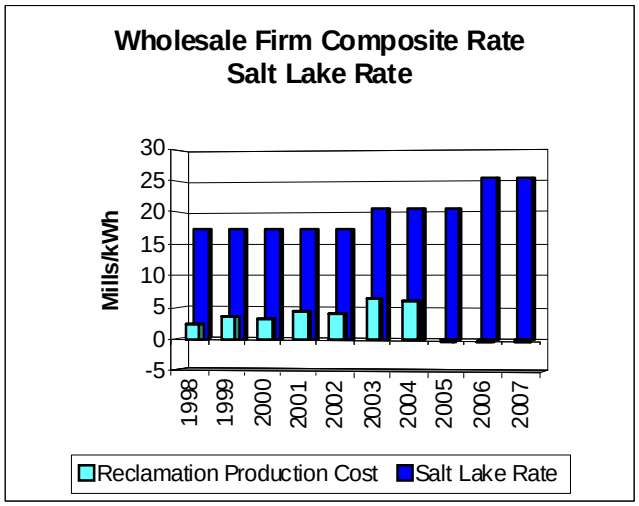

Crystal
Fiscal Year Net Generation
GWh
250
200
150
100
50
0
1998
2000
2002
2004
2006
Net Generation
10 Year Average


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

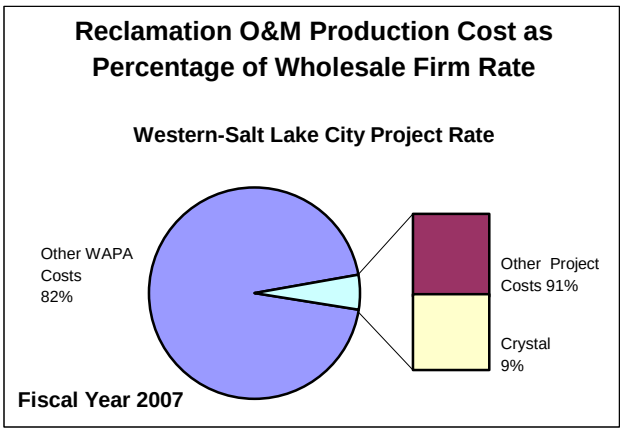

Crystal
Water Supply
Thousand Acre-Feet
1500
1000
500
0
1998
2000
2002
2004
2006
Water Spilled
Water Supply

Prime Laboratory Benchmarks

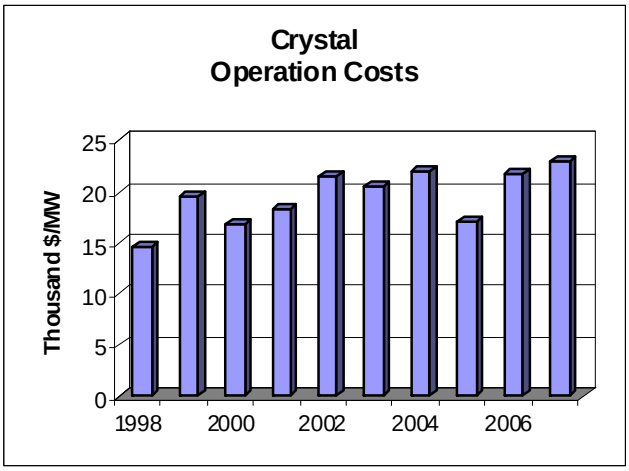
Benchmark 1
Wholesale Firm Rate

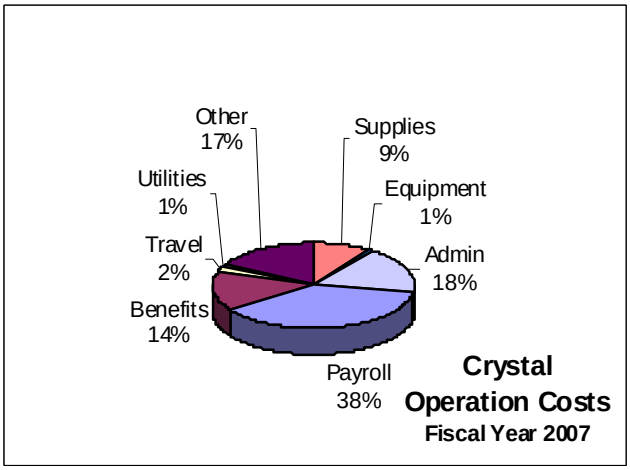


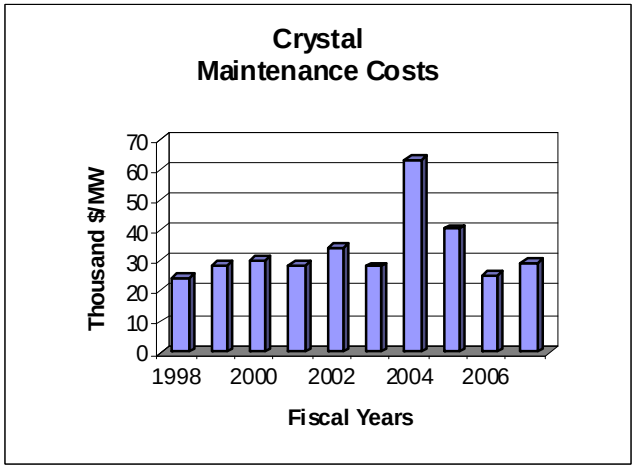
Benchmark 2
Reclamation's Production Cost as Percentage of Wholesale Firm Rate

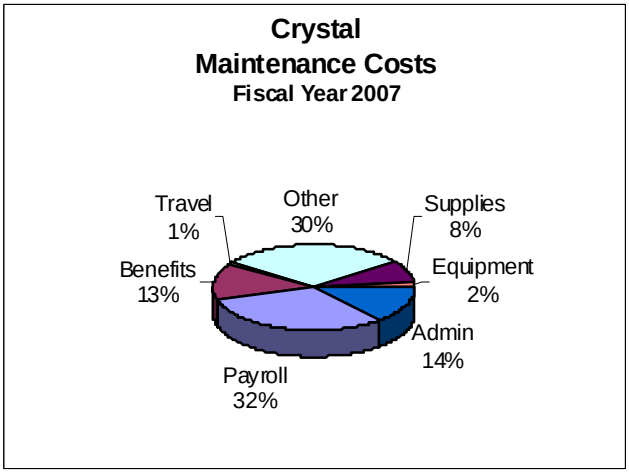


Benchmark 3
Production Cost

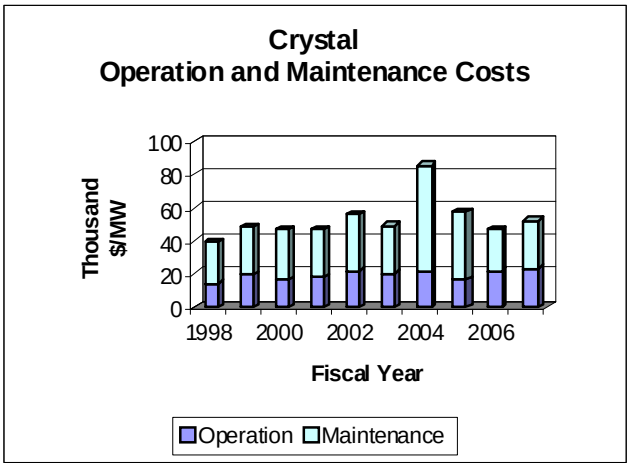


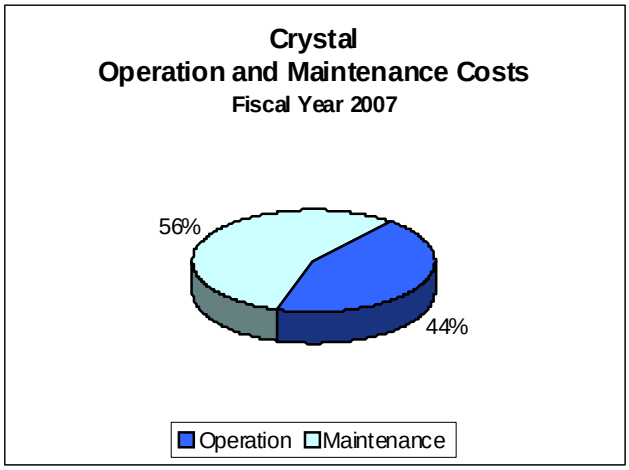


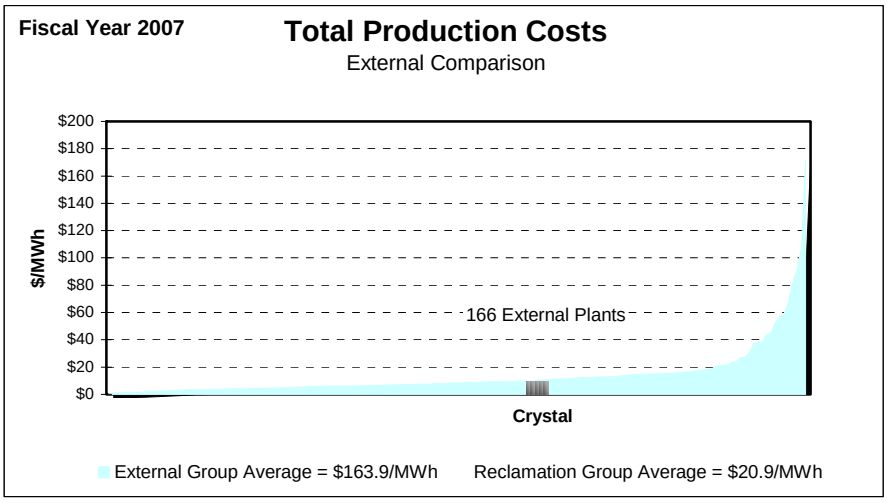


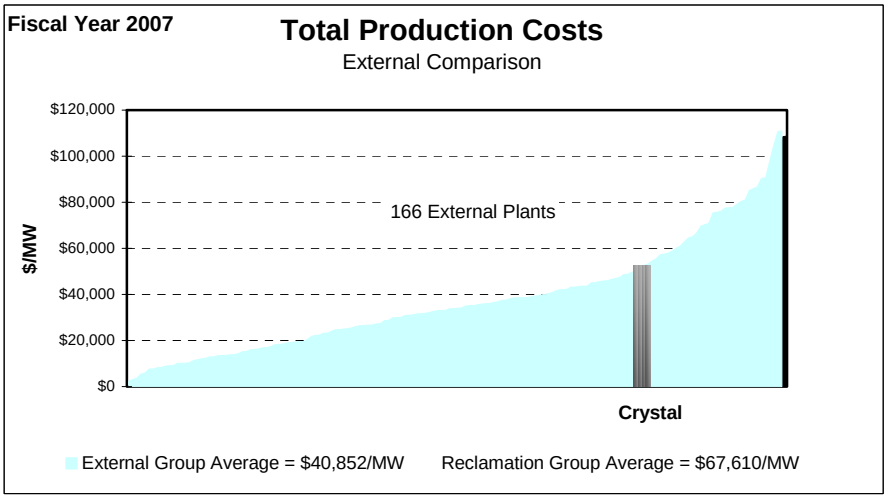


Benchmark 3
Production Cost



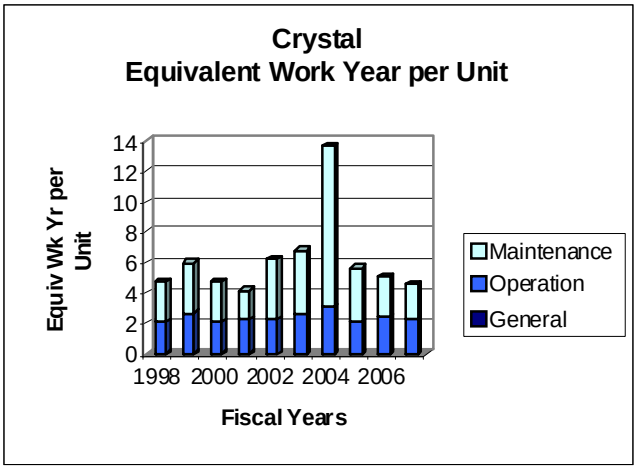


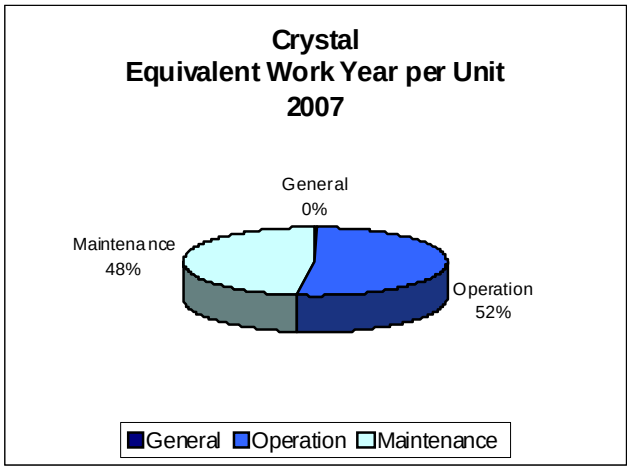


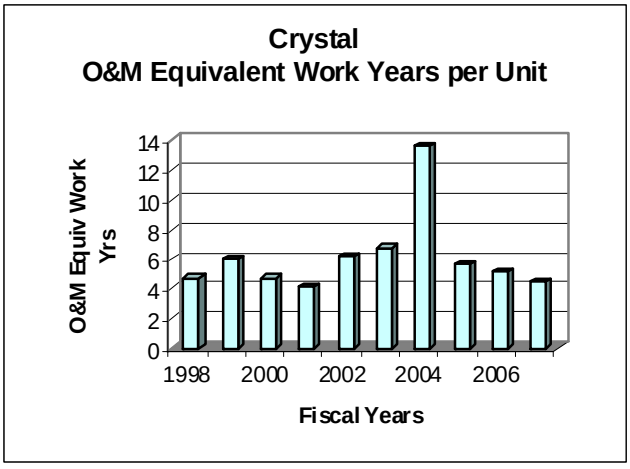


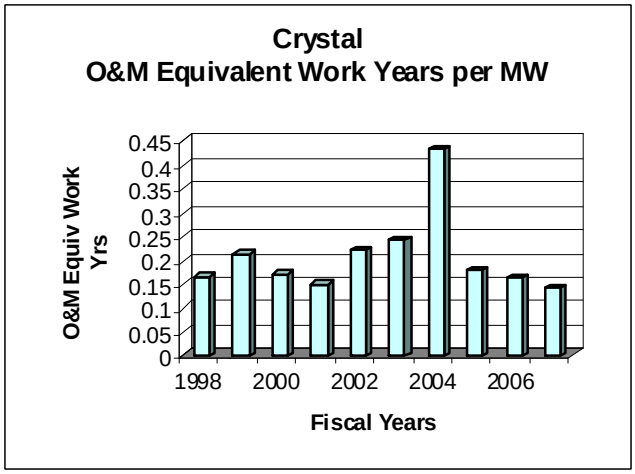
Benchmark 4
Workforce Deployment

Crystal 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	0.00	0.00	0.02	0.02	0.02	0.00
Operation	2.11	0.23	0.00	2.34	2.34	0.07
Maintenance	1.95	0.21	0.00	2.16	2.16	0.07
Total Staffing	4.06	0.43	0.02	4.51	4.51	0.14

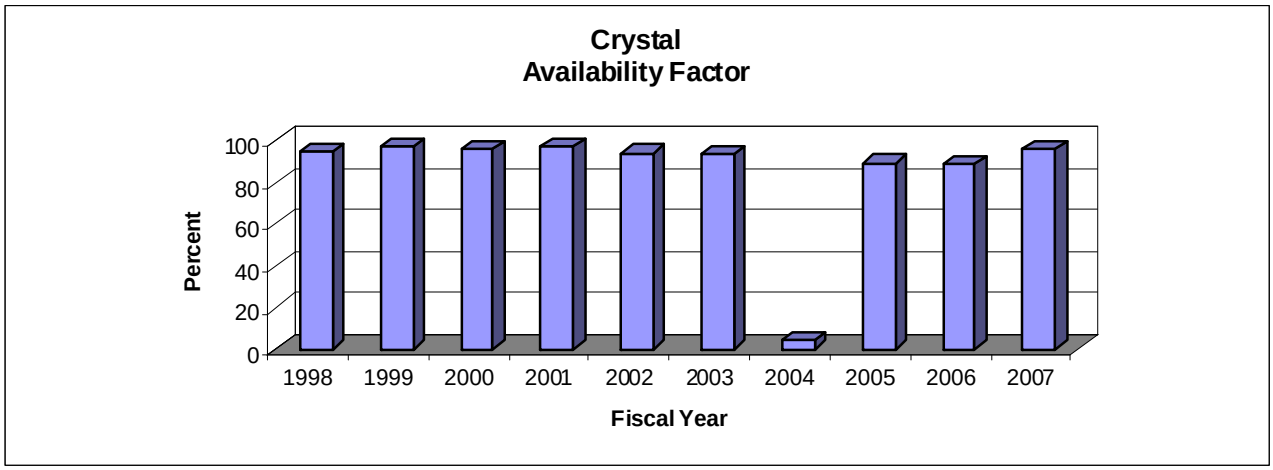




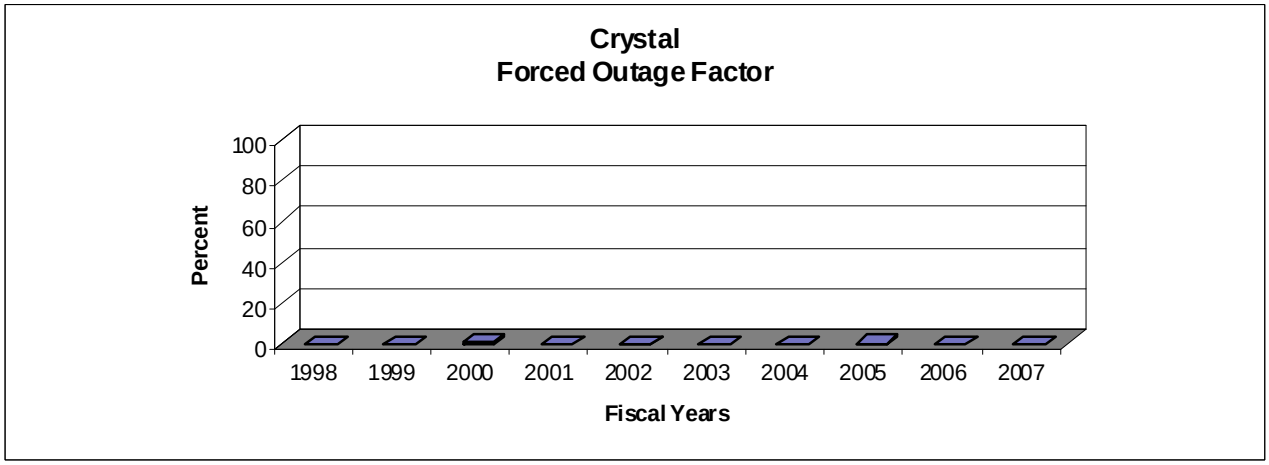




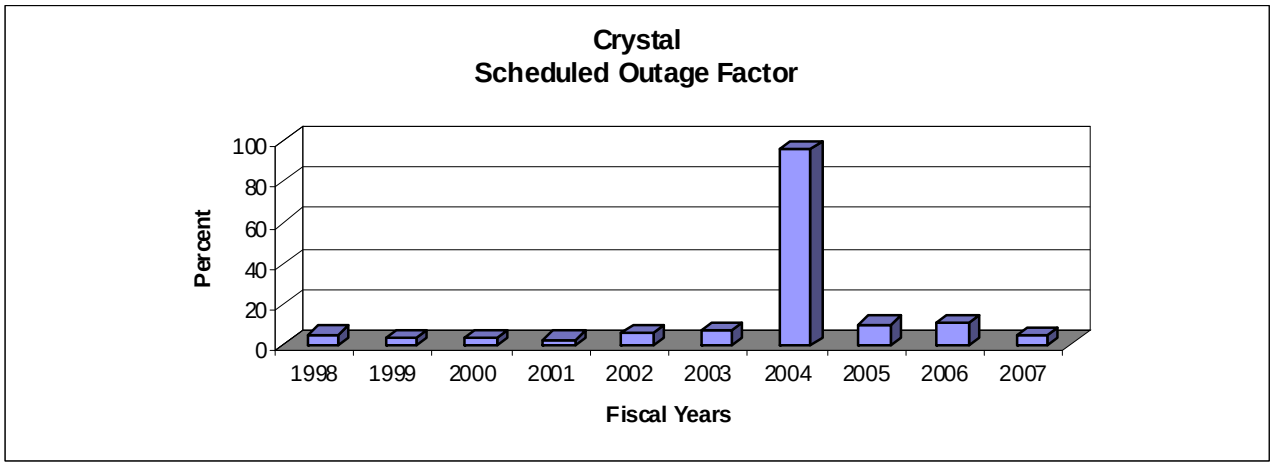
Benchmark 5
Availability Factor



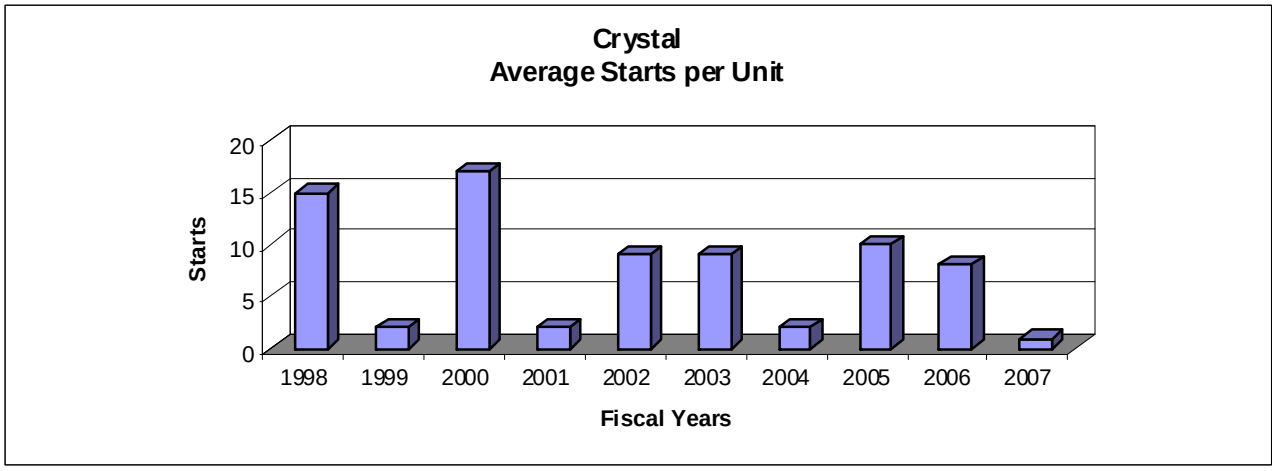
Benchmark 6
Forced Outage Factor



Benchmark 7
Scheduled Outage Factor



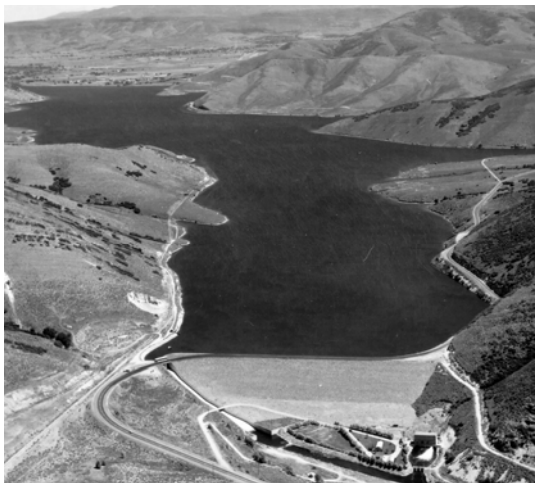
Starts



Benchmark Data Comparison					
Fiscal Year 2007	**Crystal Powerplant**	**Reclamation Average 10-30 MW Group**	**Total Reclamation Average**	**Industry Average**	**Best Performers**
Wholesale Firm Rate Mills/kWh	20.7	Not Applicable	*22.45	Not Available	Not Available
Production Cost as Percentage of Wholesale Firm Rate	1.70%	Not Applicable	12.1%	Not Applicable	Not Applicable
O&M Cost $/MWh	9.83	16.40	2.76	***163.95	1.00
O&M Costs $/MW	52,516.16	62,731.30	7,846.62	***40,852	2,897.28
O&M Equiv Work Year per MW	0.14	0.22	0.03	Not Available	0.00
Availability Factor	95.8	88.5	82.3	**88.64	98.54
Forced Outage Factor	0.00	0.1	2.6	**2.61	0.00
Scheduled Outage Factor	4.2	11.4	15.1	**8.74	0.00

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

Deer Creek Powerplant
Provo River Project



Plant Contact:
Max Spiker
Deputy Area Manager
Upper Colorado Regional Office

Plant Address:
Deer Creek Powerplant
Heber UT

Telephone Numbers:
Phone: (801) 524-3745
Fax: (801) 524-3828

E-Mail Address:
mspiker@uc.usbr.gov

Reclamation Region: Upper Colorado

NERC Region: Western Electricity Coordinating Council, Rocky Mountain Power Area

PMA Service Area: Western Area Power Administration, Colorado River Storage Project Management Center

Project Authorization: Construction of the project was initiated under the provisions of the National Industrial Recovery Act of June 16, 1933. The President approved the Provo River Project on November 16, 1935, under the terms of subsection B of section 4 of the Act of December 5, 1942 (43 Stat. 701). The President approved the Salt Lake Aqueduct on October 24, 1938. The Secretary of the Interior authorized the Deer Creek Powerplant on August 20, 1951, under the Reclamation Project Act of 1939.

Project Purposes: The Provo River Project provides a supplemental water supply for irrigation of 48,156 acres of highly developed farmlands in Utah, Salt Lake, and Wasatch Counties. The key structure of the project, Deer Creek Dam, is located on the Provo River east of the project lands.

Plant Location: The Deer Creek Powerplant is located on the Provo River in Wasatch County, Utah, about 16 miles northeast of Provo, Utah.

Plant Facts: The Deer Creek Powerplant was constructed on the substructure provided during the construction of Deer Creek Dam. Deer Creek is a zoned earthfill dam 235 feet high and 35 feet wide at the crest. The crest is 1,304 feet long. The powerplant has two 2,475-kilowatt generators and was placed in operation in 1958.

Plant Purpose: The powerplant provides replacement energy for energy lost at other non-government plants through the storage and diversion of water for irrigation during the winter storage season. The powerplant provides revenues during the summer irrigation season for operation, maintenance, and replacement costs and for irrigation project repayment purposes. Power not used for replacement purposes, is marketed to two preference power entities.

Plant History: The project is essentially an irrigation project with production of power limited to the capacity of the plant during the irrigation season. Maintenance is normally performed during the winter season when water flows are low. Since 1958, the powerplant has been operated and maintained by a contract with the Provo River Water Users Association.

Present Activities: Two new digital governors were purchased from the General Electric Company and one installed on Generating Unit No. 1 by the company under contract administered by the water district.

Future Planned Activities: Installation of the second digital governor on Generating Unit No. 2 and re-programming and alignment of both governors is planned to be accomplished with help from the Denver Technical Service Group in the early spring of 2007.

Special Issues: Operation and maintenance of the powerplant is accomplished by contract with the Local Water Users. Cost for operations and maintenance includes all government and contract costs. As the plant is operated 24 hours a day, operation costs, though shared with the other water entities operating the dam, generally exceed the maintenance costs.

River:	Provo River	**Plant Type:**	Conventional
Powerhouse Type:	Above Ground	**Turbine Type:**	Francis
Original Nameplate Capacity:	4,950 kW	**Installed Capacity:**	4,950 kW
Year of Initial Operation:	1958	**Age:**	50 years
Net Generation (FY-2007):	23.7 GWh	**Rated Head:**	120 feet
Annual Plant Factor (FY-2007):	55.2 percent	**Remotely Operated:**	No
Production Mode:	Intermediate		

Ancillary Services

Deer Creek
Ancillary Services

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

Black Start not probable, plant not in Western Area Power Administration's Black Start Plan.

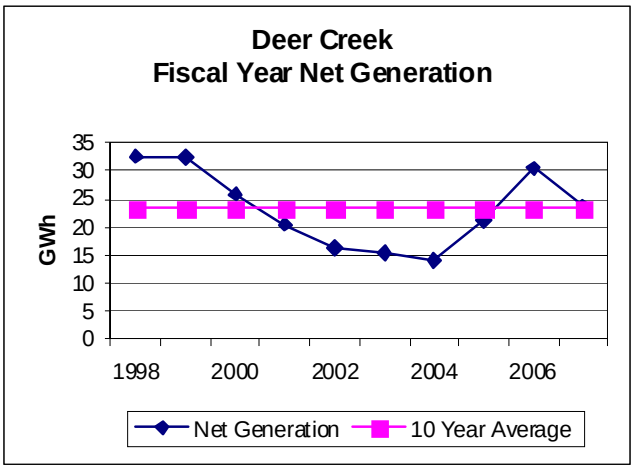
Generators

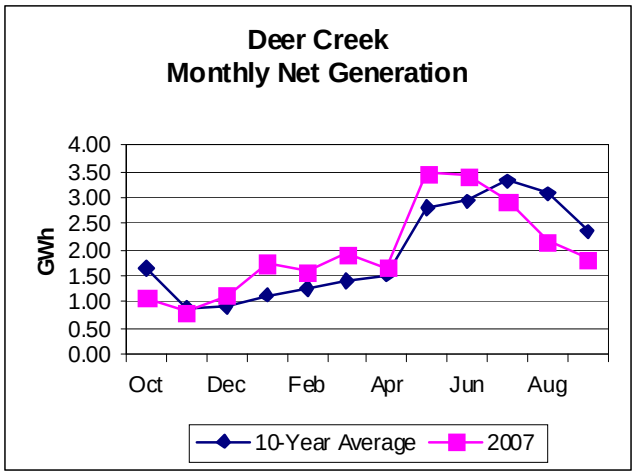
Deer Creek Generators

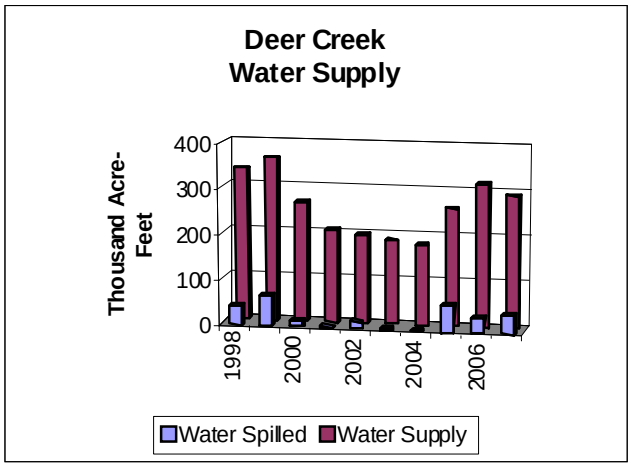
Existing Number and Capacity

Unit #	Original Capacity (kW)	Capacity Increased (kW)	Present Capacity (kW)
1	2,475	-	2,475
2	2,475	-	2,475
2 units	4,950	-	4,950

Generation


Deer Creek
Fiscal Year Net Generation
GWh
35
30
25
20
15
10
5
0
1998
2000
2002
2004
2006
Net Generation
10 Year Average


Deer Creek
Monthly Net Generation
GWh
4.00
3.50
3.00
2.50
2.00
1.50
1.00
0.50
0.00
Oct
Dec
Feb
Apr
Jun
Aug
10-Year Average
2007


Deer Creek
Water Supply
Thousand Acre-Feet
400
300
200
100
0
1998
2000
2002
2004
2006
Water Spilled
Water Supply

Prime Laboratory Benchmarks

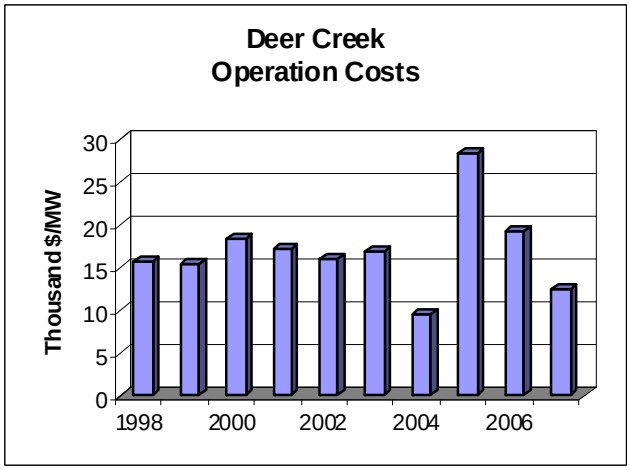
Benchmark 1
Wholesale Firm Rate

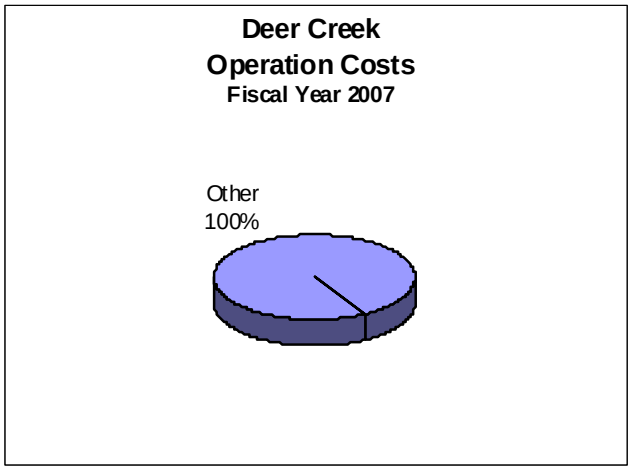
There is no fixed rate. Customers of electricity from this plant have contracts to pay annual costs regardless of energy production.

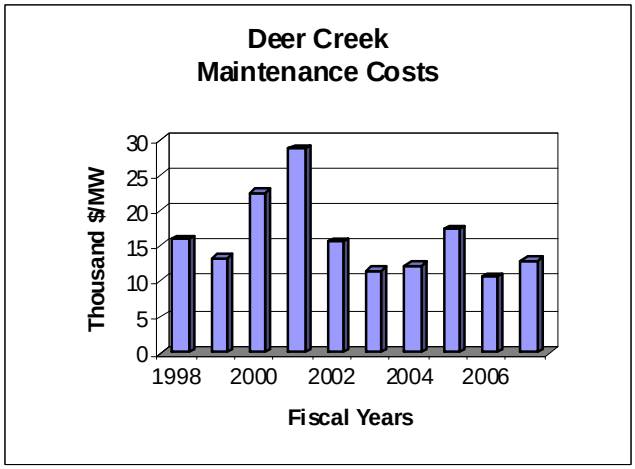
Benchmark 2
Reclamation's Production Cost as Percentage of Wholesale Firm Rate

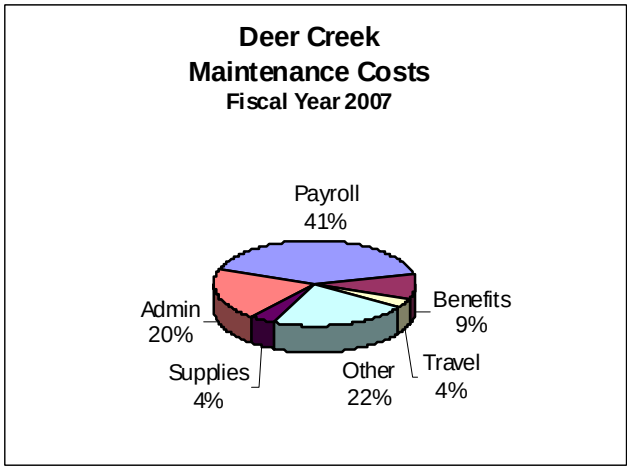
Not Applicable.

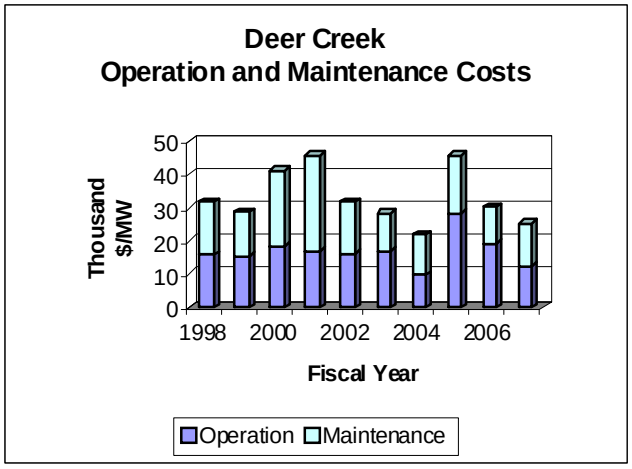
Benchmark 3
Production Cost

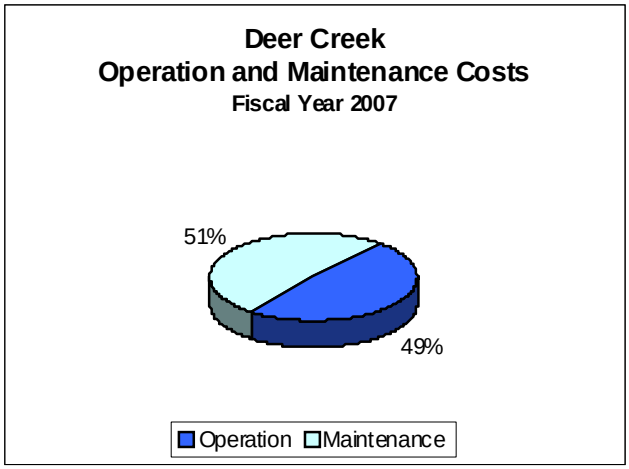






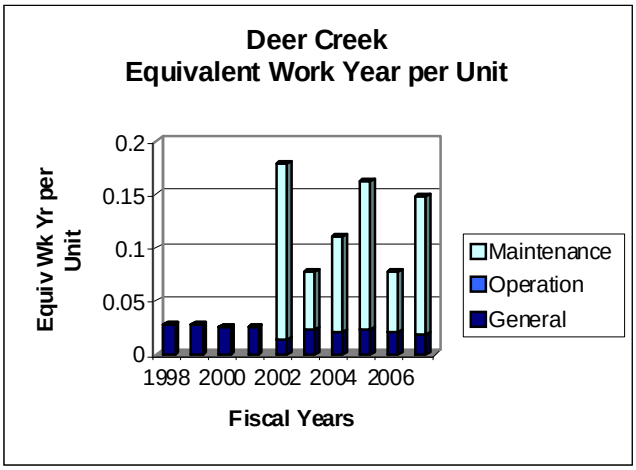


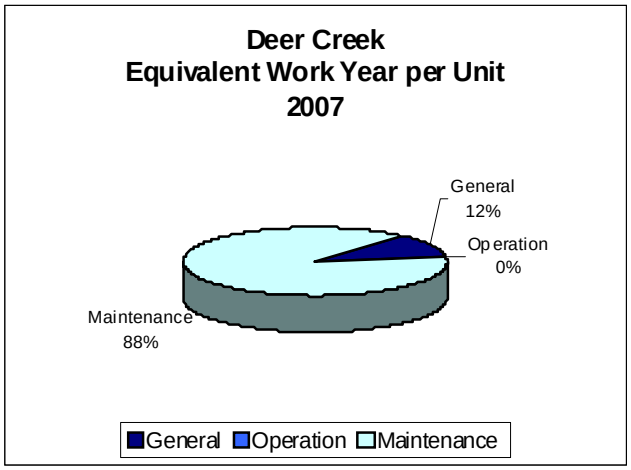


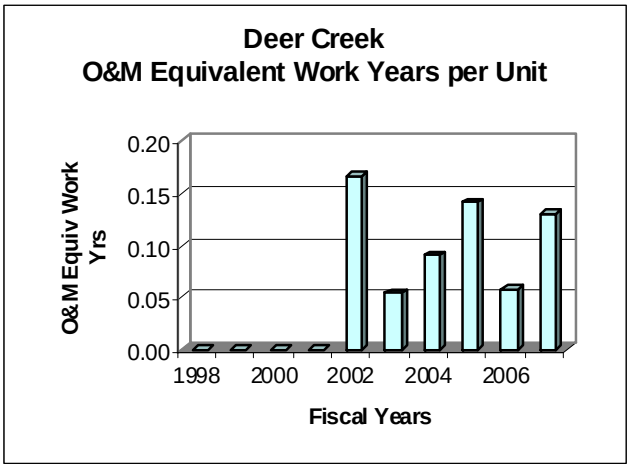


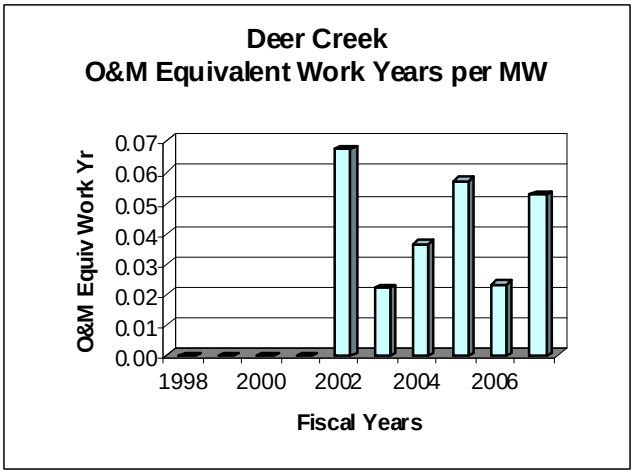
Benchmark 4
Workforce Deployment

Deer Creek 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	0.00	0.00	0.04	0.04	0.02	0.01
Operation	0.00	0.00	0.00	0.00	0.00	0.00
Maintenance	0.23	0.03	0.00	0.26	0.13	0.05
Total Staffing	0.23	0.03	0.04	0.30	0.15	0.06

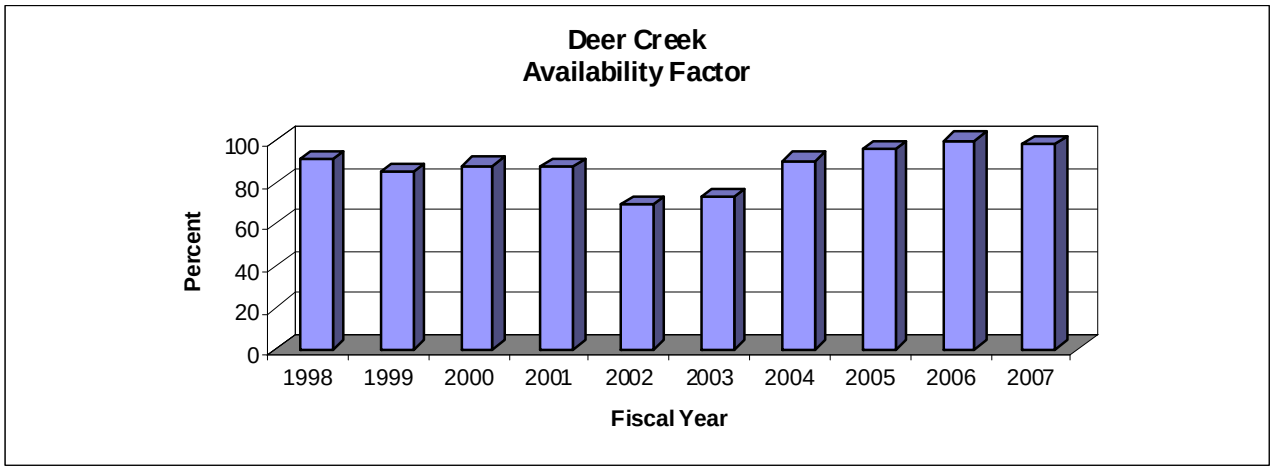




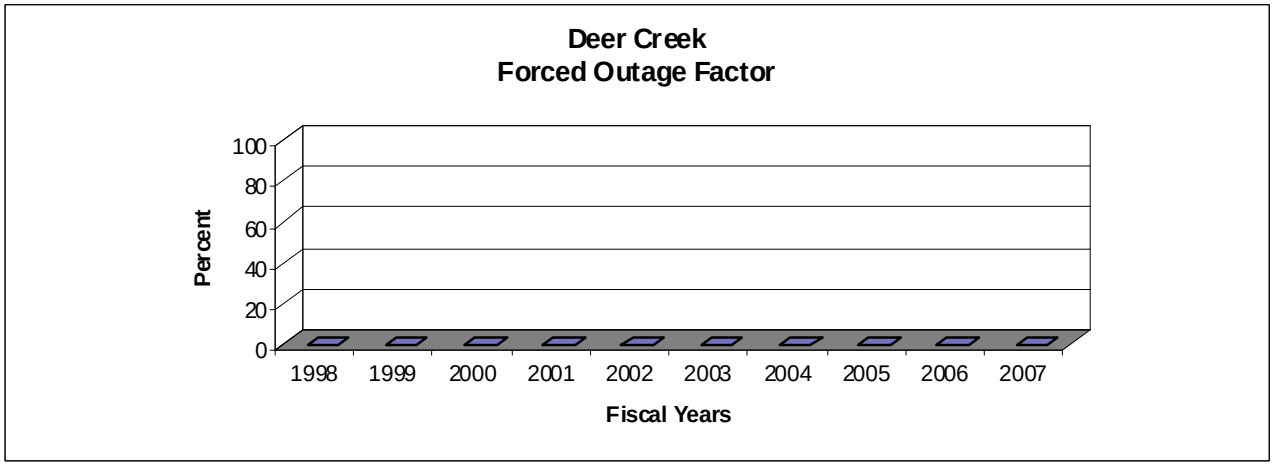




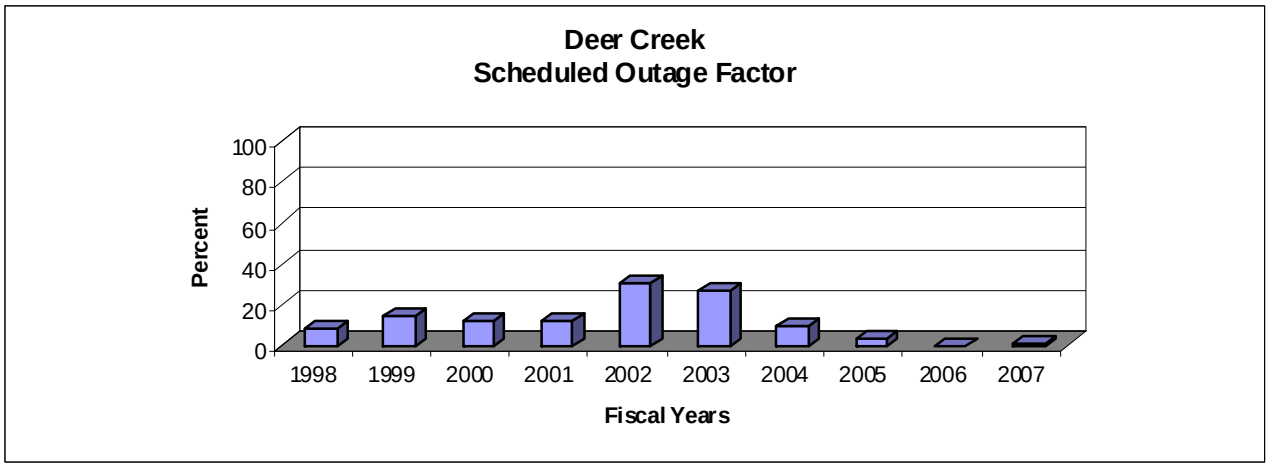
Benchmark 5
Availability Factor



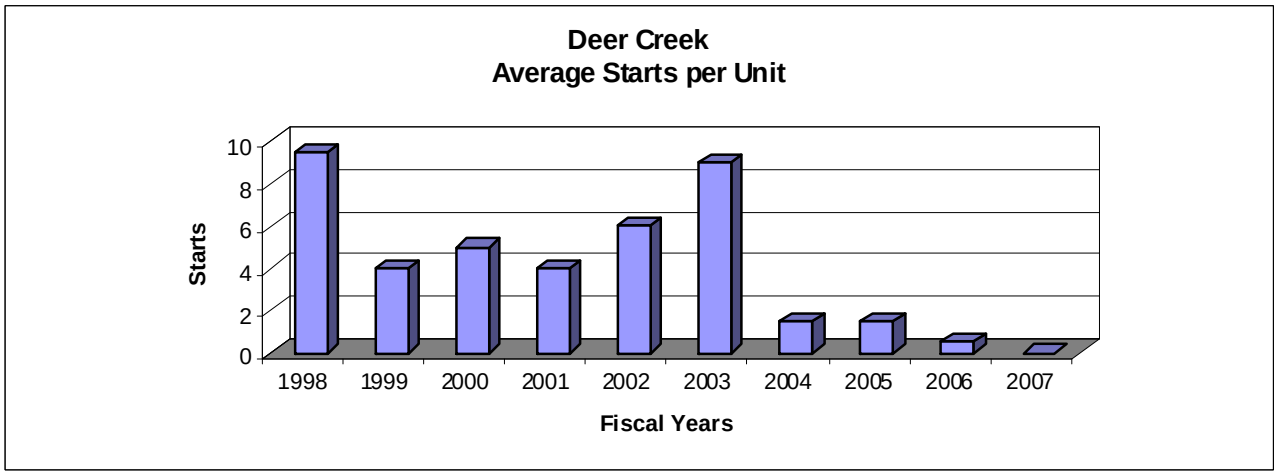
Benchmark 6
Forced Outage Factor



Benchmark 7
Scheduled Outage Factor



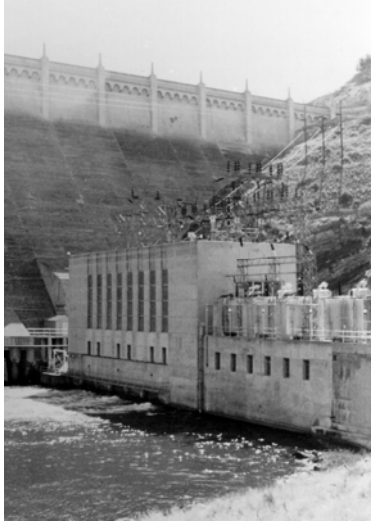
Starts



Benchmark Data Comparison				
Fiscal Year 2007	**Deer Creek Powerplant**	**Total Reclamation Average**	**Industry Average**	**Best Performers**
Wholesale Firm Rate Mills/kWh	Not Applicable	*22.45	Not Available	Not Available
Production Cost as Percentage of Wholesale Firm Rate	Not Applicable	12.1%	Not Applicable	Not Applicable
O&M Cost $/MWh	5.29	2.76	Not Applicable	1.00
O&M Costs $/MW	25,360	7,847	Not Applicable	2,897
O&M Equiv Work Year per MW	0.05	0.03	Not Available	0.00
Availability Factor	***100.0	82.3	**88.3	98.54
Forced Outage Factor	***0.00	2.6	**1.8	0.00
Scheduled Outage Factor	***0.00	15.1	**9.9	0.00

*Weighted by Net Generation
**2006 NERC Average
***Insufficient data for calculation

Elephant Butte Powerplant
Rio Grande Project



Plant Contact:
James Powell
Manager, Elephant Butte Field Division

Plant Address:
Elephant Butte Powerplant
HC32, Box 312
Truth or Consequences NM 87901-9802

Telephone Numbers:
Phone: (505) 894-6661
Fax: (505) 864-3651

E-Mail Address:
jpowell@uc.usbr.gov

Reclamation Region: Upper Colorado

NERC Region: Western Electricity Coordinating Council, Rocky Mountain Power Area

PMA Service Area: Western Area Power Administration, Colorado River Storage Project Management Center

Project Authorization: The Secretary of the Interior authorized the Rio Grande Project on December 2, 1905, under the provision of the Reclamation Act, and funds were allocated to initiate construction of the first diversion unit. The Reclamation Act was extended to the entire State of Texas on June 12, 1906, following a partial extension for Engle (Elephant Butte) Dam in 1905.

Congress authorized the construction of Elephant Butte Dam on February 25, 1905, and on May 4, 1907, $1 million of non-reimbursable funds were appropriated as the State Department's share for allocation of 60,000 acre-feet of water annually to Mexico by treaty. Additional project works authorized under congressional action include Caballo Dam, a combined flood control and power regulating structure and the Elephant Butte power development.

Project Purposes: The Rio Grande Project furnishes a full irrigation water supply for about 178,000 acres of land and electric power for communities and industries in the area. Drainage water from project lands provides a supplemental supply for 18,000 acres in Hudspeth County, Texas. Project lands occupy the river bottom land of the Rio Grande Valley in south-central New Mexico and west Texas.

Plant Location: Elephant Butte Powerplant is located on the Rio Grande River in Sierra County, New Mexico, 4 miles east of Truth or Consequences, New Mexico, and 125 miles north of El Paso, Texas.

Plant Facts: Elephant Butte Dam can store 2,065,010 acre-feet of water to provide irrigation and year-round power generation. A court order has restricted power generations during non-irrigation months. This is a concrete gravity dam 301 feet high and 1,674 feet long, including the spillway. It contains 618,785 cubic yards of concrete. The dam was completed in 1916, but storage operation began in 1915. The power system consists of a 27,945-kilowatt hydroelectric powerplant at Elephant Butte Dam.

Plant Purpose: Generation of hydroelectric power for the project.

Plant History: A system consisting of 490 miles of 115-kilovolt transmission line and 11 substations totaling 81,750 kilovolt-amperes was developed and operated by the Rio Grande Project until 1977. It was subsequently sold to a private electric company.

Present Activities: Replacement of Unit Hard Wire Logic (HWL) system with Unit Programmable Logic Controls (PLC). Updating plant As-Built-Drawings. Start replacement of penstock gate operators.

Future Planned Activities: Replacement of unit excitation systems. Replacement of unit and station service breakers. Continue working on replacement of penstock gate operators.

Special Issues: Costs for Elephant Butte Powerplant were not available to be broken down into smaller elements.

River:	Rio Grande River	**Plant Type:**	Conventional
Powerhouse Type:	Above Ground	**Turbine Type:**	Francis
Original Nameplate Capacity:	24,300 kW	**Installed Capacity:**	27,945 kW
Year of Initial Operation:	1940	**Age:**	67 years
Net Generation (FY-2007):	56.0 GWh	**Rated Head:**	140 feet
Average Plant Factor (FY-2007):	23.2 percent (seasonal)	**Remotely Operated:**	No
Production Mode:	Base Load		

Ancillary Services

Elephant Butte
Ancillary Services

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

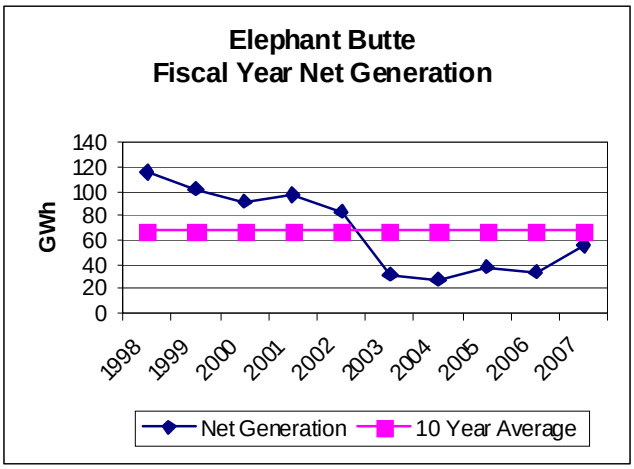
Generators

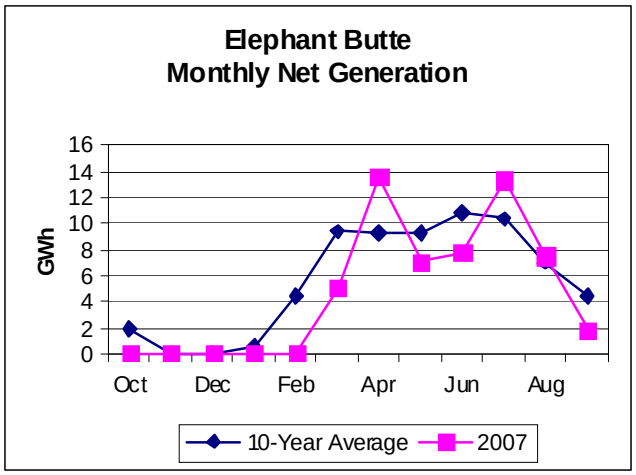
Elephant Butte Generators

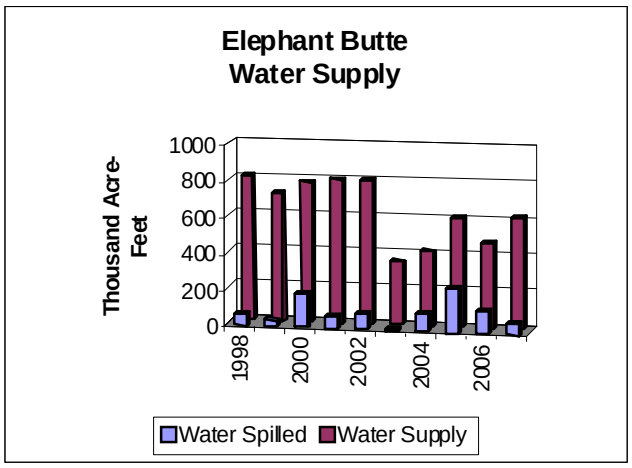
Existing Number and Capacity

Unit #	Original Capacity (kW)	Capacity Increased (kW)	Present Capacity (kW)
1	8,100	1,215	9,315
2	8,100	1,215	9,315
3	8,100	1,215	9,315
3 units	24,300	3,645	27,945

Generation

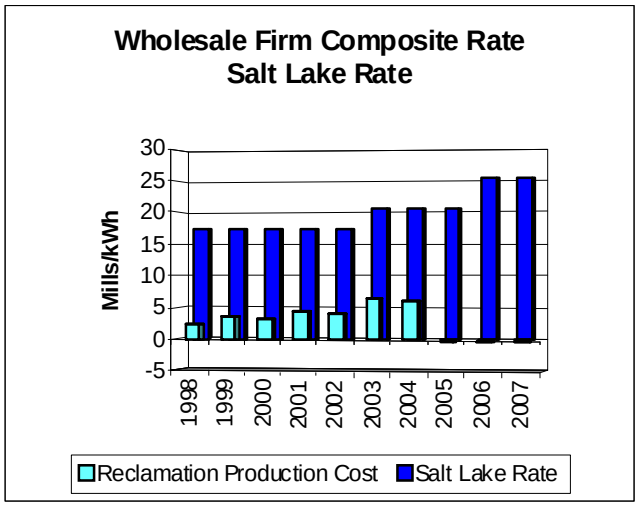

Elephant Butte
Fiscal Year Net Generation
GWh
140
120
100
80
60
40
20
0
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
Net Generation
10 Year Average


Elephant Butte
Monthly Net Generation
GWh
16
14
12
10
8
6
4
2
0
Oct
Dec
Feb
Apr
Jun
Aug
10-Year Average
2007

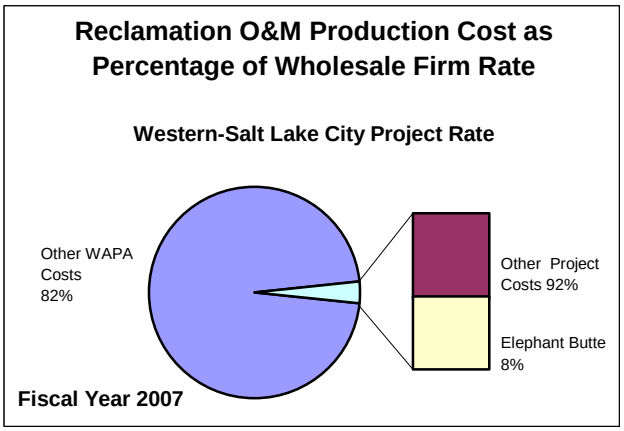

Elephant Butte
Water Supply
Thousand Acre-Feet
1000
800
600
400
200
0
1998
2000
2002
2004
2006
Water Spilled
Water Supply

Prime Laboratory Benchmarks

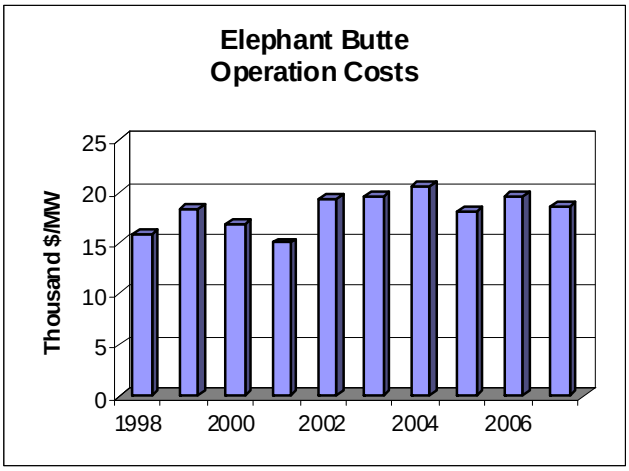
Benchmark 1
Wholesale Firm Rate

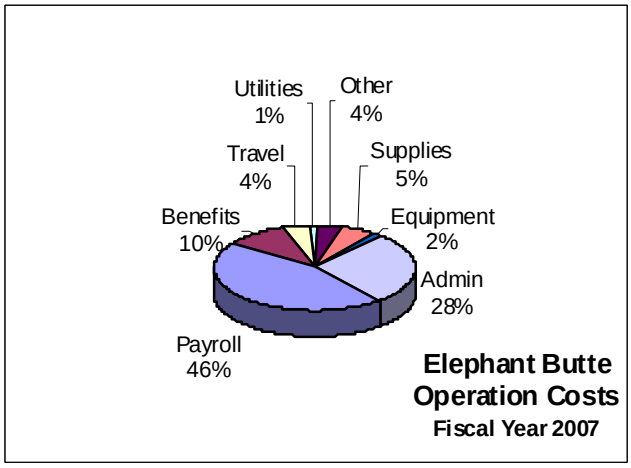


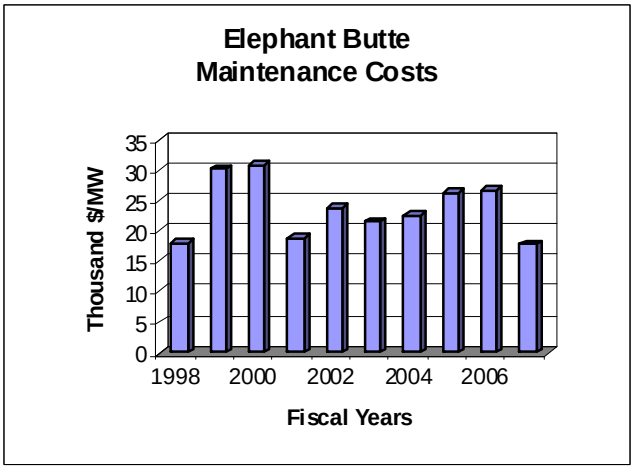
Benchmark 2
Reclamation's Production Cost as Percentage of Wholesale Firm Rate

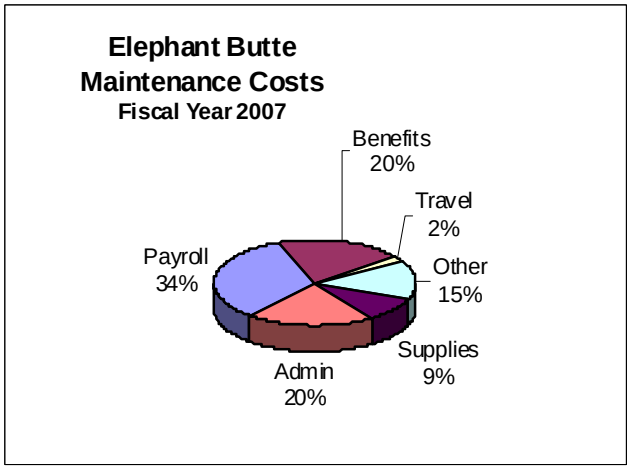


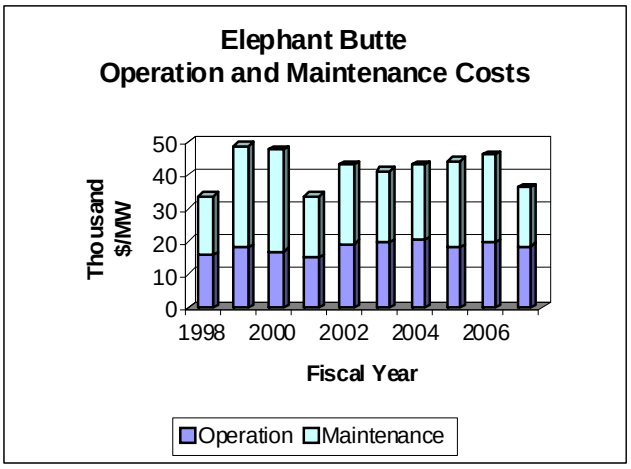
Benchmark 3
Production Cost

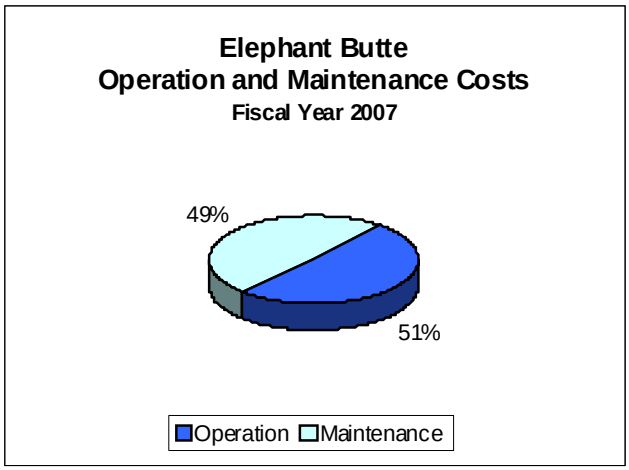






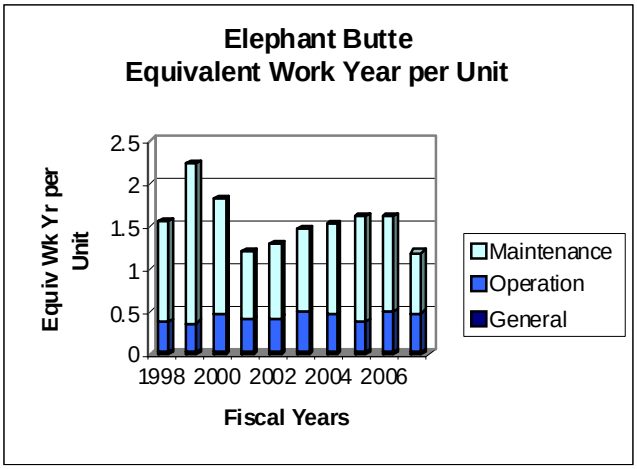


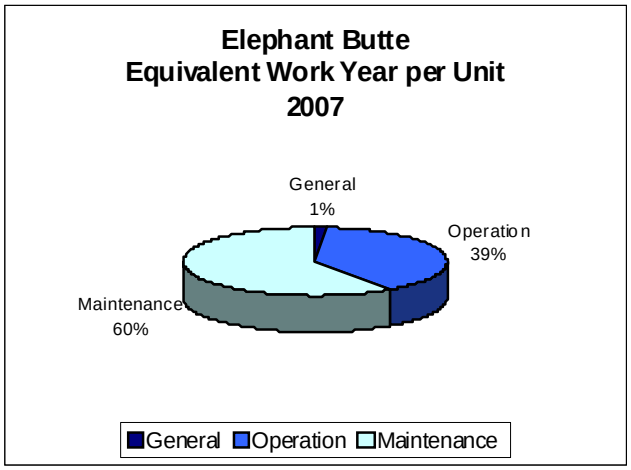


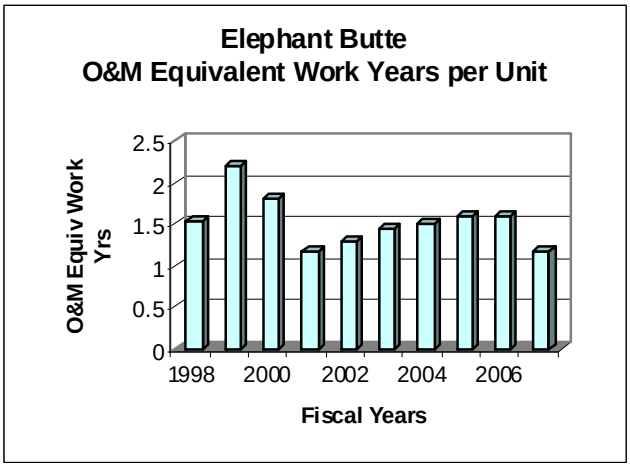


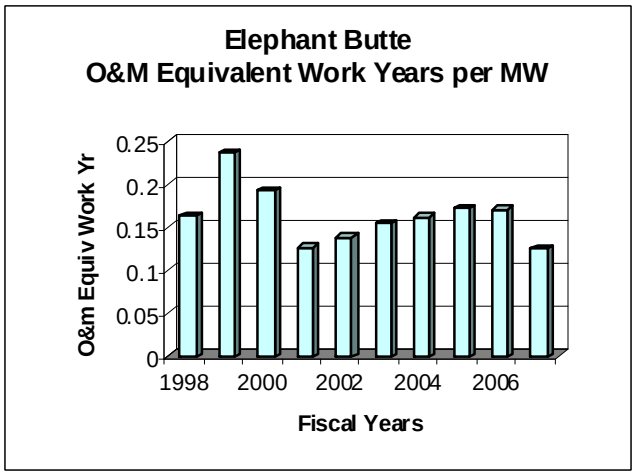
Benchmark 4
Workforce Deployment

Elephant Butte 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	0.00	0.00	0.05	0.05	0.02	0.00
Operation	1.25	0.13	0.00	1.38	0.46	0.05
Maintenance	1.93	0.21	0.00	2.14	0.71	0.08
Total Staffing	3.18	0.34	0.05	3.58	1.19	0.13

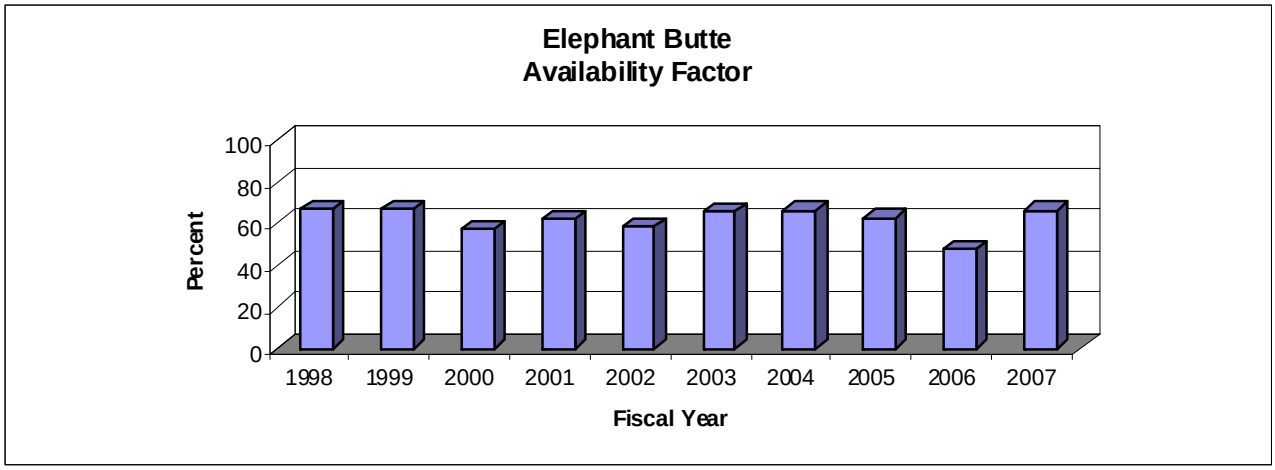




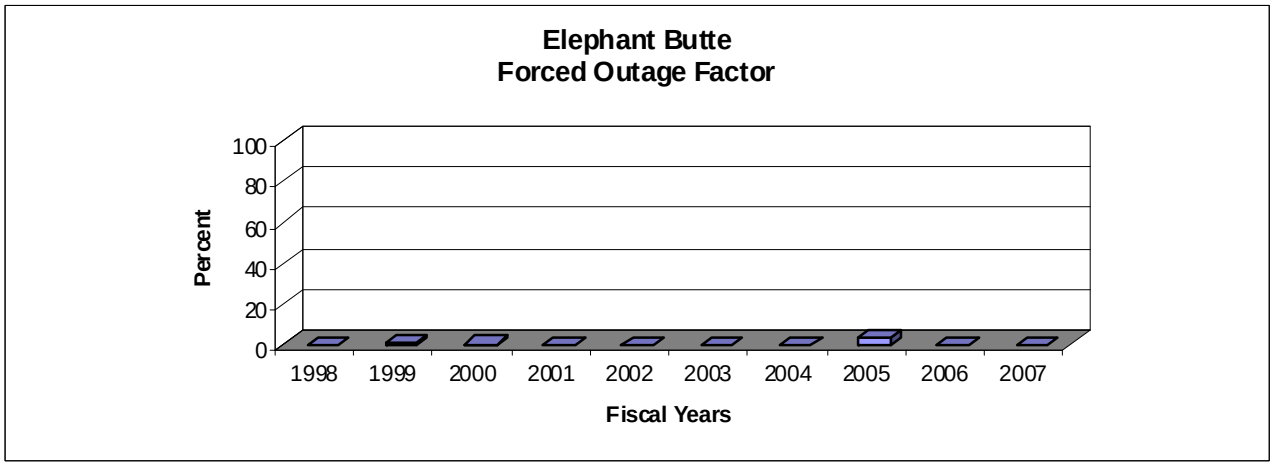




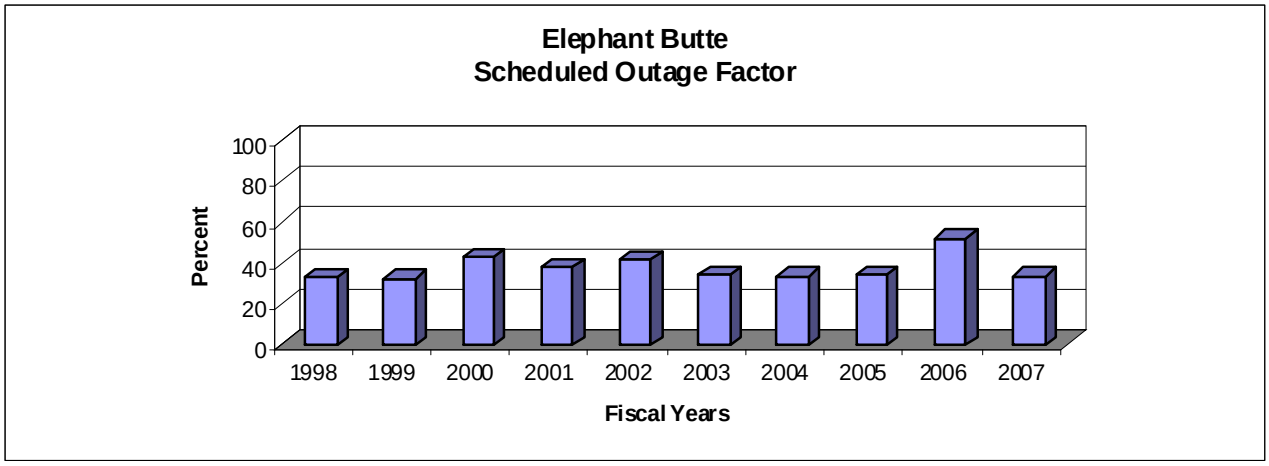
Benchmark 5
Availability Factor



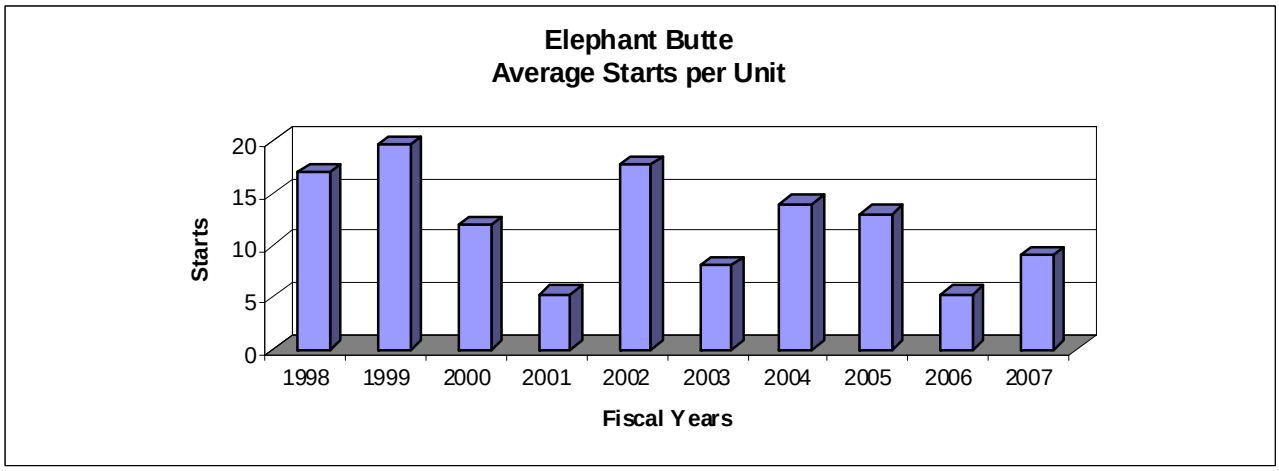
Benchmark 6
Forced Outage Factor



Benchmark 7
Scheduled Outage Factor



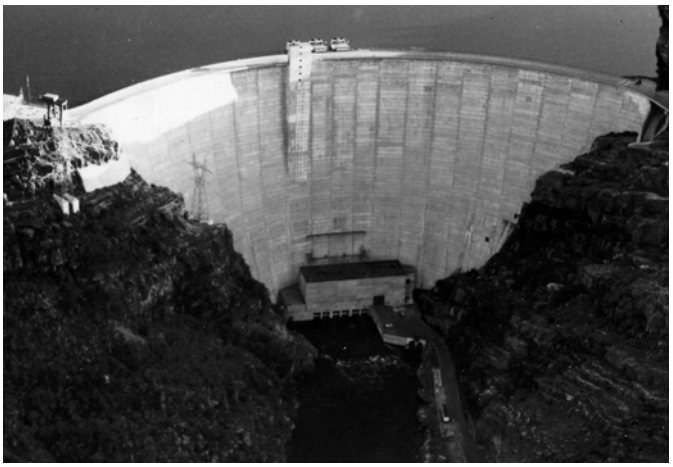
Starts



Benchmark Data Comparison				
Fiscal Year 2007	**Elephant Butte Powerplant**	**Total Reclamation Average**	**Industry Average**	**Best Performers**
Wholesale Firm Rate Mills/kWh	20.7	*22.45	Not Available	Not Available
Production Cost as Percentage of Wholesale Firm Rate	1.0%	12.1%	Not Applicable	Not Applicable
O&M Cost $/MWh	18.21	2.76	Not Applicable	1.00
O&M Costs $/MW	36,484	7,847	Not Applicable	2,897
O&M Equiv Work Year per MW	0.13	0.03	Not Available	0.00
Availability Factor	66.3	82.3	**88.64	98.54
Forced Outage Factor	0.00	2.6	**2.61	0.00
Scheduled Outage Factor	33.7	15.1	**8.74	0.00

*Weighted by Net Generation
**2006 NERC Average

Flaming Gorge Powerplant
Colorado River Storage Project
Flaming Gorge Storage Unit



Plant Contact:
C. Steven Hulet, Manager
Flaming Gorge Field Division

Plant Address:
Flaming Gorge Field Division
5995 Flaming Gorge Visitor Center
Dutch John UT 84023

Telephone Numbers:
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Fax: (435) 885-3224

E-Mail Address:
shulet@uc.usbr.gov

Reclamation Region: Upper Colorado

NERC Region: Western Electricity Coordinating Council, Rocky Mountain Power Area

PMA Service Area: Western Area Power Administration, Colorado River Storage Project Management Center

Project Authorization: The Congress authorized construction of four storage units in the Colorado River Storage Project and 11 participating projects on April 11, 1956 under Public Law 485, 84th Congress, 70 Stat. 105. Additional projects have been added since the original legislation was adopted.

Project Purposes: The Colorado River Storage Project provides for the comprehensive development of the Upper Colorado River Basin. The project furnishes the long-time regulatory storage needed to permit States in the upper basin to meet their flow obligation at Lees Ferry, Arizona, (as defined in the Colorado River Compact) and still use their apportioned water.

Plant Location: The Flaming Gorge Powerplant is located on the Green River in Daggett County, Utah, 26 miles downstream from the Utah-Wyoming border.

Plant Facts: The Flaming Gorge Powerplant has three 10-foot-diameter penstock pipes near the center of the dam, which convey water to the powerplant. The powerplant is at the downstream toe of the dam and houses three 50,650-kilowatt generators driven by three 50,000-horsepower Francis-type turbines.

Plant Purpose: As the Flaming Gorge Dam is on a major tributary to the Colorado River, it was constructed for long-term storage of water and controlled releases to meet downstream commitments. The powerplant's purpose is to use this stored water for the economical generation of electricity and provide the revenue for repayment of the project.

Plant History: Construction was authorized on April 11, 1956, and construction began in 1958 with road building, a diversion tunnel, and other preparatory work. The first unit went on the line September 27, 1963, and the third and final unit in February 1964. The Flaming Gorge Reservoir first filled in August 1974 at elevation 6,040 with 3,749,000 acre feet of live storage. The plant was automated in 1973 and 1974 and was then controlled by the Colorado River Storage Project Dispatch Center located in Montrose, Colorado. Selective withdrawal structures were installed on the turbine penstock intakes during the winters of 1977 and 1978 to provide temperature control of the water released down the Green River to improve fishery habitat. A temperature of 55 degrees Fahrenheit can be maintained from mid-June into October. On August 11, 1977, the Unit 2 turbine seized up when the lower seal ring failed. This incident lead to the replacement of seal rings on all three units. The newly designed and installed seal rings also failed and were again replaced on each unit. Generator up-rates began in August 1990 and were completed in April 1992. The generators were up rated from 36,000 kW to 50,650 kW.

Three unit transformers were replaced in 2002 and 2003.

Present Activities: On February 16, 2006, the Regional Director of Reclamation's Upper Colorado Region signed a Record of Decision (Flaming Gorge ROD) for the Operation of Flaming Gorge Dam Final Environmental Impact Statement. The Flaming Gorge ROD adopted the Action Alternative as the Federal Action to modify the operation of Flaming Gorge Dam.

Flaming Gorge upgraded the turbines in each of its three generating units beginning with Unit 3 in October of 2005 and finishing with Unit 1 in April of 2008. The upgraded turbines provided an efficiency increase of 4 to 6 percent.

Future Planned Activities: None.

Special Issues: Privatization of the community of Dutch John, the residential facility built to support the construction and operation of the Flaming Gorge Dam and Power plant, has been completed. It should be noted that Flaming Gorge's net generation, unit availability, and scheduled outages reflect the unit up rates, which took place in 1990 through

1992. Data for fiscal year 1991 is most affected, because two units were down during that year.

River:	Green River	**Plant Type:**	Conventional
Powerhouse Type:	Above Ground	**Turbine Type:**	Francis
Original Nameplate Capacity:	108,000 kW	**Installed Capacity:**	151,950 kW
Year of Initial Operation:	1963	**Age:**	44 years
Net Generation (FY-2007):	292.8 GWh	**Rated Head:**	400 feet
Average Plant Factor (FY-2007):	22.2 percent	**Remotely Operated:**	Yes
Production Mode:	Intermediate		

Ancillary Services

Flaming Gorge
Ancillary Services

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

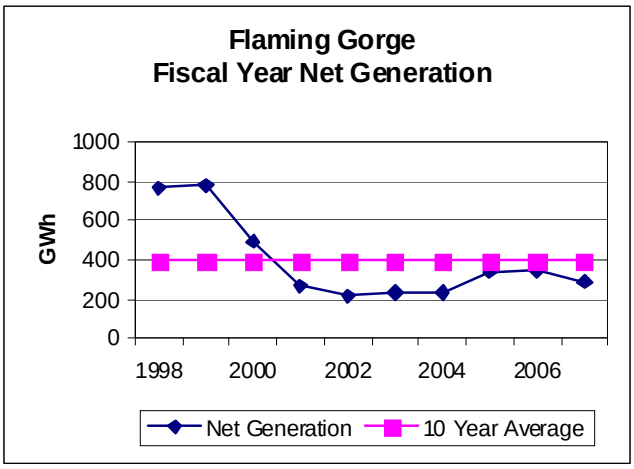
Generators

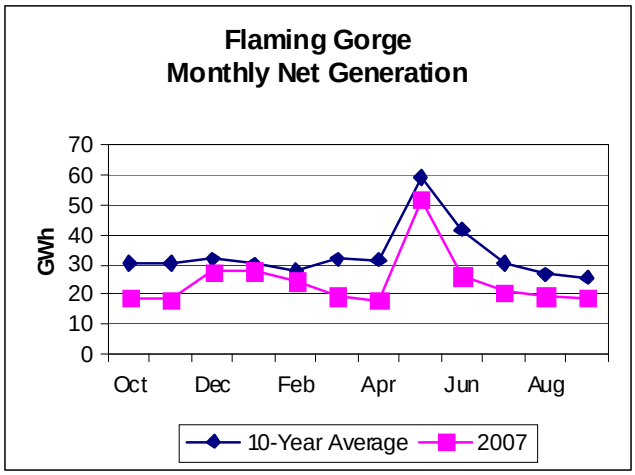
Flaming Gorge Generators

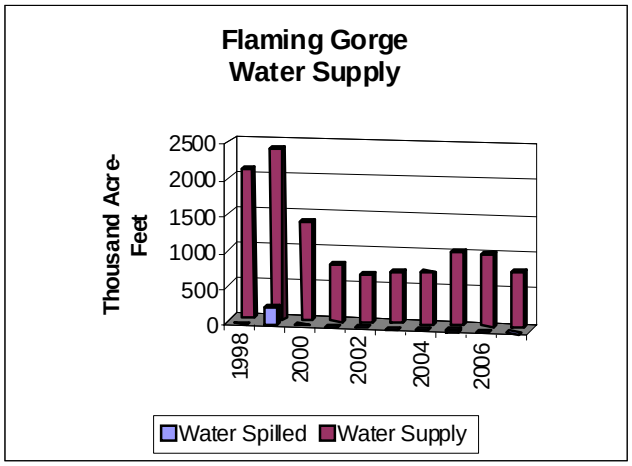
Existing Number and Capacity

Unit #	Original Capacity (kW)	Capacity Increased (kW)	Present Capacity (kW)
1	36,000	14,650	50,650
2	36,000	14,650	50,650
3	36,000	14,650	50,650
3 units	108,000	43,950	151,950

Generation

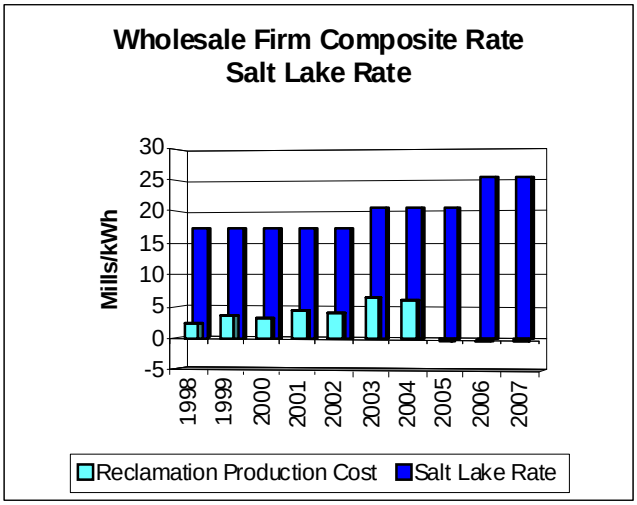

Flaming Gorge
Fiscal Year Net Generation
GWh
1000
800
600
400
200
0
1998
2000
2002
2004
2006
Net Generation
10 Year Average


Flaming Gorge
Monthly Net Generation
GWh
70
60
50
40
30
20
10
0
Oct
Dec
Feb
Apr
Jun
Aug
10-Year Average
2007

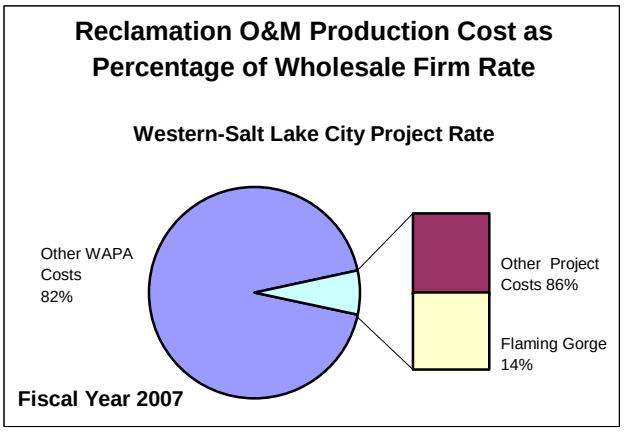

Flaming Gorge
Water Supply
Thousand Acre-Feet
2500
2000
1500
1000
500
0
1998
2000
2002
2004
2006
Water Spilled
Water Supply

Prime Laboratory Benchmarks

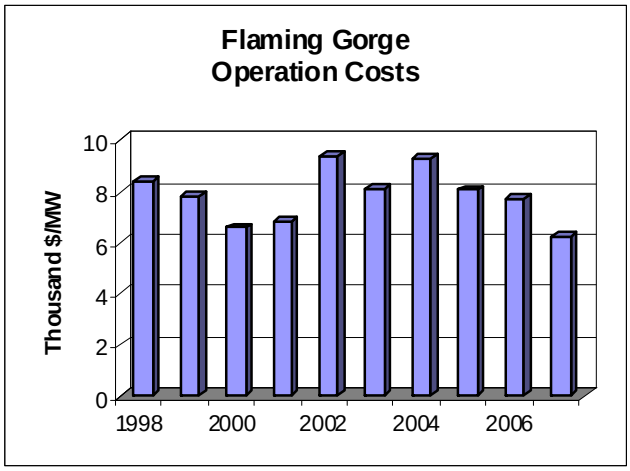
Benchmark 1
Wholesale Firm Rate

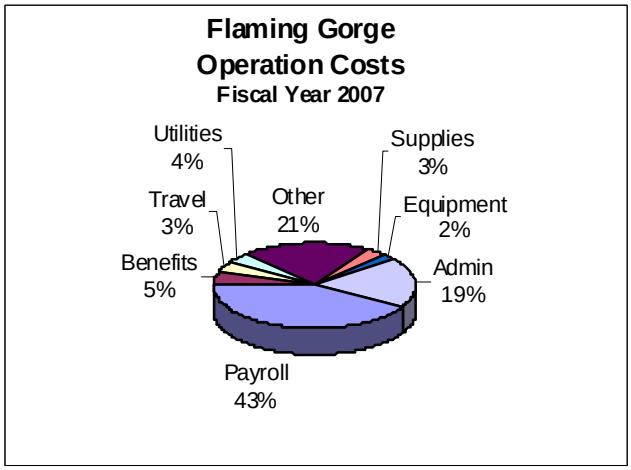


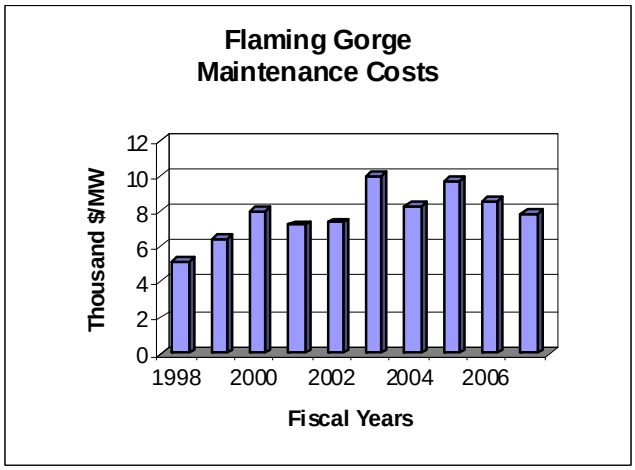
Benchmark 2
Reclamation's Production Cost as Percentage of Wholesale Firm Rate

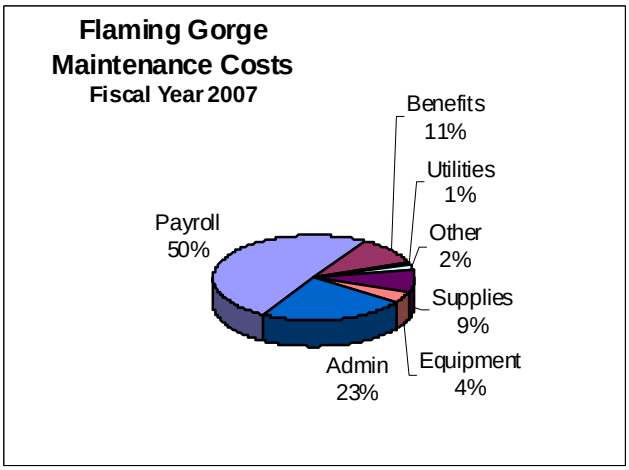


Benchmark 3
Production Cost

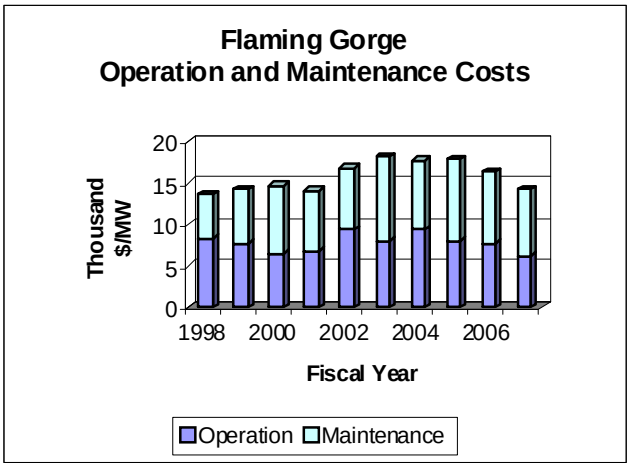


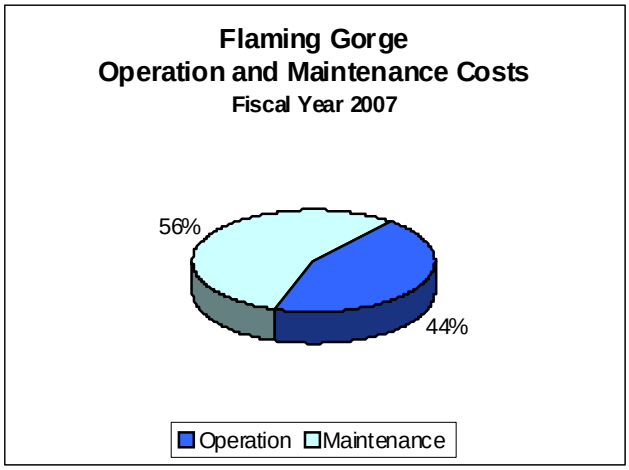


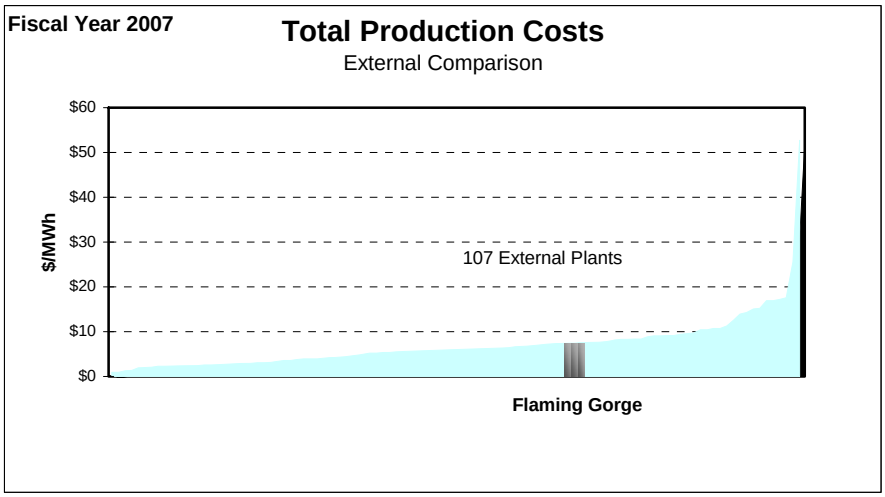


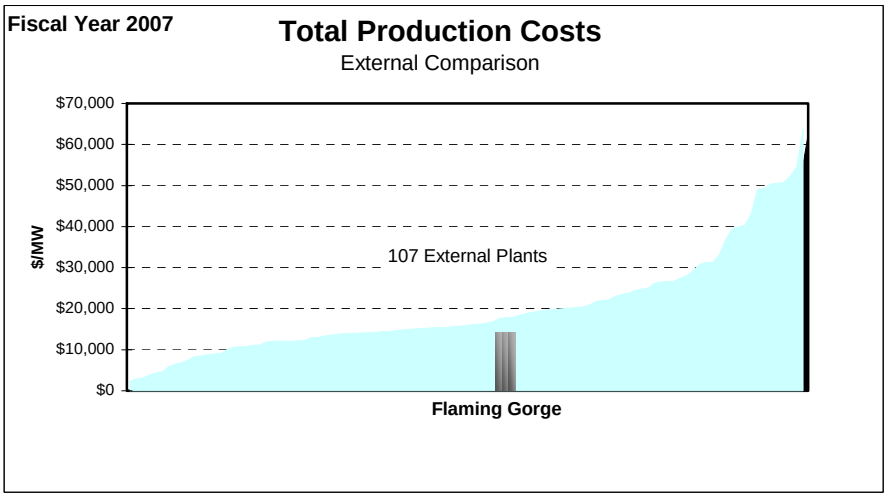


Benchmark 3
Production Cost



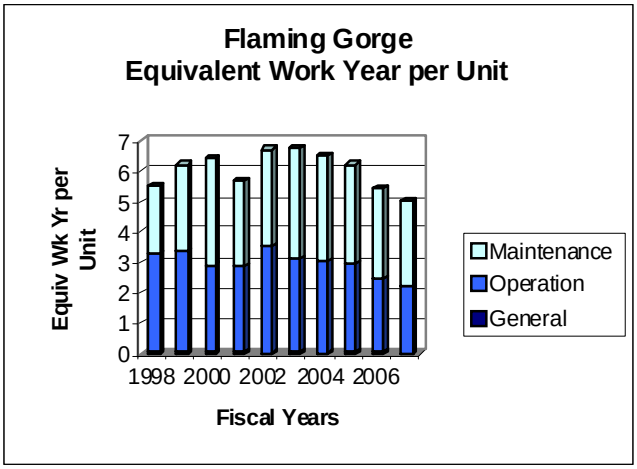


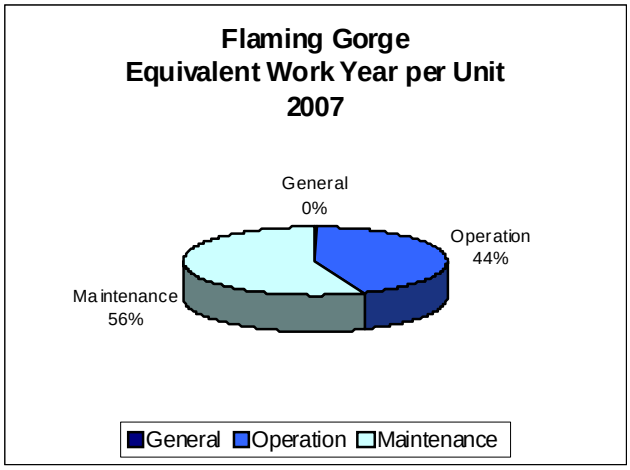


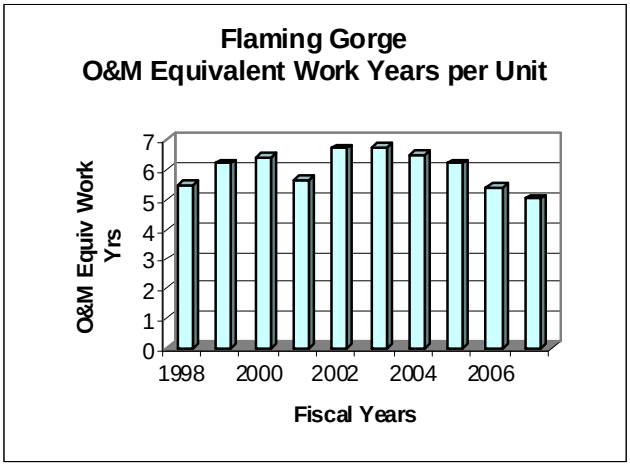


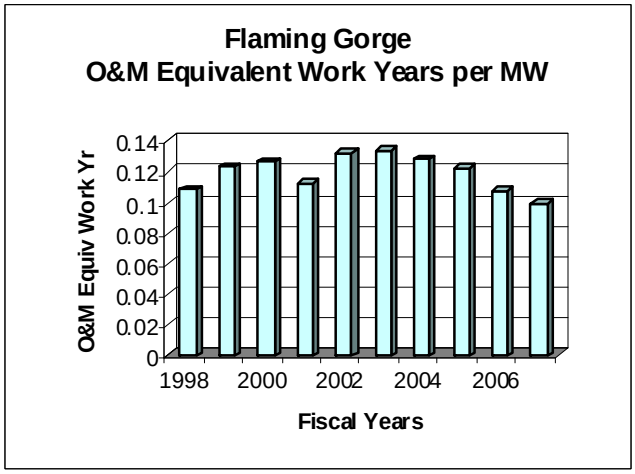
Benchmark 4
Workforce Deployment

Flaming Gorge 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	0.00	0.00	0.05	0.05	0.02	0.00
Operation	5.96	0.63	0.00	6.59	2.20	0.04
Maintenance	7.65	0.81	0.00	8.47	2.82	0.06
Total Staffing	13.61	1.45	0.05	15.11	5.04	0.10

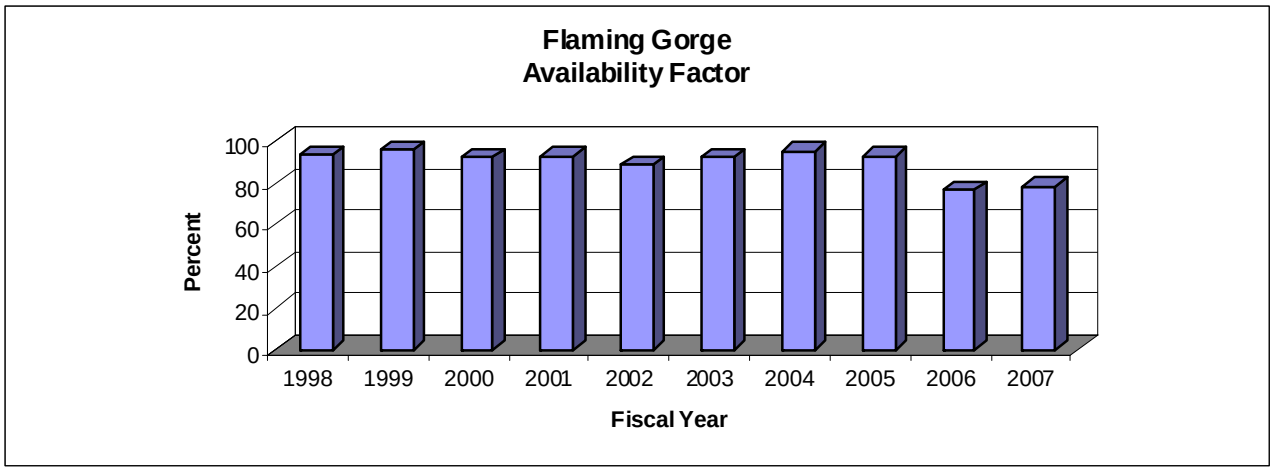




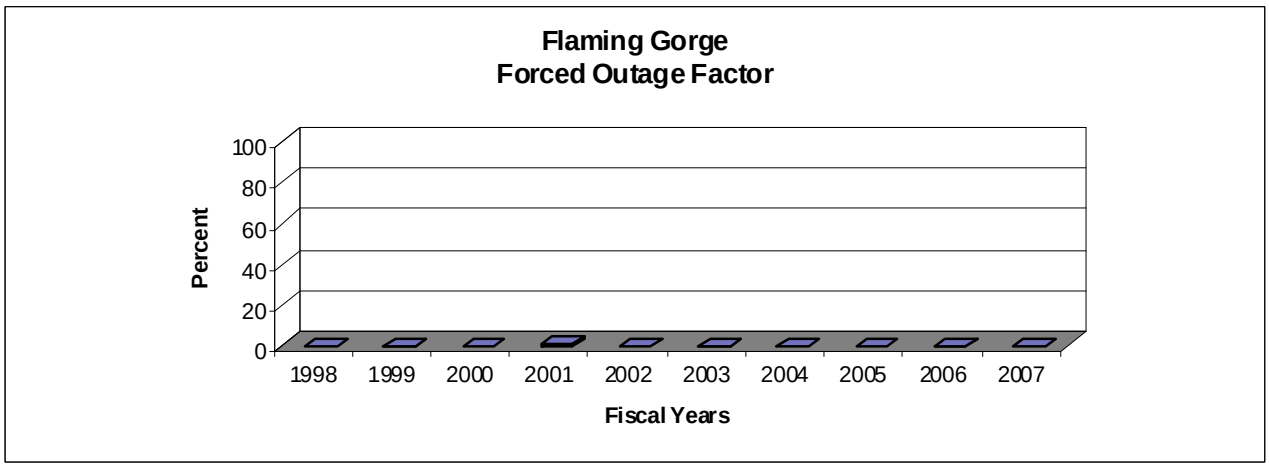




Benchmark 5
Availability Factor

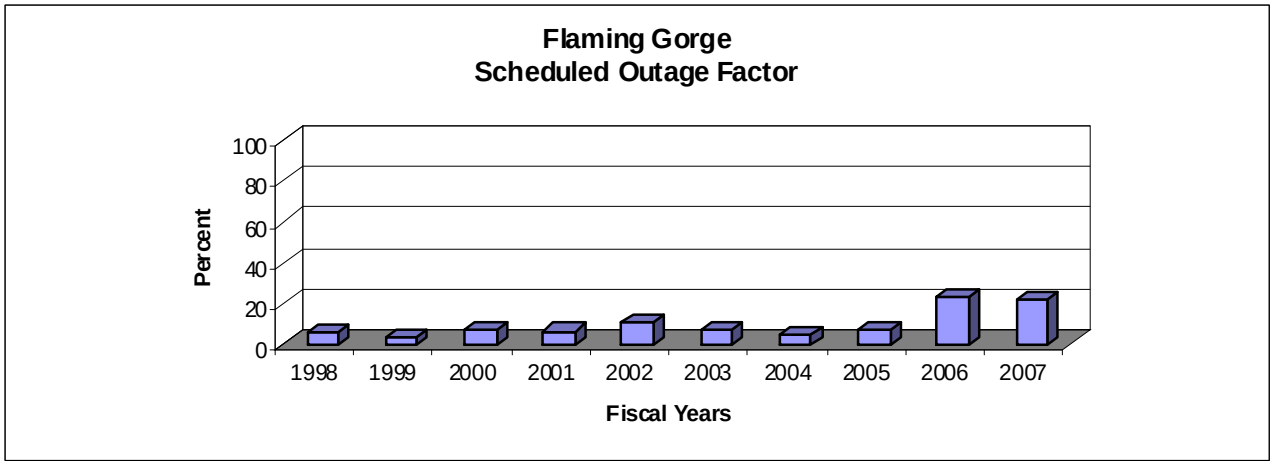


Benchmark 6
Forced Outage Factor

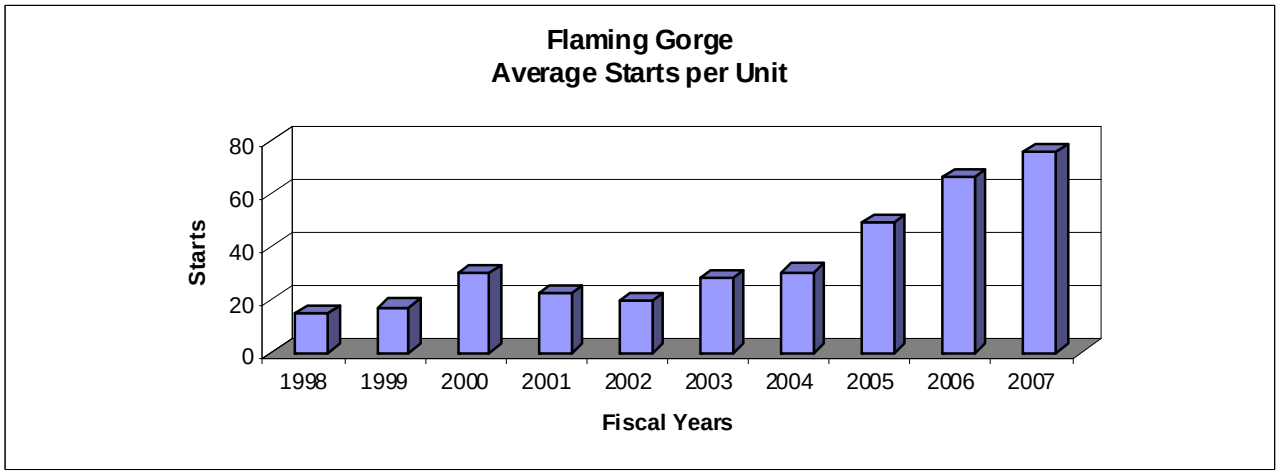


FY-97 - Units out due to plant flooding

Benchmark 7
Scheduled Outage Factor



Starts



Benchmark Data Comparison					
Fiscal Year 2007	**Flaming Gorge Powerplant**	**Reclamation Average 100-500 MW Group**	**Total Reclamation Average**	**Industry Average**	**Best Performers**
Wholesale Firm Rate Mills/kWh	20.7	Not Applicable	*22.45	Not Available	Not Available
Production Cost as Percentage of Wholesale Firm Rate	2.2%	Not Applicable	12.1%	Not Applicable	Not Applicable
O&M Cost $/MWh	7.35	4.44	2.76	***63.88	1.00
O&M Costs $/MW	14,171	10,502	7,847	***21,167	2,897
O&M Equiv Work Year per MW	0.10	0.04	0.03	Not Available	0.0
Availability Factor	78.4	83.5	82.3	**88.64	98.5
Forced Outage Factor	0.1	1.2	2.6	**2.61	0.0
Scheduled Outage Factor	21.5	15.4	15.1	**8.74	0.0

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

Fontenelle Powerplant
Seedskadee Project

Plant Contact:
C. Steven Hulet, Manager
Flaming Gorge Field Division

Charles (Chuck) Green
Fontenelle Plant Supervisor

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#38 Fontenelle Dam, Hwy 316
Fontenelle WY 83101

Telephone Numbers:
Phone: (307) 877-3561
Fax: (307) 877-3686

E-Mail Address:
cgreen@uc.usbr.gov

Reclamation Region: Upper Colorado

NERC Region: Western Electricity Coordinating Council, Rocky Mountain Power Area

PMA Service Area: Western Area Power Administration, Colorado River Storage Project Management Center

Project Authorization: Seedskadee Project is one of the initial group of participating projects authorized with the Colorado River Storage Project on April 11, 1956 (70 Stat. 105).

Project Purposes: The Seedskadee Project, a participating project of the Colorado River Storage Project, is in the Upper Green River Basin in southwestern Wyoming. It provides storage and regulation of the flows of the Green River for power generation, municipal and industrial use, fish and wildlife, and recreation.

Plant Location: Fontenelle Powerplant is located on the Green River in Lincoln County, Wyoming, 24 miles southeast of LaBarge, Wyoming.

Plant Facts: Fontenelle Powerplant is located adjacent to the toe of the dam, with a 10-foot power penstock branching from one of three river outlet works discharge conduits. The turbine has a water discharge capacity of 1,585 cubic feet per second.

Plant Purpose: Fontenelle Powerplant provides maximum generation of power from regulated base load river flows depending upon water availability. Flows/generation vary from 350 cubic feet per second/1 megawatt at low seasonal head to 1,550 cubic feet per second/11 megawatt at peak runoff periods.

Plant History: During 1986-1989, the powerplant was shutdown when the reservoir was being drained to install a diaphragm cutoff wall for the length of the dam. In June 1989, the unit began generating again at new low-head capabilities. This was in part due to the addition of additional rip-rap being placed on the upstream face of the dam.

Present Activities: Normal operations

Future Planned Activities: Future plans include major stilling basin inspection and repairs and a generator exciter replacement.

Special Issues: The powerplant was shut down 33 percent of the 10-year review period to construct and install the diaphragm cutoff wall.

River:	Green River	**Plant Type:**	Conventional
Powerhouse Type:	Above Ground	**Turbine Type:**	Francis
Original Nameplate Capacity:	10,000 kW	**Installed Capacity:**	10,000 kW
Year of Initial Operation:	1968	**Age:**	39 years
Net Generation (FY-2007):	39.7 GWh	**Rated Head:**	94 feet
Average Plant Factor (FY-2007):	45.9 percent	**Remotely Operated:**	Yes
Production Mode:	Base Load		

Ancillary Services

Fontenelle
Ancillary Services

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

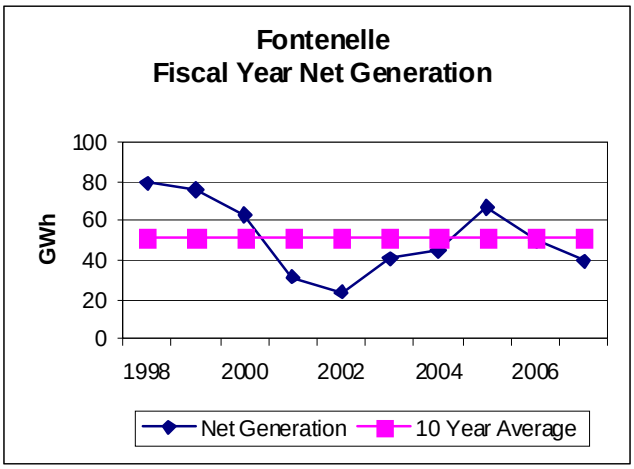
Generators

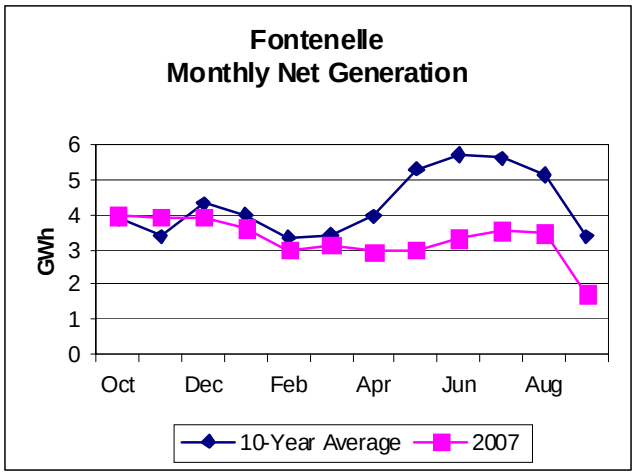
Fontenelle Generators

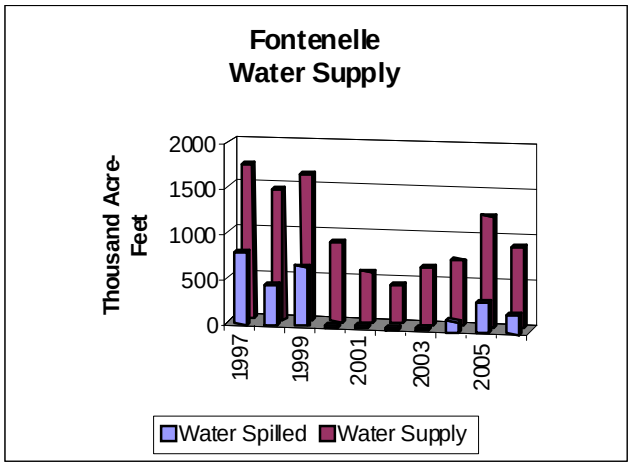
Existing Number and Capacity

Unit #	Original Capacity (kW)	Capacity Increased (kW)	Present Capacity (kW)
1	10,000	-	10,000
1 Unit	10,000	-	10,000

Generation

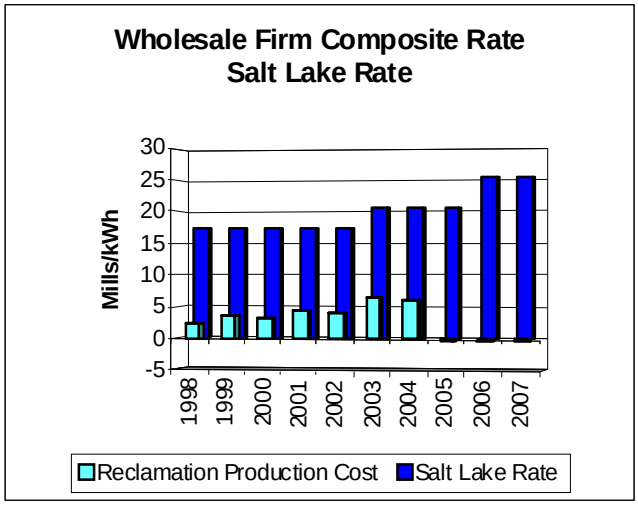

Fontenelle
Fiscal Year Net Generation
GWh
100
80
60
40
20
0
1998
2000
2002
2004
2006
Net Generation
10 Year Average


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

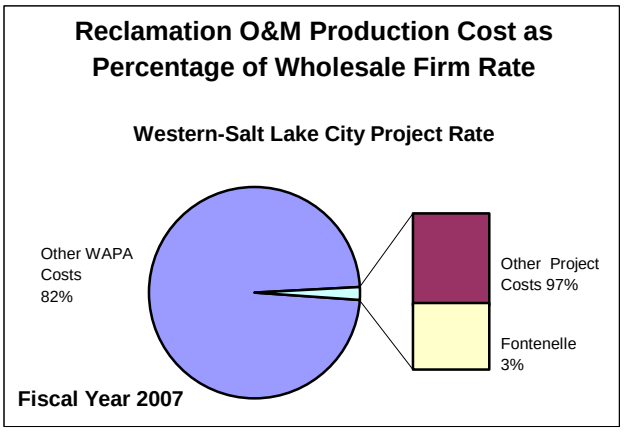

Fontenelle
Water Supply
Thousand Acre-Feet
2000
1500
1000
500
0
1997
1999
2001
2003
2005
Water Spilled
Water Supply

Prime Laboratory Benchmarks

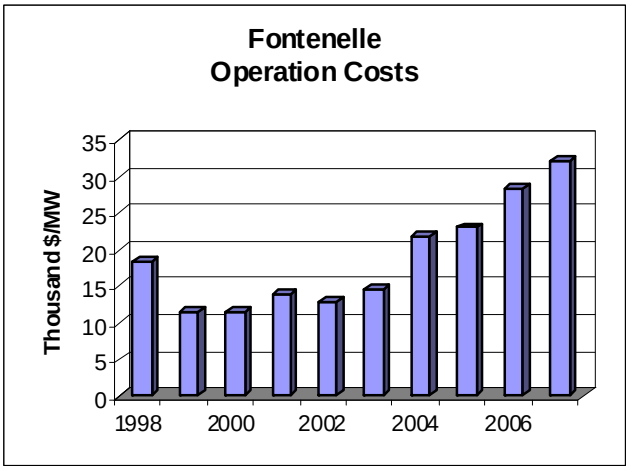
Benchmark 1
Wholesale Firm Rate

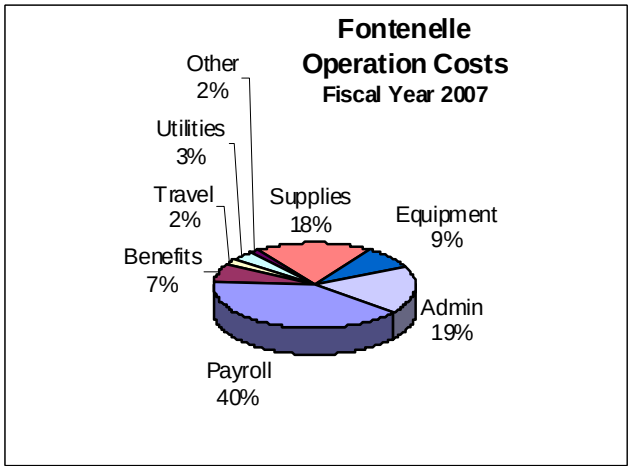


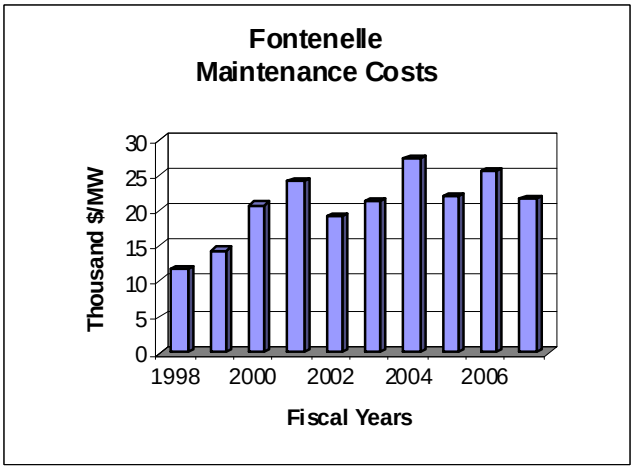
Benchmark 2
Reclamation's Production Cost as Percentage of Wholesale Firm Rate

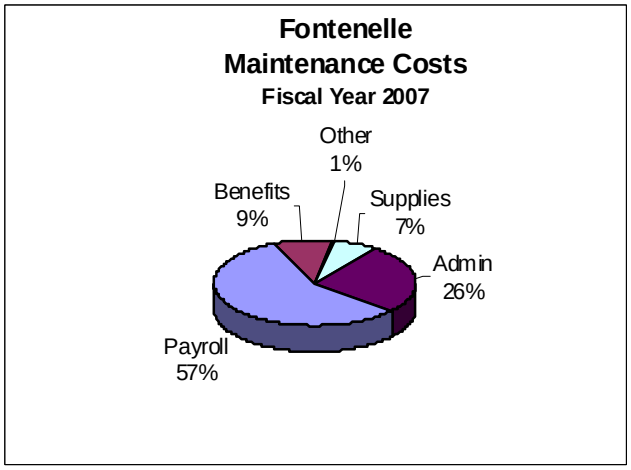


Benchmark 3
Production Cost

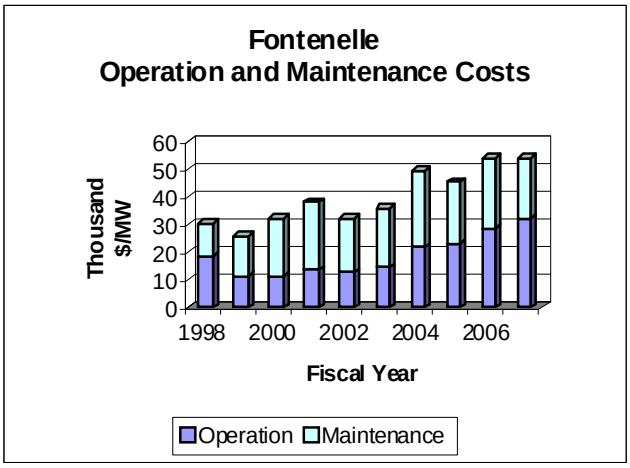


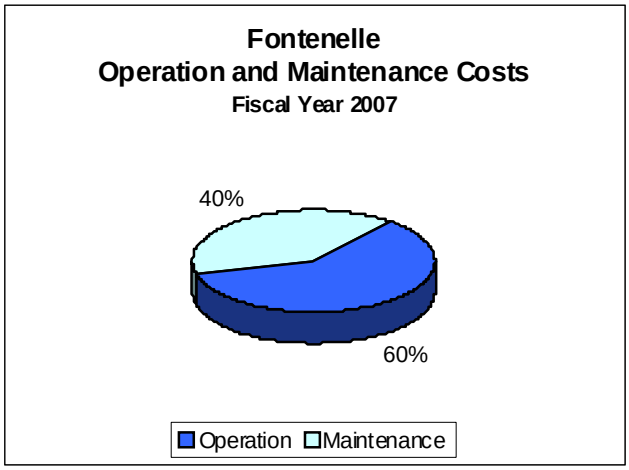


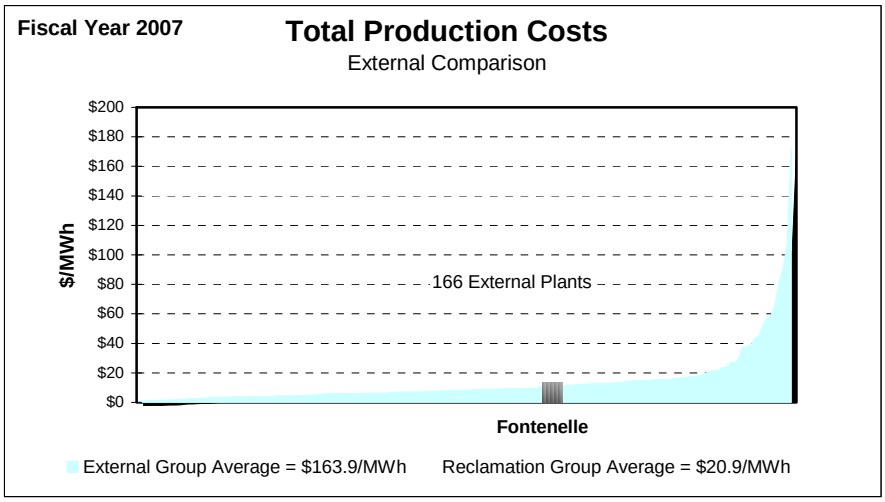


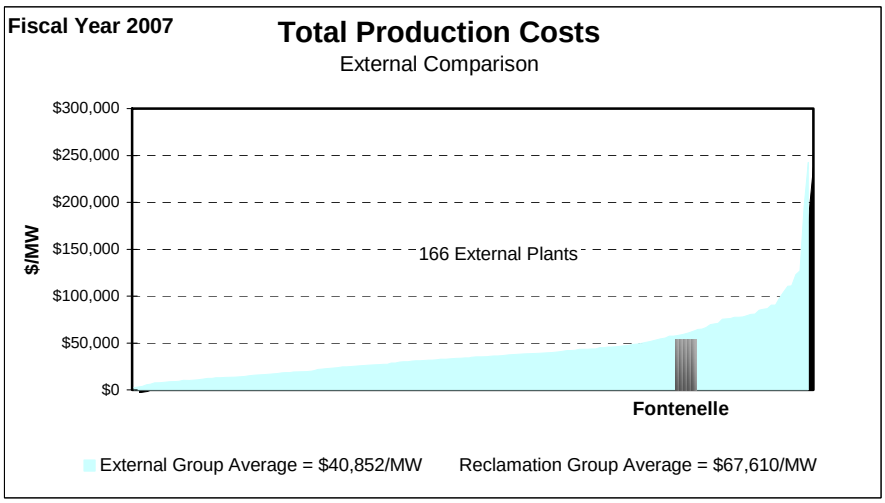


Benchmark 3
Production Cost



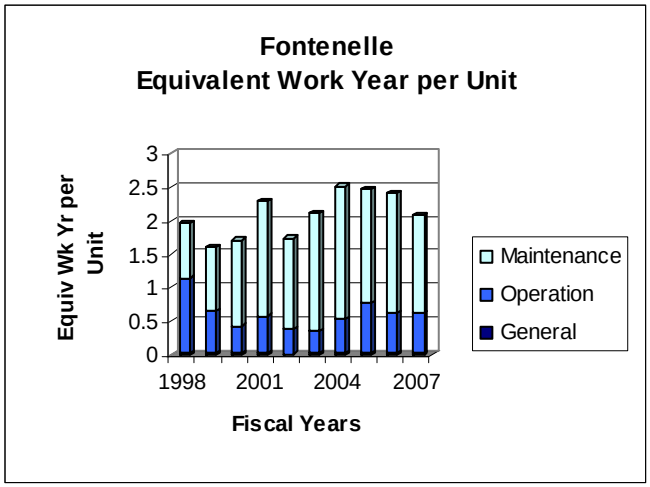


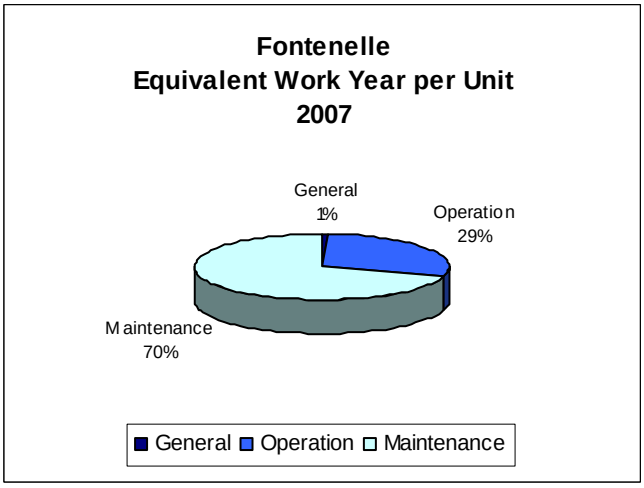


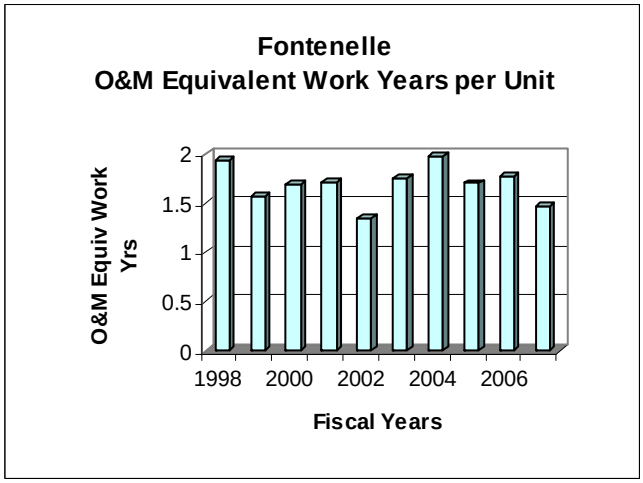


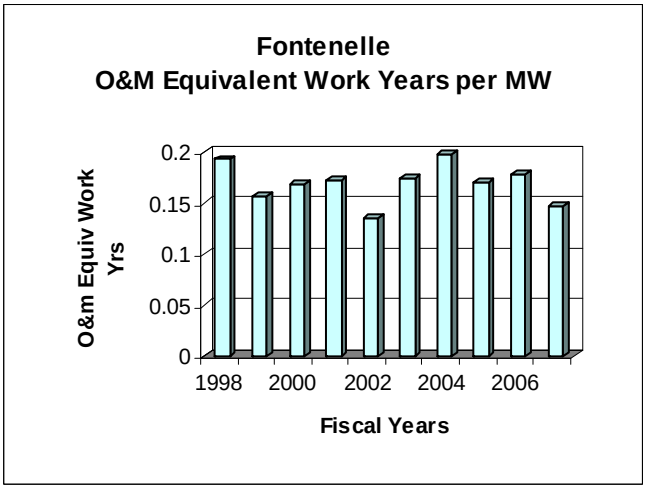
Benchmark 4
Workforce Deployment

Fontenelle 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	0.00	0.00	0.02	0.02	0.02	0.00
Operation	0.54	0.06	0.00	0.60	0.60	0.06
Maintenance	1.33	0.14	0.00	1.47	1.47	0.15
Total Staffing	1.87	0.20	0.02	2.09	2.09	0.21

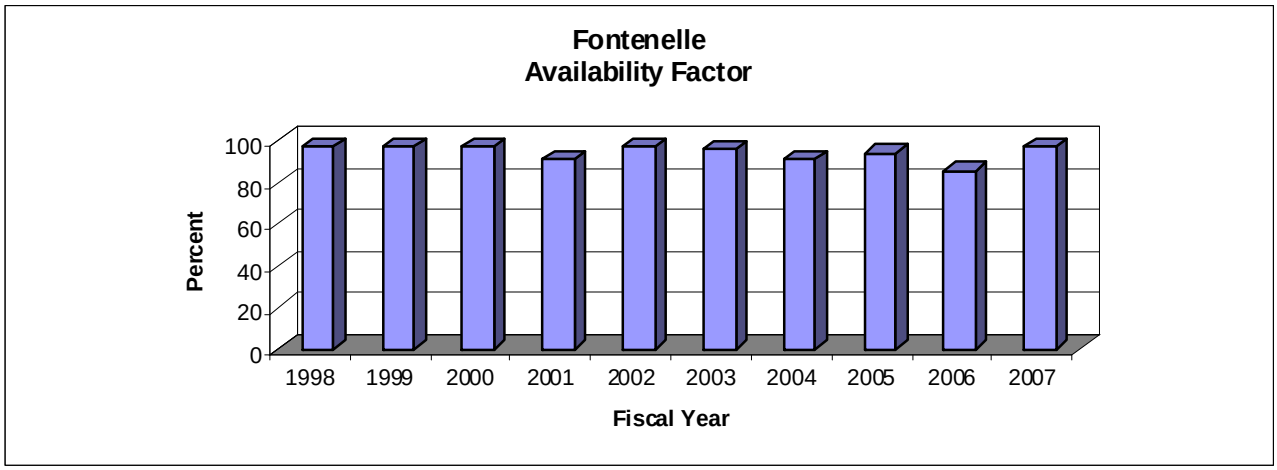




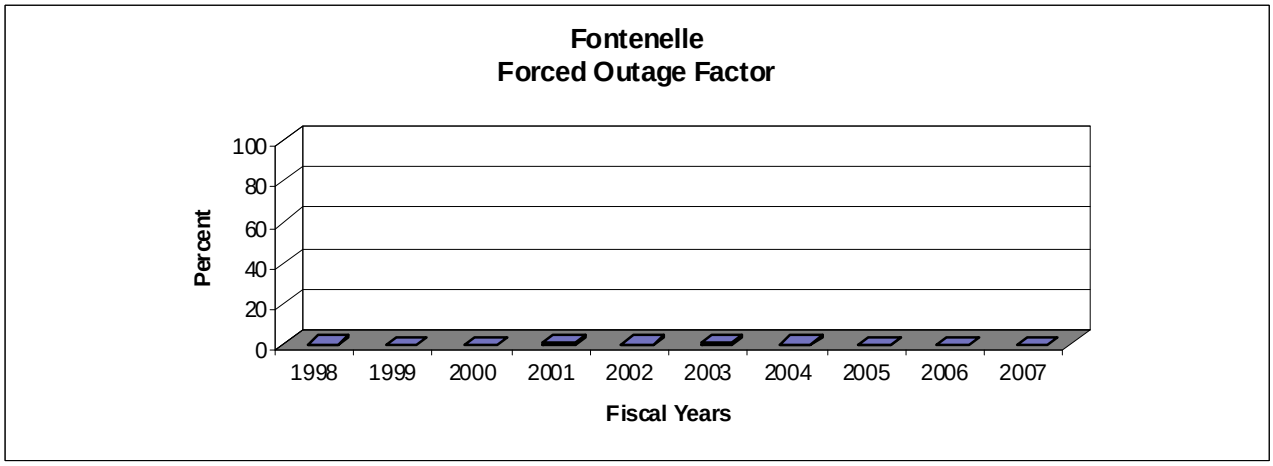




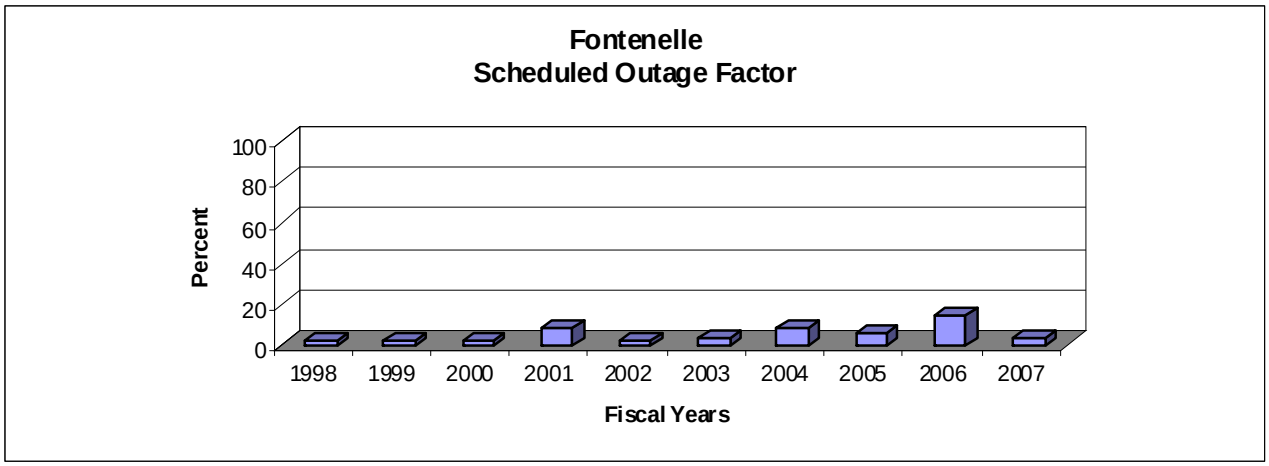
Benchmark 5
Availability Factor



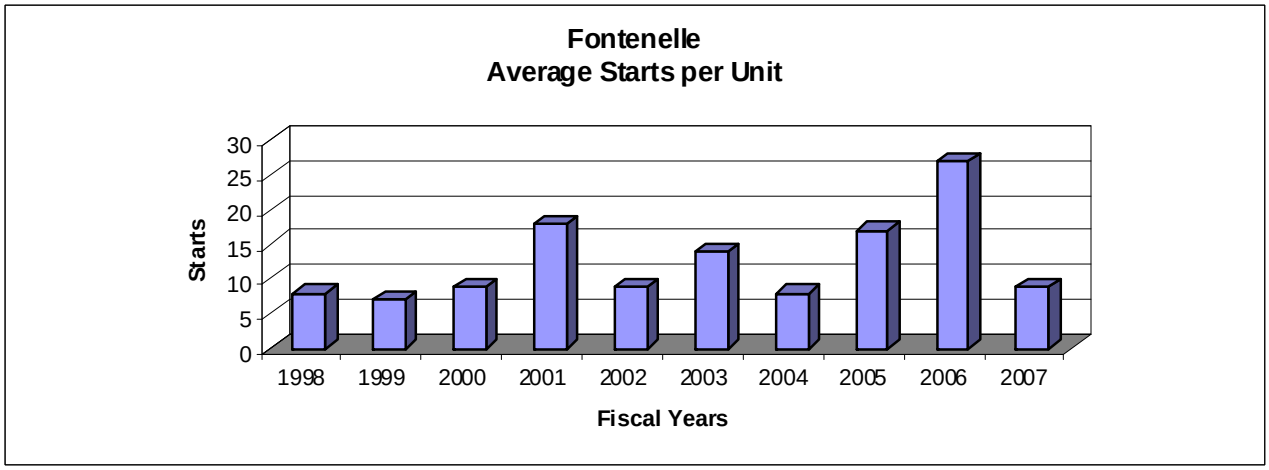
Benchmark 6
Forced Outage Factor



Benchmark 7
Scheduled Outage Factor



Starts



Benchmark Data Comparison

Fiscal Year 2007	Fontenelle Powerplant	Reclamation Average 10-30 MW Group	Total Reclamation Average	Industry Average	Best Performers
Wholesale Firm Rate Mills/kWh	20.7	Not Applicable	*22.45	Not Available	Not Available
Production Cost as Percentage of Wholesale Firm Rate	0.56%	Not Applicable	12.1%	Not Applicable	Not Applicable
O&M Cost $/MWh	13.59	16.40	2.76	***163.95	1.00
O&M Costs $/MW	53,929	62,731	7,847	***40,852	2,897
O&M Equiv Work Year per MW	0.15	0.22	0.03	Not Available	0.00
Availability Factor	96.9	88.5	82.3	**88.64	98.54
Forced Outage Factor	0.0	0.1	2.6	**2.61	0.00
Scheduled Outage Factor	3.1	11.4	15.1	**8.74	0.00

Benchmark Data Comparison

Fiscal Year 2007	Fontenelle Powerplant	Reclamation Average 10-30 MW Group	Total Reclamation Average	Industry Average	Best Performers
Wholesale Firm Rate Mills/kWh	20.7	Not Applicable	*22.45	Not Available	Not Available
Production Cost as Percentage of Wholesale Firm Rate	0.56%	Not Applicable	12.1%	Not Applicable	Not Applicable
O&M Cost $/MWh	13.59	16.40	2.76	***163.95	1.00
O&M Costs $/MW	53,929	62,731	7,847	***40,852	2,897
O&M Equiv Work Year per MW	0.15	0.22	0.03	Not Available	0.00
Availability Factor	96.9	88.5	82.3	**88.64	98.54
Forced Outage Factor	0.0	0.1	2.6	**2.61	0.00

Scheduled Outage Factor	3.1	11.4	15.1	**8.74	0.00

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

Glen Canyon Powerplant
Colorado River Storage Project
Glen Canyon Storage Unit

Plant Contact:
Kerry McCalman
Area Manager
Upper Colorado Regional Office

Plant Address:
Glen Canyon Powerplant
805 Bureau Street
PO Box 1477
Page AZ 86040-1477

Telephone Numbers:
Phone: (801) 524-3620
Fax: (801) 524-3828

E-Mail Address:
kmccalman@uc.usbr.gov

Reclamation Region: Upper Colorado

NERC Region: Western Electricity Coordinating Council, Rocky Mountain Power Area

PMA Service Area: Western Area Power Administration, Colorado River Storage project Management Center

Project Authorization: The Congress authorized construction of four storage units in the Colorado River Storage Project and 11 participating projects on April 11, 1956, under Public Law 485, 84th Congress, 70 Stat. 105. Additional projects have been added since the original legislation was adopted.

Project Purposes: The Colorado River Storage Project provides for the comprehensive development of the Upper Colorado River Basin. The project furnishes the long-time regulatory storage needed to permit States in the upper basin to meet their flow obligation at Lees Ferry, Arizona, (as defined in the Colorado River Compact) and still use their apportioned water.

Plant Location: The Glen Canyon Powerplant is located on the Colorado River in Coconino County, Arizona, near the Utah border. It is 15 miles upstream from Lees Ferry.

Plant Facts: The Glen Canyon Powerplant, at the toe of the dam, consists of eight generators, driven by eight 155,500-horsepower turbines. Total nameplate generating capacity for the powerplant is 1,320,000 kilowatts. Eight penstocks through the dam convey water to the turbines.

The Glen Canyon Dam is a 710-foot-high structure which provides more storage capacity than all other storage features of the Colorado River Storage Project combined. The concrete arch dam has a crest length of 1,560 feet and contains 4,901,000 cubic yards of concrete. The dam is 25 feet wide at the crest and 300 feet wide at the maximum base.

Plant Purpose: Generation of hydroelectric power for the project.

Plant History: The first generator uprating was completed between 1984 and 1987 and four generators were rated at 165,000 kW each and four generators were rated at 157,000 kW each. The four generators rated at 157,00 kW have since been rewound to the 165,000 kw capacity as of 2006. Air blast power circuit breakers were replaced with SF6 gas insulated units in 2000.

Present Activities: Unit 7 was rewound to 165,000 kW completing the last upgrade from 157,000 kW.

Future Planned Activities: Unit 8 turbine is the first of the original eight turbines scheduled to be replaced with a more efficient stainless steel turbine. The eight turbines will be replaced over the next eight years, starting in fiscal year 2007.

Special Issues: Glen Canyon Powerplant is operating under the Glen Canyon Dam Final Environmental Impact Statement and Record of Decision. Which limits Glen Canyons' maximum and minimum generation/flow along with limits on up and down ramps.

River:	Colorado River	**Plant Type:**	Conventional
Powerhouse Type:	Above Ground	**Turbine Type:**	Francis
Original Nameplate Capacity:	950,000 kW	**Installed Capacity:**	1,320,000 kW
Year of Initial Operation:	1964	**Age:**	43 years
Net Generation (FY-2007):	3,454.8 GWh	**Rated Head:**	510 feet
Average Plant Factor (FY-2007):	30.0 percent	**Remotely Operated:**	No
Production Mode:	Intermediate		

Ancillary Services

Glen Canyon
Ancillary Services

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

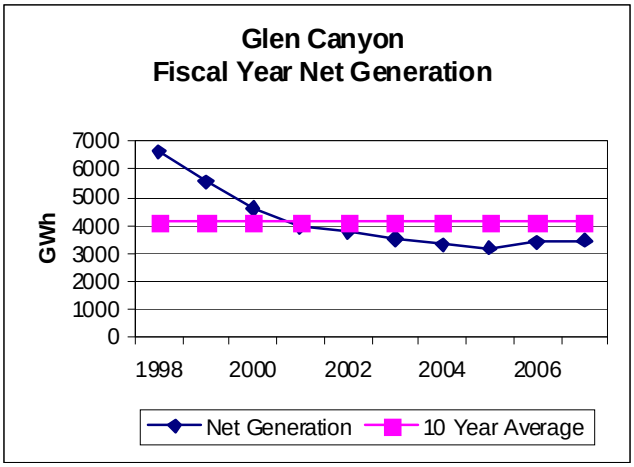
Generators

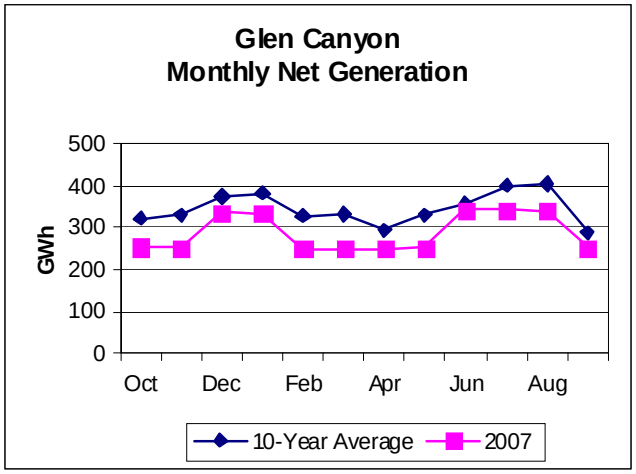
Glen Canyon Generators

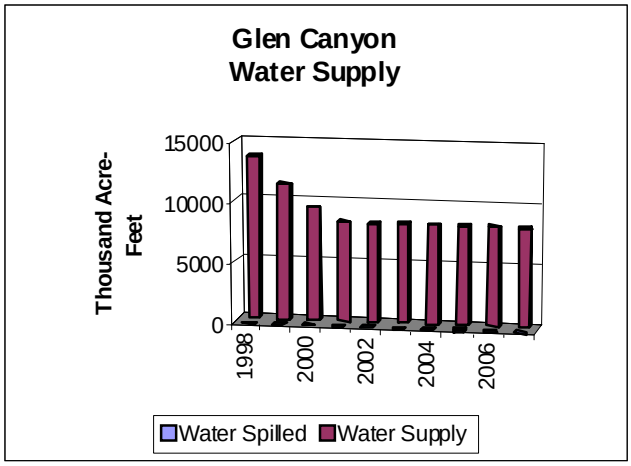
Existing Number and Capacity

Unit #	Original Capacity (kW)	Capacity Increased (kW)	Present Capacity (kW)
1	118,750	46,250	165,000
2	118,750	46,250	165,000
3	118,750	46,250	165,000
4	118,750	46,250	165,000
5	118,750	46,250	165,000
6	118,750	46,250	165,000
7	118,750	46,250	165,000
8	118,750	46,250	165,000
8 Units	950,000	370,000	1,320,000

Generation

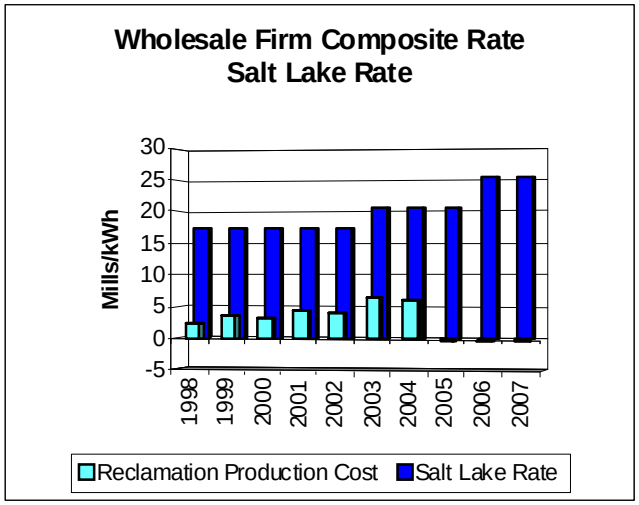

Glen Canyon
Fiscal Year Net Generation
GWh
7000
6000
5000
4000
3000
2000
1000
0
1998
2000
2002
2004
2006
Net Generation
10 Year Average


Glen Canyon
Monthly Net Generation
GWh
500
400
300
200
100
0
Oct
Dec
Feb
Apr
Jun
Aug
10-Year Average
2007

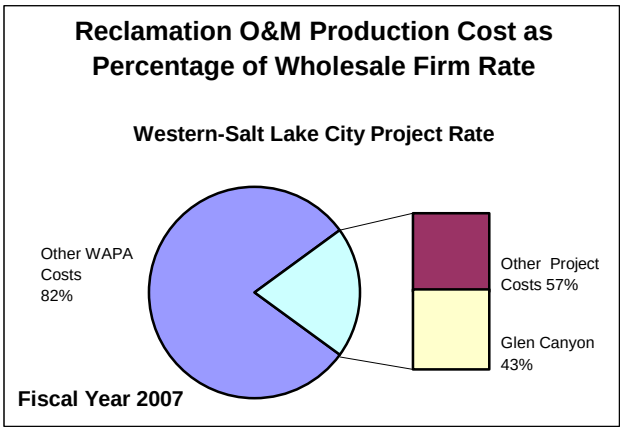

Glen Canyon
Water Supply
Thousand Acre-Feet
15000
10000
5000
0
1998
2000
2002
2004
2006
Water Spilled
Water Supply

Prime Laboratory Benchmarks

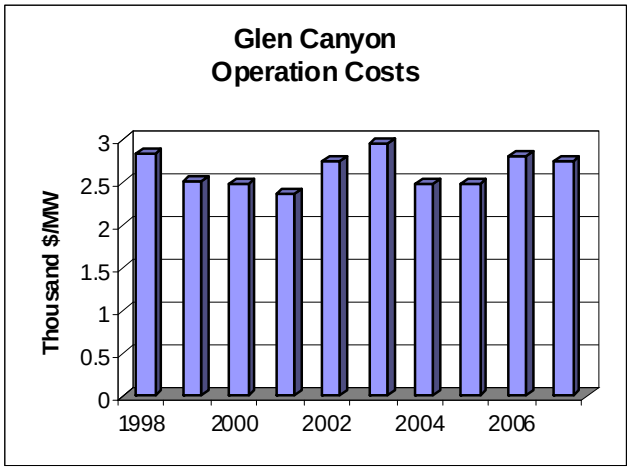
Benchmark 1
Wholesale Firm Rate

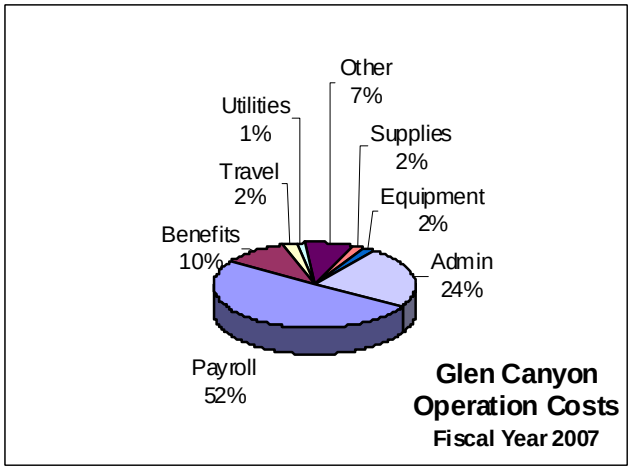


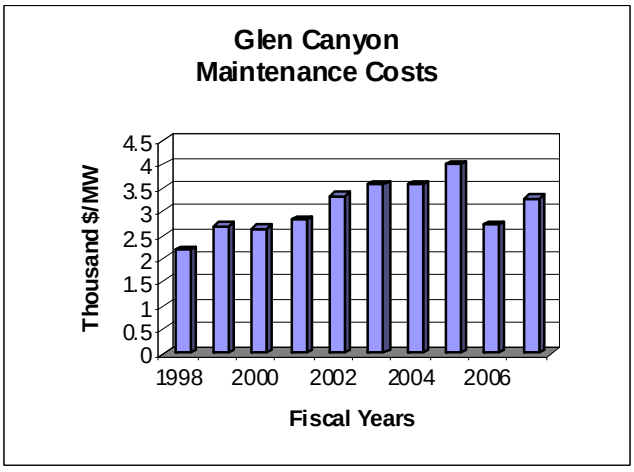
Benchmark 2
Reclamation's Production Cost as Percentage of Wholesale Firm Rate

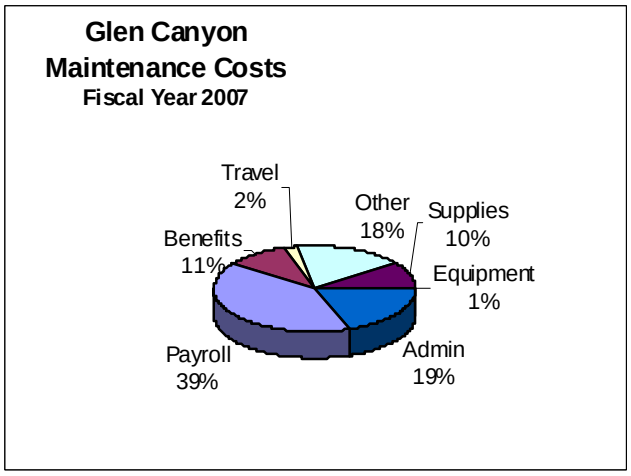


Benchmark 3
Production Cost

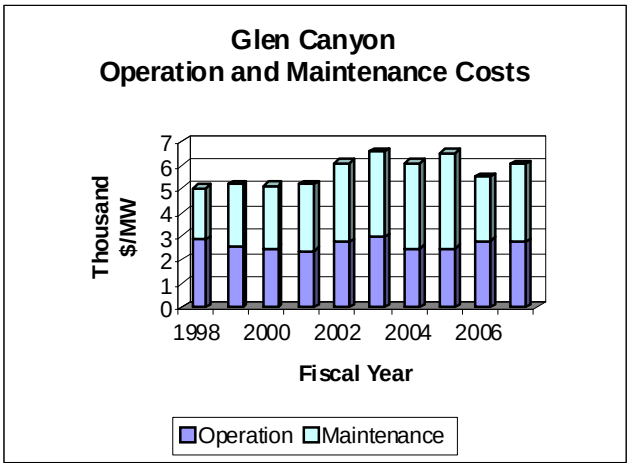


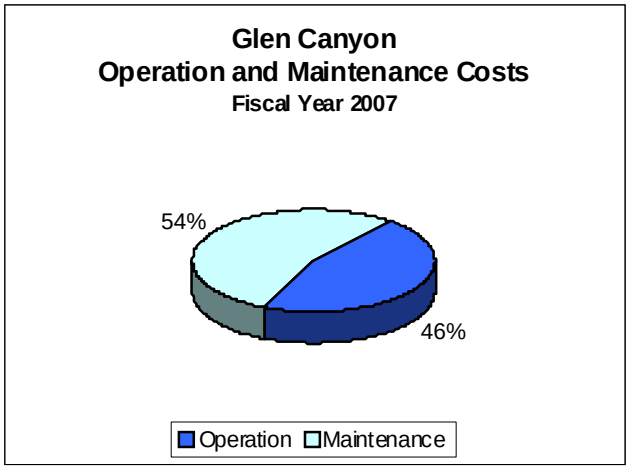


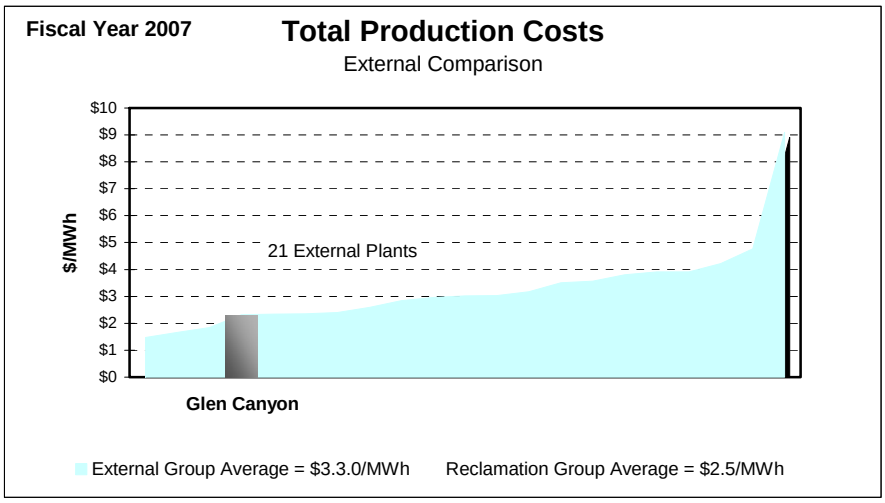


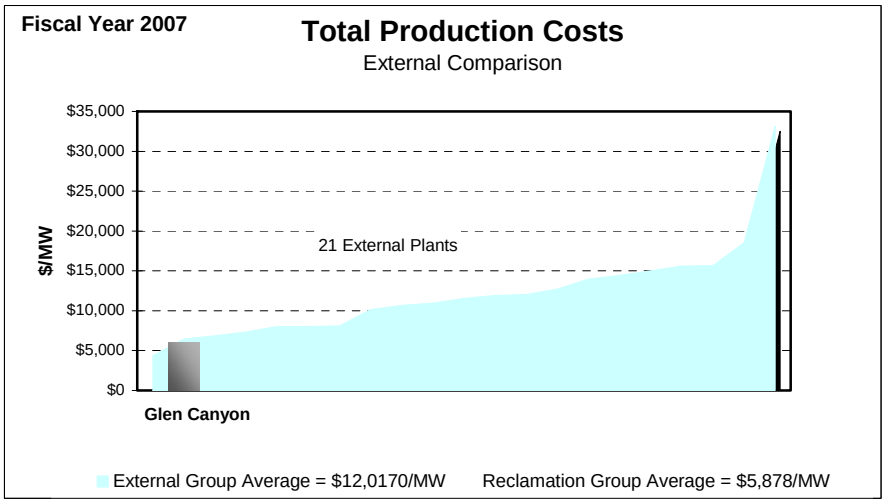


Benchmark 3
Production Cost



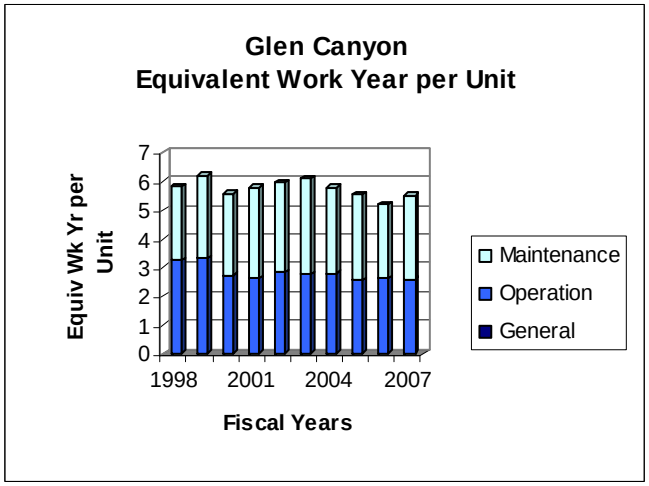


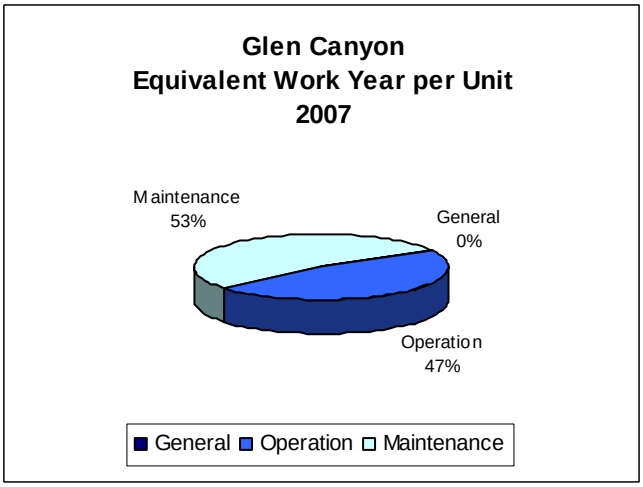


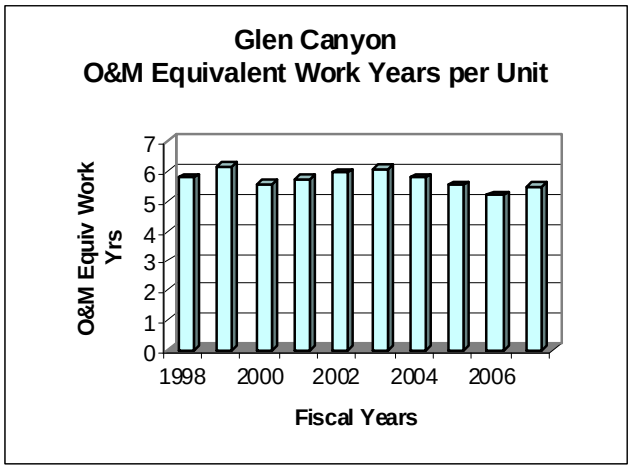


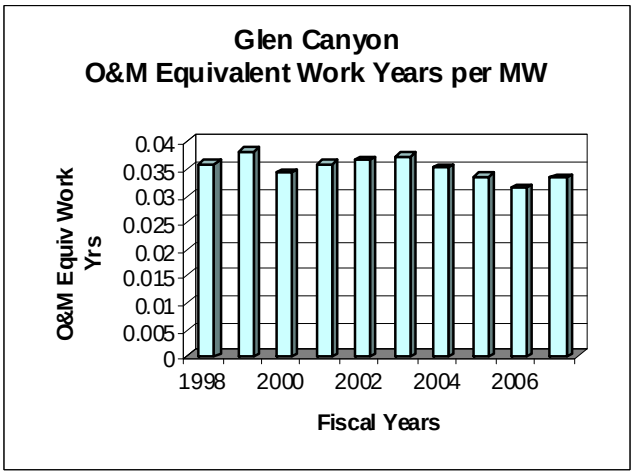
Benchmark 4
Workforce Deployment

Glen 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	0.00	0.00	0.14	0.14	0.02	0.00
Operation	18.67	1.99	0.00	20.66	2.58	0.02
Maintenance	21.13	2.25	0.00	23.38	2.92	0.02
Total Staffing	39.80	4.24	0.14	44.18	5.52	0.03

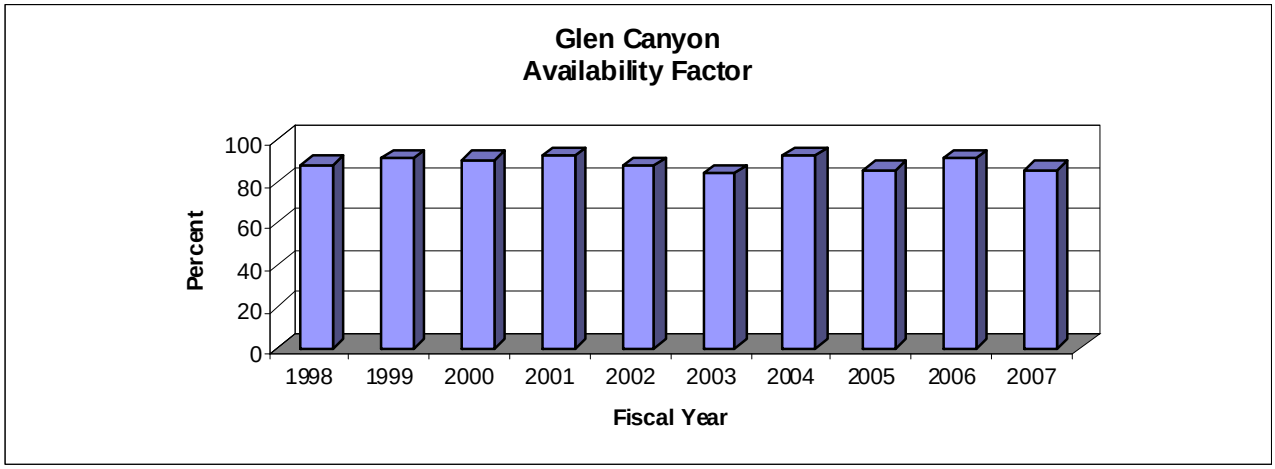




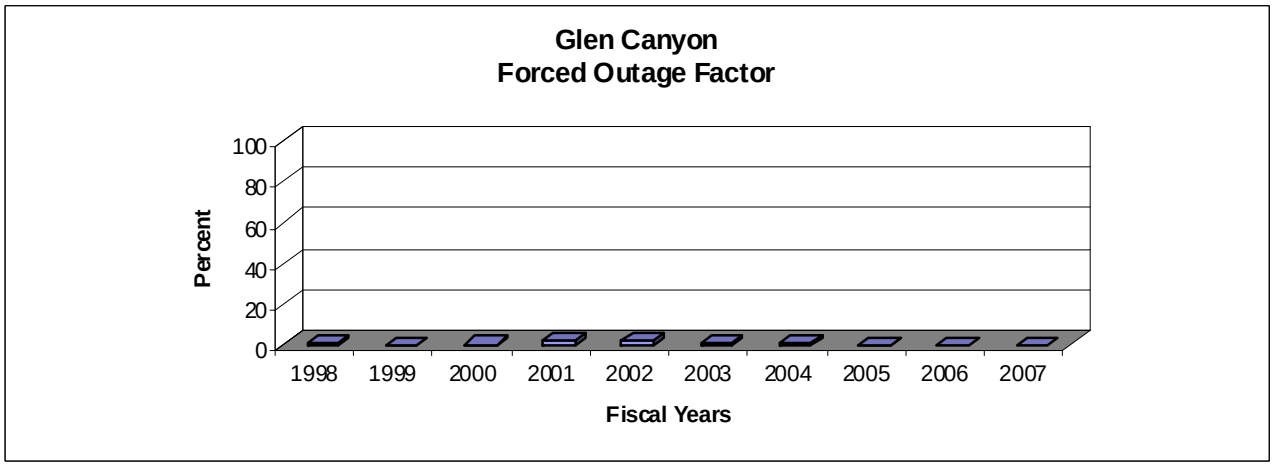




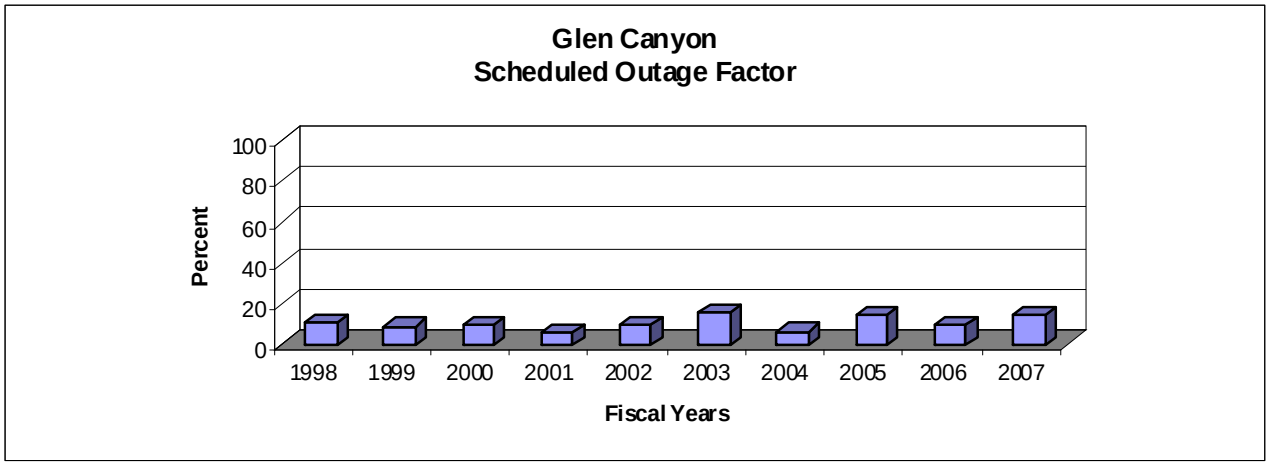
Benchmark 5
Availability Factor



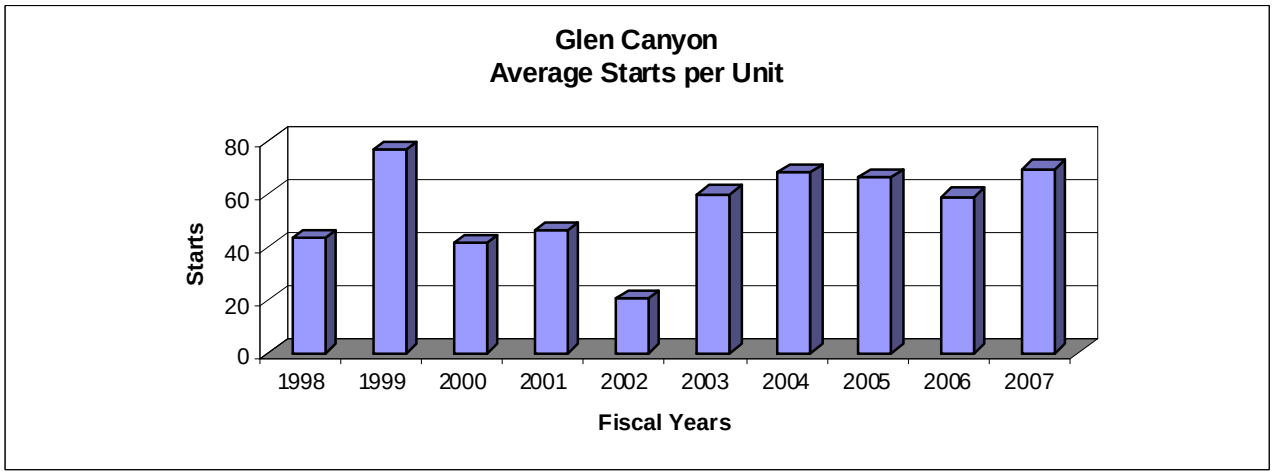
Benchmark 6
Forced Outage Factor



Benchmark 7
Scheduled Outage Factor



Starts



Benchmark Data Comparison

Fiscal Year 2007	Glen Canyon Powerplant	Reclamation Average 500+ MW Group	Total Reclamation Average	Industry Average	Best Performers
Wholesale Firm Rate Mills/kWh	20.7	Not Applicable	*22.45	Not Available	Not Available
Production Cost as Percentage of Wholesale Firm Rate	8.2%	Not Applicable	12.1%	Not Applicable	Not Applicable
O&M Cost $/MWh	2.31	1.65	2.76	***3.28	1.00
O&M Costs $/MW	6,043	4,863	7,847	***12,0170	2,897
O&M Equiv Work Year per MW	0.03	0.02	0.03	Not Available	0.0
Availability Factor	85.5	81.9	82.3	**88.64	98.5
Forced Outage Factor	0.0	3.2	2.6	**2.61	0.0
Scheduled Outage Factor	14.4	14.9	15.1	**8.74	0.0

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

Lower Molina Powerplant
Collbran Project

Plant Contact:
Donald Phillips, Manager
Curecanti Field Division

Plant Address:
Lower Molina Powerplant
Molina CO

Telephone Numbers:
Phone: (970) 240-6300
Fax: (970) 240-6304

E-Mail Address:
dphillips@uc.usbr.gov

Reclamation Region: Upper Colorado

NERC Region: Western Electricity Coordinating Council, Rocky Mountain Power Area

PMA Service Area: Western Area Power Administration, Colorado River Storage Project Management Center

Project Authorization: The Congress authorized the Collbran Project on July 3, 1952, under Public Law 445, 82nd Congress, 2nd Session.

Project Purposes: The Collbran Project, in west-central Colorado, developed a major part of the unused water in Plateau Creek and its principal tributaries. Supplemental irrigation service is furnished and electrical energy is generated for use in west-central Colorado.

The project also rehabilitated and modified the operation of 15 small privately owned storage reservoirs on the Grand Mesa in the Cottonwood Creek and Big Creek watersheds. These reservoirs provide water for power generation through exchanging storage water on Grand Mesa for irrigation water from Vega Reservoir.

Both the Lower and Upper Molina Power plants are operated in conjunction with Colorado River Storage Project power operations.

Plant Location: The Lower Molina Powerplant is located in Mesa County, Colorado, on the south bank of Plateau Creek near Molina, Colorado.

Plant Facts: The Lower Molina penstock extends 4.7 miles from the Molina Equalizing Reservoir to the Lower Molina Powerplant. The penstock consists of steel pipe ranging in diameter from 36 inches at its upper end to 30 inches at the lower section. It has a maximum capacity of 50 cubic feet per second.

The single-unit Lower Molina Powerplant has an installed capacity of 4,860 kilowatts at a design head of 1,400 feet and a maximum water discharge of 50 cubic feet per second.

Power generated at both power plants is transformed to a transmission voltage of 115 kilovolts at two substations constructed adjacent to the plants. A 5.5-mile transmission line leads from the substation at the Upper Molina Powerplant, delivers energy produced at the plant to the substation at Lower Molina Power, and then connects to Xcel Energy.

Plant Purpose: Electrical energy is generated for use in west-central Colorado.

Plant History: In FY-2003 the unit control system was upgraded to an Ethernet based Distributed Control System. A digital governor and digital protective relays were also installed. In FY-2005 a new, more efficient, turbine runner was installed and new flow control programming was added to make the Upper Molina unit ramp up with the lower unit, so that they effectively act as a single unit.

Present Activities: Communicating analog data to the RTU in digital format to lessen the errors in the data and installing transfer trip relaying to the Upper Molina plant.

Future Planned Activities: Purchase and install a new generator step up transformer.

Special Issues: None

River Name:	Plateau Creek	**Plant Type:**	Conventional
Powerhouse Type:	Above Ground	**Turbine Type:**	Pelton Impulse
Original Nameplate Capacity:	4,860 kW	**Installed Capacity:**	4,860 kW
Year of Initial Operation:	1962	**Age:**	45 years
Net Generation (FY-2007):	16.4 GWh	**Rated Head:**	1,400 feet
Average Plant Factor (FY-2007):	38.5 percent	**Remotely Operated:**	Yes
Production Mode:	Peaking		

Ancillary Services

Lower Molina
Ancillary Services

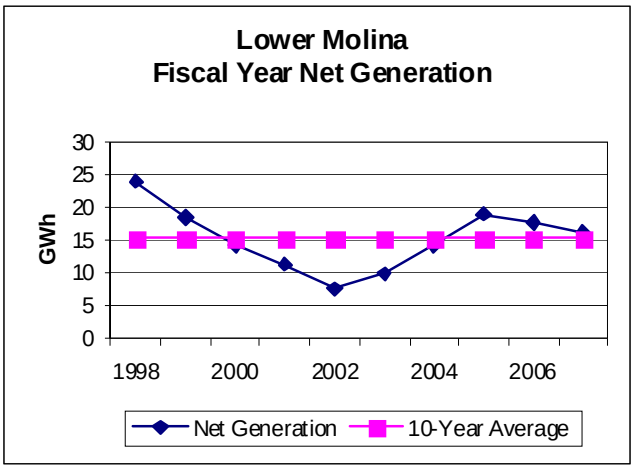
Spinning Reserve	No
Non-Spinning Reserve	No
Replacement Reserve	No
Regulation/Load Following	No
Black Start	Yes
Voltage Support	Yes

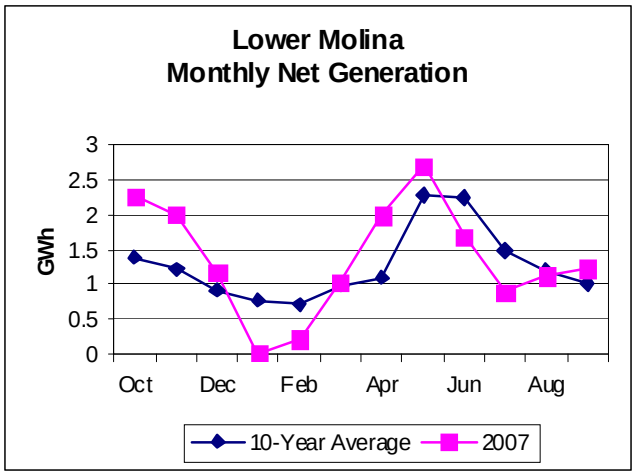
Generators

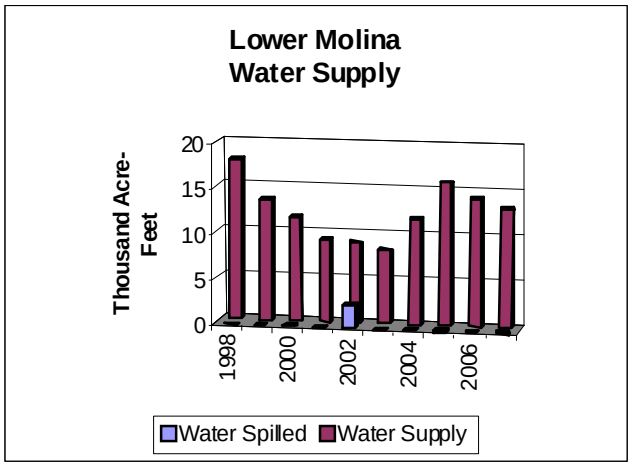
Lower Molina Generators
Existing Number and Capacity

Unit #	Original Capacity (kW)	Capacity Increased (kW)	Present Capacity (kW)
1	4,860	-	4,860
1 Unit	4,860	-	4,860

Generation

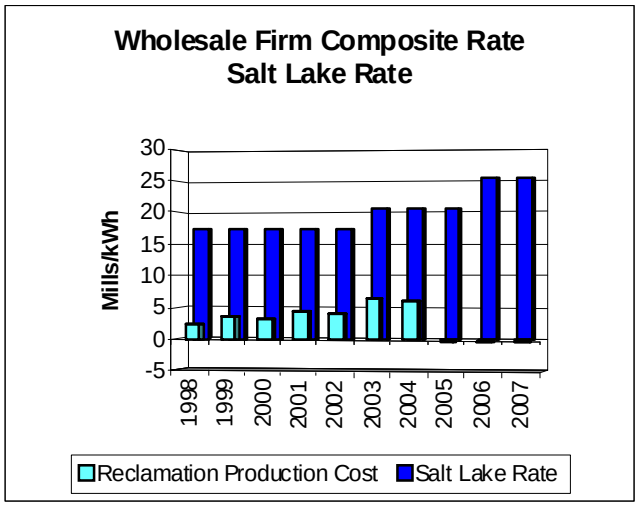

Lower Molina
Fiscal Year Net Generation
GWh
30
25
20
15
10
5
0
1998
2000
2002
2004
2006
Net Generation
10-Year Average


Lower Molina
Monthly Net Generation
GWh
3
2.5
2
1.5
1
0.5
0
Oct
Dec
Feb
Apr
Jun
Aug
10-Year Average
2007

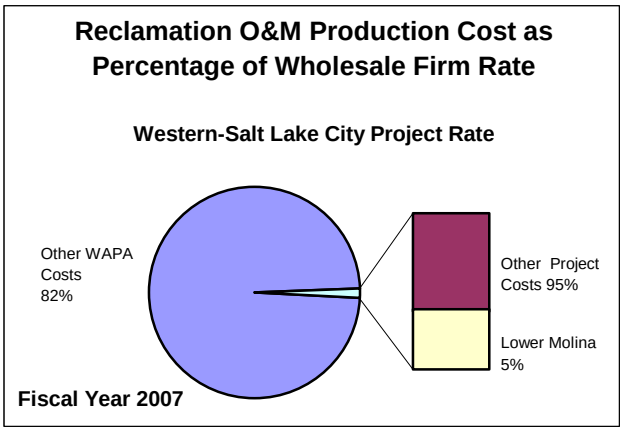

Lower Molina
Water Supply
Thousand Acre-Feet
20
15
10
5
0
1998
2000
2002
2004
2006
Water Spilled
Water Supply

Prime Laboratory Benchmarks

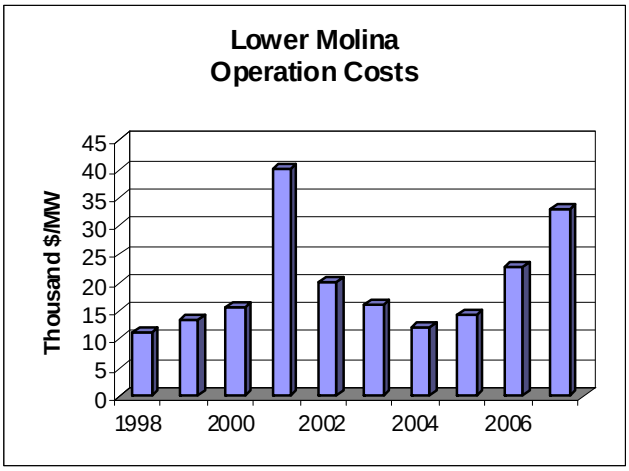
Benchmark 1
Wholesale Firm Rate

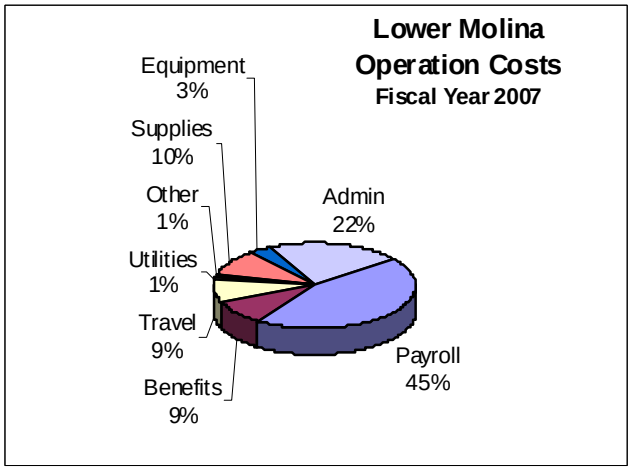


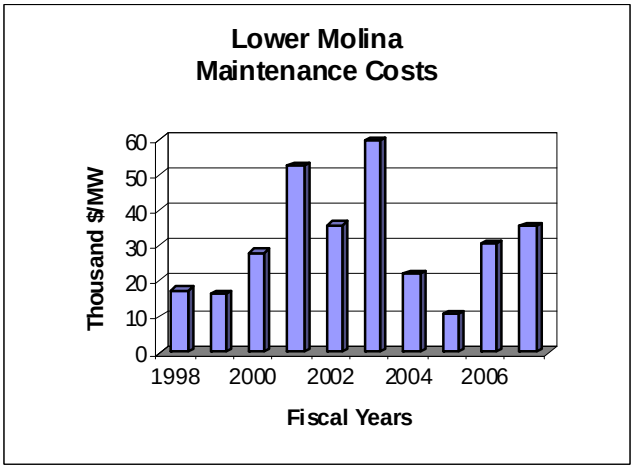
Benchmark 2
Reclamation's Production Cost as Percentage of Wholesale Firm Rate

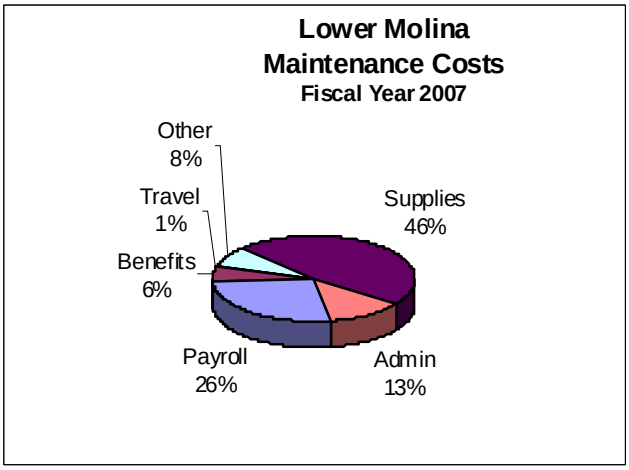


Benchmark 3
Production Cost

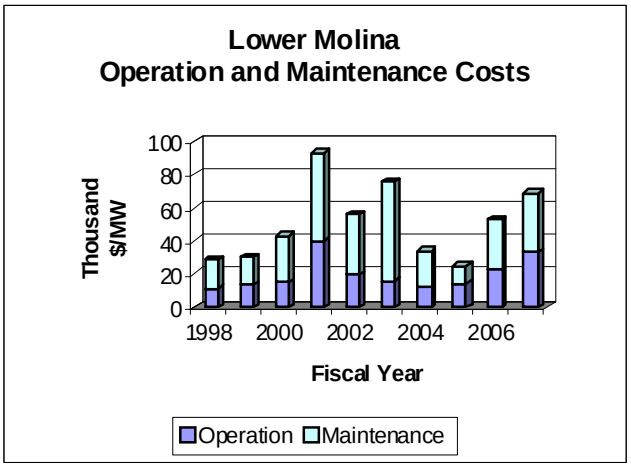


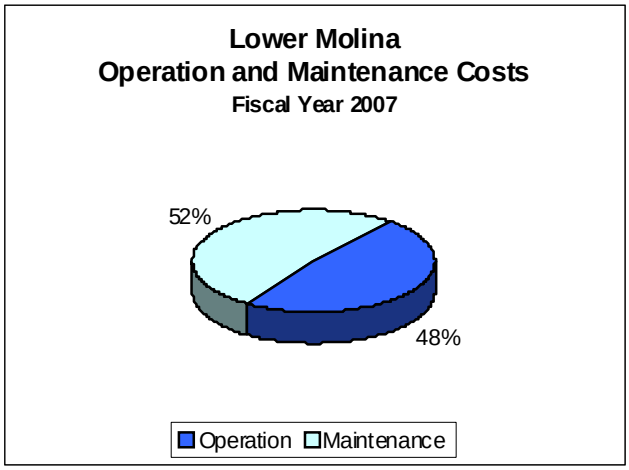


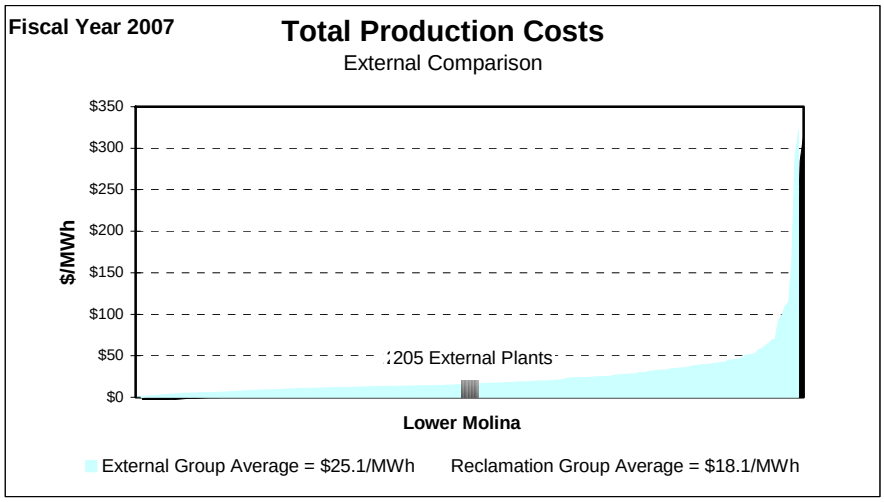


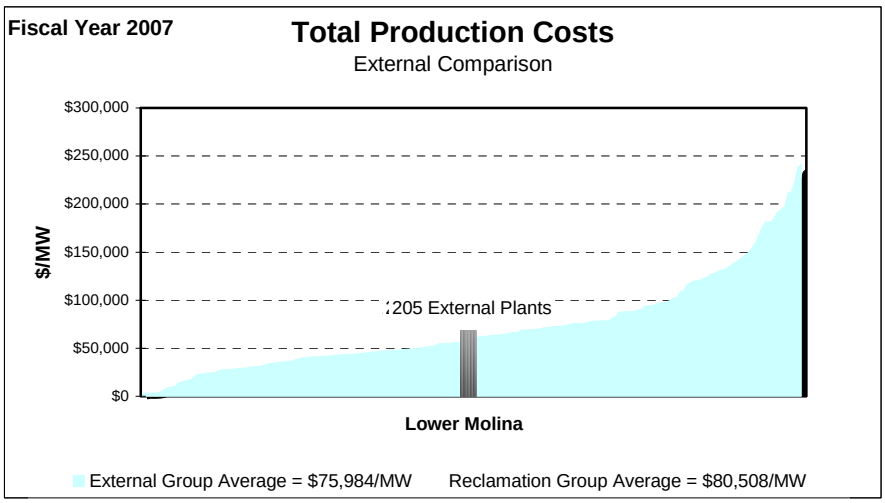


Benchmark 3
Production Cost



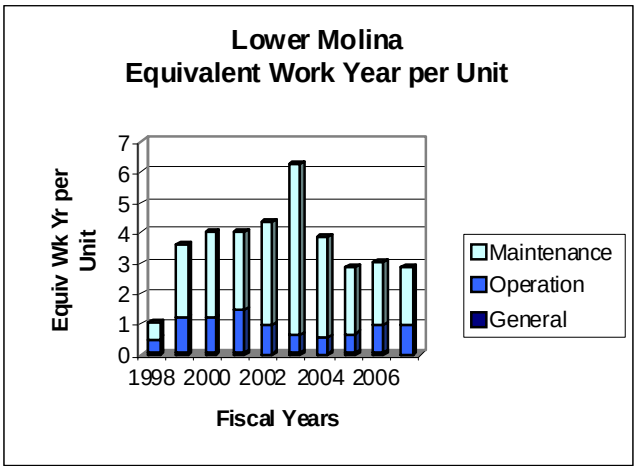


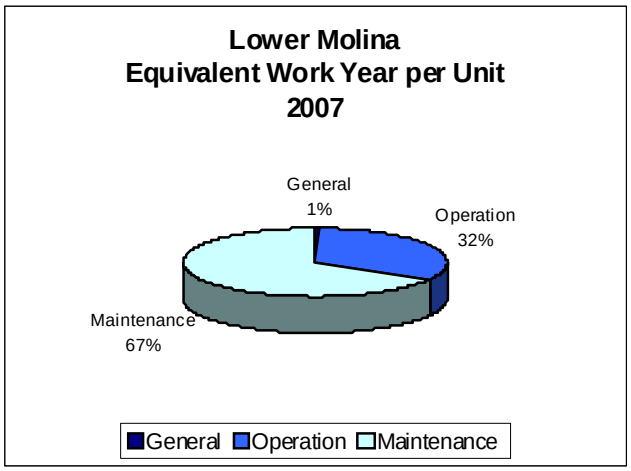


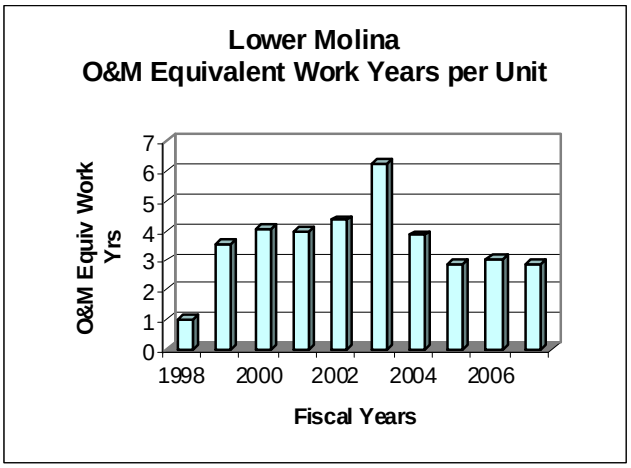


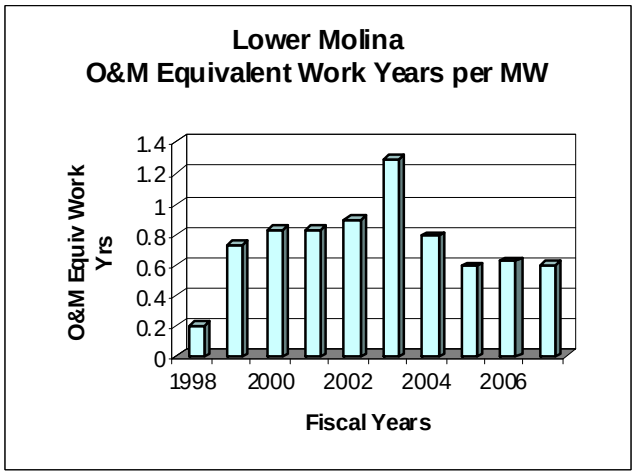
Benchmark 4
Workforce Deployment

Lower Molina 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	0.00	0.00	0.02	0.02	0.02	0.00
Operation	0.85	0.09	0.00	0.94	0.94	0.19
Maintenance	1.76	0.19	0.00	1.95	1.95	0.40
Total Staffing	2.61	0.28	0.02	2.90	2.90	0.60

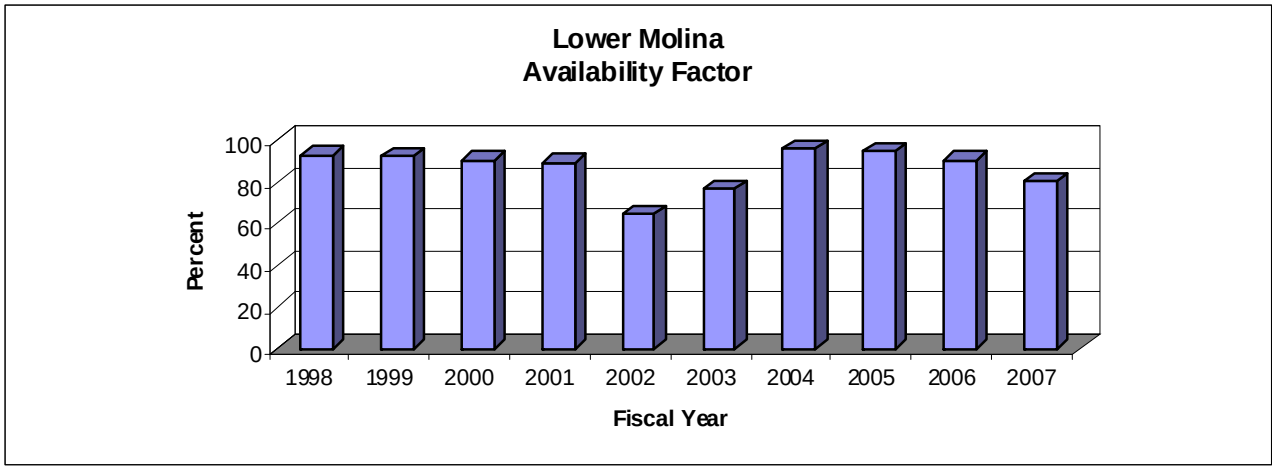




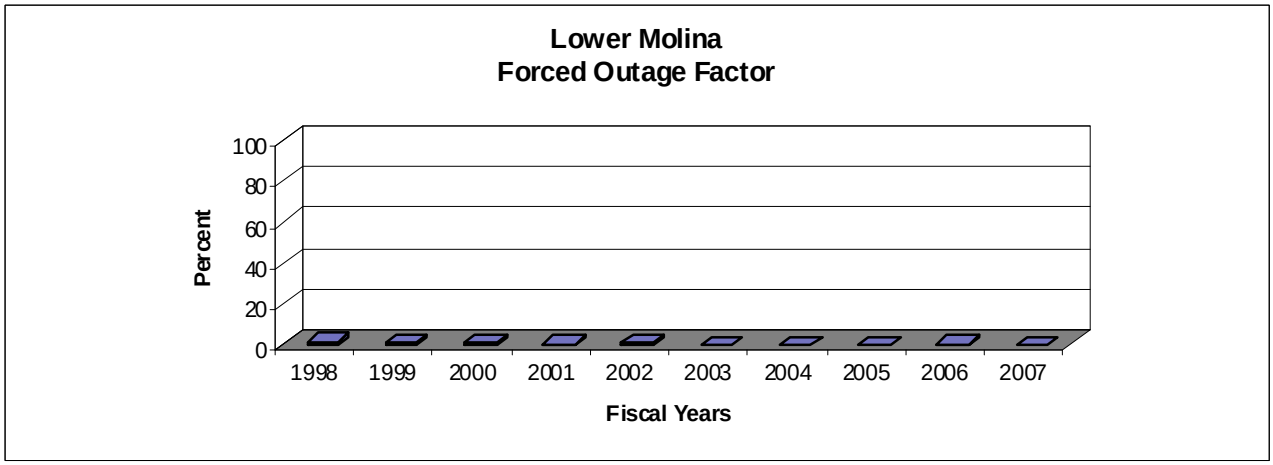




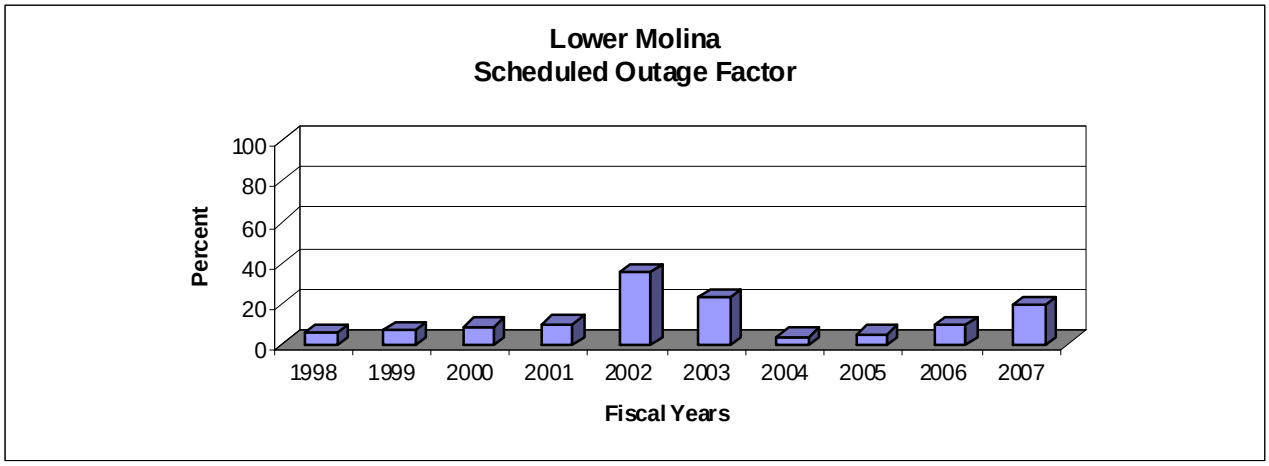
Benchmark 5
Availability Factor



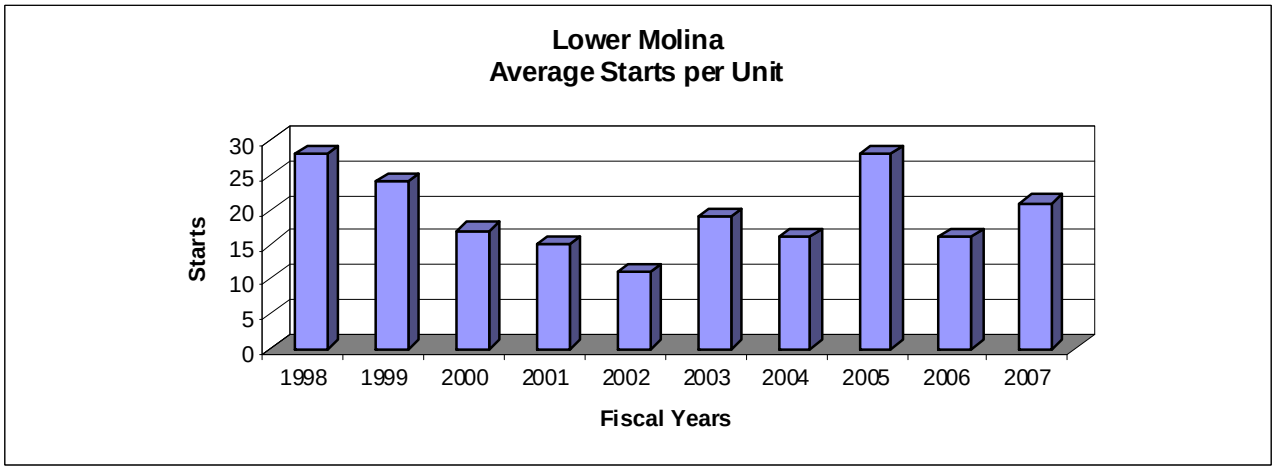
Benchmark 6
Forced Outage Factor



Benchmark 7
Scheduled Outage Factor



Starts



Benchmark Data Comparison					
Fiscal Year 2007	**Lower Molina Powerplant**	**Reclamation Average 0-10 MW Group**	**Total Reclamation Average**	**Industry Average**	**Best Performers**
Wholesale Firm Rate Mills/kWh	20.7	Not Applicable	*22.45	Not Available	Not Available
Production Cost as Percentage of Wholesale Firm Rate	0.3%	Not Applicable	12.1%	Not Applicable	Not Applicable
O&M Cost $/MWh	20.33	14.71	2.76	***25.9	1.00
O&M Costs $/MW	68,514	60,518	7,847	***75,984	2,897
O&M Equiv Work Year per MW	0.59	0.39	0.03	Not Available	0
Availability Factor	80.5	88.7	82.3	**88.64	98.54
Forced Outage Factor	0.0	0.9	2.6	**2.61	0.00
Scheduled Outage Factor	19.5	10.4	15.1	**8.74	0.00

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

McPhee Powerplant
Dolores Project

Plant Contact:
Vern Harrell
Cortez Project Office

Plant Address:
McPhee Powerplant
McPhee Dam CO

Telephone Numbers:
Phone: (970) 565-0865

E-Mail Address:
vharrell@uc.usbr.gov

Reclamation Region: Upper Colorado

NERC Region: Western Electricity Coordinating Council, Rocky Mountain Power Area

PMA Service Area: Western Area Power Administration, Colorado River Storage Project Management Center

Project Authorization: The Congress authorized the Dolores Project under the Colorado River Basin Act of September 30, 1968 (Public Law 90-537), as a participating project under the Colorado River Storage Project Act of April 11, 1956 (Public Law 84-485).

Project Purposes: The Dolores Project, located in the Dolores River Basin in southwestern Colorado, develops water from the Dolores River for irrigation, municipal and industrial use, recreation, fish and wildlife, and production of hydroelectric power. It also provides flood control and aids economic redevelopment.

Power plants are located on McPhee Dam and the Towaoc Canal to generate an annual average of 36,578,000 kilowatt-hours, which enters the Colorado River Storage Project power transmission system. The McPhee Dam facility operates year-round on fishery releases from McPhee Reservoir.

Plant Location: McPhee Powerplant is located 10 miles north of Dolores, Colorado, in Montezuma County, Colorado, on the Dolores River.

Plant Facts: McPhee Dam is a rolled earth, sand, gravel, and rockfill structure with a volume of approximately 5,029,000 cubic yards. The crest of the dam is 270 feet above streambed, 1,300 feet long and 30 feet wide. A gated spillway located in the right abutment includes a concrete chute leading to a stilling basin.

The McPhee Dam Powerplant consists of a penstock located within the River-Outlet-Works tunnel of the dam, two turbines and a generator at the base of the dam, and a 4.5-mile, 12.5-kilovolt transmission line to Great Cut Switchyard.

Plant Purpose: McPhee Powerplant provides energy for project use.

Plant History: The powerplant is operated and maintained under a contract with the Dolores Water Conservancy District. The powerplant was out of service from September 1994 to January 1997 due to a turbine problem.

Present Activities: Normal operations

Future Planned Activities: None

Special Issues: Shutdown in May 2002 through the rest of the water year due to lack of water.

River:	Dolores River	**Plant Type:**	Conventional
Powerhouse Type:	Above Ground	**Turbine Type:**	Francis
Original Nameplate Capacity:	1,283 kW	**Installed Capacity:**	1,283 kW
Year of Initial Operation:	1993	**Age:**	15 years
Net Generation (FY-2007):	5.3 GWh	**Rated Head:**	215 feet
Average Plant Factor (FY-2007):	47.5 percent	**Remotely Operated:**	Yes
Production Mode:	Peaking		

Ancillary Services

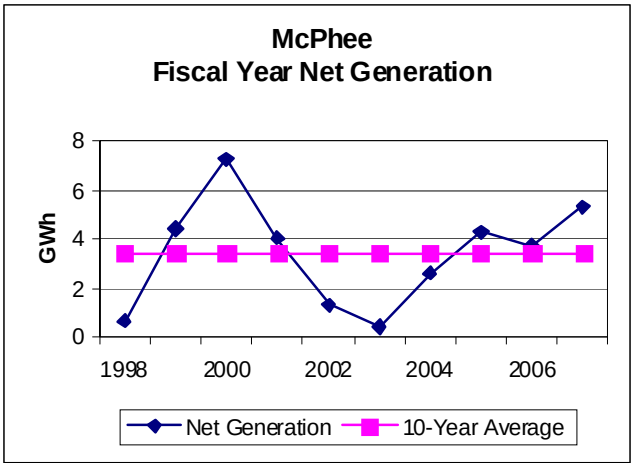
McPhee Ancillary Services	
Spinning Reserve	No
Non-Spinning Reserve	No
Replacement Reserve	No
Regulation/Load Following	No
Black Start	Yes
Voltage Support	Yes

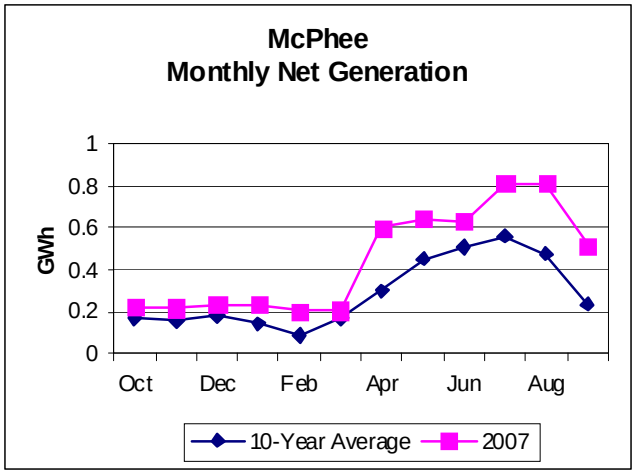
Black Start not probable, plant not in Western Area Power Administration's Black Start Plan.

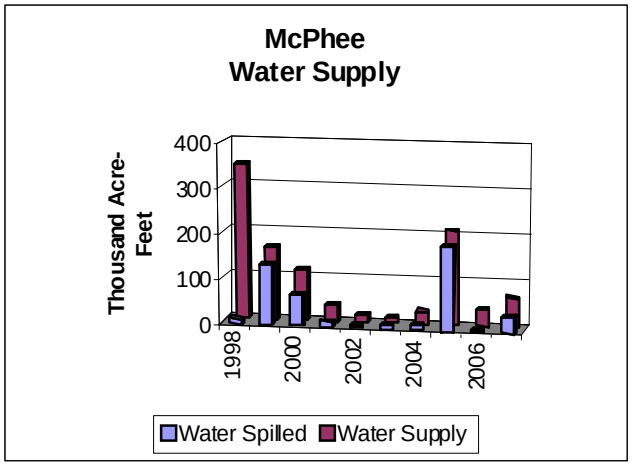
Generators

McPhee Generators Existing Number and Capacity			
Unit #	Original Capacity (kW)	Capacity Increased (kW)	Present Capacity (kW)
1	1,282	1	1,283
1 Unit	1,282	1	1,283

Generation

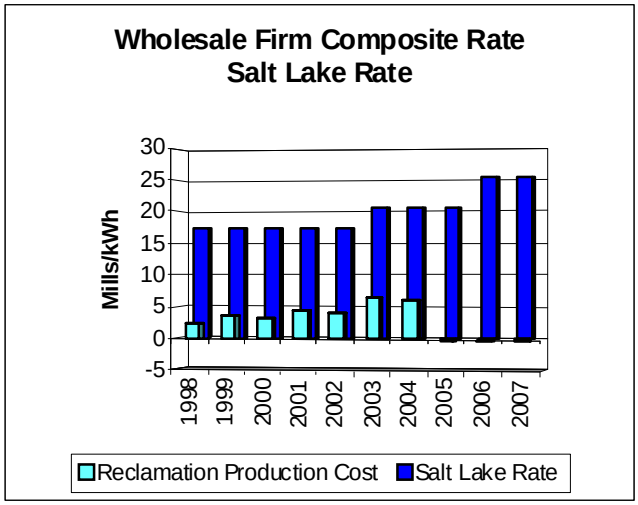

McPhee
Fiscal Year Net Generation
GWh
8
6
4
2
0
1998
2000
2002
2004
2006
Net Generation
10-Year Average


McPhee
Monthly Net Generation
GWh
1
0.8
0.6
0.4
0.2
0
Oct
Dec
Feb
Apr
Jun
Aug
10-Year Average
2007

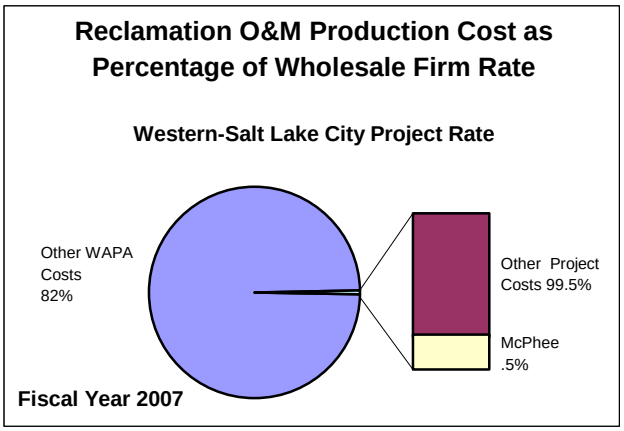

McPhee
Water Supply
Thousand Acre-Feet
400
300
200
100
0
1998
2000
2002
2004
2006
Water Spilled
Water Supply

Prime Laboratory Benchmarks

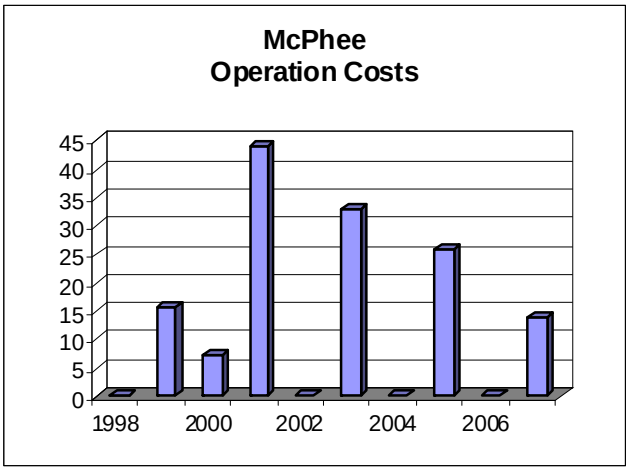
Benchmark 1
Wholesale Firm Rate

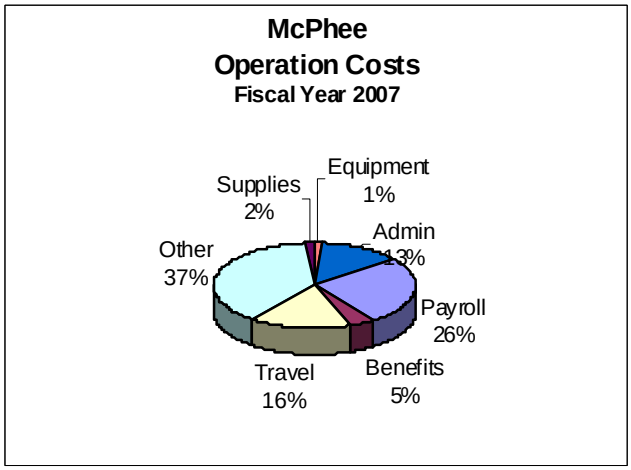


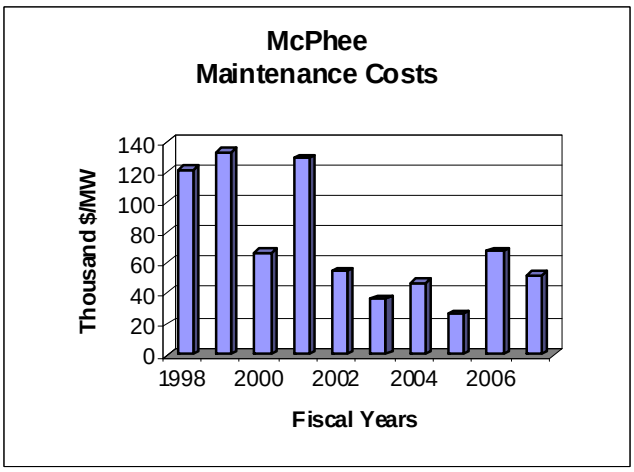
Benchmark 2
Reclamation's Production Cost as Percentage of Wholesale Firm Rate

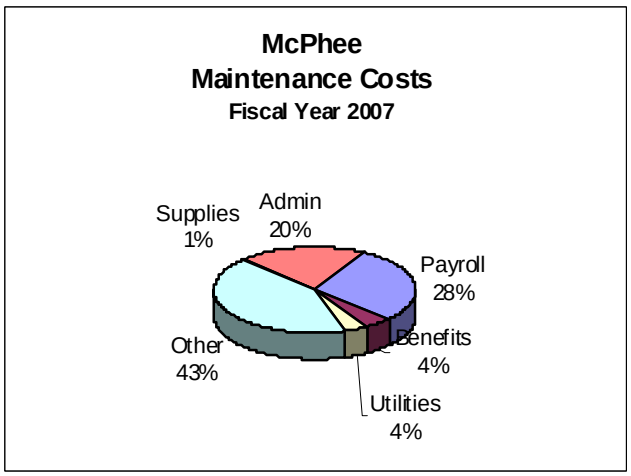


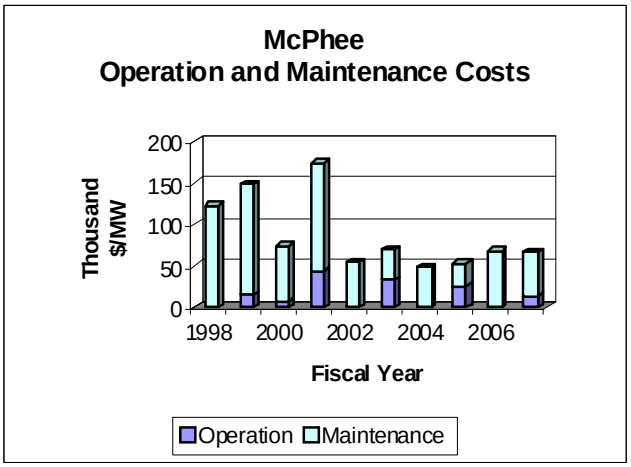
Benchmark 3
Production Cost

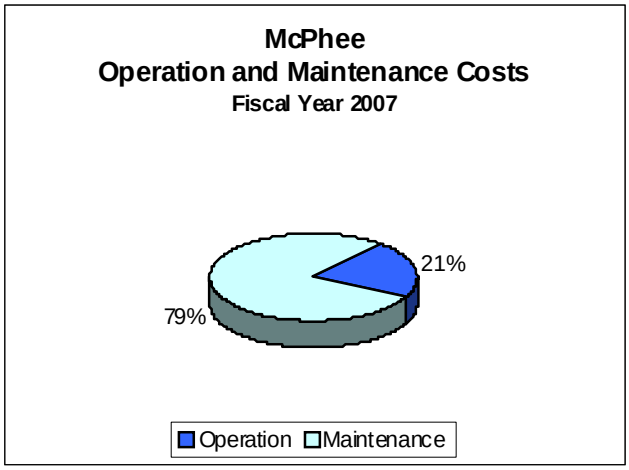






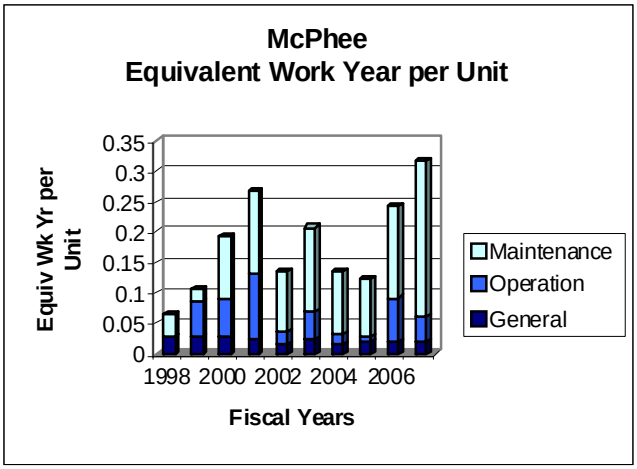


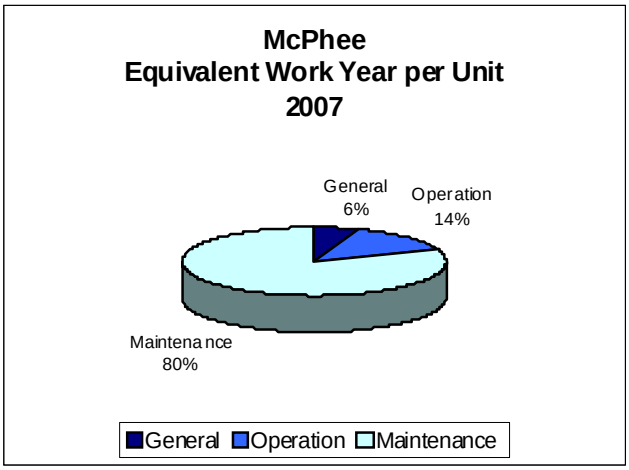


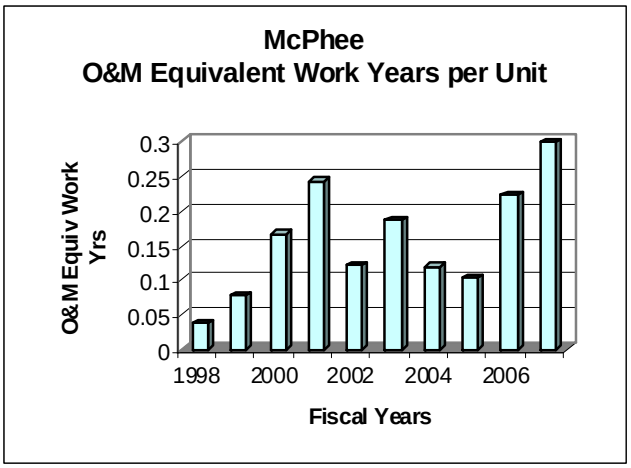


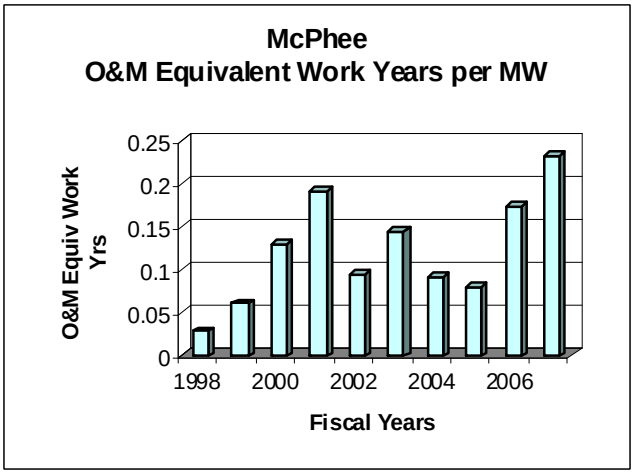
Benchmark 4
Workforce Deployment

McPhee 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	0.00	0.00	0.02	0.02	0.02	0.01
Operation	0.04	0.00	0.00	0.04	0.04	0.03
Maintenance	0.23	0.02	0.00	0.25	0.25	0.20
Total Staffing	0.27	0.03	0.02	0.32	0.32	0.25

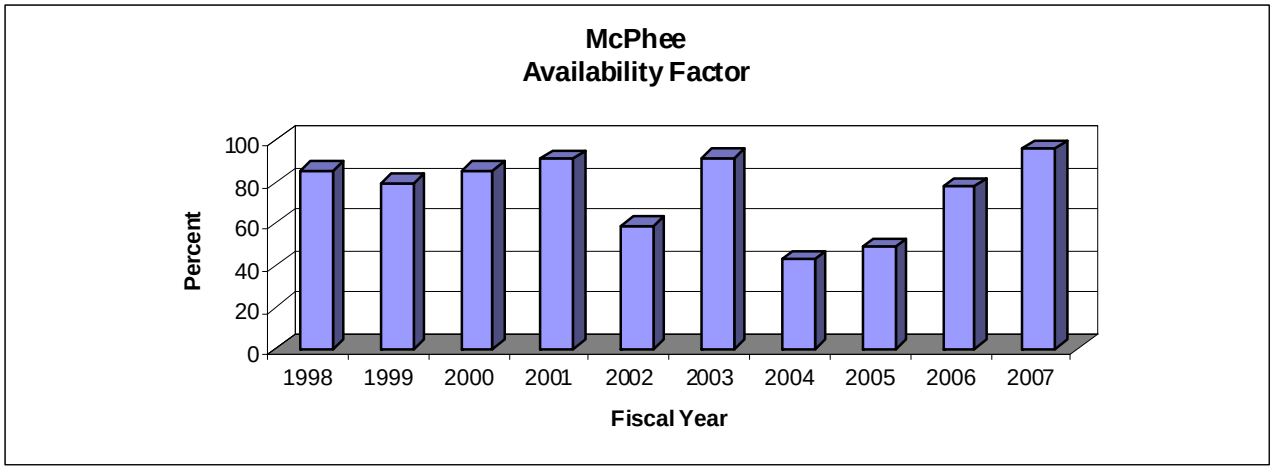




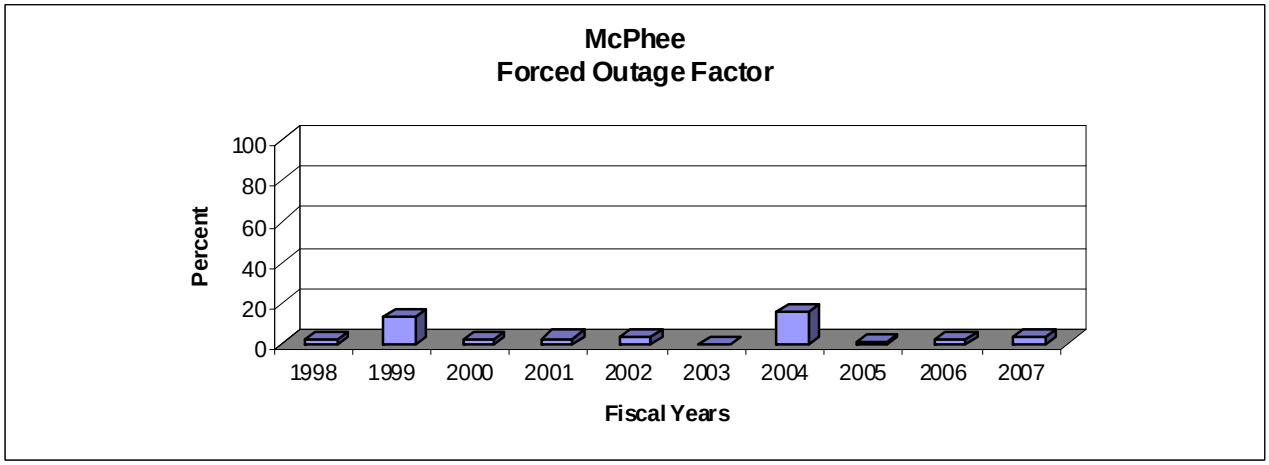




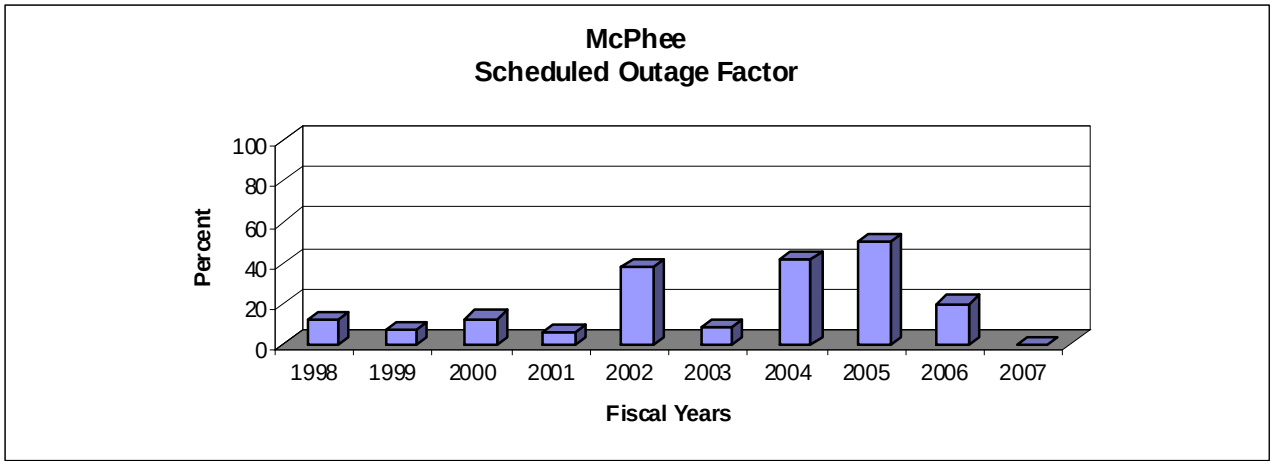
Benchmark 5
Availability Factor



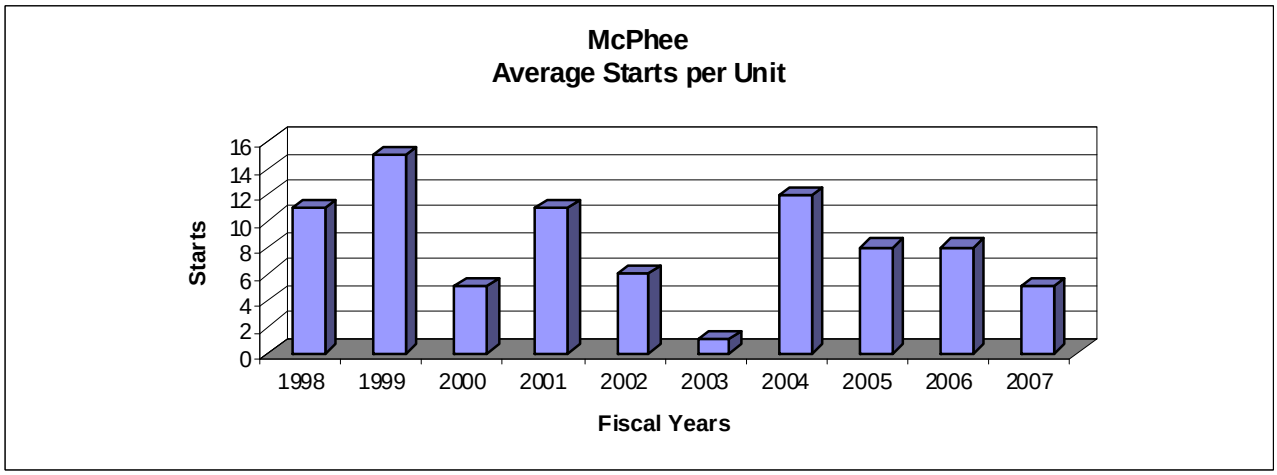
Benchmark 6
Forced Outage Factor



Benchmark 7
Scheduled Outage Factor



Starts



Benchmark Data Comparison

Fiscal Year 2007	McPhee Powerplant	Total Reclamation Average	Industry Average	Best Performers
Wholesale Firm Rate Mills/kWh	20.7	*22.45	Not Available	Not Available
Production Cost as Percentage of Wholesale Firm Rate	0.1%	12.1%	Not Applicable	Not Applicable
O&M Cost $/MWh	16.02	2.76	***25.9	1.00
O&M Costs $/MW	66,594	7,847	***75,984	2,897
O&M Equiv Work Year per MW	0.23	0.03	Not Available	0.00
Availability Factor	****78.2	82.3	**88.64	98.54
Forced Outage Factor	****1.8	2.6	**2.61	0.00
Scheduled Outage Factor	****20.0	15.1	**8.74	0.00

*Weighted by Net Generation
**2006 NERC Average
*** Energy Information Administration Data
**** Insufficient date to calculate

Morrow Point Powerplant
Colorado River Storage Project
Wayne N. Aspinall Storage Unit

Plant Contact:
Donald Phillips, Manager
Curecanti Field Division

Plant Address:
Morrow Point Powerplant
Montrose CO

Telephone Numbers:
Phone: (970) 240-6300
Fax: (970) 240-6304

E-Mail Address:
dphillips@uc.usbr.gov

Reclamation Region: Upper Colorado

NERC Region: Western Electricity Coordinating Council, Rocky Mountain Power Area

PMA Service Area: Western Area Power Administration, Colorado River Storage Project Management Center

Project Authorization: The Congress authorized construction of four storage units in the Colorado River Storage Project and 11 participating projects on April 11, 1956 under Public Law 485, 84th Congress, 70 Stat. 105. Additional projects have been added since the original legislation was adopted.

Project Purposes: The Colorado River Storage Project provides for the comprehensive development of the Upper Colorado River Basin. The project furnishes the long-time regulatory storage needed to permit States in the upper basin to meet their flow obligation at Lees Ferry, Arizona, (as defined in the Colorado River Compact) and still use their apportioned water.

Plant Location: The Morrow Point Powerplant is located on the Gunnison River in Montrose County, Colorado, 22 miles east of Montrose, Colorado.

Plant Facts: The Morrow Point Powerplant chamber is tunneled into the canyon wall in the left abutment about 400 feet below the ground surface. The powerplant chamber is 231 feet long and 57 feet wide with a height ranging from 65 to 134 feet. There are two 86,667-kilowatt generators driven by two 83,000-horsepower turbines. The power penstocks consist of 13.5-foot-diameter steel lines in 18-foot-diameter tunnels.

The Morrow Point Dam is Reclamation's first thin-arch, double-curvature dam. It is 468 feet high, 52 feet thick at the base, and 12 feet thick at the crest. The dam has a crest length of 724 feet and a volume of 365,180 cubic yards of concrete.

Plant Purpose: Generation of hydroelectric power for the upper basin and adjacent areas.

Plant History: The generators were up rated from 60,000 kW to 86,667 kW in 1992 and 1993. Replaced the three single-phase transformers in FY-1996 and the 230 kilovolt cable in FY-1998. Also replaced the unit circuit breakers in FY-1992. In 2002, surge arresters were replaced in switchyard for new 230Kv underground cable and new governors were installed. In addition, cleaned trash racks and dredged river in 2002. In 2003 additional river material was removed. Guard Rail installed on access road to top of Dam in 2004. Replaced powerplant and transformer duplex strainers, replaced UPS system and Battery chargers for powerplant in 2005. Changed the old data logger to PLC trending and monitoring.

Present Activities: Replacing all 480V and 208V power panels in the plant , dam and visitor center.

Future Planned Activities: New plant fire alarm system, new switchyard CCVT's. Replace generator vibration monitors. Install new SEL protection for both units and for plant station service

Special Issues: None

River:	Gunnison River	**Plant Type:**	Conventional
Powerhouse Type:	Below Ground	**Turbine Type:**	Francis
Original Nameplate Capacity:	120,000 kW	**Installed Capacity:**	173,334 kW
Year of Initial Operation:	1970	**Age:**	37 years
Net Generation (FY-2007):	292.9 GWh	**Rated Head:**	396 feet
Average Plant Factor (FY-2007):	19.4 percent	**Remotely Operated:**	Yes
Production Mode:	Peaking		

Ancillary Services

Morrow Point
Ancillary Services

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

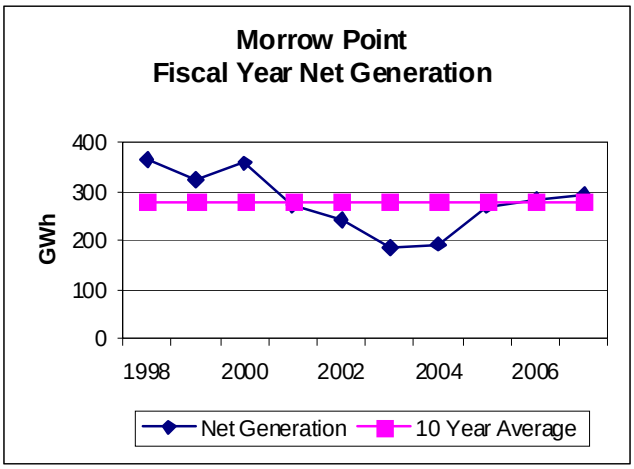
Generators

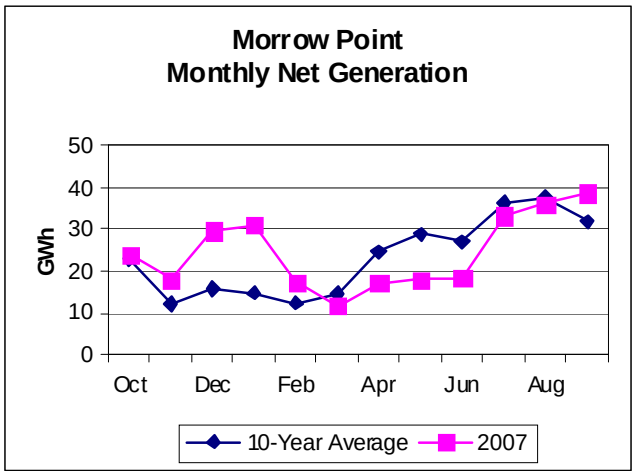
Morrow Point Generators

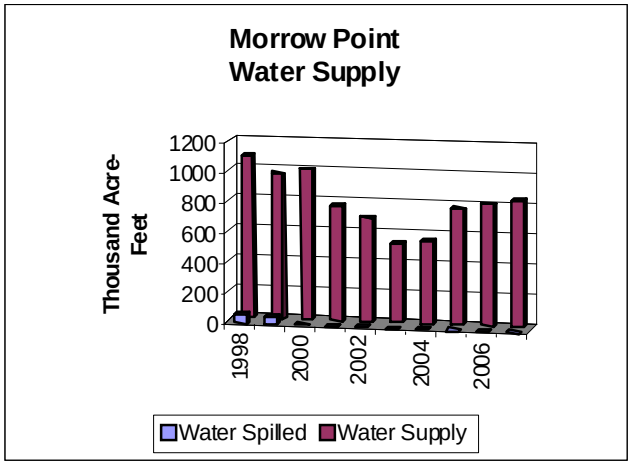
Existing Number and Capacity

Unit #	Original Capacity (kW)	Capacity Increased (kW)	Present Capacity (kW)
1	60,000	26,667	86,667
2	60,000	26,667	86,667
2 units	120,000	53,334	173,334

Generation

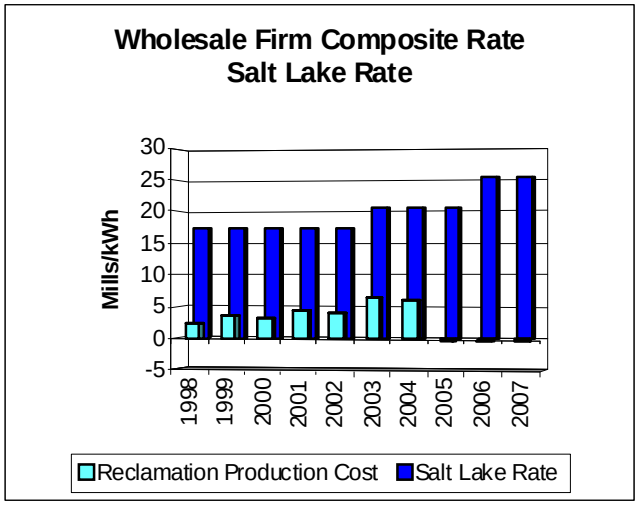

Morrow Point
Fiscal Year Net Generation
GWh
400
300
200
100
0
1998
2000
2002
2004
2006
Net Generation
10 Year Average


Morrow Point
Monthly Net Generation
GWh
50
40
30
20
10
0
Oct
Dec
Feb
Apr
Jun
Aug
10-Year Average
2007

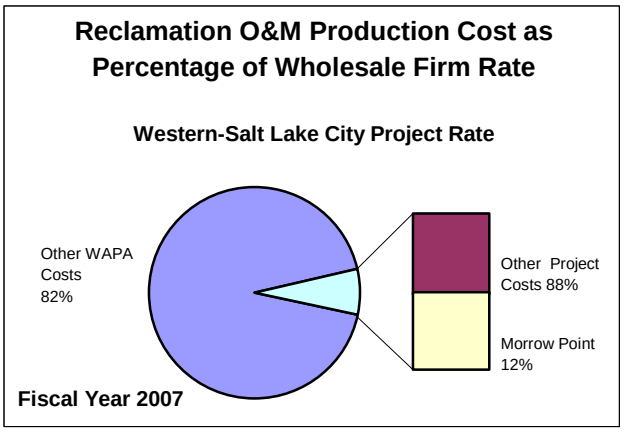

Morrow Point
Water Supply
Thousand Acre-Feet
1200
1000
800
600
400
200
0
1998
2000
2002
2004
2006
Water Spilled
Water Supply

Prime Laboratory Benchmarks

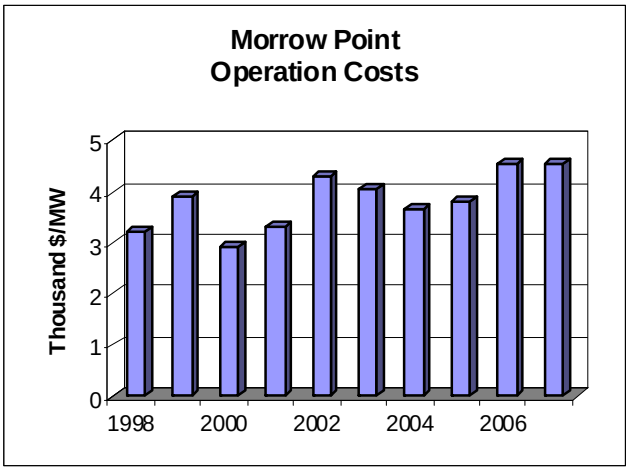
Benchmark 1
Wholesale Firm Rate

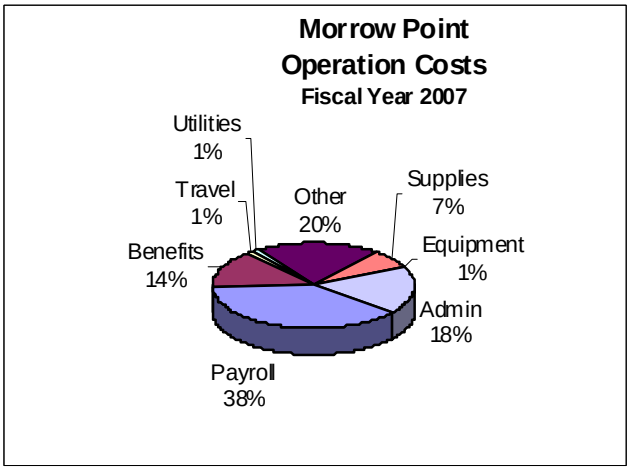


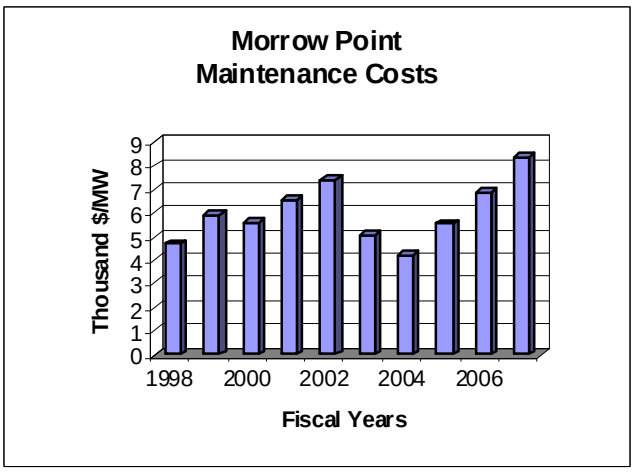
Benchmark 2
Reclamation's Production Cost as Percentage of Wholesale Firm Rate

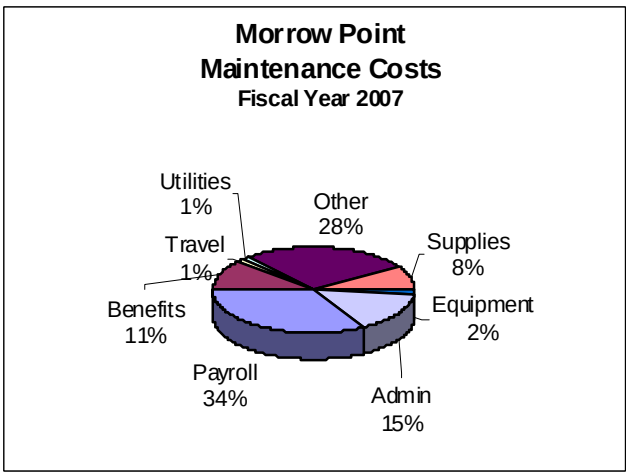


Benchmark 3
Production Cost

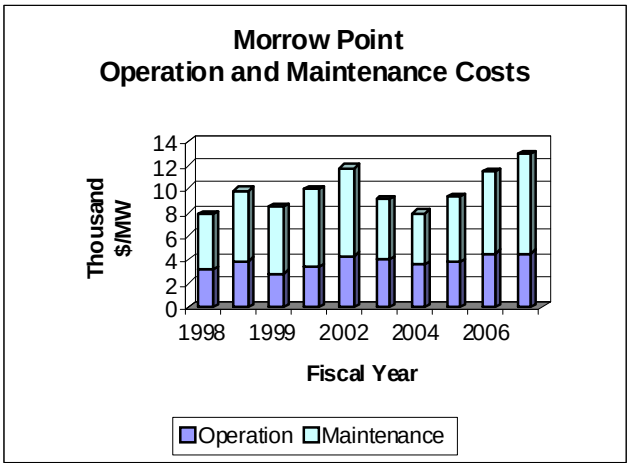


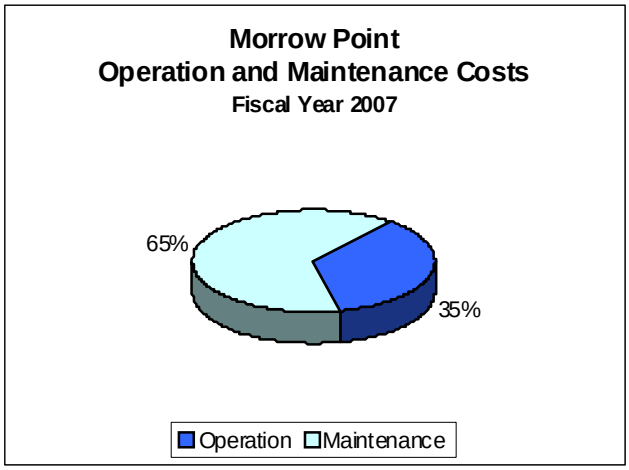


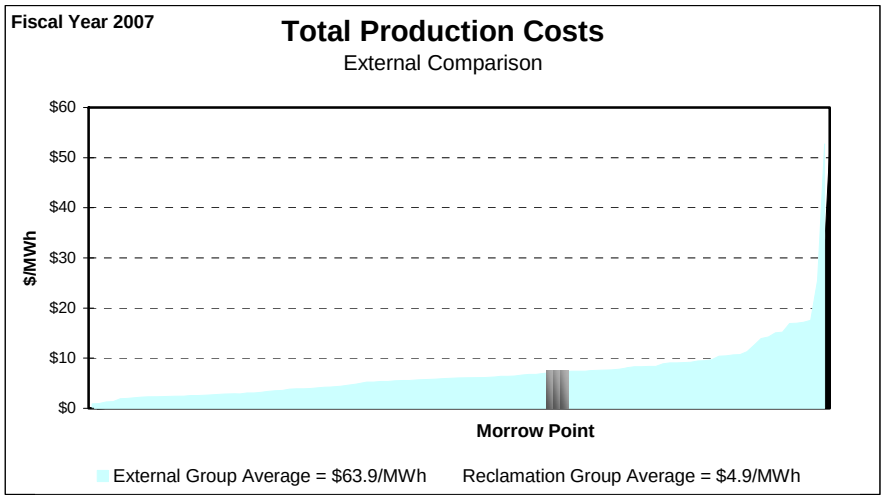


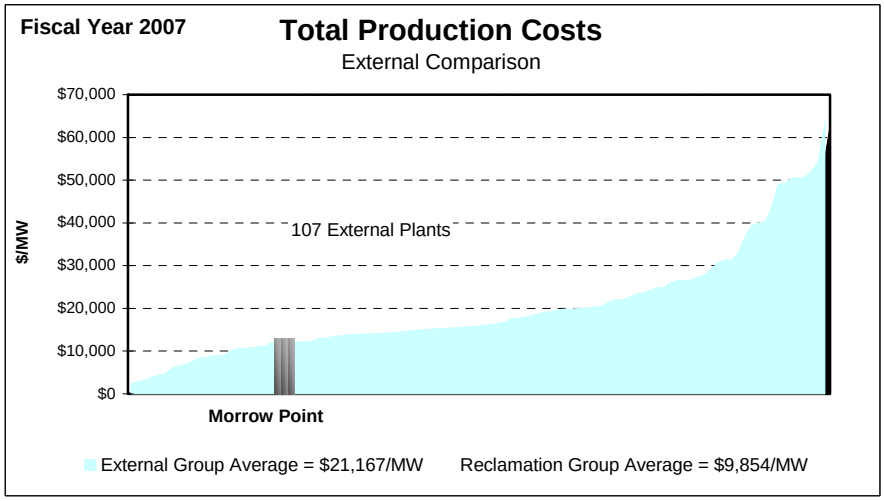


Benchmark 3
Production Cost



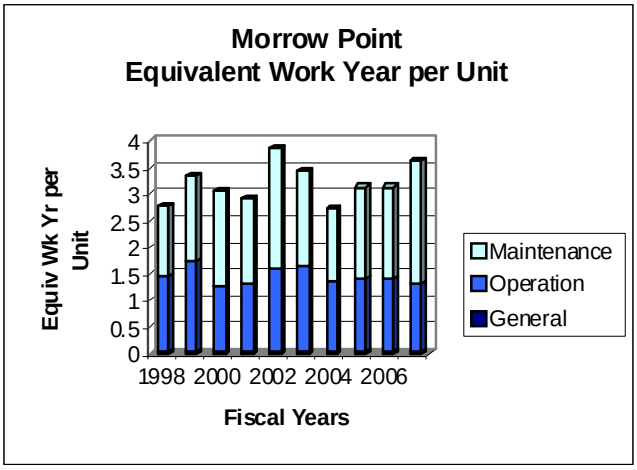


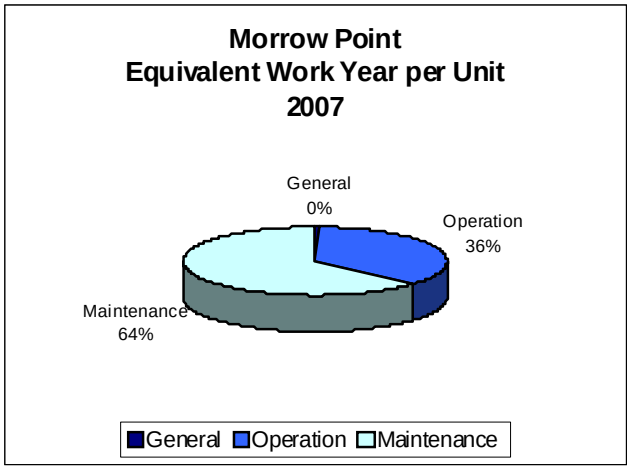


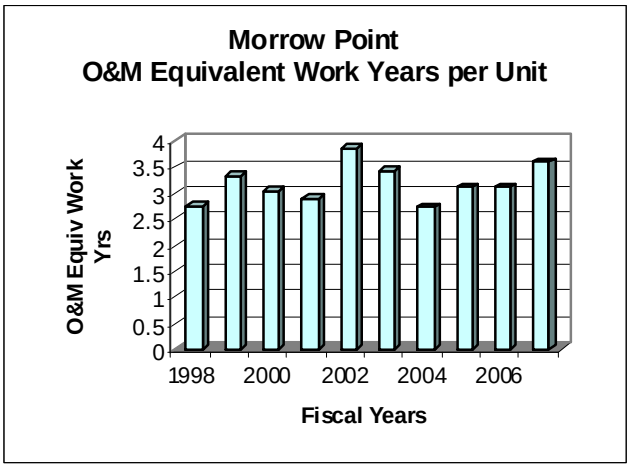


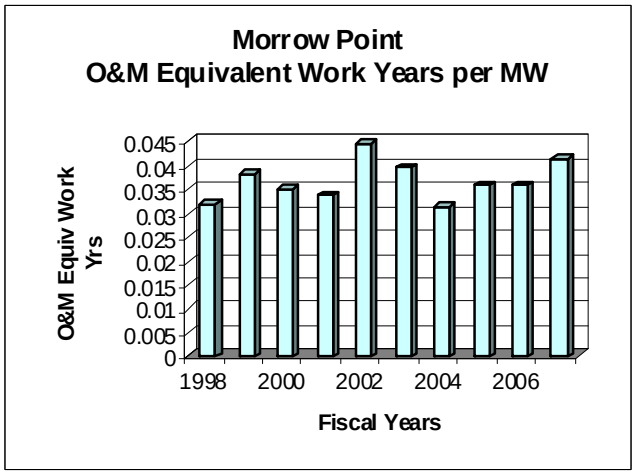
Benchmark 4
Workforce Deployment

Morrow Point 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	0.00	0.00	0.04	0.04	0.02	0.00
Operation	2.37	0.25	0.00	2.62	1.31	0.02
Maintenance	4.15	0.44	0.00	4.59	2.29	0.03
Total Staffing	6.52	0.69	0.04	7.25	3.62	0.04

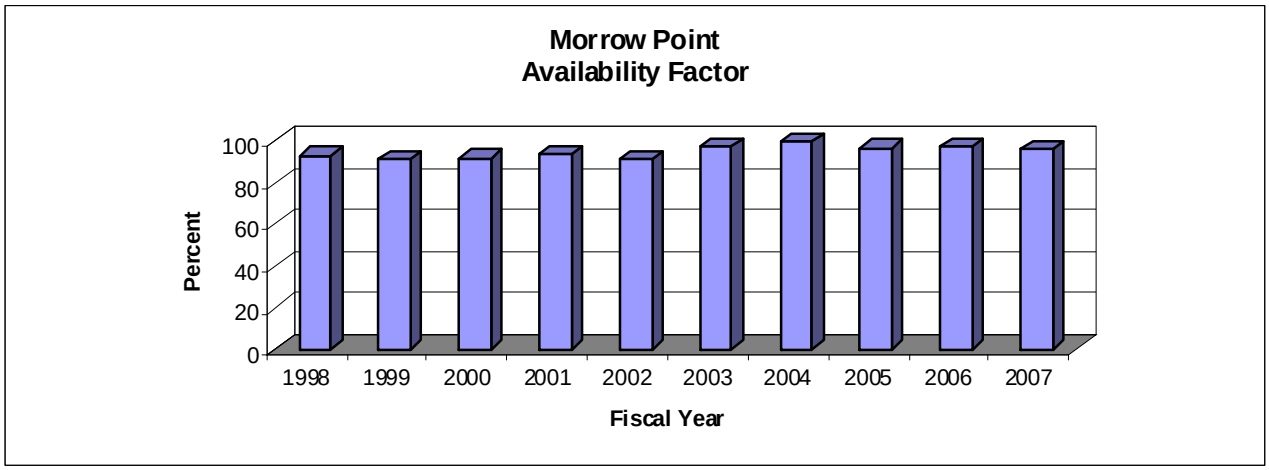




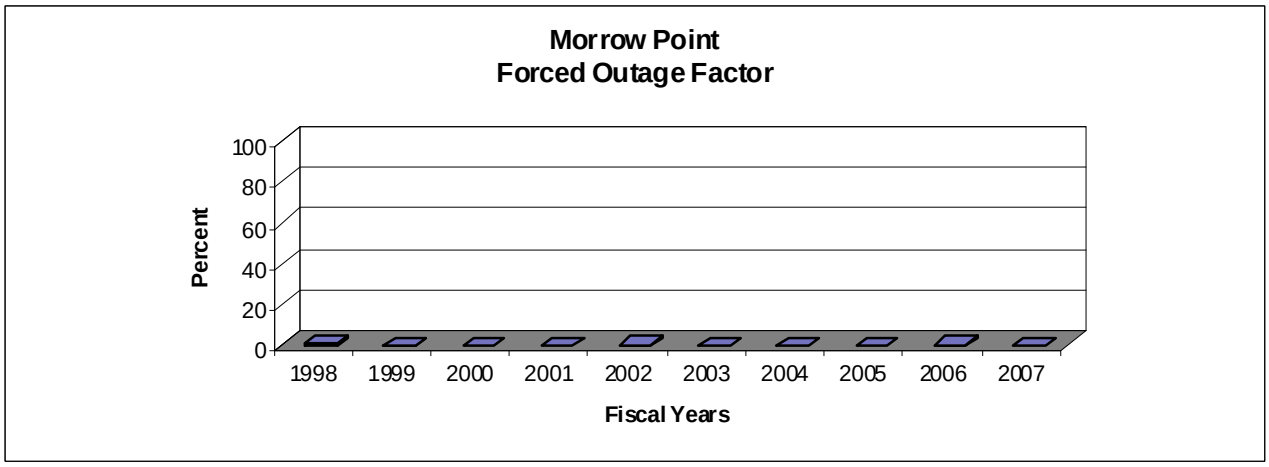




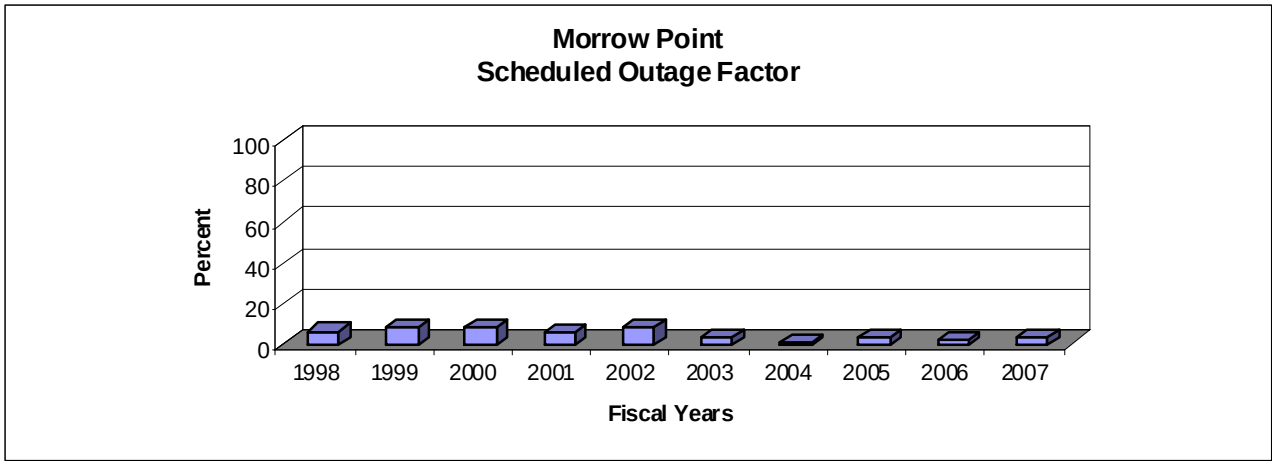
Benchmark 5
Availability Factor



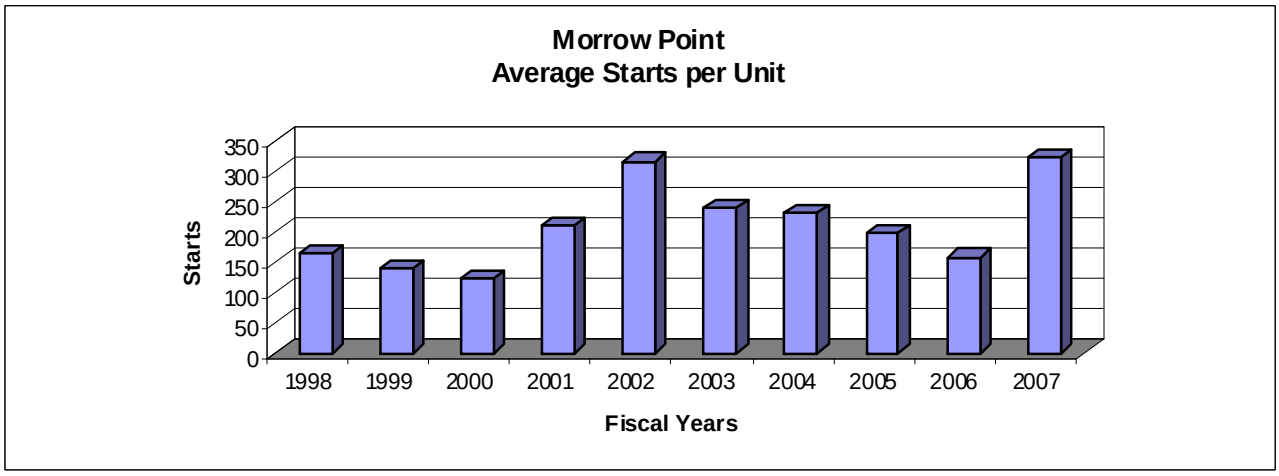
Benchmark 6
Forced Outage Factor



Benchmark 7
Scheduled Outage Factor



Starts



Benchmark Data Comparison					
Fiscal Year 2007	**Morrow Point Powerplant**	**Reclamation Average 100-500 MW Group**	**Total Reclamation Average**	**Industry Average**	**Best Performers**
Wholesale Firm Rate Mills/kWh	20.7	Not Applicable	*22.45	Not Available	Not Available
Production Cost as Percentage of Wholesale Firm Rate	2.3%	Not Applicable	12.1%	Not Applicable	Not Applicable
O&M Cost $/MWh	7.66	4.44	2.76	***63.88	1.00
O&M Costs $/MW	12,941	10,502	7,847	***21,167	2,897
O&M Equiv Work Year per MW	0.04	0.04	0.03	Not Available	0.0
Availability Factor	96.3	83.5	82.3	**88.64	98.5
Forced Outage Factor	0.1	1.2	2.6	**2.61	0.0
Scheduled Outage Factor	3.6	15.4	15.1	**8.74	0.0

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

Towaoc Powerplant
Dolores Project

Plant Contact:
Vernon Harrell
Cortez Project Office

Plant Address:
Towaoc Powerplant
Cortez CO

Telephone Numbers:
Phone: (970) 565-0865

E-Mail Address:
vharrell@uc.usbr.gov

Reclamation Region: Upper Colorado

NERC Region: Western Electricity Coordinating Council, Rocky Mountain Power Area

PMA Service Area: Western Area Power Administration, Colorado River Storage Project Management Center

Project Authorization: The Dolores Project was authorized by the Colorado River Basin Act of September 30, 1968 (Public Law 90-537), as a participating project under the Colorado River Storage Project Act of April 11, 1956 (Public Law 84-485).

Project Purposes: The Dolores Project, located in the Dolores River Basin in southwestern Colorado, develops water from the Dolores River for irrigation, municipal and industrial use, recreation, fish and wildlife, and production of hydroelectric power. It also provides flood control and aids economic redevelopment.

Powerplants located on McPhee Dam and the Towaoc Canal generate an annual average of 16,500,000 kilowatt-hours, which enters the Colorado River Storage Project power transmission system. The Towaoc Powerplant operates from April to October on the irrigation water supply conveyed through the canal.

Plant Location: Towaoc Powerplant is located on the Towaoc Canal, 5 miles north of Cortez, Colorado, in Montezuma County, Colorado.

Plant Facts: Towaoc Canal heads the Dolores Canal 1.1 miles below the outlet of the Dolores Tunnel and extends southward for 39.5 miles to the full service lands in the Towaoc area. The canal is earth lined for 38 miles and concrete lined for 1.5 miles. It has an initial capacity of 420 cubic feet per second and a terminal capacity of 135 cubic feet per second.

A 78-inch-diameter, buried concrete-lined steel pipe penstock heads at a project works on the Dolores Canal and extends southwest into Hartman Draw to the powerhouse. The powerhouse consists of one turbine connected to a 11.495-megawatt generator.

Plant Purpose: Towaoc Powerplant provides energy to project facilities. Power is sold to Western Area Power Administration and the Project receives power from the Colorado River Storage Project for project pumping at a reduced rate.

Plant History: The powerplant is operated and maintained under a contract with the Dolores Water Conservancy District. The switchyard is maintained under a contract with Empire Electric Association Inc.

Present Activities: Normal operations

Future Planned Activities: None

Special Issues: Shutdown in August 2002 through the rest of the water year due to the lack of water.

River Name:	Towaoc Canal	**Plant Type:**	Conventional
Powerhouse Type:	Above Ground	**Turbine Type:**	Francis
Original Nameplate Capacity:	11,495 kW	**Installed Capacity:**	11,495 kW
Year of Initial Operation:	1993	**Age:**	14 years
Net Generation (FY-2007):	3.2 GWh	**Rated Head:**	415 feet
Annual Plant Factor (FY-2007):	3.6 percent (seasonal)	**Remotely Operated:**	Yes
Production Mode:	Base		

Ancillary Services

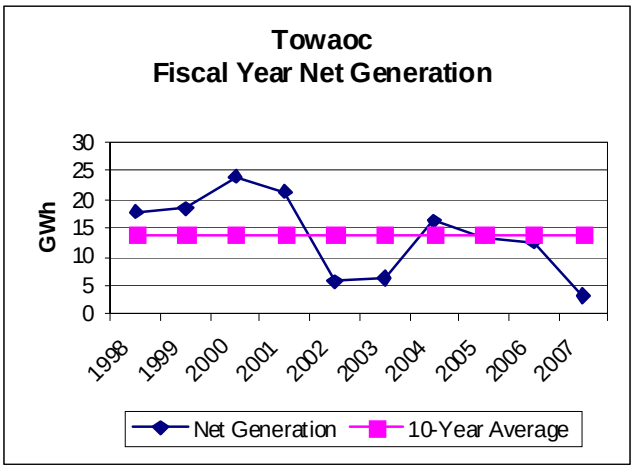
Towaoc Ancillary Services	
Spinning Reserve	No
Non-Spinning Reserve	No
Replacement Reserve	No
Regulation/Load Following	No
Black Start	Yes
Voltage Support	Yes

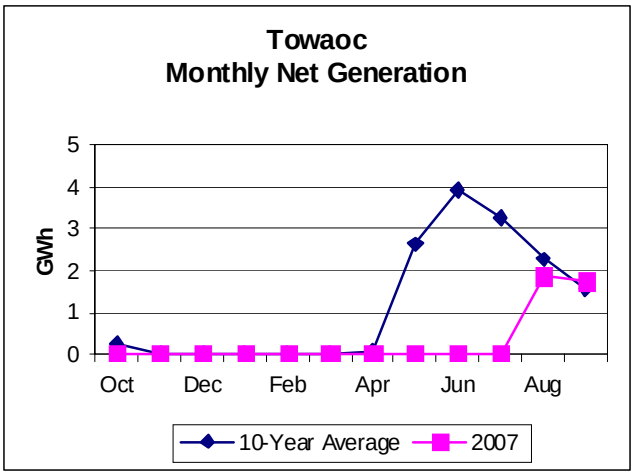
Black Start not probable, plant not in Western Area Power Administration's Black Start Plan.

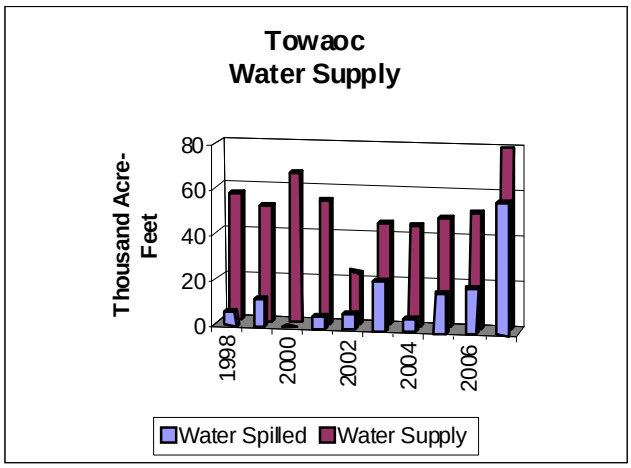
Generators

Towaoc Generators Existing Number and Capacity			
Unit #	Original Capacity (kW)	Capacity Increased (kW)	Present Capacity (kW)
2	11,495	-	11,495
1 unit	11,495	-	11,495

Generation

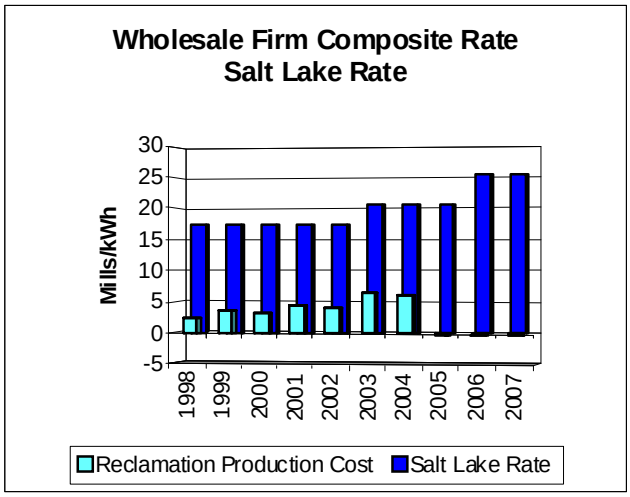

Towaoc
Fiscal Year Net Generation
GWh
30
25
20
15
10
5
0
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
Net Generation
10-Year Average


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

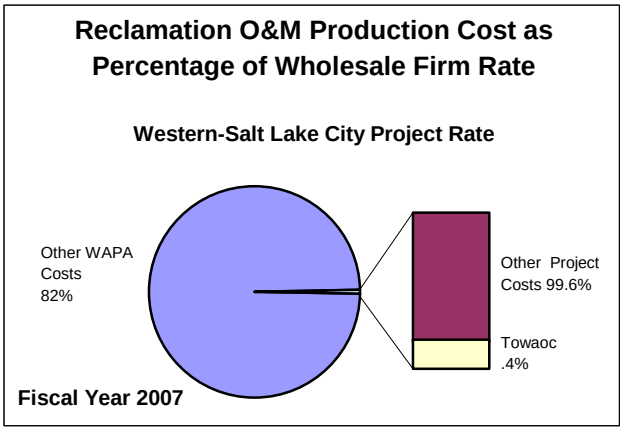

Towaoc
Water Supply
Thousand Acre-Feet
80
60
40
20
0
1998
2000
2002
2004
2006
Water Spilled
Water Supply

Prime Laboratory Benchmarks

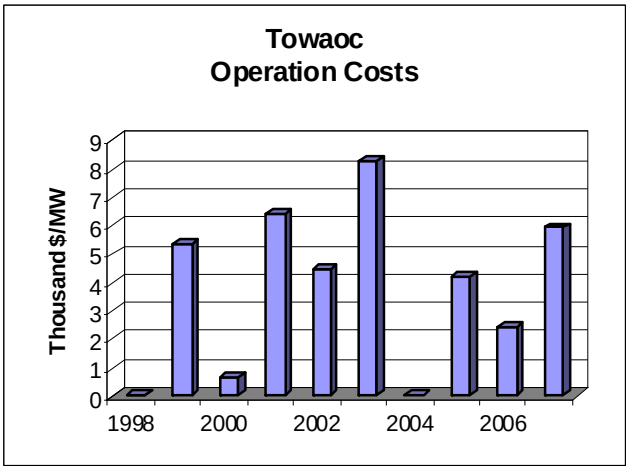
Benchmark 1
Wholesale Firm Rate

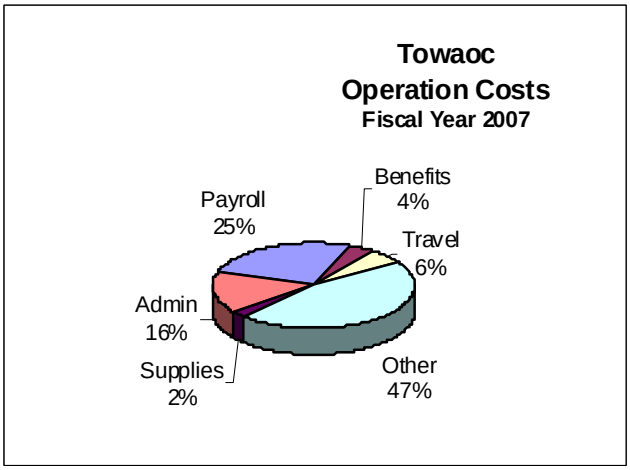


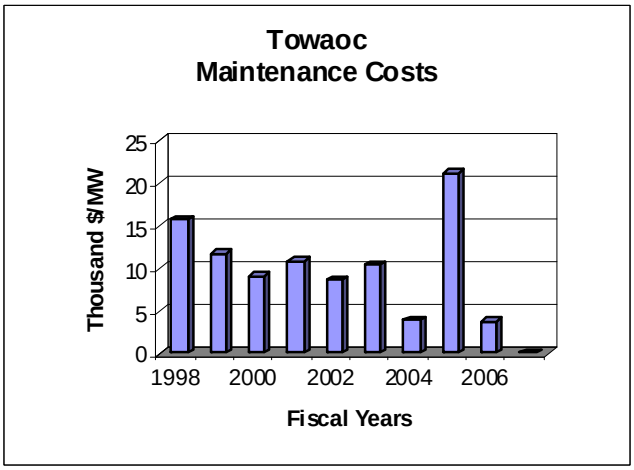
Benchmark 2
Reclamation's Production Cost as Percentage of Wholesale Firm Rate

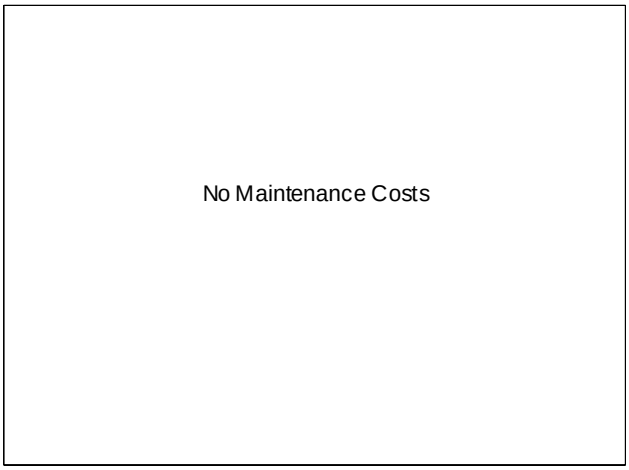


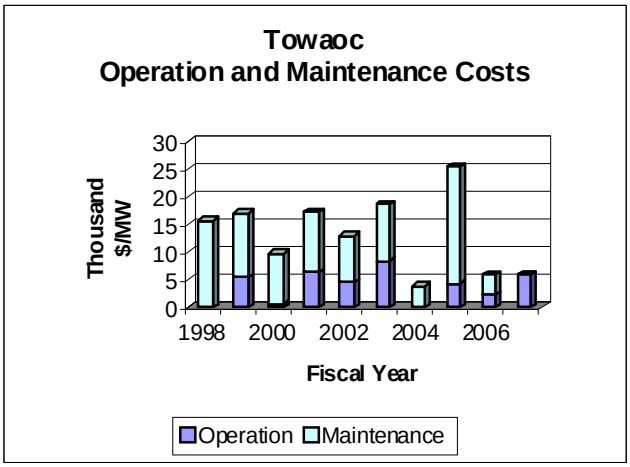
Benchmark 3
Production Cost

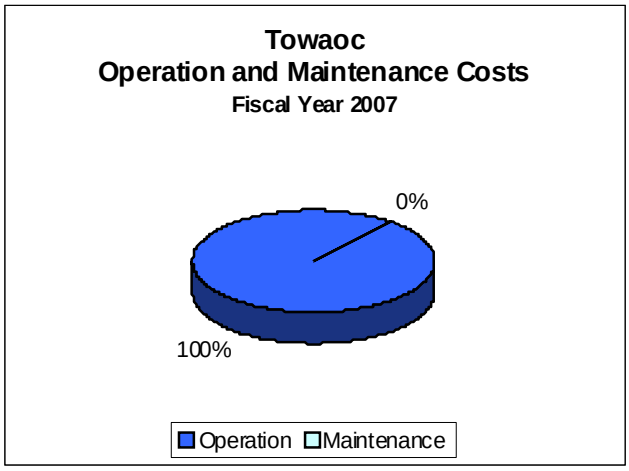






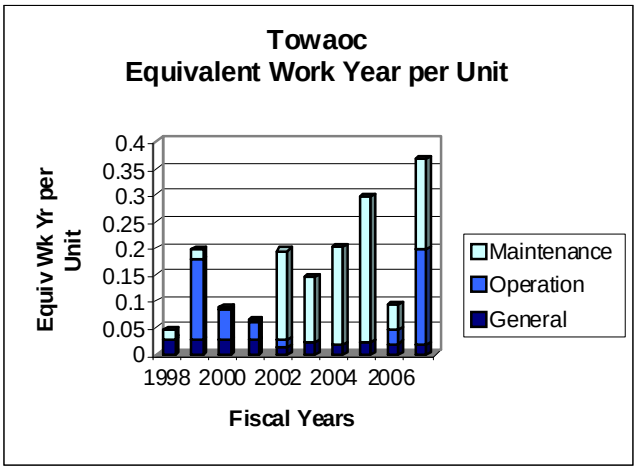


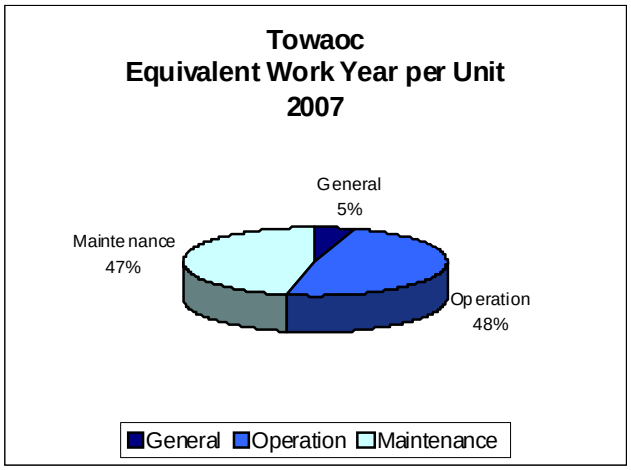


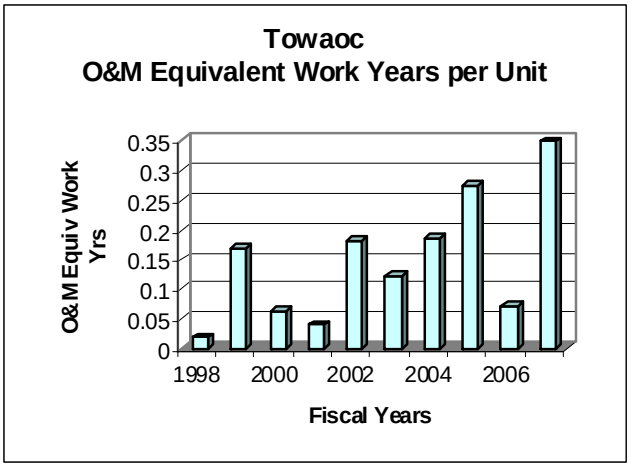


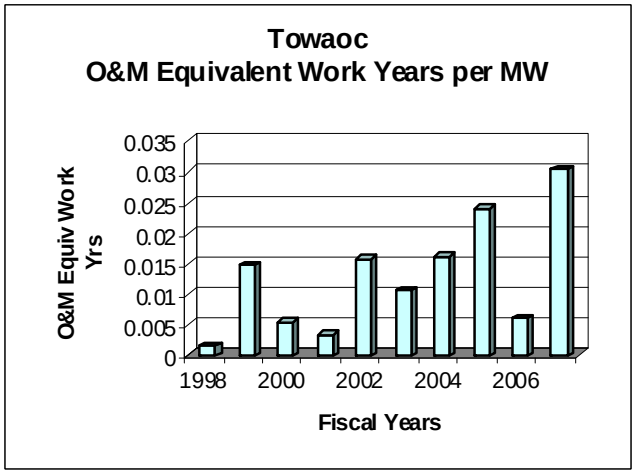
Benchmark 4
Workforce Deployment

Towaoc 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	0.00	0.00	0.02	0.02	0.02	0.00
Operation	0.16	0.02	0.00	0.18	0.18	0.02
Maintenance	0.15	0.02	0.00	0.17	0.17	0.01
Total Staffing	0.32	0.03	0.02	0.37	0.37	0.03

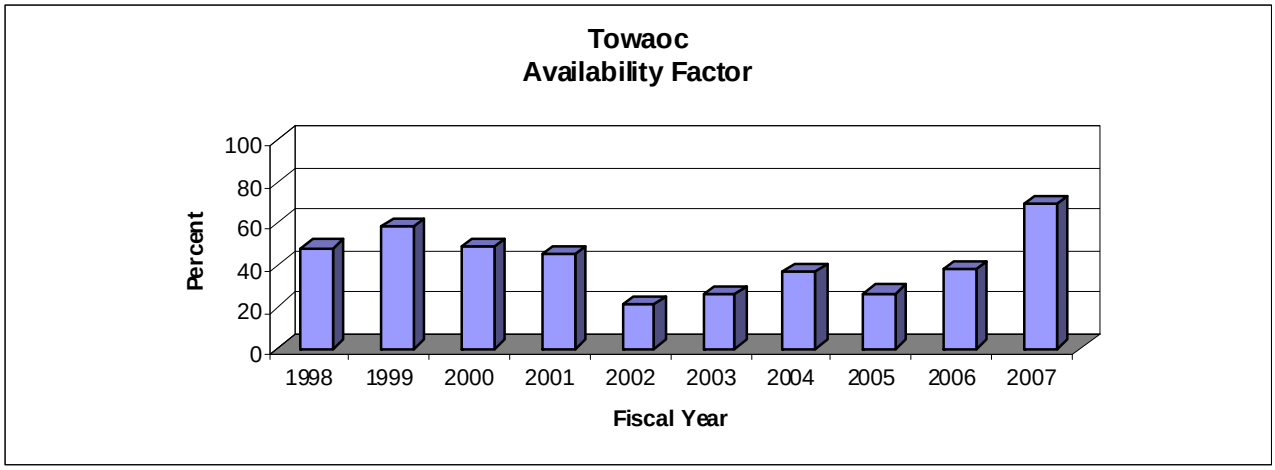






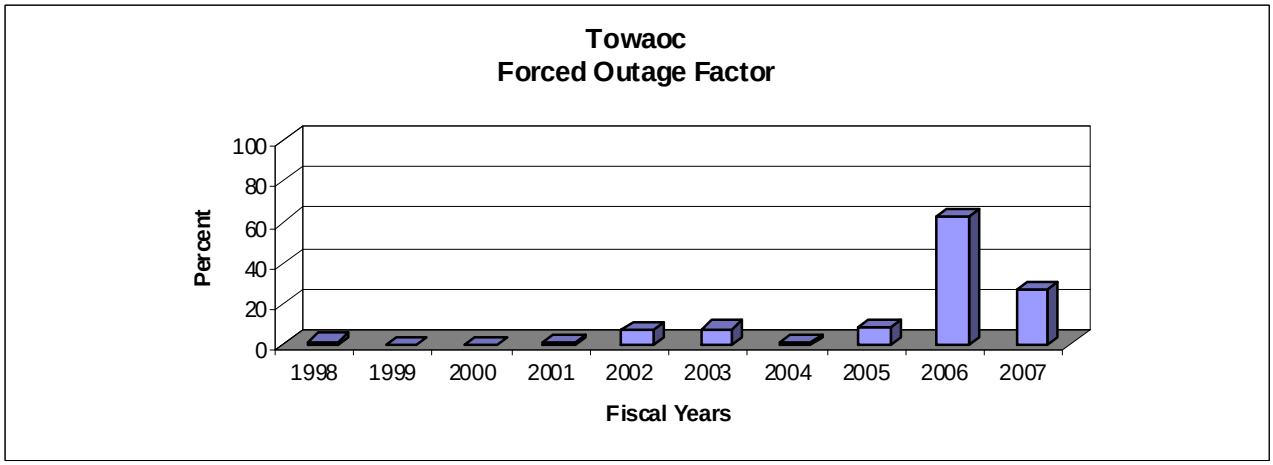


Benchmark 5
Availability Factor

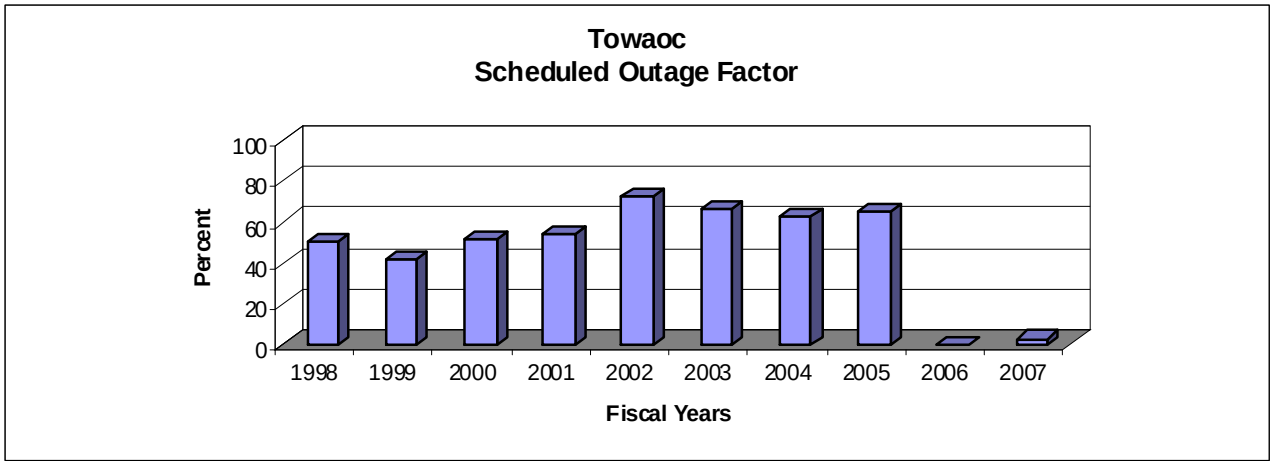


Plant is shut down through the non-irrigation season

Benchmark 6
Forced Outage Factor

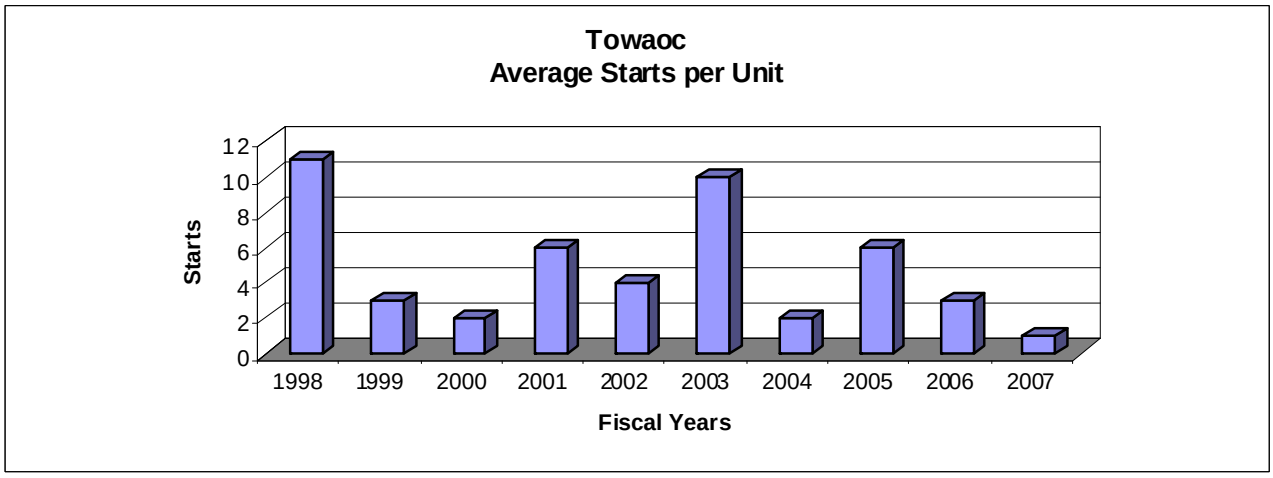


Benchmark 7
Scheduled Outage Factor



Plant is shut down through the non-irrigation season

Starts



Benchmark Data Comparison

Fiscal Year 2007	Towaoc Powerplant	Total Reclamation Average	Industry Average	Best Performers
Wholesale Firm Rate Mills/kWh	20.7	*22.45	Not Available	Not Available
Production Cost as Percentage of Wholesale Firm Rate	0.1%	12.1%	Not Applicable	Not Applicable
O&M Cost $/MWh	19.55	2.76	***163.95	1.00
O&M Costs $/MW	5,406	7,847	***40,852	2,897
O&M Equiv Work Year per MW	0.030	0.03	Not Available	0.00
Availability Factor	****37.7	82.3	**88.64	98.54
Forced Outage Factor	****62.3	2.6	**2.61	0.00
Scheduled Outage Factor	****0.0	15.1	**8.74	0.00

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

Upper Molina Powerplant
Collbran Project

Plant Contact:
Donald Phillips, Manager
Curecanti Field Division

Plant Address:
Upper Molina Powerplant
Molina CO

Telephone Numbers:
Phone: (970) 240-6300
Fax: (970) 240-6304

E-Mail Address:
dphillips@uc.usbr.gov

Reclamation Region: Upper Colorado

NERC Region: Western Electricity Coordinating Council, Rocky Mountain Power Area

PMA Service Area: Western Area Power Administration, Colorado River Storage Project Management Center

Project Authorization: The Congress authorized the Collbran Project July 3, 1952, under Public Law 445, 82nd Congress, 2nd Session.

Project Purposes: The Collbran Project, in west-central Colorado, has developed a major part of the unused water in Plateau Creek and its principal tributaries. It furnishes supplemental irrigation service and generates electrical energy for use in west-central Colorado.

The project also rehabilitated and modified the operation of 15 small privately owned storage reservoirs on the Grand Mesa situated in the Cottonwood Creek and Big Creek watersheds. These reservoirs provide water for power generation through the exchange of storage water on Grand Mesa for irrigation water from Vega Reservoir.

Plant Location: The Upper Molina Powerplant is located in Mesa County, Colorado, on the east bank of Cottonwood Creek about 7 miles southeast of Molina, Colorado, and about 23 miles northeast of Palisade, Colorado.

Plant Facts:

The Upper Molina penstock extends from the junction of the Bonham and Cottonwood pipelines, continues approximately 2.4 miles down the north slope of Grand Mesa, and terminates at the Upper Molina Powerplant. The penstock consists of welded steel pipe with a capacity of 50 cubic feet per second, ranging in diameter from 36 inches at the junction with the Bonham-Cottonwood collection system to 30 inches at the lower section.

The Bonham Reservoir acts as a fore bay for the Upper Molina Powerplant, which controls releases up to a maximum capacity of 50 cubic feet per second from the reservoir. Upper Molina Powerplant consists of a single 8,640-kilowatt generating unit. This unit operates at a design head of 2,490 feet with power tail water discharges up to 50 cubic feet per second into the Molina Equalizing Reservoir. Both the Lower and Upper Molina Power plants are operated in conjunction with Colorado River Storage Project power operations.

Power generated at both power plants is transformed to a transmission voltage of 115 kilovolts at two substations constructed adjacent to the plants. A 5.5-mile transmission line leads from the substation at the Upper Molina Powerplant, delivers energy produced at the plant to the substation at Lower Molina Powerplant, and connects to the Xcel Energy.

Plant Purpose:

Electrical energy is generated for use in west-central Colorado.

Plant History:

In FY-2005 the unit control system was upgraded to an Ethernet-based Distributed Control System. A digital governor and digital protective relays were also installed and new flow control programming was added to make the Lower Molina unit ramp up with the upper unit, so that they effectively act as a single unit.

Present Activities:

The bearing cooling system is being upgraded to eliminate some problems. Communicating analog data to the RTU in digital format to lessen the errors in the data is being implemented and installing transfer trip relaying to the Lower Molina Plant.

Future Planned Activities:

Purchase and install new generator step up transformer.

Special Issues:

None

River:	Cottonwood Creek	**Plant Type:**	Conventional
Powerhouse Type:	Above Ground	**Turbine Type:**	Pelton Impulse
Original Nameplate Capacity:	8,640 kW	**Installed Capacity:**	8,640 kW
Year of Initial Operation:	1962	**Age:**	45 years
Net Generation (FY-2007):	28.0 GWh	**Rated Head:**	2,490 feet
Average Plant Factor (FY-2007):	37.0 percent	**Remotely Operated:**	Yes
Production Mode:	Peaking		

Ancillary Services

Upper Molina
Ancillary Services

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

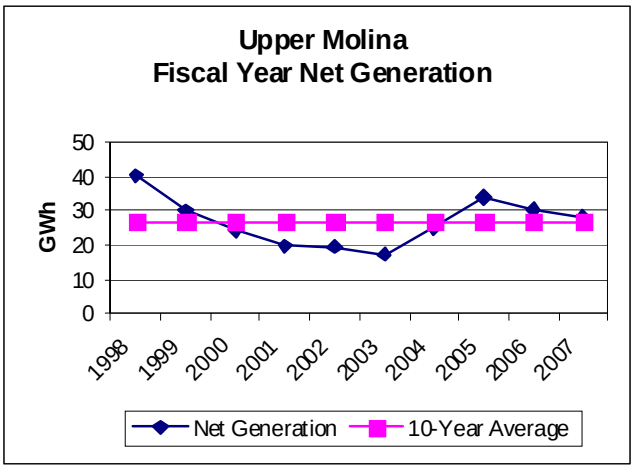
Generators

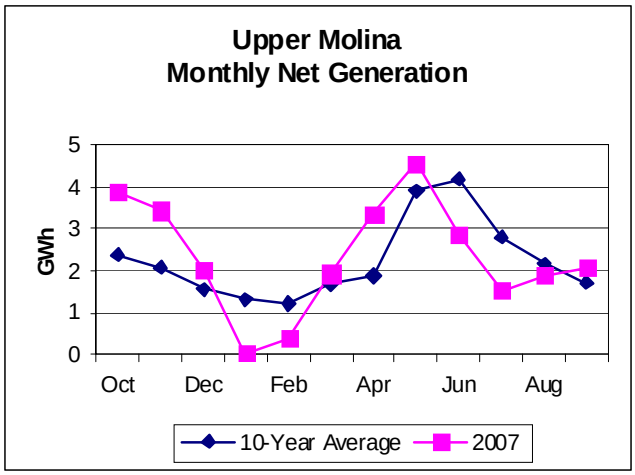
Upper Molina Generators

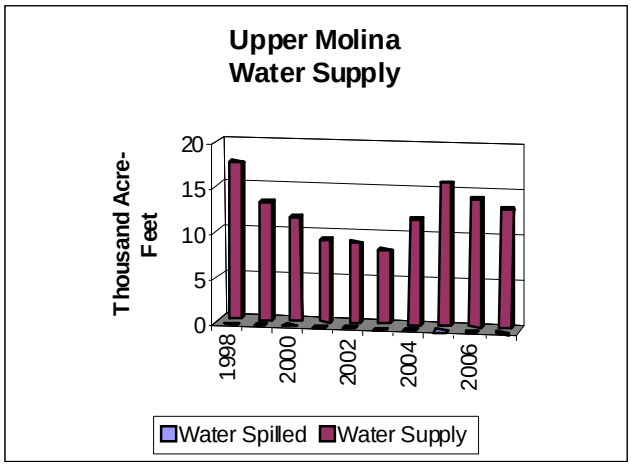
Existing Number and Capacity

Unit #	Original Capacity (kW)	Capacity Increased (kW)	Present Capacity (kW)
1	8,640	-	8,640
1 Unit	8,640	-	8,640

Generation

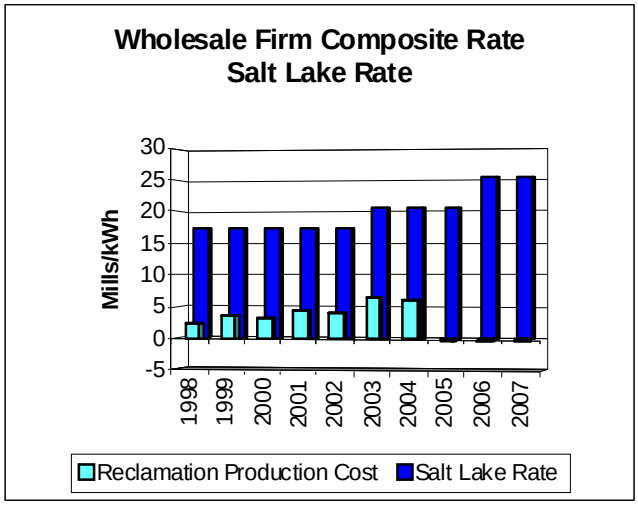

Upper Molina
Fiscal Year Net Generation
GWh
50
40
30
20
10
0
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
Net Generation
10-Year Average


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

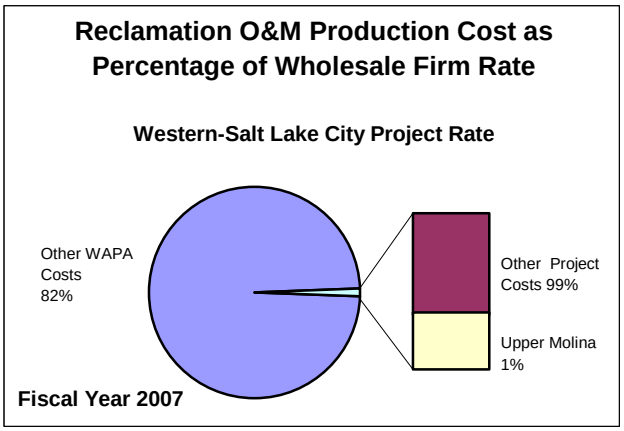

Upper Molina
Water Supply
Thousand Acre-Feet
20
15
10
5
0
1998
2000
2002
2004
2006
Water Spilled
Water Supply

Prime Laboratory Benchmarks

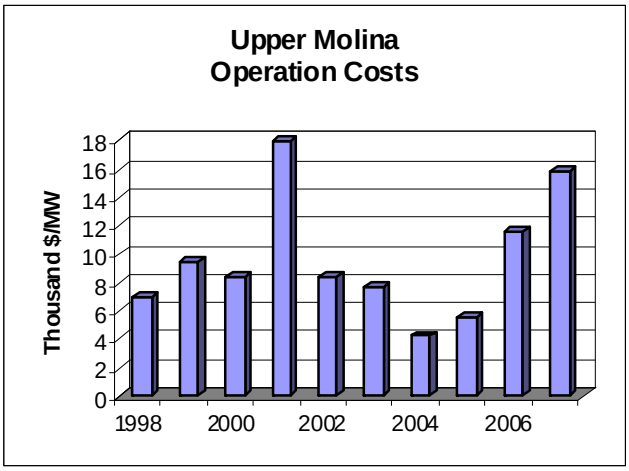
Benchmark 1
Wholesale Firm Rate

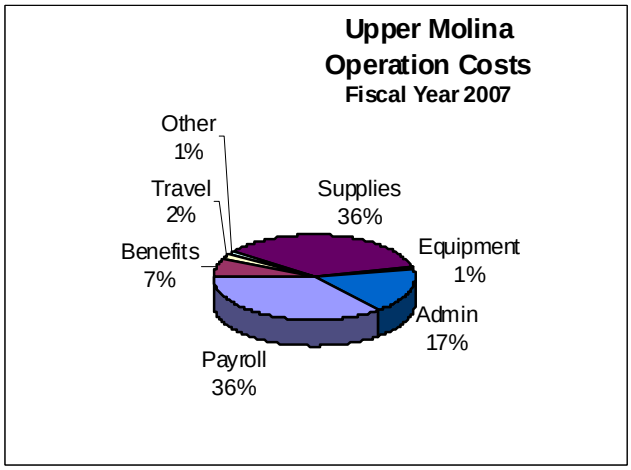


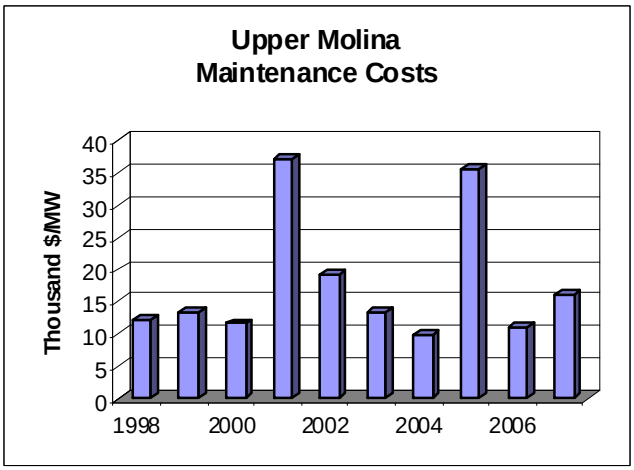
Benchmark 2
Reclamation's Production Cost as Percentage of Wholesale Firm Rate

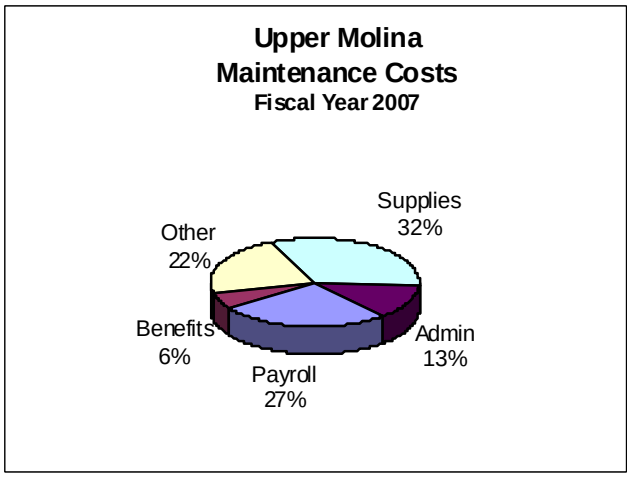


Benchmark 3
Production Cost

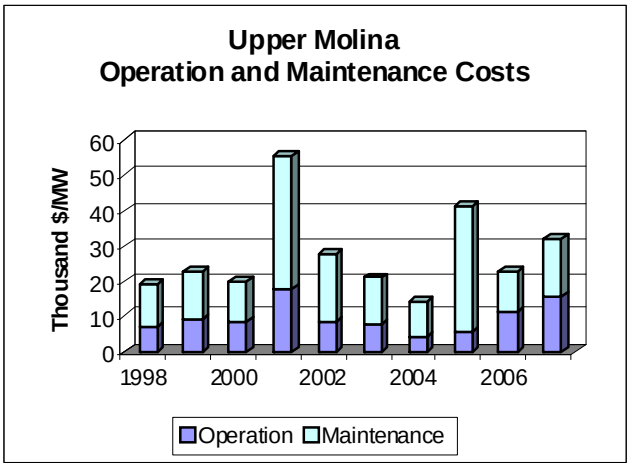


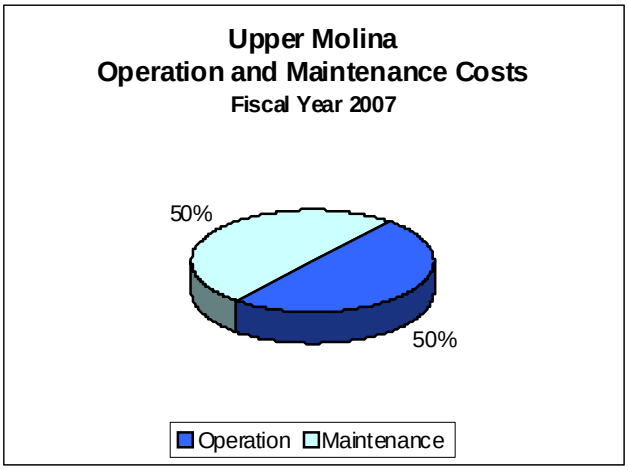


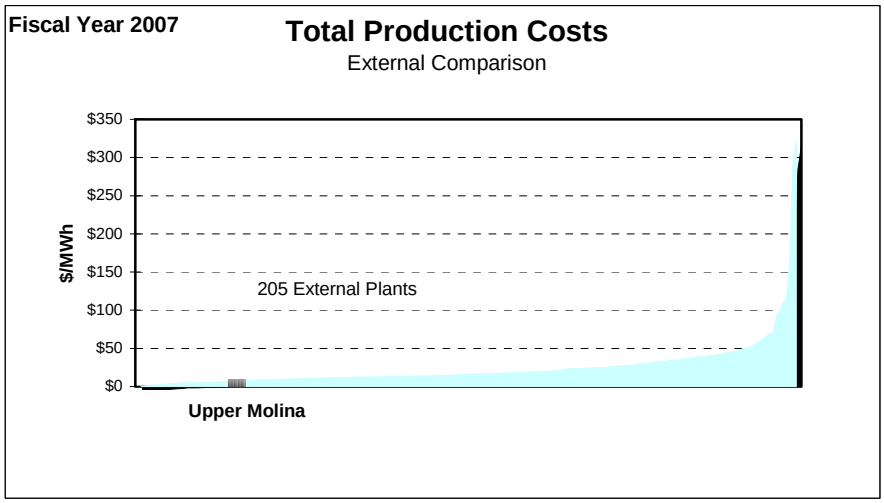


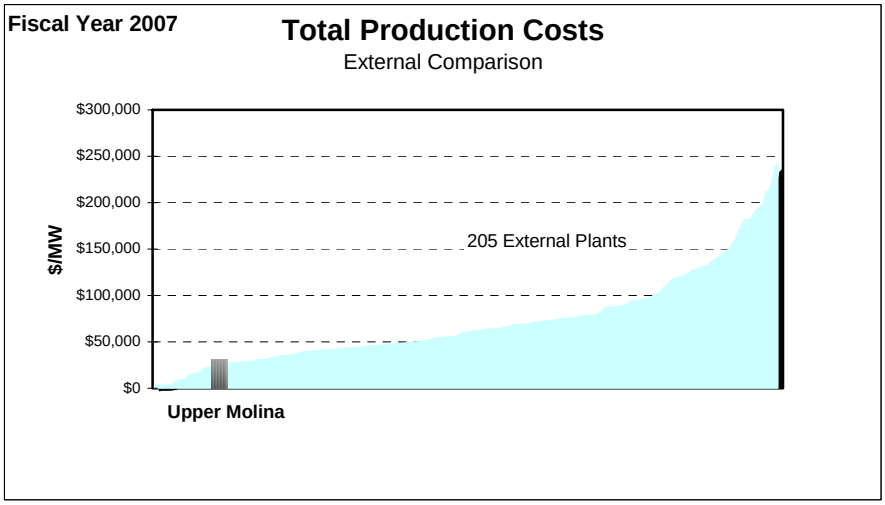


Benchmark 3
Production Cost



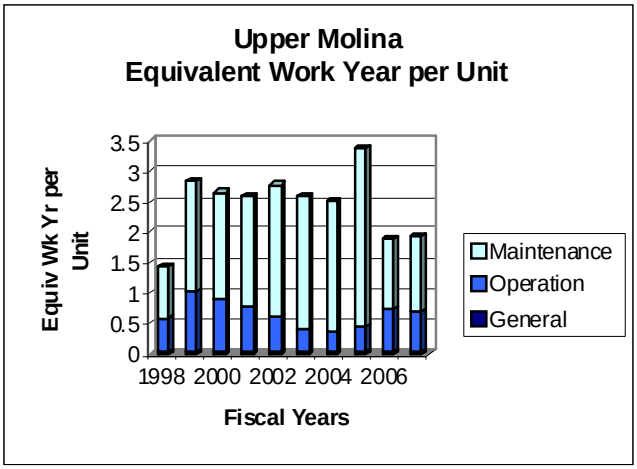


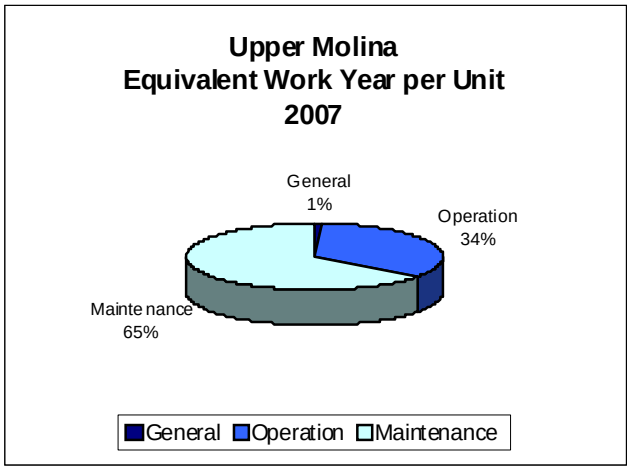


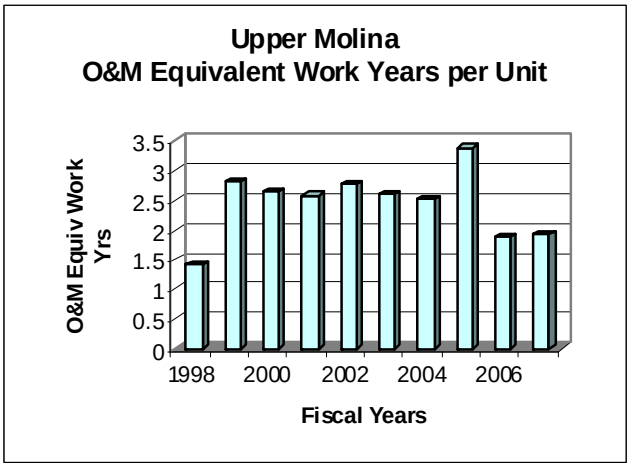


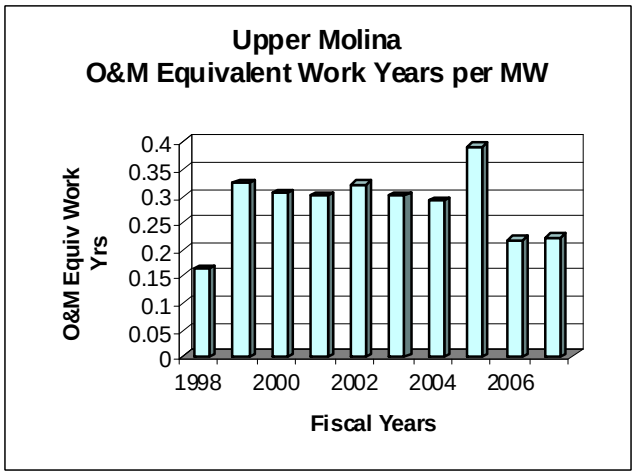
Benchmark 4
Workforce Deployment

Upper Molina 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	0.00	0.00	0.02	0.02	0.02	0.00
Operation	0.60	0.06	0.00	0.66	0.66	0.08
Maintenance	1.14	0.12	0.00	1.26	1.26	0.15
Total Staffing	1.74	0.18	0.02	1.94	1.94	0.22

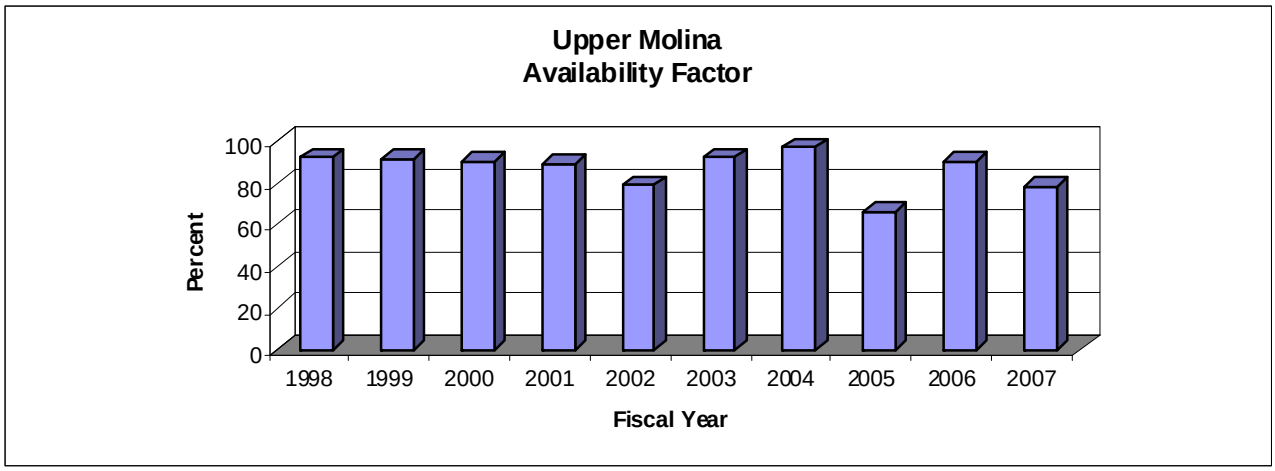




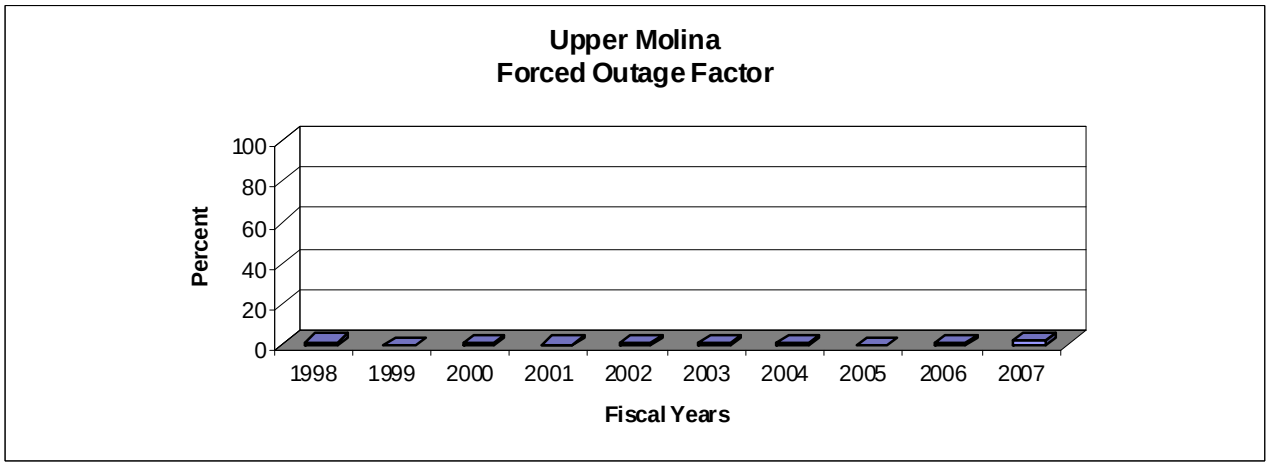




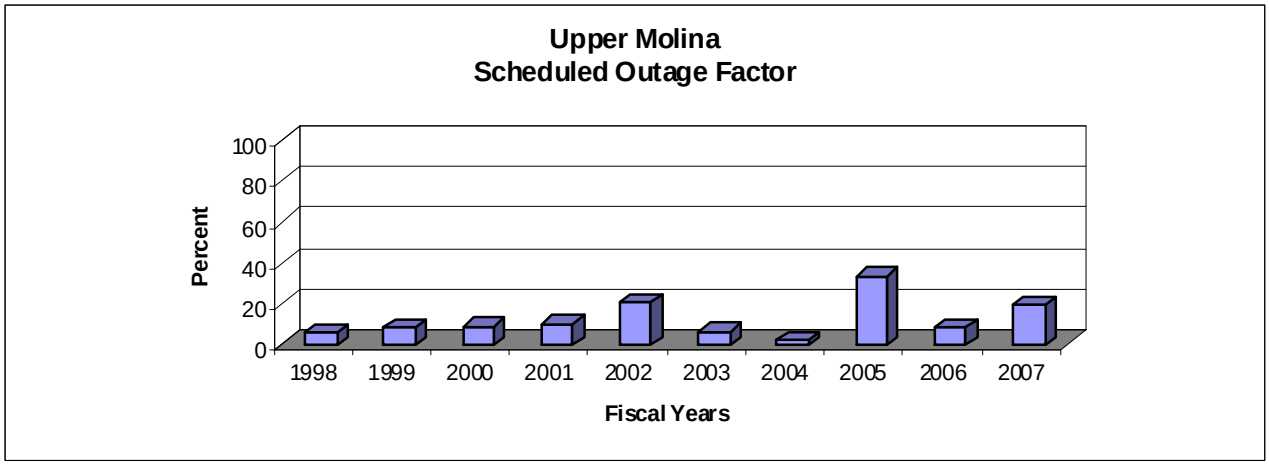
Benchmark 5
Availability Factor



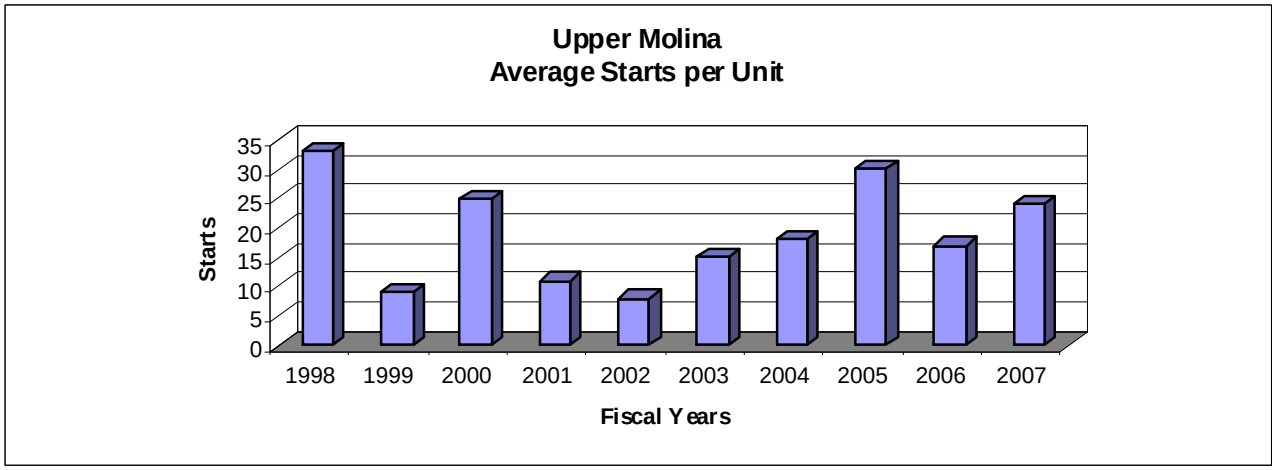
Benchmark 6
Forced Outage Factor



Benchmark 7
Scheduled Outage Factor



Starts



Benchmark Data Comparison

Fiscal Year 2007	Upper Molina Powerplant	Reclamation Average 0-10 MW Group	Total Reclamation Average	Industry Average	Best Performers
Wholesale Firm Rate Mills/kWh	20.7	Not Applicable	*22.45	Not Available	Not Available
Production Cost as Percentage of Wholesale Firm Rate	0.3%	Not Applicable	12.1%	Not Applicable	Not Applicable
O&M Cost $/MWh	9.83	14.71	2.76	***25.9	1.00
O&M Costs $/MW	31,804	60,518	7,847	***75,984	2,897
O&M Equiv Work Year per MW	0.22	0.39	0.03	Not Available	0.00
Availability Factor	78.5	88.52	82.3	**88.64	98.54
Forced Outage Factor	1.8	0.11	2.6	**2.61	0.00
Scheduled Outage Factor	19.6	11.36	15.1	**8.74	0.00

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

RECLAMATION
Managing Water in the West

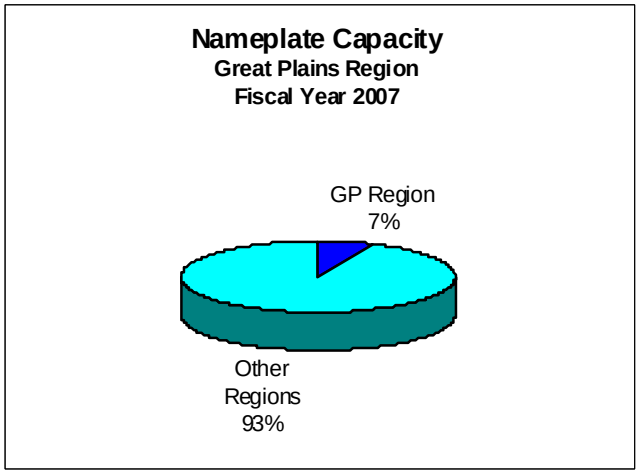
Great Plains Region Power Performance

For Fiscal Year 2007

U.S. Department of the Interior
Bureau of Reclamation

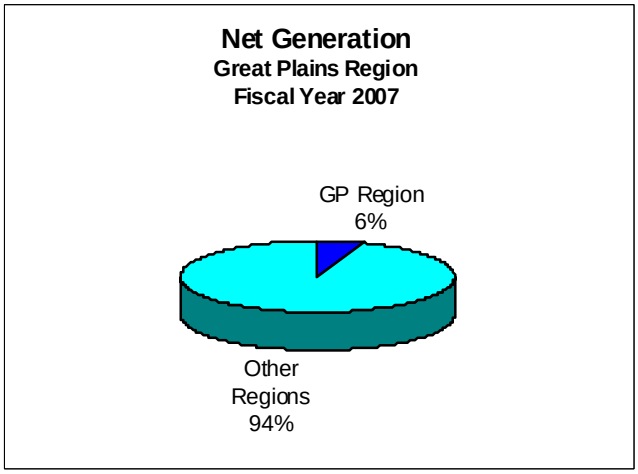
Great Plains Regional Power Profile

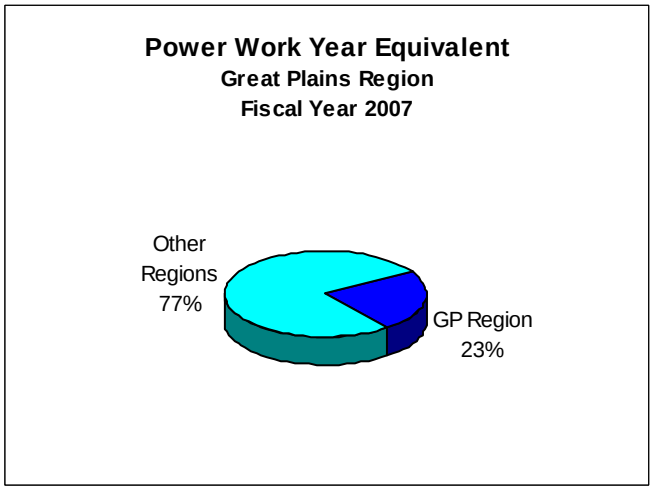
The Great Plains Regional Office is located in Billings, Montana. The regional office oversees the operation of 21 powerplants: Alcova, Big Thompson, Boysen, Buffalo Bill, Canyon Ferry, Estes, Flatiron, Fremont Canyon, Glendo, Green Mountain, Guernsey, Heart Mountain, Kortes, Marys Lake, Mt. Elbert, Pilot Butte, Pole Hill, Seminoe, Shoshone, Spirit Mountain, and Yellowtail.



The total rated nameplate capacity for the Great Plains Region in fiscal year 2007 was 1,004 megawatts, which comprises 7 percent of the Reclamation total rated nameplate capacity.

In fiscal year 2007, the Great Plains Region produced a total net generation of 2,283 net gigawatt-hours. This comprises 6 percent of the total net generation for Reclamation.

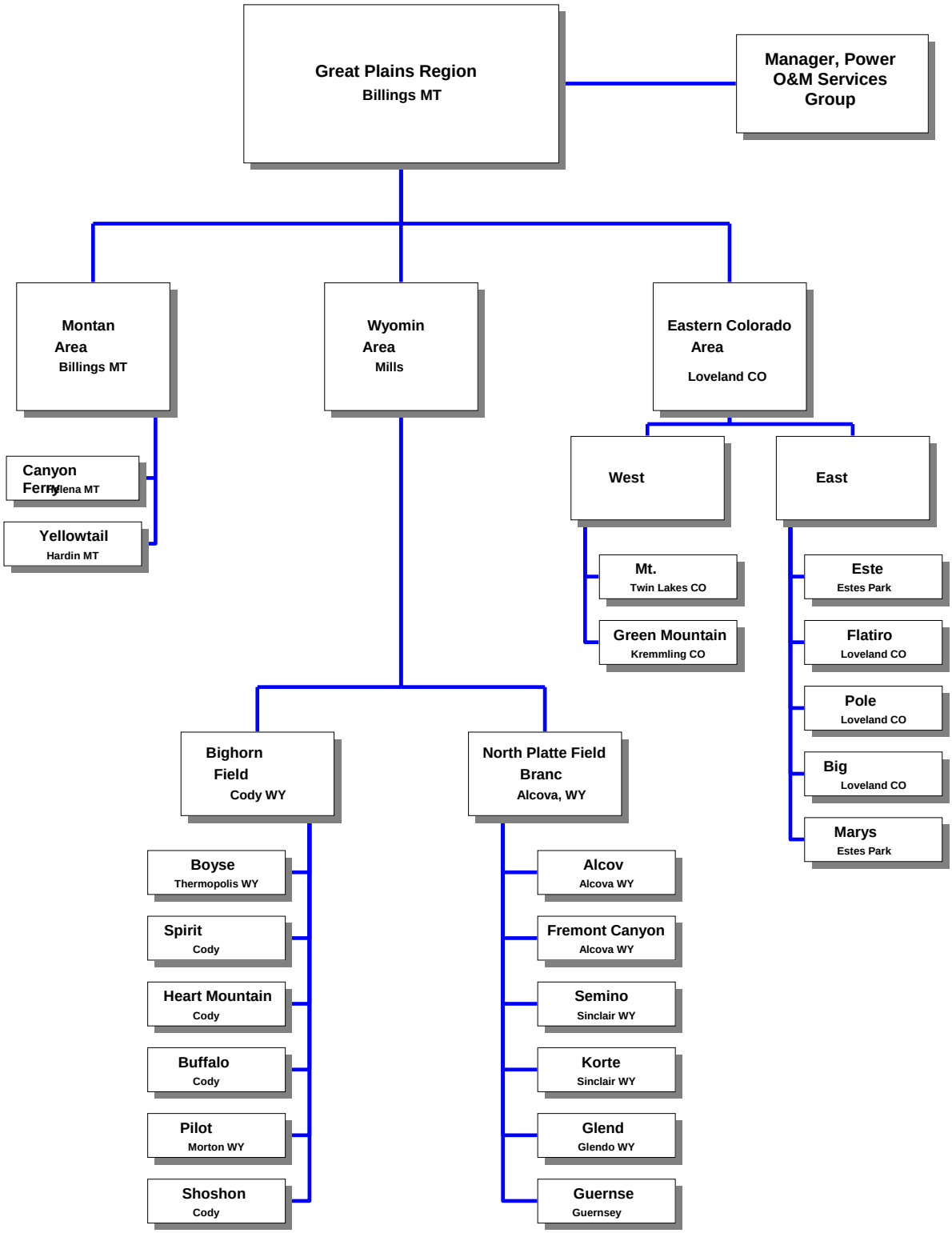




In fiscal year 2007, the Great Plains Region employed 25 percent of the total work year equivalents worked at Reclamation power facilities.

Thirty-six percent of Reclamation's power facilities are located in this region. It should be noted that multiple small capacity units require more staff than a single unit with equal or greater capacity. Also the geographic distribution of the hydropower facilities within this region impacts staff utilization and travel costs.

Great Plains Region organizational structure:



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

Regional Office:	Bureau of Reclamation Great Plains Regional Office 316 North 26th Street Billings MT 59101-1362 Mike Ryan Regional Director, GP-1000 (406) 247-7600
Power O&M Services Group:	Mike Ferguson, GP-2000 (406) 247-7705
Eastern Colorado Area Office:	Eastern Colorado Area Office 11056 West County Road 18E Loveland CO 80537, 9711 Mike Collins, EC-1000 (970) 667-4300
Montana Area Office:	Montana Area Office PO Box 30137 Billings MT 59107-0137 Dan Jewell, MT-1000 (406) 247-7298
Wyoming Area Office:	Wyoming Area Office PO Box 1630 Mills WY 82644 John Lawson, WY-1000 (307) 261-5671

WASHINGTON
OREGON
IDAHO
MONTANA
Canyon Ferry
Yellowtail
WYOMING
Spirit Mtn.
Shoshone
Buffalo Bill
Heart Mtn.
Boysen
Pilot Butte
Alcova
Fremont Canyon
Kortes
Seminoe
Glendo
Guernsey
NEVADA
UTAH
COLORADO
Big Thompson
Flatiron
Pole Hill
Estes
Marys Lake
Green Mountain
Mt. Elbert
CALIFORNIA
ARIZONA
NEW MEXICO

Alcova Powerplant
Kendrick Project

Plant Contact:
John H. Lawson
Area Manager
Wyoming Area Office

Plant Address:
Alcova Powerplant
Alcova WY

Telephone Numbers:
Phone: (307) 261-5671
Fax: (307) 261-5683

E-Mail Address:
jlawson@gp.usbr.gov

Reclamation Region: Great Plains

NERC Region: Western Electricity Coordinating Council, Rocky Mountain Power Area

PMA Service Area: Western Area Power Administration, Rocky Mountain Region

Project Authorization: The President approved the Kendrick Project on August 30, 1935. The Alcova Powerplant was authorized for construction on August 22, 1950, under the provisions of section 9(a) of the Reclamation Project Act of 1939. Originally known as Casper-Alcova, the project was renamed Kendrick in 1937.

Project Purposes: The Kendrick Project conserves the waters of the North Platte River for irrigation and electric power generation. The project is a multiple-purpose development with storage at Seminoe Reservoir and diversion at Alcova Dam to project lands. Operation of the reservoirs and powerplants is integrated with other river basin developments.

Plant Location: Alcova Powerplant is located in Natrona County, Wyoming, on the North Platte River and about 10 miles downstream from Pathfinder Dam. The powerplant is on the right bank of the river opposite the toe of the dam.

Plant Purpose: Water from Alcova Dam is released for other irrigation rights downstream through the Alcova Powerplant or over a controlled spillway.

Plant Facts: The plant uses the 165-foot drop from the reservoir to the river for power generation. It consists of two units, each a 20,700-kilowatt vertical-shaft generator driven by a 26,500-horsepower turbine. The reservoir has a total capacity of 184,208 acre-feet, of which only the top 30,606 acre-feet is active capacity available for irrigation.

Plant History: Alcova Powerplant was authorized and built after Alcova Dam was completed in 1938. Construction of Alcova Powerplant was completed in 1955.

Present Activities: Normal Operations.

.

Future Planned Activities: The CO_2 fire suppression systems for the two generating units will be installed in FY-2008. The wicket gate greasing systems for both generating units will be installed in FY-2009.

Special Issues: None.

River:	North Platte River	**Plant Type:**	Conventional
Powerhouse Type:	Above Ground	**Turbine Type:**	Francis
Original Nameplate Capacity:	36,000 kW	**Installed Capacity:**	41,400 kW
Year of Initial Operation:	1955	**Age:**	52 years
Net Generation (FY-2007):	91.3 GWh	**Rated Head:**	165 feet
Average Plant Factor (FY-2007):	25.5 percent	**Remotely Operated:**	Yes
Production Mode:	Peaking		

Ancillary Services

Alcova
Ancillary Services

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

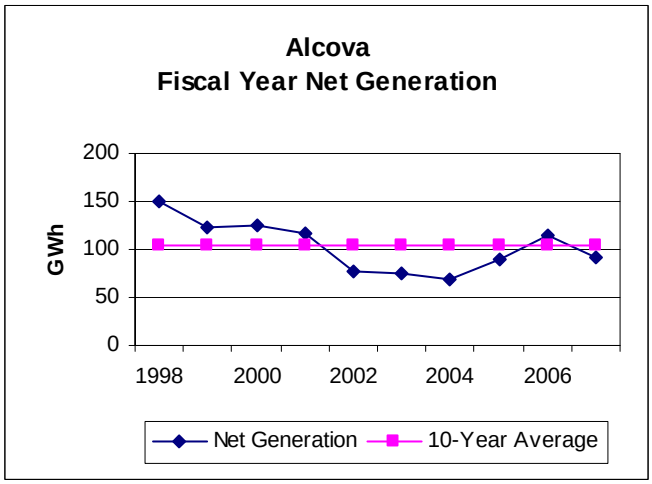
Generators

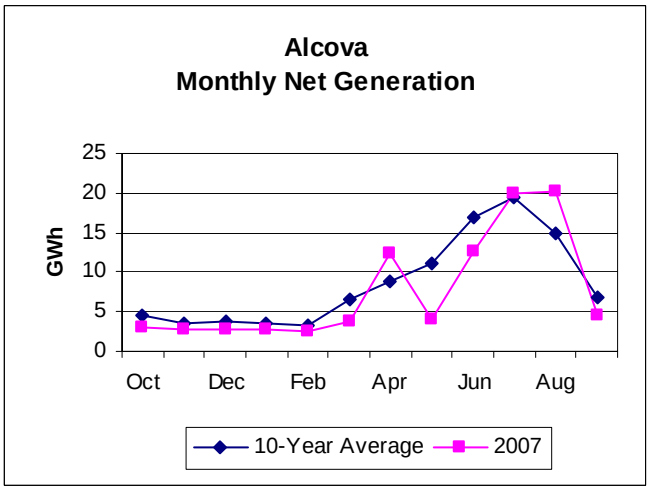
Alcova Generators
Existing Number and Capacity

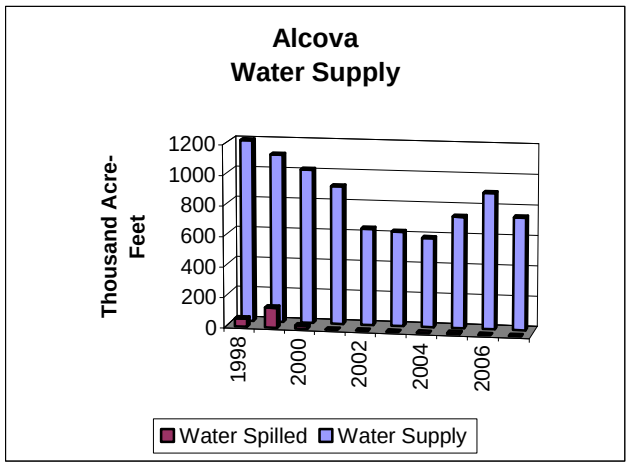
Unit #	Original Capacity (kW)	Capacity Increased (kW)	Present Capacity (kW)
1	18,000	2,700	20,700
2	18,000	2,700	20,700
2 units	36,000	5,400	41,400

Units 1 and 2 were rewound in FY-2002 and FY-2001, respectively, for a 1.0 power factor which increased the rating per unit to 20,700 kW.

Generation

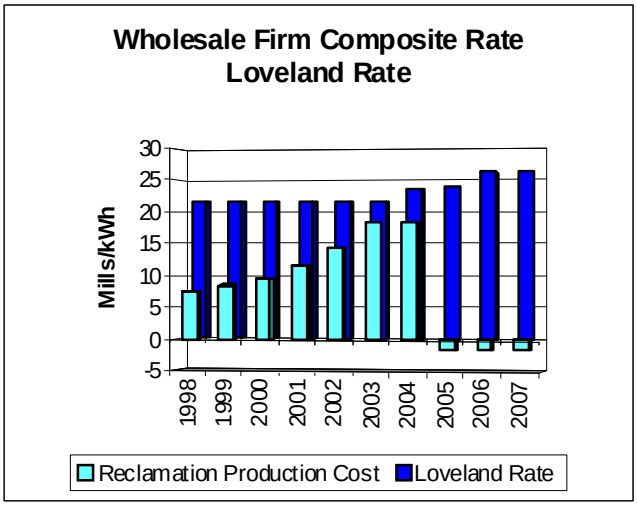

Alcova
Fiscal Year Net Generation
GWh
200
150
100
50
0
1998
2000
2002
2004
2006
Net Generation
10-Year Average


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

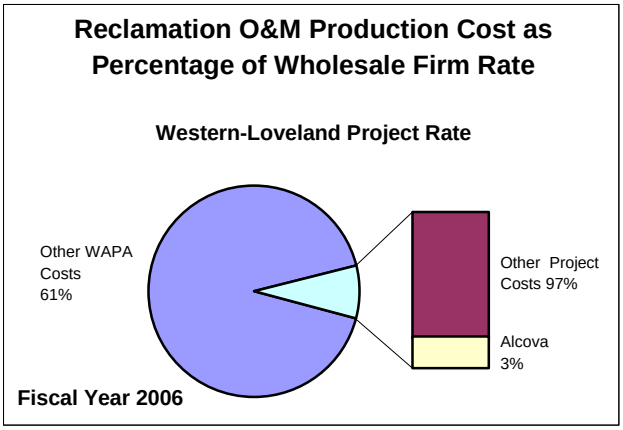

Alcova
Water Supply
Thousand Acre-Feet
1200
1000
800
600
400
200
0
1998
2000
2002
2004
2006
Water Spilled
Water Supply

Prime Laboratory Benchmarks

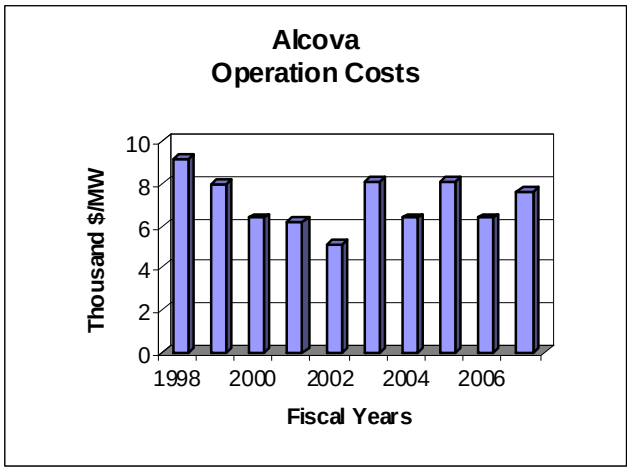
Benchmark 1
Wholesale Firm Rate

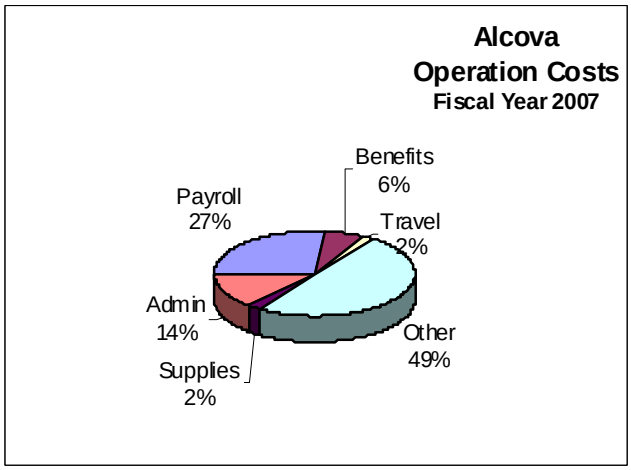


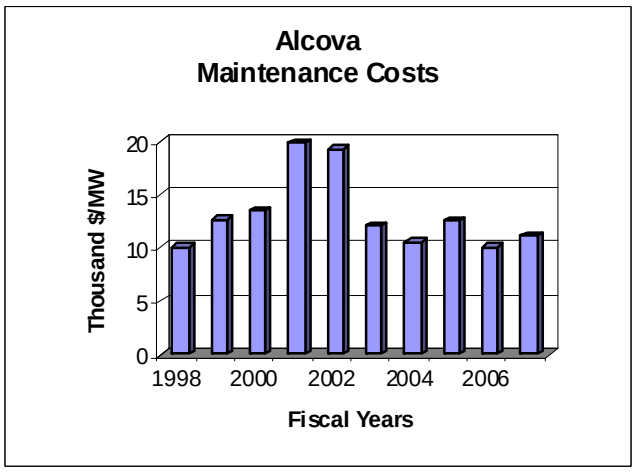
Benchmark 2
Reclamation's Production Costs as Percentage of Wholesale Firm Rate

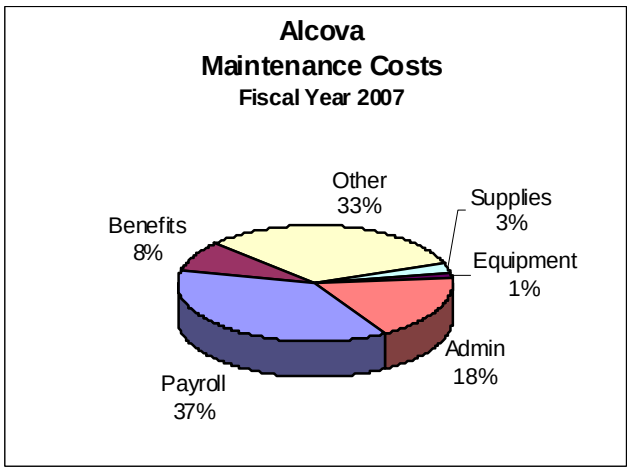


Benchmark 3
Production Costs



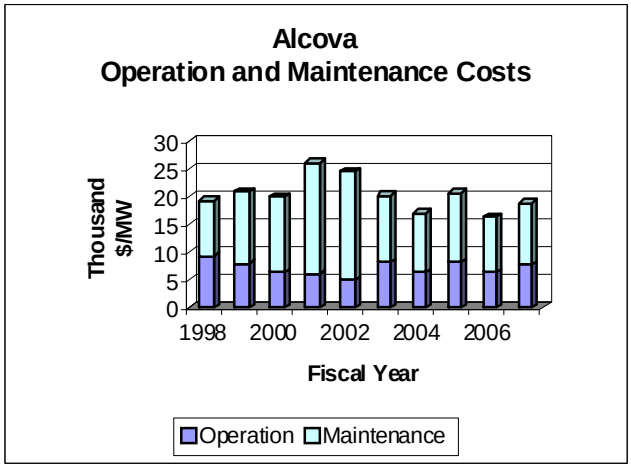


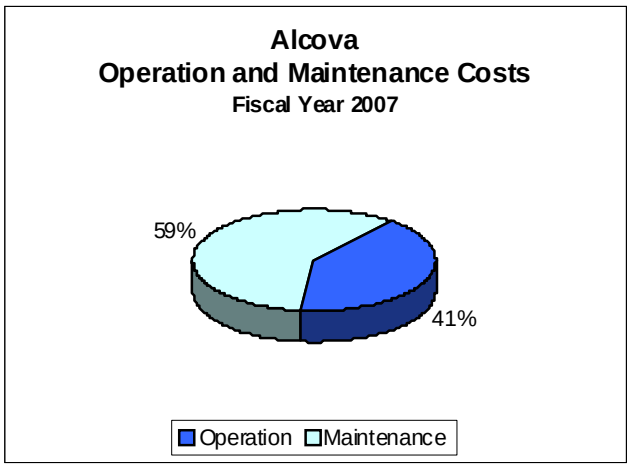


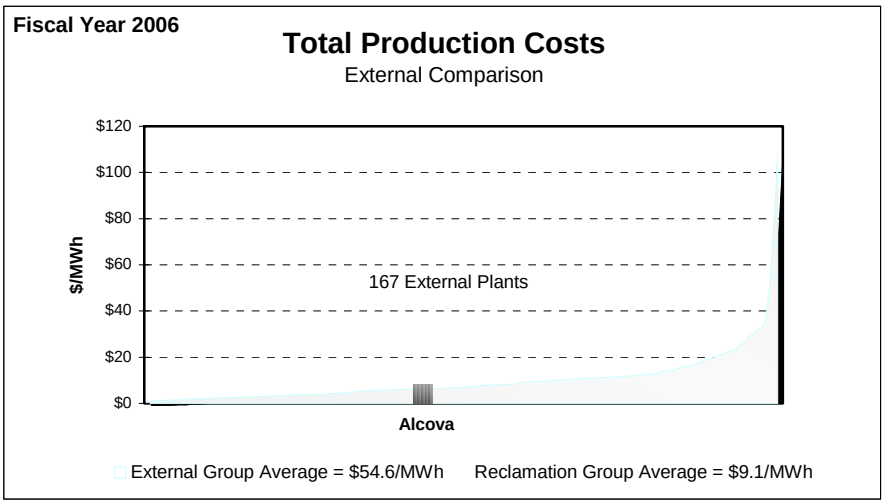


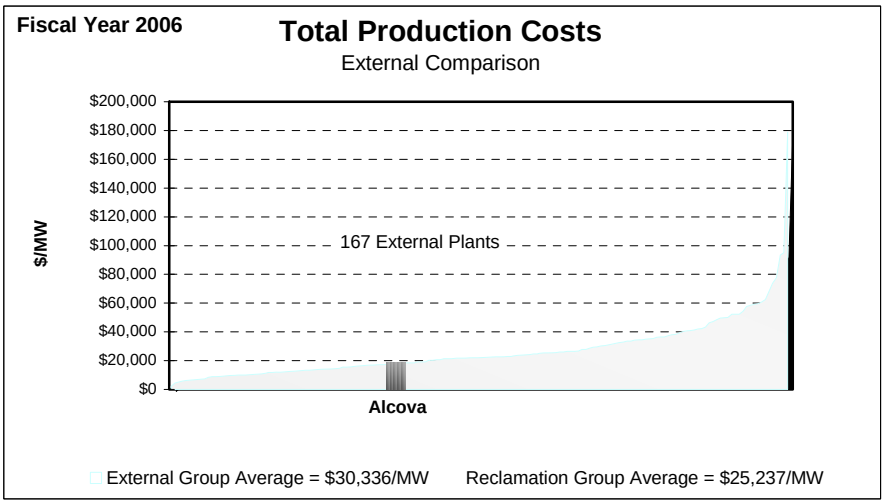
Overhaul of generator turbines in conjunction with rewind of Unit 2 in FY-2001 and Unit 1 in FY-2002.

Benchmark 3
Production Costs





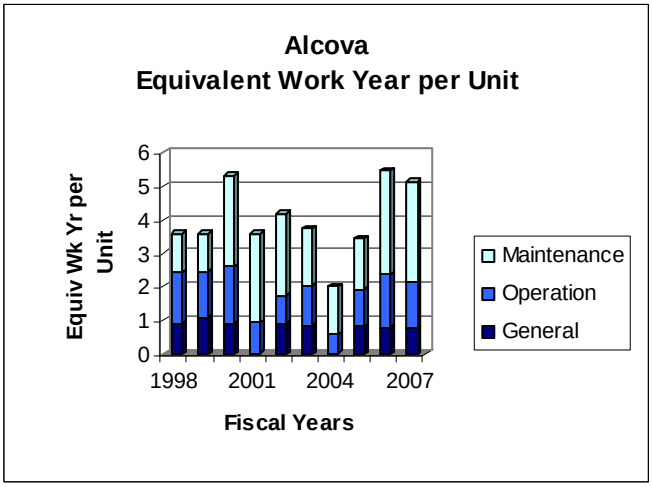


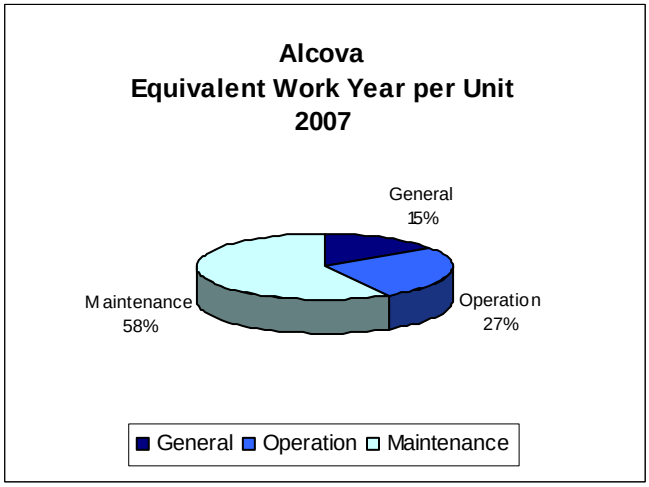


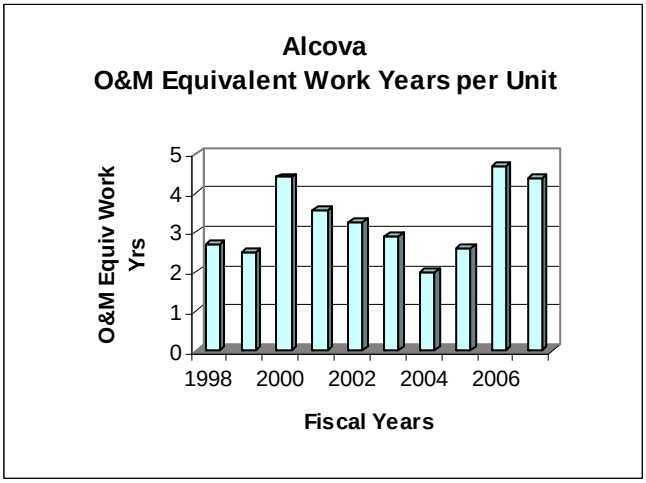
Benchmark 4
Workforce Deployment

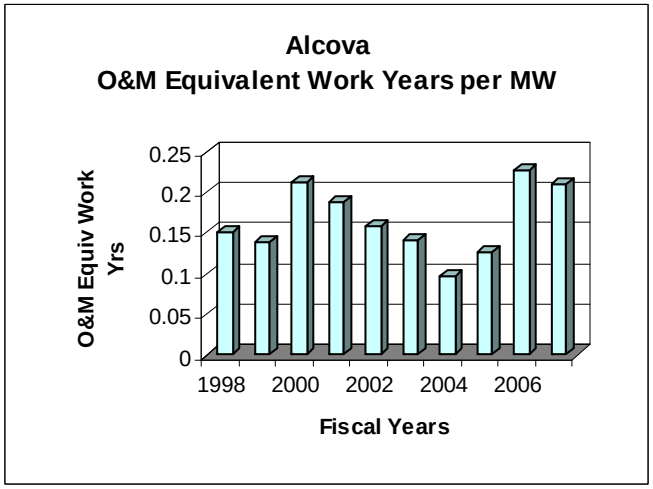
Alcova FY 2007 Equivalent Work Staffing Year Levels

	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	1.36	0.15	0.04	1.55	0.78	0.04
Operation	2.45	0.28	0.00	2.72	1.36	0.07
Maintenance	5.39	0.61	0.00	6.00	3.00	0.14
Total Staffing	9.20	1.04	0.04	10.28	5.14	0.25

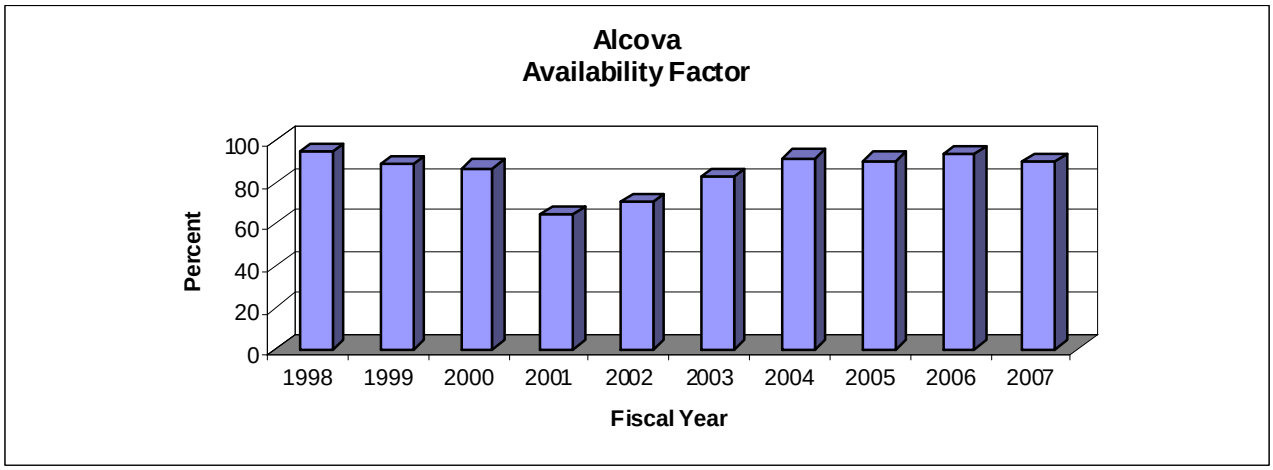






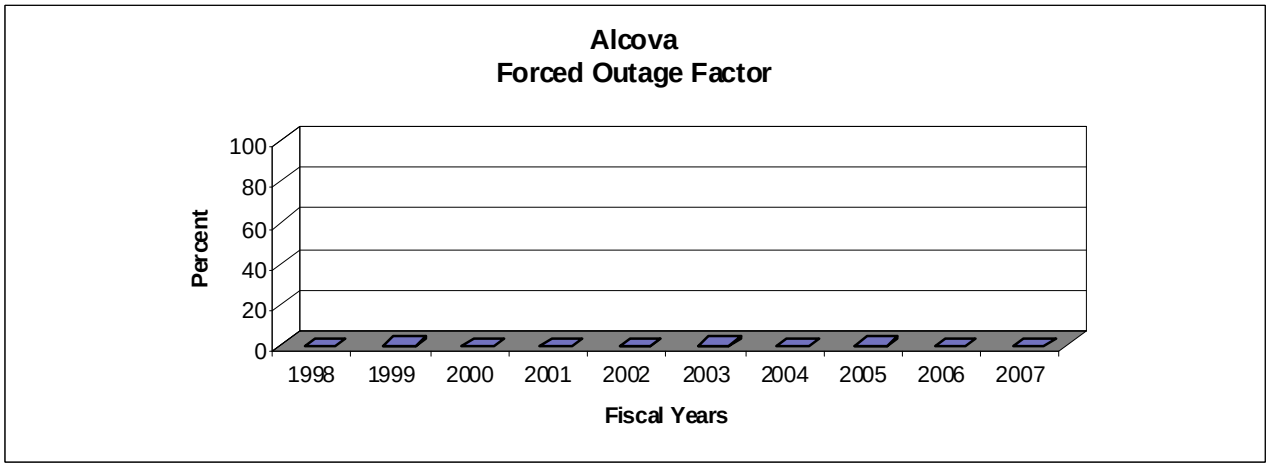


Benchmark 5
Plant Availability Factor

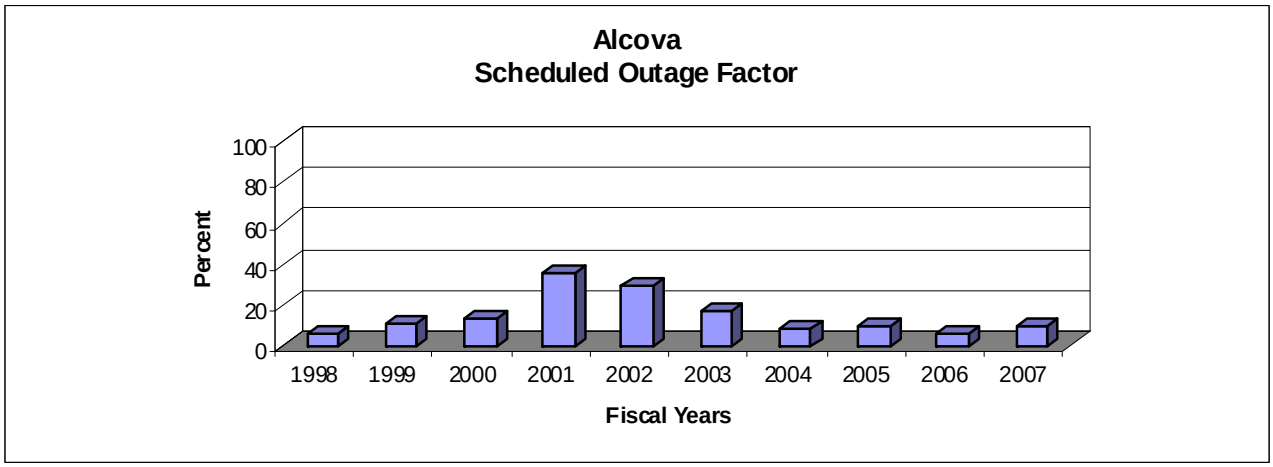


FY-2001 - Extended outage on Unit 2 for rewind and overhaul.
FY-2002 - Extended outage on Unit 1 for rewind and overhaul.

Benchmark 6
Plant Forced Outage Factor

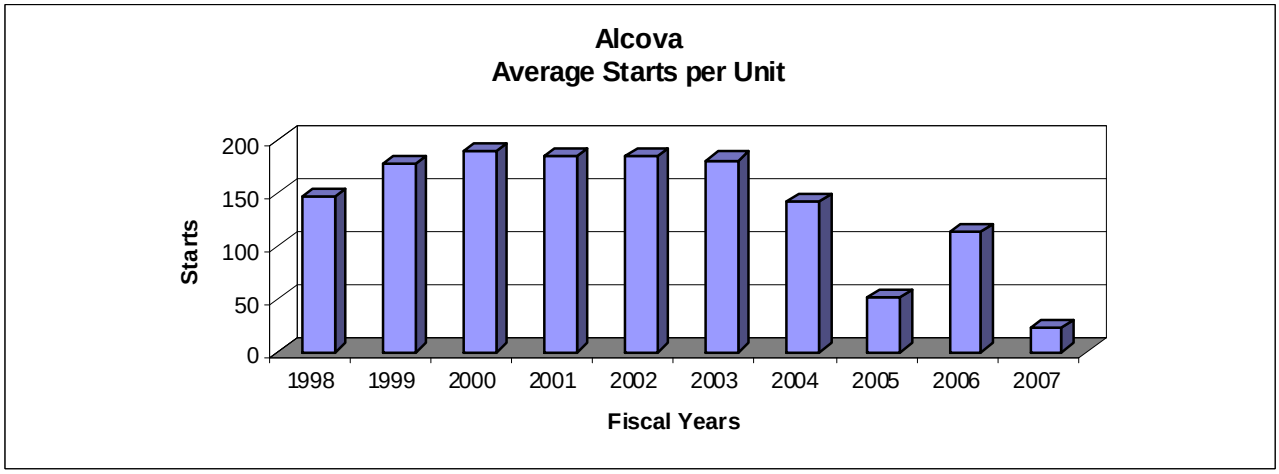


Benchmark 7
Plant Scheduled Outage Factor



FY-2001 - Extended outage on Unit 2 for rewind and overhaul.
FY-2002 - Extended outage on Unit 1 for rewind and overhaul.
FY-2003 - Unit 2 scheduled outage extended to rebuild governor after the annual inspection.

Unit Starts



Benchmark Data Comparison					
Fiscal Year 2007	**Alcova Powerplant**	**Reclamation Average 30-100 MW Group**	**Total Reclamation Average**	**Industry Average**	**Best Performers**
Wholesale Firm Rate Mills/kWh	23.9	Not Applicable	*22.45	Not Available	Not Available
Production Cost as Percentage of Wholesale Firm Rate	1.8%	Not Applicable	12.1%	Not Applicable	Not Applicable
O&M Cost $/MWh	8.5	7.8	2.8	***54.63	1.0
O&M Costs $/MW	18,745	24,132	7,847	***30,336	2,897
O&M Equiv Work Year per MW	0.10	0.10	0.03	Not Available	0.0
Availability Factor	90.2	81.3	82.3	**88.3	98.5
Forced Outage Factor	0.1	0.2	2.6	**1.8	0.0
Scheduled Outage Factor	9.7	18.5	15.1	**9.9	0.0

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

Big Thompson Powerplant
Colorado-Big Thompson Project

Plant Contact:
Chuck Pedersen
Chief, O&M
Flatiron Powerplant

Plant Address:
Big Thompson Powerplant
11056 West County Road
Loveland CO 80537-9711

Telephone Numbers:
Phone: (970) 962-4400
Fax: (970) 663-3212

E-Mail Address:
cpedersen@gp.usbr.gov

Reclamation Region: Great Plains

NERC Region: Western Electricity Coordinating Council, Rocky Mountain Power Area

PMA Service Area: Western Area Power Administration, Rocky Mountain Region

Project Authorization: First construction funds were provided by the Interior Department Appropriation Act of August 9, 1937 (50 Stat. 595). The President approved the Secretary's finding of feasibility on December 21, 1937.

Project Purposes: The Colorado-Big Thompson Project is one of the largest and most complex natural resource developments undertaken by Reclamation. It consists of over 100 structures integrated into a transmountain water diversion system through which multiple benefits are provided to the people. The project spreads over approximately 250 miles in Colorado. It stores, regulates, and diverts water from the Colorado River on the western slope of the Continental Divide to the eastern slope of the Rocky Mountains. It provides supplemental water for irrigation of about 720,000 acres of land, municipal and industrial use, hydroelectric power, and water-oriented recreation opportunities.

Plant Location: Big Thompson Powerplant is located in Larimer County on the Big Thompson River about 9 miles west of Loveland, Colorado, and just downstream from the river crossing of the Charles Hansen Feeder Canal.

Plant Purpose: Hydroelectric power is generated for the Colorado-Big Thompson Project. Water is taken from Flatiron Reservoir, passed through Big Thompson Powerplant, and returned to the Big Thompson River, as needed.

Plant Facts: The plant operates under an effective head of 180 feet and has a generating capacity of 4,500 kilowatts.

Plant History: The water and power control center for the Colorado - Big Thompson Project's reservoirs, powerplants, and transmission lines in Wyoming, Colorado, and western Nebraska is located in Loveland, Colorado. This Western Division of the Missouri River Basin is an interconnected system of 15 Reclamation powerplants.

Present Activities: Projects include a new plant fire alarm system, unit excitation system replacement, a new access bridge, and repairs to the Dille Diversion structure.

Future Planned Activities: Plant remote control (RTU SCADA and fiber communication) upgrades are planned to be completed in FY 2010. An upgrade to the governor is planned for FY 2013. Installation of online condition monitoring is planned for FY 2013. Turbine runner and wear ring replacement and a unit overhaul are scheduled to start in FY 2014.

Special Issues: The powerplant is only used on a seasonal basis, primarily during spring runoff and summer water deliveries.

River:	Colorado River and Big Thompson River	**Plant Type:**	Conventional
Powerhouse Type:	Above Ground	**Turbine Type:**	Francis
Original Nameplate Capacity:	4,500 kW	**Installed Capacity:**	4,500 kW
Year of Initial Operation:	1959	**Age:**	48 years
Net Generation (FY-2007):	1.8 GWh	**Rated Head:**	180 feet
Average Plant Factor (FY-2007):	4.8 percent (seasonal)	**Remotely Operated:**	Yes
Production Mode:	Intermediate		

Ancillary Services

Big Thompson
Ancillary Services

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

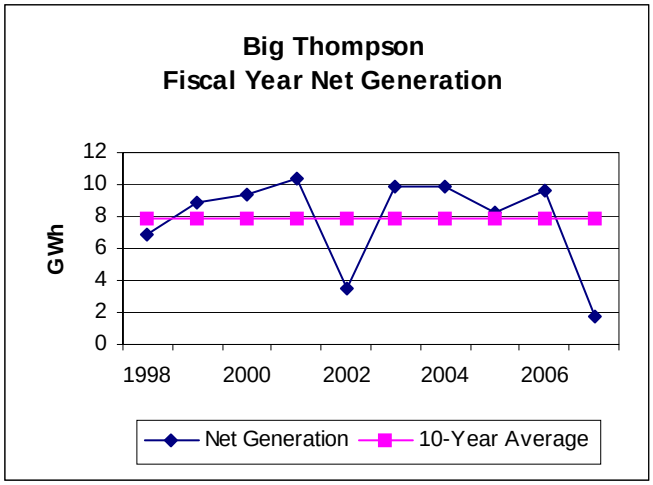
Generators

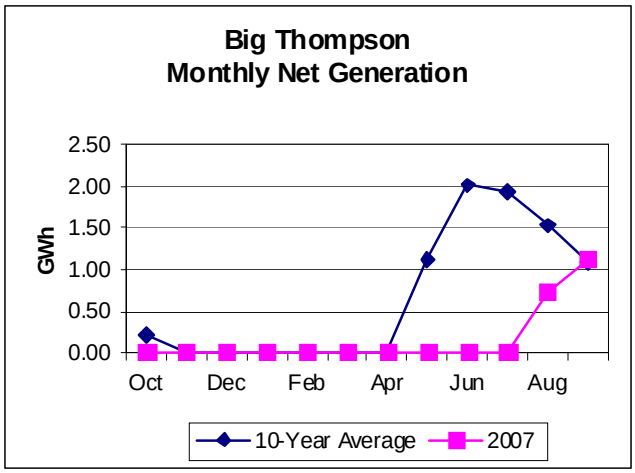
Big Thompson Generators

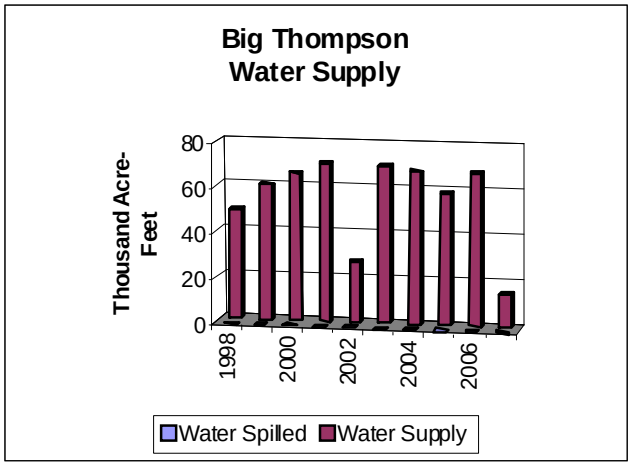
Existing Number and Capacity

Unit #	Original Capacity (kW)	Capacity Increased (kW)	Present Capacity (kW)
1	4,500	-	4,500
1 Unit	4,500	-	4,500

Generation

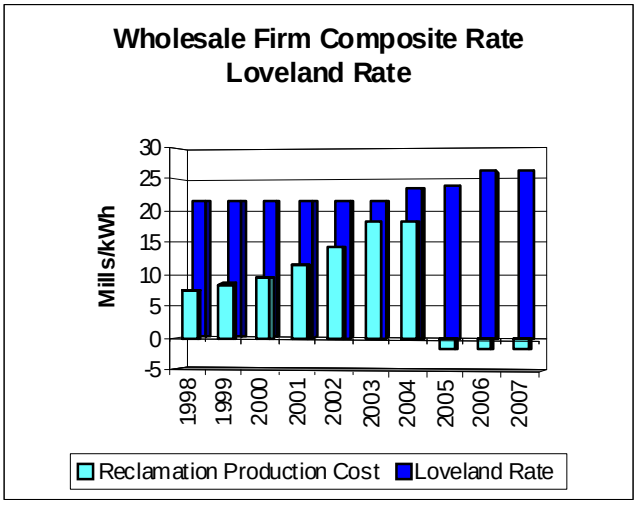

Big Thompson
Fiscal Year Net Generation
GWh
12
10
8
6
4
2
0
1998
2000
2002
2004
2006
Net Generation
10-Year Average


Big Thompson
Monthly Net Generation
GWh
2.50
2.00
1.50
1.00
0.50
0.00
Oct
Dec
Feb
Apr
Jun
Aug
10-Year Average
2007

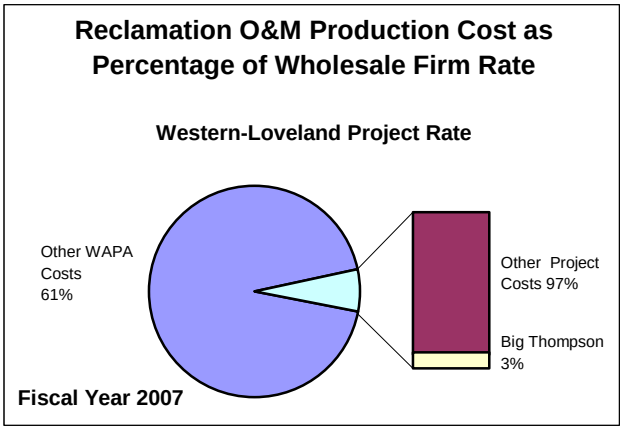

Big Thompson
Water Supply
Thousand Acre-Feet
80
60
40
20
0
1998
2000
2002
2004
2006
Water Spilled
Water Supply

Prime Laboratory Benchmarks

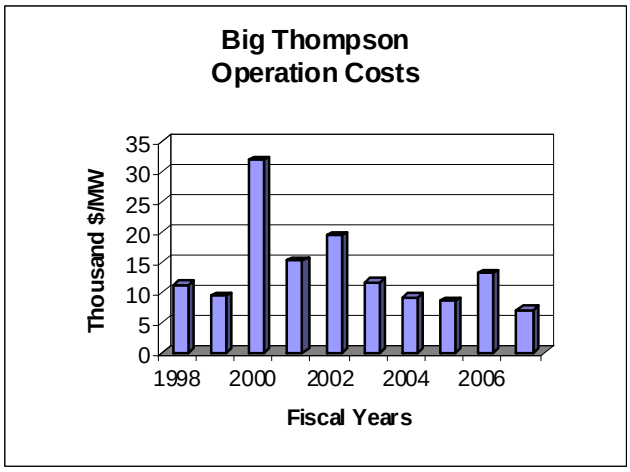
Benchmark 1
Wholesale Firm Rate

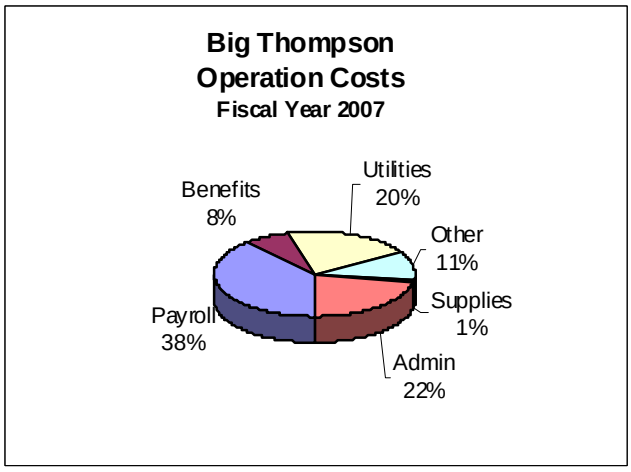


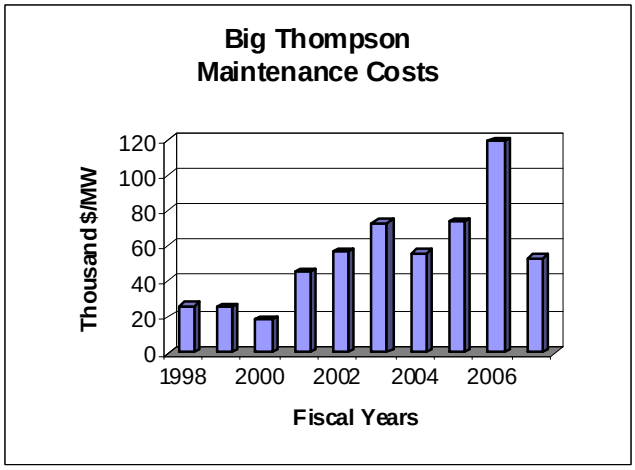
Benchmark 2
Reclamation's Production Costs as Percentage of Wholesale Firm Rate

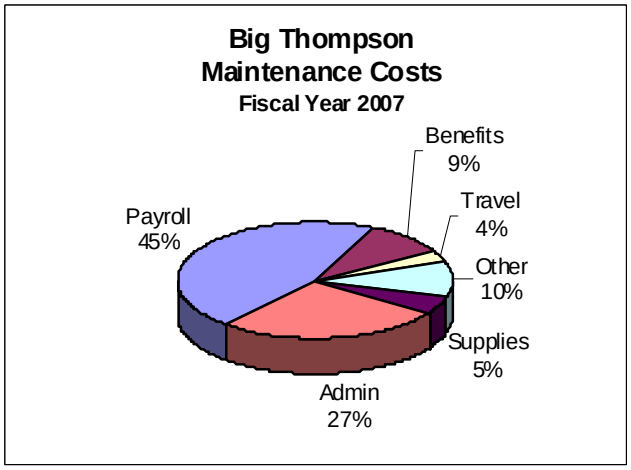


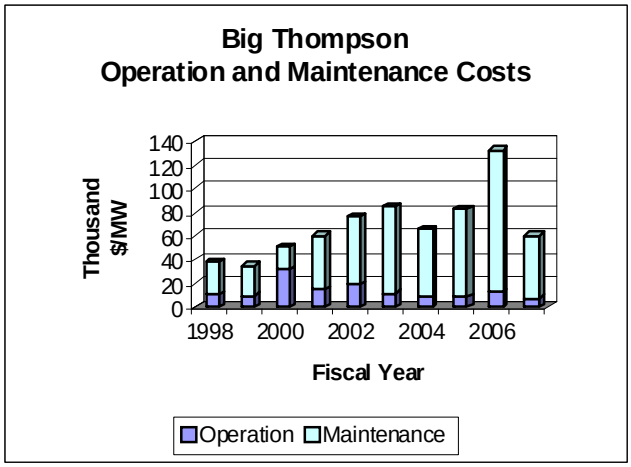
Benchmark 3
Production Costs

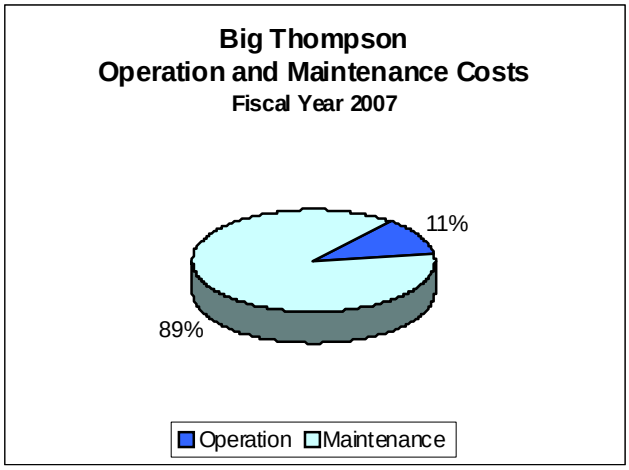






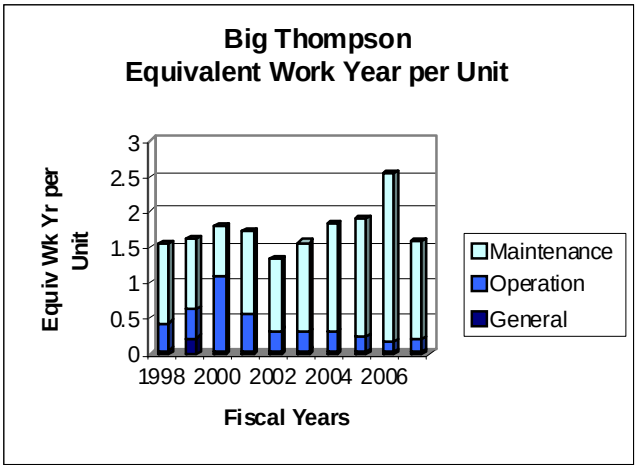


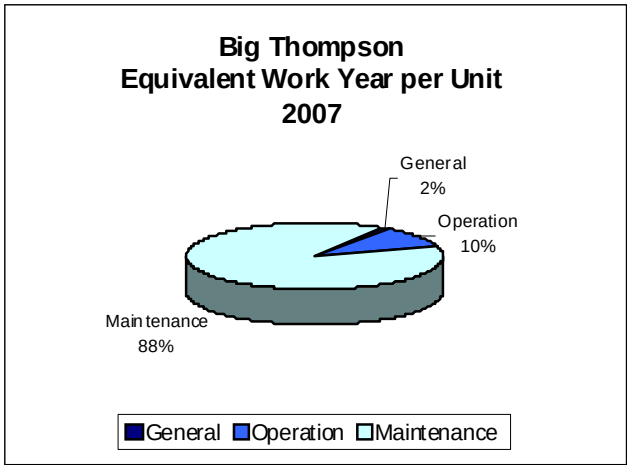


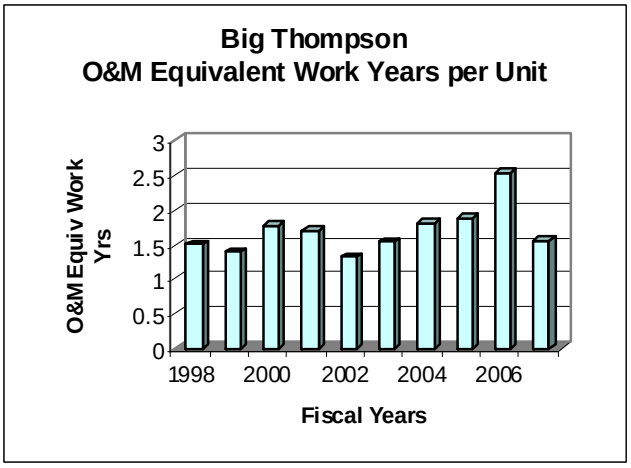


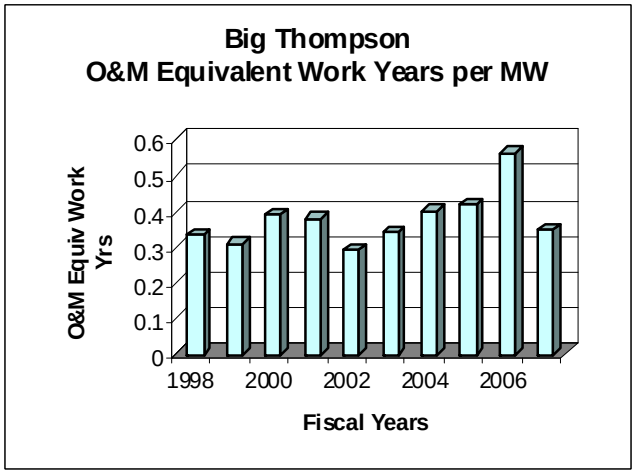
Benchmark 4
Workforce Deployment

Big Thompson 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	0.03	0.03	0.01
Operation	0.15	0.02	0.00	0.17	0.17	0.04
Maintenance	1.25	0.14	0.00	1.40	1.40	0.31
Total Staffing	1.41	0.16	0.02	1.59	1.59	0.35

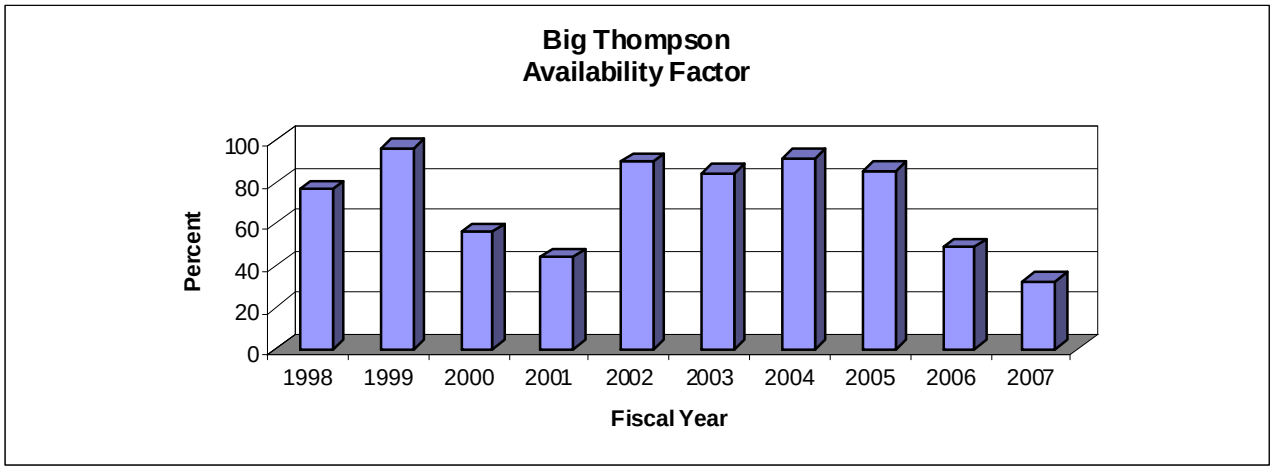




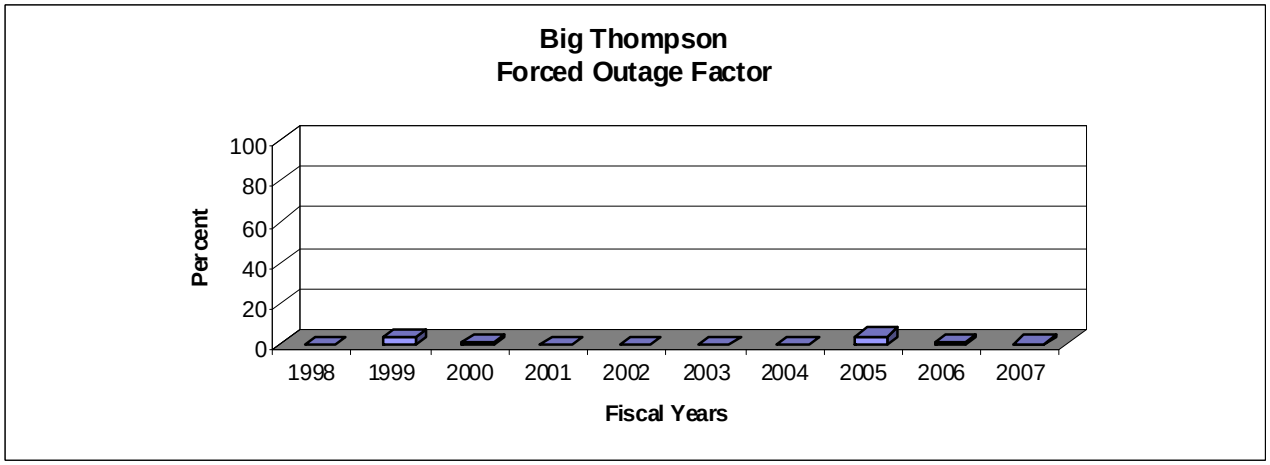




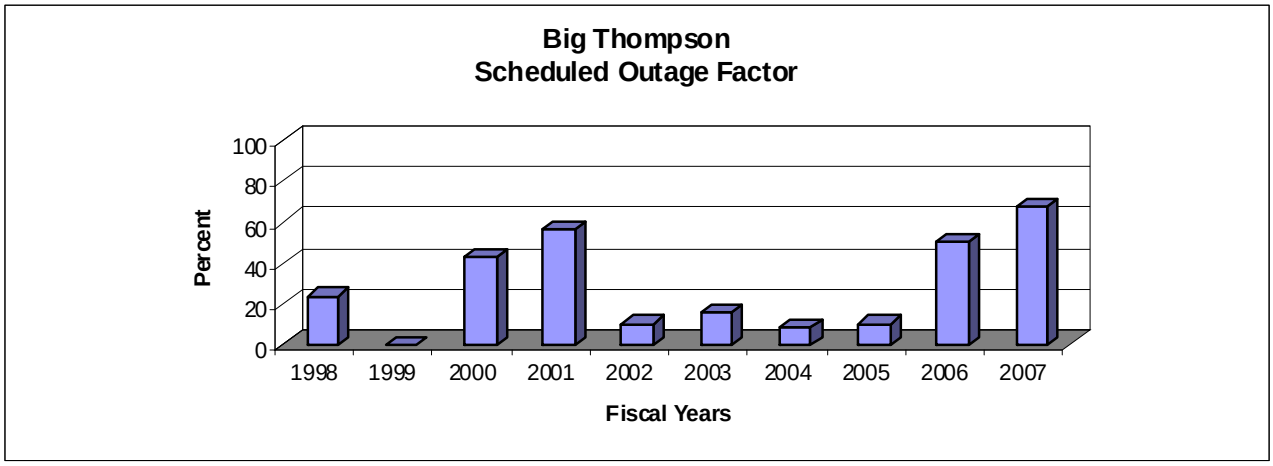
Benchmark 5
Plant Availability Factor



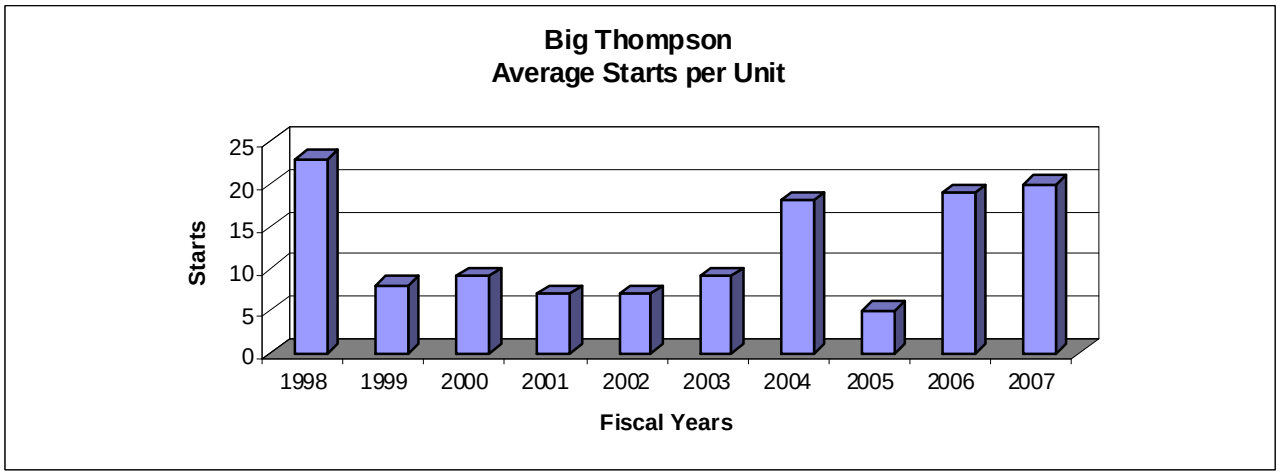
Benchmark 6
Plant Forced Outage Factor



Benchmark 7
Plant Scheduled Outage Factor



Unit Starts



Benchmark Data Comparison				
Fiscal Year 2007	**Big Thompson**	**Total Reclamation Average**	**Industry Average**	**Best Performers**
Wholesale Firm Rate Mills/kWh	23.9	*22.45	Not Available	Not Available
Production Cost as Percentage of Wholesale Firm Rate	0.62%	12.1%	Not Applicable	Not Applicable
O&M Cost $/MWh	153.57	2.76	Not Applicable	1.00
O&M Costs $/MW	60,739	7,847	Not Applicable	2,897
O&M Equiv Work Year per MW	0.35	0.03	Not Available	0.0
Availability Factor	32.5	82.3	**88.64	98.5
Forced Outage Factor	0.3	2.6	**2.61	0.0
Scheduled Outage Factor	67.3	15.1	**8.74	0.0

*Weighted by Net Generation
**2006 NERC Average

Boysen Powerplant
Pick-Sloan Missouri Basin Program

Plant Contact:
John H. Lawson
Area Manager
Wyoming Area Office

Plant Address:
Boysen Powerplant
Thermopolis WY

Telephone Numbers:
Phone: (307) 261-5671
Fax: (307) 261-5683

E-Mail Address: jlawson@gp.usbr.gov

Reclamation Region:	Great Plains
NERC Region:	Western Electricity Coordinating Council, Rocky Mountain Power Area
PMA Service Area:	Western Area Power Administration, Rocky Mountain Region
Project Authorization:	The Congress authorized the Boysen Unit of the Pick Sloan Missouri Basin Project under the Flood Control Act of December 22, 1944, Public Law 534, which approved the general comprehensive plan set forth in Senate Document 191, as revised and coordinated by Senate Document 247, 78th Congress, 2d Session.
Project Purposes:	The Boysen Unit provides regulation of the stream flow for power generation, irrigation, flood control, sediment retention, fish propagation, and recreation development.
Plant Location:	Boysen Powerplant is located in Fremont County approximately 20 miles south of Thermopolis, Wyoming, on the Wind River.
Plant Purpose:	Power generated at the Boysen Powerplant is fed into the Western Division, Pick-Sloan Missouri Basin Program transmission facilities for use within that division.

Plant Facts: An overflow, weir-type spillway controlled by radial gates is located on the right abutment and discharges immediately upstream and left of the Boysen Powerplant. The powerplant has an installed capacity of 15,000 kilowatts developed by two 7,500-kilowatt units operating under an average head of 99 feet. Each unit is served by a 10-foot-diameter steel penstock joined to a common 15-foot diameter steel penstock immediately upstream from the powerplant. The 15-foot-diameter penstock leading from the intake structure to the units was located to utilize the bore of an existing railroad tunnel made available through relocation of the CB&Q Railroad.

Plant History: Construction of the powerplant was authorized by the Flood Control Act of December 22, 1944. Construction began in 1947 and was completed in 1952.

Present Activities: Normal Operations.

Future Planned Activities: The CO_2 fire suppression systems for the two generating units will be installed in FY-2010. The wicket gate greasing systems for both generating units will be installed in FY-2009 and FY-2010. Unit one Cooler will be rebuilt in FY-2006 and Unit two's Cooler will be rebuilt in FY-2007.

Special Issues: None.

River:	Wind River	**Plant Type:**	Conventional
Powerhouse Type:	Above Ground	**Turbine Type:**	Francis
Original Nameplate Capacity:	15,000 kW	**Installed Capacity:**	15,000 kW
Year of Initial Operation:	1952	**Age:**	55 years
Net Generation (FY-2007):	37.9 GWh	**Rated Head:**	96 feet
Average Plant Factor (FY-2007):	29.7 percent	**Remotely Operated:**	Yes
Production Mode:	Intermediate		

Ancillary Services

Boysen
Ancillary Services

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

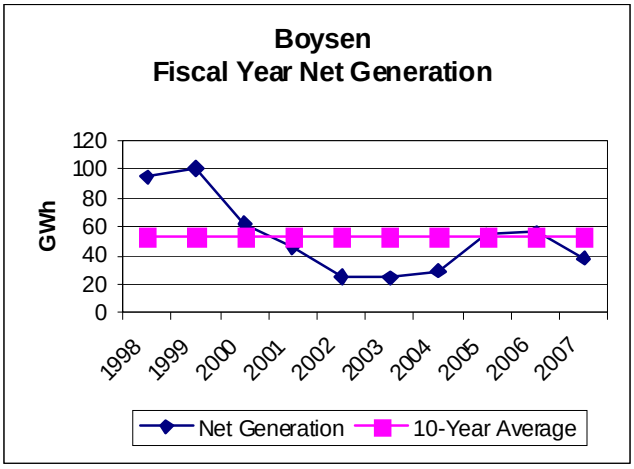
Generators

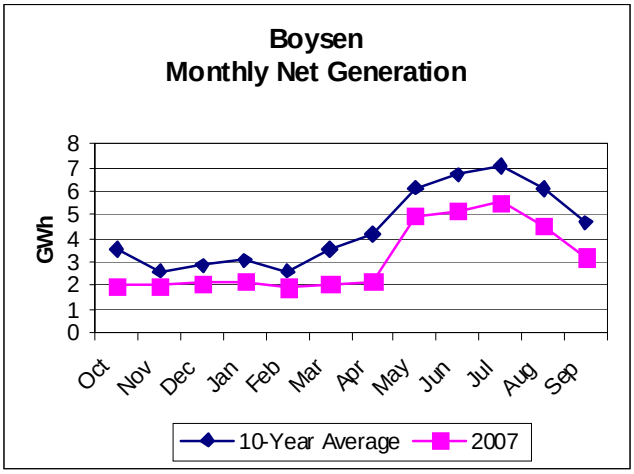
Boysen Generators

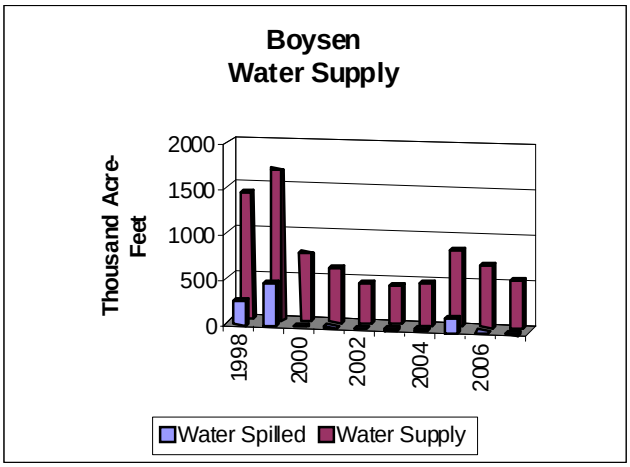
Existing Number and Capacity

Unit #	Original Capacity (kW)	Capacity Increased (kW)	Present Capacity (kW)
1	7,500	-	7,500
2	7,500	-	7,500
2 units	15,000	-	15,000

Generation

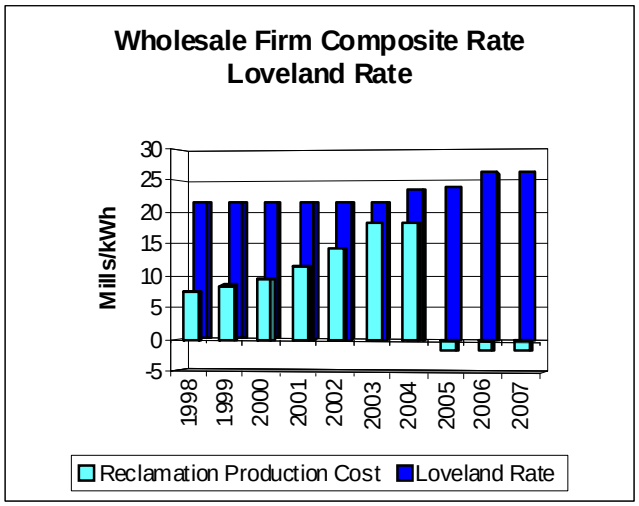

Boysen
Fiscal Year Net Generation
GWh
120
100
80
60
40
20
0
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
Net Generation
10-Year Average


Boysen
Monthly Net Generation
GWh
8
7
6
5
4
3
2
1
0
Oct
Nov
Dec
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
10-Year Average
2007

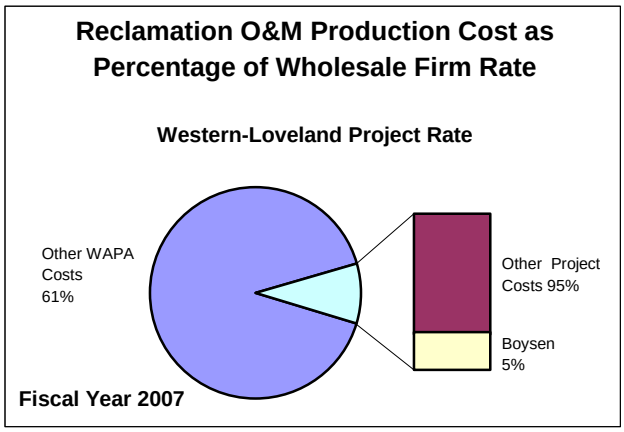

Boysen
Water Supply
Thousand Acre-Feet
2000
1500
1000
500
0
1998
2000
2002
2004
2006
Water Spilled
Water Supply

Prime Laboratory Benchmarks

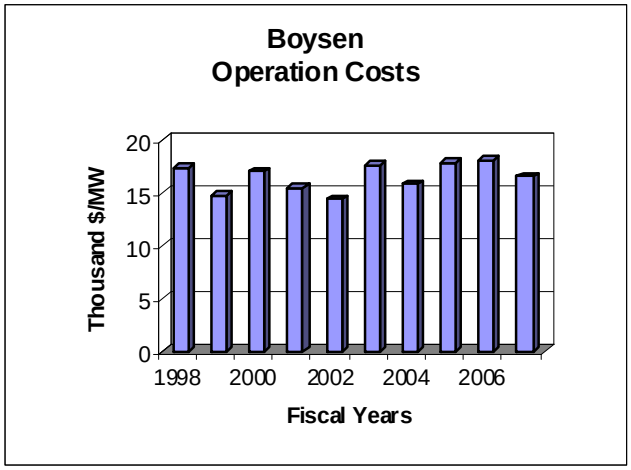
Benchmark 1
Wholesale Firm Rate

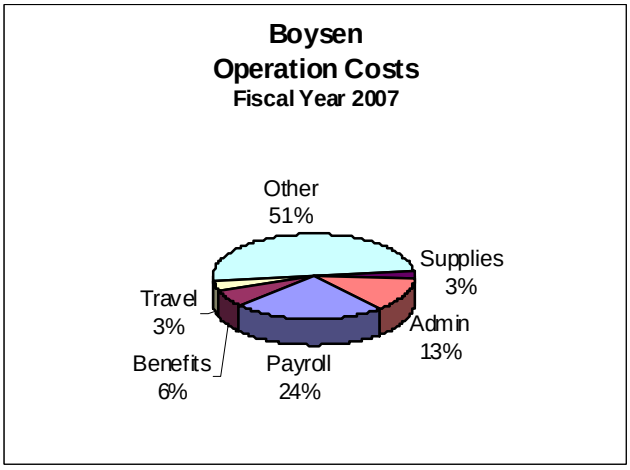


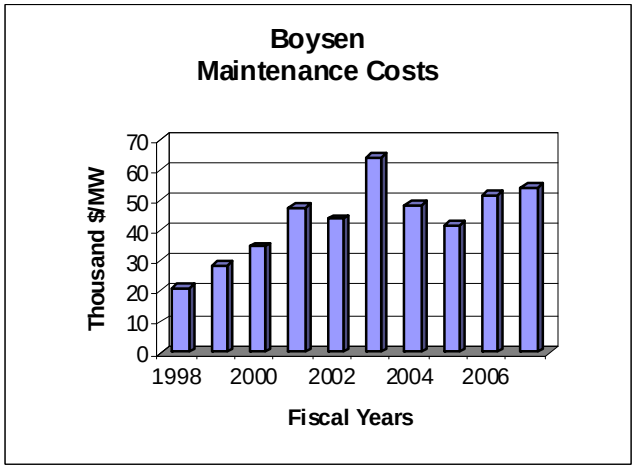
Benchmark 2
Reclamation's Production Costs as Percentage of Wholesale Firm Rate

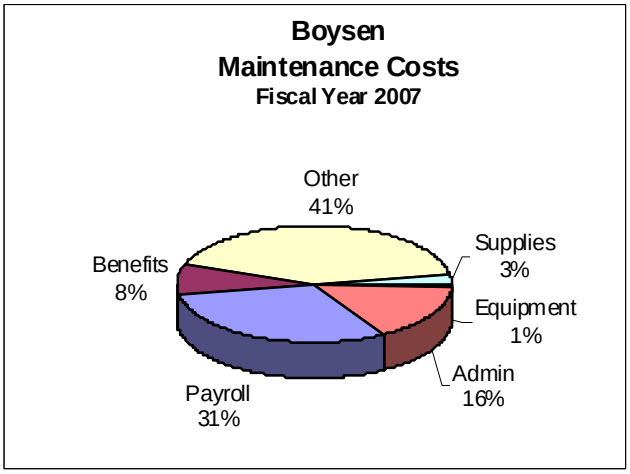


Benchmark 3
Production Costs



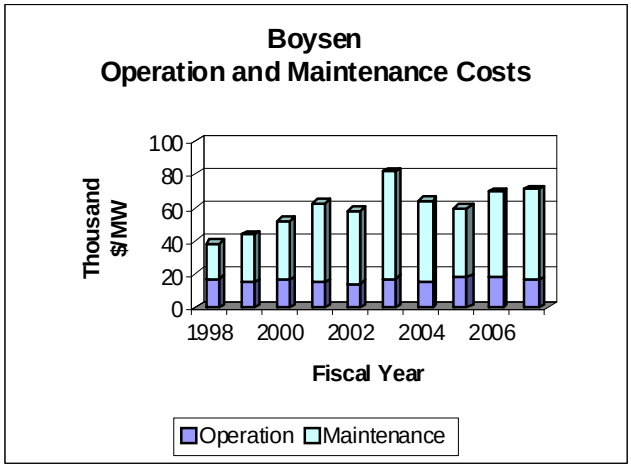


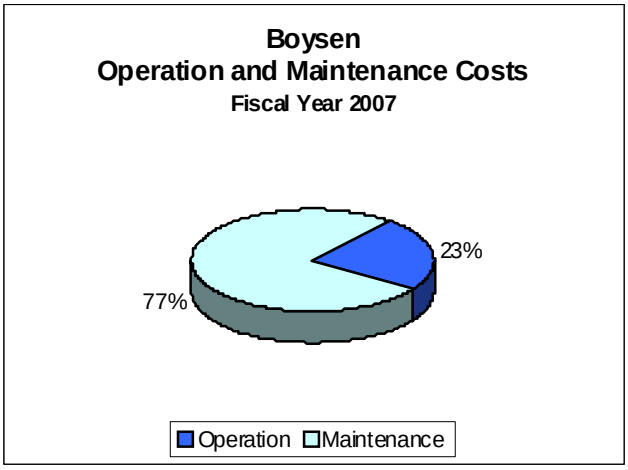


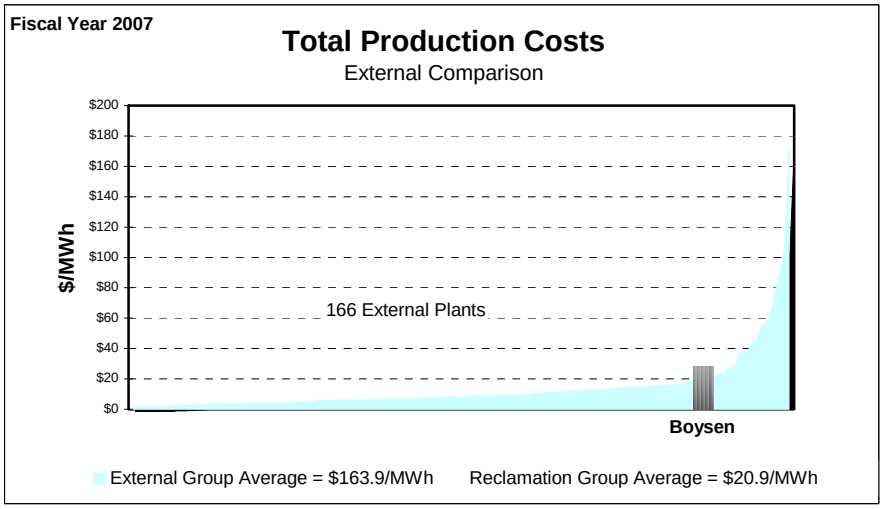


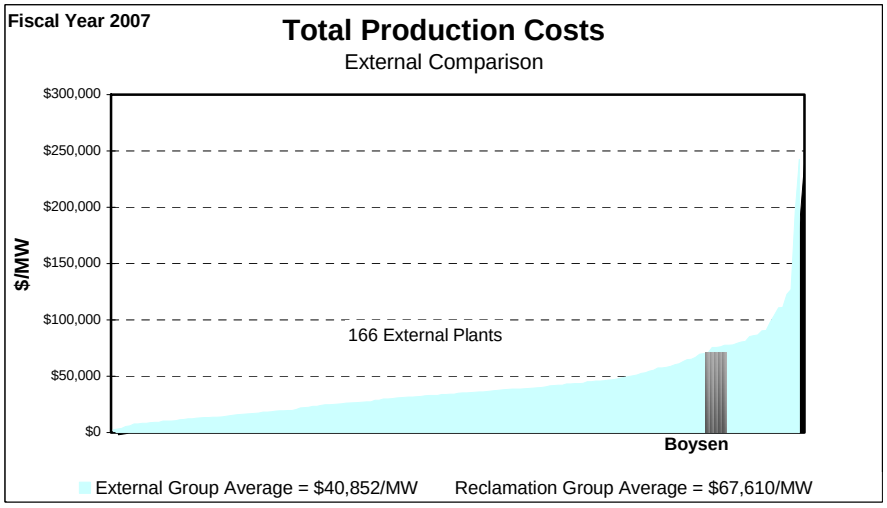
FY 2001 – Repair of Unit #2 wicket gates and re-packing of penstock expansion joints.
FY 2003 – Maintenance Costs include wicket gate greasing system repairs and transformer Doble testing.

Benchmark 3
Production Costs



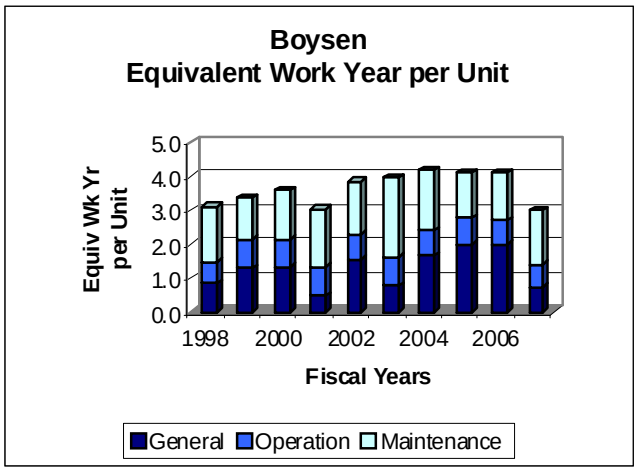


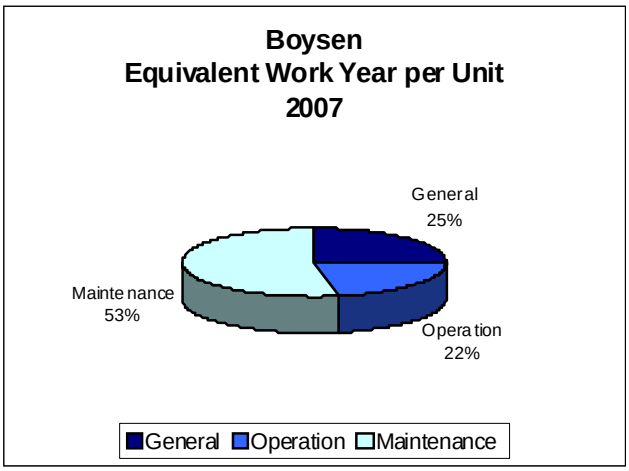


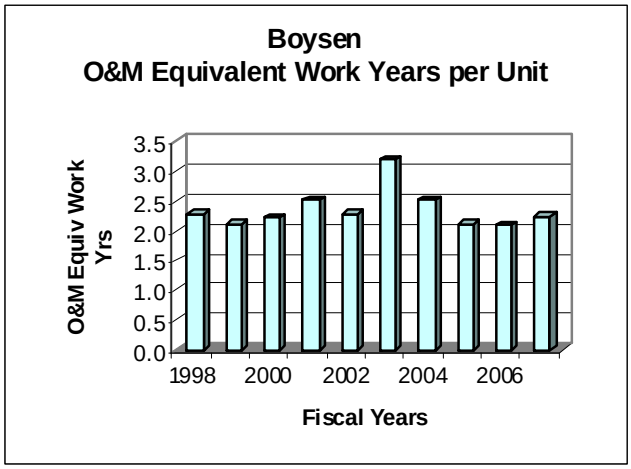


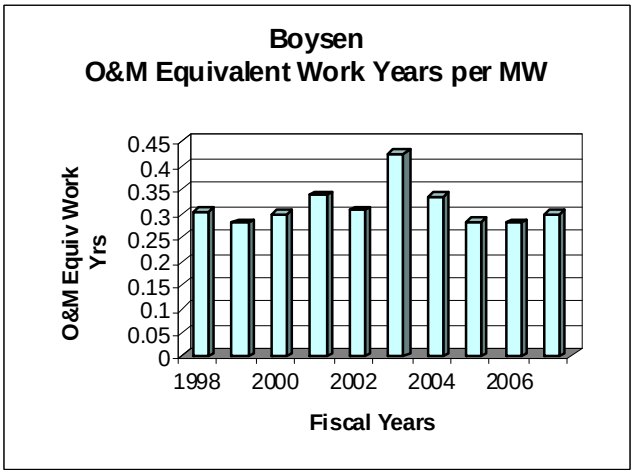
Benchmark 4
Workforce Deployment

Boysen 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	1.30	0.15	0.04	1.49	0.74	0.10
Operation	1.18	0.13	0.00	1.31	0.66	0.09
Maintenance	2.83	0.32	0.00	3.15	1.58	0.21
Total Staffing	5.32	0.60	0.04	5.95	2.98	0.40

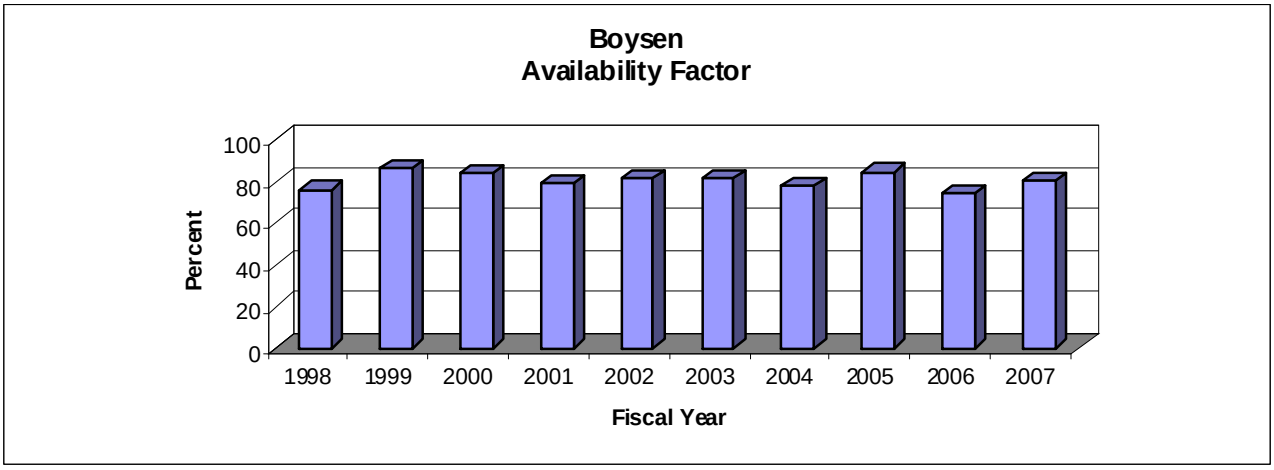




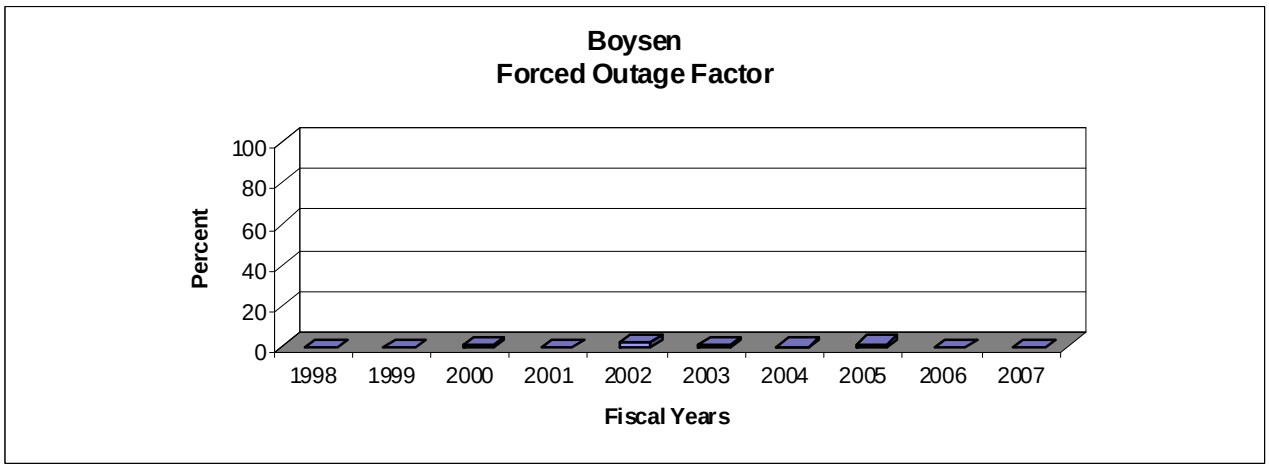




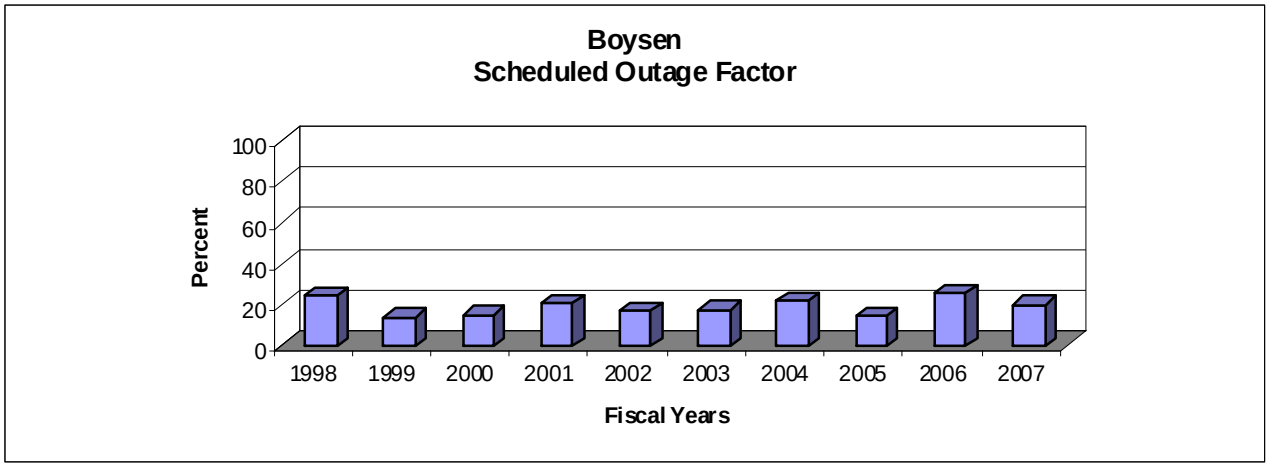
Benchmark 5
Plant Availability Factor



Benchmark 6
Plant Forced Outage Factor

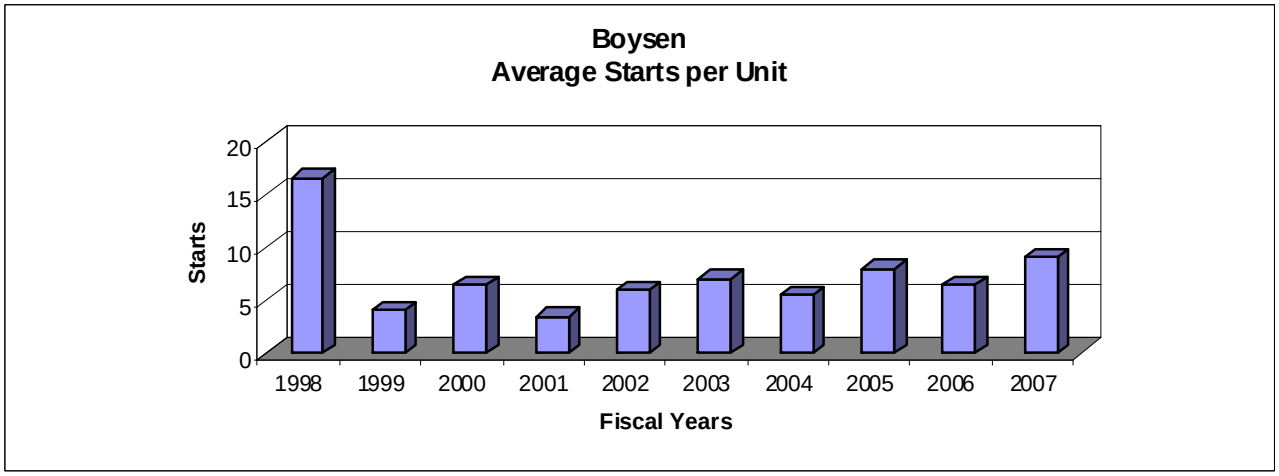


Benchmark 7
Plant Scheduled Outage Factor



FY-1997 – Unit 2 extended maintenance.
FY-1998 – Units 1 and 2 voltage regulator and exciter replacement.

Unit Starts



Benchmark Data Comparison					
Fiscal Year 2007	**Boysen Powerplant**	**Reclamation Average 10-30 MW Group**	**Total Reclamation Average**	**Industry Average**	**Best Performers**
Wholesale Firm Rate Mills/kWh	23.9	Not Applicable	*22.45	Not Available	Not Available
Production Cost as Percentage of Wholesale Firm Rate	2.42%	Not Applicable	12.1%	Not Applicable	Not Applicable
O&M Cost $/MWh	28.18	16.40	2.76	***163.95	1.00
O&M Costs $/MW	71,112	62,731	7,847	***40,852	2,897
O&M Equiv Work Year per MW	0.30	0.2	0.03	Not Available	0.0
Availability Factor	80.0	88.5	82.3	**88.64	98.5
Forced Outage Factor	0.00	0.1	2.6	**2.61	0.0
Scheduled Outage Factor	20.0	11.4	15.1	**8.74	0.0

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

Buffalo Bill Powerplant
Pick-Sloan Missouri Basin Program

Plant Contact:
John H. Lawson
Area Manager
Wyoming Area Office

Plant Address:
Buffalo Bill Powerplant
Cody WY

Telephone Numbers:
Phone: (307) 261-5671
Fax: (307) 261-5683

E-Mail Address:
jlawson@gp.usbr.gov

Reclamation Region:	Great Plains
NERC Region:	Western Electricity Coordinating Council, Rocky Mountain Power Area
PMA Service Area:	Western Area Power Administration, Rocky Mountain Region
Project Authorization:	The Secretary of the Interior authorized the Shoshone Project on February 10, 1904, under authority of the Reclamation Act of June 17, 1902, and authorized Heart Mountain power development on June 19, 1945, under the provisions of the Reclamation Project Act of 1939, and authorized under authority of the Reclamation Reform Act of October 12, 1982, as the Buffalo Bill Dam Modifications as part of the Pick-Sloan Missouri Basin Program
Project Purposes:	Floodwaters of the Shoshone River are stored in Buffalo Bill Reservoir for later release for irrigation and power generation. Power is developed at the Buffalo Bill, Spirit Mountain, Shoshone, and Heart Mountain Powerplants. The system is interconnected with the West Division of the Pick-Sloan Missouri Basin Program.
Plant Location:	Buffalo Bill Powerplant is located in Park County approximately 4 miles southwest of Cody, Wyoming, on the Shoshone River.
Plant Purpose:	Power produced on the project is fed into a grid system, which serves an area extending into three States.

Plant Facts:	Buffalo Bill Dam began storing water in 1910. The dam and reservoir are located in a rugged scenic canyon adjacent to a main highway which leads into Yellowstone National Park.		
Plant History:	In 1992 construction was completed on the dam modification (which raised the dam 25 feet), the new powerplant, and the visitor's center.		
Present Activities:	Normal Operations.		
Future Planned Activities:	None		
Special Issues:	None		
River:	Shoshone River	**Plant Type:**	Conventional
Powerhouse Type:	Underground	**Turbine Type:**	Francis
Original Nameplate Capacity:	18,000 kW	**Installed Capacity:**	18,000 kW
Year of Initial Operation:	1992	**Age:**	15 years
Net Generation (FY-2007):	41.0 GWh	**Rated Head:**	266 feet
Average Plant Factor (FY-2007):	26.2 percent	**Remotely Operated:**	Yes
Production Mode:	Intermediate		

Ancillary Services

Buffalo Bill
Ancillary Services

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

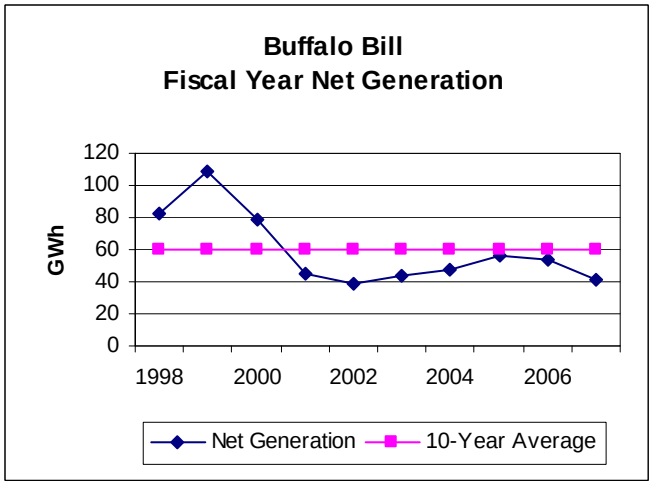
Generators

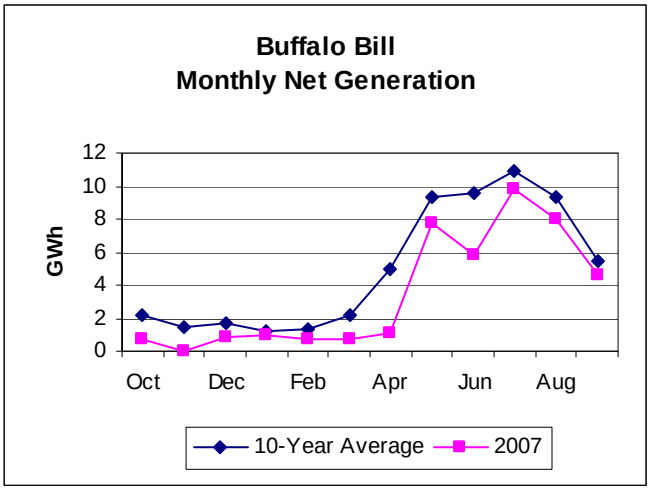
Buffalo Bill Generators

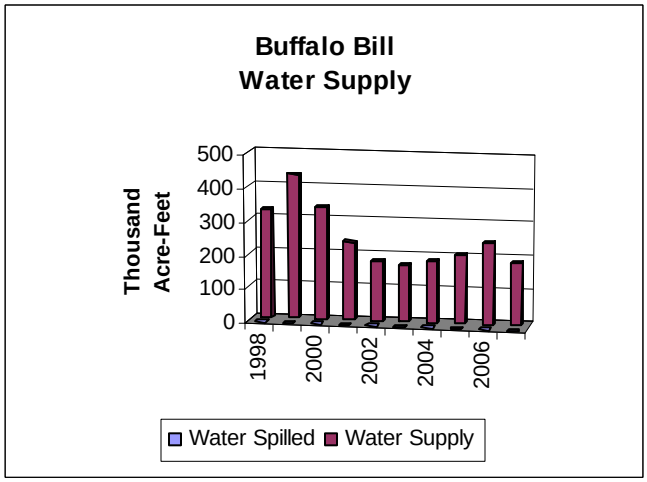
Existing Number and Capacity

Unit #	Original Capacity (kW)	Capacity Increased (kW)	Present Capacity (kW)
1	6,000	-	6,000
2	6,000	-	6,000
3	6,000	-	6,000
3 units	18,000	-	18,000

Generation

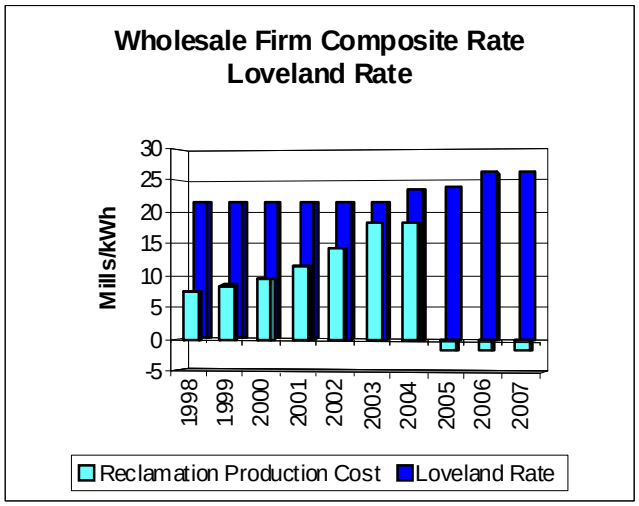

Buffalo Bill
Fiscal Year Net Generation
GWh
120
100
80
60
40
20
0
1998
2000
2002
2004
2006
Net Generation
10-Year Average


Buffalo Bill
Monthly Net Generation
GWh
12
10
8
6
4
2
0
Oct
Dec
Feb
Apr
Jun
Aug
10-Year Average
2007

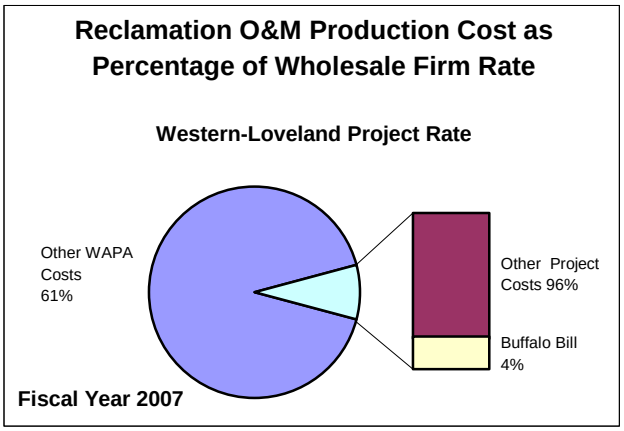

Buffalo Bill
Water Supply
Thousand Acre-Feet
500
400
300
200
100
0
1998
2000
2002
2004
2006
Water Spilled
Water Supply

Prime Laboratory Benchmarks

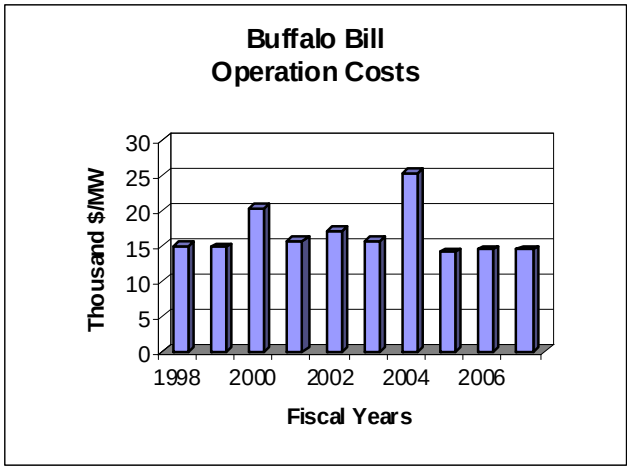
Benchmark 1
Wholesale Firm Rate

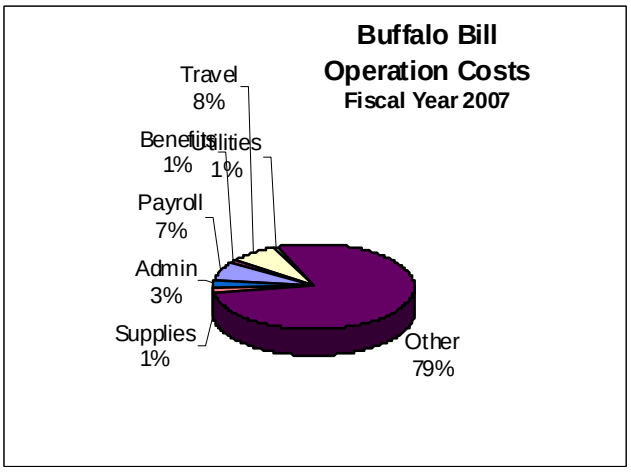


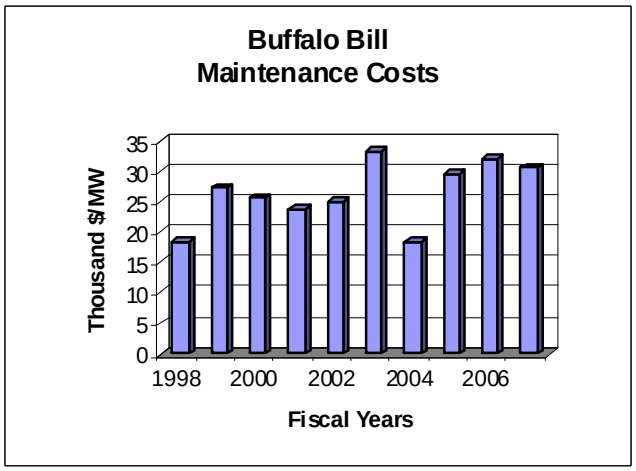
Benchmark 2
Reclamation's Production Costs as Percentage of Wholesale Firm Rate

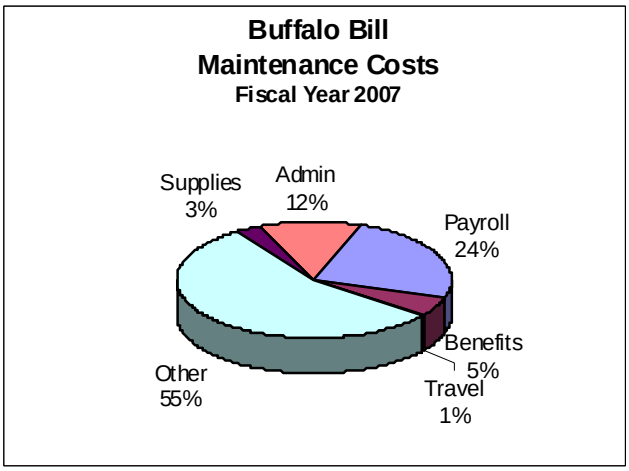


Benchmark 3
Production Costs

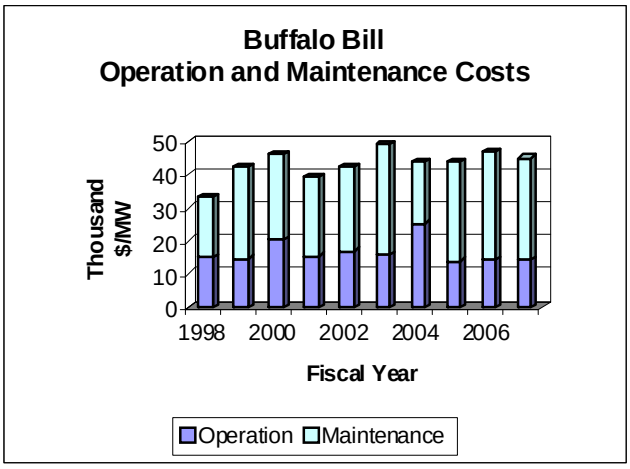


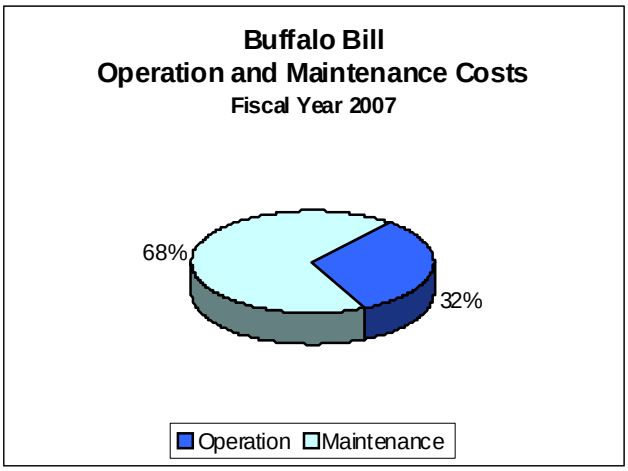


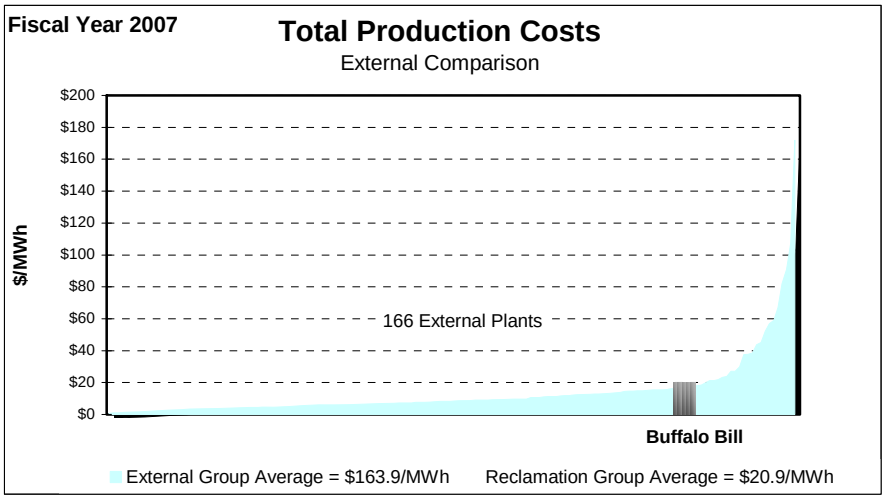


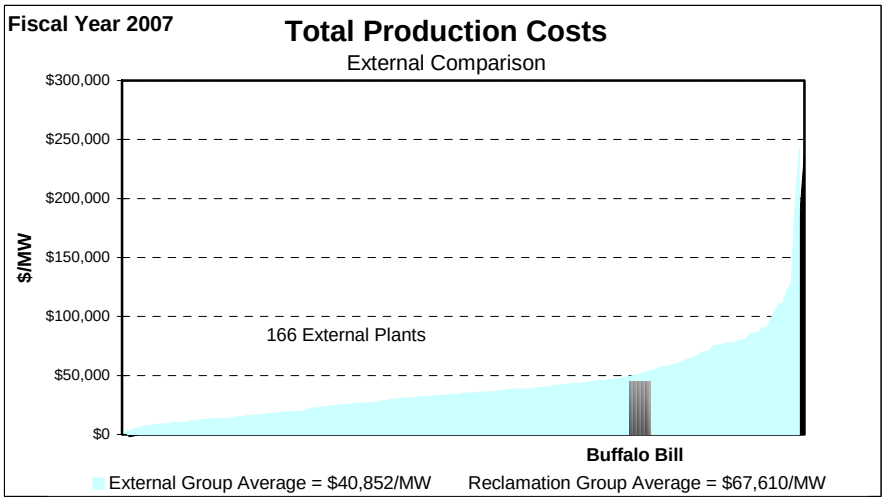


Benchmark 3
Production Costs



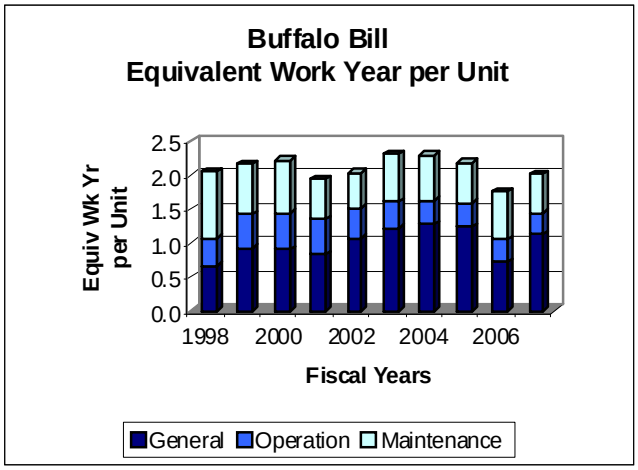


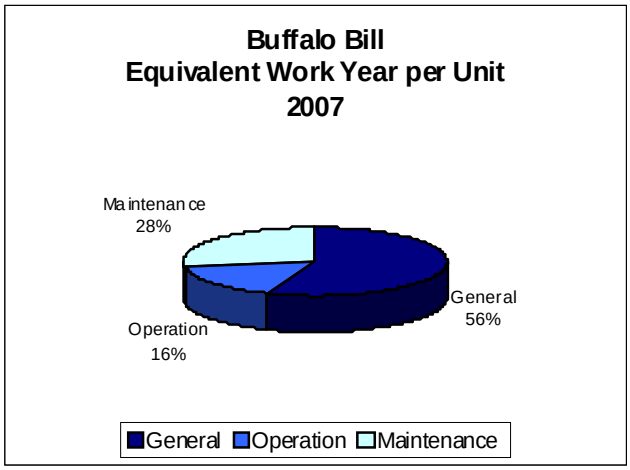


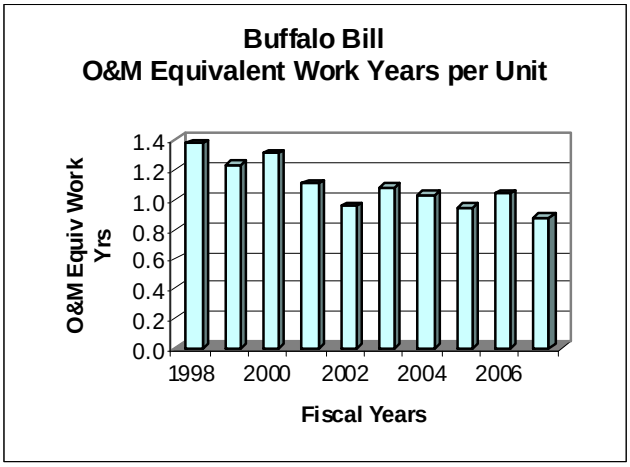


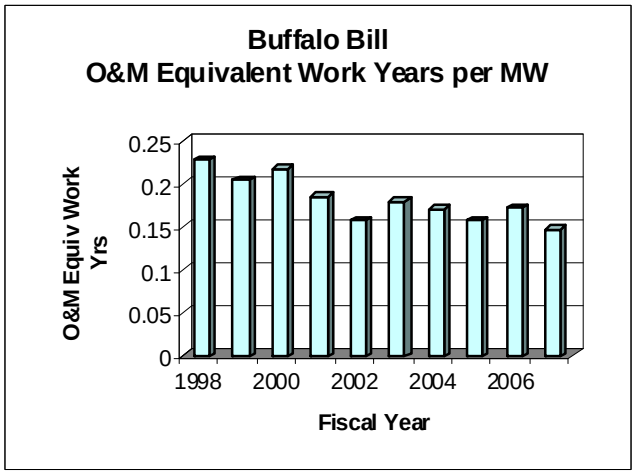
Benchmark 4
Workforce Deployment

Buffalo Bill 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	2.98	0.34	0.05	3.37	1.12	0.19
Operation	0.86	0.10	0.00	0.96	0.32	0.05
Maintenance	1.52	0.17	0.00	1.69	0.56	0.09
Total Staffing	5.36	0.61	0.05	6.02	2.01	0.33

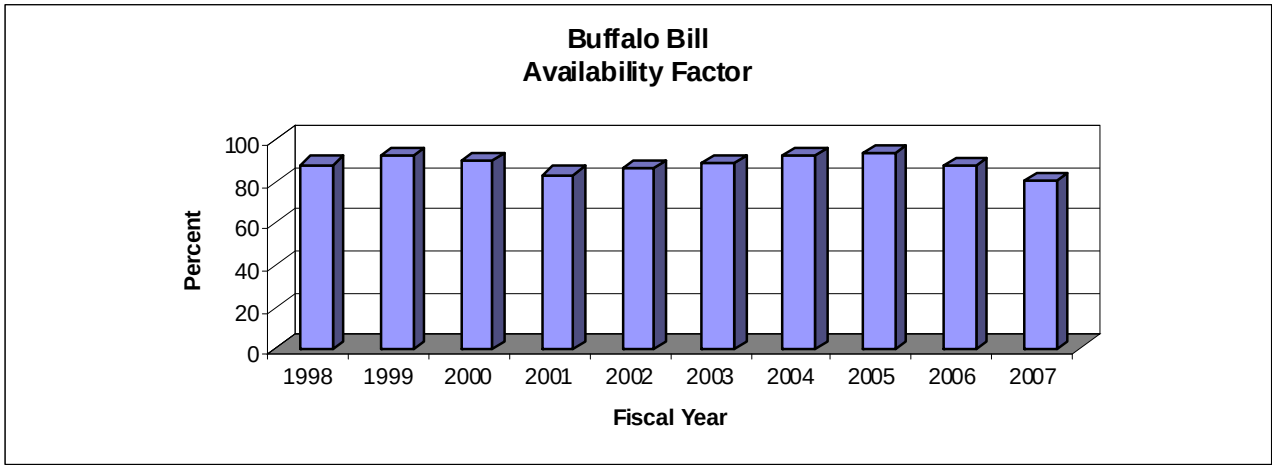




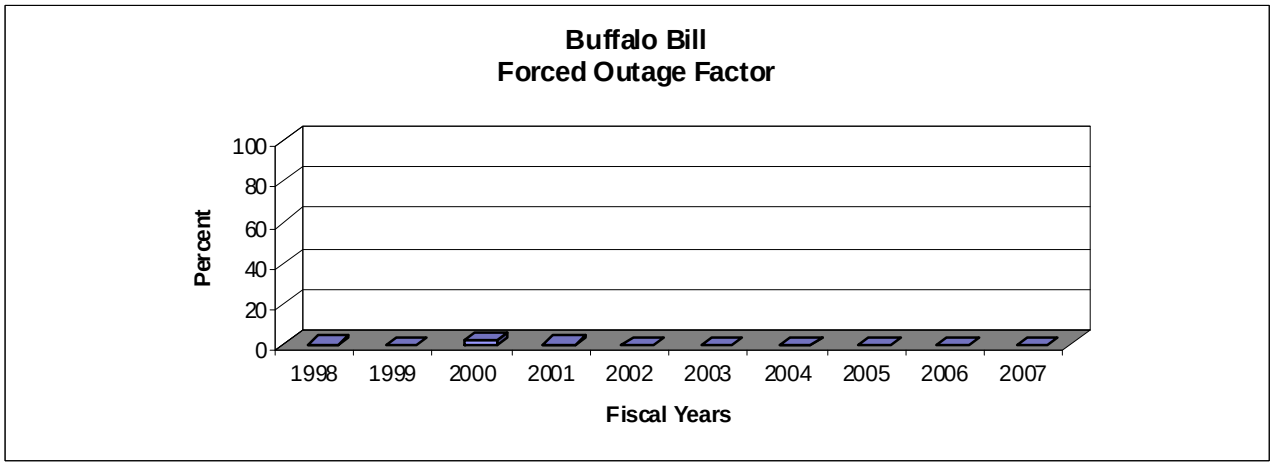




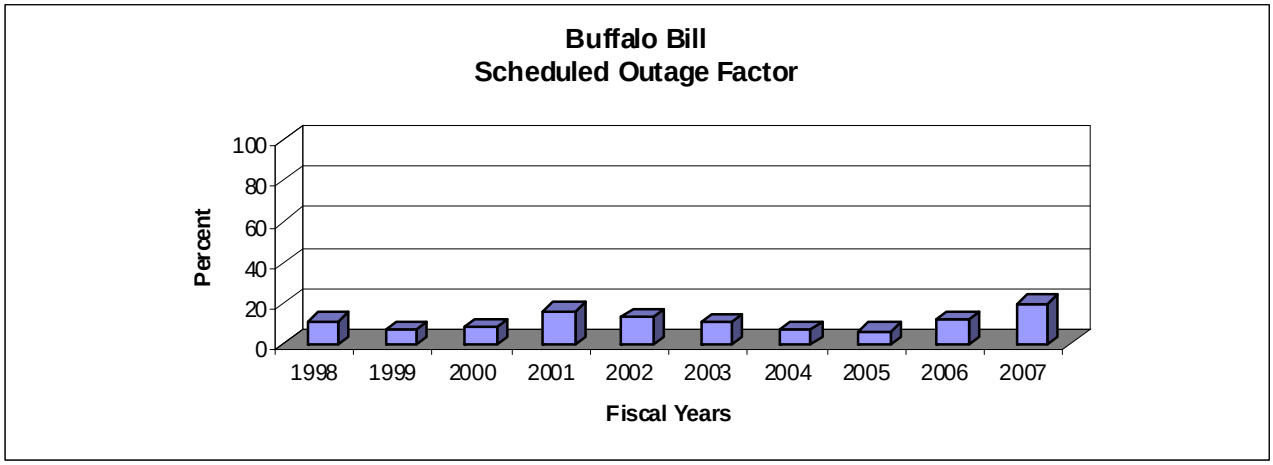
Benchmark 5
Plant Availability Factor



Benchmark 6
Plant Forced Outage Factor

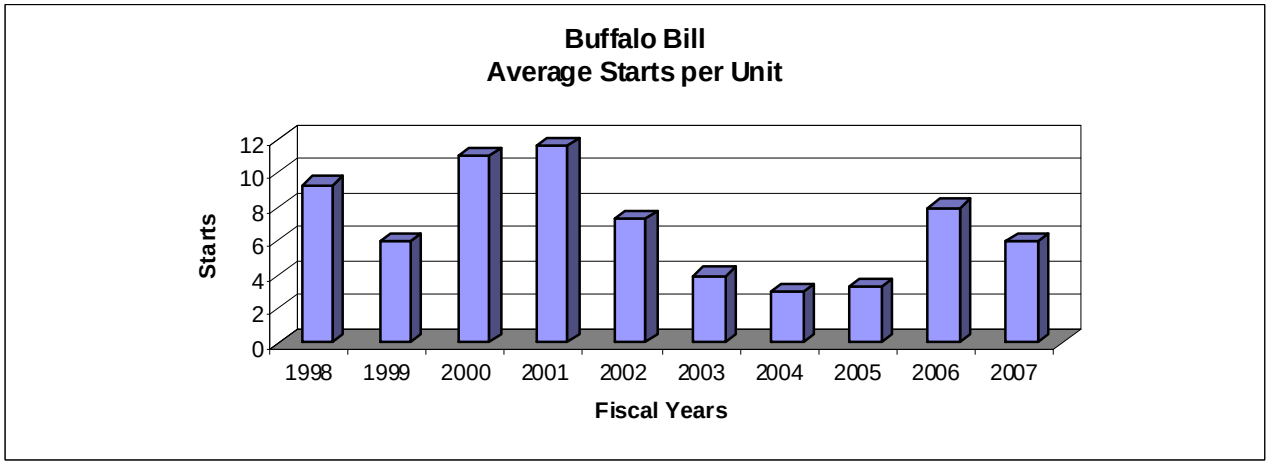


Benchmark 7
Plant Scheduled Outage Factor



FY-01 - Extended outage on all units for re-coating of power penstock.

Unit Starts



Benchmark Data Comparison

Fiscal Year 2007	Buffalo Bill Powerplant	Reclamation Average 10-30 MW Group	Total Reclamation Average	Industry Average	Best Performers
Wholesale Firm Rate Mills/kWh	23.9	Not Applicable	*22.45	Not Available	Not Available
Production Cost as Percentage of Wholesale Firm Rate	1.84%	Not Applicable	12.1%	Not Applicable	Not Applicable
O&M Cost $/MWh	19.77	16.40	2.76	***163.95	1.00
O&M Costs $/MW	45,071	62,731	7,847	***40,852	2,897
O&M Equiv Work Year per MW	0.15	0.22	0.03	Not Available	0.0
Availability Factor	79.93	88.5	82.3	**88.64	98.5
Forced Outage Factor	0.03	0.1	2.6	**2.61	0.0
Scheduled Outage Factor	20.03	11.4	15.1	**8.74	0.0

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

Canyon Ferry Powerplant
Pick-Sloan Missouri Basin Program

Plant Contact:
Paul Backlund
Facility Manager

Plant Address:
Canyon Ferry Field Office
7700 Canyon Ferry Road
Helena MT 59602

Telephone Numbers:
Phone: (406) 475-3923
Fax: (406) 475-9147

E-Mail Address:
pbacklund@gp.usbr.gov

Reclamation Region: Great Plains

NERC Region: Western Electricity Coordinating Council

PMA Service Area: Western Area Power Administration, Upper Great Plains Region

Project Authorization: Construction of the Canyon Ferry Unit, part of the Pick-Sloan Missouri Basin Project Eastern Division, was authorized by the Flood Control Act of December 22, 1944, Public Law 534, which approved the general comprehensive plan set forth in Senate document 191, as revised by Senate Document 247, 78th Congress.

Project Purposes: The Canyon Ferry Unit is a multi-purpose project, which provides low cost power generation and makes an important contribution to the flood control, irrigation, and power supply in the upper Missouri Basin. Canyon Ferry was constructed to provide regulation of runoff for low cost power and to permit increased irrigation diversions in the upper Missouri River Basin. With a total capacity of 2,051,000 acre-feet, Canyon Ferry Reservoir makes possible the irrigation of 155,600 acres of land and supplements irrigation of 82,000 acres in the upper Missouri area. The reservoir permits upstream irrigation development by reregulating residual flows of the river for downstream powerplants.

Plant Location: Canyon Ferry Powerplant is located on the main stem of the Missouri River in Lewis & Clark County, about 17 miles northeast of Helena, the capital of Montana.

Plant Purpose: Canyon Ferry Powerplant, with an installed capacity of 50,000 kilowatts, supplies expanding power needs for residential and commercial use in a wide surrounding area.

Plant Facts: The powerplant is located at the downstream toe of the dam on the right abutment. Three 13.5-foot diameter penstocks, embedded in the dam, supply water to three 23,500 horsepower, vertical-shaft, Francis-type hydraulic turbines each driving a 16,667-kilowatt generator. The Canyon Ferry 115-kilovolt switchyard is a steel structure mounted on the roof of the powerplant.

Canyon Ferry Dam is a concrete structure rising 225 feet above the rock foundation and impounds flows of the Missouri River for multi-purpose use. Canyon Ferry Reservoir is about 25 miles long with a total capacity of 2,051,000 acre-feet.

Plant History: Construction of Canyon Ferry Powerplant started in 1949 and was completed in 1954. Unit 1 began operation in December 1953, and Units 2 and 3 in March 1954. Canyon Ferry Powerplant is part of the Eastern Division of the Pick-Sloan Missouri Basin Program.

Present Activities: FY-2006 activities included: protective relay test set replacement; repair spillway guides; installed and tested a new prototype turbine air system for increasing low dissolved oxygen; oil purification system replacement; dam roadway expansion joint repair; installed underground power lines to all camp facilities; gantry crane repairs; fiber optic system installed to warehouse, visitor center, and office building; Unit 2 and transformer K2A testing and triennial maintenance; Crow Creek Pumping Plant OCB 412 and transformer KY1A testing and maintenance.

Future Activities: Major activities planned in the near future include: complete roadway and expansion joint repair; dam drain cleaning; remove possible PCB contaminated electrical equipment at Crow Creek pumping plant; field verification of powerplant electrical drawings; unbalanced closure testing of fixed wheel gates; coating of metal structures on and in the dam; replace generator, transformer, and switchyard lightning arresters; and reservoir dust abatement dike repair.

Special Issues: The Missouri River Basin experienced its seventh consecutive year of drought conditions, resulting in below average power generation in FY-2000 through FY-2006. Responsibilities, in addition to the 50,000-kilowatt powerplant, also include the operation and maintenance of the dam, reservoir, switchyard, a Government camp, two water and sewage systems, maintenance and support of Crow Creek Pumping Plant and Substation, and several miles of roads and fences.

River:	Missouri River	**Plant Type:**	Conventional
Powerhouse Type:	Above Ground	**Turbine Type:**	Francis
Original Nameplate Capacity:	50,000 kW	**Installed Capacity:**	50,000 kW
Year of Initial Operation:	1953	**Age:**	54 years
Net Generation (FY-2007):	291.8 GWh	**Rated Head:**	125 feet
Average Plant Factor (FY-2007):	67.2 percent	**Remotely Operated:**	Yes
Production Mode:	Base Load		

Ancillary Services

Canyon Ferry
Ancillary Services

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

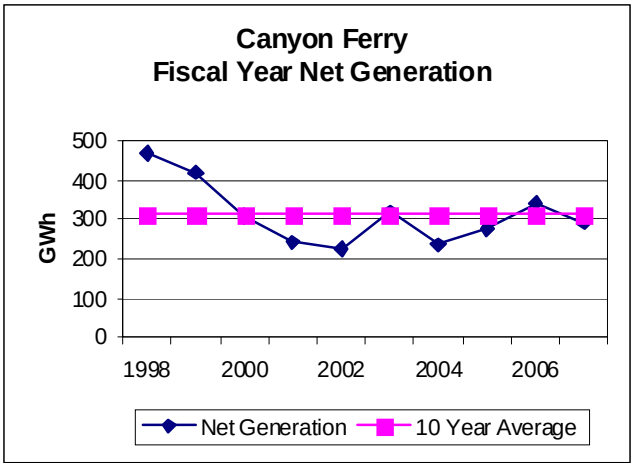
Canyon Ferry is not designated as an "official" blackstart plant, even though it has the capability.

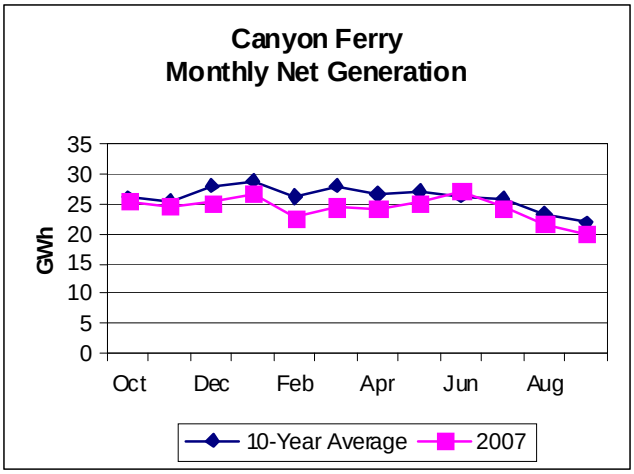
Generators

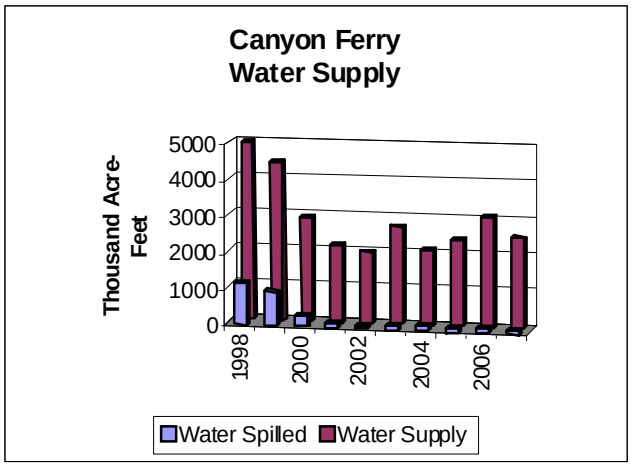
Canyon Ferry Generators
Existing Number and Capacity

Unit #	Original Capacity (kW)	Capacity Increased (kW)	Present Capacity (kW)
1	16,667	-	16,667
2	16,667	-	16,667
3	16,667	-	16,667
3 units	50,000	-	50,000

Generation



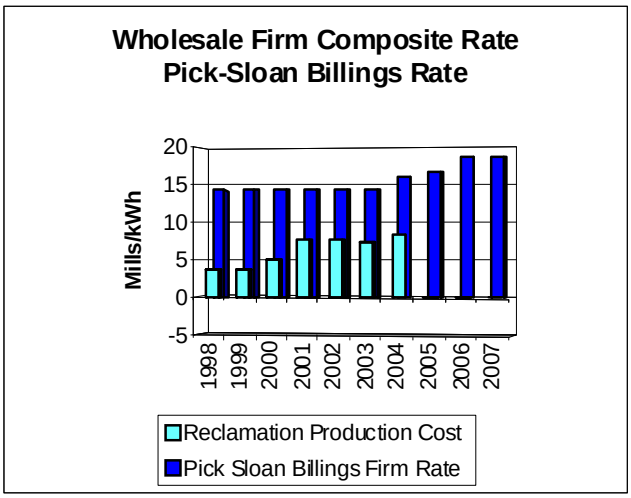




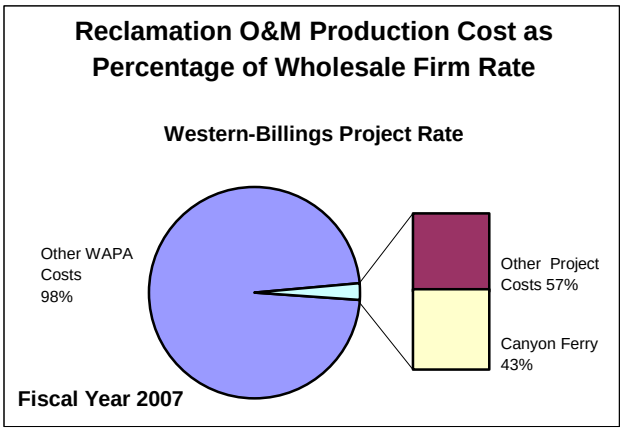
Drought conditions encountered for the sixth consecutive year.

Prime Laboratory Benchmarks

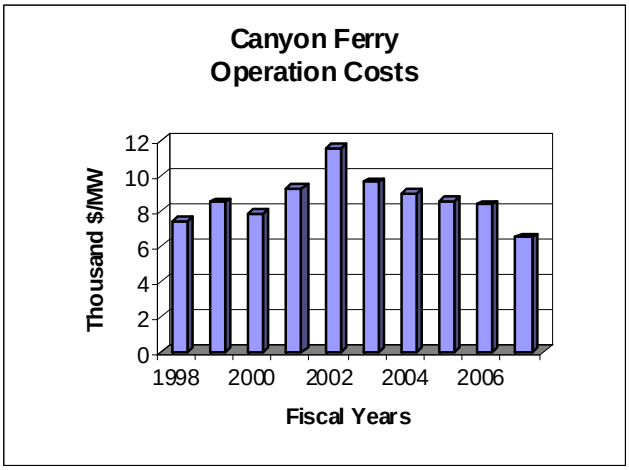
Benchmark 1
Wholesale Firm Rate

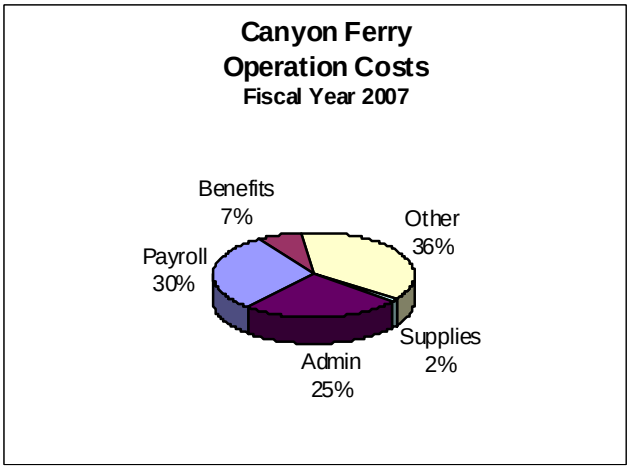


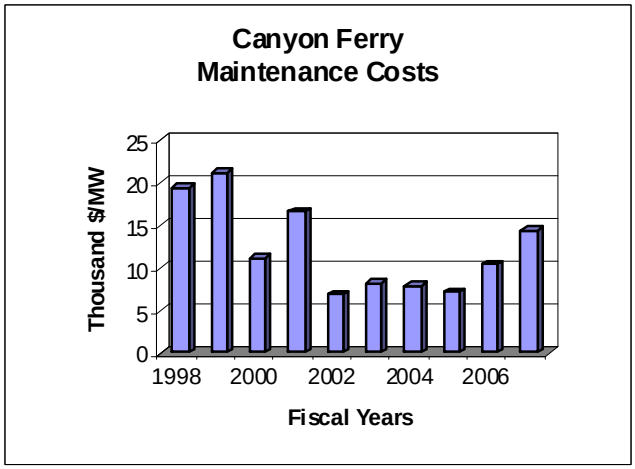
Benchmark 2
Reclamation's Production Costs as Percentage of Wholesale Firm Rate

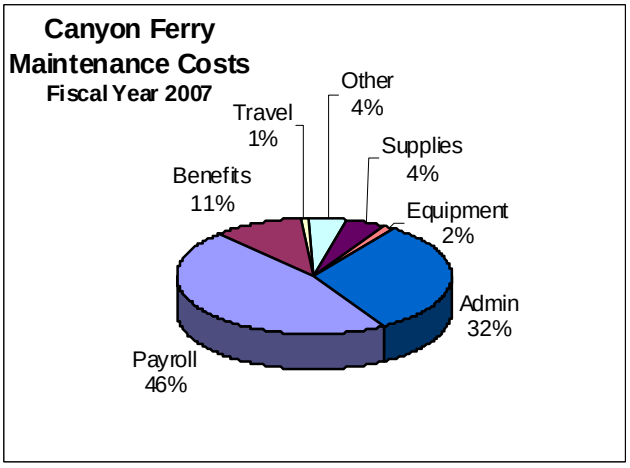


Benchmark 3
Production Costs



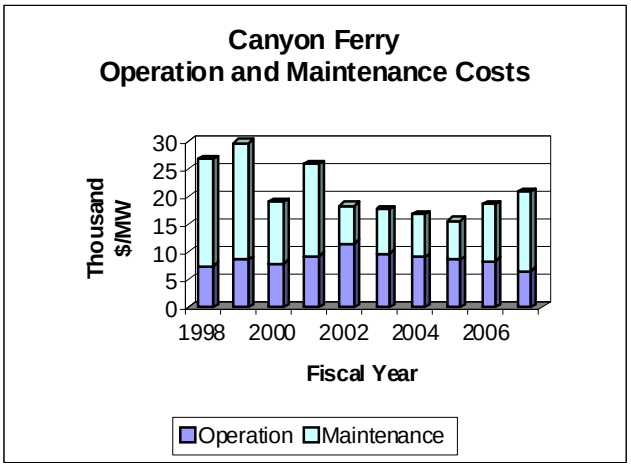


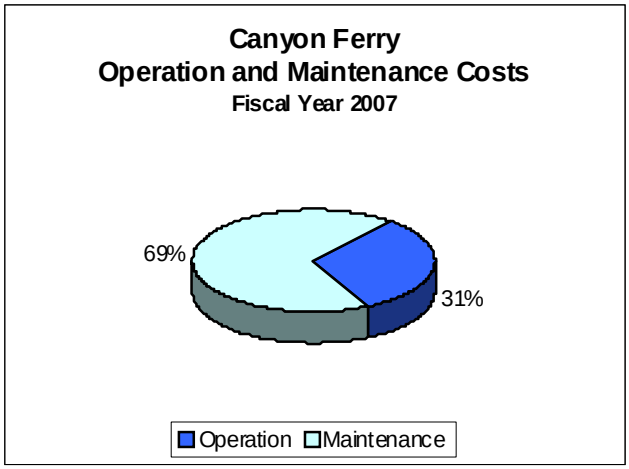


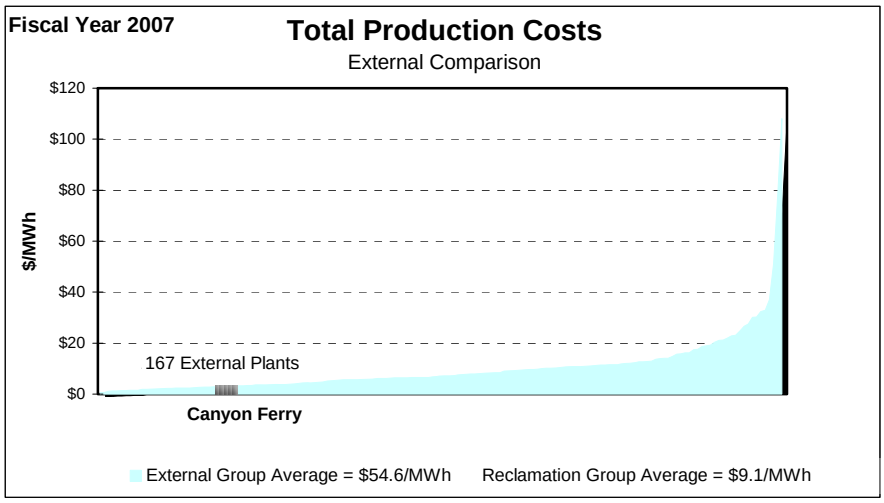


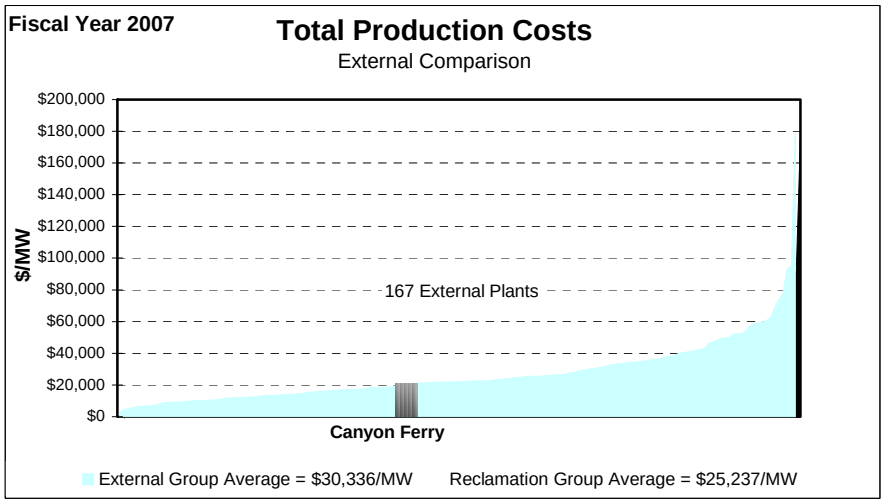
FY-1999 – FY-2001 maintenance costs include extraordinary maintenance costs for refurbishment of the powerplant penstock's fixed-wheel gates and hydraulic cylinders overhaul.

Benchmark 3
Production Costs



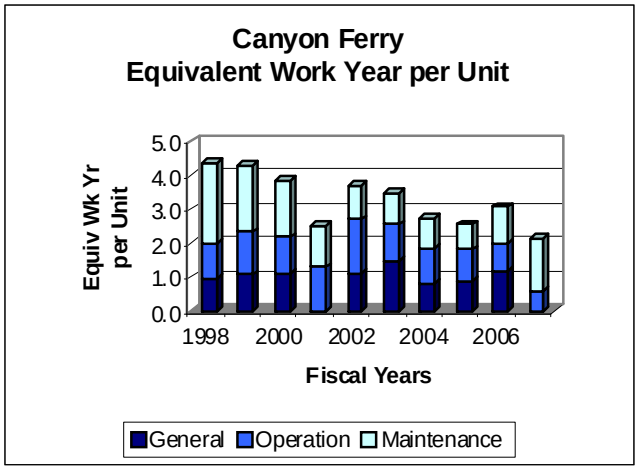


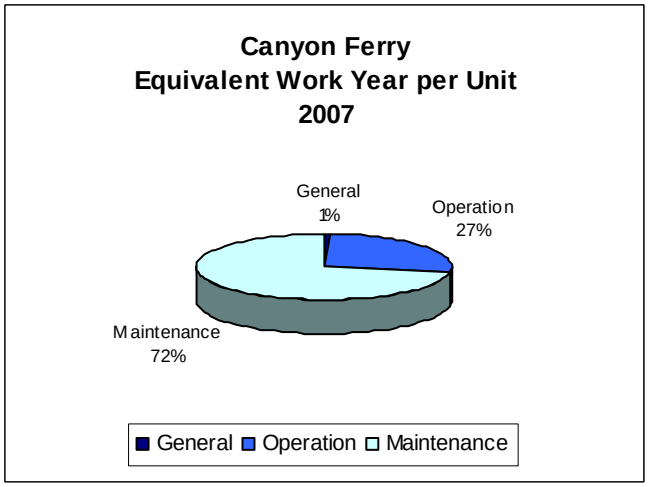


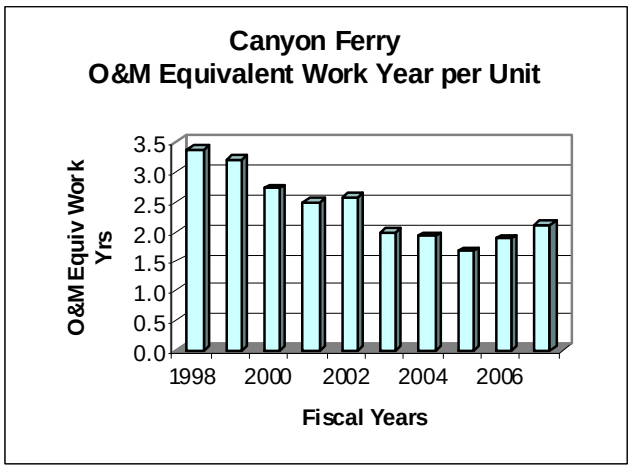


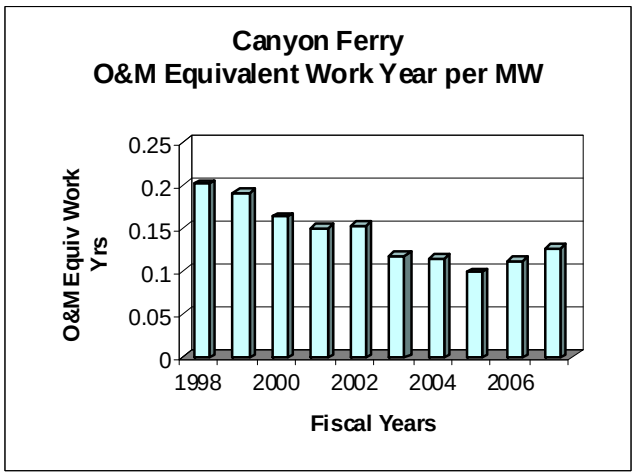
Benchmark 4
Workforce Deployment

Canyon Ferry 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	0.00	0.00	0.05	0.05	0.02	0.00
Operation	1.55	0.17	0.00	1.72	0.57	0.03
Maintenance	4.16	0.47	0.00	4.63	1.54	0.09
Total Staffing	5.71	0.64	0.05	6.41	2.14	0.13

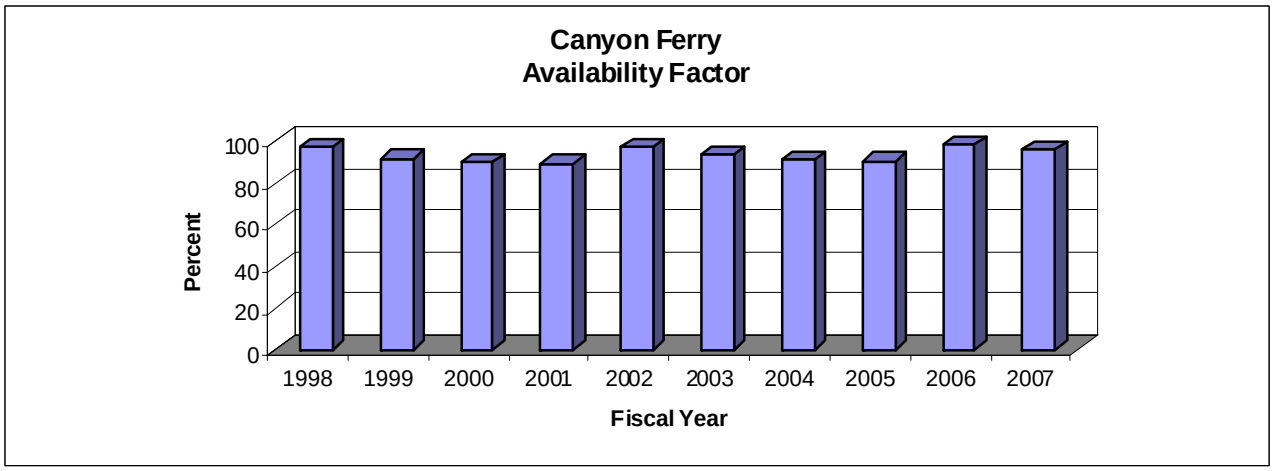






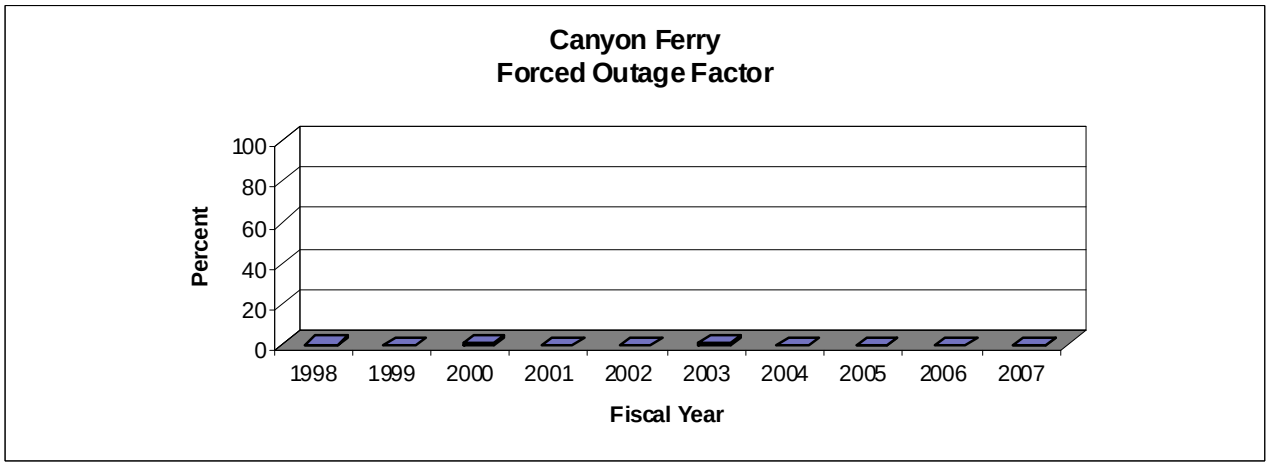


Benchmark 5
Availability Factor

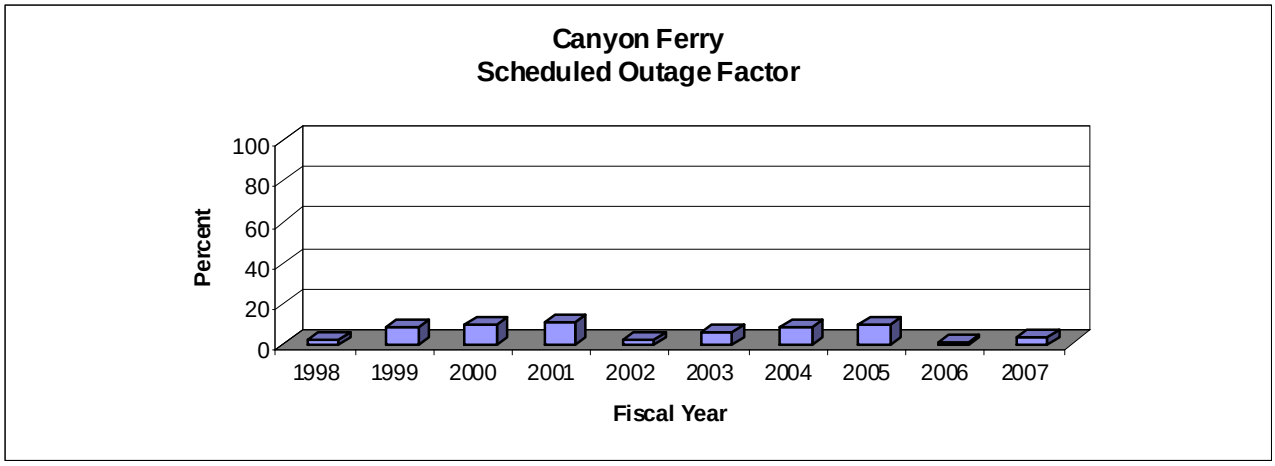


FY-1999, FY-2000, FY-2001 – Each included a 6-week extended outage for refurbishing the penstock's fixed-wheel gate and overhauling the hydraulic cylinders.
FY-2004 – Extended unit outages for low dissolved oxygen draft tube modifications and powerplant protective relaying replacement projects.

Benchmark 6
Plant Forced Outage Factor



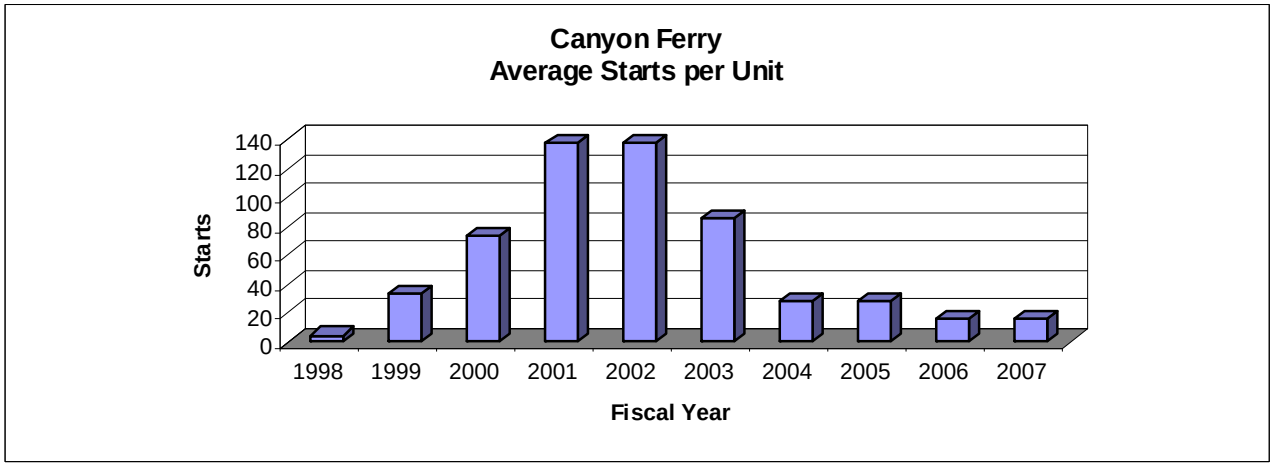
Benchmark 7
Plant Scheduled Outage Factor



FY-1999, FY-2000, FY-2001 – Extended unit outages for penstock fixed-wheel gates refurbishment and hydraulic cylinders overhaul.

FY-2004 – Extended unit outages for low dissolved oxygen draft tube modifications and powerplant protective relaying replacement projects.

Unit Starts

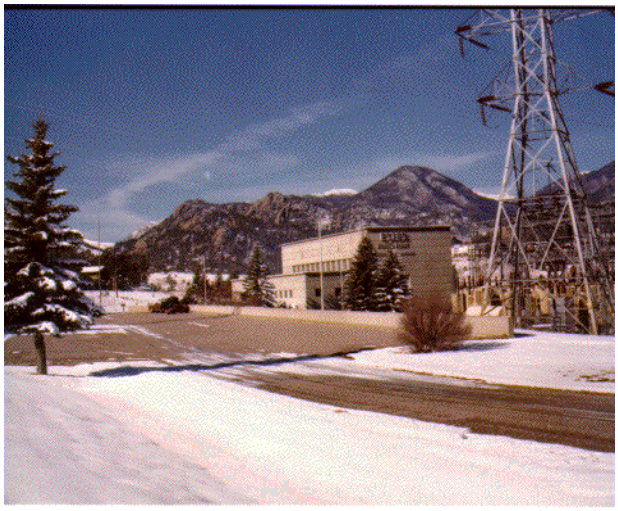


Benchmark Data Comparison					
Fiscal Year 2007	**Canyon Ferry Powerplant**	**Reclamation Average 30-100 MW Group**	**Total Reclamation Average**	**Industry Average**	**Best Performers**
Wholesale Firm Rate Mills/kWh	16.5	Not Applicable	*22.45	Not Available	Not Available
Production Cost as Percentage of Wholesale Firm Rate	1.09%	Not Applicable	12.1%	Not Applicable	Not Applicable
O&M Cost $/MWh	3.56	7.85	2.76	***54.63	1.00
O&M Costs $/MW	20,802	24,132	7,847	***30,336	2,897
O&M Equiv Work Year per MW	0.13	0.10	0.03	Not Available	0.0
Availability Factor	96.0	81.3	82.3	**88.64	98.5
Forced Outage Factor	0.2	0.2	2.6	**2.61	0.0
Scheduled Outage Factor	3.8	18.5	15.1	**8.74	0.0

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

The Missouri River Basin experienced its sixth consecutive year of drought conditions in FY-2005, which resulted in below average generation (MWh).

Estes Powerplant
Colorado-Big Thompson Project



Plant Contact:
Chuck Pedersen
O&M Chief

Plant Address:
Estes Powerplant
PO Box 960
Estes Park CO 80517-0960

Telephone Numbers:
Phone: (970) 962-4400
Fax: (970) 663-3212

E-Mail Address:
cpedersen@gp.usbr.gov

Reclamation Region: Great Plains

NERC Region: Western Electricity Coordinating Council, Rocky Mountain Power Area

PMA Service Area: Western Area Power Administration, Rocky Mountain Region

Project Authorization: The President approved the Secretary of the Interior's finding of feasibility on December 21, 1937.

Project Purposes: The Colorado-Big Thompson Project is one of the largest and most complex natural resource developments undertaken by Reclamation. It consists of over 100 structures integrated into a transmountain water diversion system through which multiple benefits are provided to the people. The project spreads over approximately 250 miles in Colorado. It stores, regulates, and diverts water from the Colorado River on the western slope of the Continental Divide to the eastern slope of the Rocky Mountains. It provides supplemental water for irrigation of about 720,000 acres of land, municipal and industrial use, hydroelectric power, and water-oriented recreation opportunities.

Plant Location: Estes Power plant is located in Larimer County, Colorado, near the town of Estes Park, Colorado.

Plant Purpose: The powerplant takes diversion water delivered from Marys Lake Powerplant and holds it in Lake Estes for the project. A side benefit is the generation of hydroelectric power for the project.

Plant Facts: Lake Estes, below Estes Powerplant, is formed by Olympus Dam constructed across the Big Thompson River. The afterbay storage in Lake Estes and the forebay storage in Marys Lake enable the Estes Powerplant to meet daily variations in energy demand.

Plant History: The water and power control center for Colorado Big Thompson Project's reservoirs, power plants, and transmission lines in Wyoming, Colorado, and western Nebraska is located at the project headquarters in Loveland, Colorado. This Western Division of the Missouri River Basin is an interconnected system of 15 Reclamation power plants.

Present Activities: Recently completed projects include installation of a new fire alarm system, installation of a new CO_2 fire suppression system, rehabilitation of powerplant fire and cooling water piping systems, and installation of new unit excitation systems. Installation of an automatic trashrake and new trashracks are in progress and scheduled for FY2009 completion at the associated Olympus Dam site.

Future Planned Activities: Life safety modifications are planned for FY 2009. Unit 1 and 2 breaker replacement and fixed-wheel headgate repairs are planned for FY 2010. Plant remote control (RTU SCADA and fiber communication) upgrades are planned to be completed in FY 2010. Governor upgrades are planned for FY 2010. Online condition monitoring equipment installation is planned for FY 2013.

Special Issues: Estes Units 1, 2, and 3 are on AGC and provide VAR support, and occasionally are used for spinning reserve.

River:	Big Thompson River	**Plant Type:**	Conventional
Powerhouse Type:	Above Ground	**Turbine Type:**	Francis
Original Nameplate Capacity:	45,000 kW	**Installed Capacity:**	45,000 kW
Year of Initial Operation:	1950	**Age:**	57 years
Net Generation (FY-2007):	102.0 GWh	**Rated Head:**	515 feet
Average Plant Factor (FY-2007):	26.2 percent	**Remotely Operated:**	Yes
Production Mode:	Intermediate		

Ancillary Services

Estes
Ancillary Services

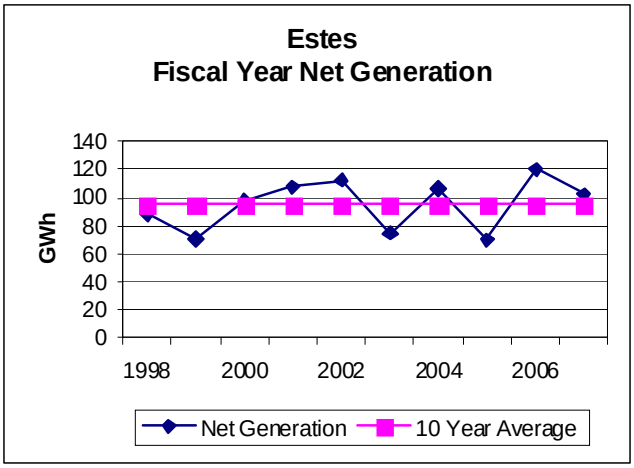
Spinning Reserve	Yes
Non-Spinning Reserve	Yes
Replacement Reserve	No
Regulation/Load Following	Yes
Black Start	Yes
Voltage Support	Yes

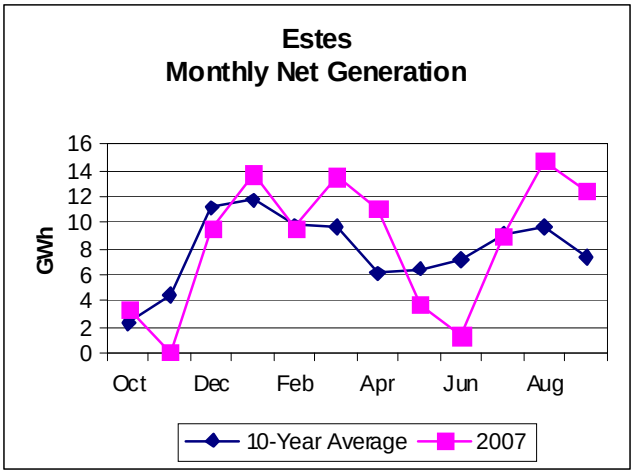
Generators

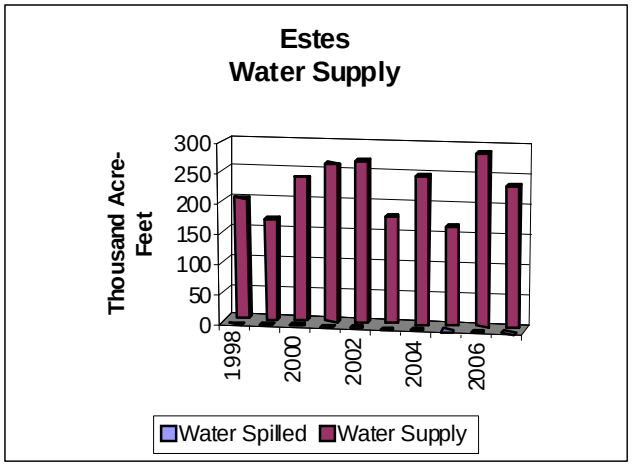
Estes Generators
Existing Number and Capacity

Unit #	Original Capacity (kW)	Capacity Increased (kW)	Present Capacity (kW)
1	15,000	-	15,000
2	15,000	-	15,000
3	15,000	-	15,000
3 units	45,000	-	45,000

Generation

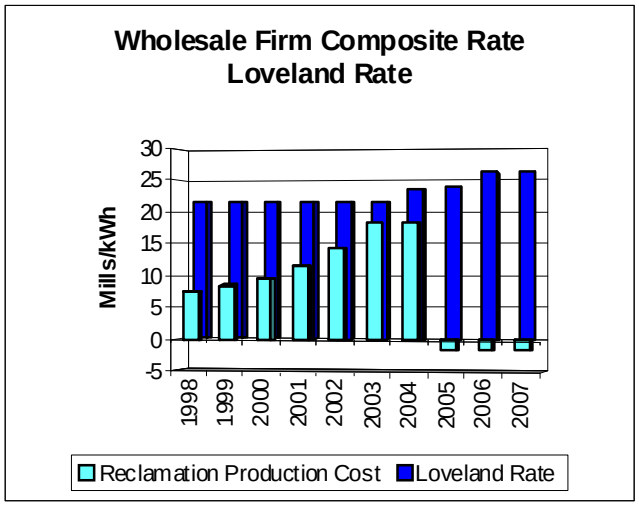

Estes
Fiscal Year Net Generation
GWh
140
120
100
80
60
40
20
0
1998
2000
2002
2004
2006
Net Generation
10 Year Average


Estes
Monthly Net Generation
GWh
16
14
12
10
8
6
4
2
0
Oct
Dec
Feb
Apr
Jun
Aug
10-Year Average
2007

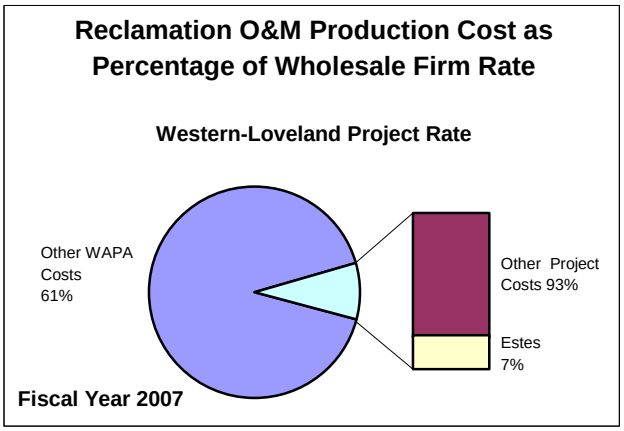

Estes
Water Supply
Thousand Acre-Feet
300
250
200
150
100
50
0
1998
2000
2002
2004
2006
Water Spilled
Water Supply

Prime Laboratory Benchmarks

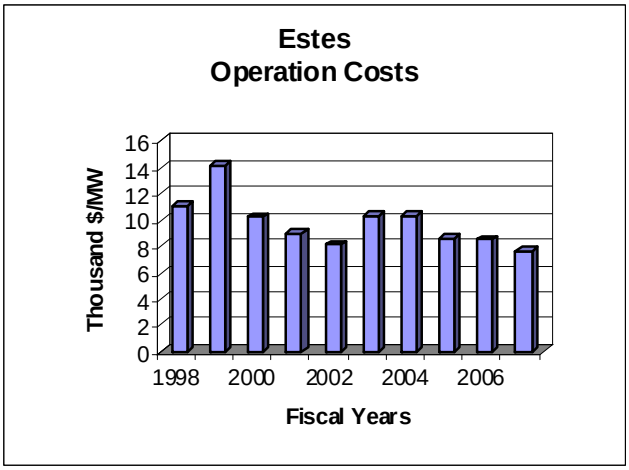
Benchmark 1
Wholesale Firm Rate

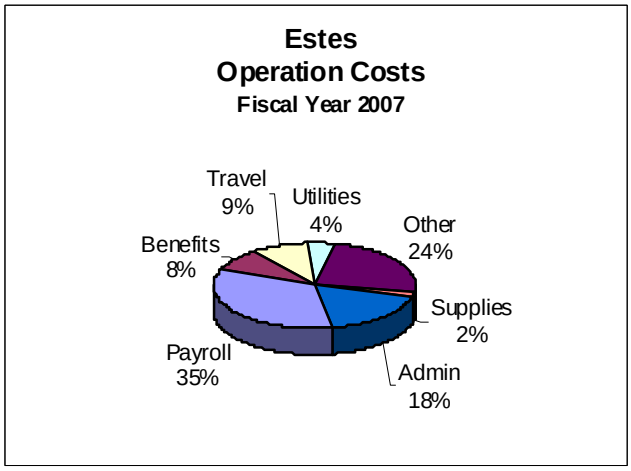


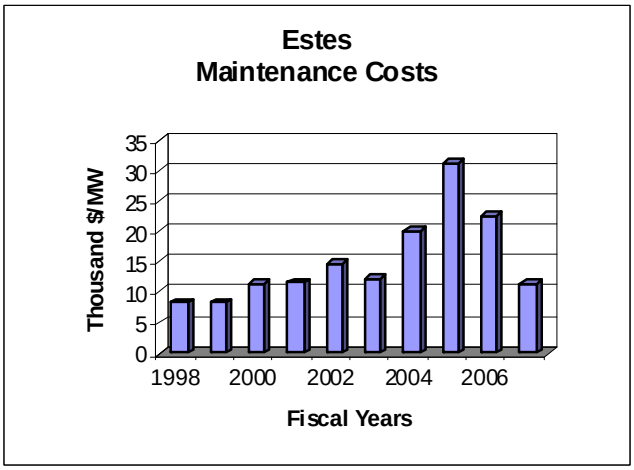
Benchmark 2
Reclamation's Production Costs as Percentage of Wholesale Firm Rate

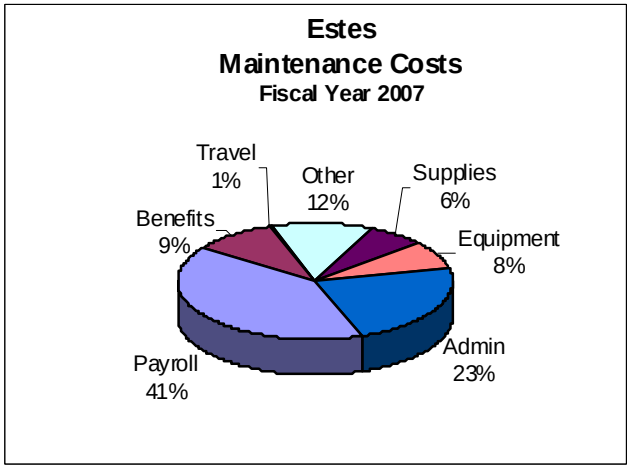


Benchmark 3
Production Costs

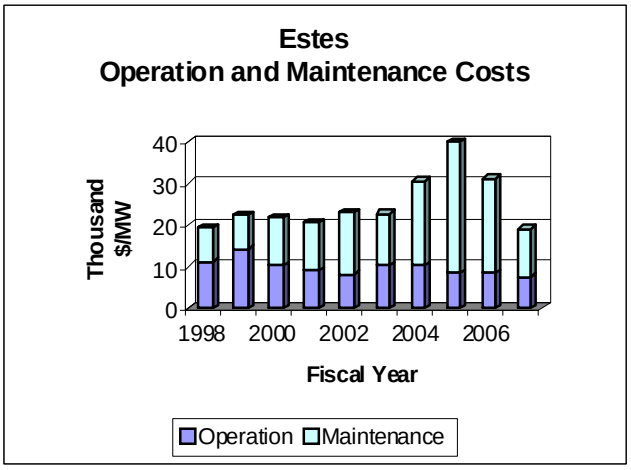


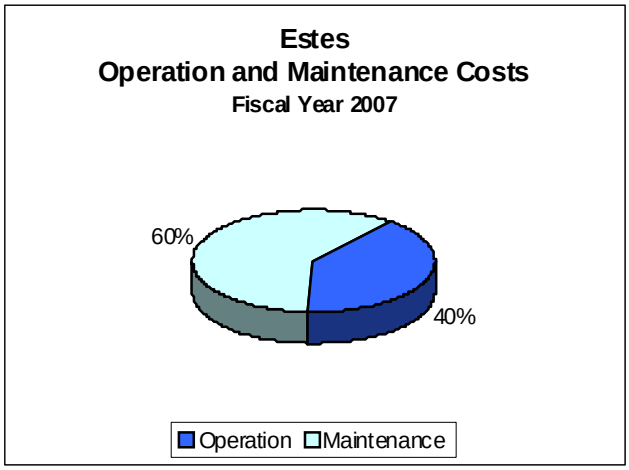


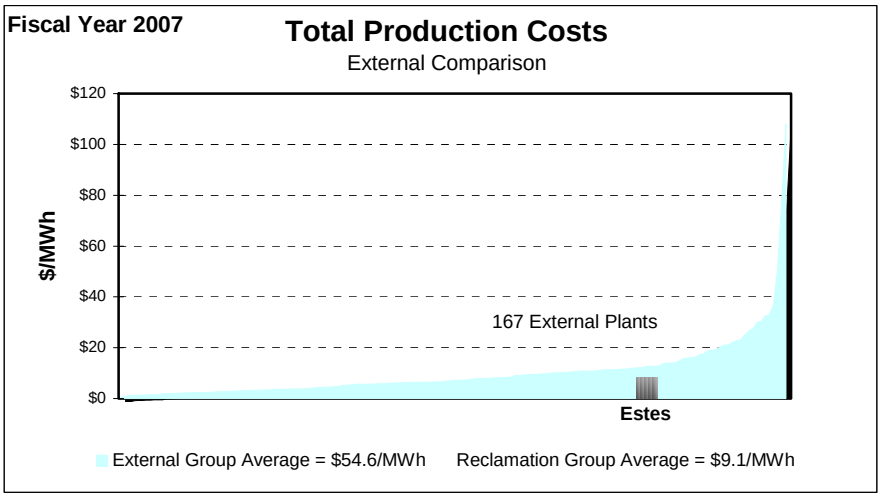


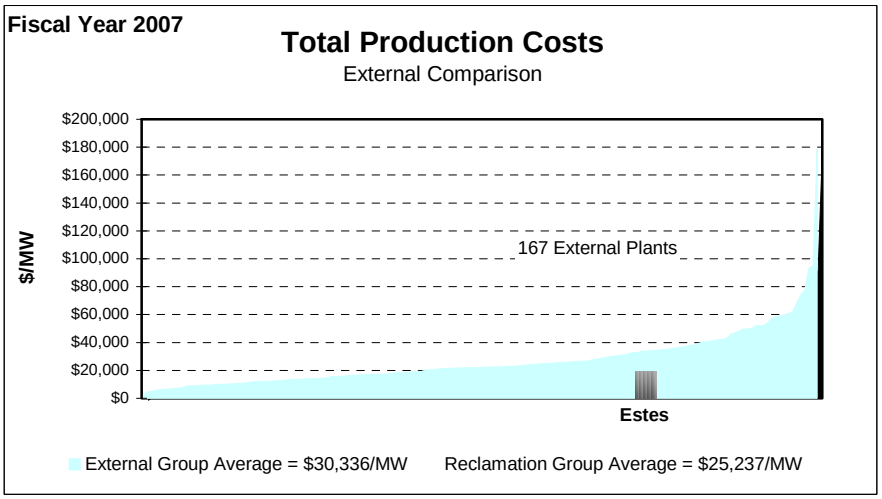


Benchmark 3
Production Costs



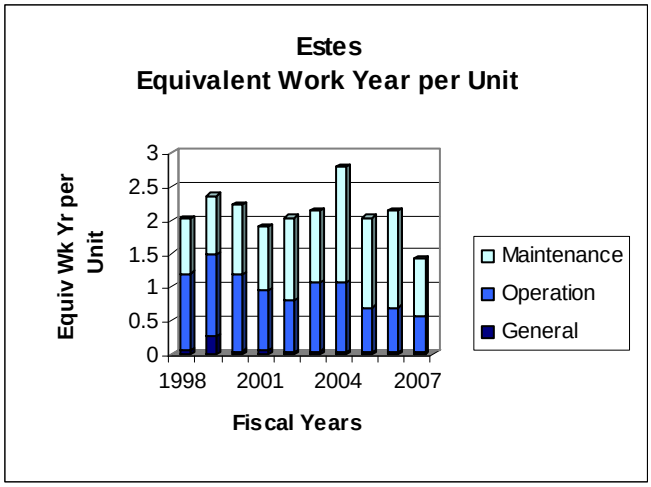


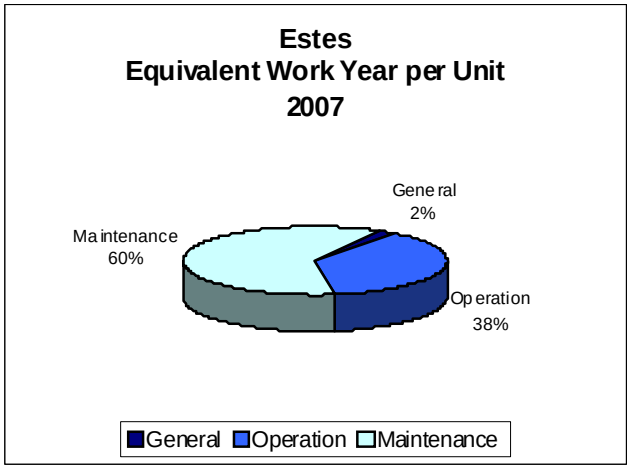


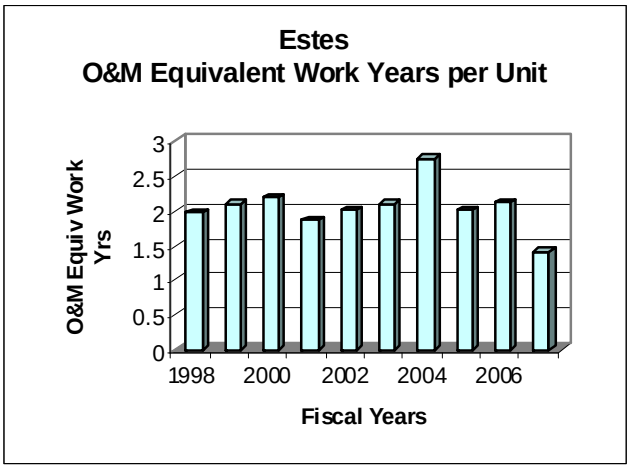


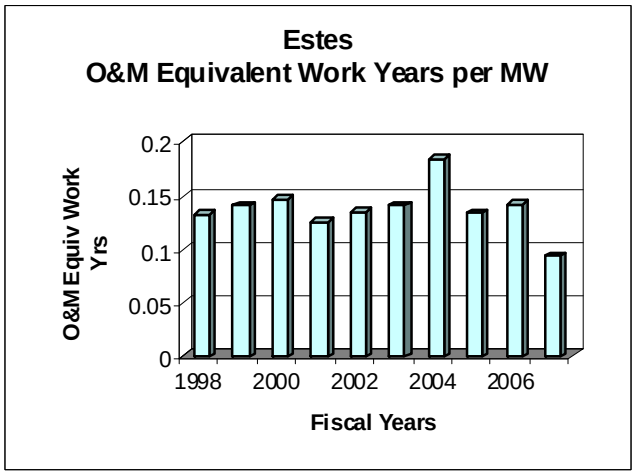
Benchmark 4
Workforce Deployment

Estes 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	0.02	0.00	0.05	0.08	0.03	0.00
Operation	1.45	0.16	0.00	1.61	0.54	0.04
Maintenance	2.34	0.26	0.00	2.60	0.87	0.06
Total Staffing	3.81	0.43	0.05	4.29	1.43	0.10

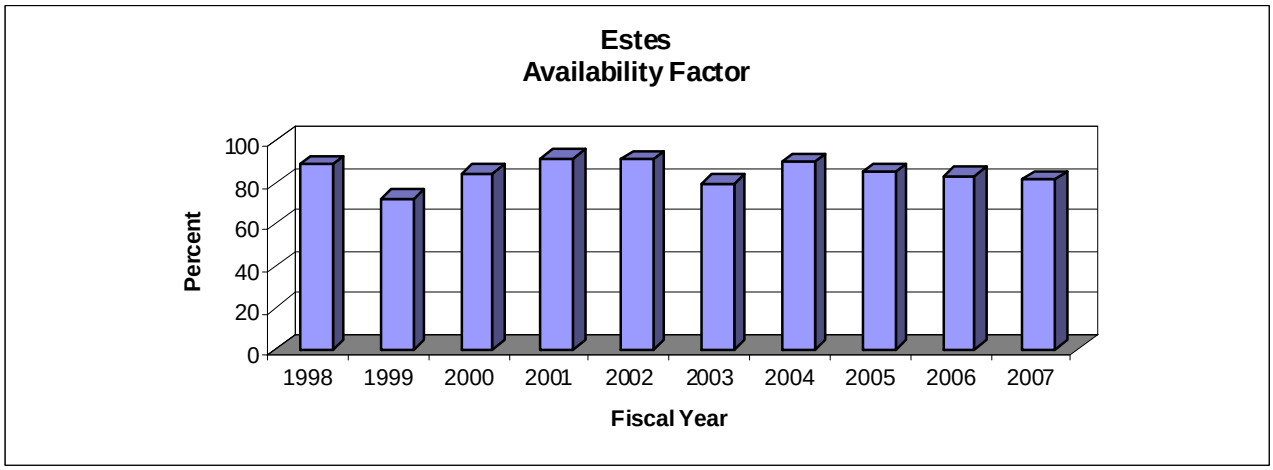




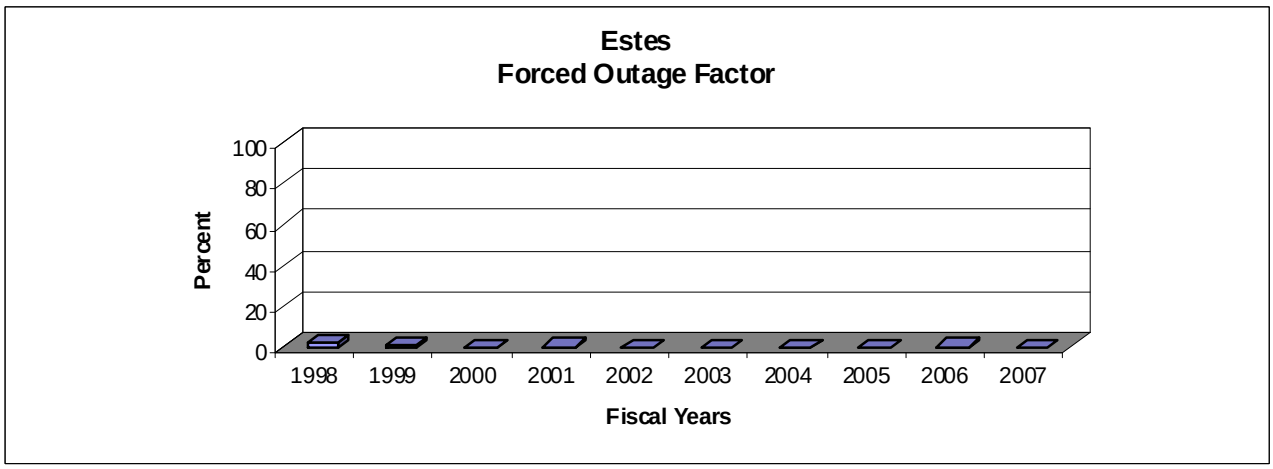




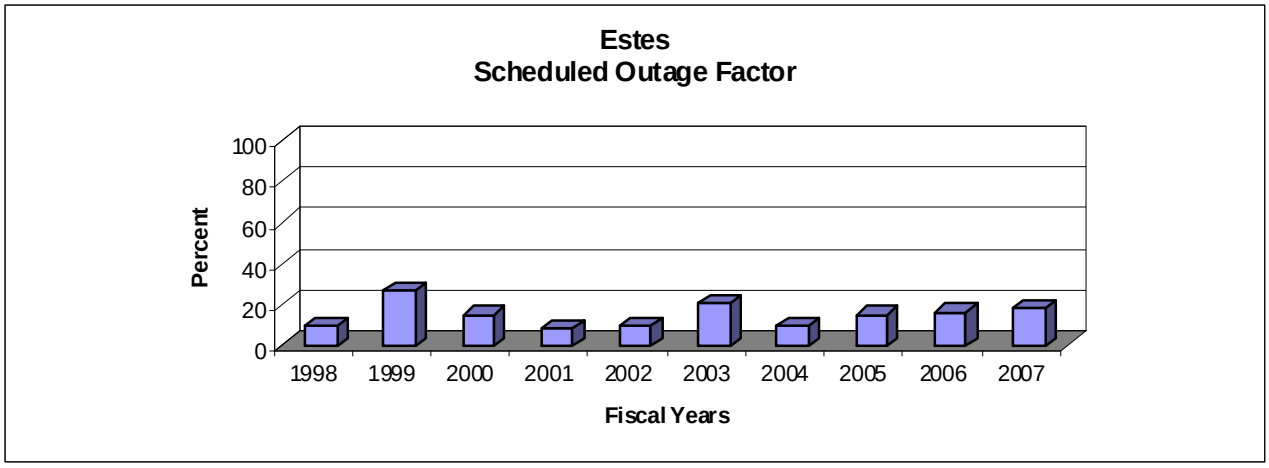
Benchmark 5
Plant Availability Factor



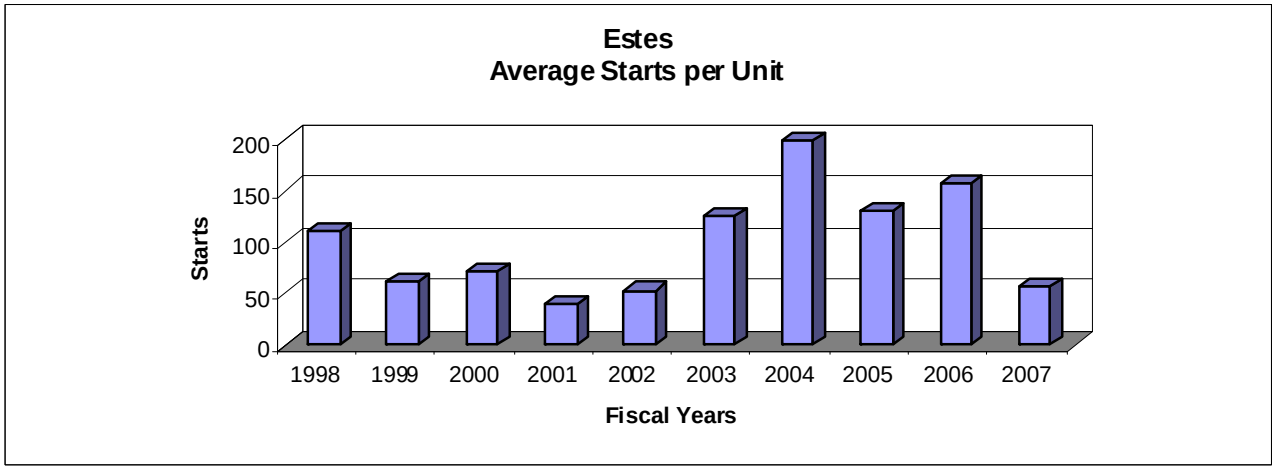
Benchmark 6
Plant Forced Outage Factor



Benchmark 7
Plant Scheduled Outage Factor



Unit Starts



Benchmark Data Comparison					
Fiscal Year 2007	**Estes Powerplant**	**Reclamation Average 30-100 MW Group**	**Total Reclamation Average**	**Industry Average**	**Best Performers**
Wholesale Firm Rate Mills/kWh	23.9	Not Applicable	*22.45	Not Available	Not Available
Production Cost as Percentage of Wholesale Firm Rate	1.94%	Not Applicable	12.1%	Not Applicable	Not Applicable
O&M Cost $/MWh	8.40	7.85	2.76	***54.63	1.00
O&M Costs $/MW	19,046	24,132	7,847	***30,336	2,897
O&M Equiv Work Year per MW	0.09	0.10	0.03	Not Available	0.0
Availability Factor	81.7	81.3	82.3	**88.64	98.5
Forced Outage Factor	0.1	0.2	2.6	**2.61	0.0
Scheduled Outage Factor	18.1	18.5	15.1	**8.74	0.0

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

Flatiron Powerplant
Colorado-Big Thompson Project

Plant Contact:
Chuck Pedersen
Chief, O&M

Plant Address:
Flatiron Powerplant
11056 West County Road 18E
Loveland CO 80537-9711

Telephone Numbers:
Phone: (970) 962-4400
Fax: (970) 663-3212

E-Mail Address:
cpedersen@gp.usbr.gov

Reclamation Region:	Great Plains
NERC Region:	Western Electricity Coordinating Council, Rocky Mountain Power Area
PMA Service Area:	Western Area Power Administration, Rocky Mountain Region
Project Authorization:	The President approved the Secretary of the Interior's finding of feasibility on December 21, 1937.
Project Purposes:	The Colorado-Big Thompson Project is one of the largest and most complex natural resource developments undertaken by Reclamation. It consists of over 100 structures integrated into a transmountain water diversion system through which multiple benefits are provided to the people. The project spreads over approximately 250 miles in the Colorado. It stores, regulates, and diverts water from the Colorado River on the western slope of the Continental Divide to the eastern slope of the Rocky Mountains. It provides supplemental water for irrigation of about 720,000 acres of land, municipal and industrial use, hydroelectric power, and water-oriented recreation opportunities.
Plant Location:	Flatiron Powerplant and Pumping Plant are located in Larimer County, near Carter Lake, 10 miles west of Loveland, Colorado.
Plant Purpose:	Generating hydroelectric power for the project and providing water to Carter Lake for delivery to other customers.

Plant Facts: The Flatiron Powerplant discharges into Flatiron Reservoir, which regulates the water for release to the foothills storage and distribution system. The afterbay storage in Flatiron Reservoir and the forebay storage in Pinewood Lake enable Flatiron Powerplant to meet daily power loads. The Flatiron reversible pump unit lifts water from Flatiron Reservoir, a maximum of 297 feet, and delivers it through a pressure conduit and tunnel to Carter Lake. When the flow is reversed, the unit acts as a turbine-generator and produces electric energy.

Plant History: The water and power control center for Colorado-Big Thompson Project's reservoirs, powerplants, and transmission lines in Wyoming, Colorado, and western Nebraska is located at the project headquarters in Loveland, Colorado. This Western Division of the Missouri River Basin is an interconnected system of 15 Reclamation powerplants.

Present Activities: Recently completed projects include CO_2 fire suppression system upgrade, fire detection and alarm system installation, and unit excitation system replacement. Flatiron Unit No. 1 shorted windings were repaired in September 2006, but shorted out again one year later. Flatiron Dam spillway repairs were completed in FY 2008.

Future Planned Activities: The windings for both Unit Nos. 1 and 2 will be replaced starting in FY 2008. Unit 3 bypass stilling basin concrete repairs are scheduled for FY 2010. Plant remote control (RTU SCADA and fiber communication) upgrades are planned to be completed in FY 2010. Governor upgrades are planned for FY2011. Penstocks interior lining and exterior coating replacements are planned to start in FY 2012.

Special Issues: Flatiron Units 1 and 2 are on AGC and provide VAR support.

River:	Big Thompson River and Colorado River	**Plant Type:**	Conventional – Pump Generator
Powerhouse Type:	Above Ground	**Turbine Type:**	Francis
Original Nameplate Capacity:	71,500 kW	**Installed Capacity:**	94,500 kW
Year of Initial Operation:	1954	**Age:**	54 years
Net Generation (FY-2007)	240.3 GWh	**Rated Head:**	1,055 feet
Average Plant Factor (FY-2007):	29.2 percent	**Remotely Operated:**	Yes
Production Mode:	Intermediate		

Ancillary Services

Flatiron
Ancillary Services

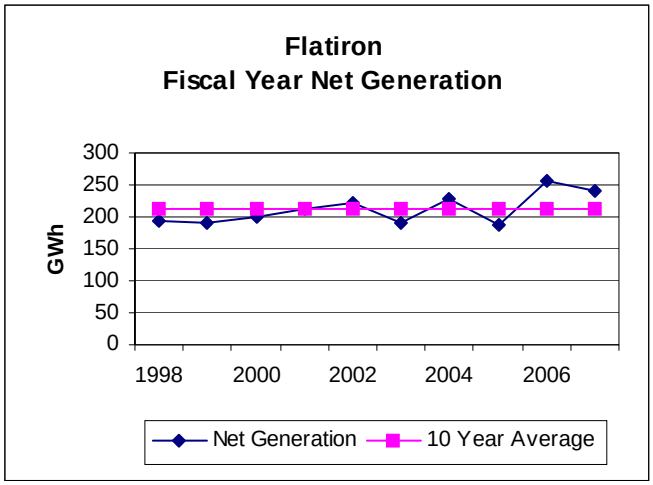
Spinning Reserve	Yes
Non-Spinning Reserve	Yes
Replacement Reserve	Yes
Regulation/Load Following	Yes
Black Start	Yes
Voltage Support	Yes

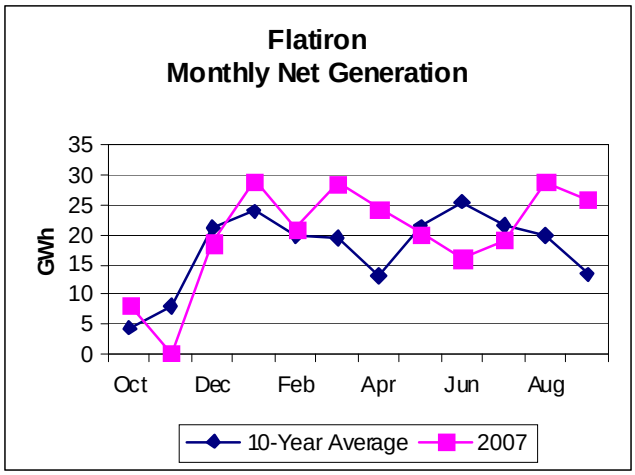
Generators

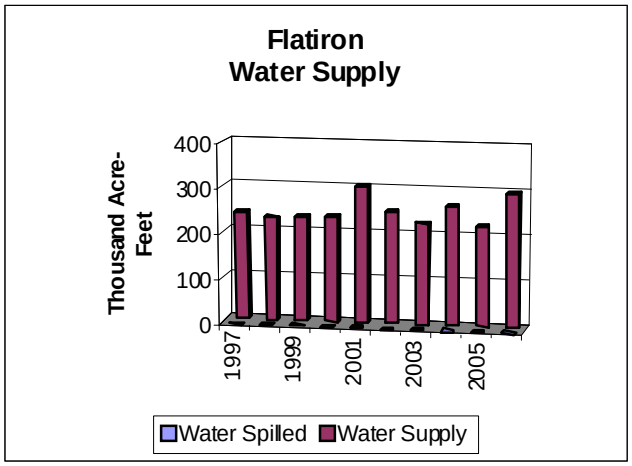
Flatiron Generators
Existing Number and Capacity

Unit #	Original Capacity (kW)	Capacity Increased (kW)	Present Capacity (kW)
1	31,500	11,500	43,000
2	31,500	11,500	43,000
3	8,500	-	8,500
3 units	71,500	23,000	94,500

Generation

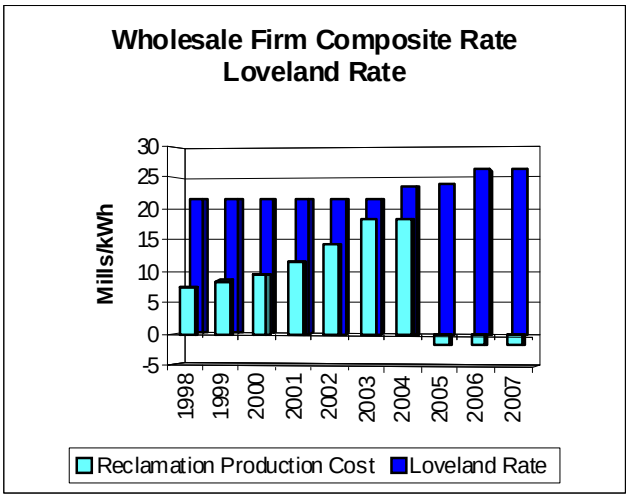

Flatiron
Fiscal Year Net Generation
GWh
300
250
200
150
100
50
0
1998
2000
2002
2004
2006
Net Generation
10 Year Average


Flatiron
Monthly Net Generation
GWh
35
30
25
20
15
10
5
0
Oct
Dec
Feb
Apr
Jun
Aug
10-Year Average
2007

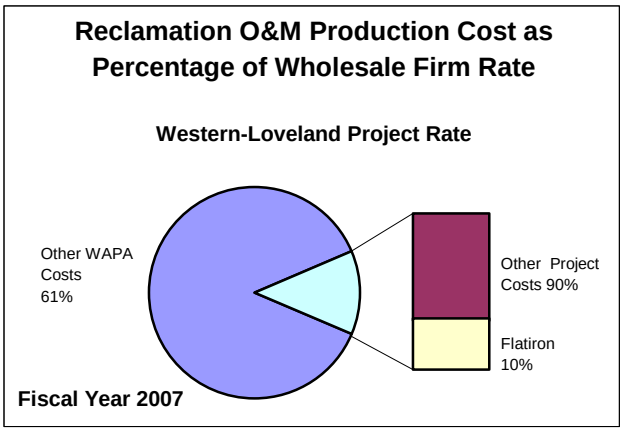

Flatiron
Water Supply
Thousand Acre-Feet
400
300
200
100
0
1997
1999
2001
2003
2005
Water Spilled
Water Supply

Prime Laboratory Benchmarks

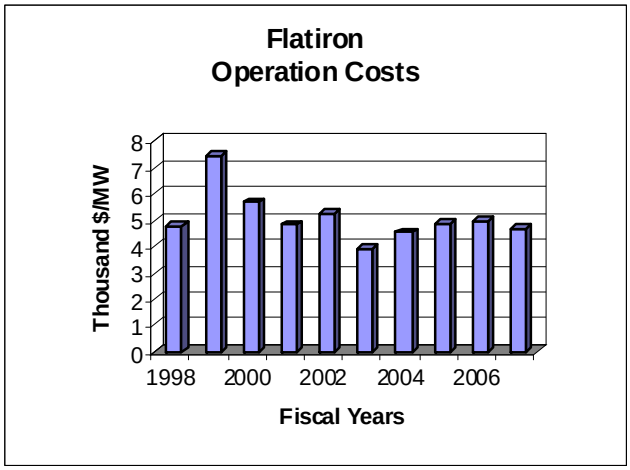
Benchmark 1
Wholesale Firm Rate

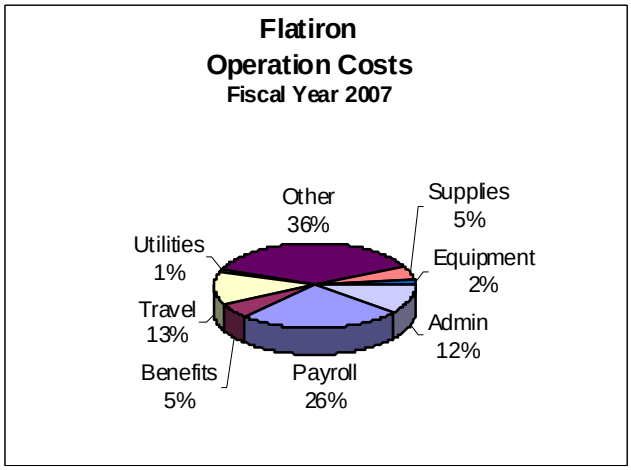


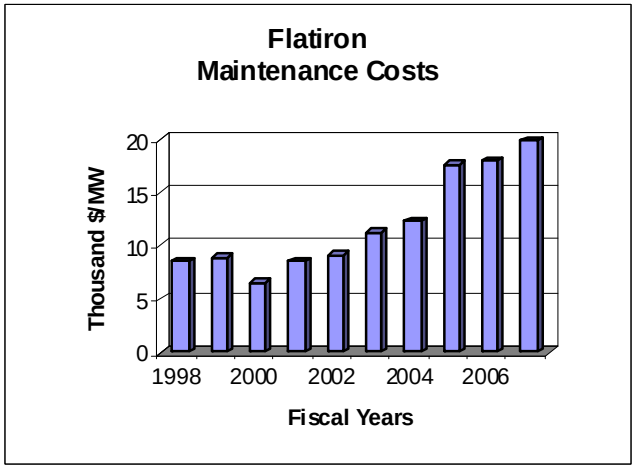
Benchmark 2
Reclamation's Production Costs as Percentage of Wholesale Firm Rate

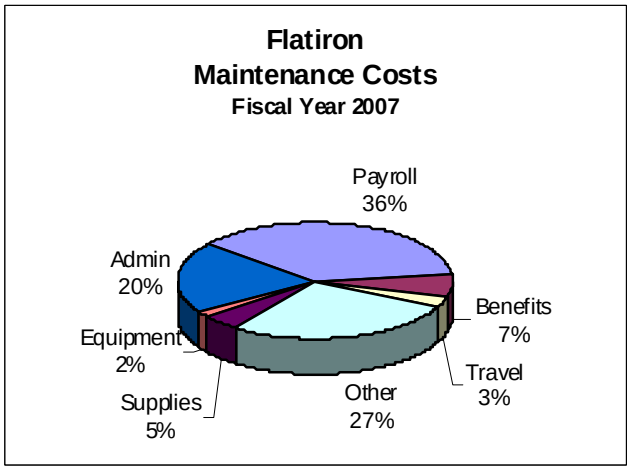


Benchmark 3
Production Costs

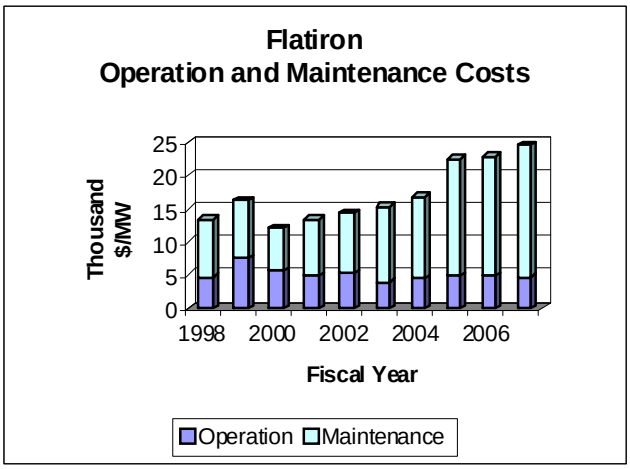


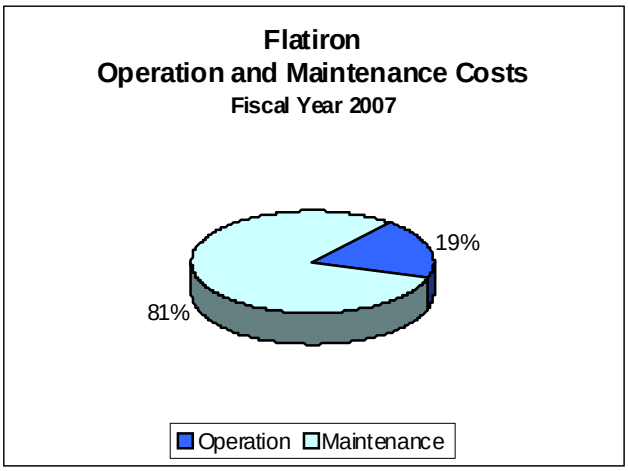


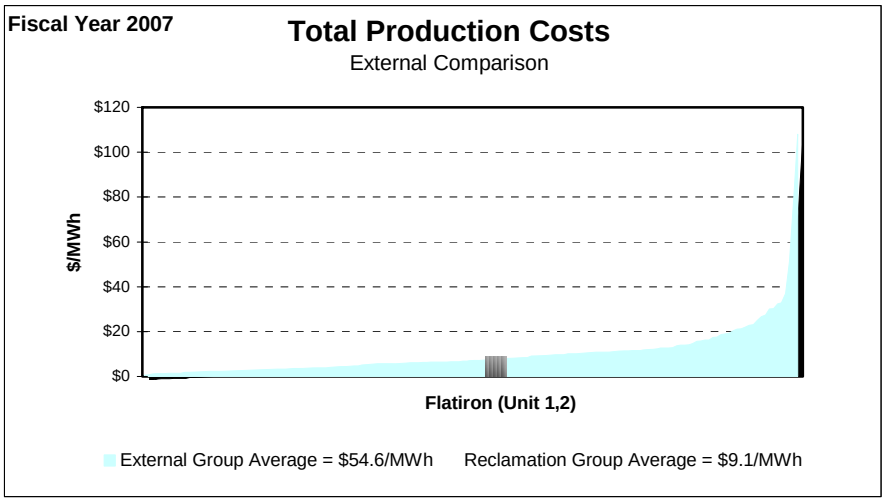


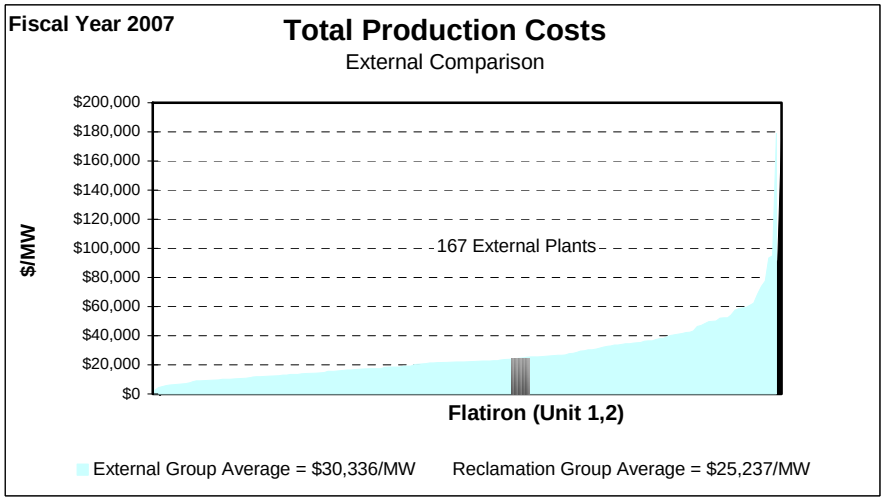


Benchmark 3
Production Costs



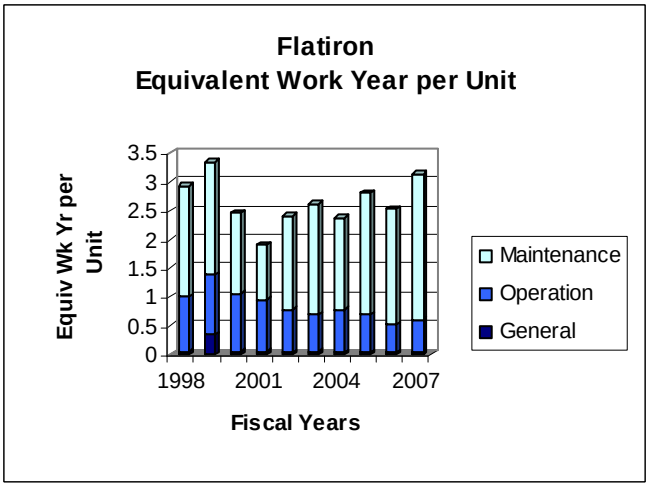


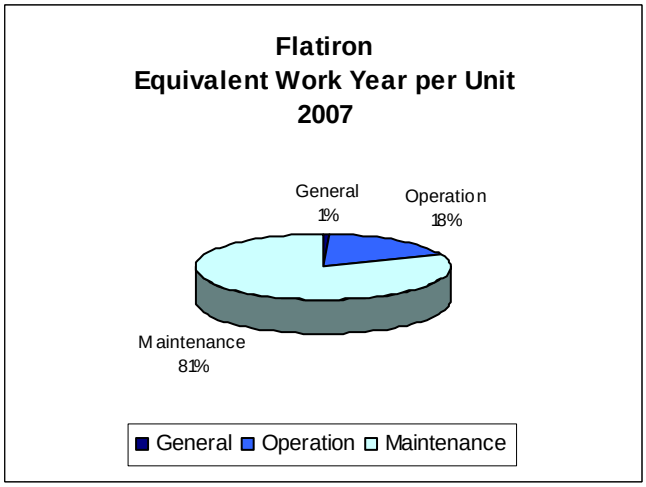


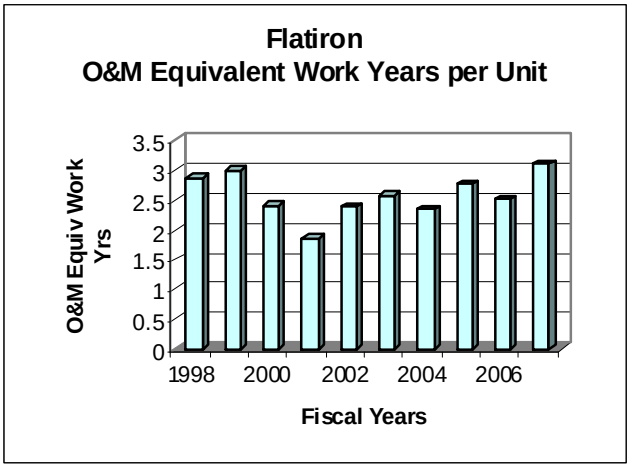


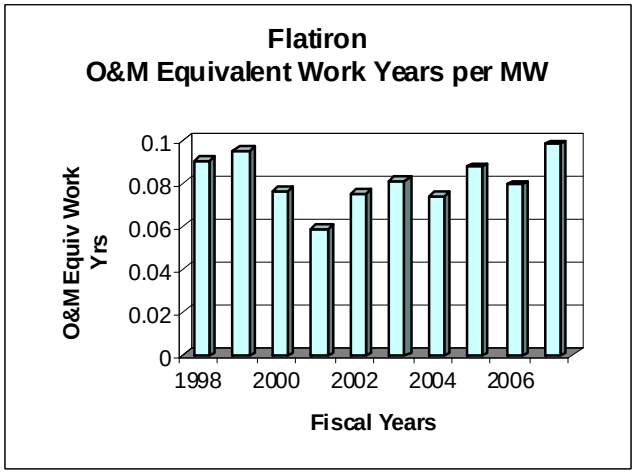
Benchmark 4
Workforce Deployment

Flatiron 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	0.03	0.00	0.05	0.09	0.03	0.00
Operation	1.54	0.17	0.00	1.71	0.57	0.02
Maintenance	6.85	0.77	0.00	7.62	2.54	0.08
Total Staffing	8.42	0.95	0.05	9.43	3.14	0.10

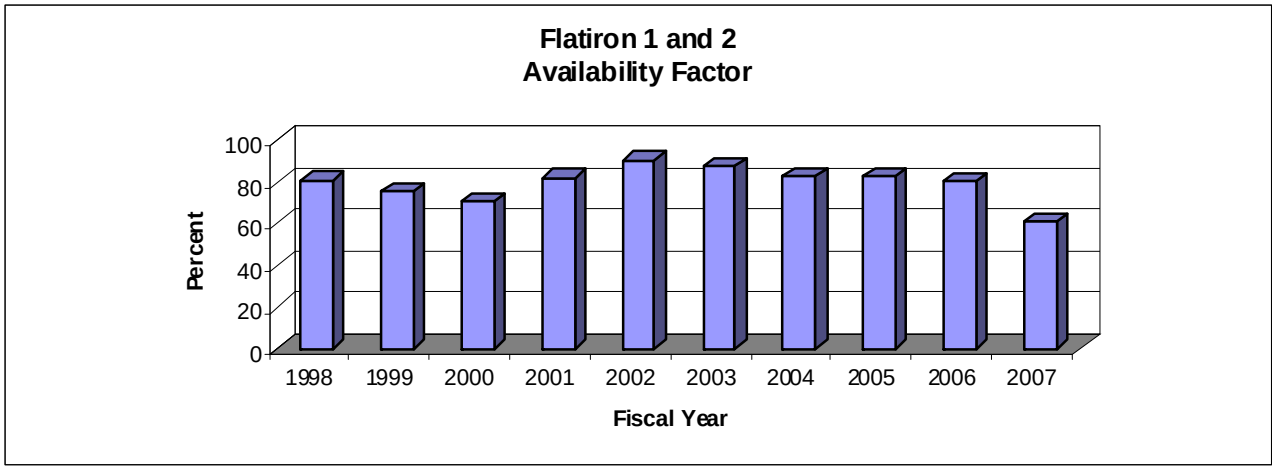




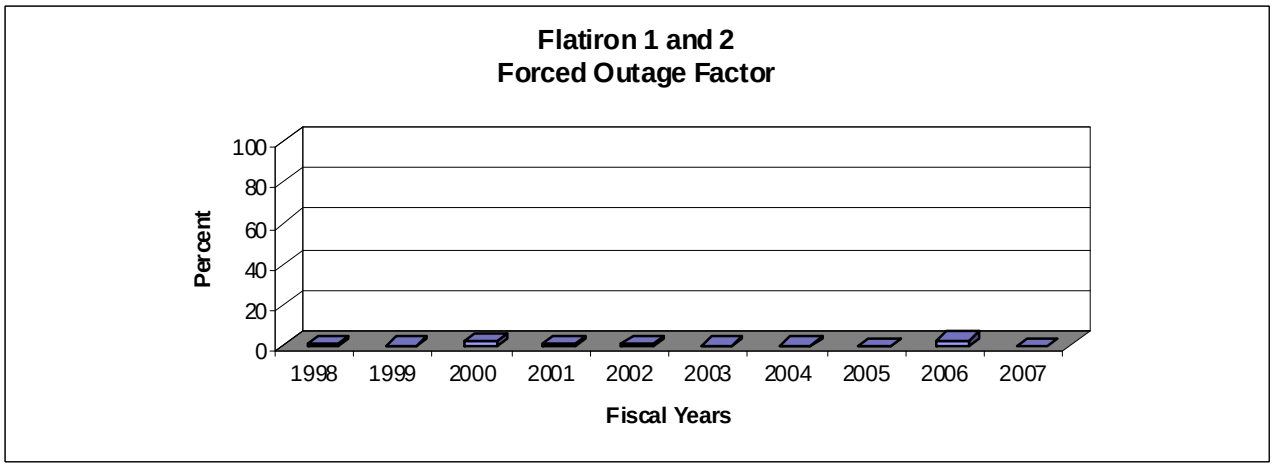




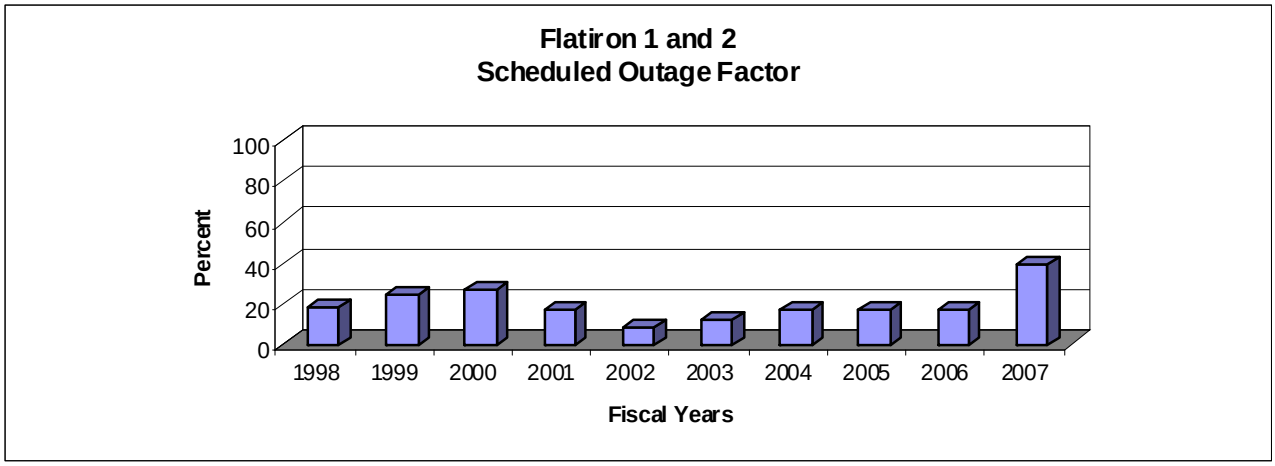
Benchmark 5
Plant Availability Factor



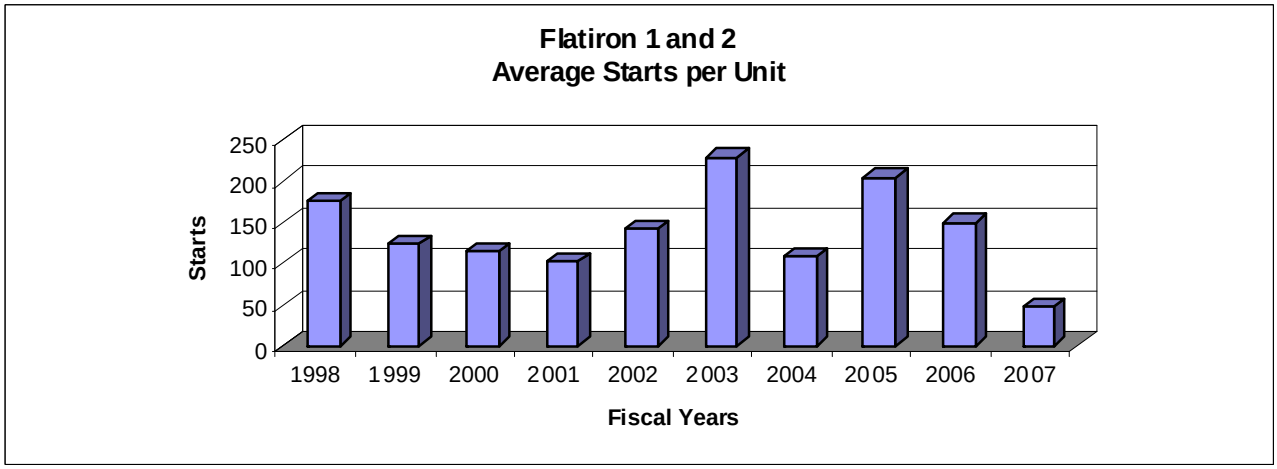
Benchmark 6
Plant Forced Outage Factor



Benchmark 7
Plant Scheduled Outage Factor



Unit Starts



Benchmark Data Comparison

Fiscal Year 2007	Flatiron Powerplant	Reclamation Average 30-100 MW Group	Total Reclamation Average	Industry Average	Best Performers
Wholesale Firm Rate Mills/kWh	23.9	Not Applicable	*22.45	Not Available	Not Available
Production Cost as Percentage of Wholesale Firm Rate	4.81%	Not Applicable	12.1%	Not Applicable	Not Applicable
O&M Cost $/MWh	8.82	7.85	2.76	***54.63	1.00
O&M Costs $/MW	24,628	24,132	7,847	***30,336	2,897
O&M Equiv Work Year per MW	0.10	0.10	0.03	Not Available	0.0
Availability Factor	61.0	81.3	82.3	**88.64	98.5
Forced Outage Factor	0.1	0.2	2.6	**2.61	0.0
Scheduled Outage Factor	38.9	18.5	15.1	**8.74	0.0

Benchmark Data Comparison

Fiscal Year 2007	Flatiron Powerplant	Reclamation Average 30-100 MW Group	Total Reclamation Average	Industry Average	Best Performers
Wholesale Firm Rate Mills/kWh	23.9	Not Applicable	*22.45	Not Available	Not Available
Production Cost as Percentage of Wholesale Firm Rate	4.81%	Not Applicable	12.1%	Not Applicable	Not Applicable
O&M Cost $/MWh	8.82	7.85	2.76	***54.63	1.00
O&M Costs $/MW	24,628	24,132	7,847	***30,336	2,897
O&M Equiv Work Year per MW	0.10	0.10	0.03	Not Available	0.0
Availability Factor	61.0	81.3	82.3	**88.64	98.5
Forced Outage Factor	0.1	0.2	2.6	**2.61	0.0
Scheduled Outage Factor	38.9	18.5	15.1	**8.74	0.0

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

Note: Performance data based on Units 1 and 2. Unit 3 is primarily used as a pump.

Fremont Canyon Powerplant
Pick-Sloan Missouri Basin Program

Plant Contact:
John H. Lawson
Area Manager
Wyoming Area Office

Plant Address:
Fremont Canyon Powerplant
Alcova WY

Telephone Numbers:
Phone: (307) 261-5671
Fax: (307) 261-5683

E-Mail Address:
jlawson@gp.usbr.gov

Reclamation Region: Great Plains

NERC Region: Western Electricity Coordinating Council, Rocky Mountain Power Area

PMA Service Area: Western Area Power Administration, Rocky Mountain Region

Project Authorization: The Glendo Unit of the Pick-Sloan Missouri Basin Project was authorized by the Flood Control Act of December 22, 1944, Public Law 534, which approved the general plan set forth in Senate Document 191, as revised and coordinated by Senate Document 247, 78th Congress, 2d Session. The project was reauthorized by Public Law 503, 83d Congress, on July 16, 1954.

Project Purposes: The Glendo Unit is a multi-purpose project. The unit furnishes a maximum of 40,000 acre-feet of water annually from Glendo Reservoir for irrigation in Wyoming and Nebraska. Glendo and Fremont Canyon Powerplants supply electrical power to Wyoming, Colorado, and Nebraska. The unit provides irrigation, power generation, flood control, fish and wildlife enhancement, recreation, sediment retention, and pollution abatement. It also improves the quality of municipal and industrial water supply in the North Platte River Valley between Gray Reef Dam and Glendo Reservoir.

Plant Location: Fremont Canyon Powerplant is located in Natrona County, Wyoming, approximately 3 miles downstream from Pathfinder Dam on the left bank of the North Platte River Canyon.

Plant Purpose: The powerplant generates power during releases of stored water from Pathfinder Reservoir of the North Platte Project.

Plant Facts: The Fremont Canyon Powerplant consists of two hydraulic turbine-driven generators, with a combined capacity of 66,800 kilowatts. Water for power generation is conveyed to the powerplant by a 3-mile-long 18-foot-diameter, concrete-lined pressure tunnel. The tunnel branches to two 10.75-foot-diameter penstocks upstream of the powerplant. This conduit is controlled by a 14- by 18-foot fixed-wheel gate located 243 feet downstream from the inlet.

Plant History: Construction of Fremont Canyon Powerplant and power conduit began in 1956 and was completed in 1961. The plant had an original installed capacity of 48,000 kilowatts, and was up rated between 1986 and 1990, through the installation of new generator windings and turbines, to its current installed rating of 66,800 kilowatts.

Present Activities: A contract for replacement of the CO_2 fire suppression system for the three generating units was awarded in FY-2004 and the new system was installed in FY-2005. Unit 2 power cables from the transformer to the unit breaker were replaced in FY-2004. The overhead tunnel door and operator that provides access to the powerplant was replaced in FY-2004.

Future Planned Activities: The wicket gate greasing systems for both generating units will be installed in FY-2007.

Special Issues: Because of low water conditions from FY-1991through FY-1994, extensive cavitation damage required lengthy annual welding repair. The availability factor low and the scheduled outage factor high in fiscal year 2002 were due to significant draft tube and runner cavitation repairs to Unit 2 plus interruption of annual maintenance to complete critical maintenance at other facilities.

A new, low flow outlet at Pathfinder Dam was completed in 1997. This new outlet works will allow restoration of year-round flows to 4 miles of river between the Dam and Fremont Canyon Powerplant when necessary river access and operation agreements have been established.

Fremont Canyon Powerplant
30-100 MW

River Name:	North Platte River	**Plant Type:**	Conventional
Powerhouse Type:	Above Ground	**Turbine Type:**	Francis
Original Nameplate Capacity:	48,000 kW	**Installed Capacity:**	66,800 kW
Year of Initial Operation:	1960	**Age:**	47 years
Net Generation (FY-2007):	172.6 GWh	**Rated Head:**	300 feet
Annual Plant Factor (FY-2007):	29.7 percent	**Remotely Operated:**	Yes
Production Mode:	Intermediate		

Ancillary Services

Fremont Canyon
Ancillary Services

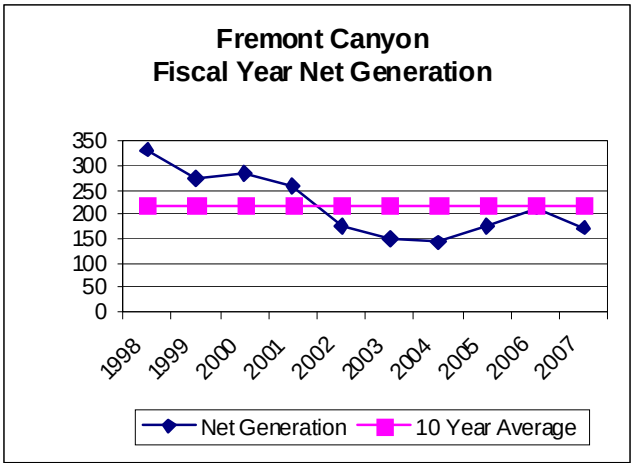
Spinning Reserve	Yes
Non-Spinning Reserve	Yes
Replacement Reserve	Yes
Regulation/Load Following	Yes
Black Start	No
Voltage Support	Yes

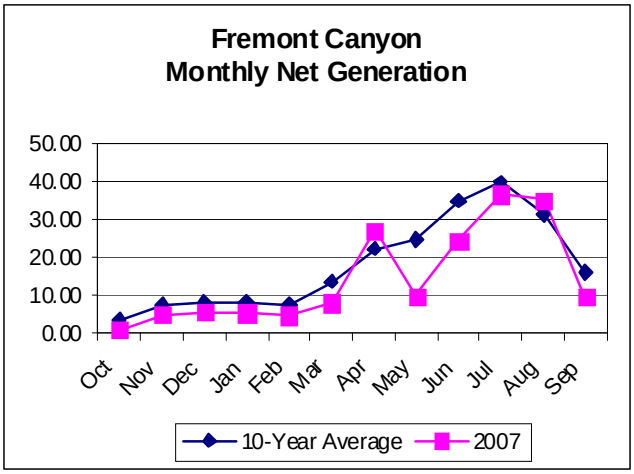
Generators

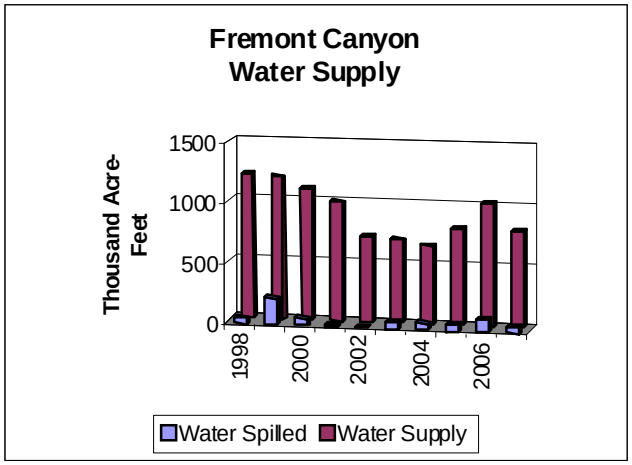
Fremont Canyon Generators
Existing Number and Capacity

Unit #	Original Capacity (kW)	Capacity Increased (kW)	Present Capacity (kW)
1	24,000	9,400	33,400
2	24,000	9,400	33,400
2 units	48,000	18,800	66,800

Generation

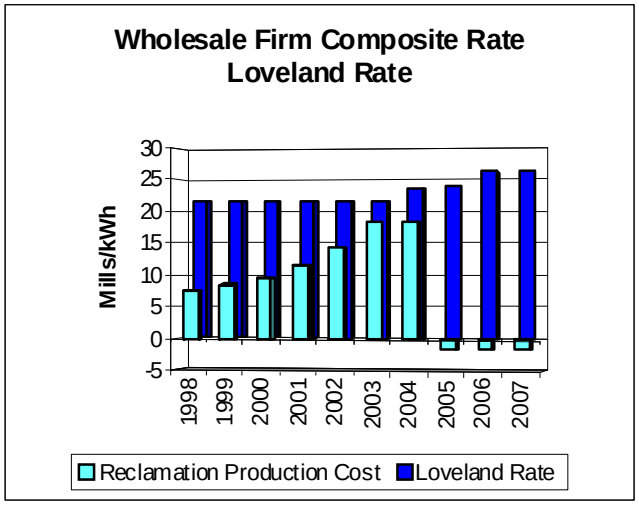

Fremont Canyon
Fiscal Year Net Generation
350
300
250
200
150
100
50
0
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
Net Generation
10 Year Average


Fremont Canyon
Monthly Net Generation
50.00
40.00
30.00
20.00
10.00
0.00
Oct
Nov
Dec
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
10-Year Average
2007

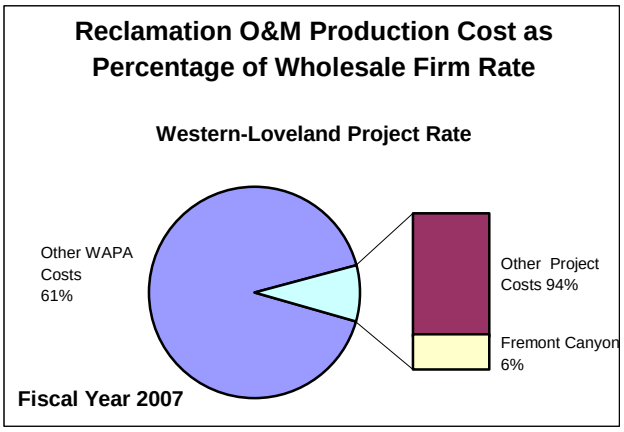

Fremont Canyon
Water Supply
Thousand Acre-Feet
1500
1000
500
0
1998
2000
2002
2004
2006
Water Spilled
Water Supply

Prime Laboratory Benchmarks

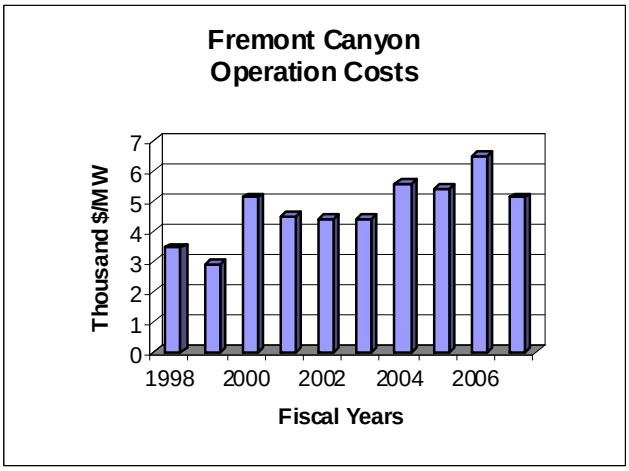
Benchmark 1
Wholesale Firm Rate

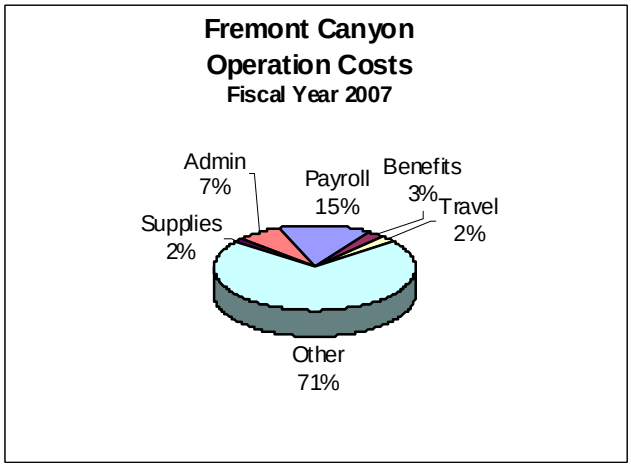


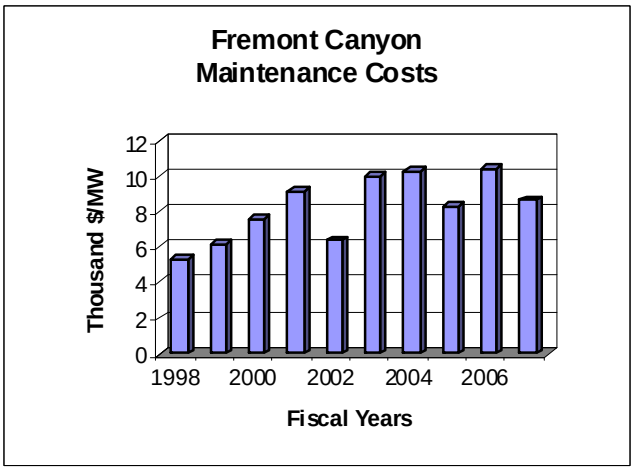
Benchmark 2
Reclamation's Production Costs as Percentage of Wholesale Firm Rate

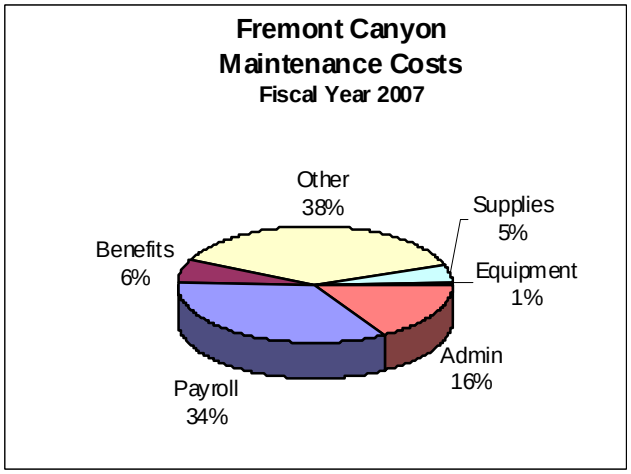


Benchmark 3
Production Costs



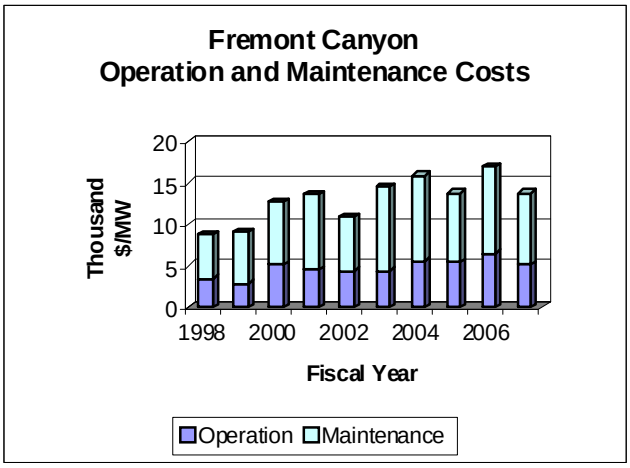


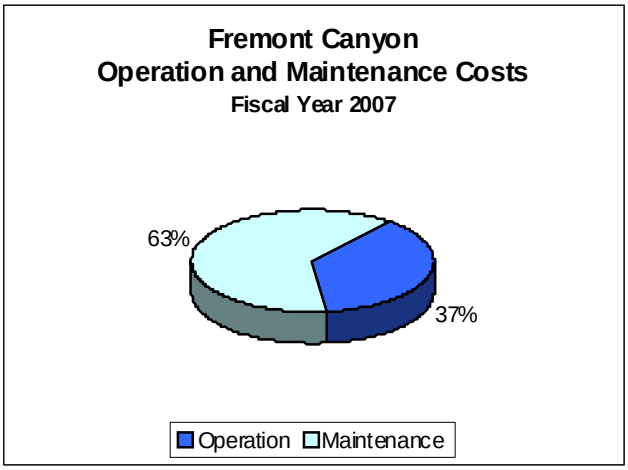


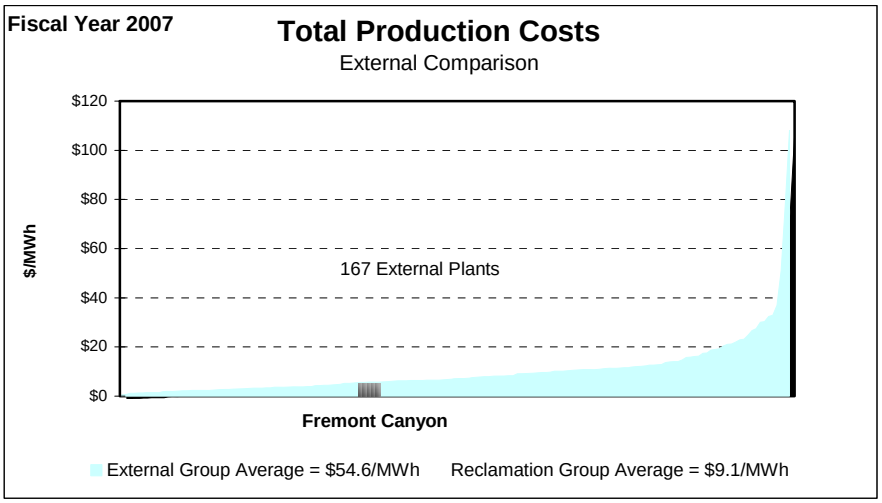


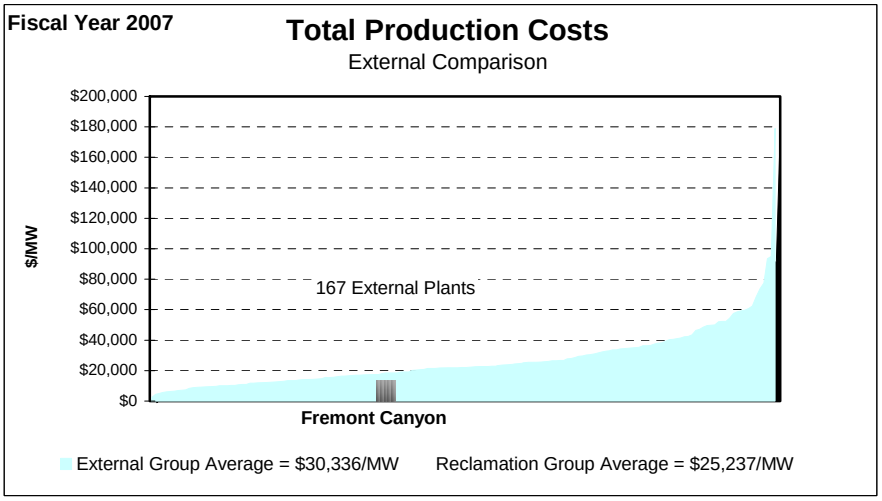
FY-2003 – Maintenance costs include replacement of Unit 1 power cables.

Benchmark 3
Production Costs



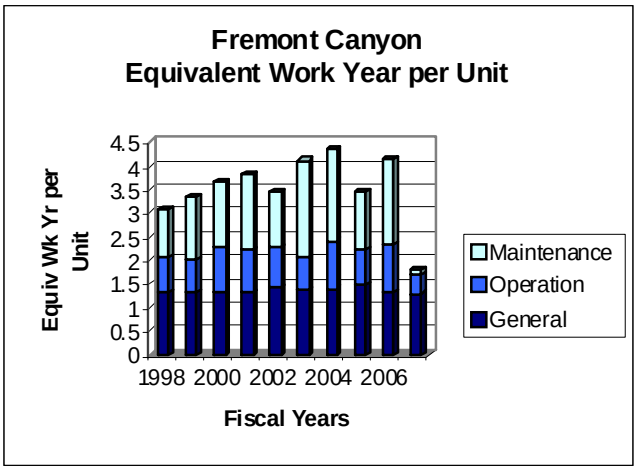


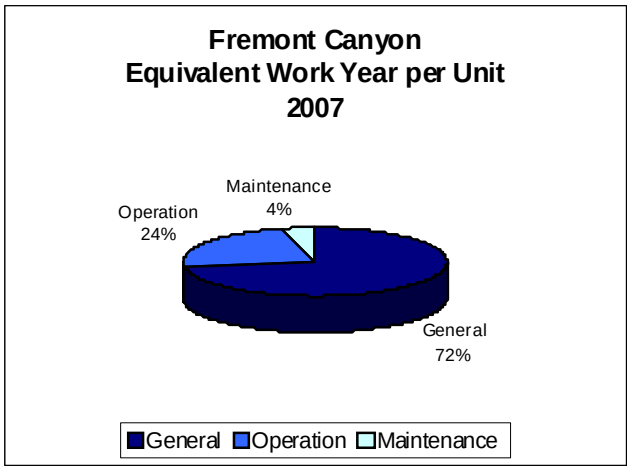


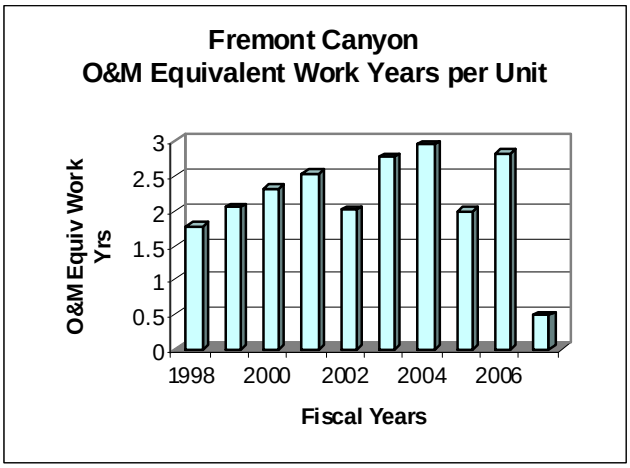


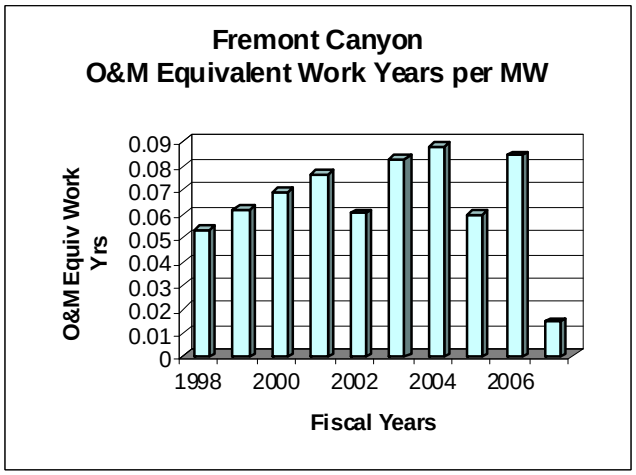
Benchmark 4
Workforce Deployment

Fremont 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	2.28	0.26	0.04	2.58	1.29	0.04
Operation	0.75	0.09	0.00	0.84	0.42	0.01
Maintenance	0.12	0.01	0.00	0.14	0.07	0.00
Total Staffing	3.16	0.36	0.04	3.55	1.78	0.05

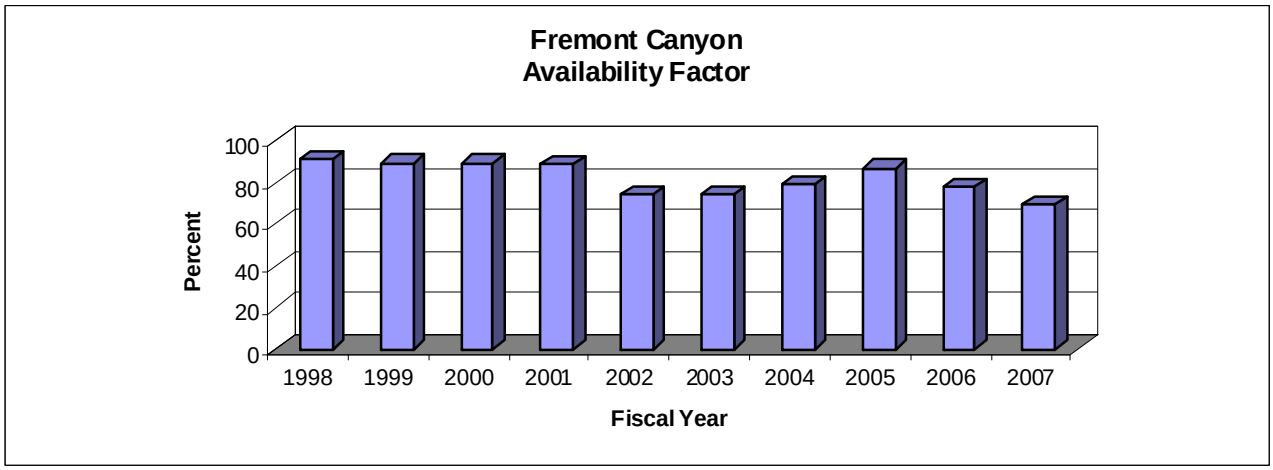




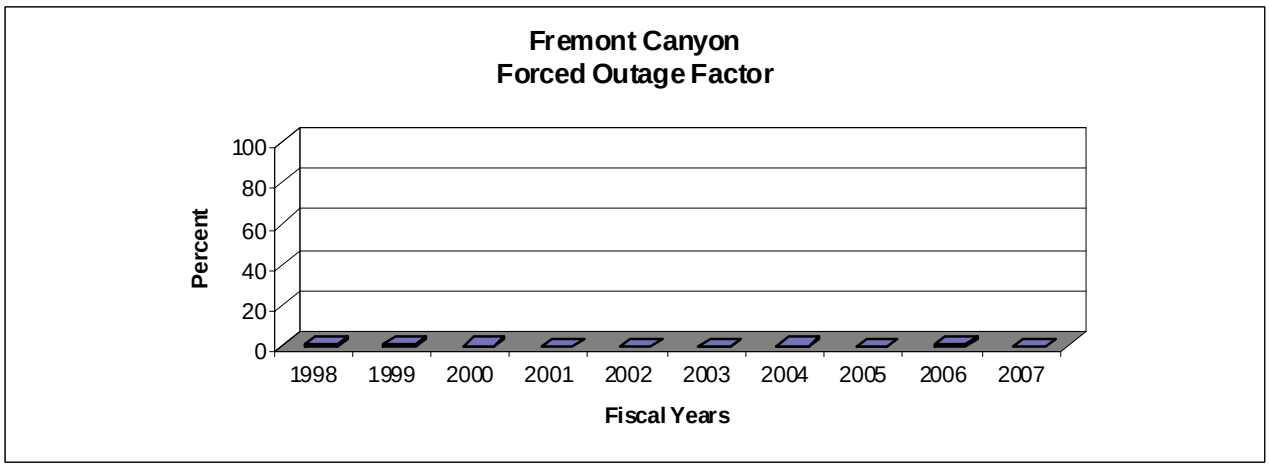




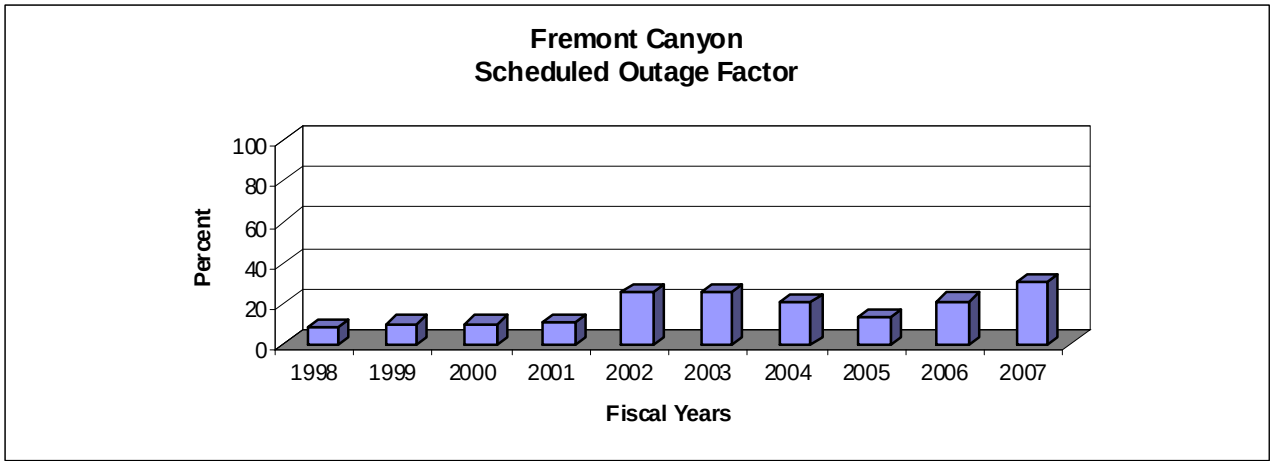
Benchmark 5
Plant Availability Factor



Benchmark 6
Plant Forced Outage Factor



Benchmark 7
Plant Scheduled Outage Factor

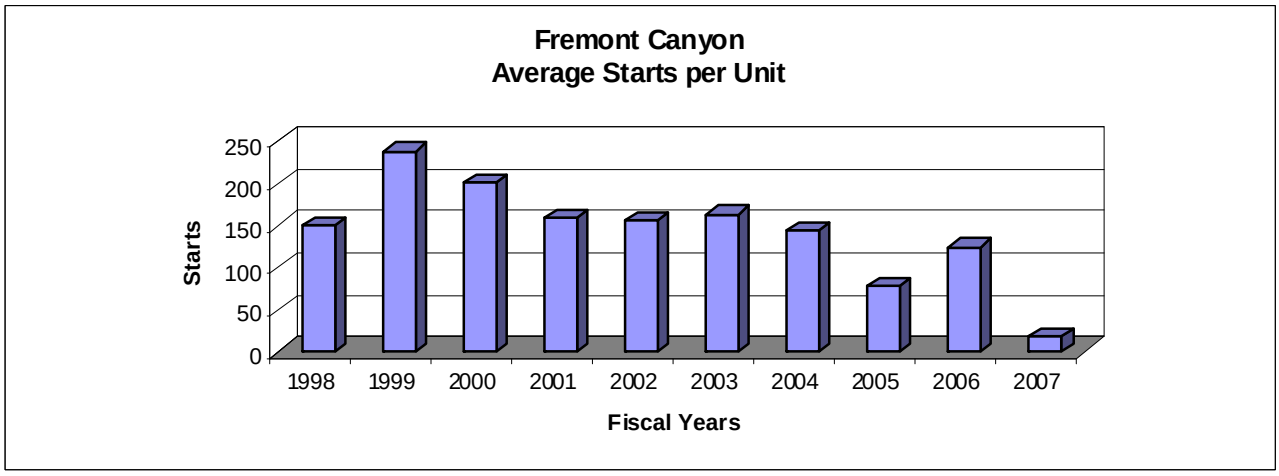


FY-1996 to FY-1997 – Extended maintenance.

FY-2002 – Extended outage for significant draft tube and runner cavitation repairs to Unit 2 plus interruption of annual maintenance to complete critical maintenance at other facilities.

FY-2003 – Extended outage for significant re-contouring of Units 1 and 2 turbine runner buckets.
FY-2004 – Unit 2 power cable replacement and CO_2 system replacement.

Unit Starts



Benchmark Data Comparison

Fiscal Year 2007	Fremont Canyon Powerplant	Reclamation Average 30-100 MW Group	Total Reclamation Average	Industry Average	Best Performers
Wholesale Firm Rate Mills/kWh	23.9	Not Applicable	*22.45	Not Available	Not Available
Production Cost as Percentage of Wholesale Firm Rate	2.10%	Not Applicable	12.1%	Not Applicable	Not Applicable
O&M Cost $/MWh	5.35	7.85	2.76	***54.63	1.00
O&M Costs $/MW	13,832	24,132	7,847	***30,336	2,897
O&M Equiv Work Year per MW	0.01	0.10	0.03	Not Available	0.0
Availability Factor	69.2	84.3	82.3	**88.64	98.5
Forced Outage Factor	0.0	0.5	2.6	**2.61	0.0
Scheduled Outage Factor	30.8	15.3	15.1	**8.74	0.0

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

Glendo Powerplant
Pick-Sloan Missouri Basin Program

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Area Manager
Wyoming Area Office

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Glendo WY

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Reclamation Region: Great Plains

NERC Region: Western Electricity Coordinating Council, Rocky Mountain Power Area

PMA Service Area: Western Area Power Administration, Rocky Mountain Region

Project Authorization: The Glendo Unit of the Pick-Sloan Missouri Basin Project was authorized by the Flood Control Act of December 22, 1944, Public Law 534, which approved the general plan set forth in Senate Document 191, as revised and coordinated by Senate Document 247, 78th Congress, 2d Session. The project was reauthorized by Public Law 503, 83d Congress, on July 16, 1954.

Project Purposes: The Glendo Unit is a multi-purpose project. The unit furnishes a maximum of 40,000 acre-feet of water annually from Glendo Reservoir for irrigation in Wyoming and Nebraska. Glendo and Fremont Canyon Powerplants supply electrical power to Wyoming, Colorado, and Nebraska. The unit provides irrigation, power generation, flood control, fish and wildlife enhancement, recreation, sediment retention, and pollution abatement. It also improves the quality of municipal and industrial water supply in the North Platte River Valley between Gray Reef Dam and Glendo Reservoir.

Plant Location: Glendo Powerplant is located in Platte County approximately 4.5 miles southeast of Glendo, Wyoming, on the North Platte River.

Plant Purpose: Addition of Glendo Unit power generation facilities increases available power in the North Platte River Basin by about 500 million kilowatt-hours annually. This increase comes principally from the Glendo and Fremont Canyon Powerplants, however, some of the gain is due to the conversion of the Alcova Powerplant from seasonal to year-round operation made possible by the regulation afforded by Glendo Reservoir.

Plant Facts: Glendo Dam is a zoned earth fill structure on the North Platte River. The embankment 190 feet high and 2,096 feet long along the crest. An uncontrolled concrete spillway 45 feet wide is located about 450 feet north of the right abutment of the dam. The Glendo Powerplant is joined to the Glendo Reservoir by a diversion tunnel 21 feet in diameter and 2,100 feet long.

Glendo Powerplant is operated on a seasonal basis during the release of irrigation flows to satisfy downstream demands on the North Platte River in Wyoming and Nebraska.

Plant History: Construction of Glendo Dam and Powerplant began in 1954 and was completed in 1958. The plant had an original installed capacity of 24,000 kilowatts and was up rated between 1980-84 to its present installed capacity of 38,000 kilowatts by replacing turbines and windings.

Present Activities: The unit governors were rebuilt, water service piping was replaced, and new digital generator temperature recorders were installed in FY-2004.

Future Planned Activities: Materials will be purchased in FY-2006 for replacement of the wicket gate greasing system. The new system is planned for installation by Reclamation forces in FY-2011.

Special Issues: In 1993, a low-flow bypass at Glendo Dam was made operational to restore year-round flows to 22 miles of downstream river. Main power transformer KY1A was replaced in 1998.

River:	North Platte River	**Plant Type:**	Conventional
Powerhouse Type:	Above Ground	**Turbine Type:**	Francis
Original Nameplate Capacity:	24,000 kW	**Installed Capacity:**	38,000 kW
Year of Initial Operation:	1958	**Age:**	49 years
Net Generation (FY-2007):	57.8 GWh	**Rated Head:**	100 feet
Average Plant Factor (FY-2007):	17.6 percent (seasonal)	**Remotely Operated:**	Yes
Production Mode:	Intermediate (seasonal)		

Ancillary Services

Glendo
Ancillary Services

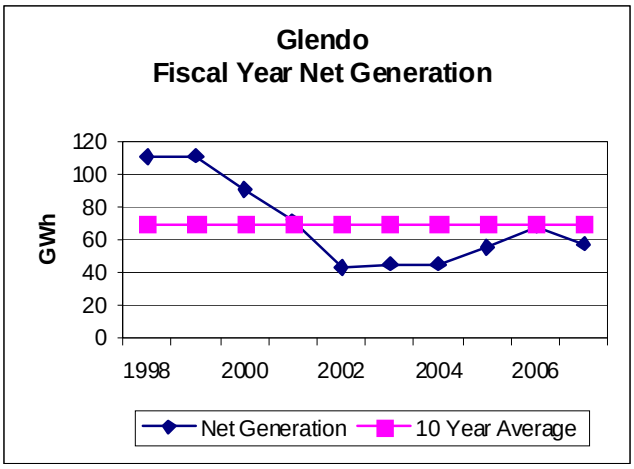
Spinning Reserve	No
Non-Spinning Reserve	No
Replacement Reserve	Yes
Regulation/Load Following	No
Black Start	No
Voltage Support	Yes

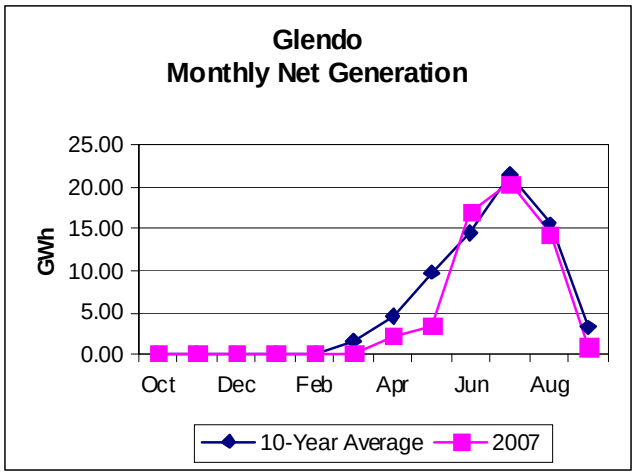
Generators

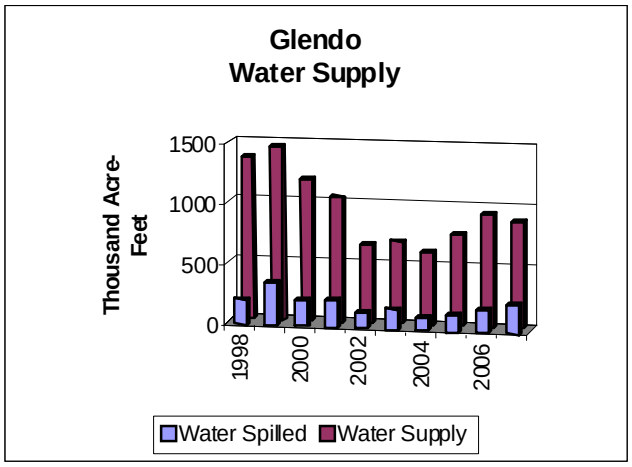
Glendo Generators
Existing Number and Capacity

Unit #	Original Capacity (kW)	Capacity Increased (kW)	Present Capacity (kW)
1	12,000	7,000	19,000
2	12,000	7,000	19,000
2 units	24,000	14,000	38,000

Generation

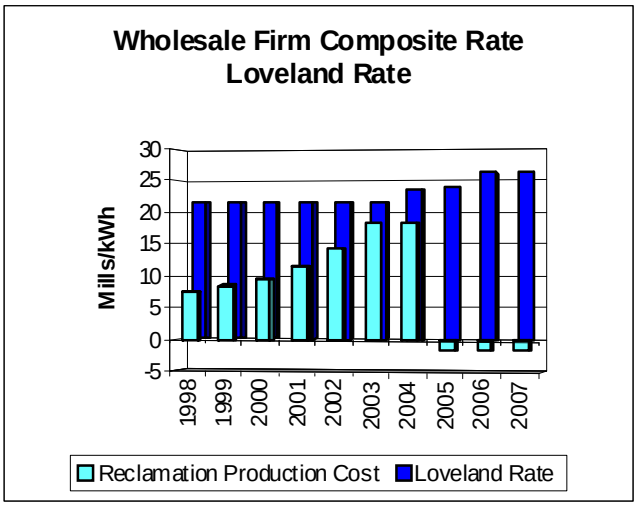

Glendo
Fiscal Year Net Generation
GWh
120
100
80
60
40
20
0
1998
2000
2002
2004
2006
Net Generation
10 Year Average


Glendo
Monthly Net Generation
GWh
25.00
20.00
15.00
10.00
5.00
0.00
Oct
Dec
Feb
Apr
Jun
Aug
10-Year Average
2007

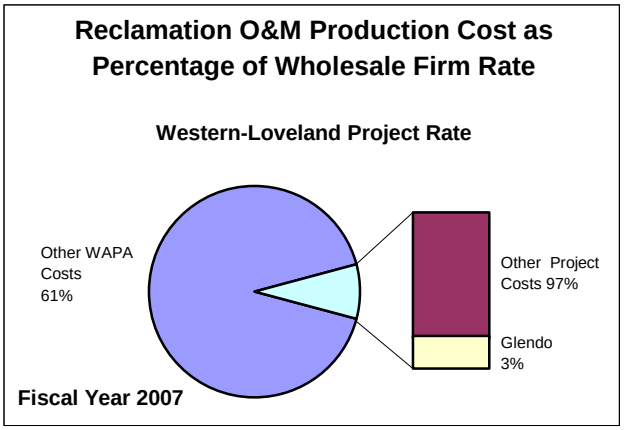

Glendo
Water Supply
Thousand Acre-Feet
1500
1000
500
0
1998
2000
2002
2004
2006
Water Spilled
Water Supply

Prime Laboratory Benchmarks

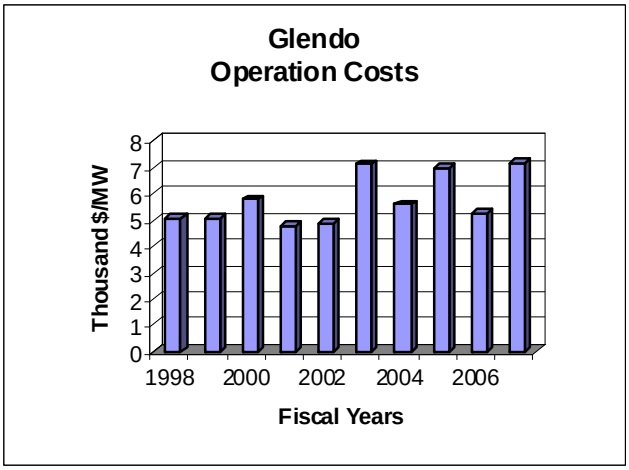
Benchmark 1
Wholesale Firm Rate

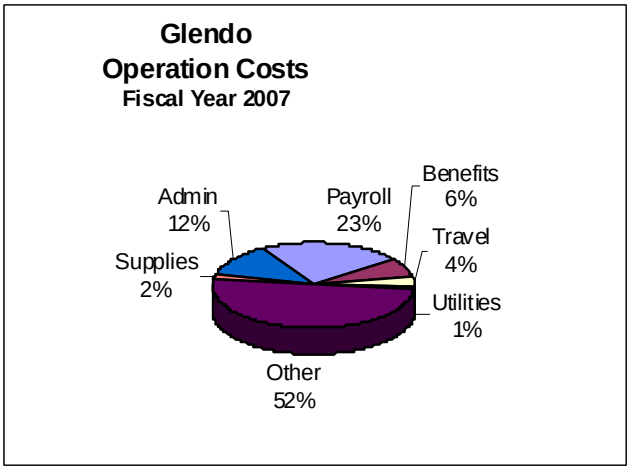


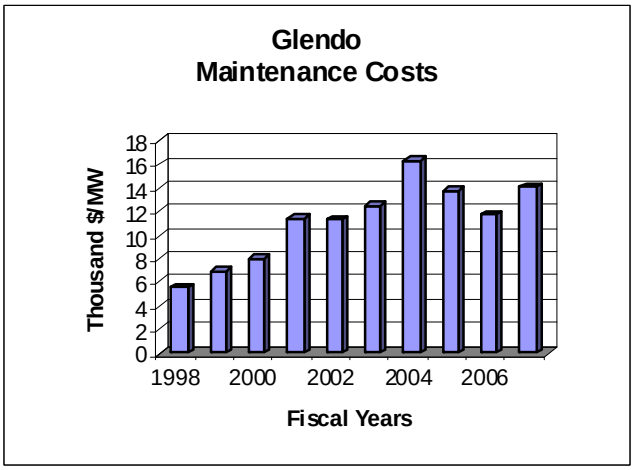
Benchmark 2
Reclamation's Production Costs as Percentage of Wholesale Firm Rate

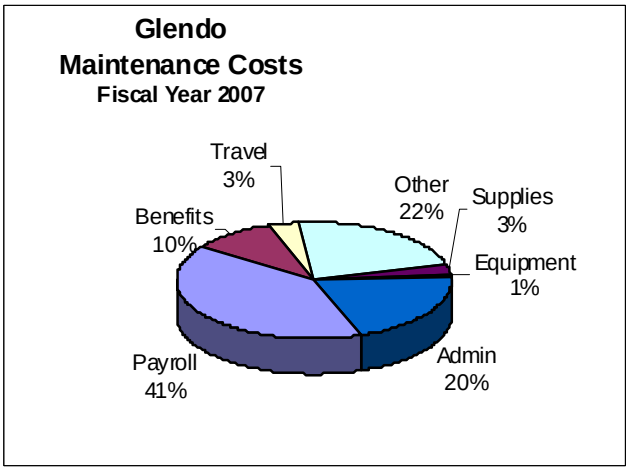


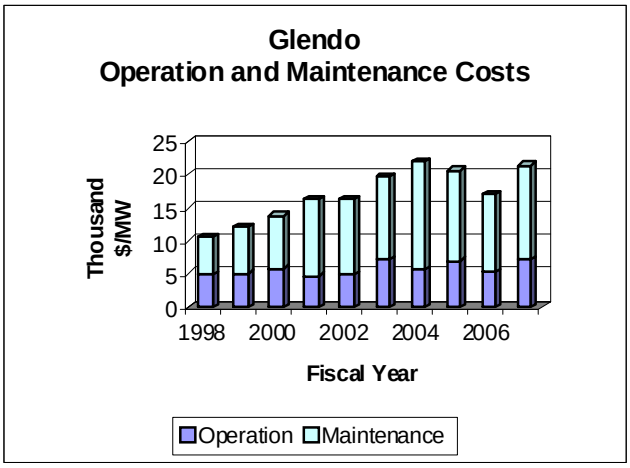
Benchmark 3
Production Costs

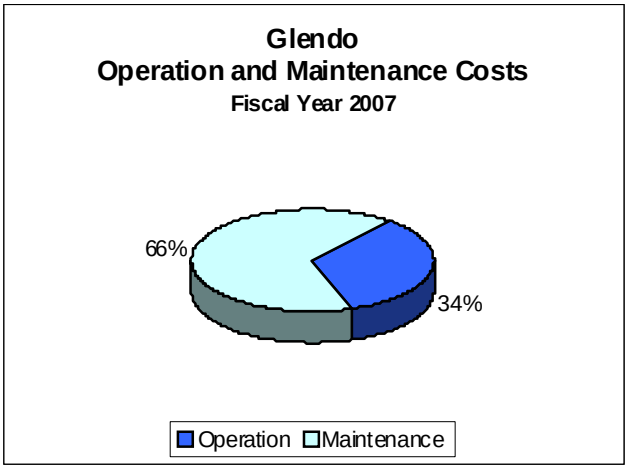






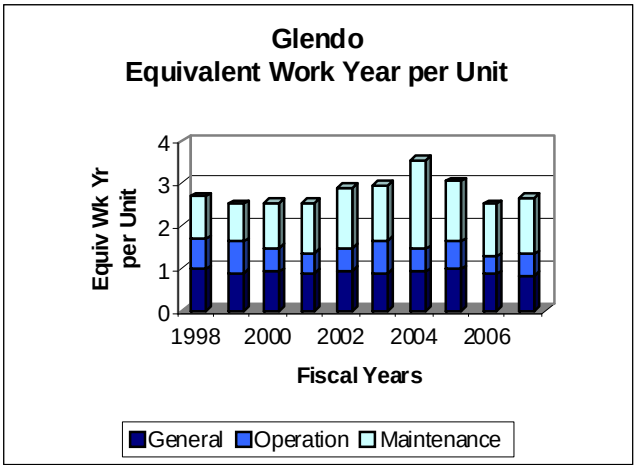


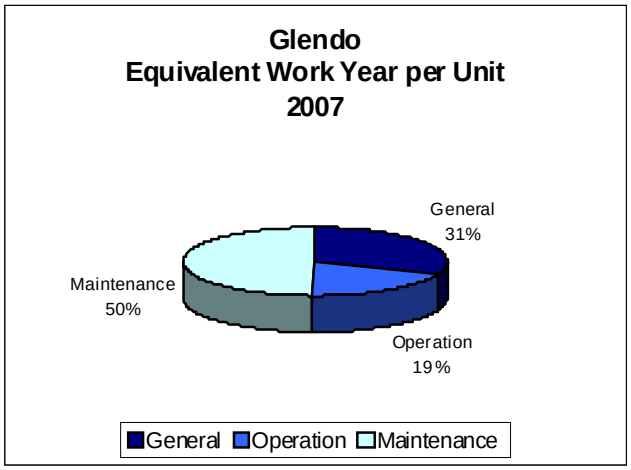


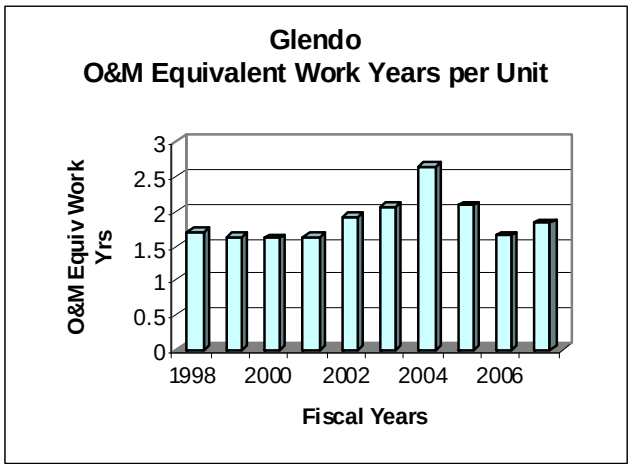


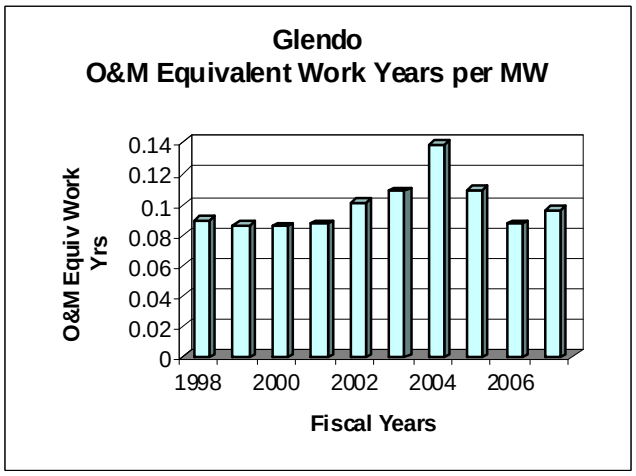
Benchmark 4
Workforce Deployment

Glendo 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	1.47	0.17	0.04	1.68	0.84	0.04
Operation	0.90	0.10	0.00	1.00	0.50	0.03
Maintenance	2.38	0.27	0.00	2.65	1.33	0.07
Total Staffing	4.76	0.54	0.04	5.33	2.66	0.14

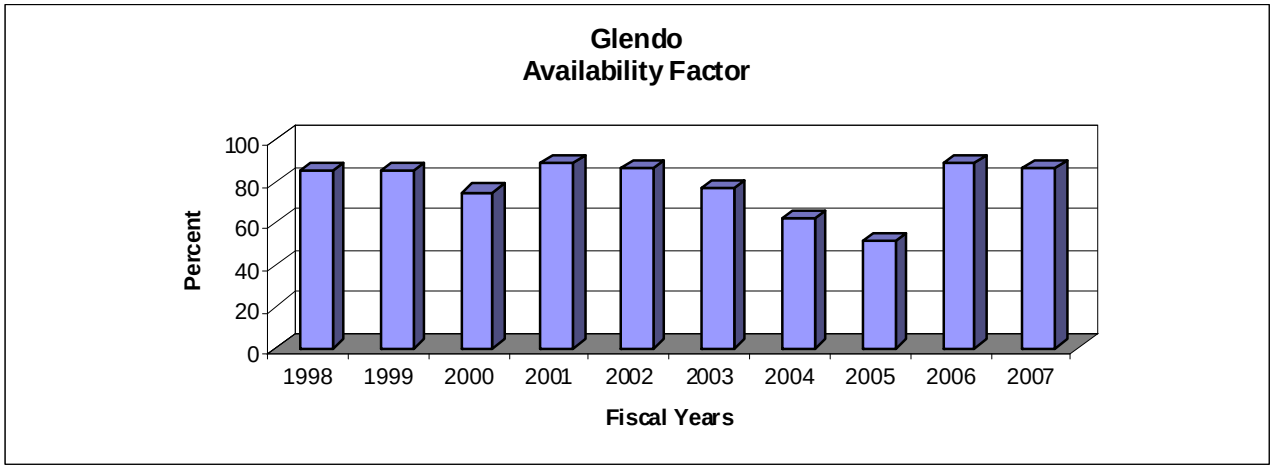




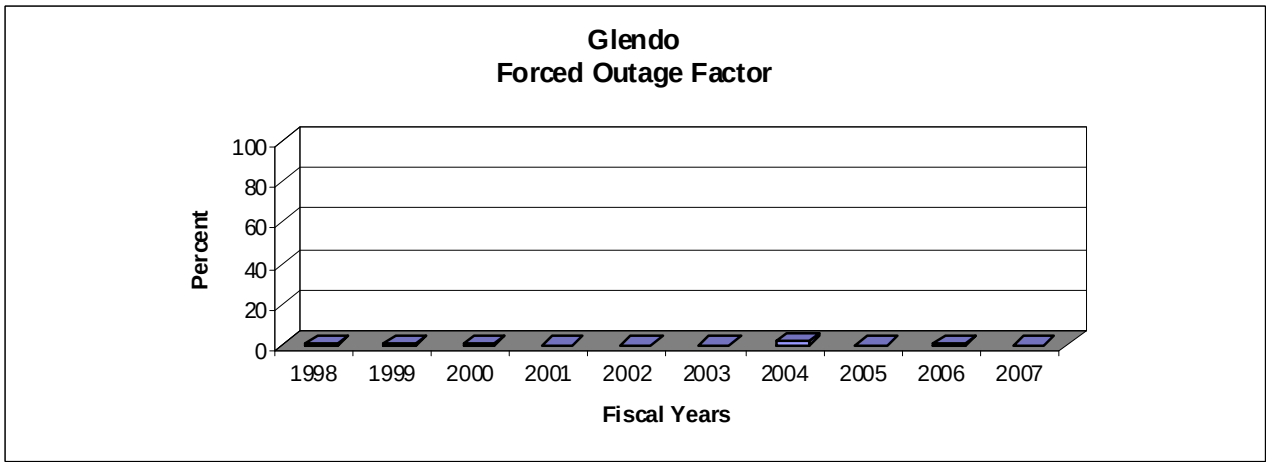




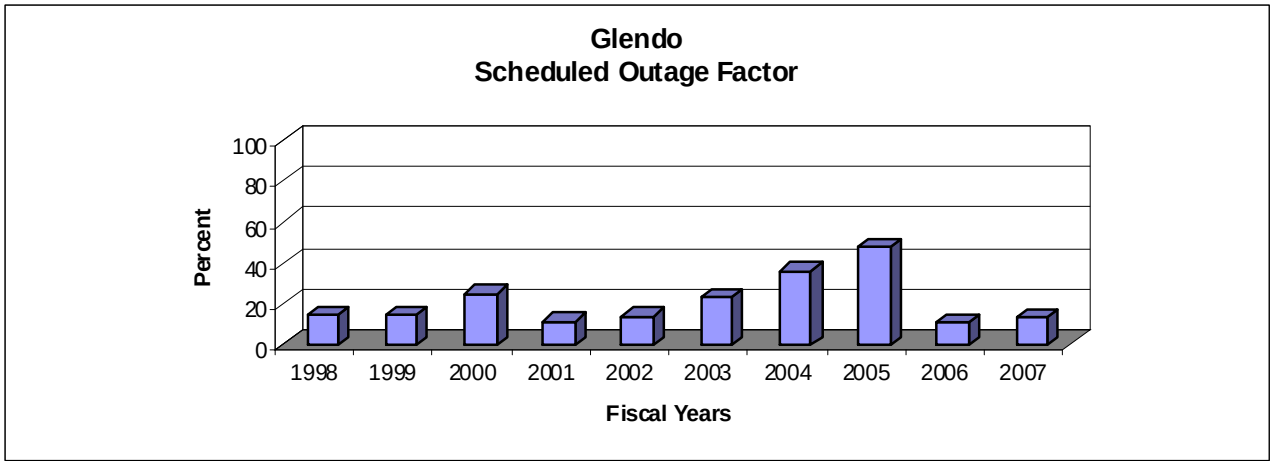
Benchmark 5
Plant Availability Factor



Benchmark 6
Plant Forced Outage Factor



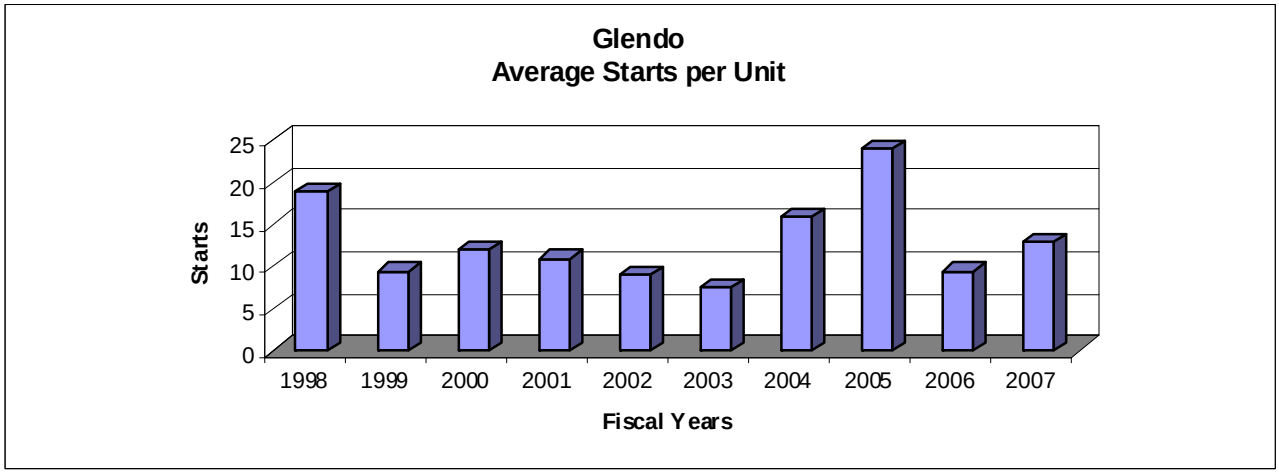
Benchmark 7
Plant Scheduled Outage Factor



Extended maintenance done during winter shutdown.

FY-2003 – Unit 1 schedule outage extended for replacement of water service piping.
FY-2004 – Both unit governors were rebuilt; water service piping was replaced; and new digital generator temperature recorders were installed.

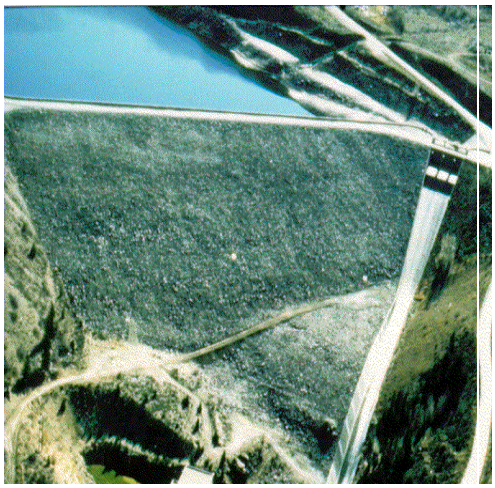
Unit Starts



Benchmark Data Comparison				
Fiscal Year 2007	**Glendo**	**Total Reclamation Average**	**Industry Average**	**Best Performers**
Wholesale Firm Rate Mills/kWh	23.9	*22.45	Not Available	Not Available
Production Cost as Percentage of Wholesale Firm Rate	1.84%	12.1%	Not Applicable	Not Applicable
O&M Cost $/MWh	13.98	2.76	Not Applicable	1.00
O&M Costs $/MW	21,285	7,847	Not Applicable	2,897
O&M Equiv Work Year per MW	0.10	0.03	Not Available	0.0
Availability Factor	86.4	82.3	**88.64	98.5
Forced Outage Factor	0.10	2.6	**2.61	0.0
Scheduled Outage Factor	13.5	15.1	**8.74	0.0

*Weighted by Net Generation
**2006 NERC Average

Green Mountain Powerplant
Colorado-Big Thompson Project



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Chuck Pederson
O&M Chief

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Silverthorne CO 80498

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Reclamation Region: Great Plains

NERC Region: Western Electricity Coordinating Council, Rocky Mountain Power Area

PMA Service Area: Western Area Power Administration, Rocky Mountain Region

Project Authorization: The President approved the Secretary of the Interior's finding of feasibility on December 21, 1937.

Project Purposes: The Colorado-Big Thompson Project is one of the largest and most complex natural resource developments undertaken by Reclamation. It consists of over 100 structures integrated into a transmountain water diversion system through which multiple benefits are provided to the people. The project spreads over approximately 250 miles in the State of Colorado. It stores, regulates, and diverts water from the Colorado River on the western slope of the Continental Divide to the eastern slope of the Rocky Mountains. It provides supplemental water for irrigation of about 720,000 acres of land, municipal and industrial use, hydroelectric power, and water-oriented recreation opportunities.

Plant Location: Green Mountain Powerplant is located in Summit County, approximately 13 miles southeast of the town of Kremmling, Colorado on the Blue River, a tributary of the Colorado.

Plant Purpose: Provides project water storage and maintains minimum water flows in the Blue River.

Plant Facts: This dam provides replacement storage for water diverted by the project to the eastern slope. The dam is an earth fill structure, 309 feet high, with a crest length of 1,150 feet and volume of 4,360, 211 cubic yards. The powerplant has two units with a total installed generating capacity of 26,000 kilowatts.

Plant History: The water and power control center for Colorado-Big Thompson Project's reservoirs, powerplants, and transmission lines in Wyoming, Colorado, and western Nebraska is located at the project headquarters in Loveland, Colorado. This Western Division of the Missouri River Basin is an interconnected system of 15 Reclamation powerplants.

Present Activities: Recently completed projects include ring seal gate removal and restoration; CO_2 fire suppression system replacement; fire detection and alarm system installation; Unit 1 overhaul; and powerplant lead cleanup.

Future Planned Activities: Excitation system replacement, headgate hydraulic motor replacement, spillway concrete repairs, and transformer KZ1A repairs are planned for FY 2009. Plant remote control (RTU SCADA and digital microwave/fiber) upgrades are planned to be completed in FY 2010. Access road repairs and building roof and concrete repairs are planned to be completed in FY 2010. Penstock relining is planned for FY 2011; governor upgrades are planned for FY 2012. Online condition monitoring system addition is planned for FY 2013.

Special Issues: None.

River:	Blue River	**Plant Type:**	Conventional
Powerhouse Type:	Above Ground	**Turbine Type:**	Francis
Original Nameplate Capacity:	21,600 kW	**Installed Capacity:**	26,000 kW
Year of Initial Operation:	1943	**Age:**	64 years
Net Generation (FY-2007):	60.2 GWh	**Rated Head:**	210 feet
Average Plant Factor (FY-2007):	26.7 percent	**Remotely Operated:**	Yes
Production Mode:	Intermediate		

Ancillary Services

Green Mountain
Ancillary Services

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

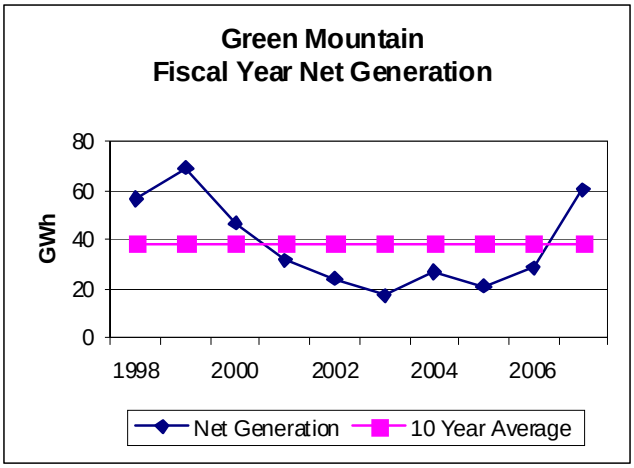
Generators

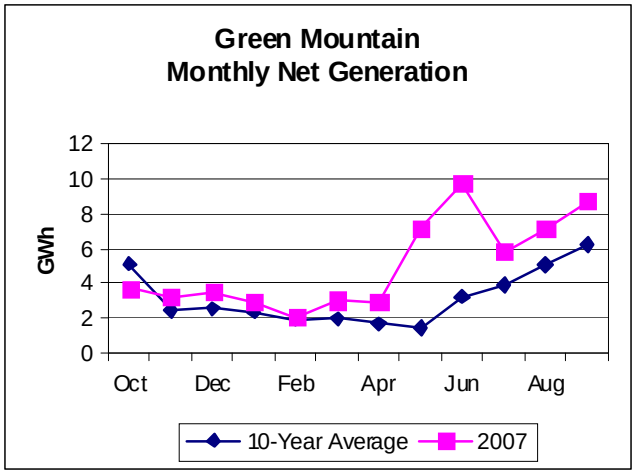
Green Mountain Generators

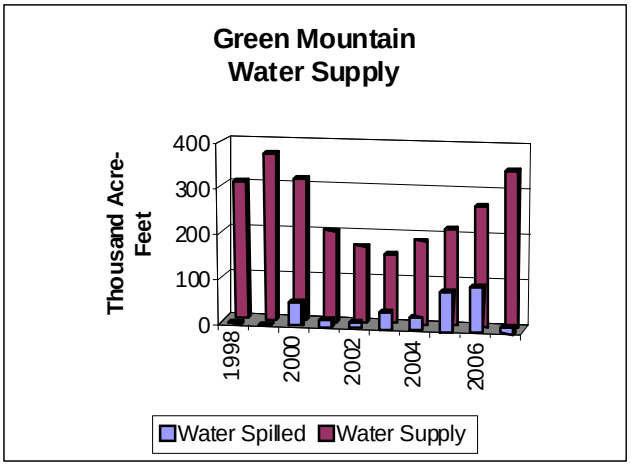
Existing Number and Capacity

Unit #	Original Capacity (kW)	Capacity Increased (kW)	Present Capacity (kW)
1	10,800	2,200	13,000
2	10,800	2,200	13,000
2 units	21,600	4,400	26,000

Generation

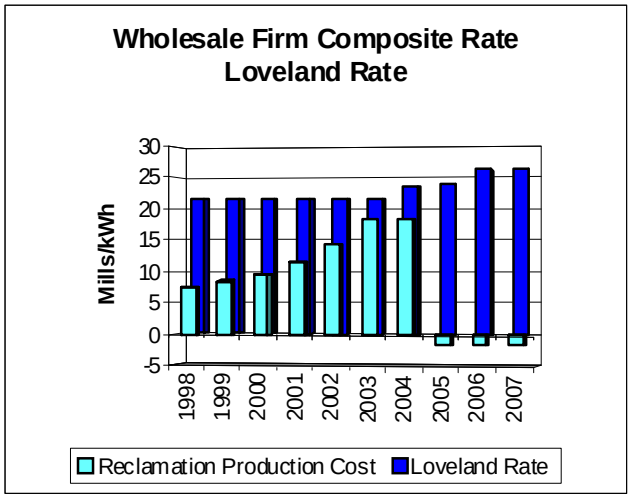

Green Mountain
Fiscal Year Net Generation
GWh
80
60
40
20
0
1998
2000
2002
2004
2006
Net Generation
10 Year Average


Green Mountain
Monthly Net Generation
GWh
12
10
8
6
4
2
0
Oct
Dec
Feb
Apr
Jun
Aug
10-Year Average
2007

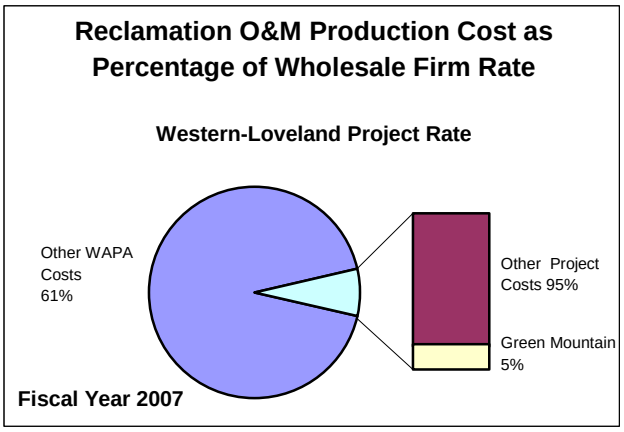

Green Mountain
Water Supply
Thousand Acre-Feet
400
300
200
100
0
1998
2000
2002
2004
2006
Water Spilled
Water Supply

Prime Laboratory Benchmarks

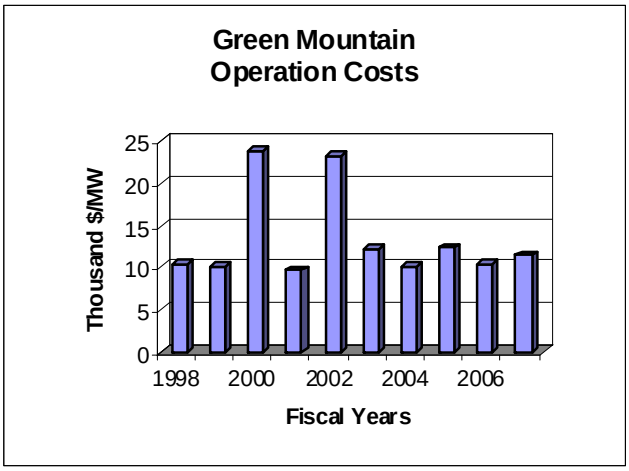
Benchmark 1
Wholesale Firm Rate

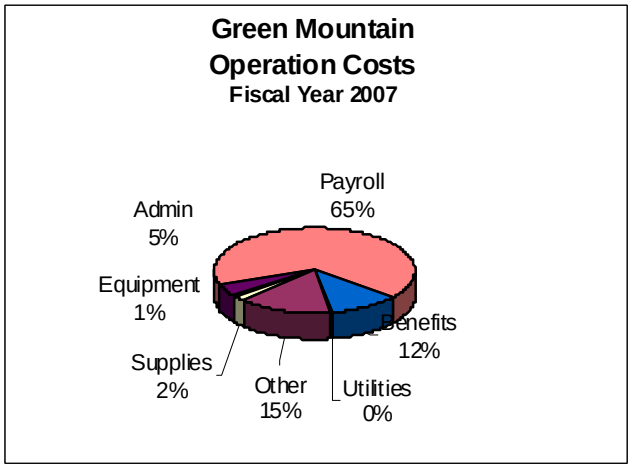


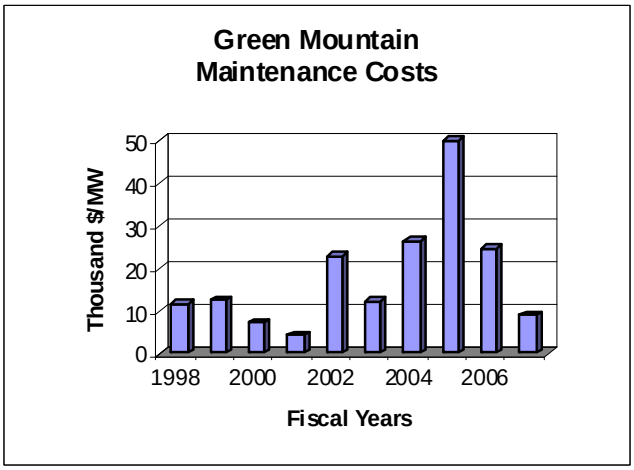
Benchmark 2
Reclamation's Production Costs as Percentage of Wholesale Firm Rate

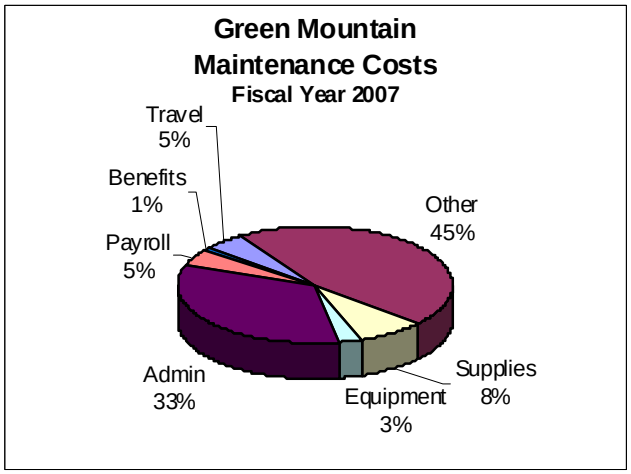


Benchmark 3
Production Costs

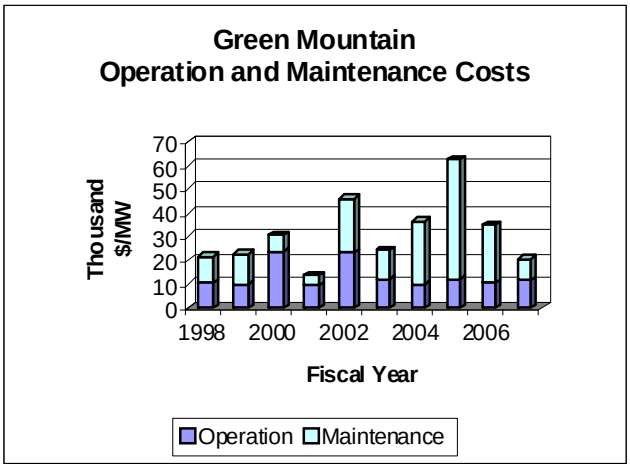


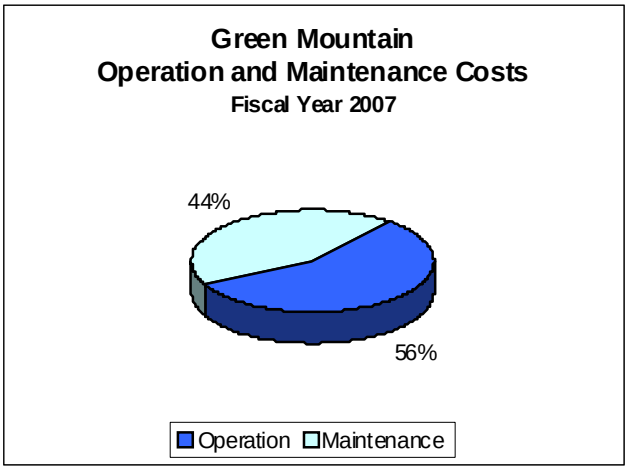


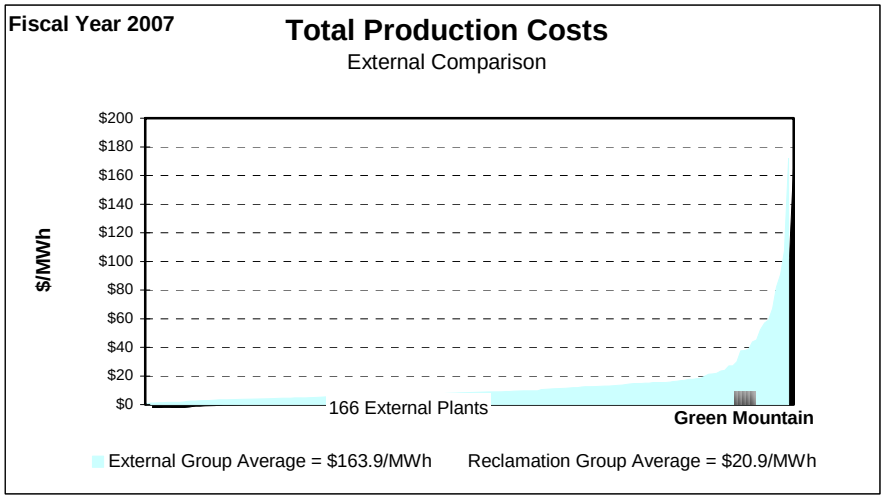


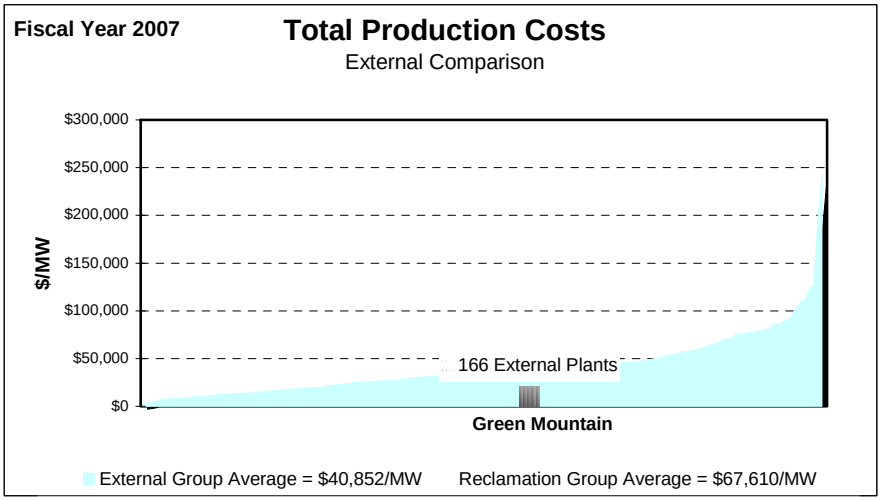


Benchmark 3
Production Costs



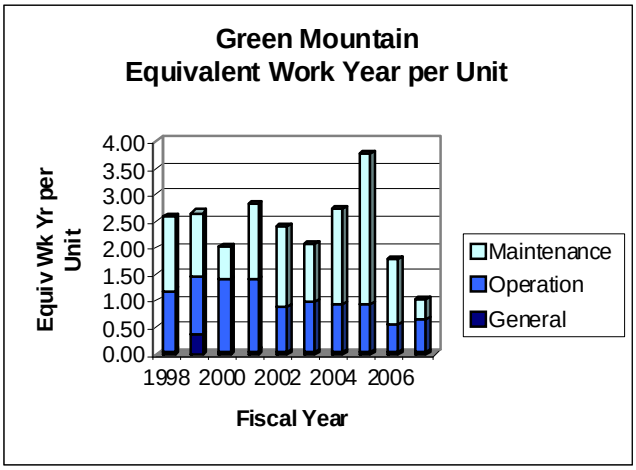


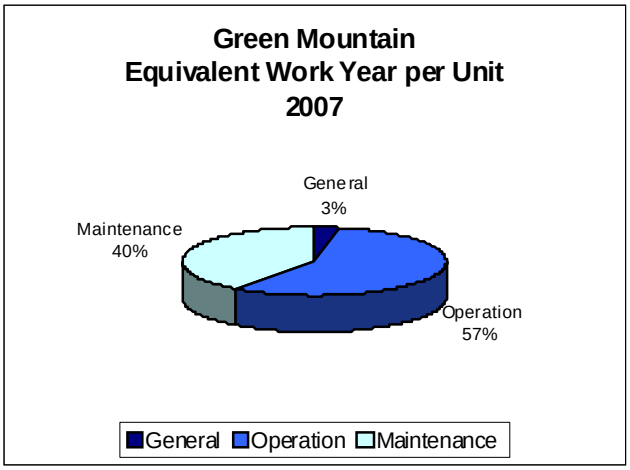


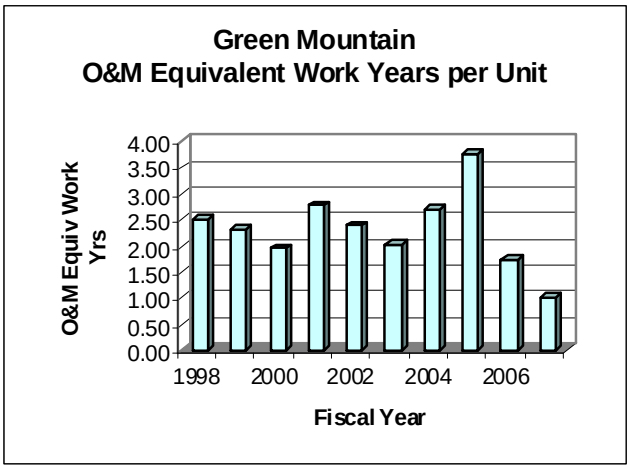


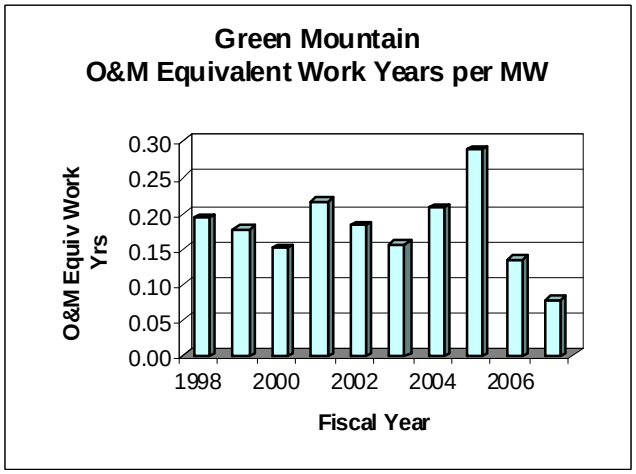
Benchmark 4
Workforce Deployment

Green Mountain 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	0.03	0.00	0.04	0.07	0.03	0.00
Operation	0.97	0.10	0.00	1.07	0.53	0.04
Maintenance	2.20	0.23	0.00	2.43	1.22	0.09
Total Staffing	3.19	0.34	0.04	3.57	1.78	0.14

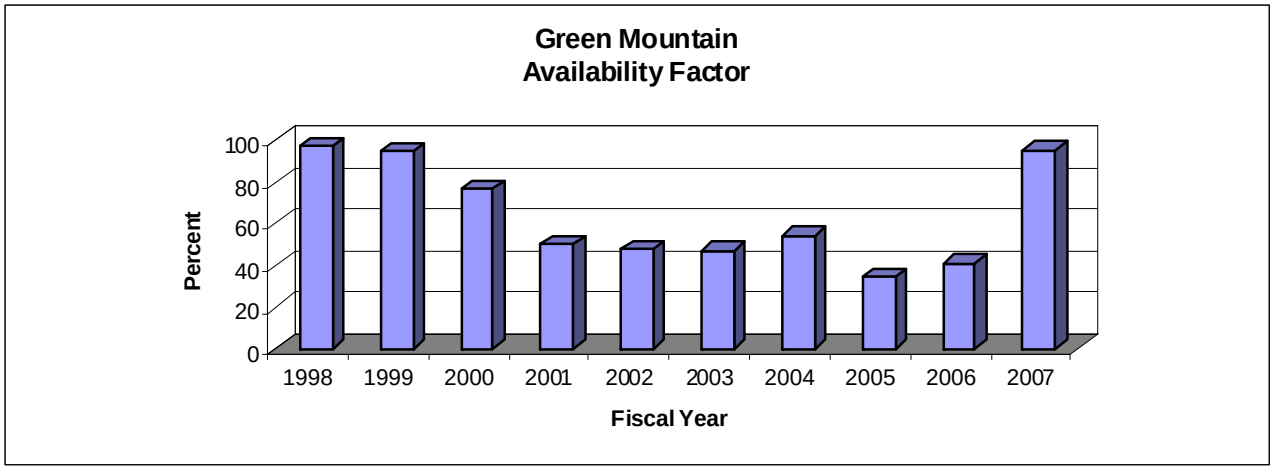




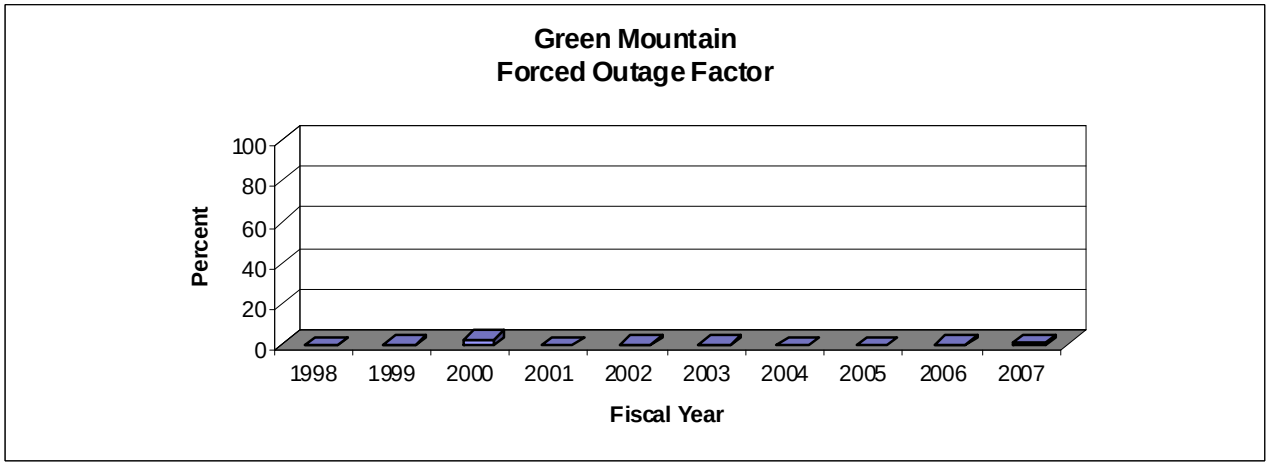




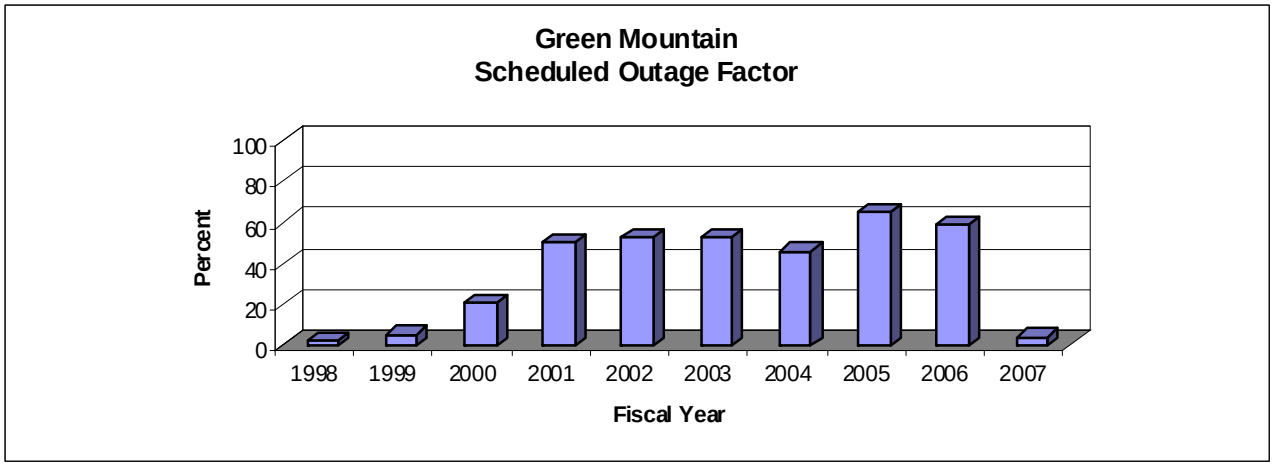
Benchmark 5
Plant Availability Factor



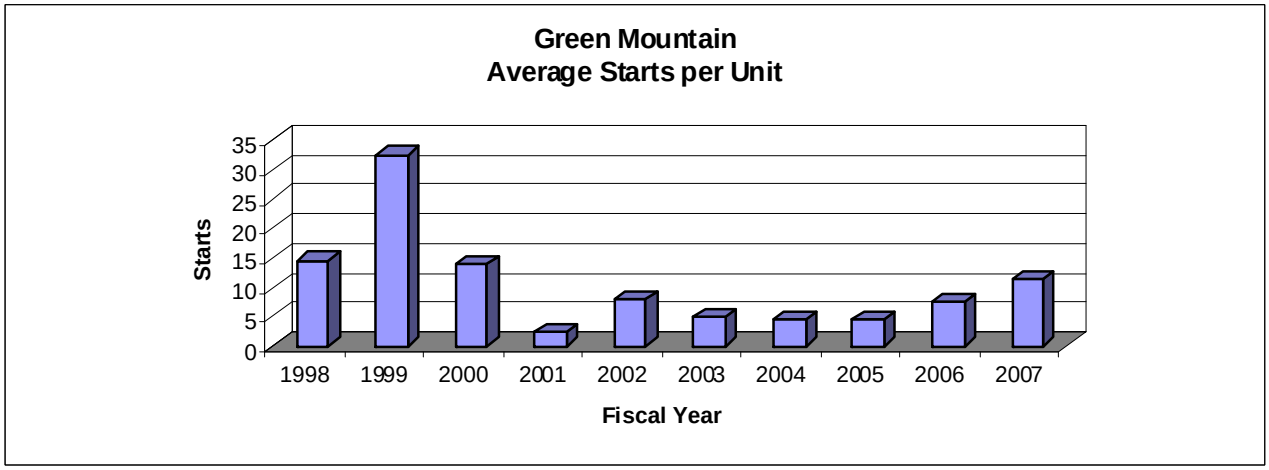
Benchmark 6
Plant Forced Outage Factor



Benchmark 7
Plant Scheduled Outage Factor



Unit Starts



Benchmark Data Comparison					
Fiscal Year 2007	**Green Mountain Powerplant**	**Reclamation Average 10-30 MW Group**	**Total Reclamation Average**	**Industry Average**	**Best Performers**
Wholesale Firm Rate Mills/kWh	26.1	Not Applicable	*22.45	Not Available	Not Available
Production Cost as Percentage of Wholesale Firm Rate	0.94%	Not Applicable	12.1%	Not Applicable	Not Applicable
O&M Cost $/MWh	8.86	16.40	2.76	***163.95	1.00
O&M Costs $/MW	20,517	62,731	7,847	***40,852	2,897
O&M Equiv Work Year per MW	0.13	0.23	0.03	Not Available	0.0
Availability Factor	95.4	88.5	82.3	**88.64	98.5
Forced Outage Factor	0.5	0.1	2.6	**2.61	0.0
Scheduled Outage Factor	4.1	11.4	15.1	**8.74	0.0

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

Guernsey Powerplant
North Platte Project

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Reclamation Region: Great Plains

NERC Region: Western Electricity Coordinating Council, Rocky Mountain Power Area

PMA Service Area: Western Area Power Administration, Rocky Mountain Region

Project Authorization: The Secretary of the Interior authorized the project on March 14, 1903. The President approved the Guernsey Dam and Powerplant on April 30, 1925. The project was originally called the Sweetwater Project.

Project Purposes: The North Platte Project provides full service irrigation for about 226,000 acres. The North Platte River, fed by many mountain streams rising in the Rocky Mountains of Colorado and Wyoming, is the most important river in southeastern Wyoming and western Nebraska. Its waters are stored and used for irrigation and power development.

Plant Location: Guernsey Powerplant is located in Platte County, Wyoming, approximately 2 miles upstream of Guernsey, Wyoming, on the North Platte River about 180 miles below Alcova Dam and 25 miles below Glendo Dam.

Plant Purpose: The Guernsey Dam controls river flow. Water released from Pathfinder Reservoir can be stored at this dam and released to fit varying irrigation demands. Water is released through Guernsey Powerplant.

Plant Facts: The powerplant is on the right bank below the dam and has two 3,200-kilowatt generators. Power is transmitted to towns and industries down the valley over transmission lines. The electric power generated at Guernsey Powerplant is supplied to the project area by four substations and about 160 miles of transmission lines.

Guernsey Powerplant is operated on a seasonal basis during the release of irrigation flows to satisfy downstream demands on the North Platte River in Wyoming and Nebraska.

Plant History: Construction of Guernsey Powerplant began in 1925 and was completed in 1928. The original installed capacity of the plant was 4,800 kilowatts. The plant was up rated between 1992 and 1994 through replacement of the generator windings to its current installed capacity of 6,400 kilowatts.

Present Activities: Normal operations.

Future Planned Activities: Materials will be purchased in FY-2006 for replacement of the wicket gate greasing system. The new system is planned for installation by Reclamation forces in FY-2007.

Special Issues: Units were rewound, new excitation equipment was installed, and major overhaul of both turbines occurred in calendar years 1993 and 1994, which accounts for high production costs in FY-1994.

The Guernsey Switchyard was removed and replaced by Western Limestone substation in 1980 and 1981.

River:	North Platte River	**Plant Type:**	Conventional
Powerhouse Type:	Above Ground	**Turbine Type:**	Francis
Original Nameplate Capacity:	4,800 kW	**Installed Capacity:**	6,400 kW
Year of Initial Operation:	1927	**Age:**	80 years
Net Generation (FY-2007):	14.4 GWh	**Rated Head:**	70 feet
Average Plant Factor (FY-2007):	26.1 percent (seasonal)	**Remotely Operated:**	Yes
Production Mode:	Intermediate (seasonal)		

Ancillary Services

Guernsey
Ancillary Services

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

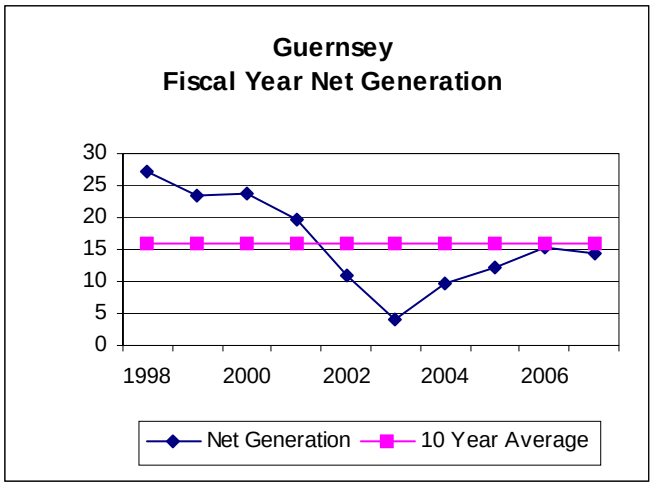
Generators

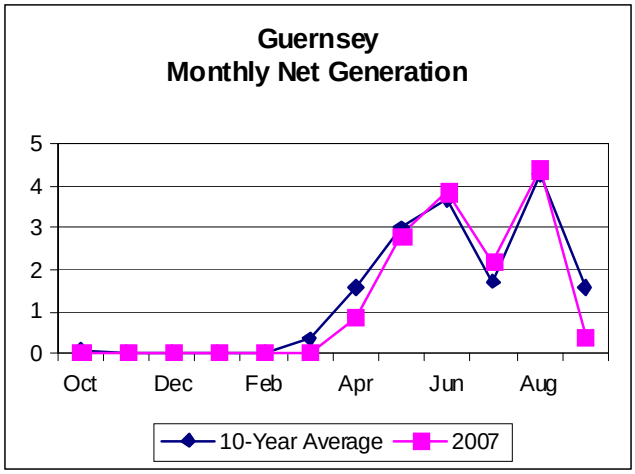
Guernsey Generators

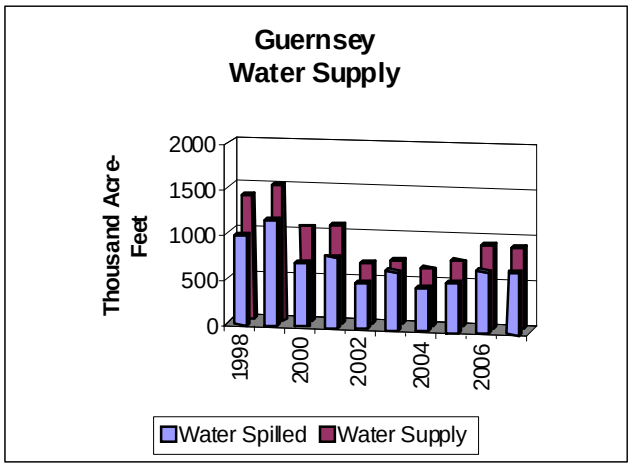
Existing Number and Capacity

Unit #	Original Capacity (kW)	Capacity Increased (kW)	Present Capacity (kW)
1	2,400	800	3,200
2	2,400	800	3,200
2 units	4,800	1,600	6,400

Generation

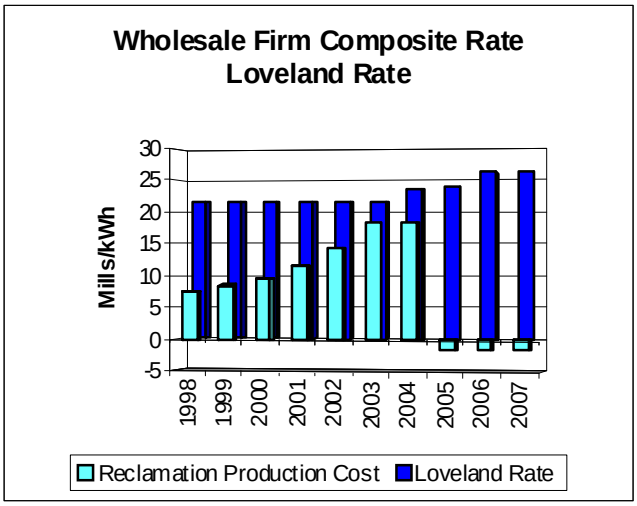

Guernsey
Fiscal Year Net Generation
30
25
20
15
10
5
0
1998
2000
2002
2004
2006
Net Generation
10 Year Average


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

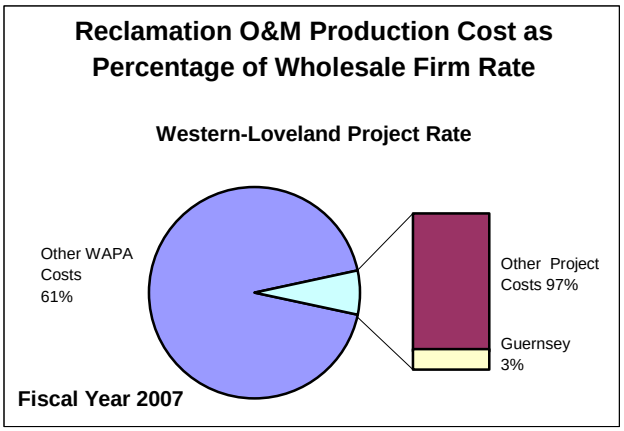

Guernsey
Water Supply
Thousand Acre-Feet
2000
1500
1000
500
0
1998
2000
2002
2004
2006
Water Spilled
Water Supply

Prime Laboratory Benchmarks

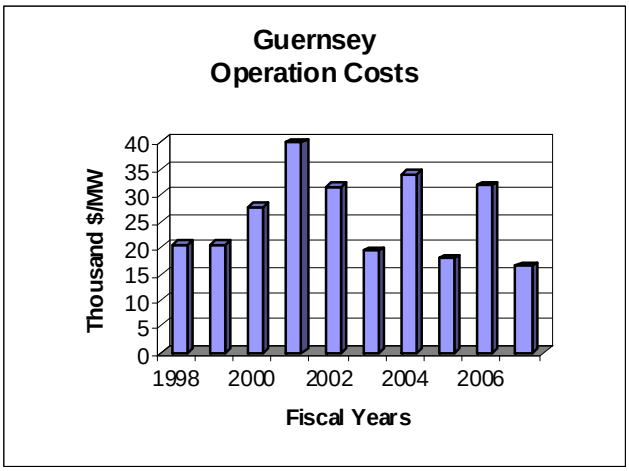
Benchmark 1
Wholesale Firm Rate

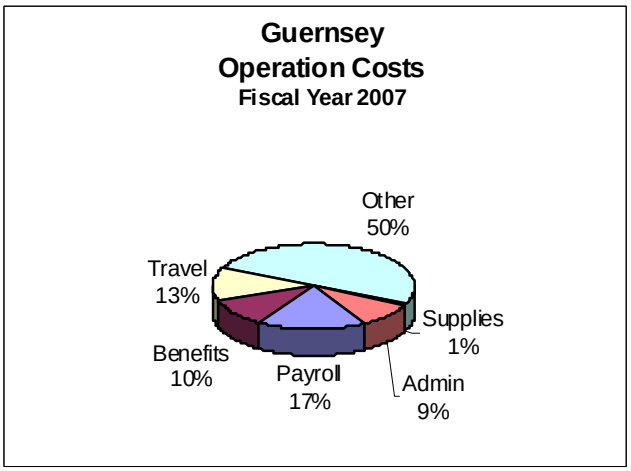


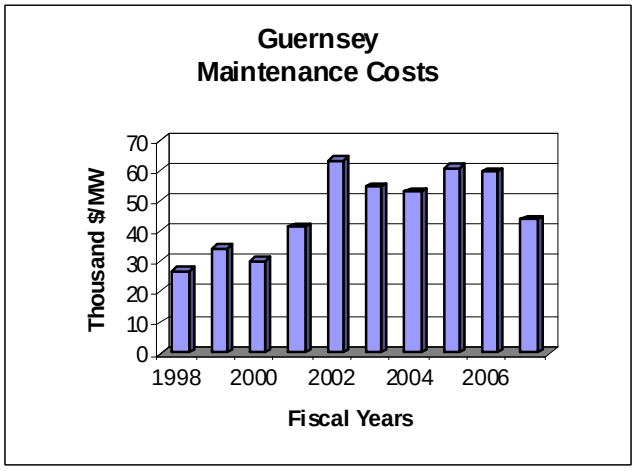
Benchmark 2
Reclamation's Production Costs as Percentage of Wholesale Firm Rate

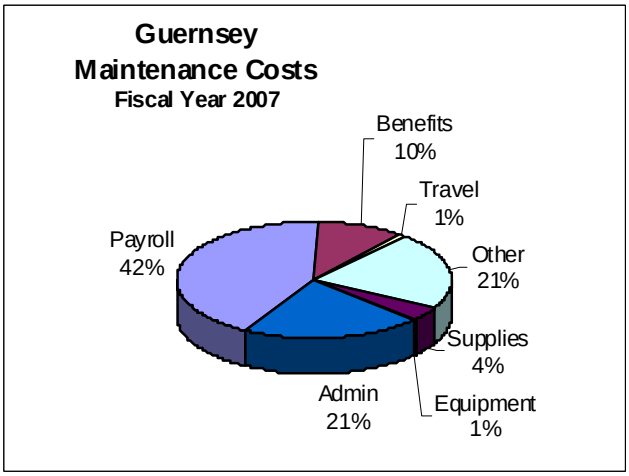


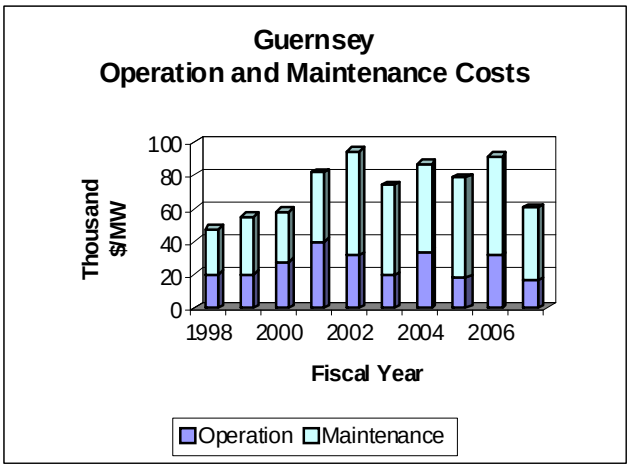
Benchmark 3
Production Costs

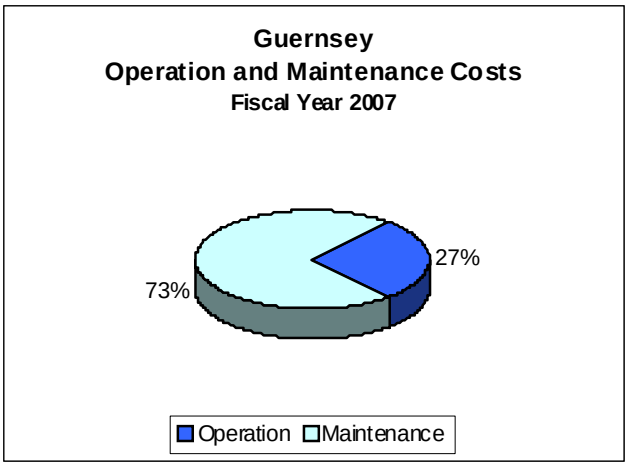






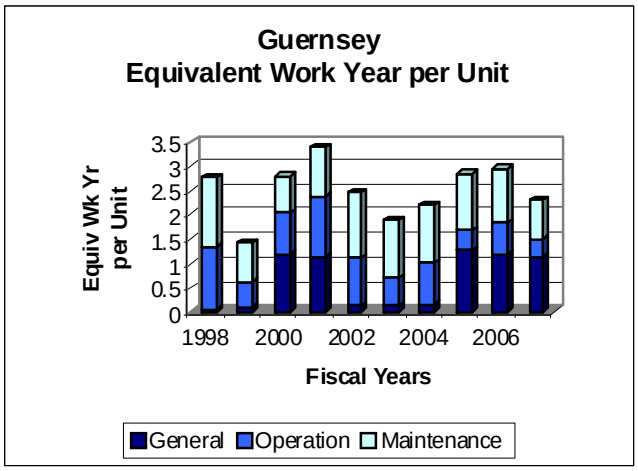


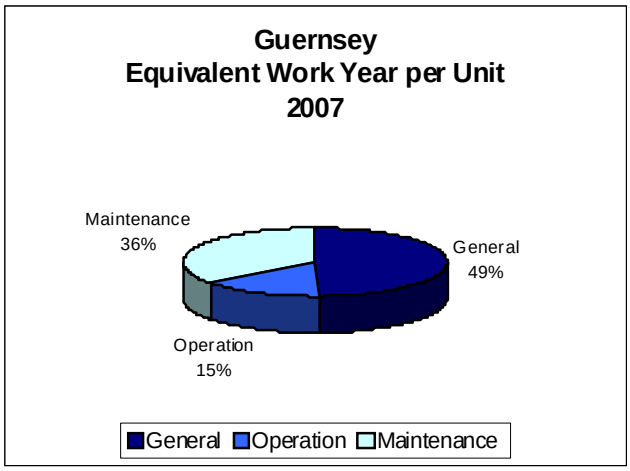


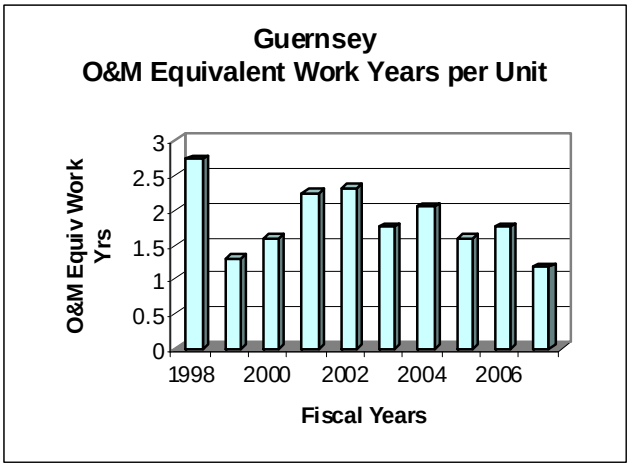


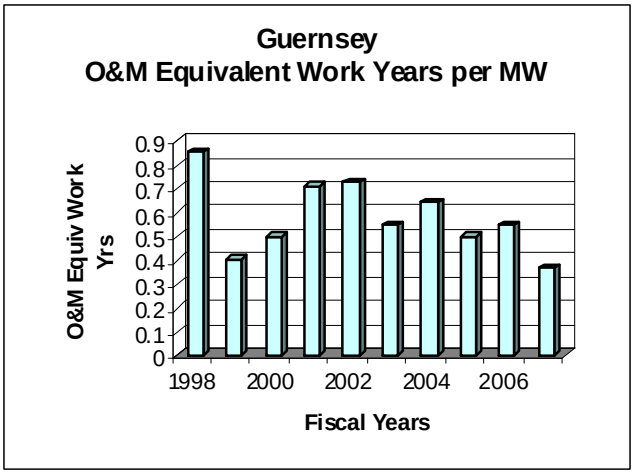
Benchmark 4
Workforce Deployment

Guernsey 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	2.03	0.23	0.04	2.29	1.15	0.36
Operation	0.62	0.07	0.00	0.69	0.35	0.11
Maintenance	1.48	0.17	0.00	1.65	0.83	0.26
Total Staffing	4.13	0.47	0.04	4.64	2.32	0.72

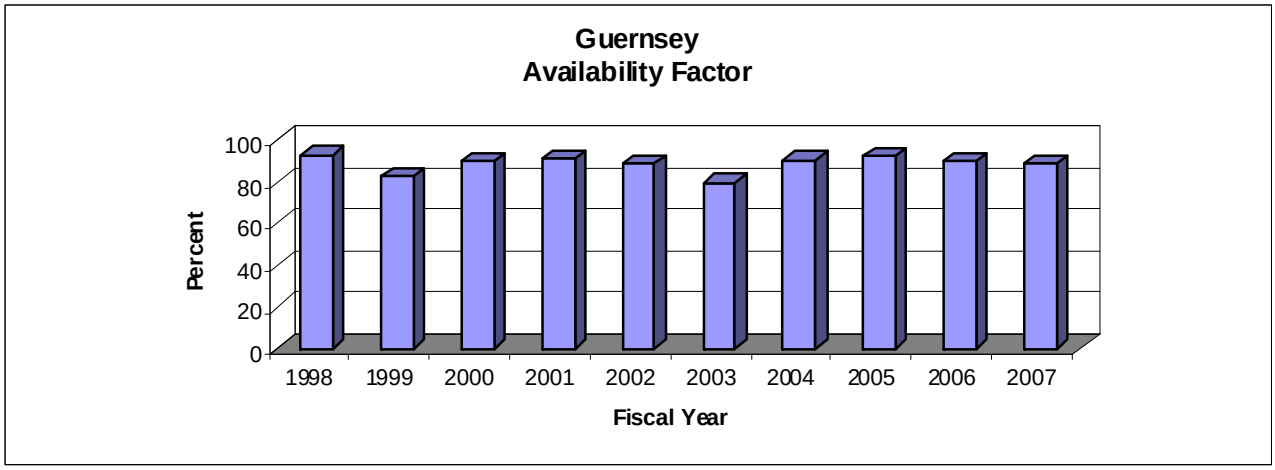




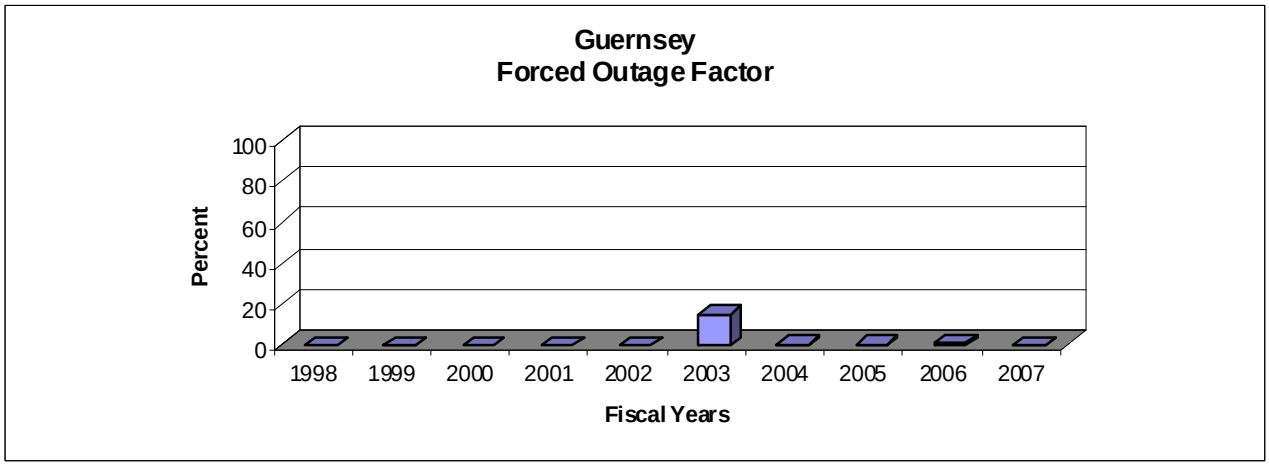




Benchmark 5
Plant Availability Factor

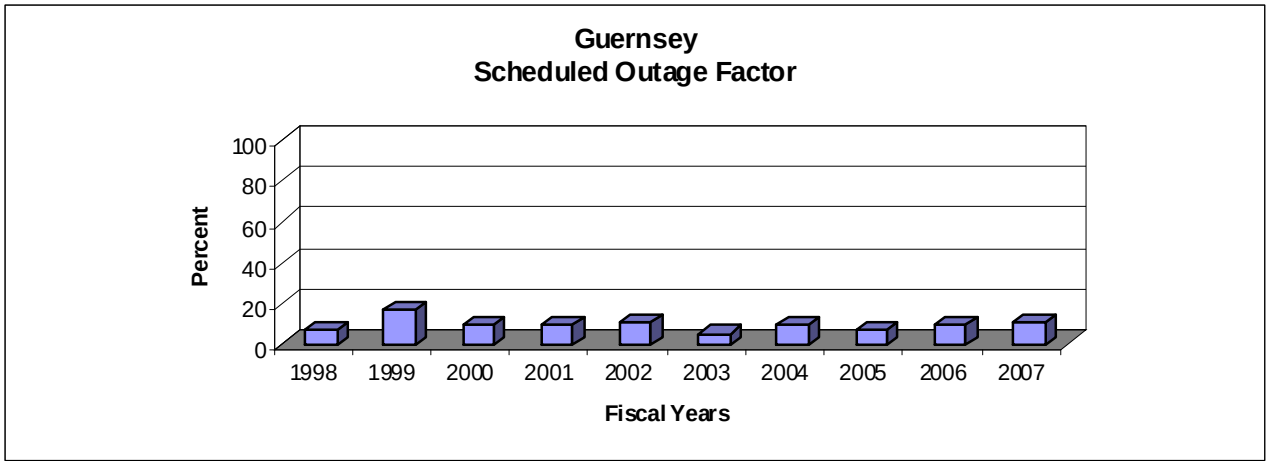


Benchmark 6
Plant Forced Outage Factor



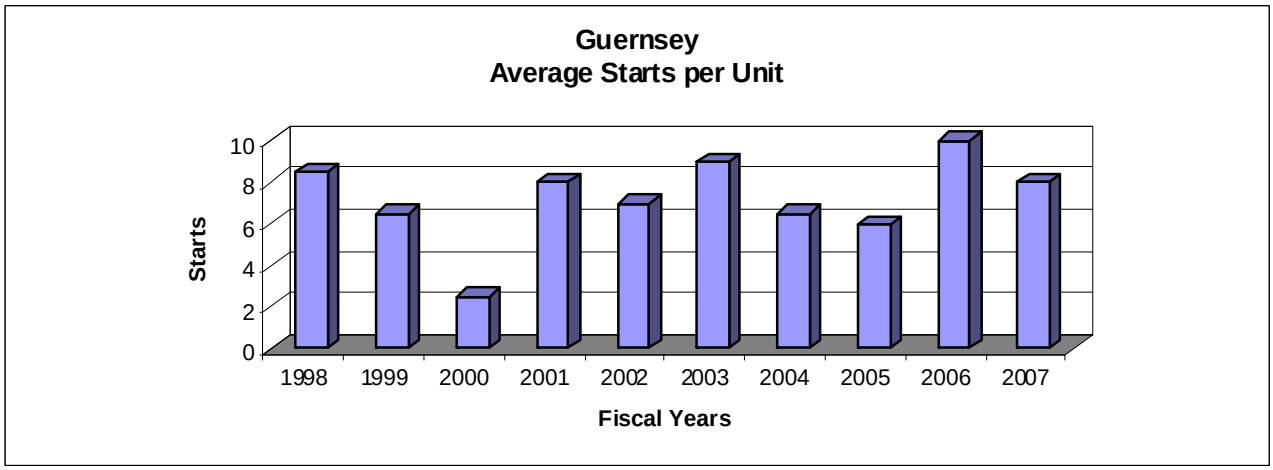
FY-2003 – Extended outage for rock fall clean up and hillside stabilization efforts above transformers and plant.

Benchmark 7
Plant Scheduled Outage Factor



FY-1999 – Units 1 and 2 water service piping rehabilitation.

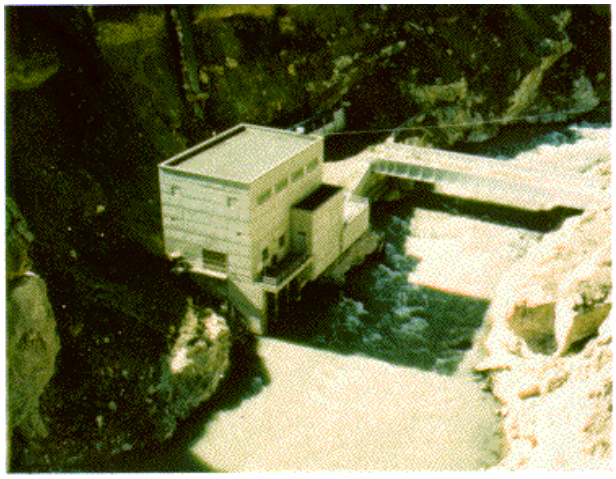
Unit Starts



Benchmark Data Comparison				
Fiscal Year 2007	**Guernsey Powerplant**	**Total Reclamation Average**	**Industry Average**	**Best Performers**
Wholesale Firm Rate Mills/kWh	23.9	*22.45	Not Available	Not Available
Production Cost as Percentage of Wholesale Firm Rate	0.9%	12.1%	Not Applicable	Not Applicable
O&M Cost $/MWh	26.92	2.76	Not Applicable	1.00
O&M Costs $/MW	60,458	7,847	Not Applicable	2,897
O&M Equiv Work Year per MW	0.37	0.03	Not Available	0.0
Availability Factor	89.0	82.3	**88.64	98.5
Forced Outage Factor	0.15	2.6	**2.61	0.0
Scheduled Outage Factor	10.8	15.1	**8.74	0.0

*Weighted by Net Generation
**2006 NERC Average

Heart Mountain Powerplant
Shoshone Project



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Reclamation Region:	Great Plains
NERC Region:	Western Electricity Coordinating Council, Rocky Mountain Power Area
PMA Service Area:	Western Area Power Administration, Rocky Mountain Region
Project Authorization:	The Secretary of the Interior authorized the project on February 10, 1904, under authority of the Reclamation Act of June 17, 1902. The Secretary authorized Heart Mountain power development on June 19, 1945, under the provisions of the Reclamation Project Act of 1939.
Project Purposes:	Floodwaters of the Shoshone River are stored in Buffalo Bill Reservoir for later release for irrigation and power generation. Power is developed at the Shoshone and Heart Mountain Powerplants. The system is interconnected with the West Division of the Pick-Sloan Missouri Basin Program.
Plant Location:	Heart Mountain Powerplant is located in Park County, Wyoming, approximately 4 miles southwest of Cody, Wyoming, on the Shoshone River.
Plant Purpose:	Power produced at the Heart Mountain Powerplant is fed into a power grid system, which serves an area extending into three States.

Plant Facts:

The Heart Mountain Powerplant is at the outlet of Shoshone Canyon Conduit about 4 miles southwest of Cody, Wyoming. The capacity of the plant is 5,000 kilowatts.

As a result of the modification of Buffalo Bill Dam, Buffalo Bill and Shoshone Powerplants were completed in 1992. Due to the Revised Instream Flow Agreement associated with the reconstruction of the dam, winter releases previously discharged from Heart Mountain Powerplant are now made through these two upstream powerplants. As a result, Heart Mountain Powerplant has been operated on a seasonal basis since 1992.

Plant History:

Construction of the powerplant was completed in 1947.The plant, which was originally built to be a temporary plant, was rewound in 1992.

Present Activities:

A contract was awarded in FY-2003 for installation of a new 3-phase power transformer, modification of existing bus work, and installation of new power cables. The contract was completed in FY-2004.

Preparation of designs and specifications for a contract to replace the generating unit voltage regulator was initiated in FY-2002. The contract was issued and awarded in FY-2003 and installation was completed in FY-2005.

Preparation of designs and specifications for a contract to replace the powerplant switchgear was initiated in FY-2002. The contract was awarded in FY-2004 and completed in FY-2004.

Future Planned Activities:

The wicket gate greasing system for the generating unit will be installed in FY-2009.

Special Issues:

Shoshone Canyon Conduit water restrictions, coupled with chronic oil leak and thrust bearing problems after the rewind reassembly, accounted for high production costs for FY-1994.

The fractured and soluble nature of the rocks which form the free flow section of the Shoshone Canyon Conduit has resulted in significant maintenance expenses which are assigned to Heart Mountain Powerplant.

A congressional budget write-in during FY-1996 resulted in a $600,000 obligation during that fiscal year for Reclamation's share of the costs associated with repairs to the conduit. Expenditure of these funds was accomplished over a 5-year period.

River:	Shoshone River	**Plant Type:**	Conventional
Powerhouse Type:	Above Ground	**Turbine Type:**	Francis
Original Nameplate Capacity:	5,000 kW	**Installed Capacity:**	5,000 kW
Year of Initial Operation:	1948	**Age:**	59 years
Net Generation (FY-2007):	13.9 GWh	**Rated Head:**	265 feet
Average Plant Factor (FY-2007):	32.4 percent	**Remotely Operated:**	Yes
Production Mode:	Intermediate/Seasonal		

Ancillary Services

Heart Mountain
Ancillary Services

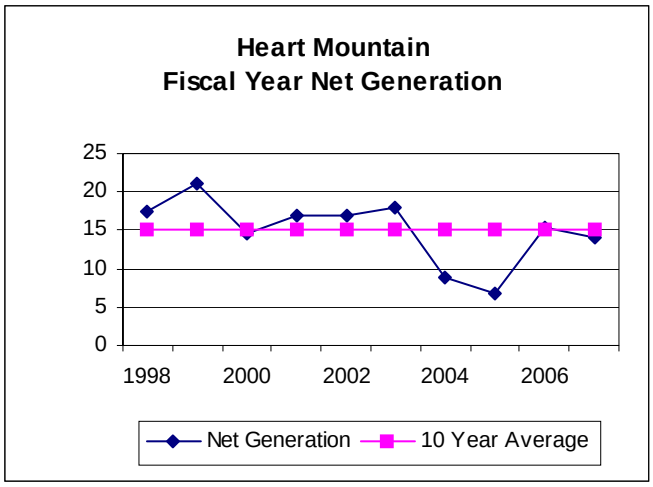
Spinning Reserve	No
Non-Spinning Reserve	No
Replacement Reserve	No
Regulation/Load Following	No
Black Start	No
Voltage Support	Yes

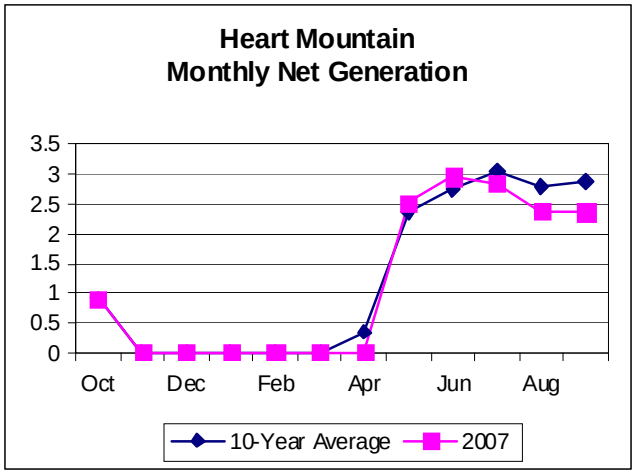
Generators

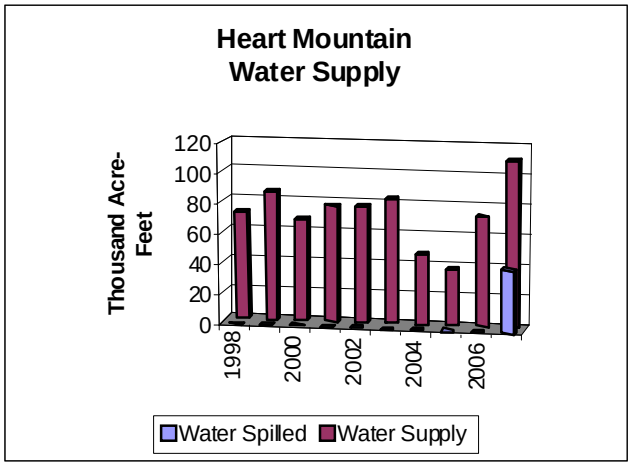
Heart Mountain Generators
Existing Number and Capacity

Unit #	Original Capacity (kW)	Capacity Increased (kW)	Present Capacity (kW)
1	5,000	-	5,000
1 Unit	5,000	-	5,000

Generation

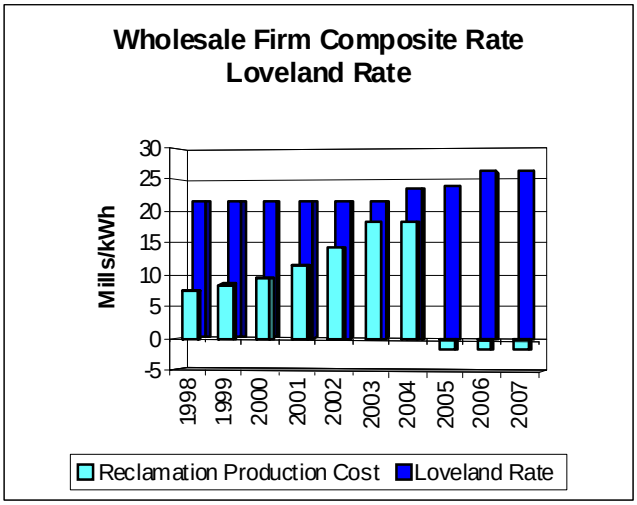

Heart Mountain
Fiscal Year Net Generation
25
20
15
10
5
0
1998
2000
2002
2004
2006
Net Generation
10 Year Average


Heart Mountain
Monthly Net Generation
3.5
3
2.5
2
1.5
1
0.5
0
Oct
Dec
Feb
Apr
Jun
Aug
10-Year Average
2007

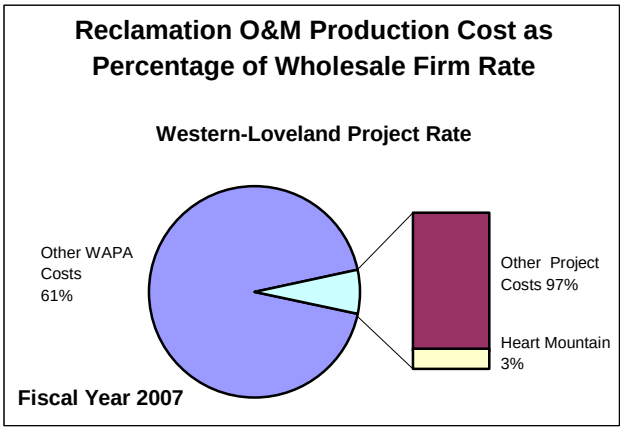

Heart Mountain
Water Supply
Thousand Acre-Feet
120
100
80
60
40
20
0
1998
2000
2002
2004
2006
Water Spilled
Water Supply

Prime Laboratory Benchmarks

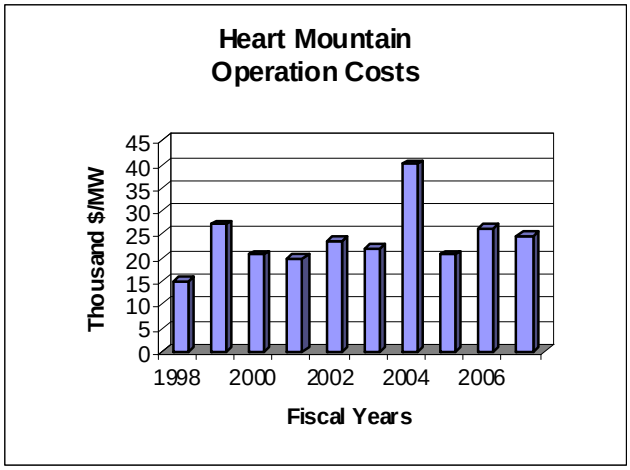
Benchmark 1
Wholesale Firm Rate

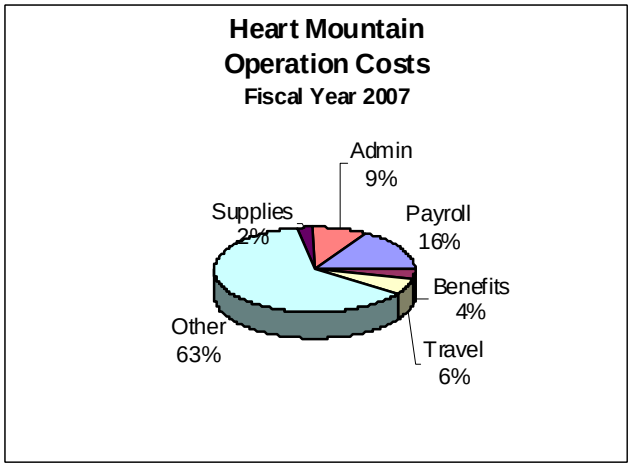


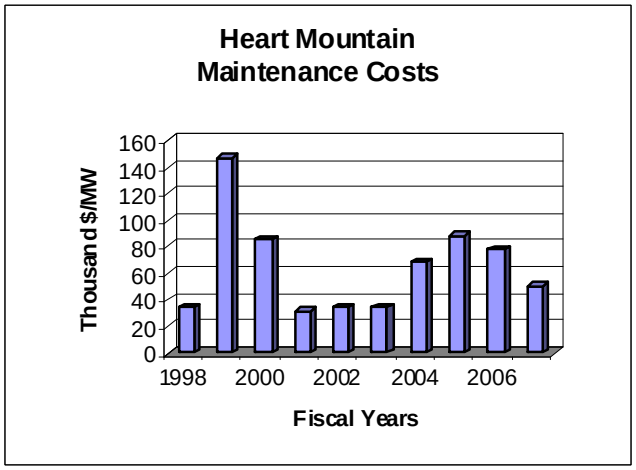
Benchmark 2
Reclamation's Production Costs as Percentage of Wholesale Firm Rate

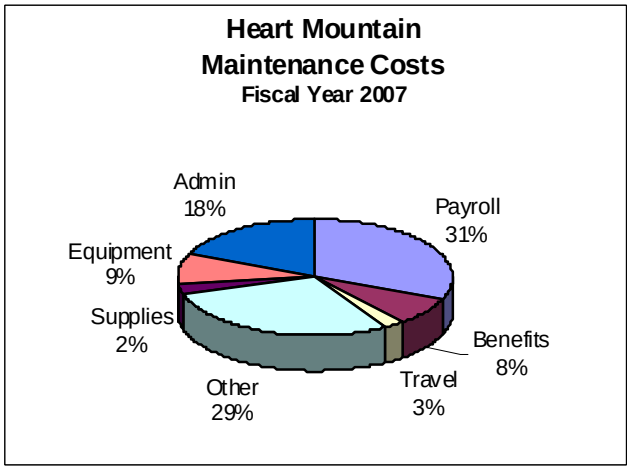


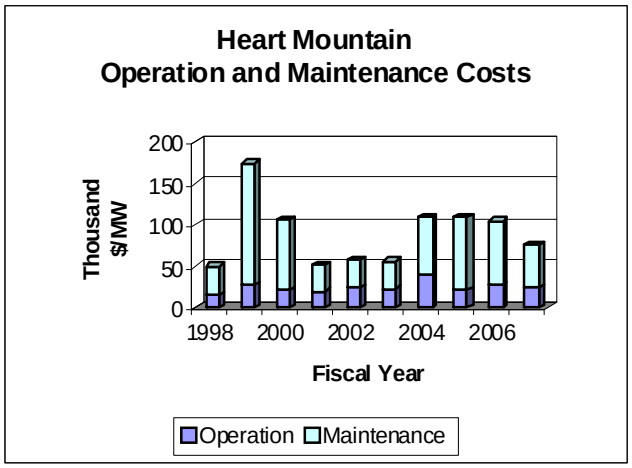
Benchmark 3
Production Costs

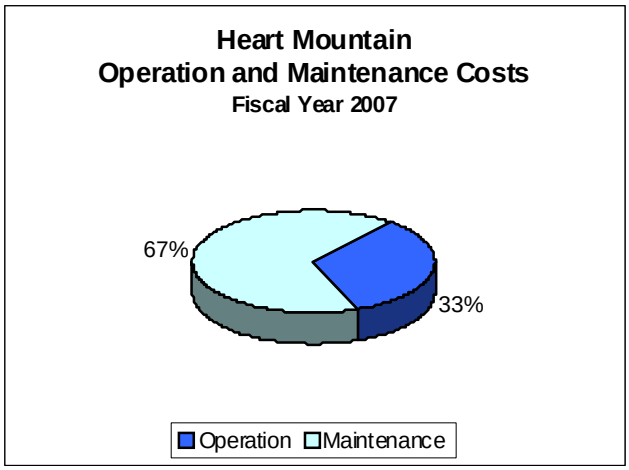








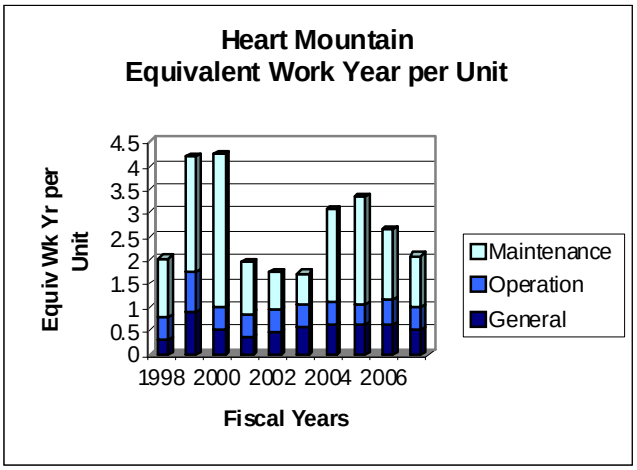


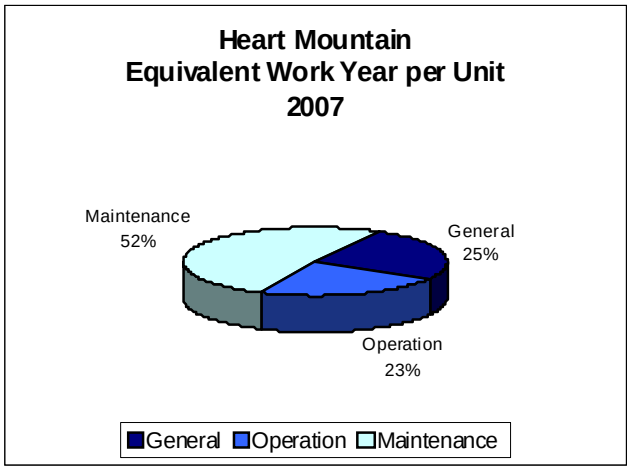


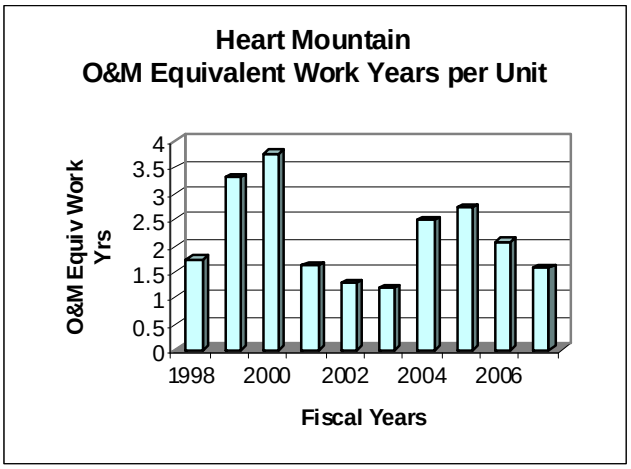
FY-1999 – Penstock repairs and slope stabilization.
FY-2000 – Wicket gate repairs accomplished.

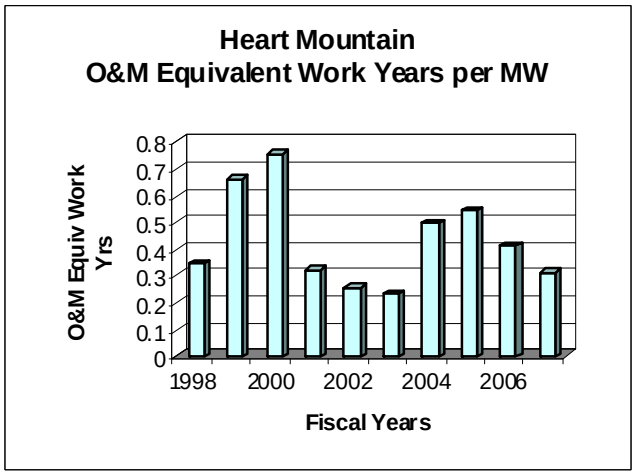
Benchmark 4
Workforce Deployment

Heart Mountain 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	0.02	0.52	0.52	0.10
Operation	0.44	0.05	0.00	0.49	0.49	0.10
Maintenance	0.97	0.11	0.00	1.08	1.08	0.22
Total Staffing	1.86	0.21	0.02	2.09	2.09	0.42

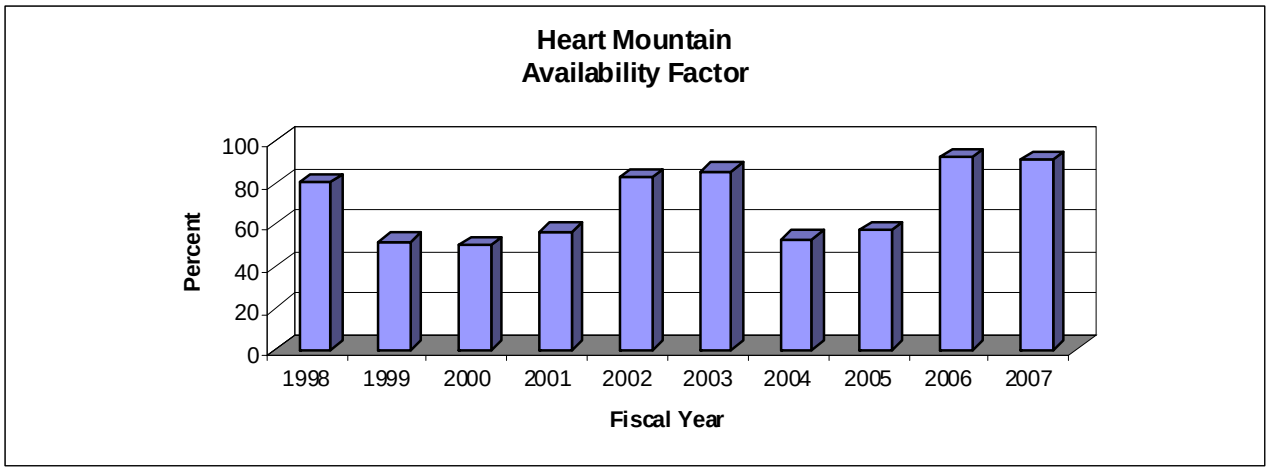






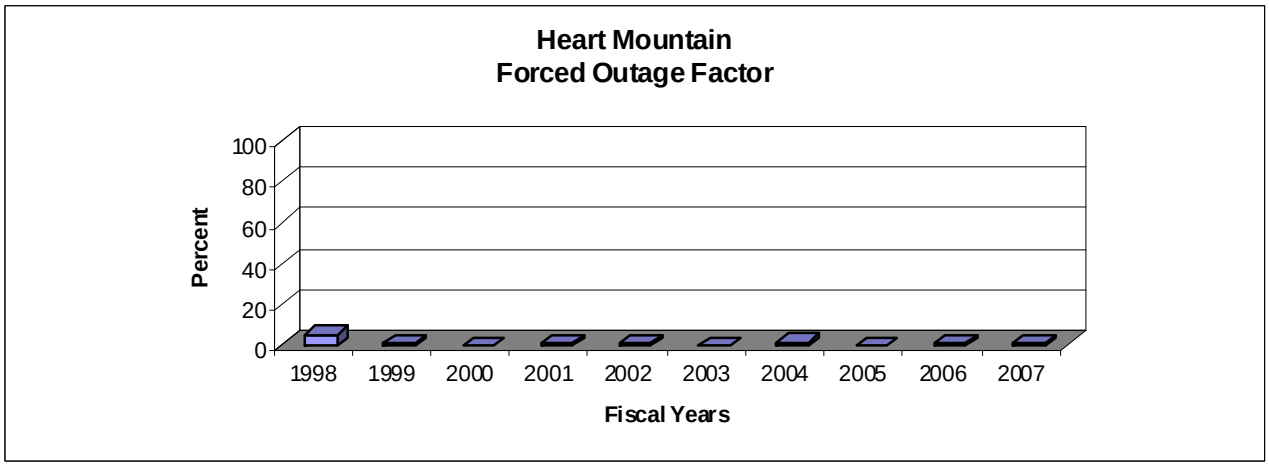


Benchmark 5
Plant Availability Factor

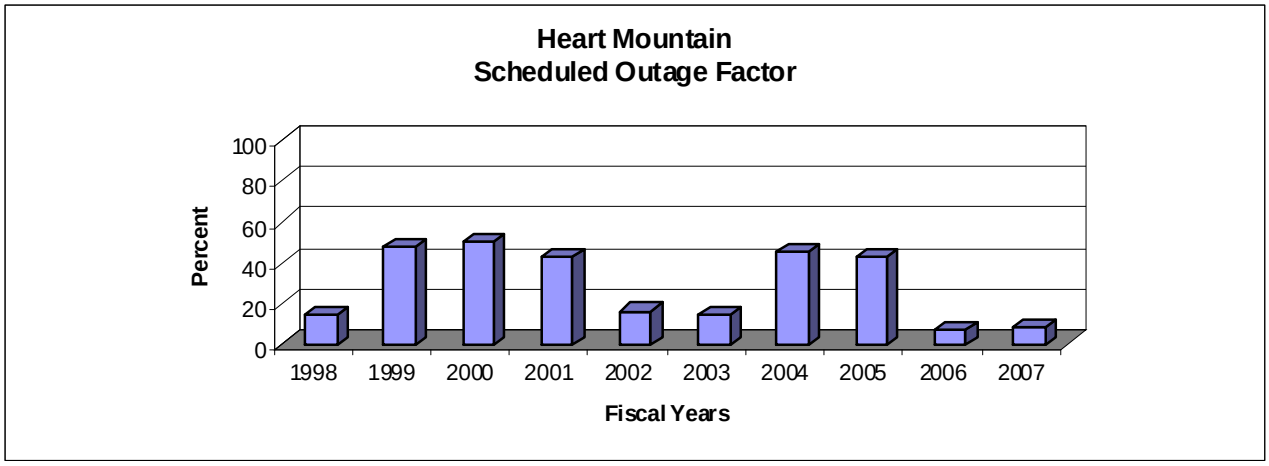


FY-1997 – Governor and wicket gate repairs.
FY-1998 – Penstock and wicket gate repairs.
FY-1999 – Penstock repairs and slope stabilization.
FY-2000 – Wicket gate repairs.
FY-2001 – Buffalo Bill Powerplant penstock and Spirit Mountain sleeve valve re-coating resulted in an extended outage at this plant.
FY-2004 – Transformer and switchgear replacements.

Benchmark 6
Plant Forced Outage Factor

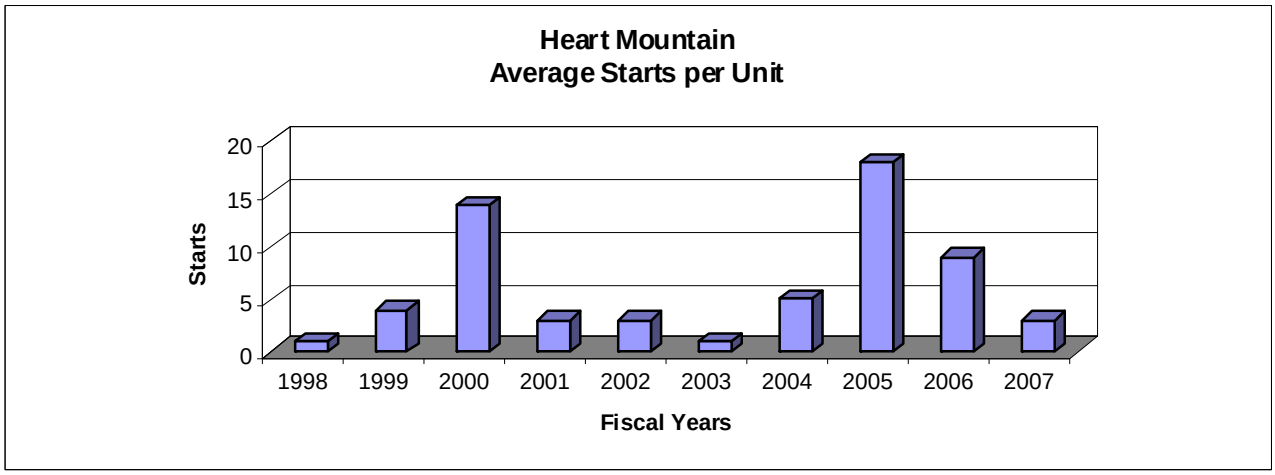


Benchmark 7
Plant Scheduled Outage Factor



FY-97 - Governor and wicket gate repairs
FY-98 - Penstock and wicket gate repairs
FY-99 - Penstock repairs and slope stabilization
FY-00 - Wicket gate repairs.
FY-01- Buffalo Bill Powerplant penstock and Spirit Mountain sleeve valve re-coating resulted in an extended outage at this plant

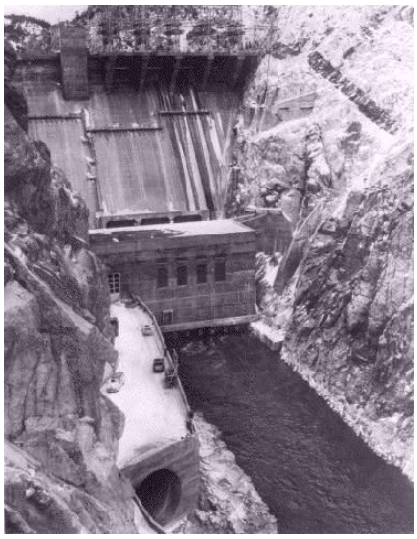
Unit Starts



Benchmark Data Comparison				
Fiscal Year 2007	**Heart Mountain Powerplant**	**Total Reclamation Average**	**Industry Average**	**Best Performers**
Wholesale Firm Rate Mills/kWh	23.9	*22.45	Not Available	Not Available
Production Cost as Percentage of Wholesale Firm Rate	0.9%	12.1%	Not Applicable	Not Applicable
O&M Cost $/MWh	26.95	2.76	Not Applicable	1.00
O&M Costs $/MW	75,126	7,847	Not Applicable	2,897
O&M Equiv Work Year per MW	0.31	0.03	Not Available	0.0
Availability Factor	91.0	82.3	**88.64	98.5
Forced Outage Factor	0.81	2.6	**2.61	0.0
Scheduled Outage Factor	8.2	15.1	**8.74	0.0

*Weighted by Net Generation
**2006 NERC Average

Kortes Powerplant
Pick-Sloan Missouri Basin Program



Plant Contact:
John Lawson
Area Manager
Wyoming Area Office

Plant Address:
Kortes Powerplant
Sinclair WY

Telephone Numbers:
Phone: (307) 261-5671
Fax: (307) 261-5683

E-Mail Address: jlawson@gp.usbr.gov

Reclamation Region: Great Plains

NERC Region: Western Electricity Coordinating Council, Rocky Mountain Power Area

PMA Service Area: Western Area Power Administration, Rocky Mountain Region

Project Authorization: The Kortes power development, Pick-Sloan Missouri Basin Prgram was found feasible by the Secretary of the Interior as a supplement to the Kendrick Project on November 26, 1941. However, it was authorized by the Flood Control Act of December 22, 1944, Public Law 534, which approved the general plan set forth in Senate Document 191, as revised and coordinated by Senate Document 247, 78th Congress, 2d Session.

Project Purposes: Maximum benefits are obtained when Kortes Reservoir remains full and the power releases are coordinated with those from the Seminoe plant. The Seminoe and Kortes facilities are controlled from the Casper Control Center.

Plant Location: Kortes Powerplant is located in Carbon County, Wyoming, approximately 2 miles below Seminoe Dam on the North Platte River and about 60 miles southwest of Casper, Wyoming.

Plant Purpose: Because of the enormous increase in power demands in the area and power sales commitments, an accelerated power program was developed which consisted of erecting generating equipment and machinery concurrently with Kortes dam and powerhouse construction.

Plant Facts: The reinforced-concrete powerhouse at Kortes Powerplant occupies the entire width of the canyon at the toe of the dam. The plant has three 18,500-horsepower Francis-type turbines and three 12,000-kilowatt generators with a combined capacity of 36,000 kilowatts.

Plant History: Unit 2 was rewound in 1973. Units 1 and 3 were rewound in 1985. The three unit power transformers were replaced under a single contract in 1999, 2000, and 2001.

Present Activities: The second runner was installed in FY-2005 maintenance season. The 12” diameter water supply line was rehabilitated by contract in the FY-2005 maintenance season.

Future Planned Activities: Designs and specifications were initiated in FY-2004 for a contract to rehabilitate the three unit Ring Follower Gates. The gates will be rehabilitated under a three-year contract beginning in FY-2006.

Special Issues: Kortes is used as a peaking plant except when low water years restrict outflow.

Kortes Reservoir surface elevation is maintained in the range of 6,138 to 6,142 feet above sea level to maximize the plant's efficiency for hydropower production. In 1972, a minimum flow of 500 cubic feet per second was established in the Miracle Mile to support the blue ribbon trout fishery below Kortes Dam.

Access to the Kortes Powerplant is affected by periodic rock fall from the steep canyon walls necessitating continual operation and maintenance expenditures.

Significant cavitation damage has occurred in the turbine runners for all three units over the past several years requiring extended outages for extensive welding repairs.

Black start procedures have been developed and tested at the upper North Platte facilities to address re-start capabilities under a severe transmission system disturbance. If necessary, Kortes Powerplant could be used as the first step in starting Seminoe, Fremont Canyon, and Alcova Powerplants. These plants would then collectively be used to start PacifiCorp’s Dave Johnson Powerplant in the event of a power system emergency.

River:	North Platte River	**Plant Type:**	Conventional
Powerhouse Type:	Above Ground	**Turbine Type:**	Francis
Original Nameplate Capacity:	36,000 kW	**Installed Capacity:**	36,000 kW
Year of Initial Operation:	1950	**Age:**	57 years
Net Generation (FY 2007):	122.4 GWh	**Rated Head:**	200 feet
Average Plant Factor (FY 2007):	39.1 percent	**Remotely Operated:**	Yes
Production Mode:	Peaking/Intermediate		

Ancillary Services

Kortes
Ancillary Services

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

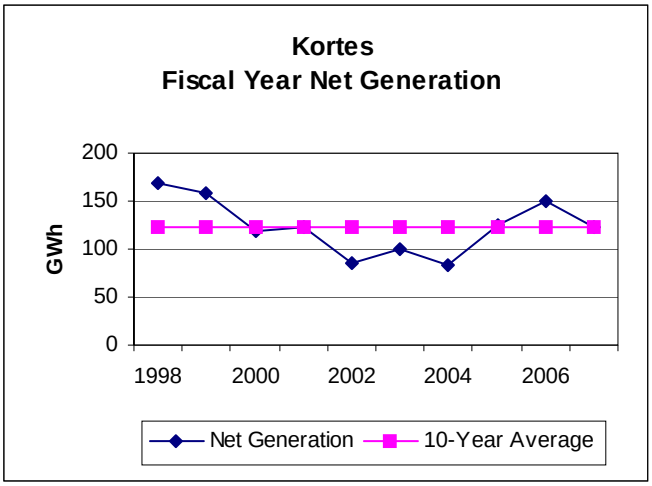
Generators

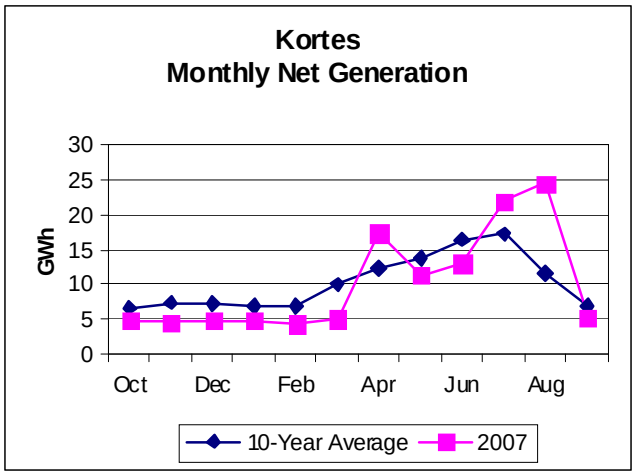
Kortes Generators

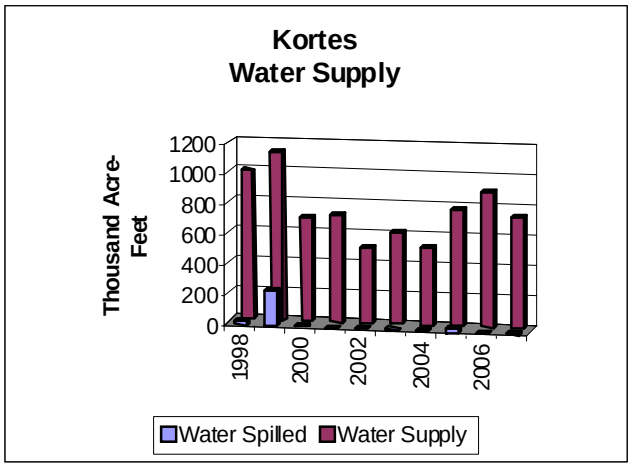
Existing Number and Capacity

Unit #	Original Capacity (kW)	Capacity Increased (kW)	Present Capacity (kW)
1	12,000	-	12,000
2	12,000	-	12,000
3	12,000	-	12,000
3 units	36,000	-	36,000

Generation

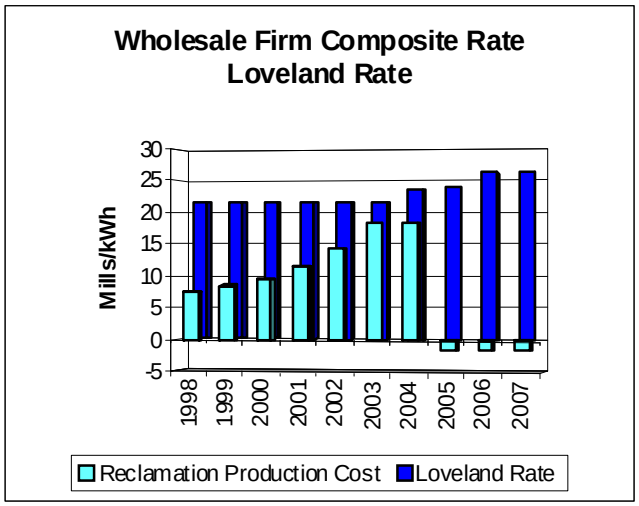

Kortes
Fiscal Year Net Generation
GWh
200
150
100
50
0
1998
2000
2002
2004
2006
Net Generation
10-Year Average


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

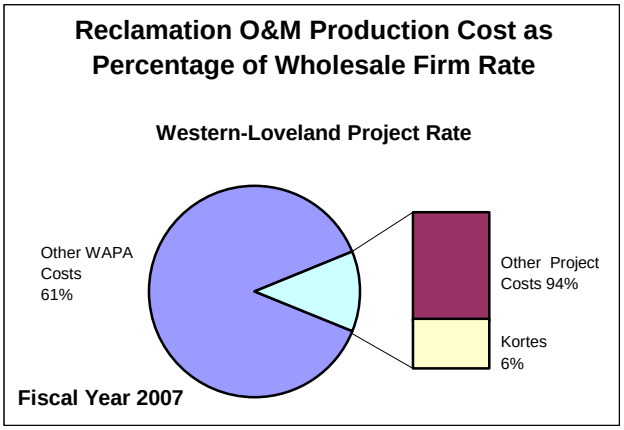

Kortes
Water Supply
Thousand Acre-Feet
1200
1000
800
600
400
200
0
1998
2000
2002
2004
2006
Water Spilled
Water Supply

Prime Laboratory Benchmarks

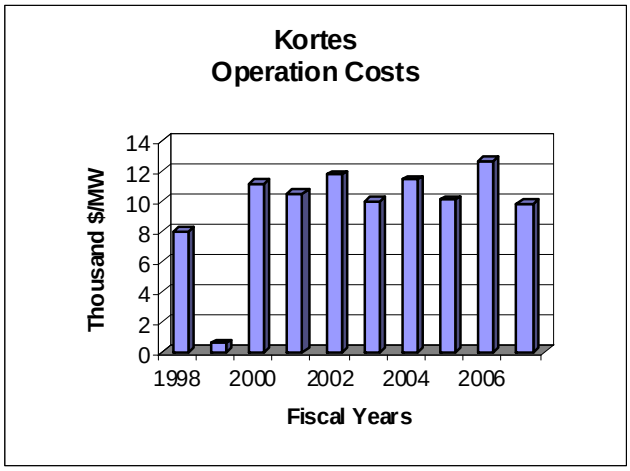
Benchmark 1
Wholesale Firm Rate

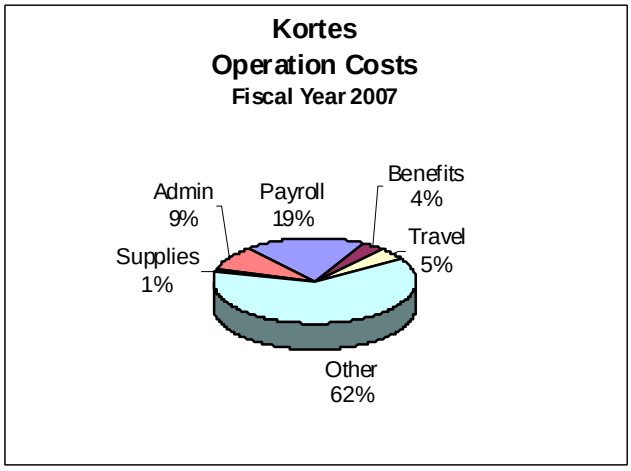


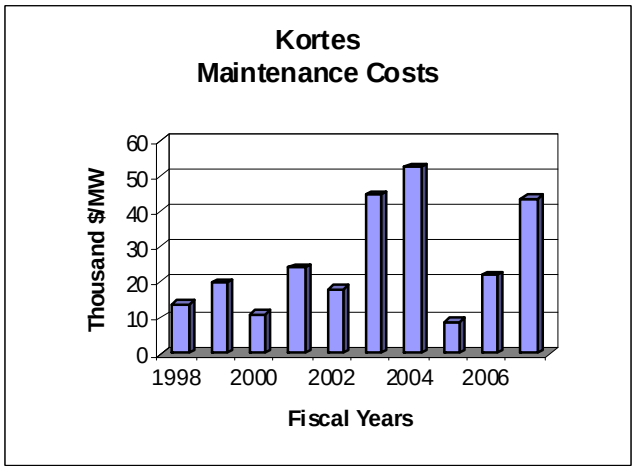
Benchmark 2
Reclamation's Production Costs as Percentage of Wholesale Firm Rate

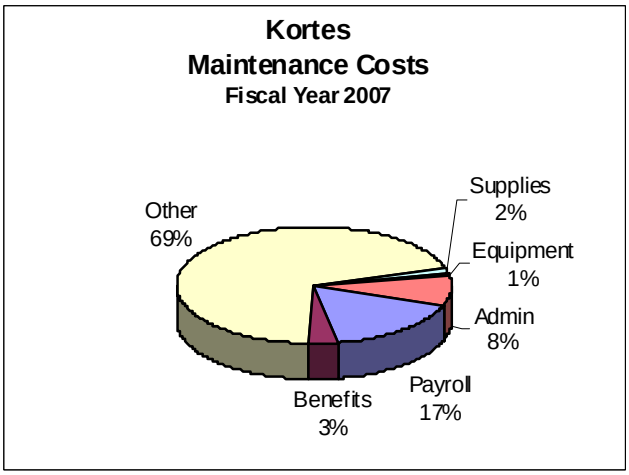


Benchmark 3
Production Costs



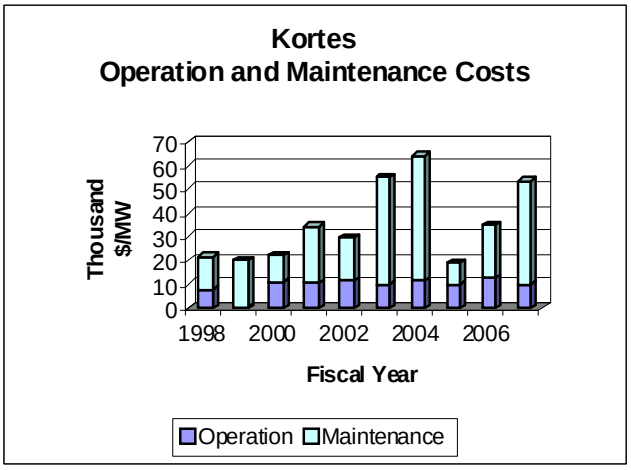


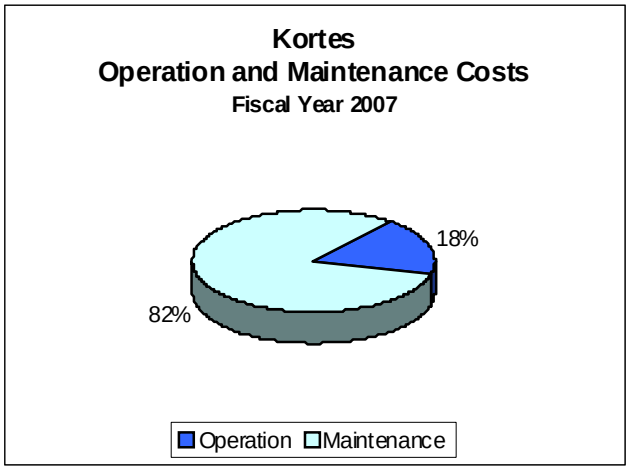


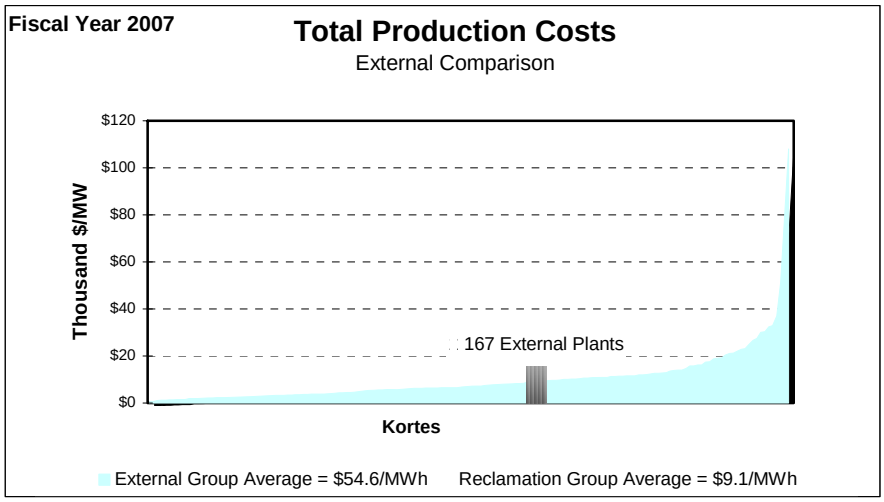


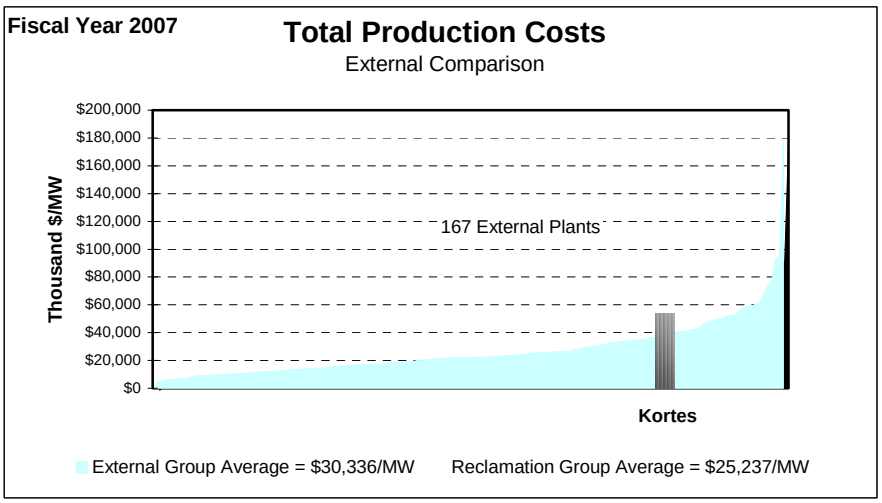
FY-2003 Maintenance Costs include a $900,000 RAX expense on the Kortes Tunnel Repair.

Benchmark 3
Production Cost



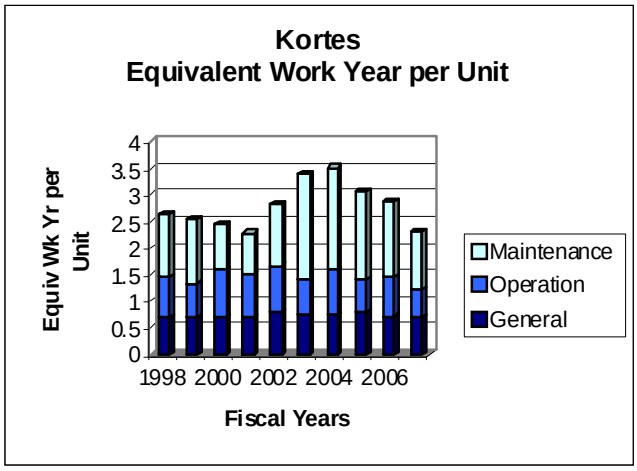


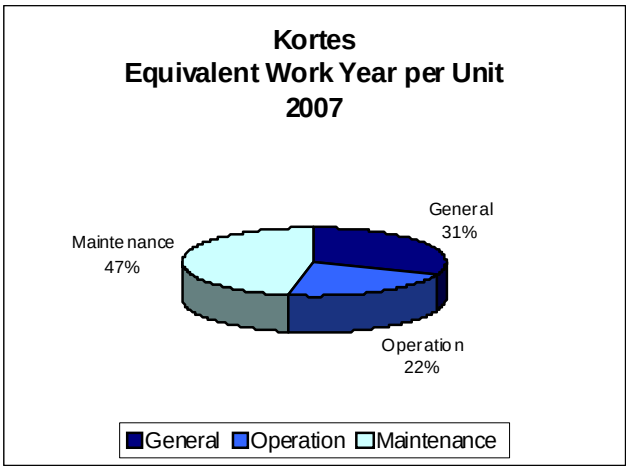


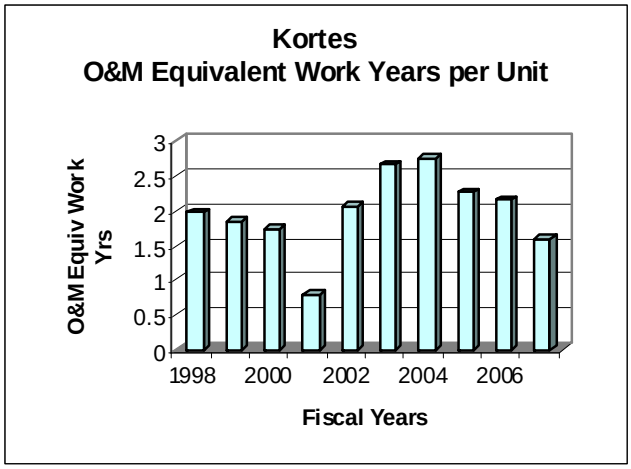


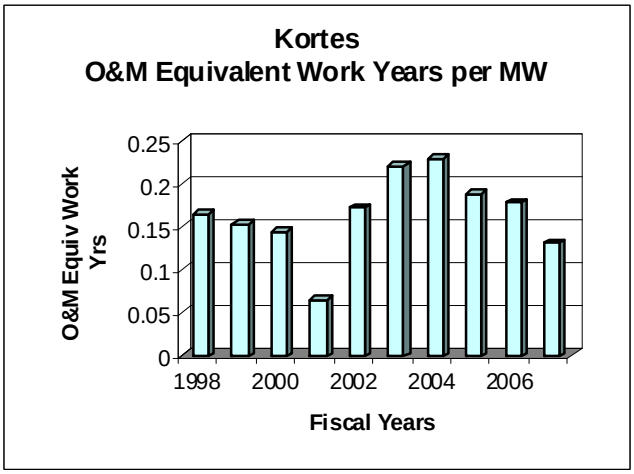
Benchmark 4
Workforce Deployment

Kortes 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	1.86	0.21	0.05	2.12	0.71	0.06
Operation	1.38	0.16	0.00	1.54	0.51	0.04
Maintenance	2.90	0.33	0.00	3.23	1.08	0.09
Total Staffing	6.14	0.69	0.05	6.88	2.29	0.19

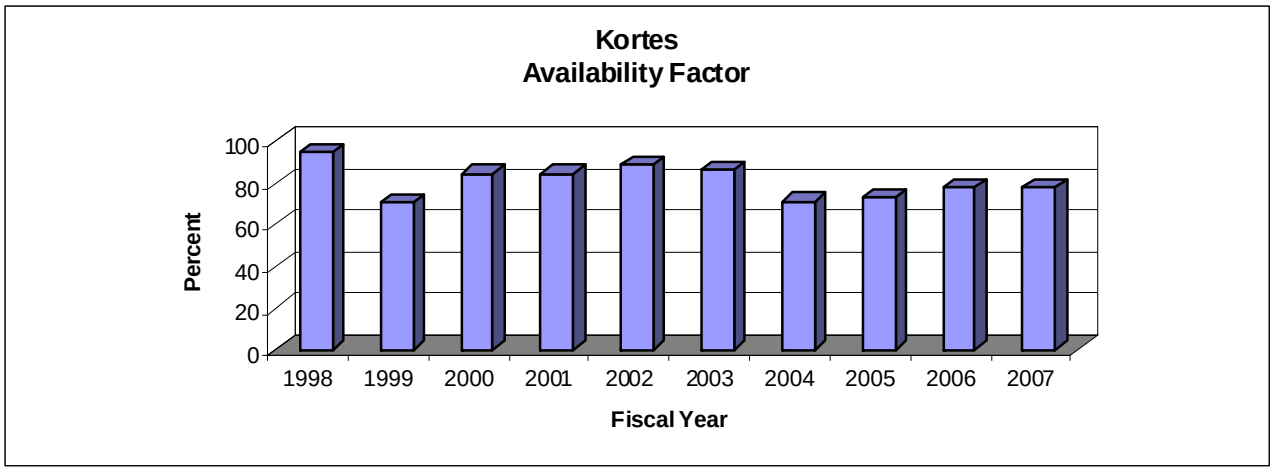






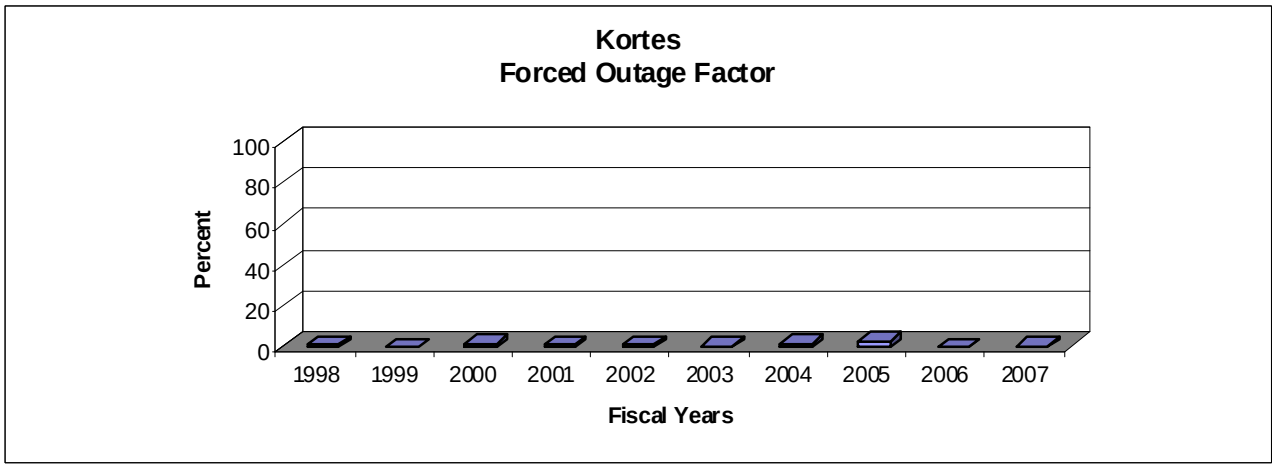


Benchmark 5
Plant Availability Factor

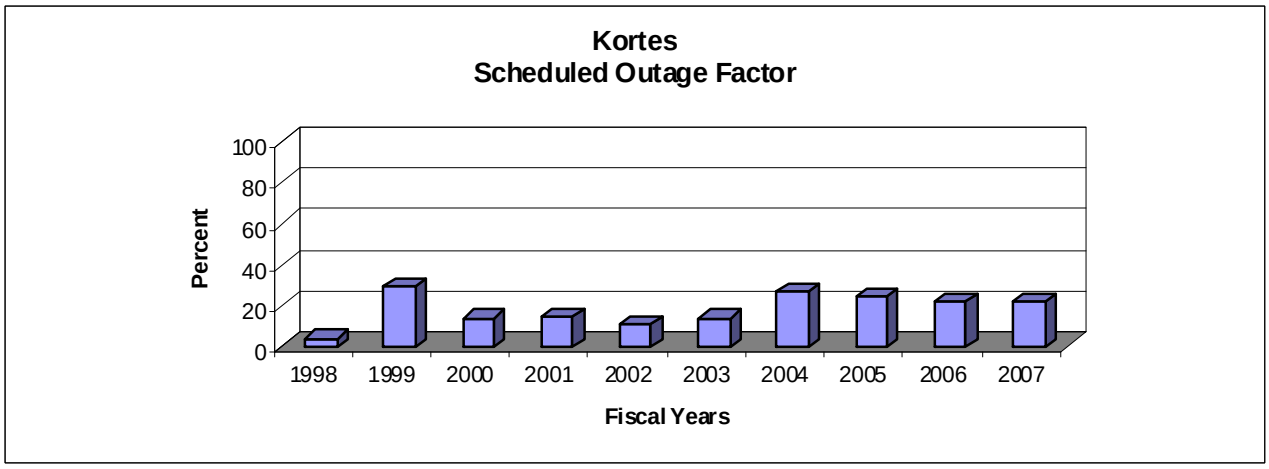


FY-1999 – Unit 2 transformer failure in September 1998 and replacement in June 1999.
FY-2000 – Replacement of Unit 3 transformer in March 2000.
FY-2001 – Replacement of Unit 1 transformer in February 2001.

Benchmark 6
Plant Forced Outage Factor

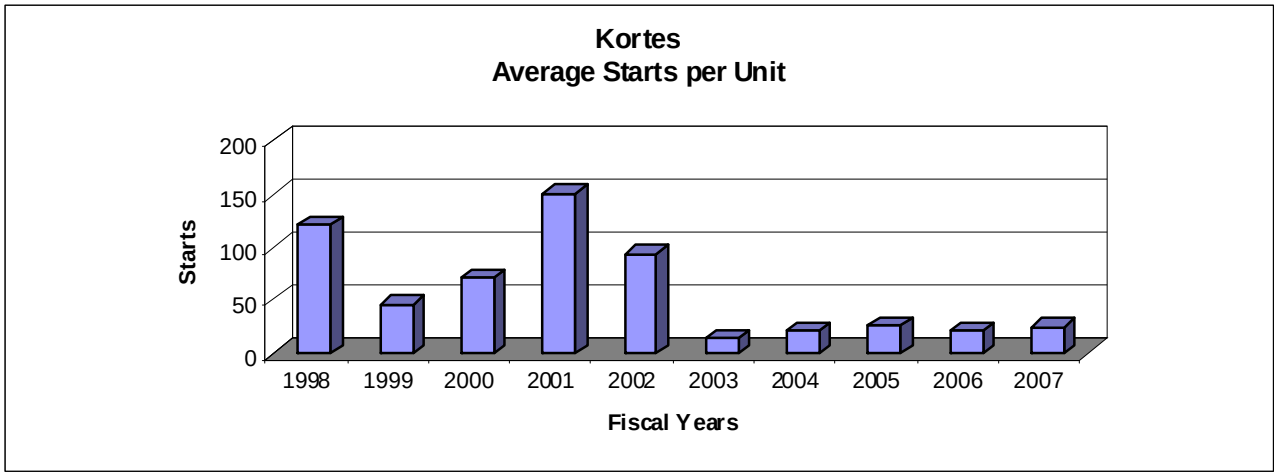


Benchmark 7
Plant Scheduled Outage Factor



FY-1999 - Unit 2 transformer replaced.
FY-2001 – Unit 1 transformer replaced.

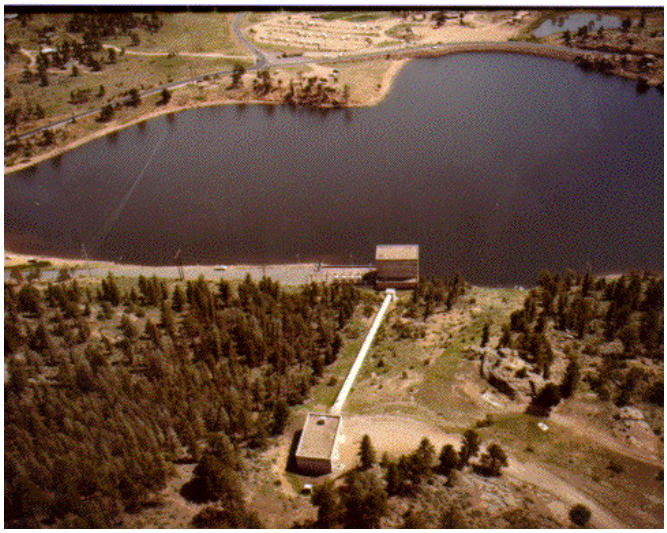
Unit Starts



Benchmark Data Comparison					
Fiscal Year 2007	**Kortes Powerplant**	**Reclamation Average 30-100 MW Group**	**Total Reclamation Average**	**Industry Average**	**Best Performers**
Wholesale Firm Rate Mills/kWh	23.9	Not Applicable	*22.45	Not Available	Not Available
Production Cost as Percentage of Wholesale Firm Rate	4.38%	Not Applicable	12.1%	Not Applicable	Not Applicable
O&M Cost $/MWh	15.75	7.85	2.76	***54.63	1.00
O&M Costs $/MW	53,564	24,132	7,847	***30,336	2,897
O&M Equiv Work Year per MW	0.13	0.10	0.03	Not Available	0.0
Availability Factor	77.8	84.3	82.3	**88.64	98.5
Forced Outage Factor	0.3	0.5	2.6	**2.61	0.0
Scheduled Outage Factor	21.8	15.3	15.1	**8.74	0.0

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

Marys Lake Powerplant
Colorado-Big Thompson Project



Plant Contact:
Chuck Pedersen
O&M Chief

Plant Address:
Marys Lake Powerplant
PO Box 960
Estes Park CO 80517-0960

Telephone Numbers:
Phone: (970) 586-4400
Fax: (970) 663-3212

E-Mail Address:
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Reclamation Region: Great Plains

NERC Region: Western Electricity Coordinating Council, Rocky Mountain Power Area

PMA Service Area: Western Area Power Administration, Rocky Mountain Region

Project Authorization: The Secretary's finding of feasibility was approved by the President on December 21, 1937.

Project Purposes: The Colorado-Big Thompson Project is one of the largest and most complex natural resource developments undertaken by Reclamation. It consists of over 100 structures integrated into a transmountain water diversion system through which multiple benefits are provided to the people. The project spreads over approximately 250 miles in the State of Colorado. It stores, regulates, and diverts water from the Colorado River on the western slope of the Continental Divide to the eastern slope of the Rocky Mountains. It provides supplemental water for irrigation of about 720,000 acres of land, municipal and industrial use, hydroelectric power, and water-oriented recreation opportunities.

Plant Location: Marys Lake Powerplant is located in Larimer County, Colorado, on the western shore of Marys Lake, 2.5 miles southwest of Estes Park, Colorado.

Plant Purpose: Marys Lake provides afterbay and forebay capacity for reregulating water flow. Marys Lake Power plant provides generation of hydroelectric power for the project.

Plant Facts: Marys Lake discharges into Estes Powerplant. There is limited after bay storage, therefore, operation of Marys Lake Powerplant must be coordinated with the Estes Powerplant.

Plant History: The water and power control center for Colorado-Big Thompson Project's reservoirs, powerplants, and transmission lines in Wyoming, Colorado, and western Nebraska is at the project headquarters in Loveland, Colorado. This Western Division of the Missouri River Basin is an interconnected system of 15 Reclamation powerplants.

Present Activities: Recently completed projects include fire alarm system upgrades; CO_2 fire suppression system replacement; power and control panel replacement/reconfiguration; and powerplant roof repairs. Unit excitation system replacement is in progress.

Future Planned Activities: Plant remote control (RTU SCADA and fiber communication) upgrades are planned to be completed in FY 2010. Governor upgrading is planned for FY 2013 as is the addition of online condition monitoring.

Special Issues: None.

River:	Colorado River	**Plant Type:**	Conventional
Powerhouse Type:	Above Ground	**Turbine Type:**	Francis
Original Nameplate Capacity:	8,100 kW	**Installed Capacity:**	8,100 kW
Year of Initial Operation:	1951	**Age:**	56 years
Net Generation (FY-2007):	40.8 GWh	**Rated Head:**	212 feet
Average Plant Factor (FY-2007):	58.0 percent	**Remotely Operated:**	Yes
Production Mode:	Base Load		

Ancillary Services

Marys Lake
Ancillary Services

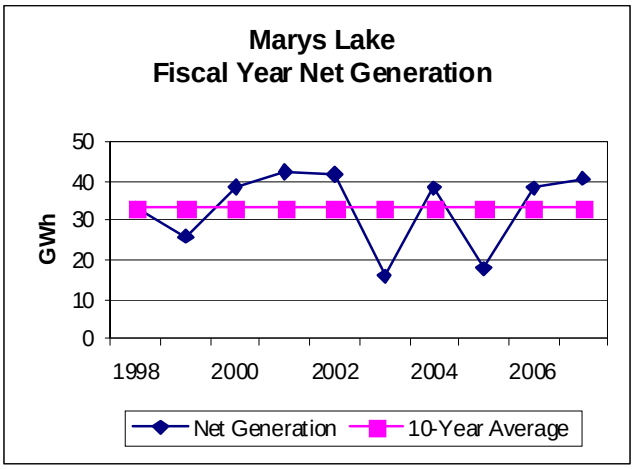
Spinning Reserve	No
Non-Spinning Reserve	No
Replacement Reserve	No
Regulation/Load Following	No
Black Start	Yes
Voltage Support	Yes

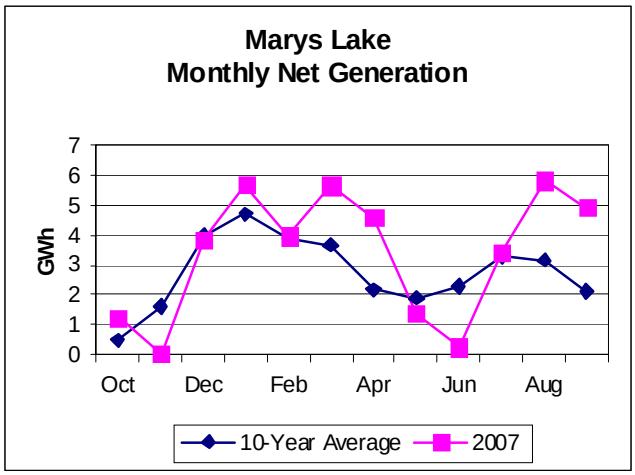
Generators

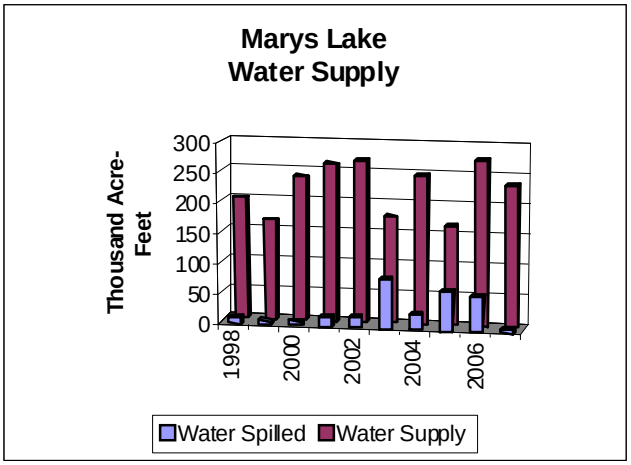
Marys Lake Generators
Existing Number and Capacity

Unit #	Original Capacity (kW)	Capacity Increased (kW)	Present Capacity (kW)
1	8,100	-	8,100
1 Unit	8,100	-	8,100

Generation

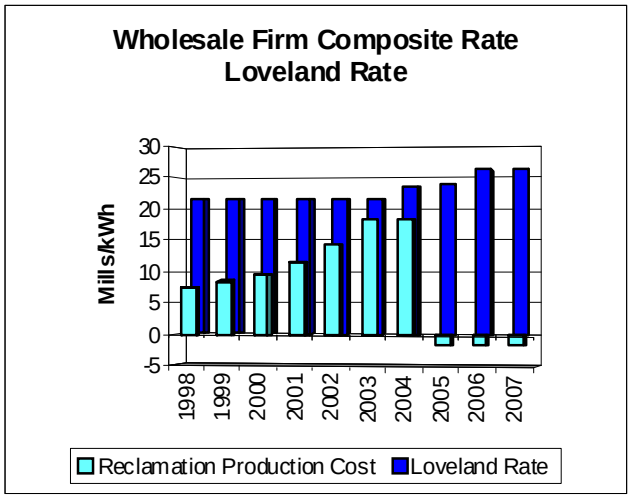

Marys Lake
Fiscal Year Net Generation
GWh
50
40
30
20
10
0
1998
2000
2002
2004
2006
Net Generation
10-Year Average


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

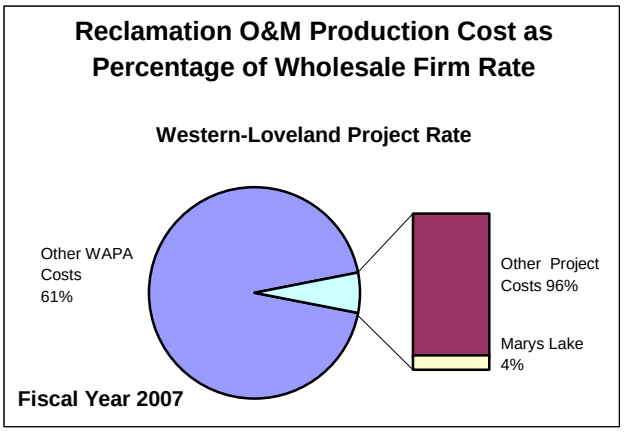

Marys Lake
Water Supply
Thousand Acre-Feet
300
250
200
150
100
50
0
1998
2000
2002
2004
2006
Water Spilled
Water Supply

Prime Laboratory Benchmarks

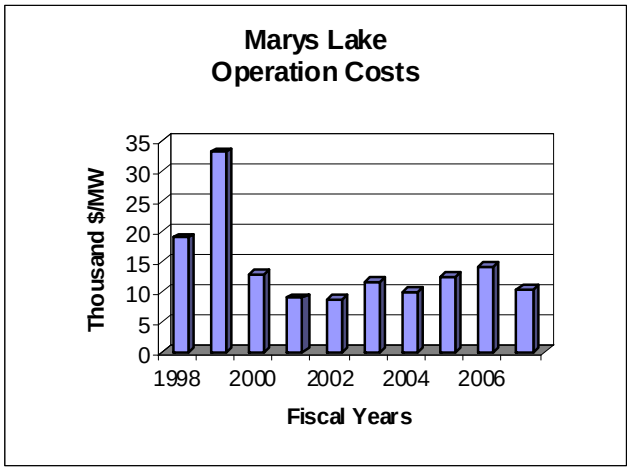
Benchmark 1
Wholesale Firm Rate

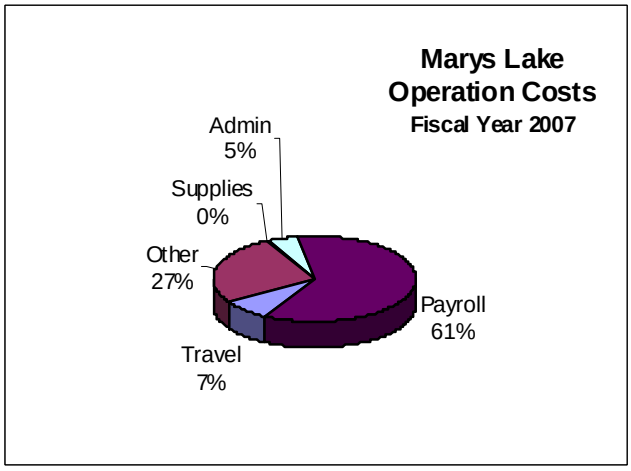


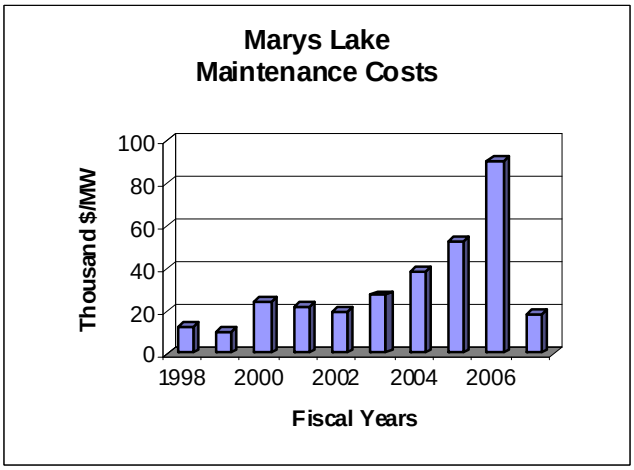
Benchmark 2
Reclamation's Production Costs as Percentage of Wholesale Firm Rate

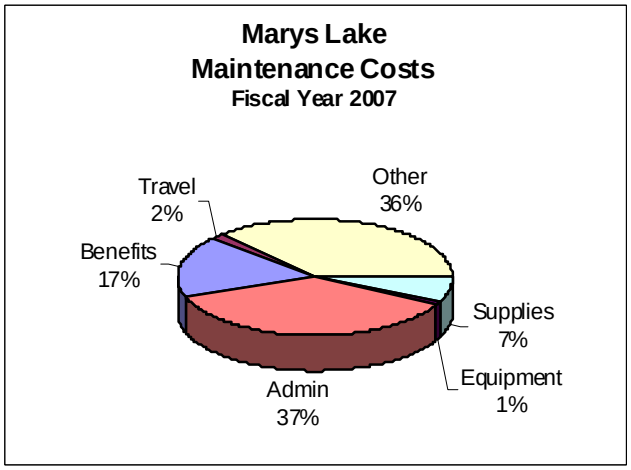


Benchmark 3
Production Costs

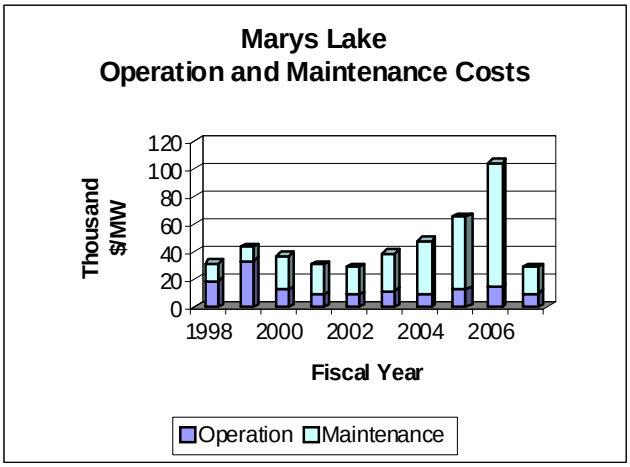


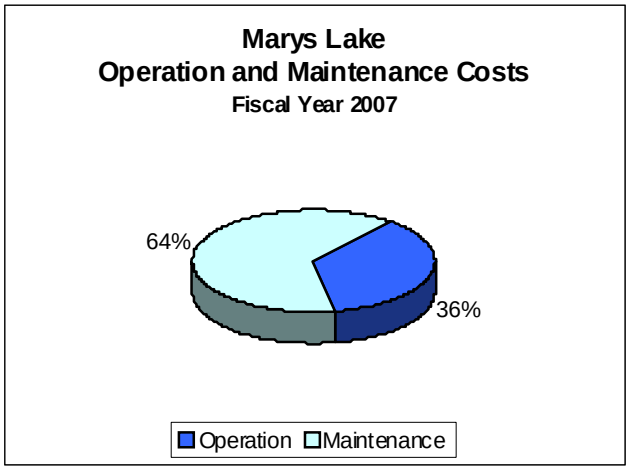


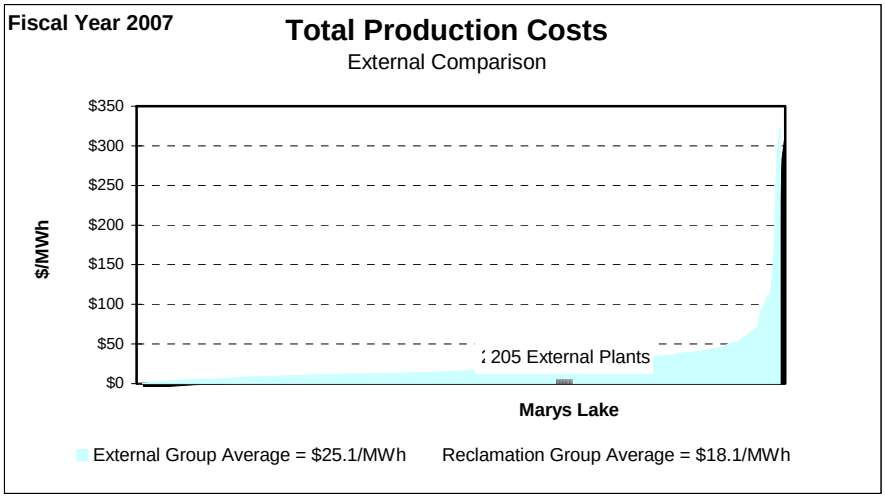


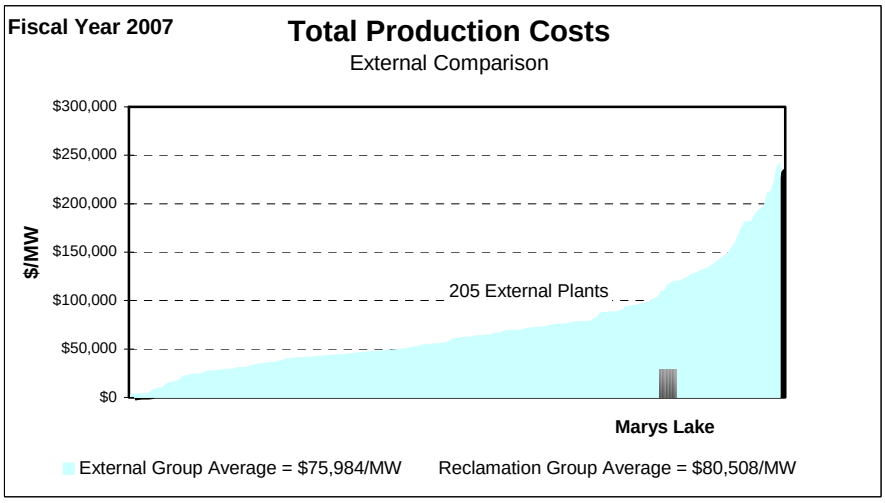


Benchmark 3
Production Costs



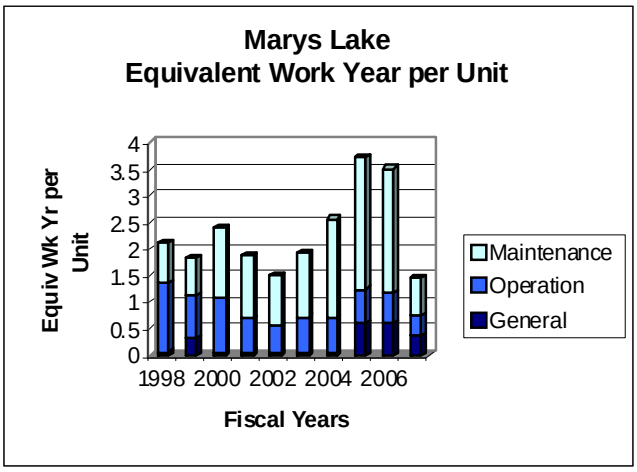


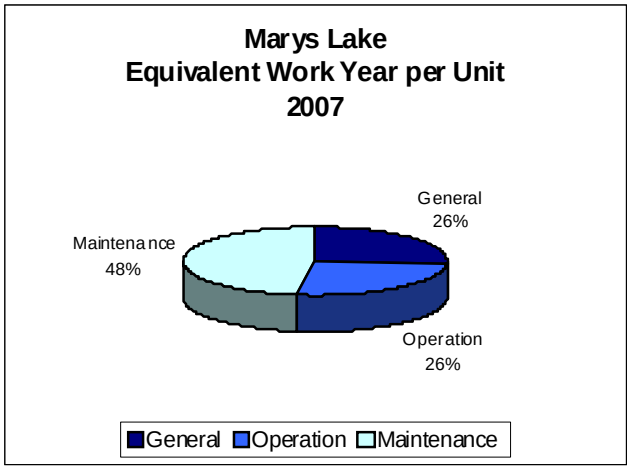


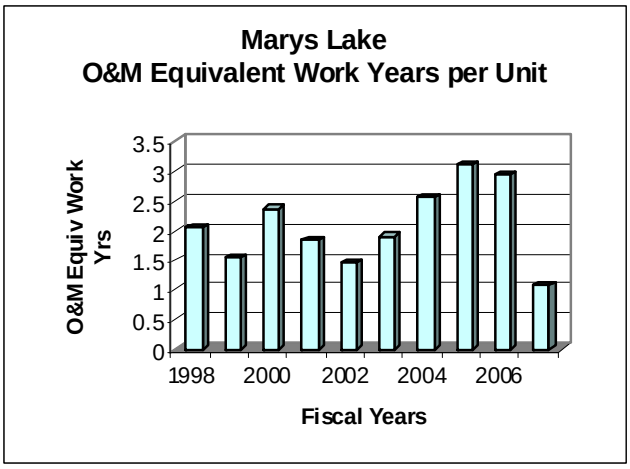


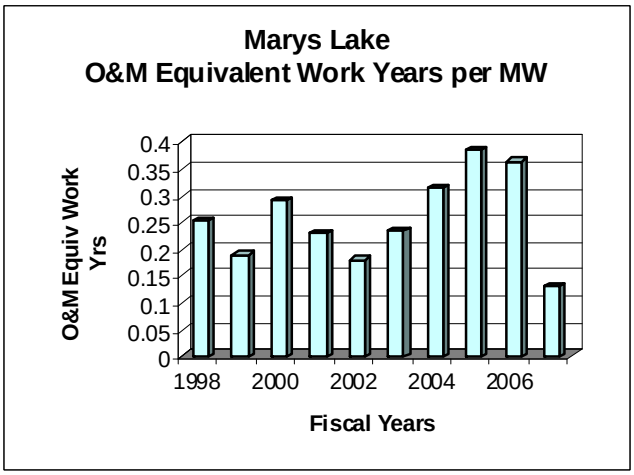
Benchmark 4
Workforce Deployment

Marys Lake 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	0.03	0.03	0.00
Operation	0.52	0.06	0.00	0.58	0.58	0.07
Maintenance	2.13	0.22	0.00	2.36	2.36	0.29
Total Staffing	2.67	0.28	0.02	2.97	2.97	0.37

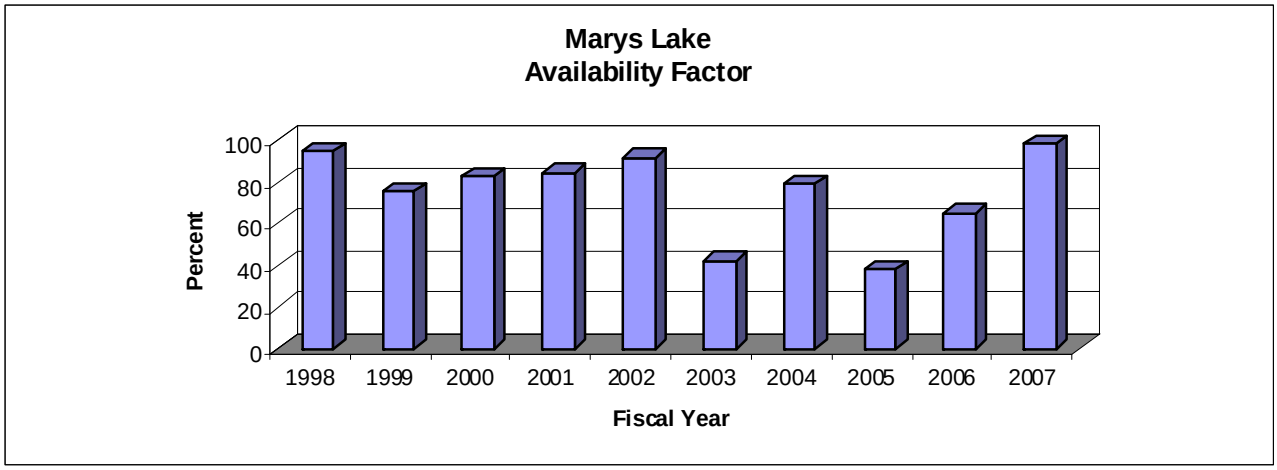




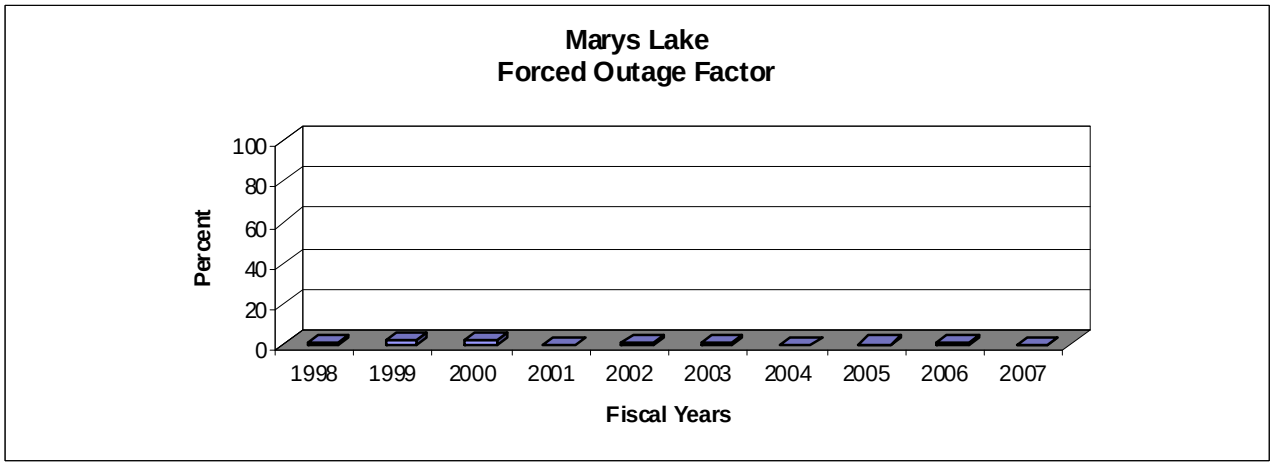




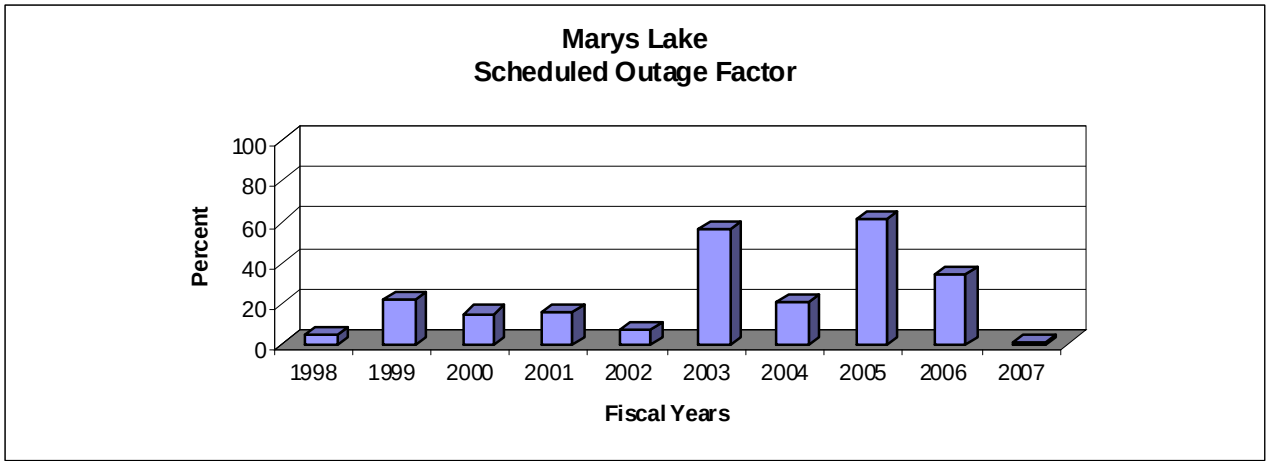
Benchmark 5
Plant Availability Factor



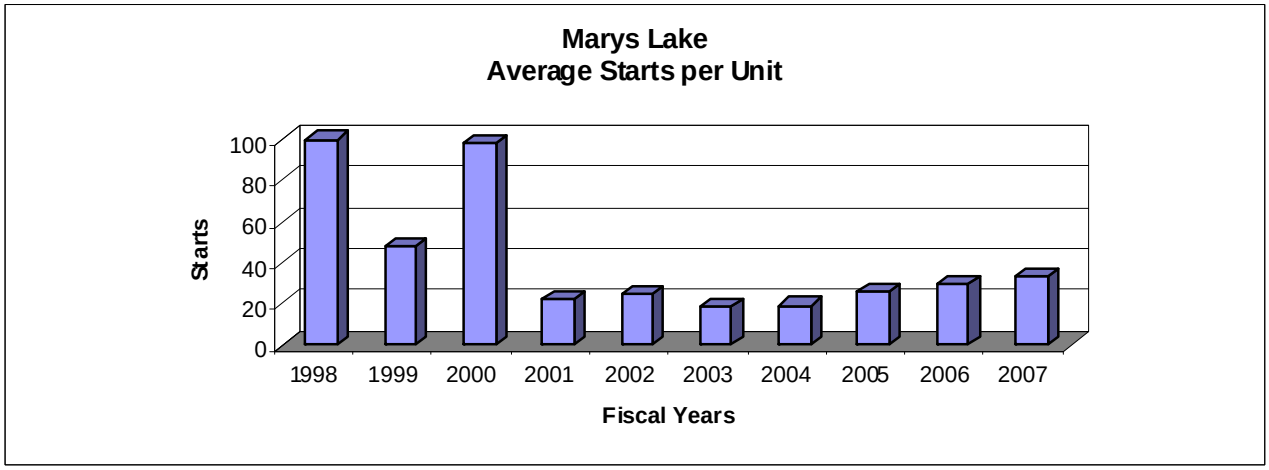
Benchmark 6
Plant Forced Outage Factor



Benchmark 7
Plant Scheduled Outage Factor



Unit Starts



Benchmark Data Comparison					
Fiscal Year 2007	**Marys Lake Powerplant**	**Reclamation Average 0-10 MW Group**	**Total Reclamation Average**	**Industry Average**	**Best Performers**
Wholesale Firm Rate Mills/kWh	26.1	Not Applicable	*22.45	Not Available	Not Available
Production Cost as Percentage of Wholesale Firm Rate	0.4%	Not Applicable	12.1%	Not Applicable	Not Applicable
O&M Cost $/MWh	5.71	14.71	2.76	***25.9	1.00
O&M Costs $/MW	28,728	60,518	7,847	***75,984	2,897
O&M Equiv Work Year per MW	0.00	0.42	0.03	Not Available	0.0
Availability Factor	98.5	88.7	82.3	**88.64	98.5
Forced Outage Factor	0.2	0.9	2.6	**2.61	0.0
Scheduled Outage Factor	1.3	10.4	15.1	**8.74	0.0

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

Mt. Elbert Pumped-Storage Powerplant
Fryingpan-Arkansas Project

Plant Contact:
Chuck Pedersen
O&M Chief

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Mt. Elbert Powerplant
Twin Lake Field Office
Granite Star Route
Granite CO 81228

Telephone Numbers:
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Fax: (970) 663-3212

E-Mail Address:
cpedersen@gp.usbr.gov

Reclamation Region: Great Plains

NERC Region: Western Electricity Coordinating Council, Rocky Mountain Power Area

PMA Service Area: Western Area Power Administration, Rocky Mountain Region

Project Authorization: The Congress authorized the Fryingpan-Arkansas Project under Public Law 87-590 (77 Stat. 393), signed by the President on August 16, 1962.

Project Purposes: The Fryingpan-Arkansas Project is a multi-purpose transmountain diversion development in southeastern Colorado. It makes possible an average annual diversion of 69,200 acre-feet of surplus water from the Fryingpan River and other tributaries of the Roaring Fork River on the western slope of the Rocky Mountains to the Arkansas River on the eastern slope.

Plant Location: Mt. Elbert Pumped-Storage Powerplant is located in Lake County, on the north shore of Twin Lakes, 20 miles southwest of Leadville, Colorado. It is at the foot of Mt. Elbert, Colorado's highest peak.

Plant Purpose: Generation of hydroelectric power for the project and supports peak capacity needs and power support of the interconnected power system.

Plant Facts: The powerplant was designed with modern architectural lines and is an all-concrete structure equivalent to a 14-story building, although most of the structure is below ground on the edge of Twin Lakes. The power generated at Mt. Elbert derives from water originally pumped from Twin Lakes, which acts as the Mt. Elbert afterbay, and also from supplemental water delivered from Turquoise Lake to the forebay. The generators are designed to operate as a 170,000-horsepower electric motor which drives the turbines in reverse, and pumps water back up to refill the forebay. This pumping mode normally will be used during the very early morning hours, when power demands are low and surplus low-rate power is received from other generating stations. This pump-back storage principle is advantageous since the generating units can be started quickly and adjustments of power output can be made rapidly to respond to varying patterns of daily and seasonal power demands.

Plant History: Normal operations.

Present Activities: Recently completed projects include plant compressor replacement, governor replacement, cooling water piping replacement, afterbay bulkhead gate cranes installation and protective relaying replacement. Unit CO_2 fire suppression and plant fire alarm upgrades in progress are scheduled to be completed in FY 2008. Communication (RTU SCADA) and digital microwave upgrades under progress are planned to be completed in FY 2009. A condition assessment by a private contractor that may recommend future repairs or upgrades (including, but not limited to cracked runner replacement) will be completed in FY2009.

Future Planned Activities: Unit 1 and 2 penstock guard cylinder and guard gate shaft repairs are planned for FY 2009. Online condition monitoring addition is planned for FY 2013.

Special Issues: None.

River:	Trans Mountain Division	**Plant Type:**	Pump Storage
Powerhouse Type:	Above Ground	**Turbine Type:**	Francis
Original Nameplate Capacity:	200,000 kW	**Installed Capacity:**	200,000 kW
Year of Initial Operation:	1981	**Age:**	26 years
Net Generation (FY-2007):	313.4 GWh	**Rated Head:**	448 feet
Average Plant Factor (FY-2007):	18.1 percent	**Remotely Operated:**	No
Production Mode:	Peaking		

Ancillary Services

Mt. Elbert
Ancillary Services

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

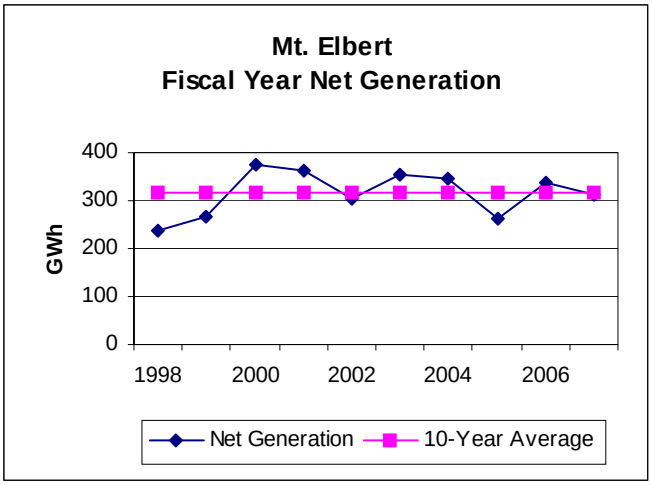
Generators

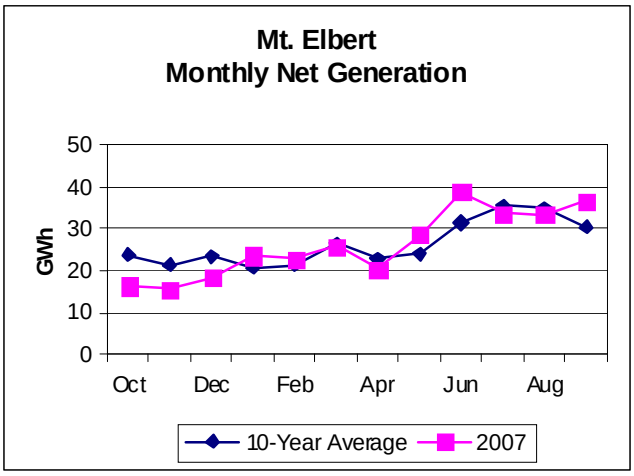
Mt. Elbert PS Generators

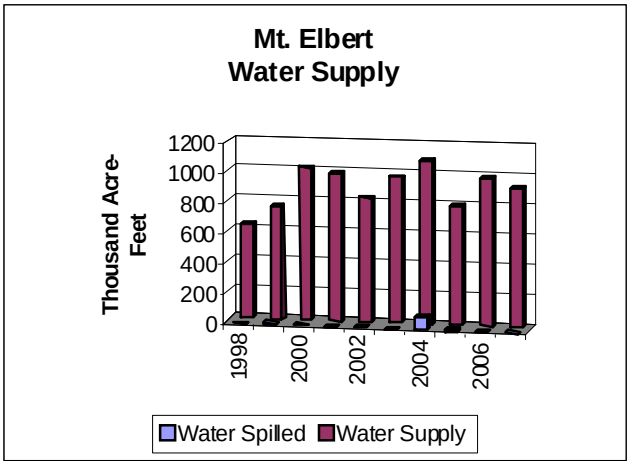
Existing Number and Capacity

Unit #	Original Capacity (kW)	Capacity Increased (kW)	Present Capacity (kW)
1	100,000	-	100,000
2	100,000	-	100,000
2 units	200,000	-	200,000

Generation

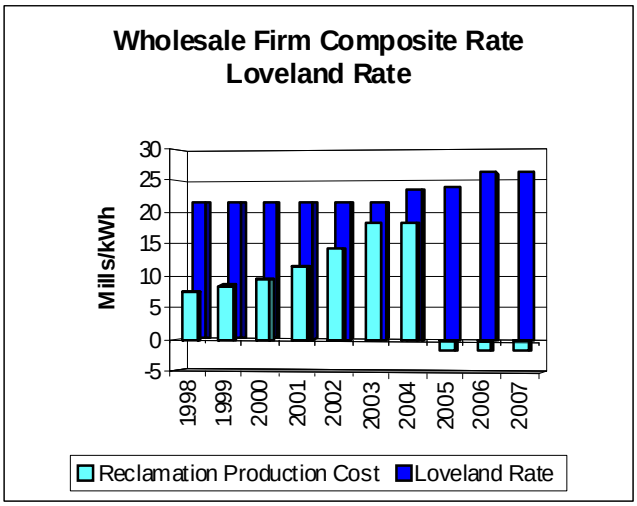

Mt. Elbert
Fiscal Year Net Generation
GWh
400
300
200
100
0
1998
2000
2002
2004
2006
Net Generation
10-Year Average


Mt. Elbert
Monthly Net Generation
GWh
50
40
30
20
10
0
Oct
Dec
Feb
Apr
Jun
Aug
10-Year Average
2007

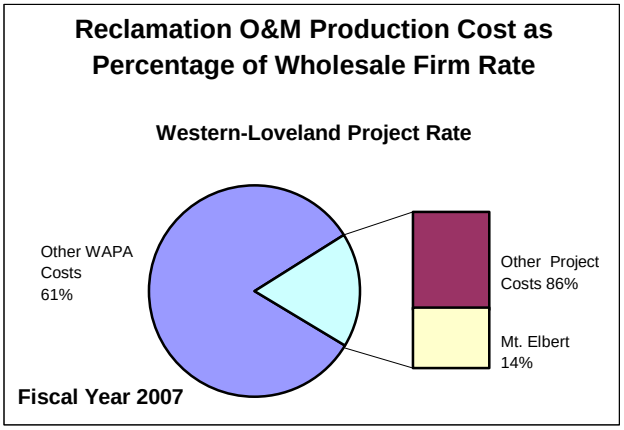

Mt. Elbert
Water Supply
Thousand Acre-Feet
1200
1000
800
600
400
200
0
1998
2000
2002
2004
2006
Water Spilled
Water Supply

Prime Laboratory Benchmarks

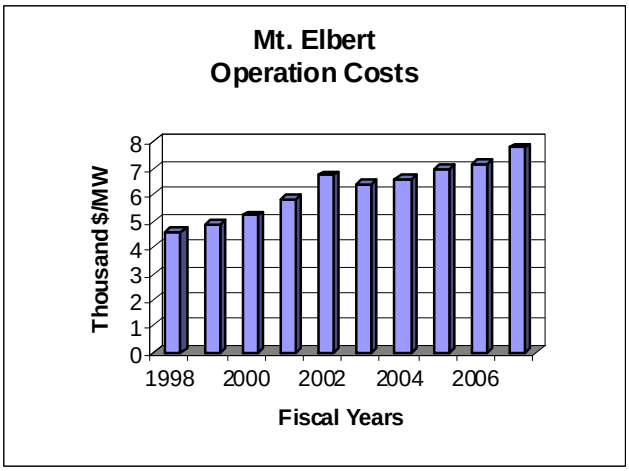
Benchmark 1
Wholesale Firm Rate

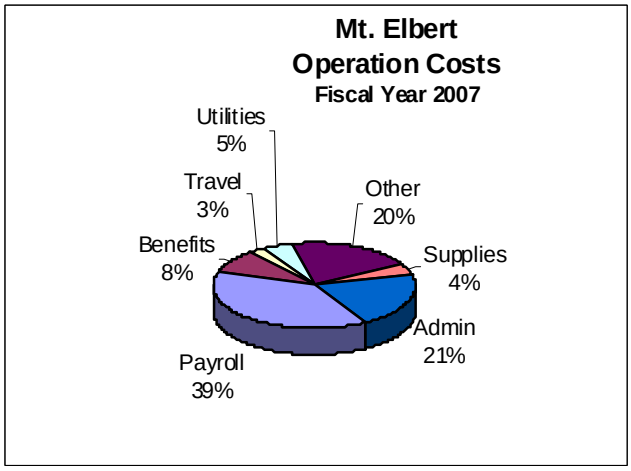


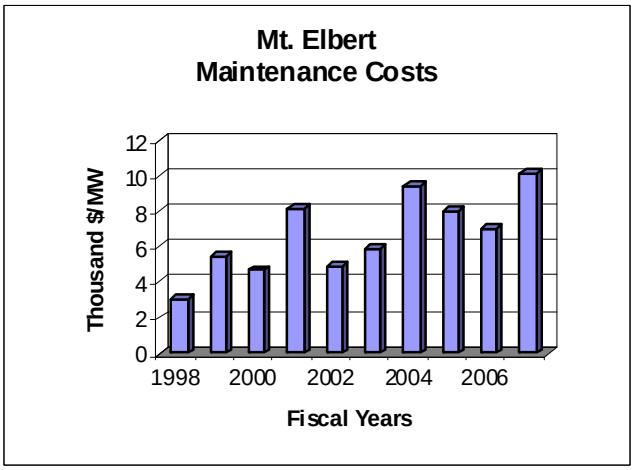
Benchmark 2
Reclamation's Production Costs as Percentage of Wholesale Firm Rate

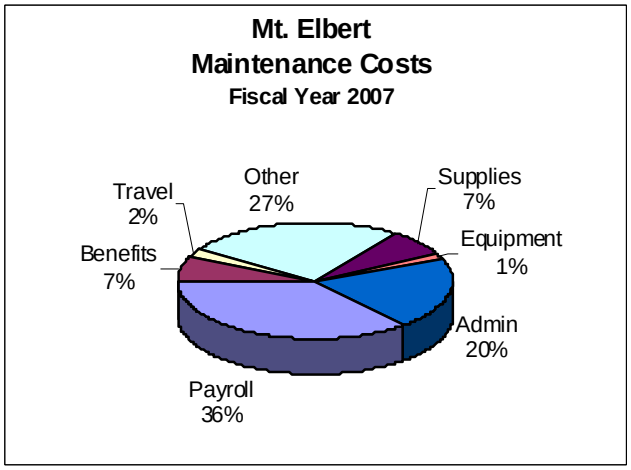


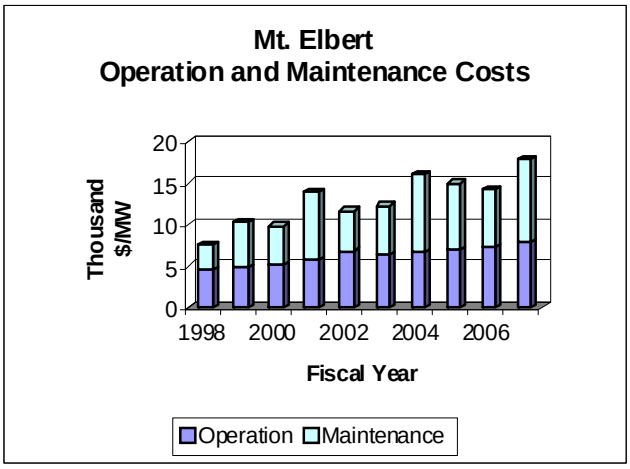
Benchmark 3
Production Costs

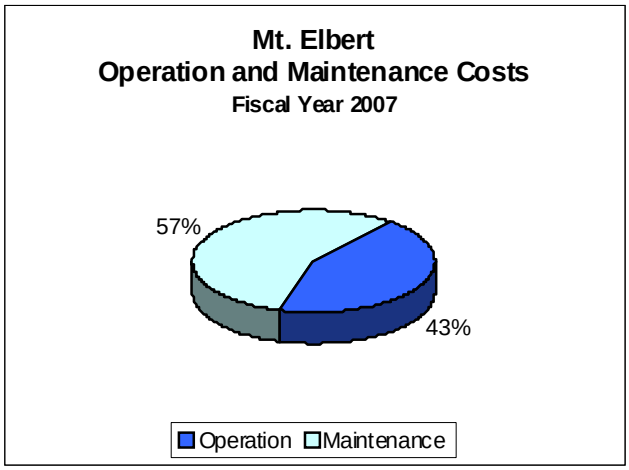






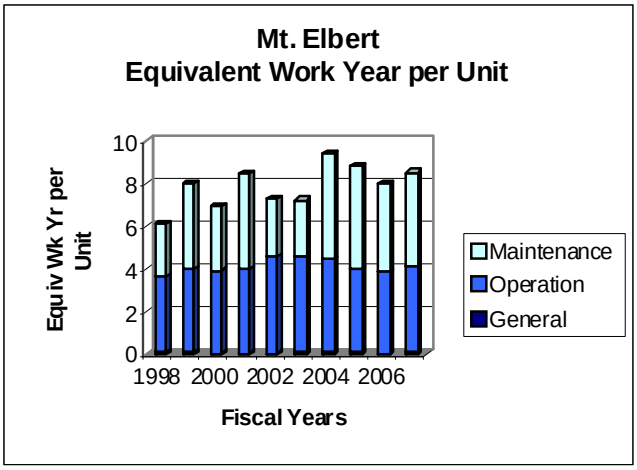


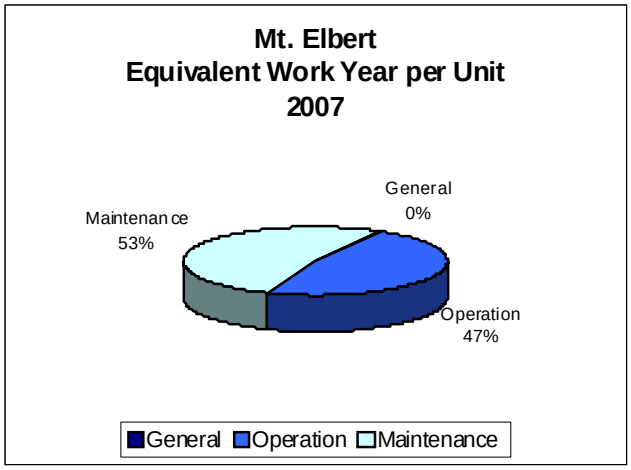


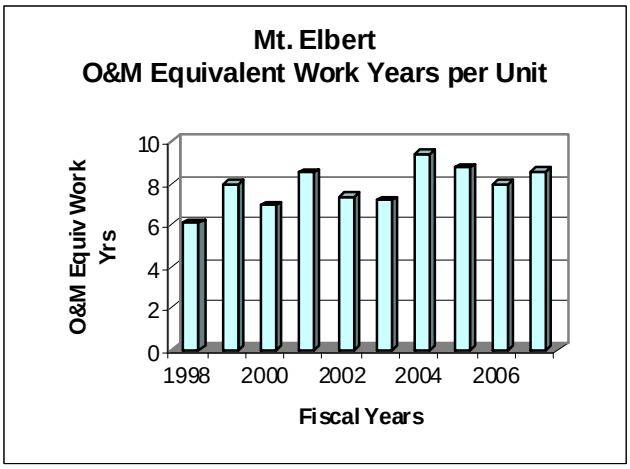


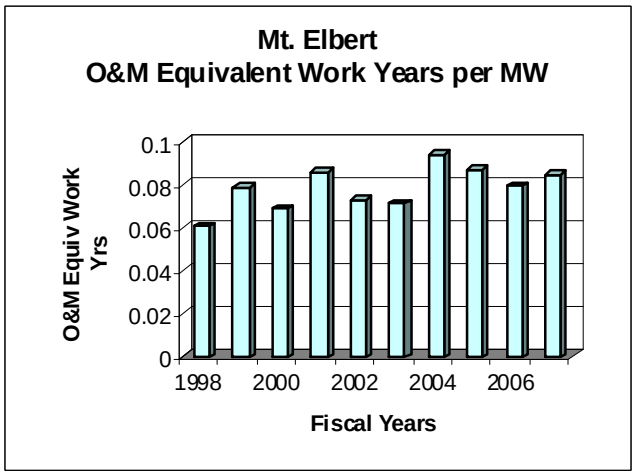
Benchmark 4
Workforce Deployment

Mt. Elbert 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	0.02	0.00	0.04	0.06	0.03	0.00
Operation	7.26	0.82	0.00	8.08	4.04	0.04
Maintenance	8.08	0.91	0.00	8.99	4.49	0.04
Total Staffing	15.36	1.73	0.04	17.13	8.56	0.09

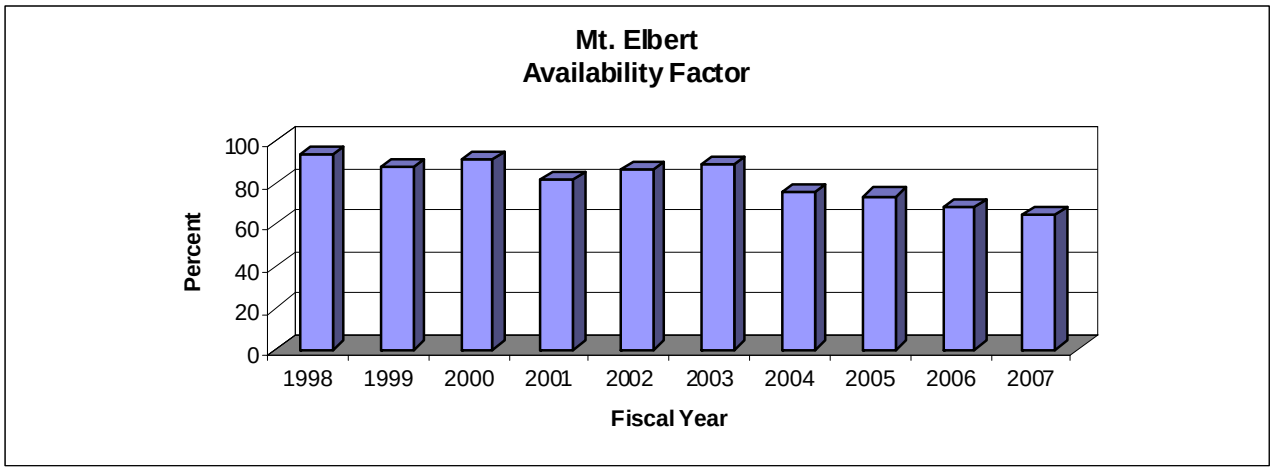




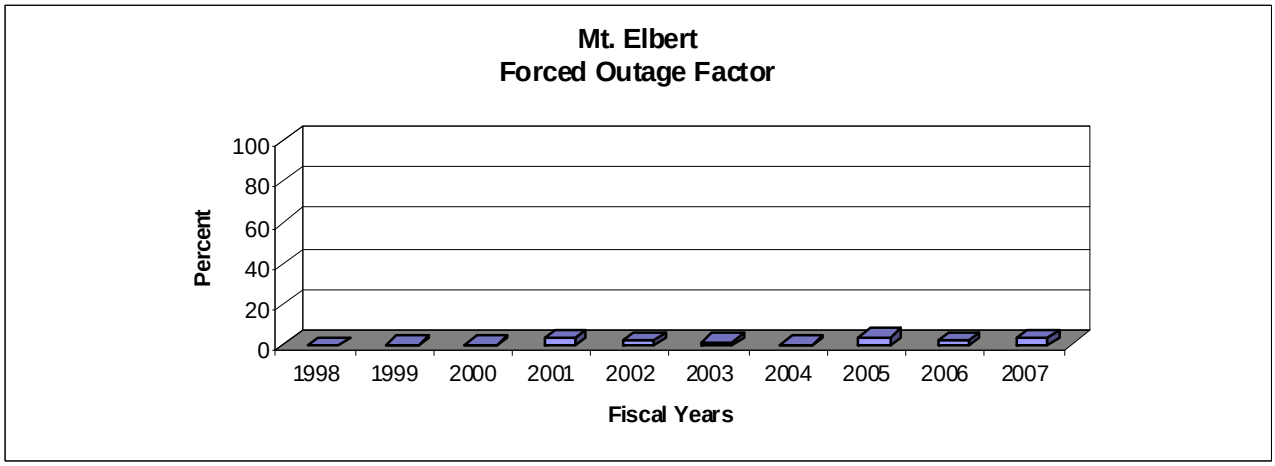




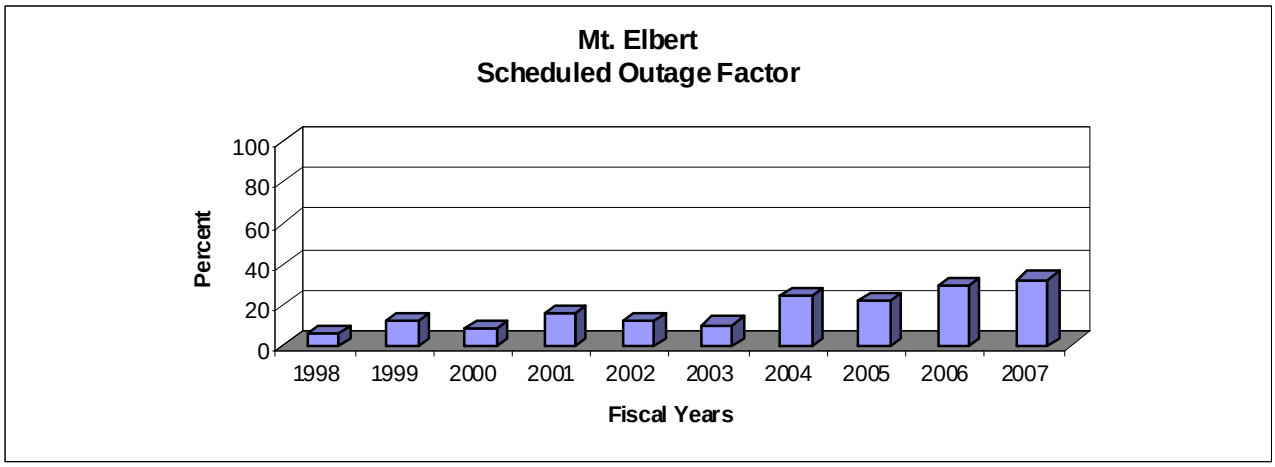
Benchmark 5
Plant Availability Factor



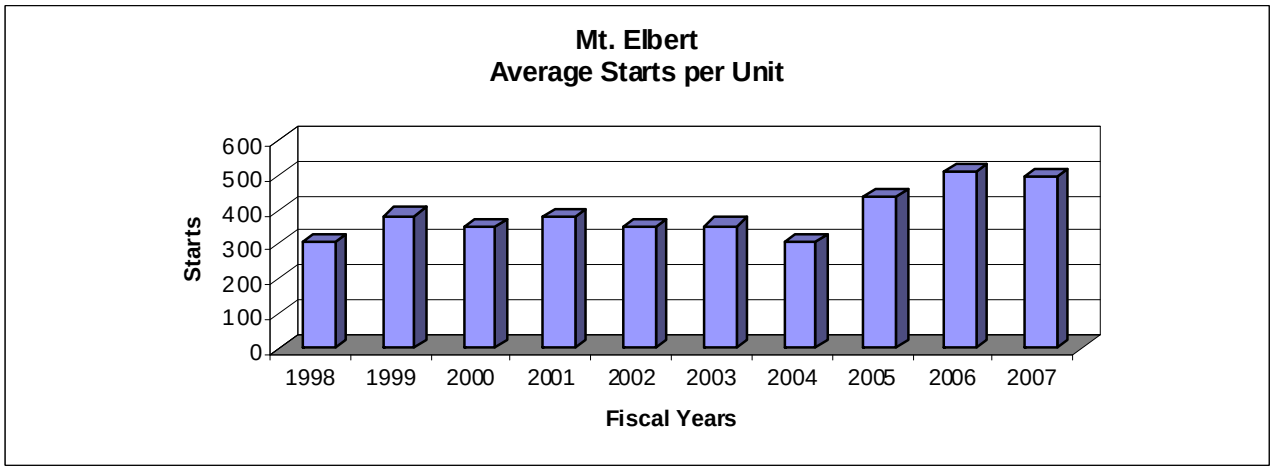
Benchmark 6
Plant Forced Outage Factor



Benchmark 7
Plant Scheduled Outage Factor



Unit Starts



Benchmark Data Comparison

Fiscal Year 2007	Mt. Elbert Powerplant	Total Reclamation Average	Industry Average	Best Performers
Wholesale Firm Rate Mills/kWh	23.9	*22.45	Not Available	Not Available
Production Cost as Percentage of Wholesale Firm Rate	8.14%	12.1%	Not Applicable	Not Applicable
O&M Cost $/MWh	11.44	2.76	Not Applicable	1.00
O&M Costs $/MW	17,932	7,846.6	Not Applicable	2,897.3
O&M Equiv Work Year per MW	0.09	0.03	Not Available	0
Availability Factor	64.5	82.3	**88.64	98.5
Forced Outage Factor	3.0	2.6	**2.61	0.0
Scheduled Outage Factor	32.4	15.1	**8.74	0.0

*Weighted by Net Generation
**2006 NERC Average

Note: Mt. Elbert is the only Reclamation facility that is operated in a pump-storage mode. This means that the plant purchases off peak energy to pump water to an upper storage reservoir. The water is then released to a lower reservoir when needed to meet system peak demands and for system stability. It is important to note the unique demands and usages on the Mt. Elbert facility, when comparing to other Reclamation and Industry plants.

Pilot Butte Powerplant
Pick-Sloan Missouri Basin Program

Plant Contact:
John H. Lawson
Area Manager
Wyoming Area Office

Plant Address:
Pilot Butte Powerplant
Morton WY

Telephone Numbers:
Phone: (307) 261-5671
Fax: (307) 261-5683

E-Mail Address:
jlawson@gp.usbr.gov

Reclamation Region:	Great Plains
NERC Region:	Western Electricity Coordinating Council, Rocky Mountain Power Area
PMA Service Area:	Western Area Power Administration, Rocky Mountain Region
Project Authorization:	The project was authorized for construction by the Secretary of the Interior on June 19, 1918, under the terms of the Indian Appropriation Act for fiscal year 1919, and approved by the Congress on May 25, 1918. By the act of June 5, 1920, the project was placed under Reclamation's jurisdiction. On September 25, 1970, Public Law 91-409 reauthorized the project as the Riverton Unit of the Pick-Sloan Missouri Basin Program.
Project Purposes:	Pilot Canal flows in a generally easterly direction from Pilot Butte Reservoir, servicing lands south of those supplied by the Wyoming Canal.
Plant Location:	The Riverton Unit is in central Wyoming on the Wind River Indian Reservation. Pilot Butte Powerplant is located in Fremont County, approximately 22 miles northwest of Riverton, Wyoming, at the drop from the Wyoming Canal to Pilot Butte Reservoir.
Plant Purpose:	Pilot Butte Powerplant was built to supply power to the project.

Plant Facts:	The plant has two generating units, which operate under a maximum head of 105 feet with a total capacity of 1,600 kilowatts. Power is distributed over 76 miles of transmission lines. Pilot Butte Powerplant is operated on a seasonal basis during the diversion of irrigation flows to Pilot Butte Reservoir.		
Plant History:	The Pilot Butte Powerplant, located at the drop from the Wyoming Canal to Pilot Butte Reservoir was out of service in June 1973. A new penstock was installed and units were placed in service in June 1990.		
Present Activities:	Normal Operations.		
Future Planned Activities:	None		
Special Issues:	None		
River:	Wind River	**Plant Type:**	Conventional
Powerhouse Type:	Above Ground	**Turbine Type:**	Francis
Original Nameplate Capacity:	1,600 kW	**Installed Capacity:**	1,600 kW
Year of Initial Operation:	1925	**Age:**	83 years
Net Generation (FY 2007):	3.1 GWh	**Rated Head:**	100 feet
Average Plant Factor (FY 2007):	22.9 percent	**Remotely Operated:**	Yes
Production Mode:	Base Load (seasonal)		

Ancillary Services

Pilot Butte
Ancillary Services

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

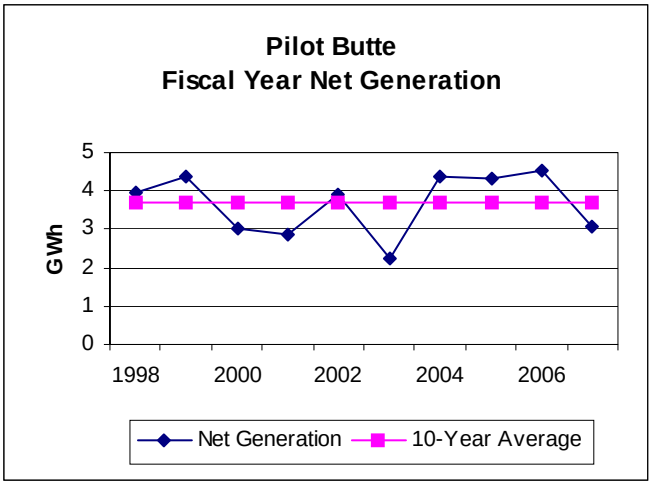
Generators

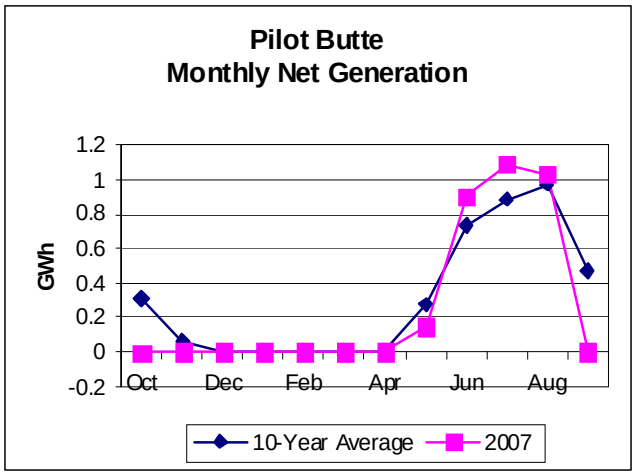
Pilot Butte Generators

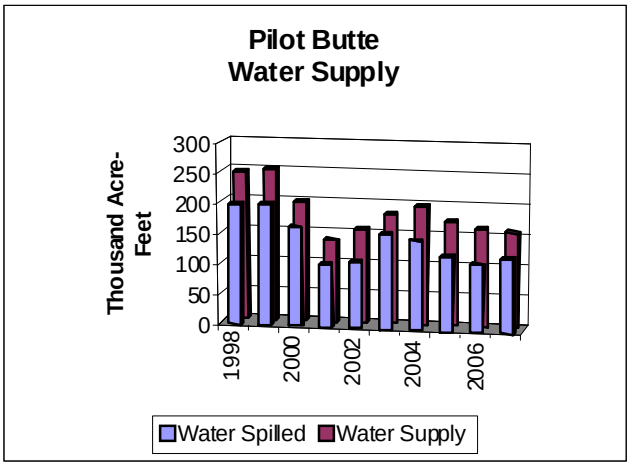
Existing Number and Capacity

Unit #	Original Capacity (kW)	Capacity Increased (kW)	Present Capacity (kW)
1	800	-	800
2	800	-	800
2 units	1,600	-	1,600

Generation

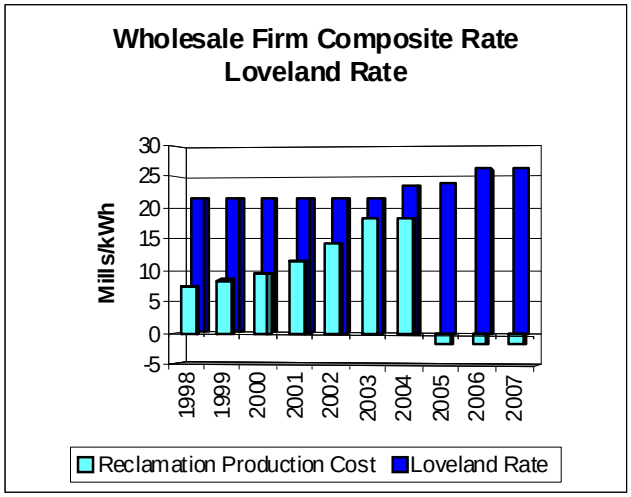

Pilot Butte
Fiscal Year Net Generation
GWh
5
4
3
2
1
0
1998
2000
2002
2004
2006
Net Generation
10-Year Average


Pilot Butte
Monthly Net Generation
GWh
1.2
1
0.8
0.6
0.4
0.2
0
-0.2
Oct
Dec
Feb
Apr
Jun
Aug
10-Year Average
2007

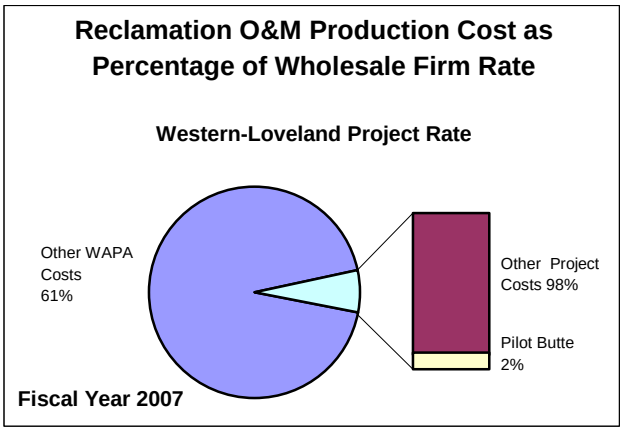

Pilot Butte
Water Supply
Thousand Acre-Feet
300
250
200
150
100
50
0
1998
2000
2002
2004
2006
Water Spilled
Water Supply

Prime Laboratory Benchmarks

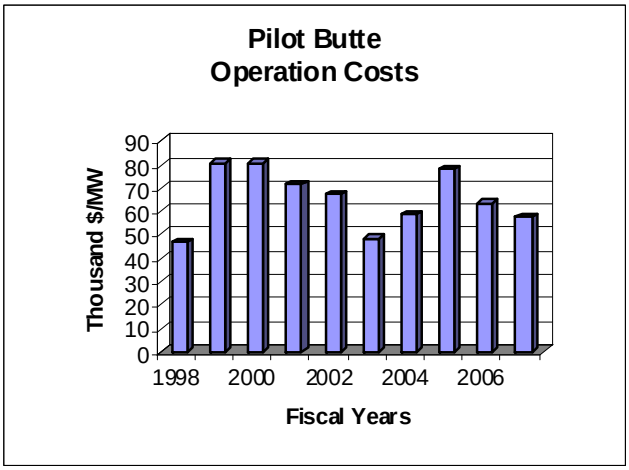
Benchmark 1
Wholesale Firm Rate

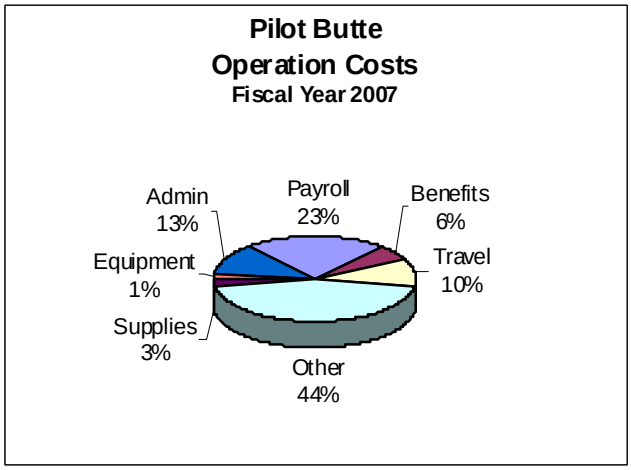


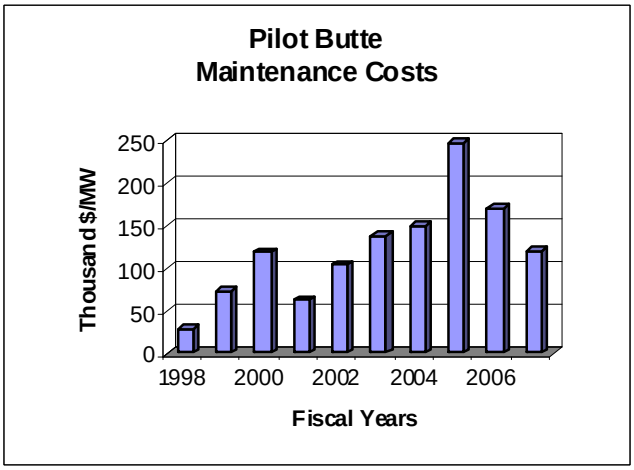
Benchmark 2
Reclamation's Production Costs as Percentage of Wholesale Firm Rate

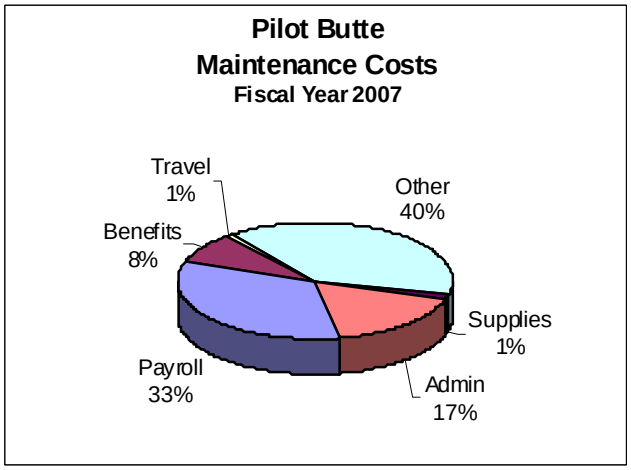


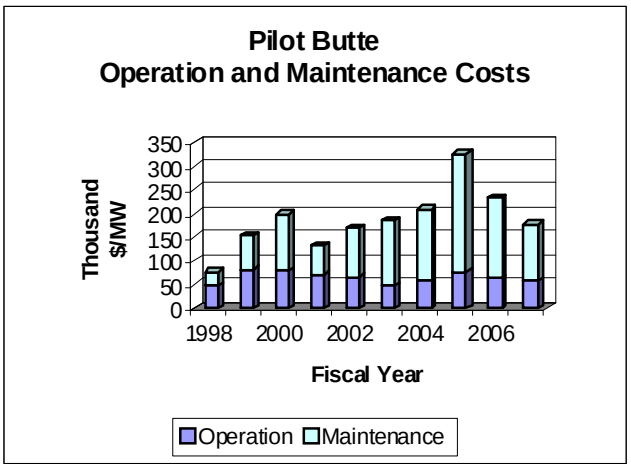
Benchmark 3
Production Cost

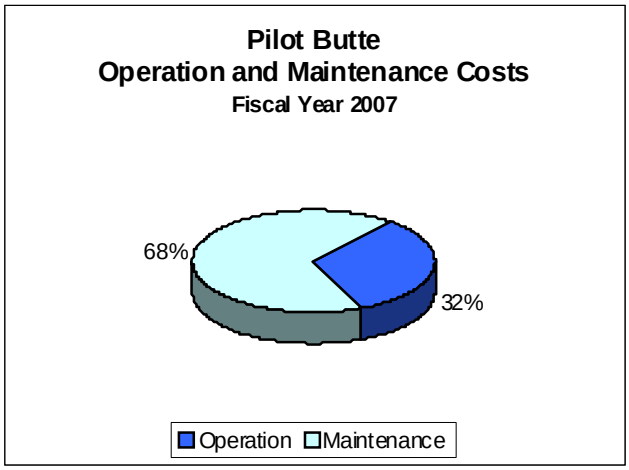








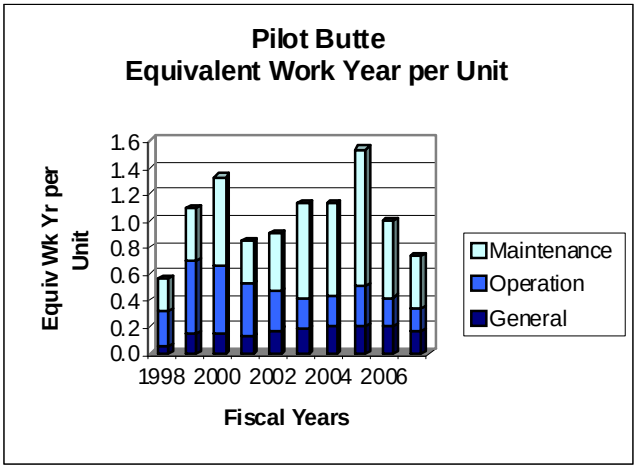


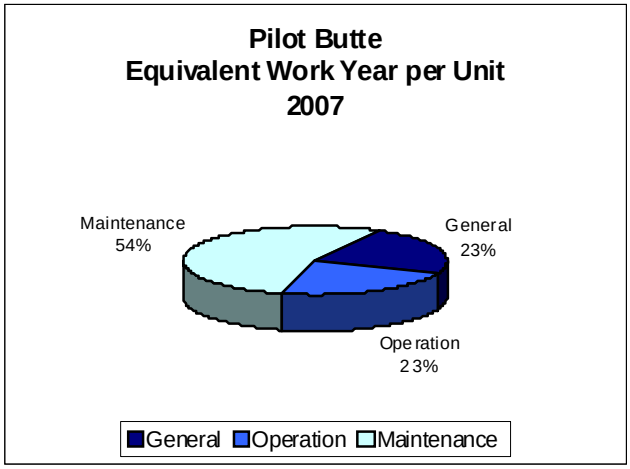


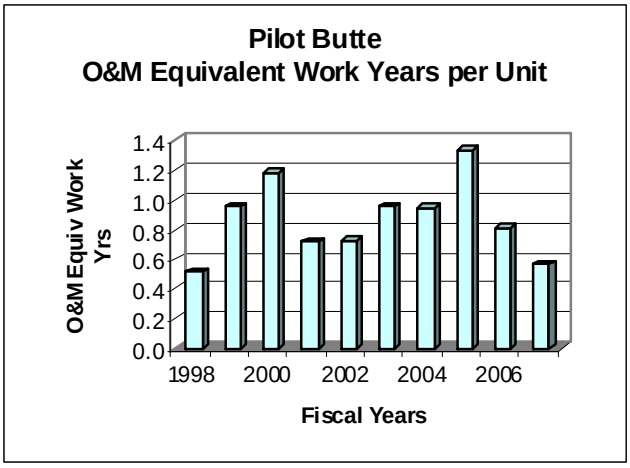
FY2003- Includes costs for significant repair of the stator winding for Unit 2.

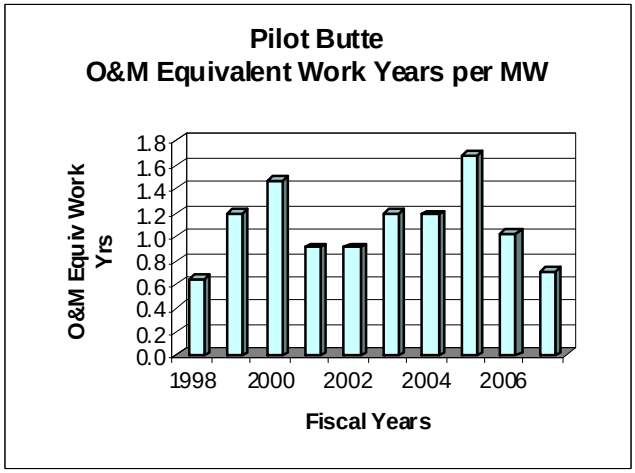
Benchmark 4
Workforce Deployment

Pilot Butte 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	0.27	0.03	0.04	0.34	0.17	0.21
Operation	0.30	0.03	0.00	0.34	0.17	0.21
Maintenance	0.72	0.08	0.00	0.80	0.40	0.50
Total Staffing	1.29	0.15	0.04	1.47	0.74	0.92

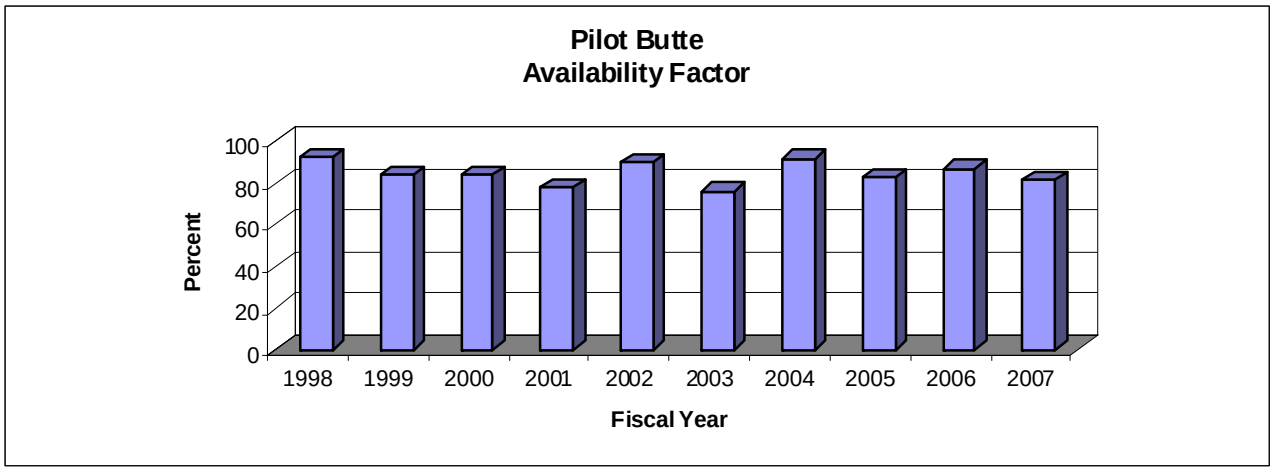






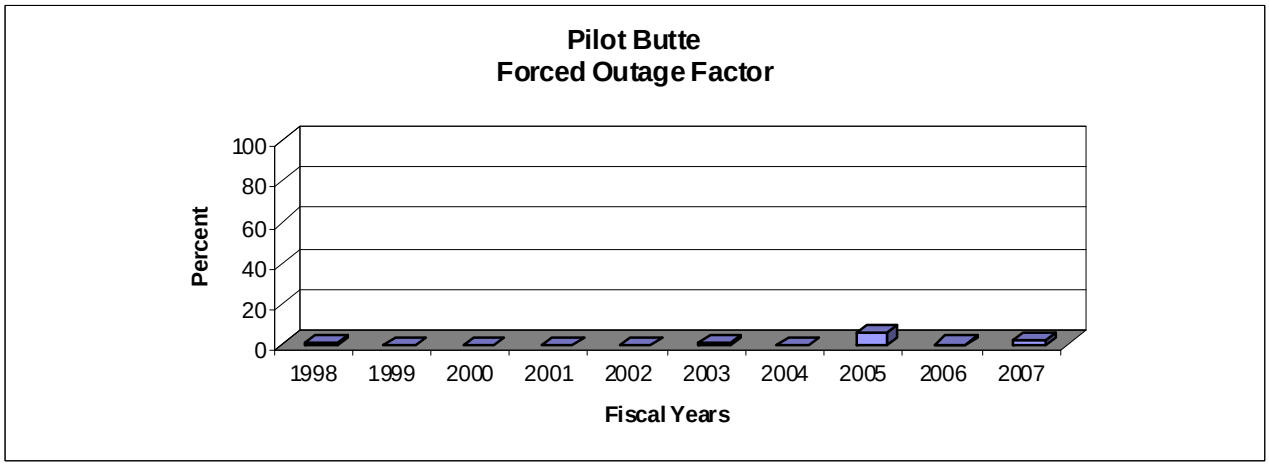


Benchmark 5
Plant Availability Factor

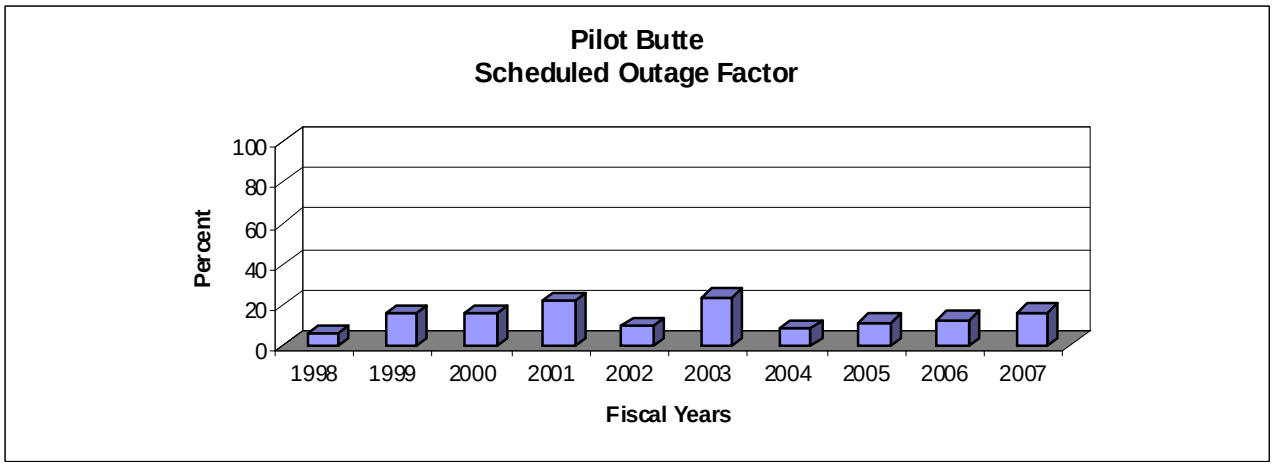


FY-2003 – Extended outage for significant repair of the stator winding for Unit 2.

Benchmark 6
Plant Forced Outage Factor

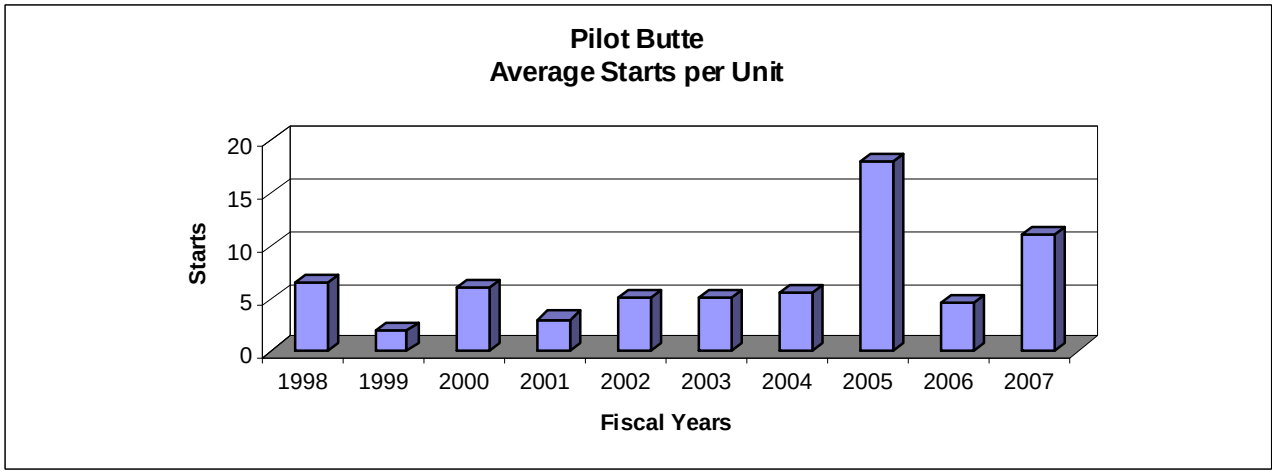


Benchmark 7
Plant Scheduled Outage Factor



FY-2003 - Extended outage for significant repair of the stator winding for Unit 2.

Unit Starts



Benchmark Data Comparison				
Fiscal Year 2007	**Pilot Butte Powerplant**	**Total Reclamation Average**	**Industry Average**	**Best Performers**
Wholesale Firm Rate Mills/kWh	23.9	*22.45	Not Available	Not Available
Production Cost as Percentage of Wholesale Firm Rate	0.6%	12.1%	Not Applicable	Not Applicable
O&M Cost $/MWh	92.06	2.76	Not Applicable	1.00
O&M Costs $/MW	176,449	7,847	Not Applicable	2,897
O&M Equiv Work Year per MW	0.71	0.03	Not Available	0.0
Availability Factor	81.2	82.3	**88.64	98.5
Forced Outage Factor	2.55	2.6	**2.61	0.0
Scheduled Outage Factor	16.3	15.1	**8.74	0.0

*Weighted by Net Generation
**2006 NERC Average

Pole Hill Powerplant
Colorado-Big Thompson Project

Plant Contact:
Chuck Pedersen
O&M Chief

Plant Address:
Pole Hill Powerplant
11056 West County Road 18E
Loveland CO 80537-9711

Telephone Numbers:
Phone: (970) 962-4400
Fax: (970) 663-3212

E-Mail Address:
cpedersen@gp.usbr.gov

Reclamation Region: Great Plains

NERC Region: Western Systems Coordinating Council, Rocky Mountain Power Area

PMA Service Area: Western Area Power Administration, Rocky Mountain Region

Project Authorization: First construction funds were provided by the Interior Department Appropriation Act of August 9, 1937 (50 Stat. 595). The President approved Secretary of the Interior's finding of feasibility on December 21, 1937.

Project Purposes: The Colorado-Big Thompson Project is one of the largest and most complex natural resource developments undertaken by Reclamation. It consists of over 100 structures integrated into a transmountain water diversion system through which multiple benefits are provided to the people. The project spreads over approximately 250 miles in the State of Colorado. It stores, regulates, and diverts water from the Colorado River on the western slope of the Continental Divide to the eastern slope of the Rocky Mountains. It provides supplemental water for irrigation of about 720,000 acres of land, municipal and industrial use, hydroelectric power, and water-oriented recreation opportunities.

Plant Location: Pole Hill Powerplant is located in Larimer County, Colorado, in Little Hell Canyon, 10 miles east of Estes Park, Colorado.

Plant Purpose: Generation of hydroelectric power and water storage is for the Colorado-Big Thompson Project.

Plant Facts:	Olympus Siphon and Tunnel and Pole Hill Tunnel and Canal convey project water from Lake Estes and some Big Thompson River floodwaters to a penstock, through which the water drops 815 feet to Pole Hill Powerplant. Water is then routed through Pole Hill Powerplant Afterbay, Rattlesnake Tunnel, Pinewood Lake, and Bald Mountain Pressure Tunnel and dropped to Flatiron Powerplant.
Plant History:	The water and power control center for Colorado-Big Thompson Project's reservoirs, powerplants, and transmission lines in Wyoming, Colorado, and western Nebraska is located in Loveland, Colorado. This Western Division of the Missouri River Basin is an interconnected system of 15 Reclamation powerplants.
Present Activities:	Generator CO_2 fire suppression replacement, new plant fire alarm system installation, 125 Vdc distribution board replacement, and excitation system replacement projects are currently in progress.
Future Planned Activities:	Continuation with excitation system replacement and 125 Vdc distribution board replacement, repairs to Rattlesnake Dam spillway and turbine pit scaffolding procurement will be completed in FY 2008. Plant remote control (RTU SCADA and fiber communication) upgrades are planned to be completed in FY 2010.
Special Issues:	None

River:	Colorado River and Big Thompson River	**Plant Type:**	Conventional
Powerhouse Type:	Above Ground	**Turbine Type:**	Francis
Original Nameplate Capacity:	33,250 kW	**Installed Capacity:**	38,238 kW
Year of Initial Operation:	1954	**Age:**	54 years
Net Generation (FY-2007):	183.7 GWh	**Rated Head:**	825 feet
Average Plant Factor (FY-2007):	55.0 percent	**Remotely Operated:**	Yes
Production Mode:	Base Load		

Ancillary Services

Pole Hill
Ancillary Services

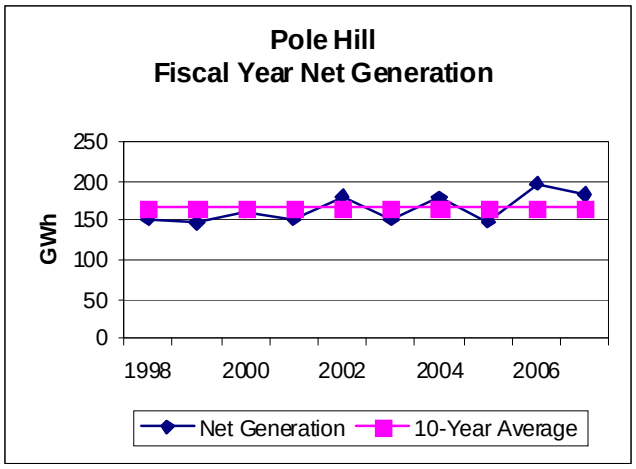
Spinning Reserve	No
Non-Spinning Reserve	No
Replacement Reserve	No
Regulation/Load Following	No
Black Start	Yes
Voltage Support	Yes

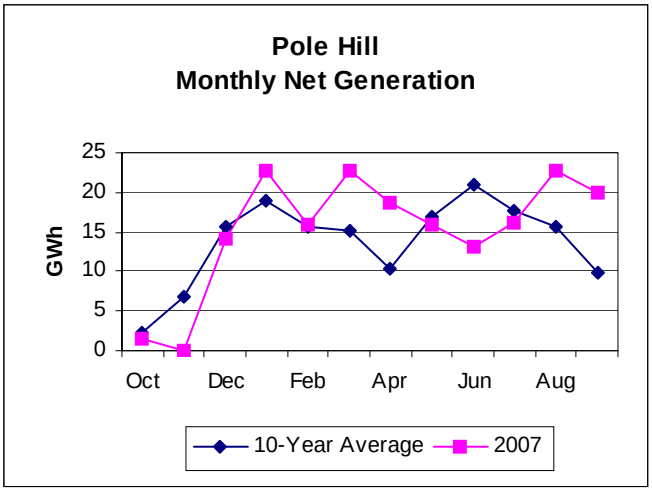
Generators

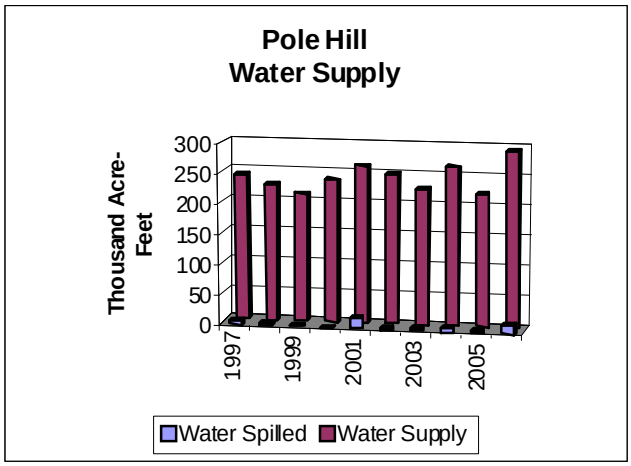
Pole Hill Generators
Existing Number and Capacity

Unit #	Original Capacity (kW)	Capacity Increased (kW)	Present Capacity (kW)
1	33,250	4,988	38,238
1 Unit	33,250	4,988	38,238

Generation

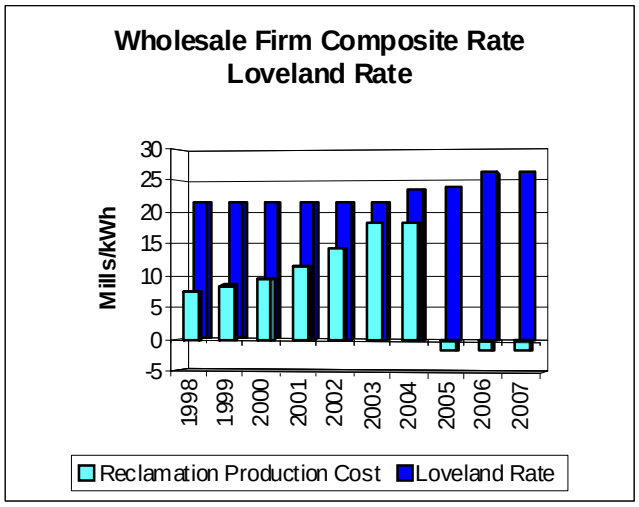

Pole Hill
Fiscal Year Net Generation
GWh
250
200
150
100
50
0
1998
2000
2002
2004
2006
Net Generation
10-Year Average


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

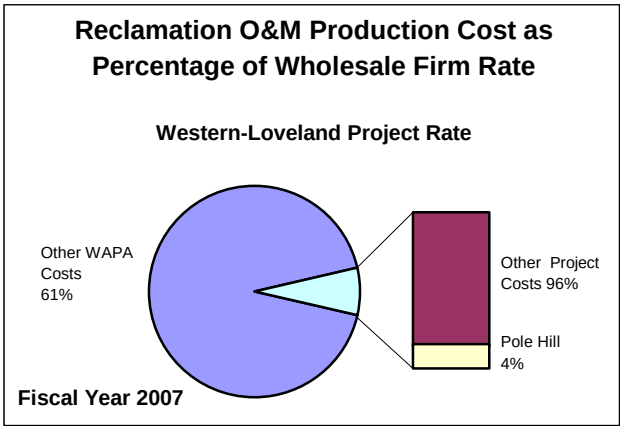

Pole Hill
Water Supply
Thousand Acre-Feet
300
250
200
150
100
50
0
1997
1999
2001
2003
2005
Water Spilled
Water Supply

Prime Laboratory Benchmarks

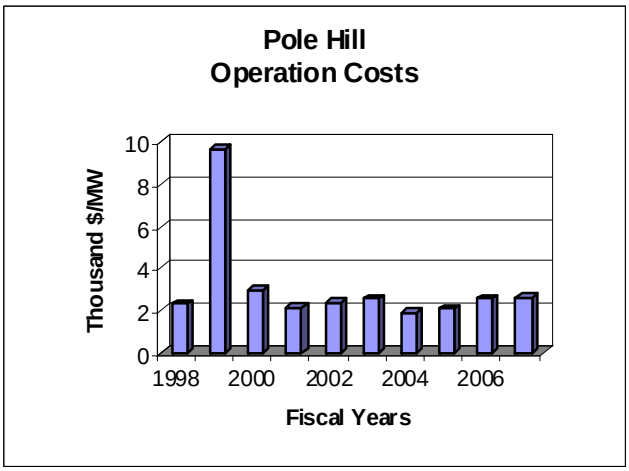
Benchmark 1
Wholesale Firm Rate

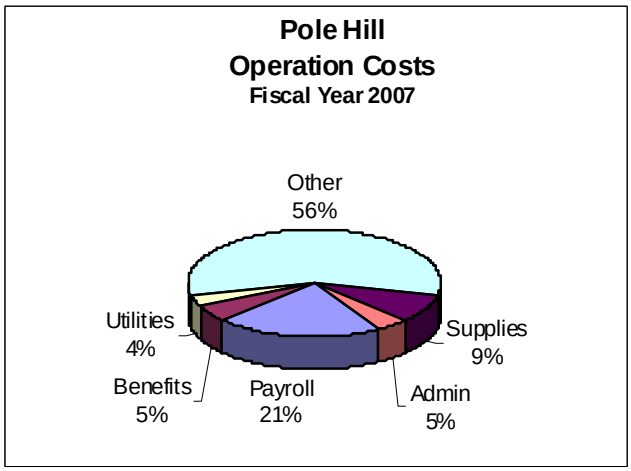


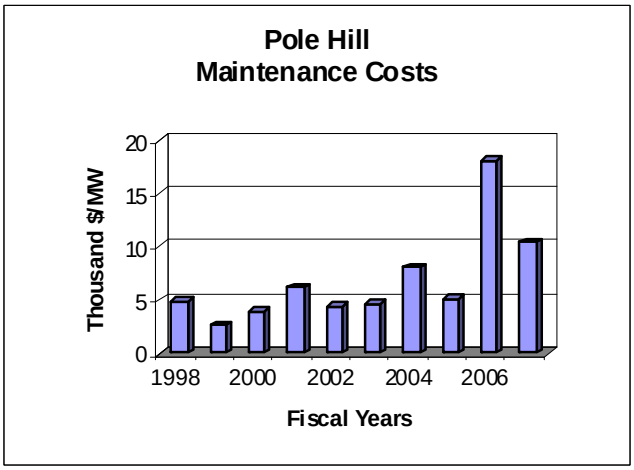
Benchmark 2
Reclamation's Production Costs as Percentage of Wholesale Firm Rate

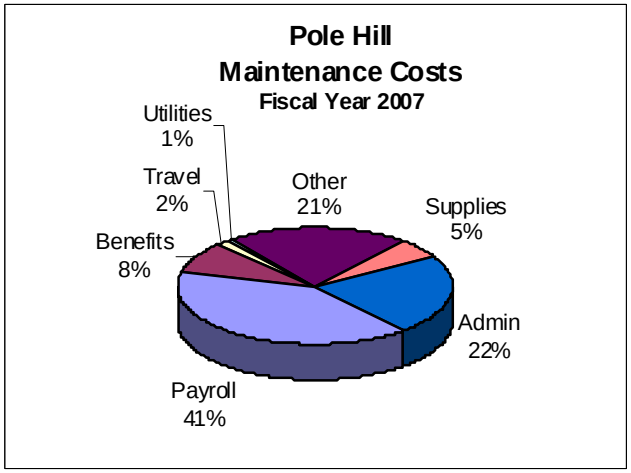


Benchmark 3
Production Costs

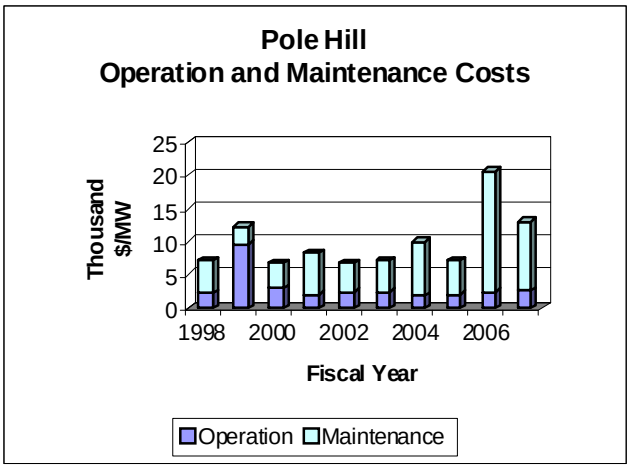


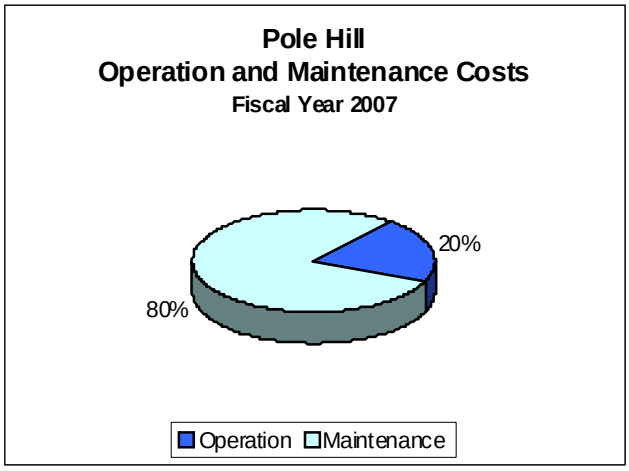


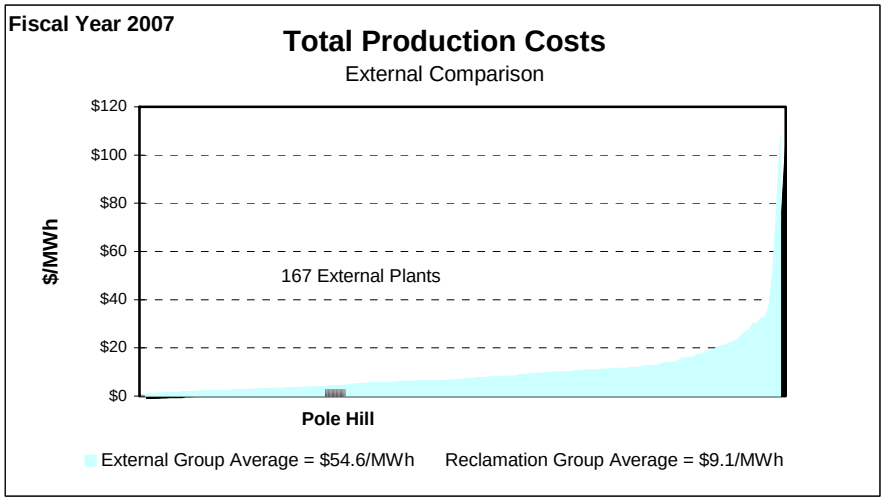


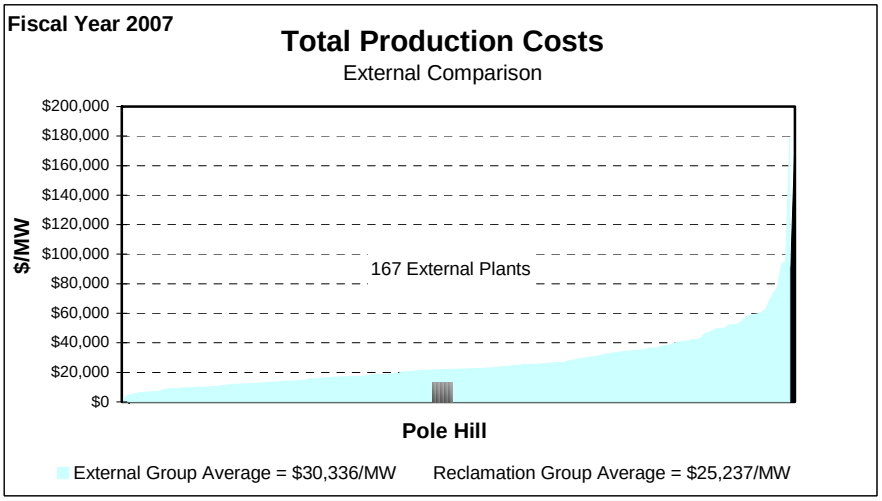


Benchmark 3
Production Costs



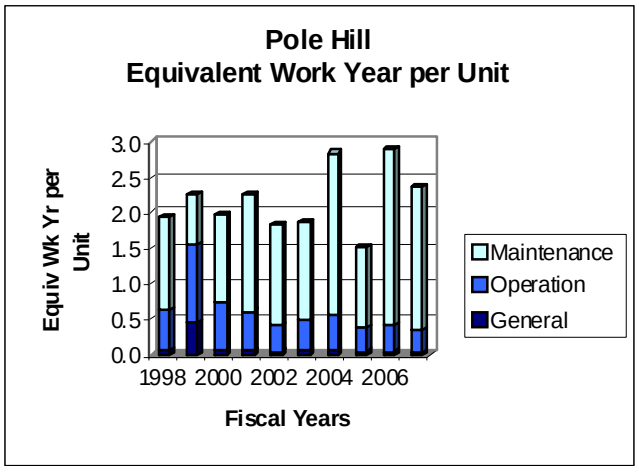


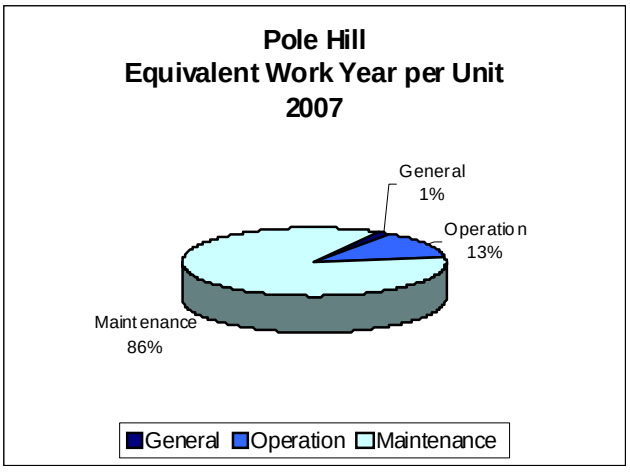


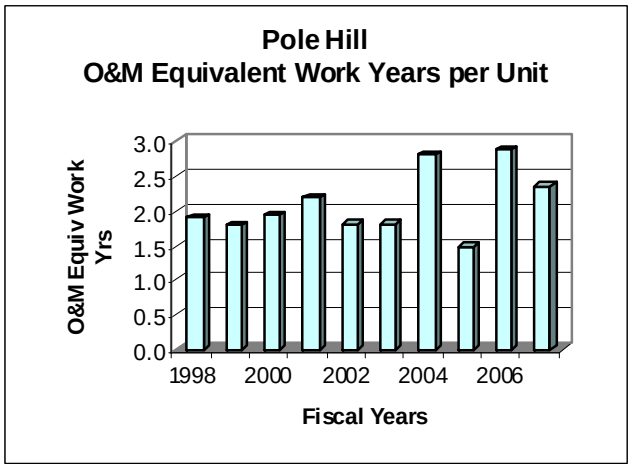


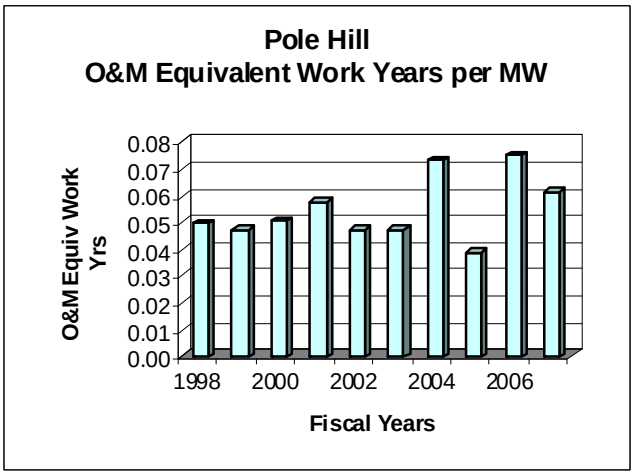
Benchmark 4
Workforce Deployment

Pole Hill 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	0.02	0.00	0.02	0.03	0.03	0.00
Operation	0.28	0.03	0.00	0.31	0.31	0.01
Maintenance	1.83	0.21	0.00	2.04	2.04	0.05
Total Staffing	2.13	0.24	0.02	2.38	2.38	0.06

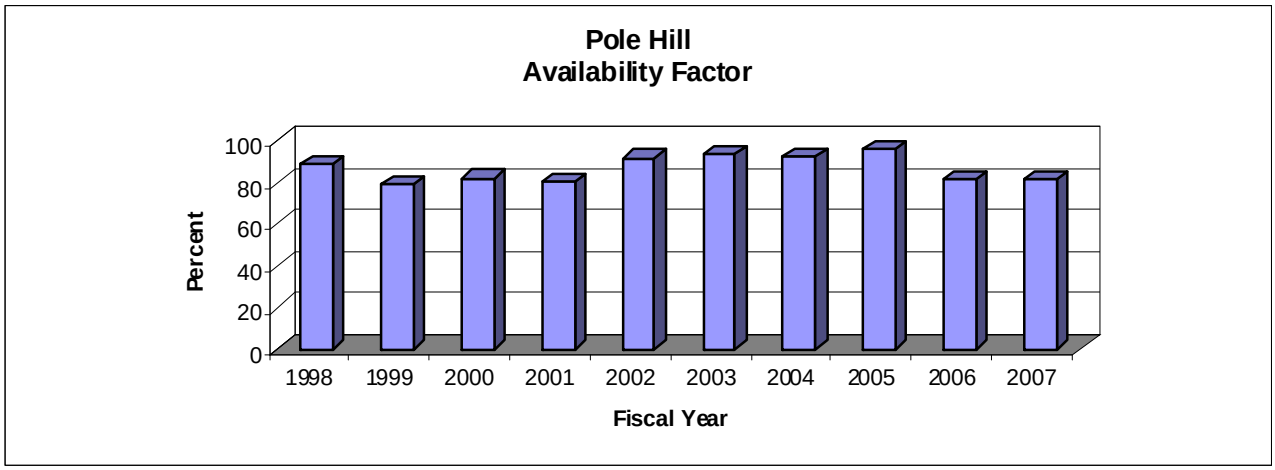




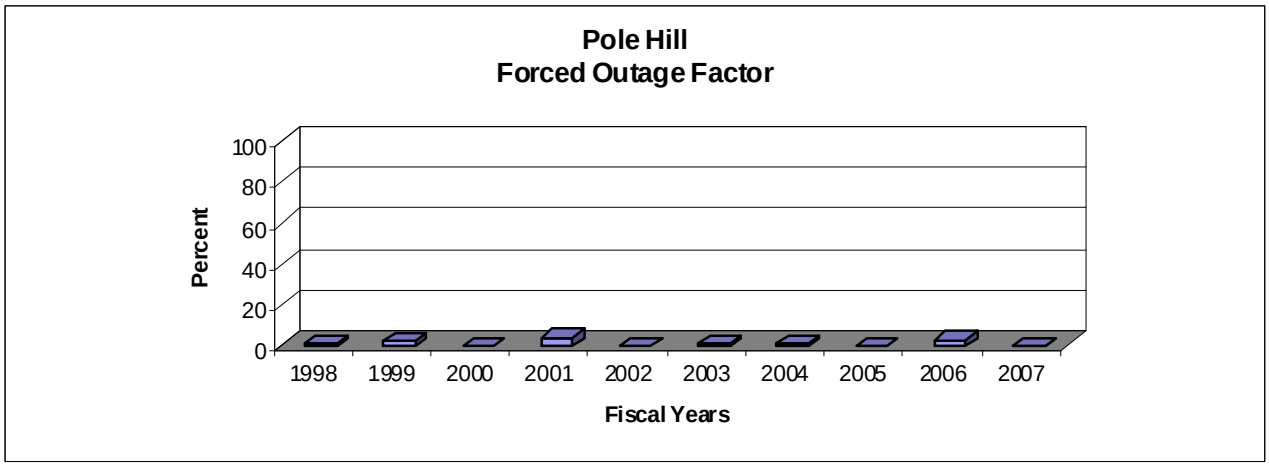




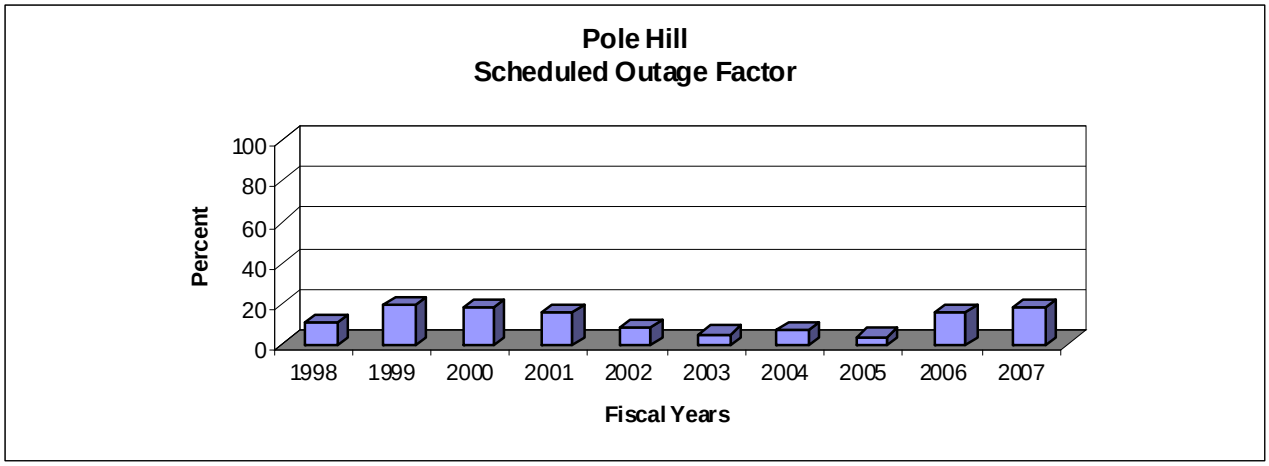
Benchmark 5
Plant Availability Factor



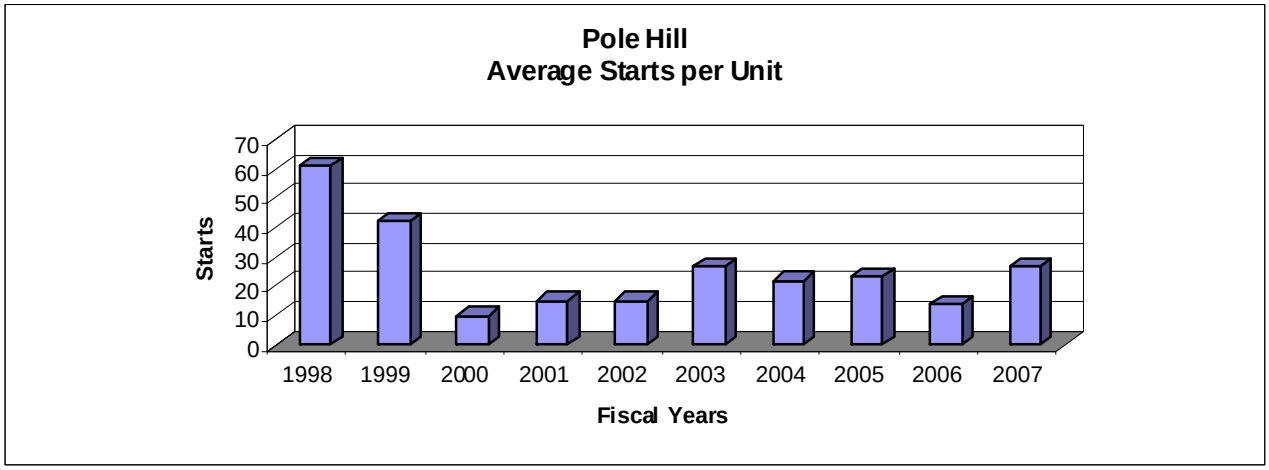
Benchmark 6
Plant Forced Outage Factor



Benchmark 7
Plant Scheduled Outage Factor



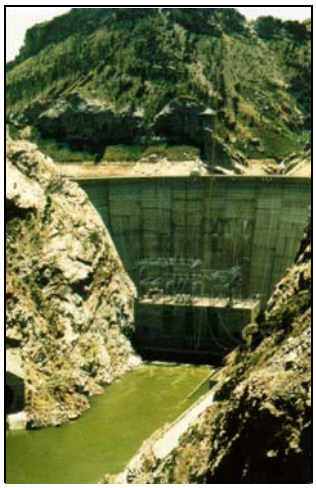
Unit Starts



Benchmark Data Comparison					
Fiscal Year 2007	**Pole Hill Powerplant**	**Reclamation Average 30-100 MW Group**	**Total Reclamation Average**	**Industry Average**	**Best Performers**
Wholesale Firm Rate Mills/kWh	23.9	Not Applicable	*22.45	Not Available	Not Available
Production Cost as Percentage of Wholesale Firm Rate	1.13%	Not Applicable	12.1%	Not Applicable	Not Applicable
O&M Cost $/MWh	2.71	7.85	2.76	***54.63	1.00
O&M Costs $/MW	13,037	24,132	7,847	***30,336	2,897
O&M Equiv Work Year per MW	0.06	0.10	0.03	Not Available	0.00
Availability Factor	81.3	81.3	82.3	**88.64	98.5
Forced Outage Factor	0.2	0.2	2.6	**2.61	0.0
Scheduled Outage Factor	18.5	18.5	15.1	**8.74	0.0

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

Seminoe Powerplant
Kendrick Project



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Area Manager
Wyoming Area Office

Plant Address:
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Sinclair WY

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Fax: (307) 261-5683

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Reclamation Region: Great Plains

NERC Region: Western Electricity Coordinating Council, Rocky Mountain Power Area

PMA Service Area: Western Area Power Administration, Rocky Mountain Region

Project Authorization: The President approved the Kendrick Project on August 30, 1935. Originally known as Casper-Alcova, the project was renamed Kendrick in 1937.

Project Purposes: The Kendrick Project conserves the waters of the North Platte River for irrigation and electric power generation. The project is a multi-purpose development with storage at Seminoe Reservoir and diversion at Alcova Dam to project lands. Operation of the reservoirs and powerplants is integrated with other river basin developments. Seminoe Reservoir, with a total capacity of 1,017,279 acre-feet, provides storage capacity for the water to irrigate the project lands. The powerplant generates electric power as the water is released for irrigation or stored in Pathfinder Reservoir for later release as required.

Plant Location: Seminoe Powerplant is located in Carbon County, Wyoming, on the North Platte River and about 72 miles southwest of Casper, Wyoming.

Plant Purpose: Electric energy generated at the Seminoe Powerplant is marketed through the Pick-Sloan Missouri Basin Program's integrated system.

Plant Facts: The dam is a concrete-arch structure containing 210,000 cubic yards of concrete and rising 295 feet above the rock foundation. Water is released from the reservoir through penstocks at the Seminoe Powerplant or over a controlled spillway and outlet tunnel. The power plant is located at the base of the dam and has a rated head of 166 feet. The plant contains three units, each composed of a 15,000-kilowatt generator driven by a 20,800-horsepower turbine.

Plant History: Seminoe Dam and Powerplant construction began in 1936 and was completed in 1939. The original installed capacity of the plant was 32,400 but the plant was up rated in the mid-1970 to its current installed capacity of 45,000 kilowatts. The three-phase unit power transformer was replaced in 2001.

Present Activities: A contract was completed for supplying new controls and a new trolley for the powerplant 50-ton bridge crane. Reclamation forces installed the new crane in FY-2004.

Replacement of the three powerplant single-phase unit power transformers with a new 3-phase transformer along with modification to the associated bus work was completed in FY-2004.

Future Planned Activities: The three unit Ring Seal Gates will be rehabilitated under a three-year contract beginning in FY-2006.

Special Issues: Access to Seminoe Powerplant is affected by periodic rock falls from the steep canyon walls necessitating continual operation and maintenance expenditures.

River:	North Platte River	**Plant Type:**	Conventional
Powerhouse Type:	Above Ground	**Turbine Type:**	Francis
Original Nameplate Capacity:	32,400 kW	**Installed Capacity:**	51,750 kW
Year of Initial Operation:	1939	**Age:**	68 years
Net Generation (FY-2007):	96.4 GWh	**Rated Head:**	166 feet
Average Plant Factor (FY-2007):	21.3 percent	**Remotely Operated:**	Yes
Production Mode:	Intermediate		

Ancillary Services

Seminoe
Ancillary Services

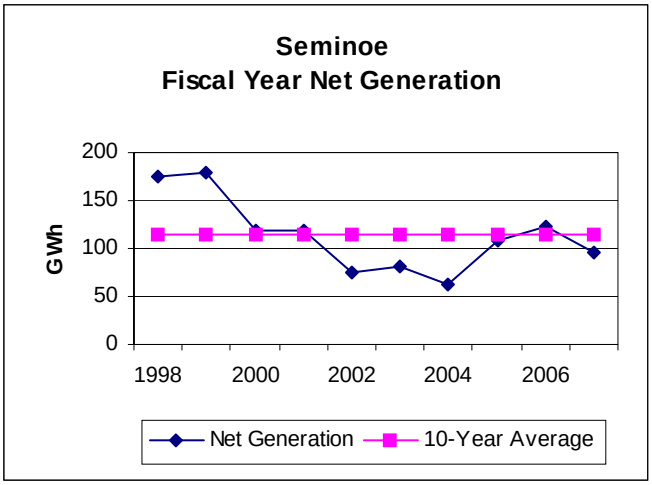
Spinning Reserve	Yes
Non-Spinning Reserve	Yes
Replacement Reserve	Yes
Regulation/Load Following	Yes
Black Start	No
Voltage Support	Yes

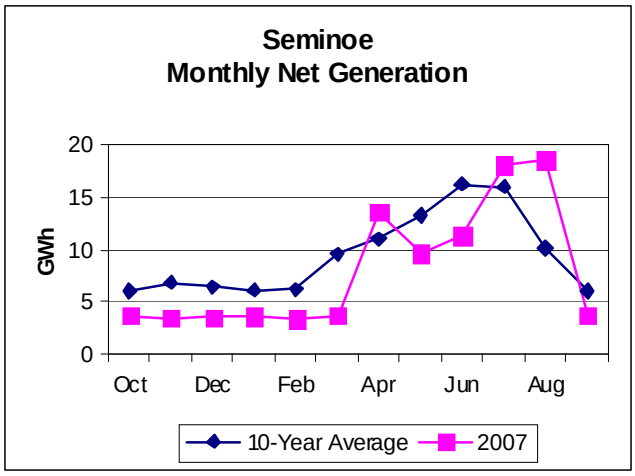
Generators

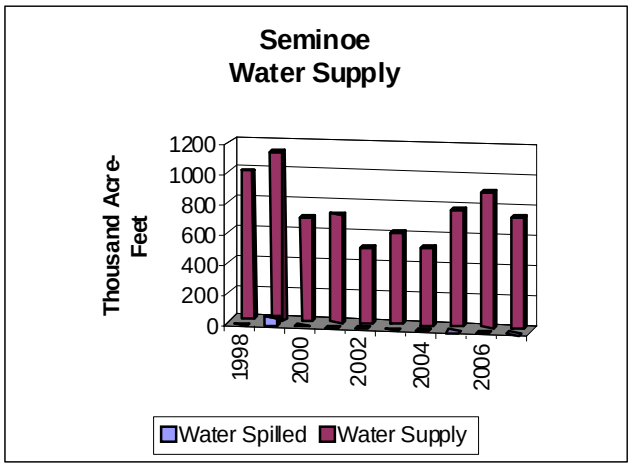
Seminoe Generators
Existing Number and Capacity

Unit #	Original Capacity (kW)	Capacity Increased (kW)	Present Capacity (kW)
1	10,800	6,450	17,250
2	10,800	6,450	17,250
3	10,800	6,450	17,250
3 units	32,400	19,350	51,750

Generation

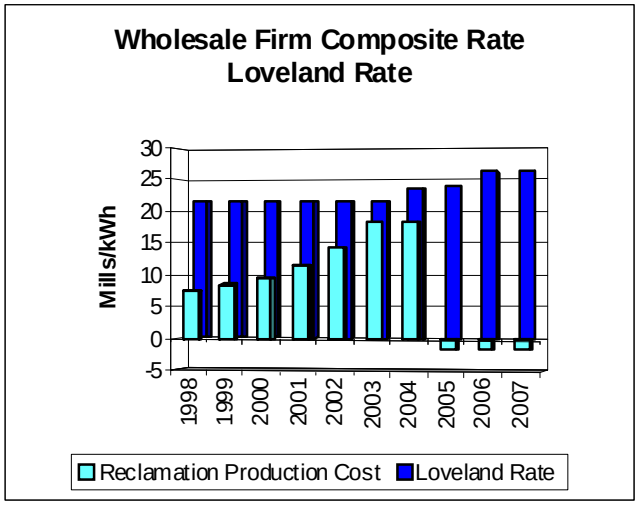

Seminoe
Fiscal Year Net Generation
GWh
200
150
100
50
0
1998
2000
2002
2004
2006
Net Generation
10-Year Average


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

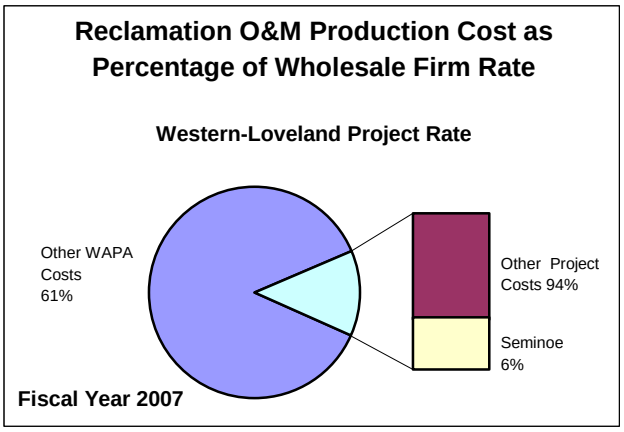

Seminoe
Water Supply
Thousand Acre-Feet
1200
1000
800
600
400
200
0
1998
2000
2002
2004
2006
Water Spilled
Water Supply

Prime Laboratory Benchmarks

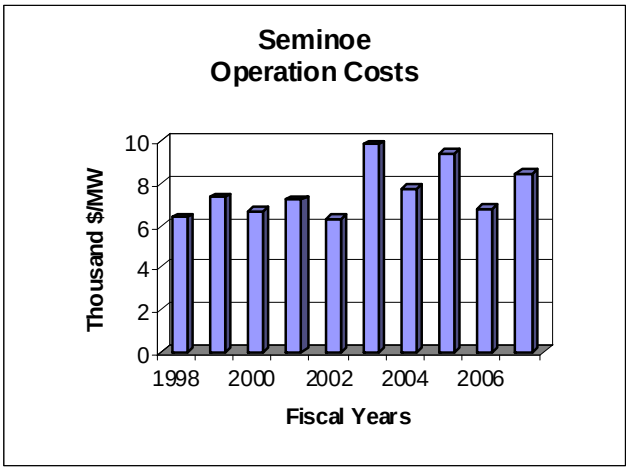
Benchmark 1
Wholesale Firm Rate

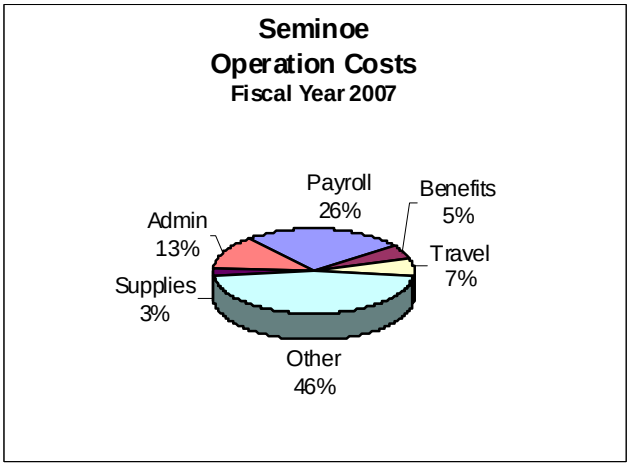


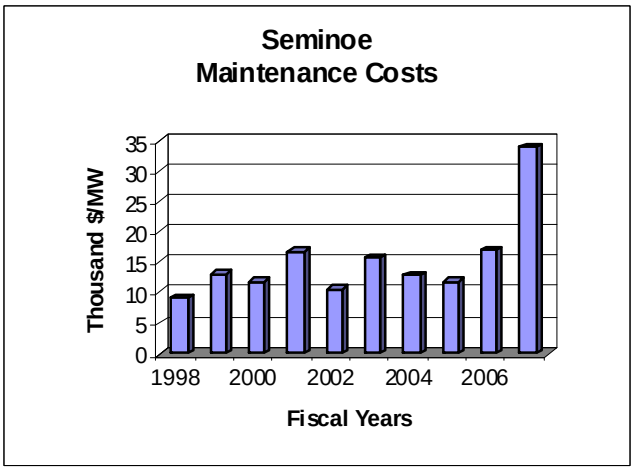
Benchmark 2
Reclamation's Production Costs as Percentage of Wholesale Firm Rate

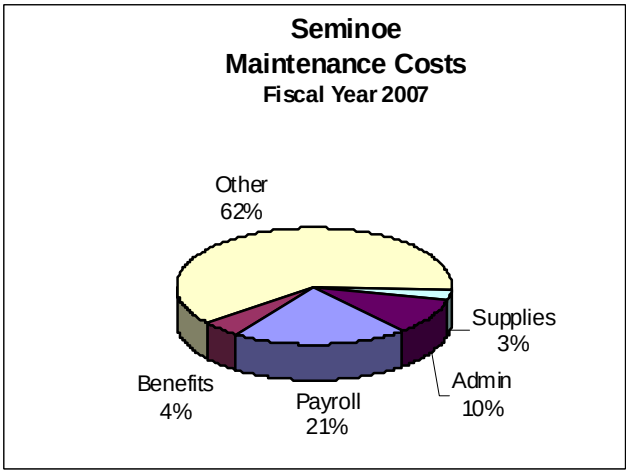


Benchmark 3
Production Costs



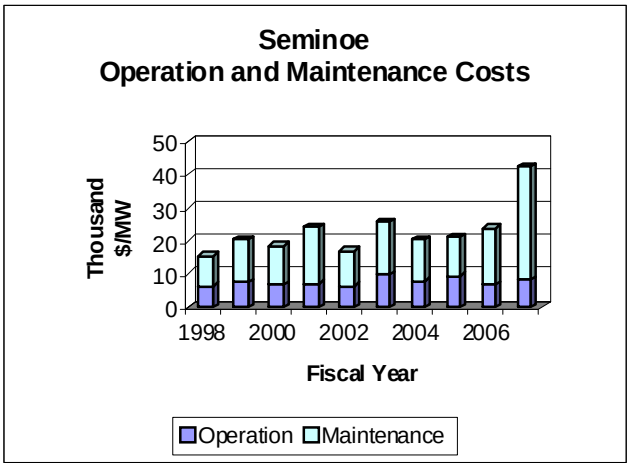


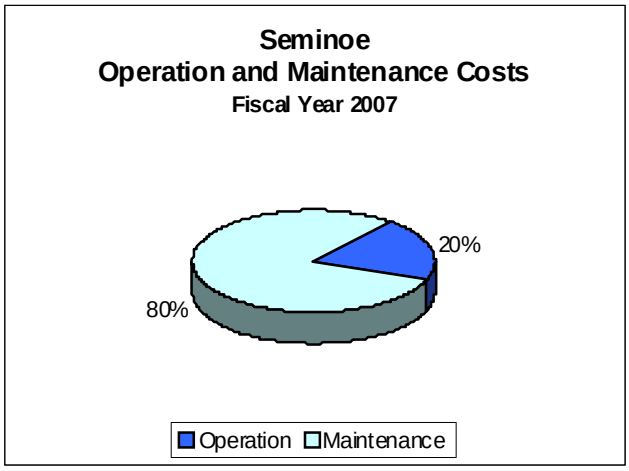


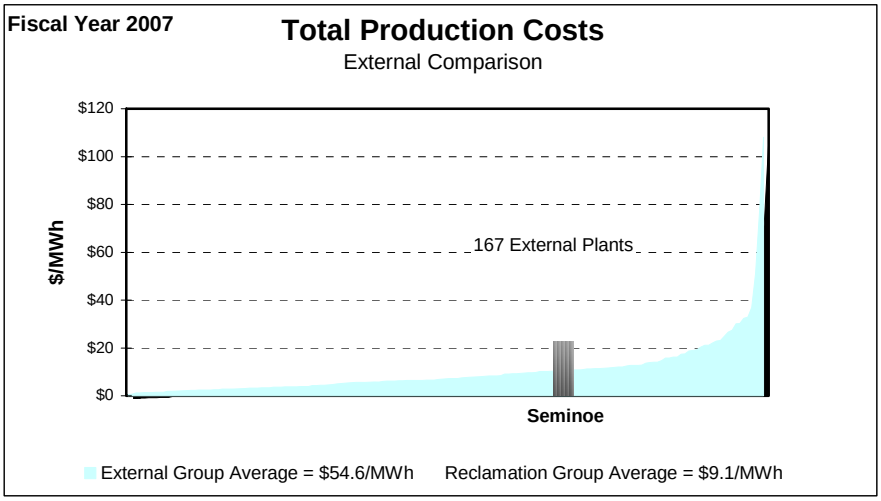


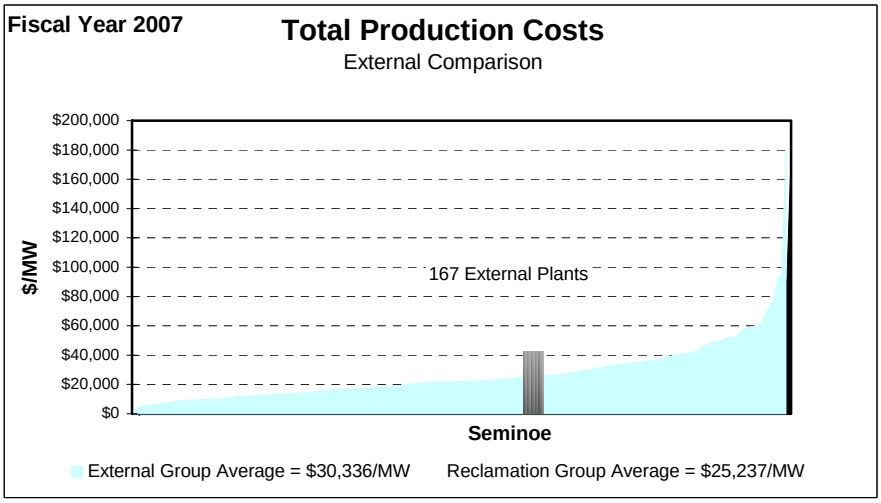
FY-2001- Significant cavitation repairs on all three units.

Benchmark 3
Production Costs



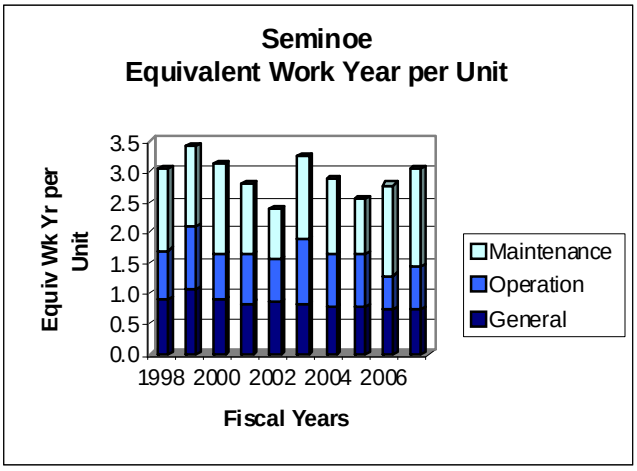


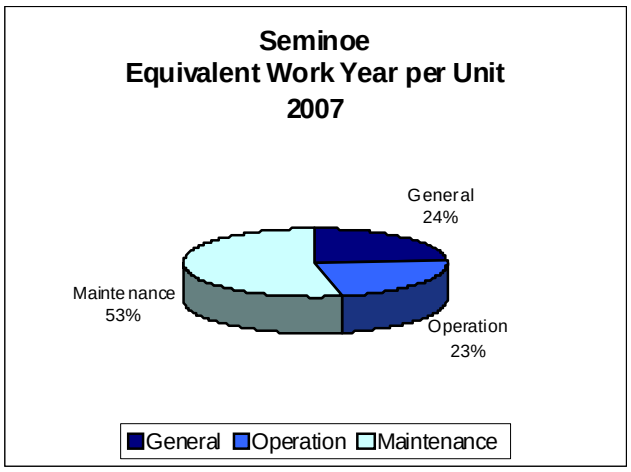


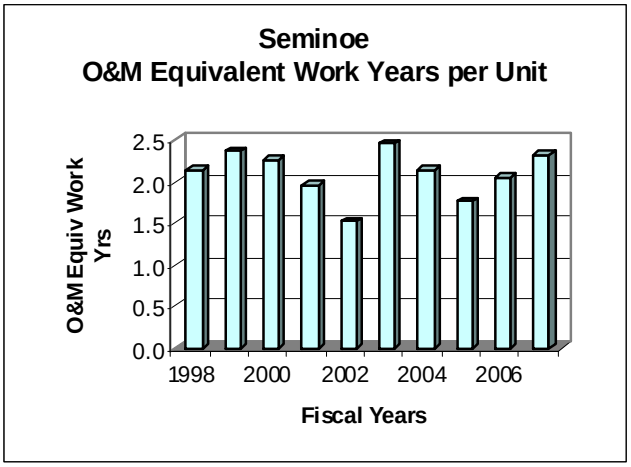


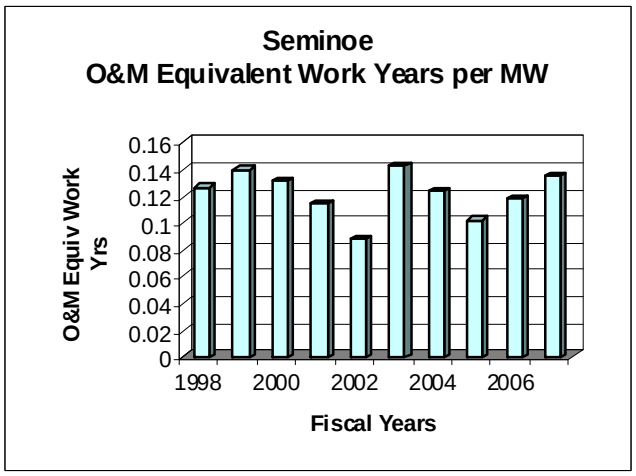
Benchmark 4
Workforce Deployment

Seminoe 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	1.90	0.21	0.05	2.17	0.72	0.04
Operation	1.90	0.21	0.00	2.12	0.71	0.04
Maintenance	4.38	0.49	0.00	4.88	1.63	0.09
Total Staffing	8.19	0.92	0.05	9.17	3.06	0.18

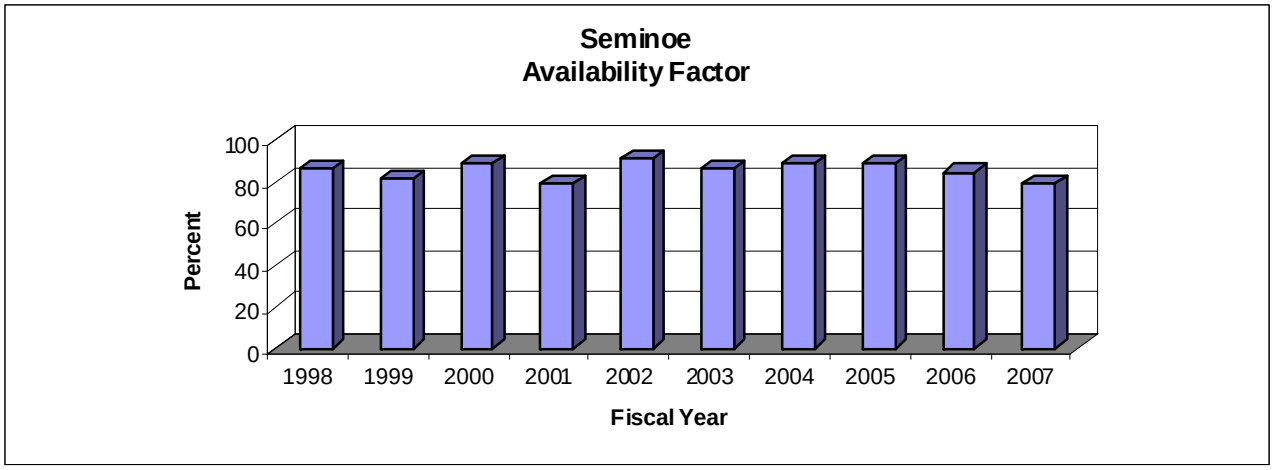






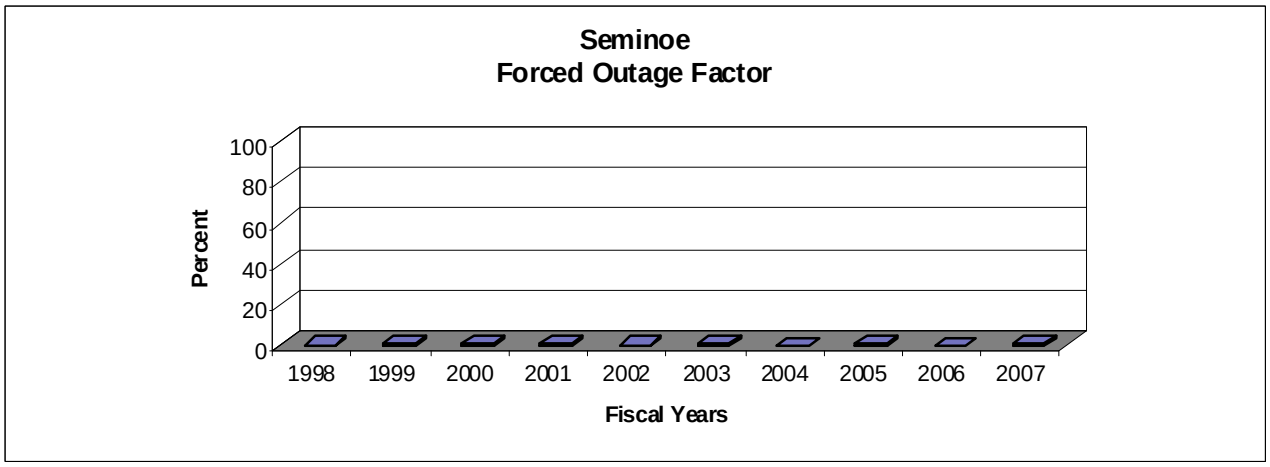


Benchmark 5
Plant Availability Factor

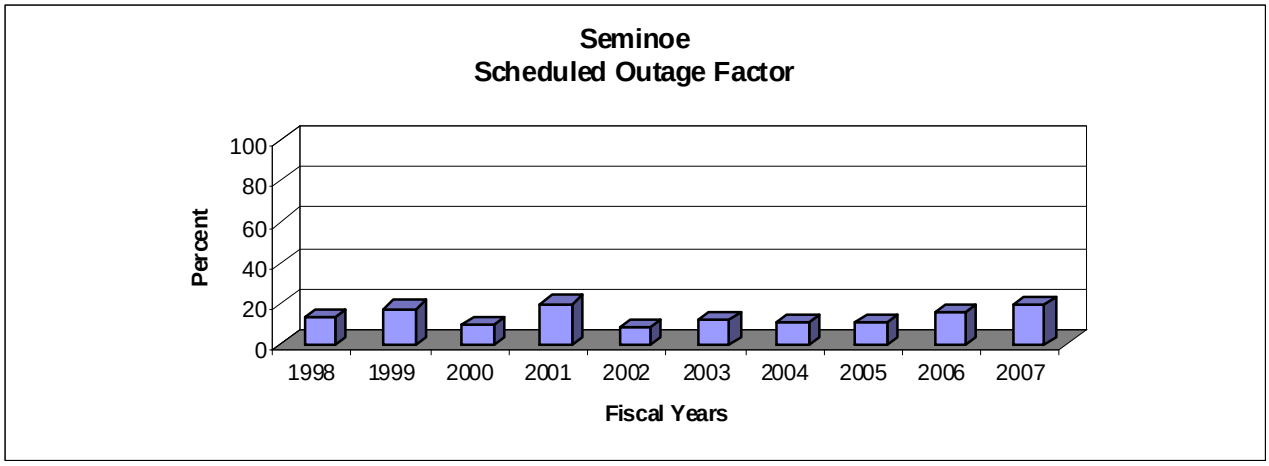


FY-2001– Extended outages on all three units for cavitation repairs

Benchmark 6
Plant Forced Outage Factor

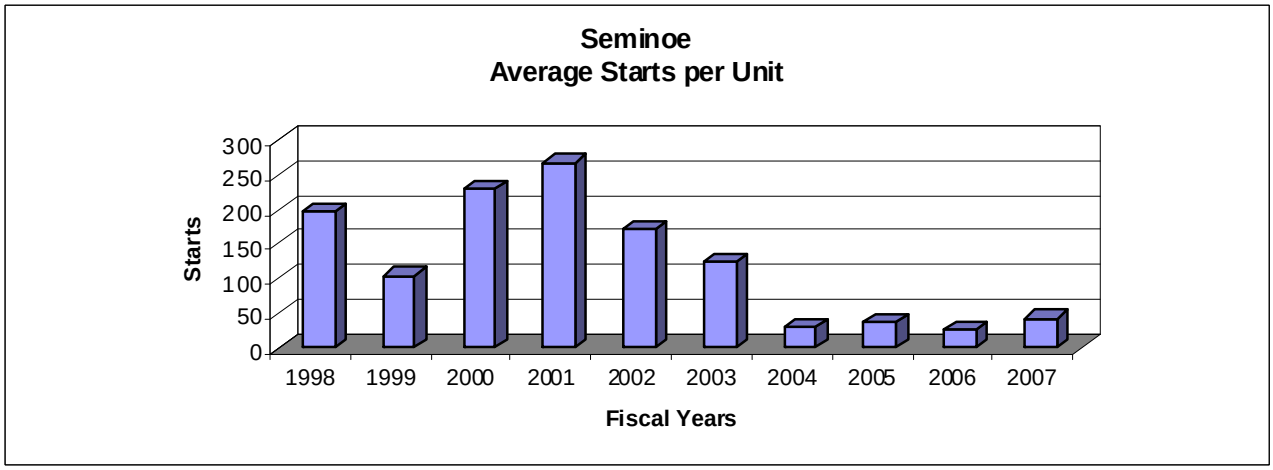


Benchmark 7
Plant Scheduled Outage Factor



FY-1996, and FY-1998 – Extended Maintenance.
FY-1999 – Extended maintenance of Unit 3.
FY-2000 – Replacement of Unit 3 transformer.

Unit Starts



Benchmark Data Comparison					
Fiscal Year 2007	**Seminoe Powerplant**	**Reclamation Average 30-100 MW Group**	**Total Reclamation Average**	**Industry Average**	**Best Performers**
Wholesale Firm Rate Mills/kWh	23.9	Not Applicable	*22.45	Not Available	Not Available
Production Cost as Percentage of Wholesale Firm Rate	4.99%	Not Applicable	12.1%	Not Applicable	Not Applicable
O&M Cost $/MWh	22.83	7.85	2.76	***54.63	1.00
O&M Costs $/MW	42,530	24,132	7,847	***30,336	2,897
O&M Equiv Work Year per MW	0.14	0.10	0.03	Not Available	0.0
Availability Factor	79.4	81.3	82.3	**88.64	98.5
Forced Outage Factor	0.7	0.2	2.6	**2.61	0.0
Scheduled Outage Factor	19.9	18.5	15.1	**8.74	0.0

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

Shoshone Powerplant
Pick-Sloan Missouri Basin Program

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Wyoming Area Office

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Reclamation Region: Great Plains

NERC Region: Western Electricity Coordinating Council, Rocky Mountain Power Area

PMA Service Area: Western Area Power Administration, Rocky Mountain Region

Project Authorization: The Secretary of the Interior authorized the Shoshone Project on February 10, 1904, under authority of the Reclamation Act of June 17, 1902, and authorized under authority of the Reclamation Reform Act of October 12, 1982, as the Buffalo Bill Dam Modifications as part of the Pick-Sloan Missouri Basin Program.

Project Purposes: Floodwaters of the Shoshone River are stored in Buffalo Bill Reservoir for later release for irrigation and power generation. Power is developed at the Shoshone and Heart Mountain Powerplants. The system is interconnected with the West Division of the Pick-Sloan Missouri Basin Program.

Plant Location: Shoshone Powerplant is located near the base of Buffalo Bill Dam. Shoshone Power plant is located in Park County, Wyoming, approximately 4.5 miles southwest of Cody, Wyoming, on the Shoshone River.

Plant Purpose: Power produced on the project is fed into a grid system which serves an area extending into three States.

Plant Facts: The Shoshone Powerplant is near the base of Buffalo Bill Dam and has a generating capacity of 3,000 kilowatts.

Plant History: Shoshone Powerplant began operation in 1922 and the third unit came on line in 1931. The original total installed capacity of the three generating units was 5,600 kilowatts. Unit 1 was rewound in 1956, which increased the total installed capacity of the three units to 6,012 kilowatts. In 1980 the plant was shut down due to the deteriorated condition of the units. Units 1 and 2 remain in place in a decommissioned status. Unit 3 was removed and replaced with a new 3,000-kilowatt unit in 1991.

Present Activities: Normal Operations.

Future Planned Activities: None

Special Issues: None

River:	Shoshone River	**Plant Type:**	Conventional
Powerhouse Type:	Above Ground	**Turbine Type:**	Francis
Original Nameplate Capacity:	8,600 kW	**Installed Capacity:**	3,000 kW
Year of Initial Operation:	1922	**Age:**	85 years
Net Generation (FY-2007):	20.0 GWh	**Rated Head:**	220 feet
Average Plant Factor (FY-2007):	77.3 percent	**Remotely Operated:**	Yes
Production Mode:	Base Load		

Ancillary Services

Shoshone
Ancillary Services

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

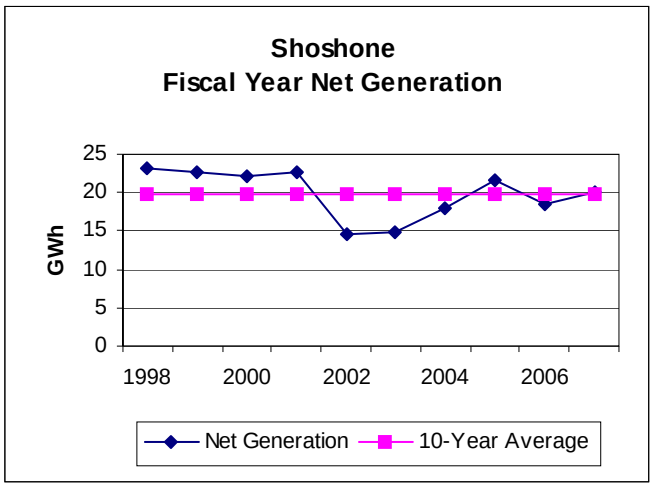
Generators

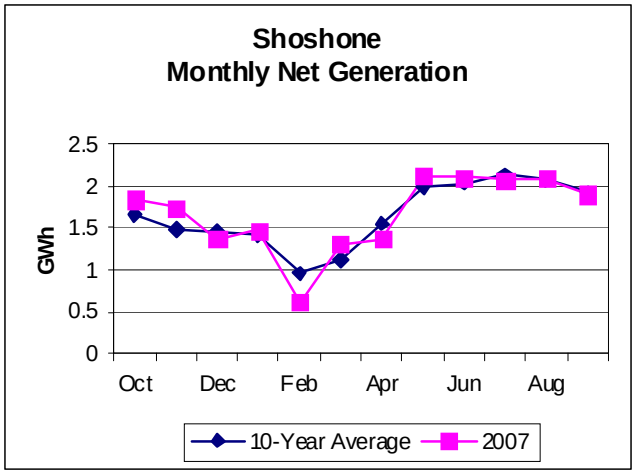
Shoshone Generators

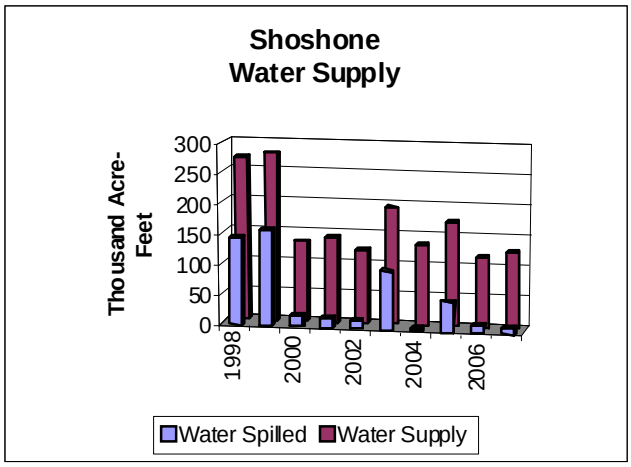
Existing Number and Capacity

Unit #	Original Capacity (kW)	Capacity Increased (kW)	Present Capacity (kW)
1	3,000	-	3,000
1 Unit	3,000	-	3,000

Generation

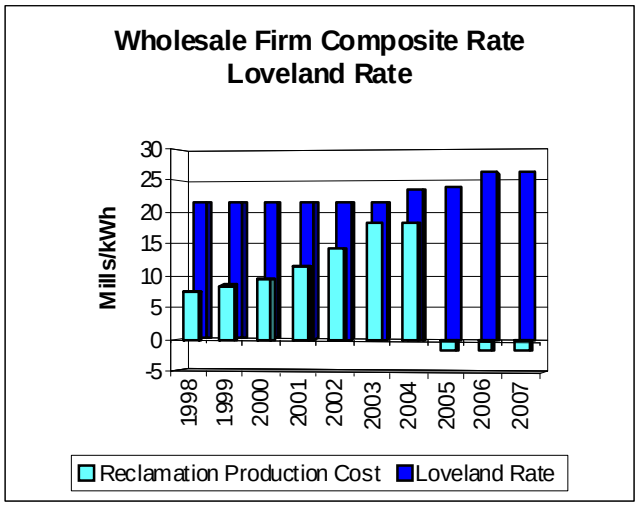

Shoshone
Fiscal Year Net Generation
GWh
25
20
15
10
5
0
1998
2000
2002
2004
2006
Net Generation
10-Year Average


Shoshone
Monthly Net Generation
GWh
2.5
2
1.5
1
0.5
0
Oct
Dec
Feb
Apr
Jun
Aug
10-Year Average
2007

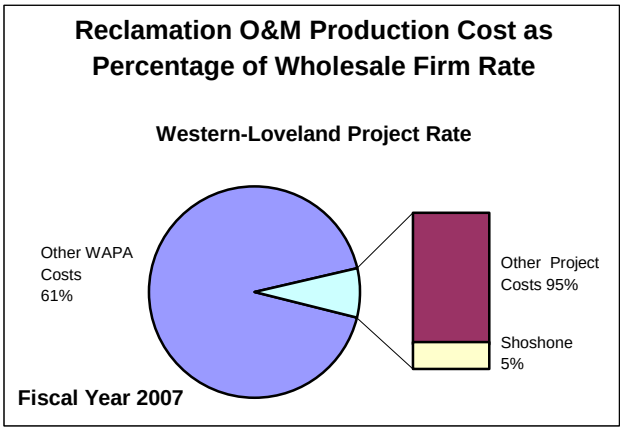

Shoshone
Water Supply
Thousand Acre-Feet
300
250
200
150
100
50
0
1998
2000
2002
2004
2006
Water Spilled
Water Supply

Prime Laboratory Benchmarks

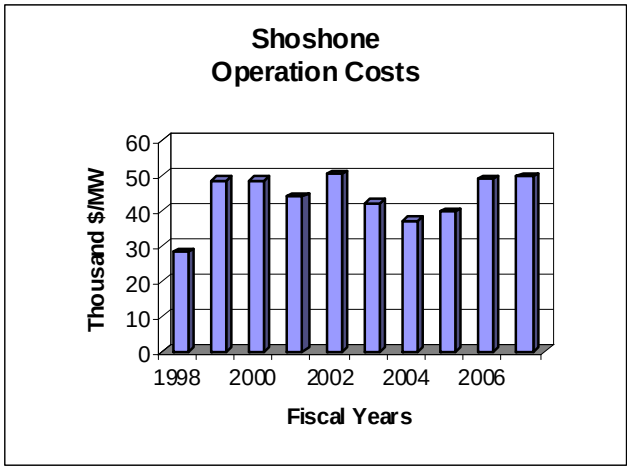
Benchmark 1
Wholesale Firm Rate

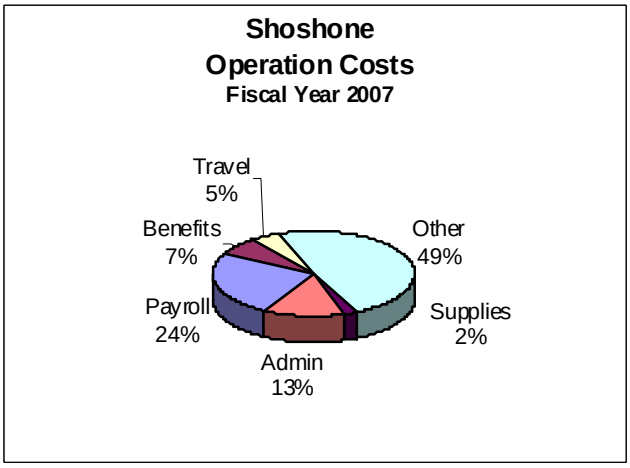


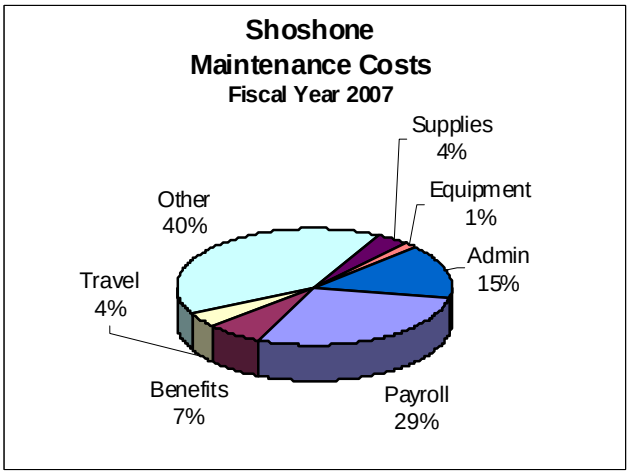
Benchmark 2
Reclamation's Production Costs as Percentage of Wholesale Firm Rate



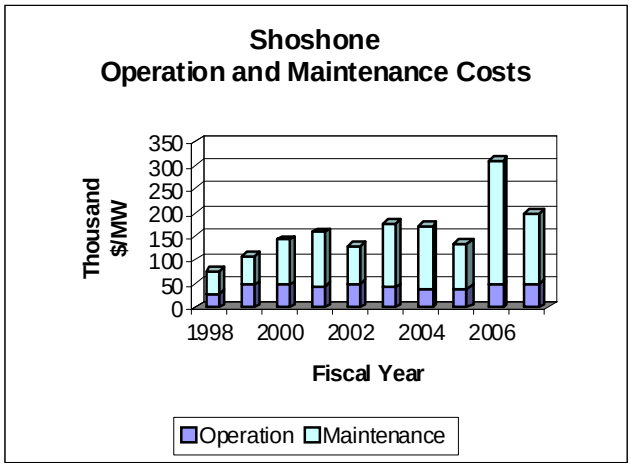
Benchmark 3
Production Costs

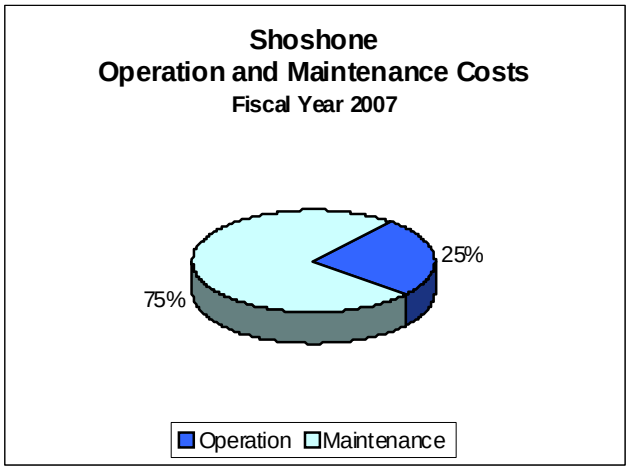


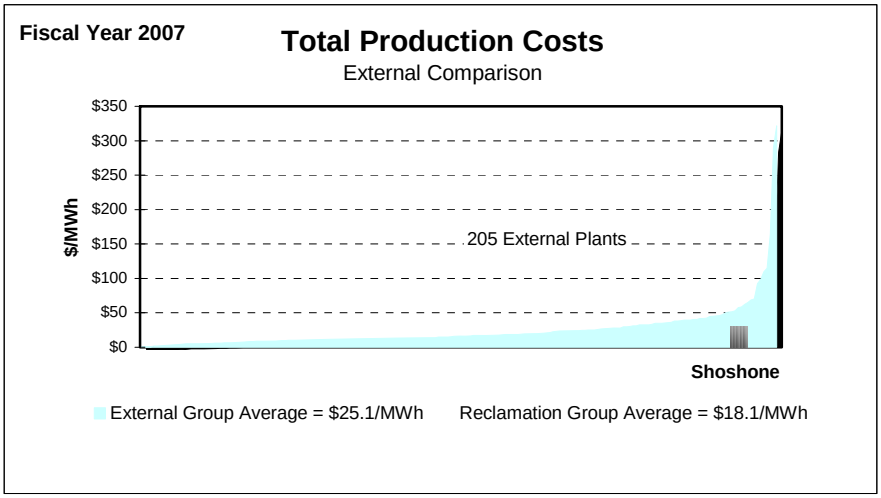


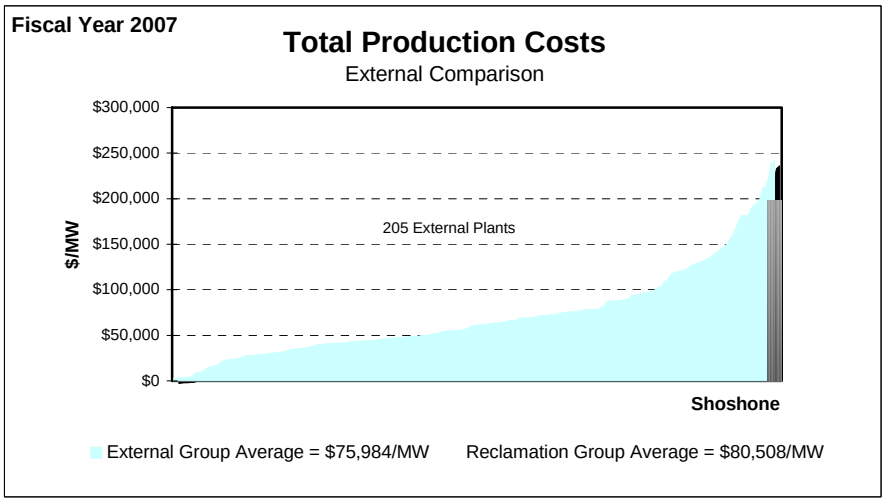


Benchmark 3
Production Costs



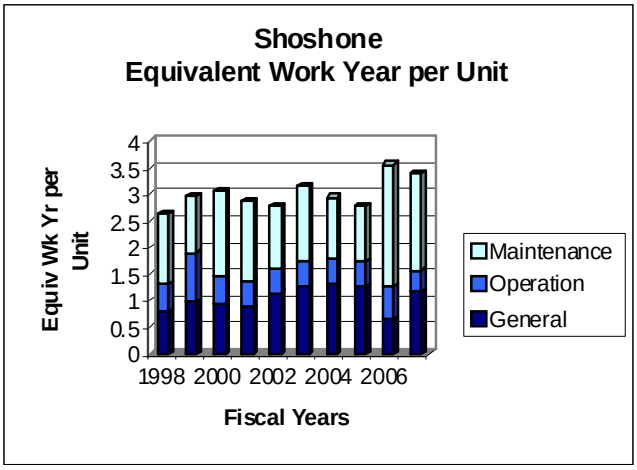


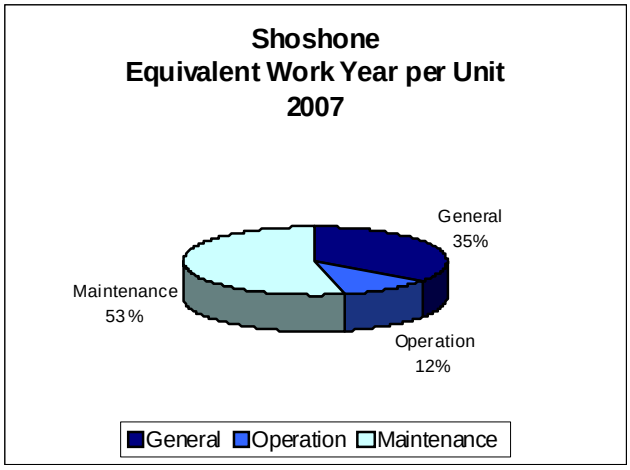


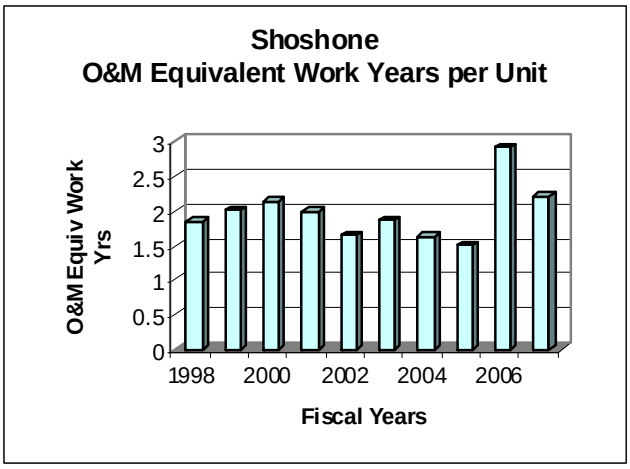


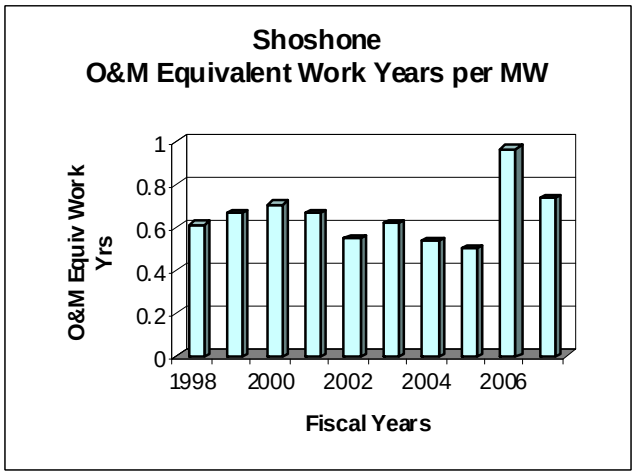
Benchmark 4
Workforce Deployment

Shoshone 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	1.04	0.12	0.02	1.17	1.17	0.39
Operation	0.35	0.04	0.00	0.39	0.39	0.13
Maintenance	1.64	0.18	0.00	1.82	1.82	0.61
Total Staffing	3.03	0.34	0.02	3.39	3.39	1.13

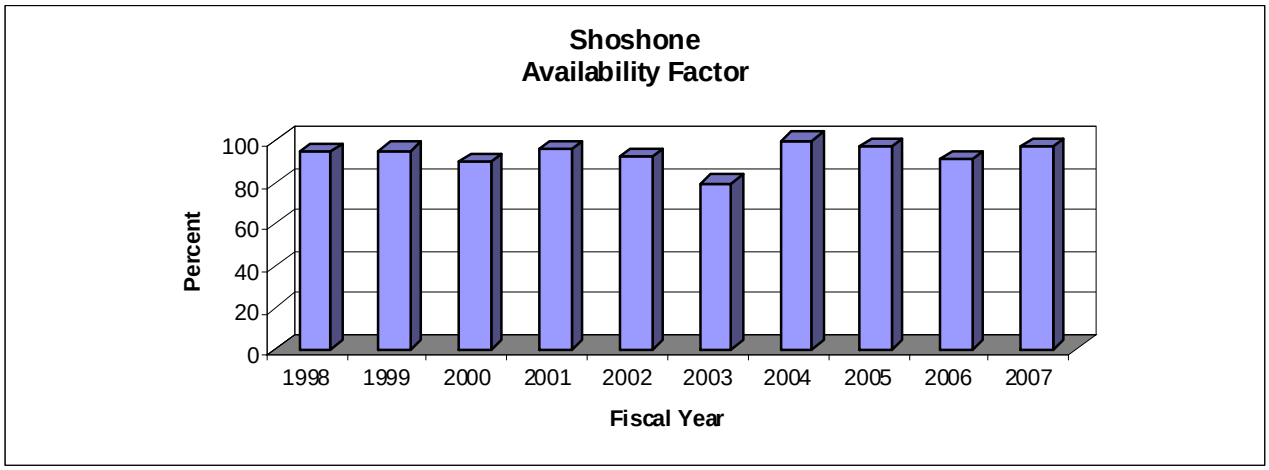




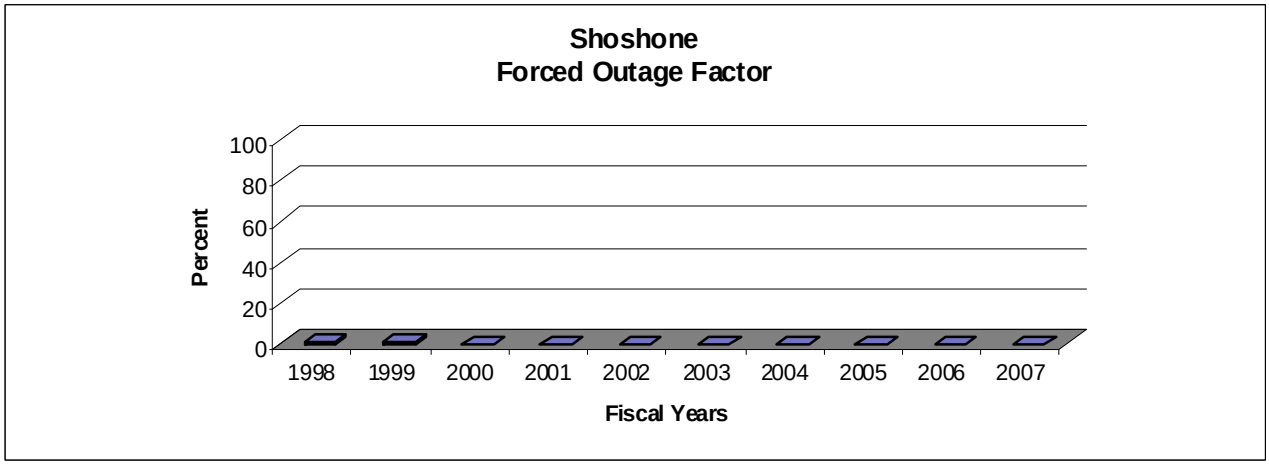




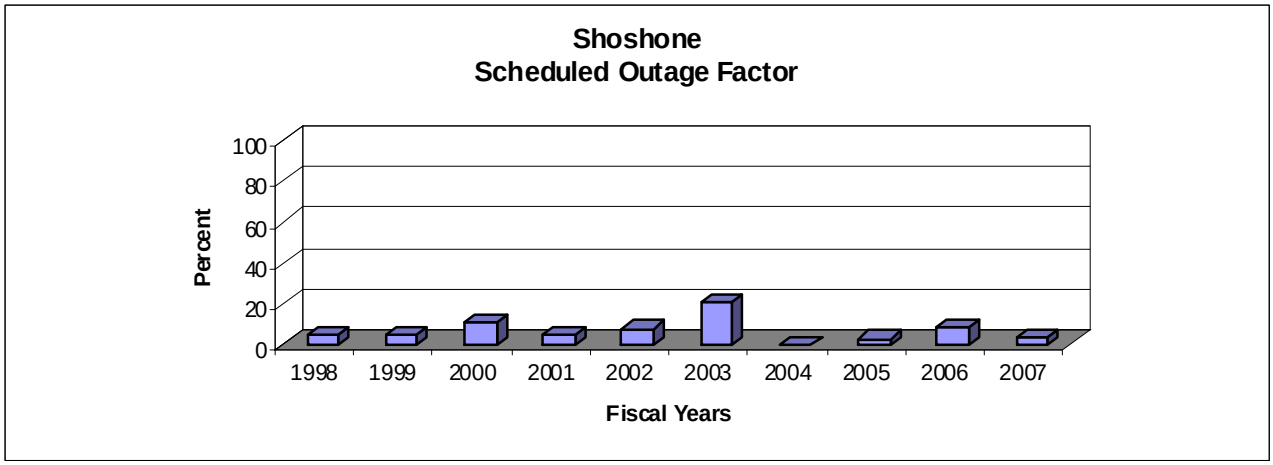
Benchmark 5
Plant Availability Factor



Benchmark 6
Plant Forced Outage Factor

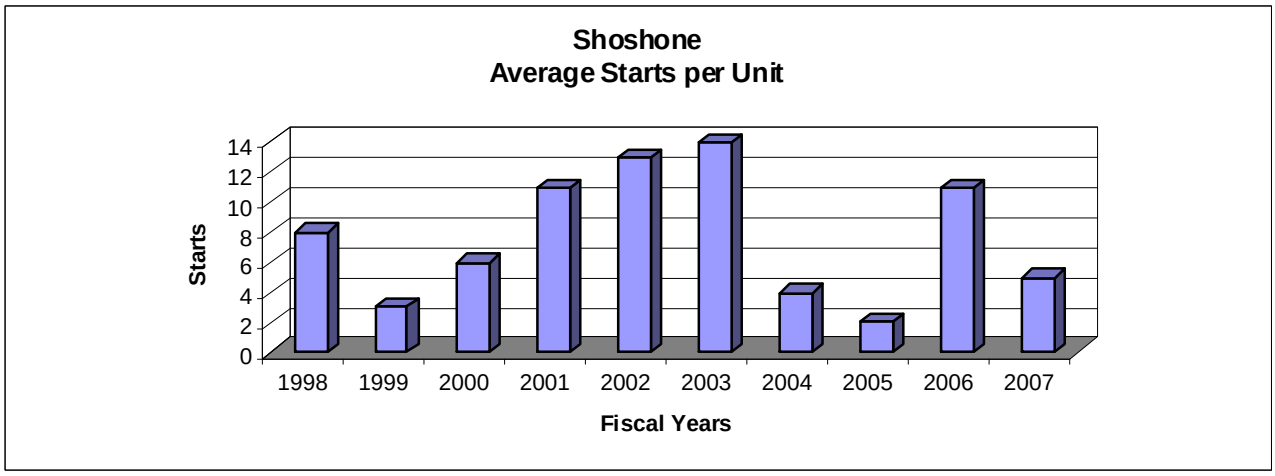


Benchmark 7
Plant Scheduled Outage Factor



FY-2003 – Contract repairs to draft tube.

Unit Starts



Benchmark Data Comparison					
Fiscal Year 2007	**Shoshone Powerplant**	**Reclamation Average 0-10 MW Group**	**Total Reclamation Average**	**Industry Average**	**Best Performers**
Wholesale Firm Rate Mills/kWh	23.9	Not Applicable	*22.45	Not Available	Not Available
Production Cost as Percentage of Wholesale Firm Rate	1.4%	Not Applicable	12.1%	Not Applicable	Not Applicable
O&M Cost $/MWh	29.77	14.71	2.76	***25.9	1.00
O&M Costs $/MW	198,590	60,518	7,847	***75,984	2,897
O&M Equiv Work Year per MW	0.74	0.41	0.03	Not Available	0.0
Availability Factor	96.9	88.73	82.3	**88.64	98.5
Forced Outage Factor	0.0	0.91	2.6	**2.61	0.0
Scheduled Outage Factor	3.1	10.36	15.1	**8.74	0.0

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

Spirit Mountain Powerplant
Pick-Sloan Missouri Basin Program

Plant Contact:
John H. Lawson
Area Manager
Wyoming Area Office

Plant Address:
Spirit Mountain Powerplant
Cody, WY

Telephone Numbers:
Phone: (307) 261-5671
Fax: (307) 261-5683

E-Mail Address: jlawson@gp.usbr.gov

Reclamation Region:	Great Plains
NERC Region:	Western Electricity Coordinating Council, Rocky Mountain Power Area
PMA Service Area:	Western Area Power Administration, Rocky Mountain Region
Project Authorization:	The Secretary of the Interior authorized the Shoshone Project on February 10, 1904, under authority of the Reclamation Act of June 17, 1902, and authorized under authority of the Reclamation Reform Act of October 12, 1982, as the Buffalo Bill Dam Modifications as part of the Pick-Sloan Missouri Basin Program.
Project Purposes:	Floodwaters of the Shoshone River are stored in Buffalo Bill Reservoir for later release for irrigation and power generation. Power is developed at the Buffalo Bill, Shoshone, Heart Mountain, and Spirit Mountain Power plants. The system is interconnected with the West Division of the Pick-Sloan Missouri Basin Program.
Plant Location:	Spirit Mountain Power plant is located in Park County, Wyoming, approximately 4 miles southwest of Cody, Wyoming, on a conduit from Buffalo Bill Dam.
Plant Purpose:	The primary purpose of the Spirit Mountain Powerplant is to dissipate energy of the water from the pressurized supply conduit from Buffalo Bill Reservoir before it enters the unpressurized supply canal which feeds the Heart Mountain Powerplant and the Heart Mountain Canal. The secondary purpose of the powerplant is to produce electrical power.

Plant Facts:	Spirit Mountain Powerplant consists of one 4,500-kilowatt generator.
Plant History:	Operation of this plant began in 1995.
Present Activities:	None
Future Planned Activities:	None
Special Issues:	This plant cannot operate unless the downstream Shoshone conduit is watered up. As a result of the modification of Buffalo Bill Dam, Buffalo Bill and Shoshone Power plants were completed in 1992. Due to the Revised In stream Flow Agreement associated with the reconstruction of the dam, winter releases previously discharged from Heart Mountain Powerplant that would have passed through spirit Mountain Powerplant are now made through the two upstream facilities. As a result, Spirit Mountain Powerplant has been operated on a seasonal basis since its completion in 1995.

River:	Shoshone River	**Plant Type:**	Conventional
Powerhouse Type:	Under Ground	**Turbine Type:**	Francis
Original Nameplate Capacity:	4,500 kW	**Installed Capacity:**	4,500 kW
Year of Initial Operation:	1994	**Age:**	13 years
Net Generation (FY-2007):	16.1 GWh	**Rated Head:**	110 feet
Average Plant Factor (FY-2007):	41.6 percent	**Remotely Operated:**	Yes
Production Mode:	Base Load/Seasonal		

Ancillary Services

Spirit Mountain
Ancillary Services

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

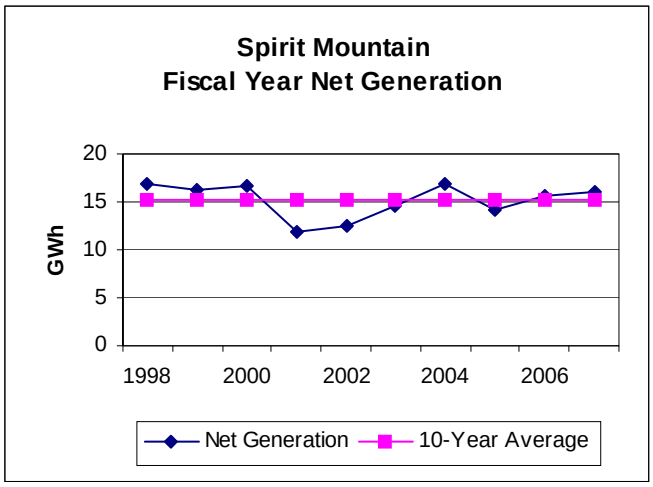
Generators

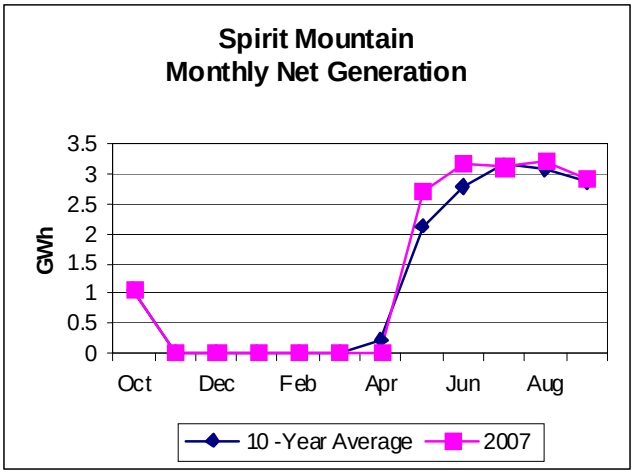
Spirit Mountain Generators

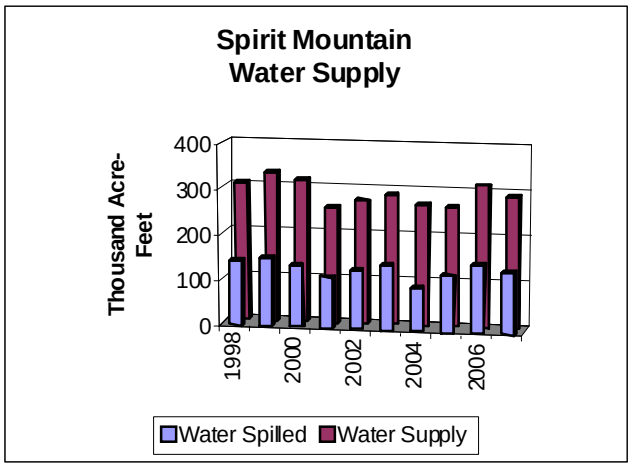
Existing Number and Capacity

Unit #	Original Capacity (kW)	Capacity Increased (kW)	Present Capacity (kW)
1	4,500	-	4,500
1 Unit	4,500	-	4,500

Generation

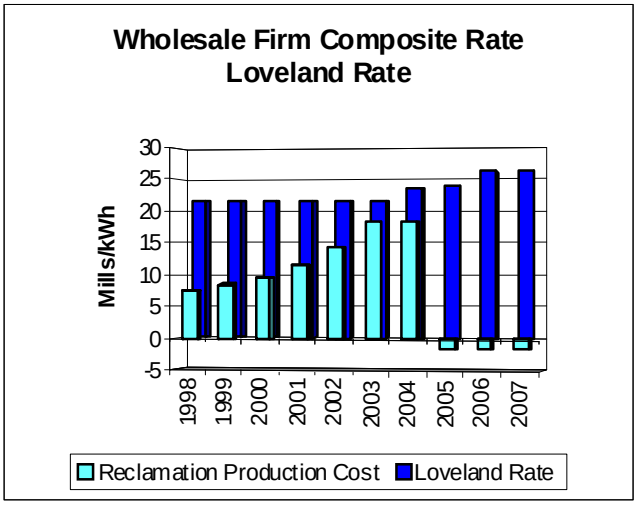

Spirit Mountain
Fiscal Year Net Generation
GWh
20
15
10
5
0
1998
2000
2002
2004
2006
Net Generation
10-Year Average


Spirit Mountain
Monthly Net Generation
GWh
3.5
3
2.5
2
1.5
1
0.5
0
Oct
Dec
Feb
Apr
Jun
Aug
10 -Year Average
2007

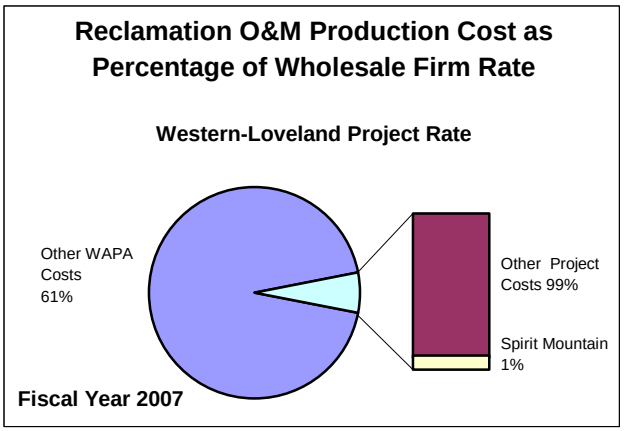

Spirit Mountain
Water Supply
Thousand Acre-Feet
400
300
200
100
0
1998
2000
2002
2004
2006
Water Spilled
Water Supply

Prime Laboratory Benchmarks

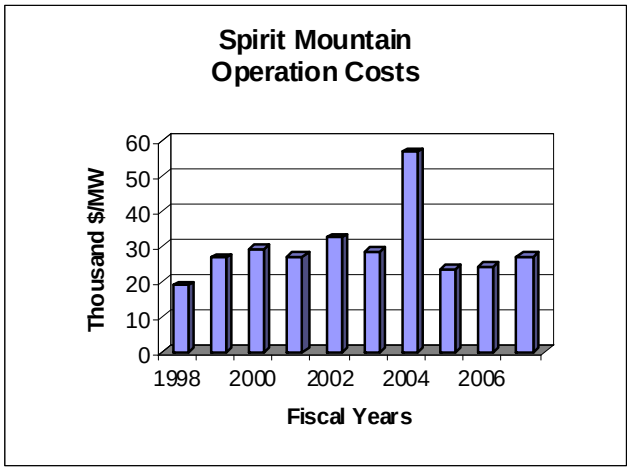
Benchmark 1
Wholesale Firm Rate

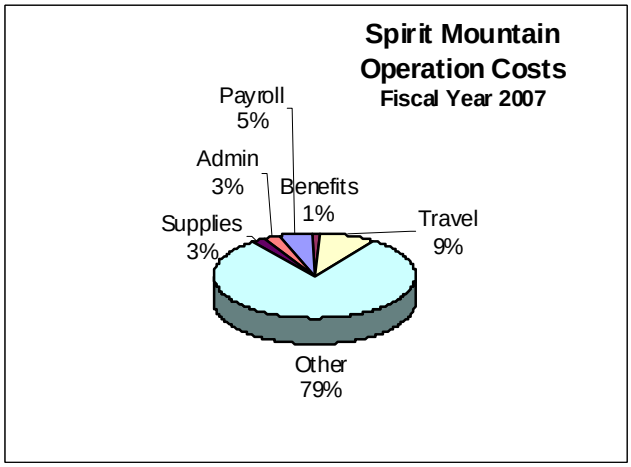


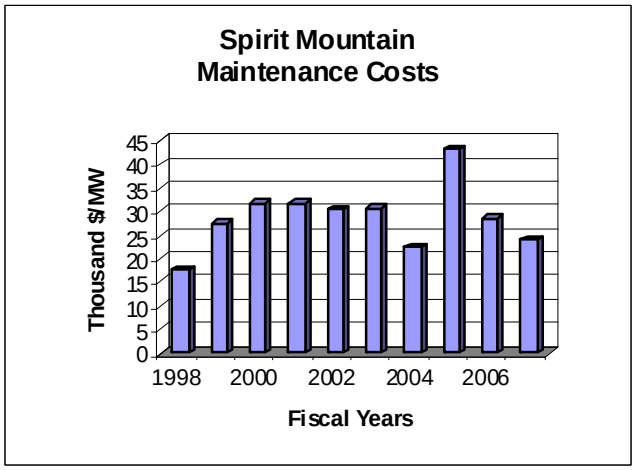
Benchmark 2
Reclamation's Production Cost as Percentage of Wholesale Firm Rate

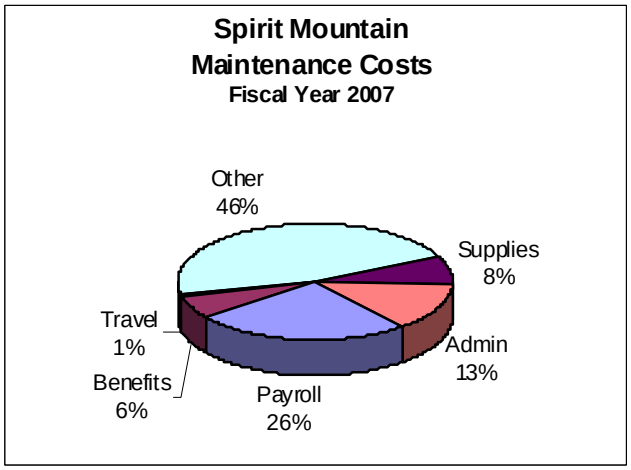


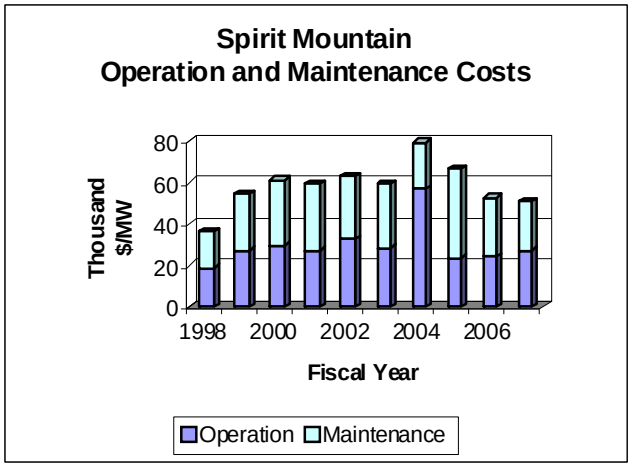
Benchmark 3
Production Cost

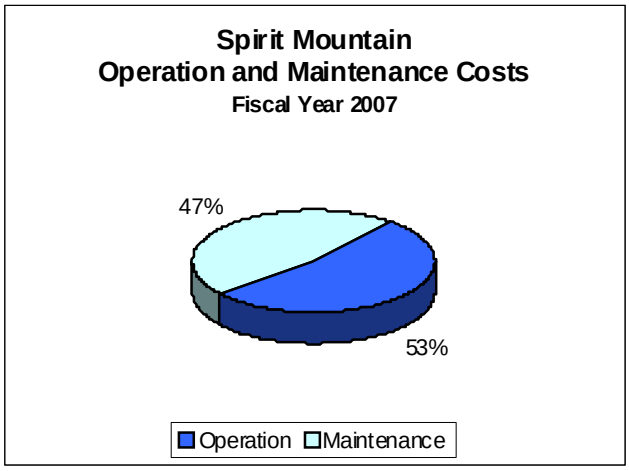






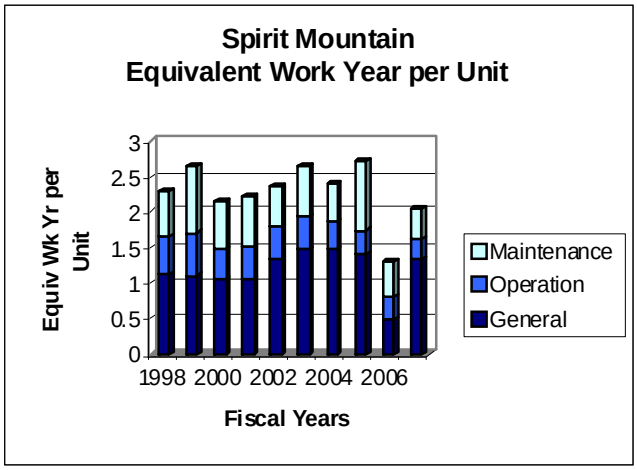


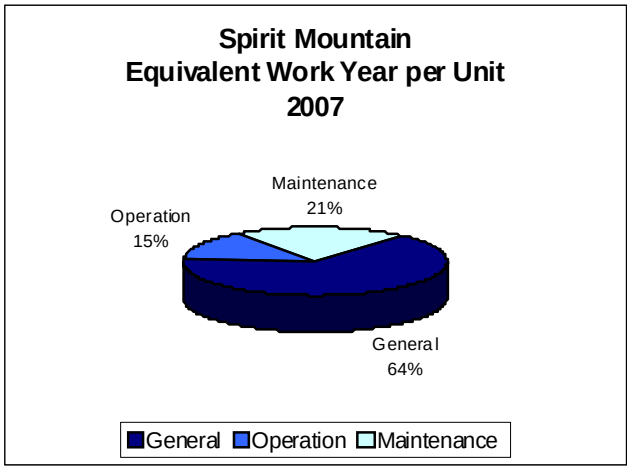


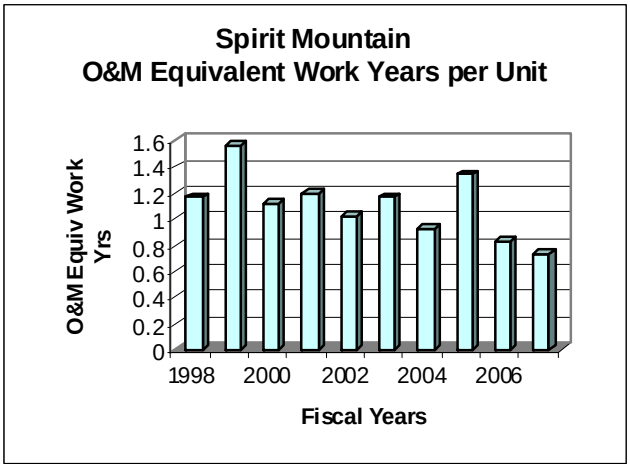


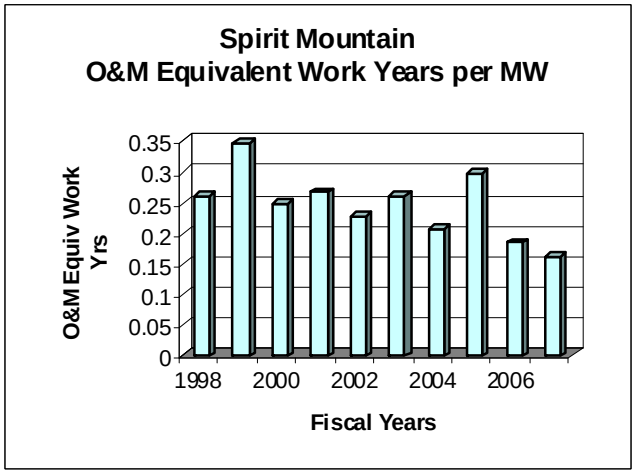
Benchmark 4
Workforce Deployment

Spirit Mountain 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	1.18	0.13	0.02	1.33	1.33	0.30
Operation	0.27	0.03	0.00	0.30	0.30	0.07
Maintenance	0.39	0.04	0.00	0.43	0.43	0.10
Total Staffing	1.84	0.21	0.02	2.06	2.06	0.46

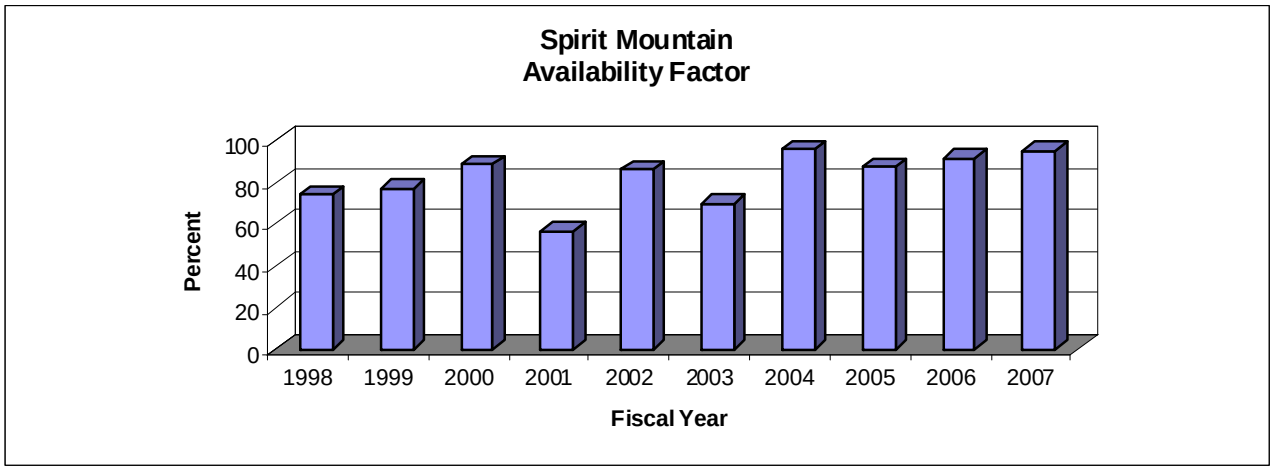






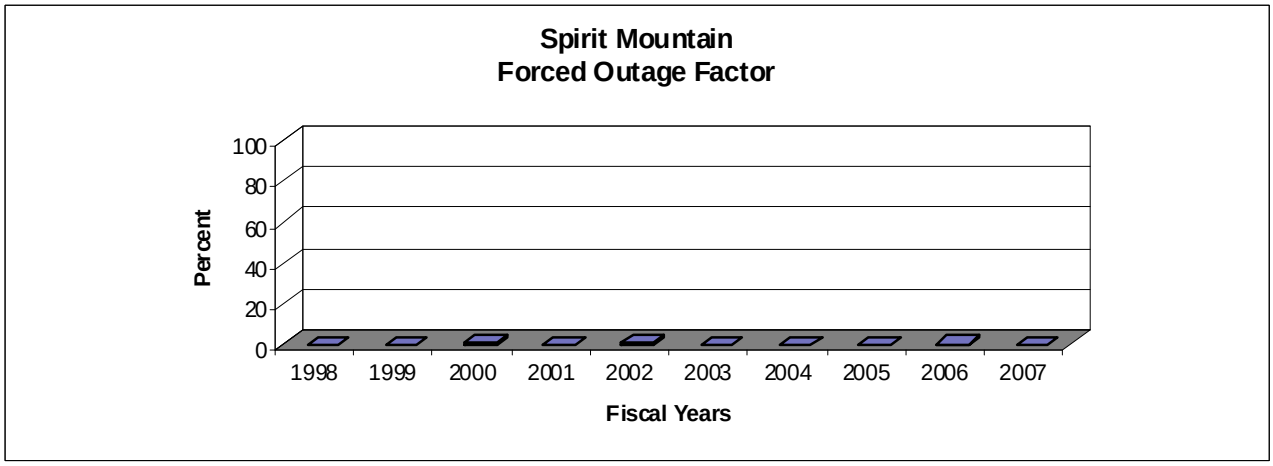


Benchmark 5
Availability Factor

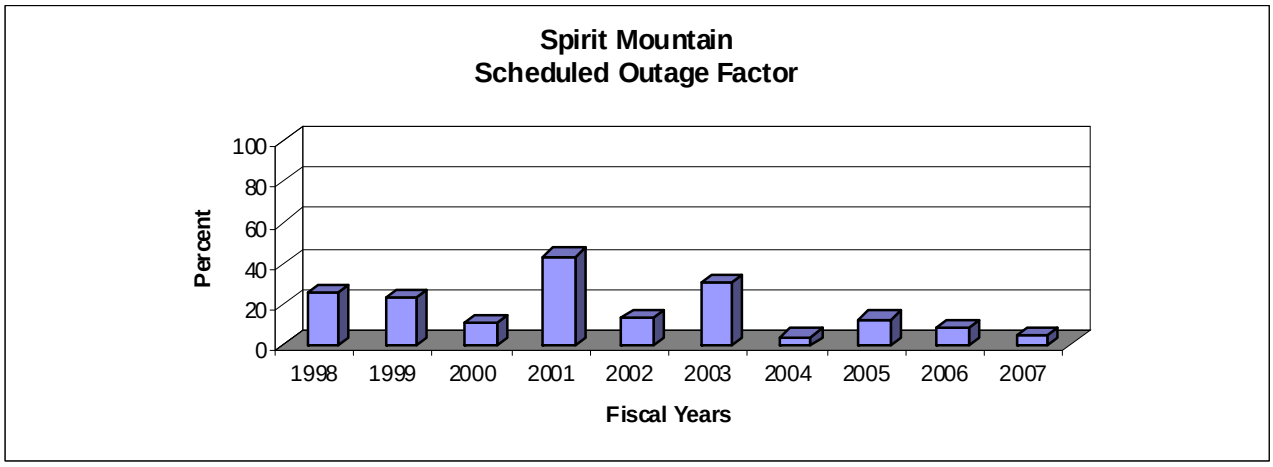


FY-01-Extended outages due to coating repairs in the Buffalo Bill penstock and to the sleeve valves.

Benchmark 6
Forced Outage Factor

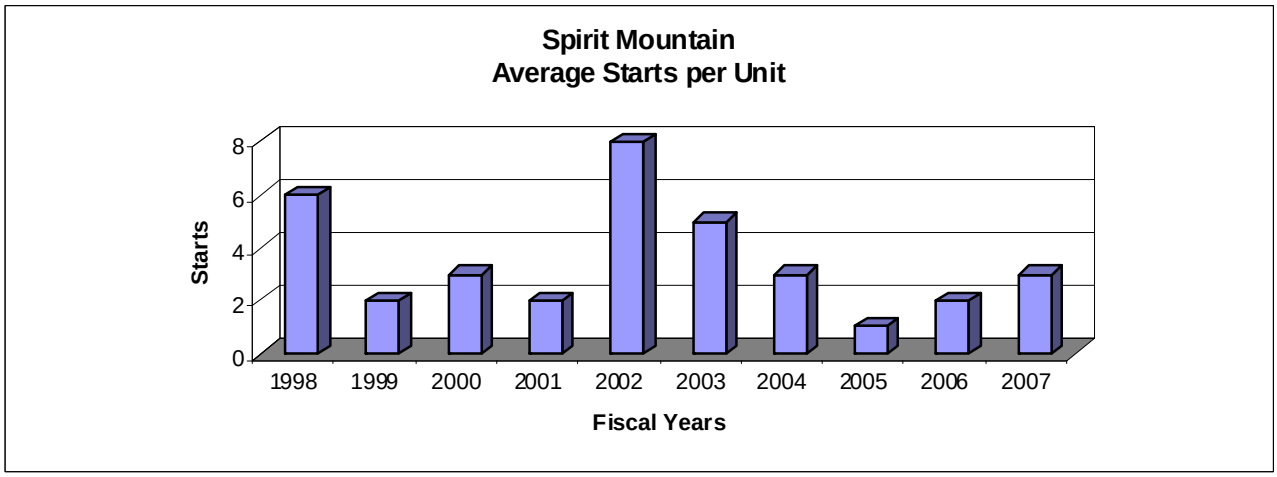


Benchmark 7
Scheduled Outage Factor



FY-01 – Extended outages due to coating repairs in the Buffalo Bill penstock and to the sleeve valves.
FY 03 – Extensive packing box repairs and replacement of failed and disconnected switch.

Starts



Benchmark Data Comparison				
Fiscal Year 2007	**Spirit Mountain Powerplant**	**Total Reclamation Average**	**Industry Average**	**Best Performers**
Wholesale Firm Rate Mills/kWh	23.9	*22.45	Not Available	Not Available
Production Cost as Percentage of Wholesale Firm Rate	0.5%	12.1%	Not Applicable	Not Applicable
O&M Cost $/MWh	14.24	2.76	Not Applicable	1.00
O&M Costs $/MW	51,068	7,847	Not Applicable	2,897
O&M Equiv Work Year per MW	0.16	0.03	Not Available	0.0
Availability Factor	95.23	82.3	**88.64	98.5
Forced Outage Factor	0.00	2.6	**2.61	0.0
Scheduled Outage Factor	4.77	15.1	**8.74	0.0

*Weighted by Net Generation
**2006 NERC Average

Yellowtail Powerplant
Pick-Sloan Missouri Basin Program

Plant Contact:
Tom Tauscher
Facility Manager

Plant Address:
Yellowtail Field Office
PO Box 7551
Ft. Smith MT 59035

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Phone: (406) 666-3201
Fax: (406) 666-3209

E-Mail Address:
ttauscher@gp.usbr.gov

Reclamation Region: Great Plains

NERC Region: Western Electricity Coordinating Council, Rocky Mountain Power Area

PMA Service Area: Western Area Power Administration, Rocky Mountain Region and Upper Great Plains Region

Project Authorization: Construction of the Yellowtail Unit, part of the Pick-Sloan Missouri Basin Project Eastern and Western Divisions, was authorized by the Flood Control Act of December 22, 1944, Public Law 534, which approved the general comprehensive plan set forth in Senate document 191, as revised by Senate Document 247, 78th Congress.

Project Purposes: The Yellowtail Unit is a multi-purpose project which provides low cost power generation and makes an important contribution to the flood control, irrigation, and power supply in the Missouri Basin.

Plant Location: Yellowtail Dam, Powerplant, and Afterbay Dam, the principle structures of the Yellowtail Unit, are located on the Bighorn River, in south-central Montana, approximately 45 miles southwest of Hardin, Montana, and 90 miles southeast of Billings.

Plant Purpose: Yellowtail Powerplant, with an installed capacity of 250,000 kilowatts, provides low cost power and supplies expanding power needs for residential and commercial use in a wide surrounding area. The widely varying releases from the powerplant are regulated by the Yellowtail Afterbay Dam, constructed 2.2 miles downstream. The afterbay, with a capacity of 3140 acre-feet, minimizes downstream fluctuations in the Bighorn River by providing a uniform daily flow, leveling the peaking power discharges from the powerplant.

Plant Facts:

Yellowtail Powerplant is located at the downstream toe of the dam on the right abutment. Four 12-foot diameter penstocks embedded in the dam supply water to four vertical-shaft, Francis-type hydraulic turbines, two are the originals rated at 87,500 horsepower and two are replacements that were installed in 1999 and 2000, rated at 96,500 horsepower, each driving a 62,500-kilowatt generator. Yellowtail Dam, at the mouth of Bighorn Canyon, is a concrete structure rising 525 feet above the rock foundation and impounds flows of the Bighorn River for multi-purpose use. Bighorn Lake is about 72 miles long with a total capacity of 1,328,360 acre feet.

Plant History:

Construction on Yellowtail Dam and Powerplant began in May 1961 and was completed in December 1967; construction of the Afterbay Dam was started in April 1964 and was completed in November 1966. Operation of Units 3 and 4 began in August 1966, followed by Unit 2 in October 1966, and Unit 1 in November 1966. Units 1 and 2 (115-kV) are part of the Western Division of Pick-Sloan Missouri Basin Program, and Units 3 and 4 (230-kV) are part of the Eastern Division.

Present Activities:

Activities included: hollow jet valve condition assessment; power penstock fatigue analysis; Afterbay power line installation; triennial maintenance on generator step-up and station service transformers; Afterbay gate actuator replacement; replacement of the Afterbay 48-volt DC batteries; dam face and spillway tunnel inspections; maintenance of the Afterbay 13.8 kV switchyard supply breaker 4322; Afterbay control system upgrade; foundation drain cleaning; dam and powerplant elevator modernization; Unit 3 and 4 annual maintenance; and Unit 2 quadrennial maintenance.

Future Activities:

Major activities planned in the near future include: completion of powerplant station service standby engine-generator addition; hollow-jet valve refurbishment; complete Afterbay gate actuator replacement; install new shoring in the right G&I tunnel; Afterbay control system upgrade and gate automation; and MAXIMO (CARMA) implementation.

Special Issues:

The Bighorn River Basin experienced its seventh consecutive year of drought conditions, resulting in below average power generation in FY2000 through FY2006. Responsibilities, in addition to the 250,000-kilowatt powerplant, also include the operation and maintenance of two dams, two reservoirs, a Government camp and residential housing, two water and sewage systems, the Bighorn Canal headworks, and miles of road and fences.

River:	Bighorn River	**Plant Type:**	Conventional
Powerhouse Type:	Above Ground	**Turbine Type:**	Francis
Original Nameplate Capacity:	250,000 kW	**Installed Capacity:**	250,000 kW
Year of Initial Operation:	1966	**Age:**	41 years
Net Generation (FY-2007):	362.0 GWh	**Rated Head:**	440 feet
Average Plant Factor (FY-2007):	16.7 percent	**Remotely Operated:**	Yes
Production Mode:	Peaking		

Ancillary Services

Yellowtail
Ancillary Services

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

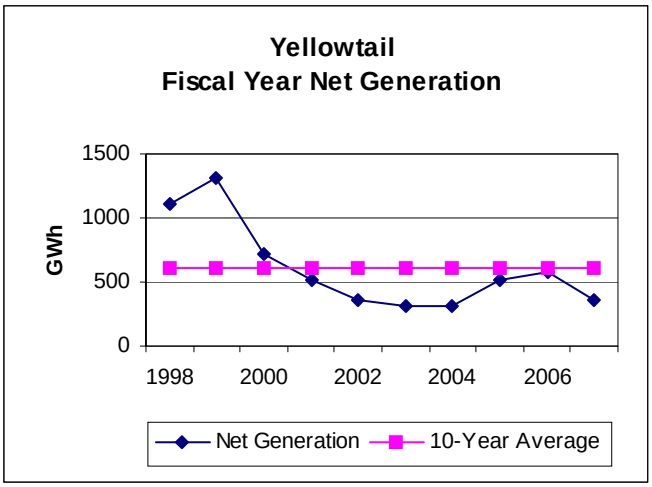
Generators

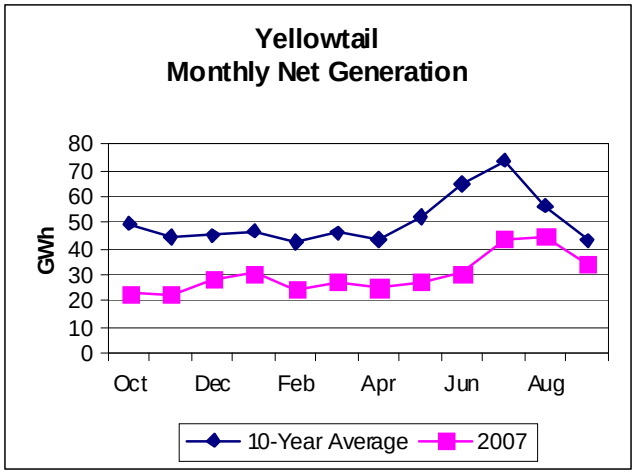
Yellowtail Generators

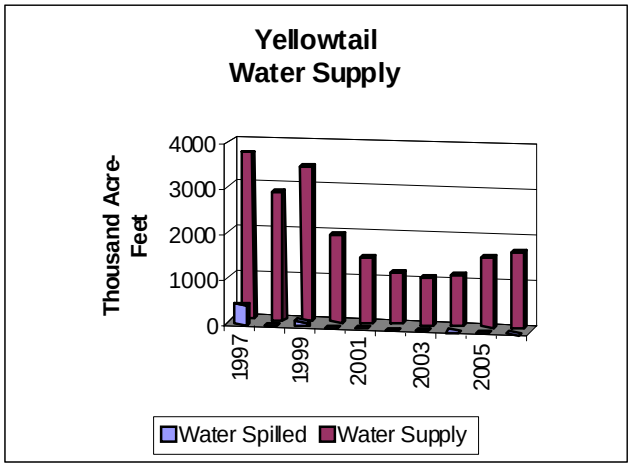
Existing Number and Capacity

Unit #	Original Capacity (kW)	Capacity Increased (kW)	Present Capacity (kW)
1	62,500	-	62,500
2	62,500	-	62,500
3	62,500	-	62,500
4	62,500	-	62,500
4 units	250,000	-	250,000

Generation



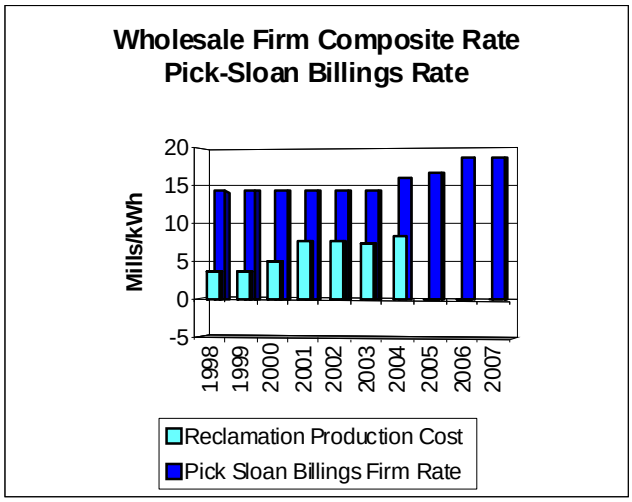


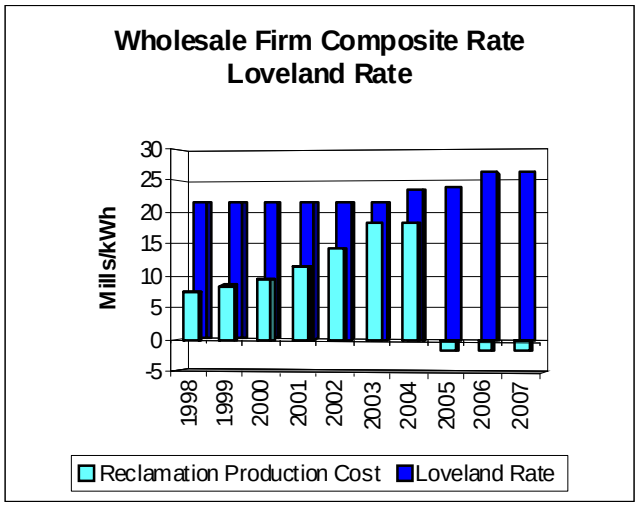


Drought conditions encountered for the sixth consecutive year.

Prime Laboratory Benchmarks

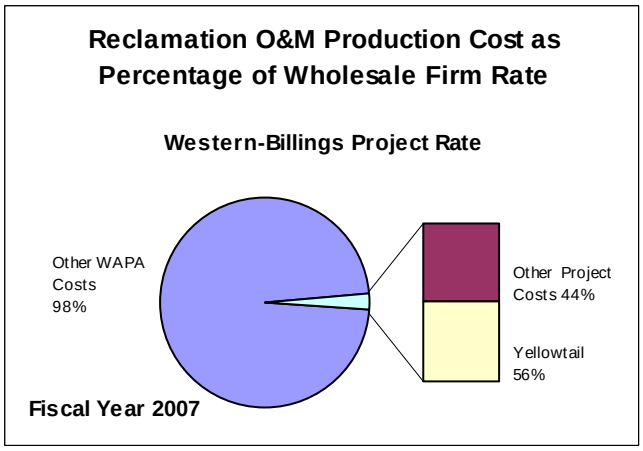
Benchmark 1
Wholesale Firm Rate

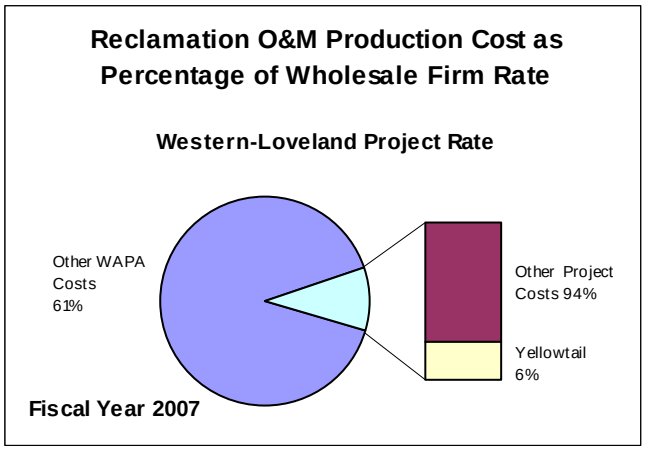




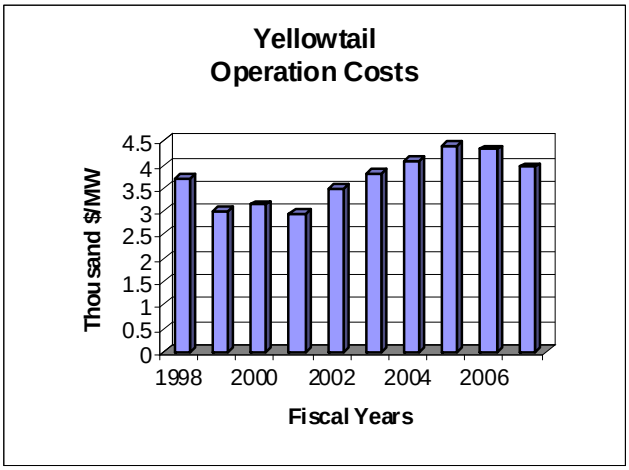
Yellowtail Units 1 and 2 are part of the Pick-Sloan Billings Rate and Yellowtail Units 3 and 4 are part of the Pick-Sloan Loveland Rate.

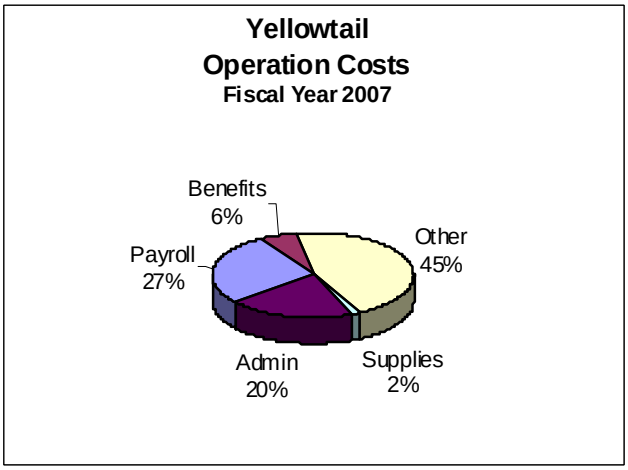
Benchmark 2
Reclamation's Production Costs as Percentage of Wholesale Firm Rate

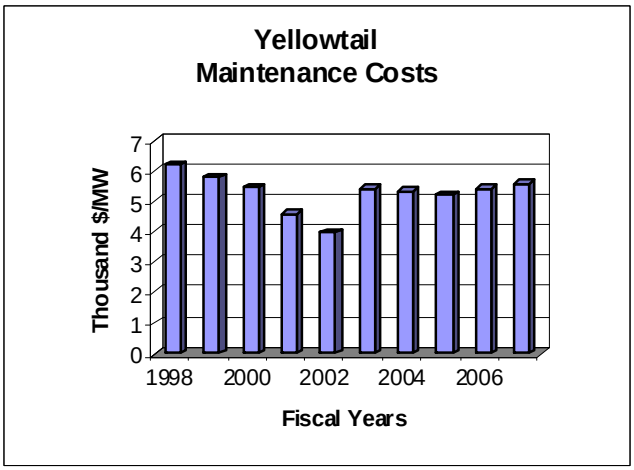


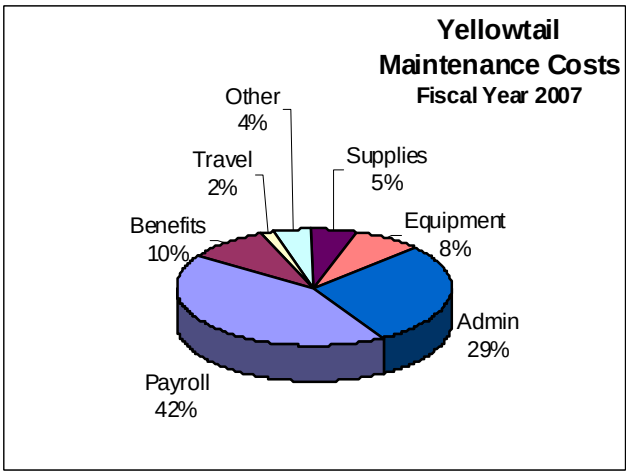


Benchmark 3
Production Costs

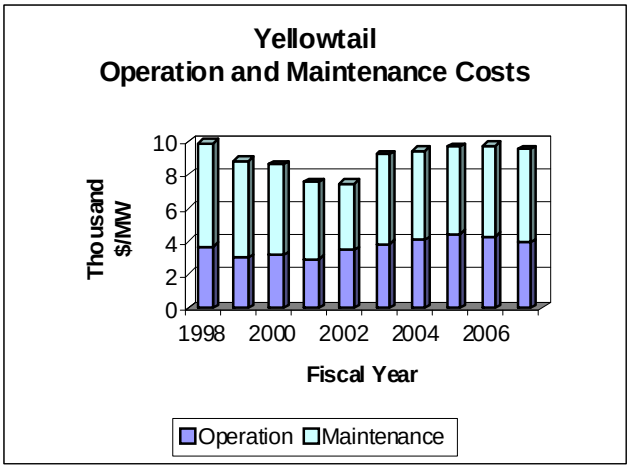


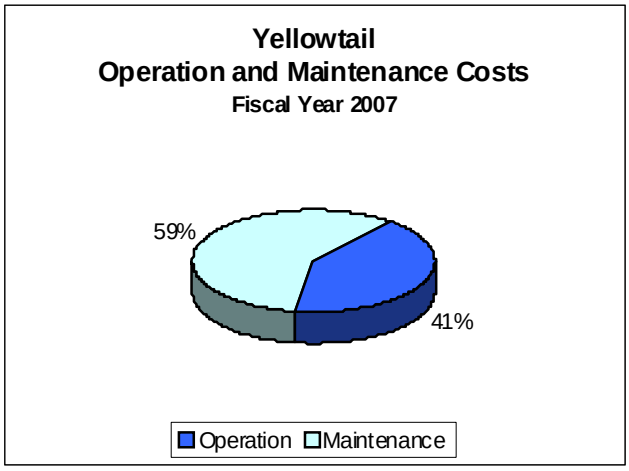


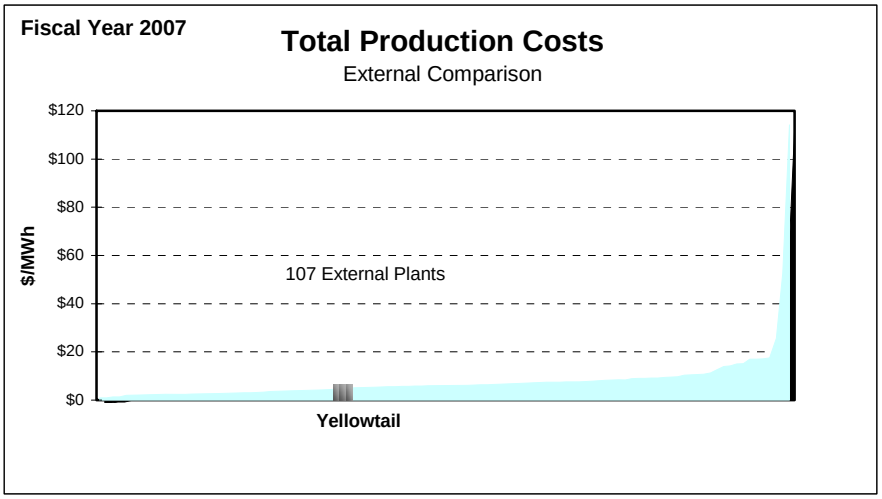


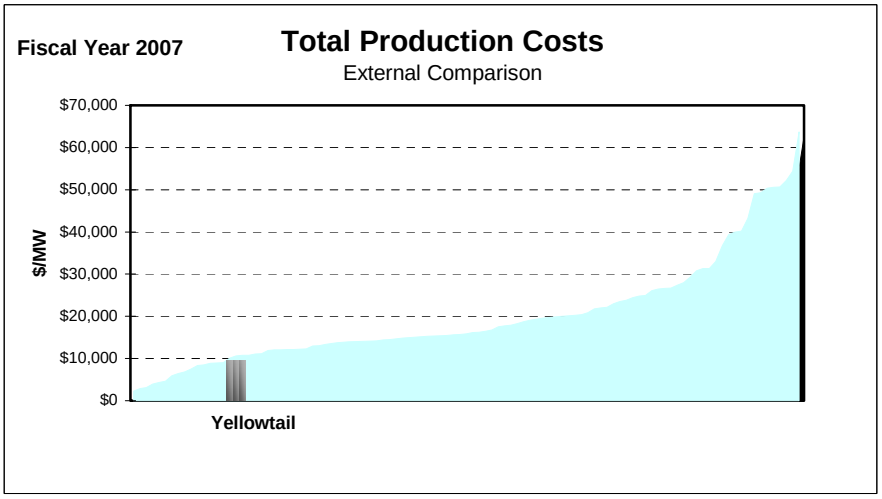


Benchmark 3
Production Costs



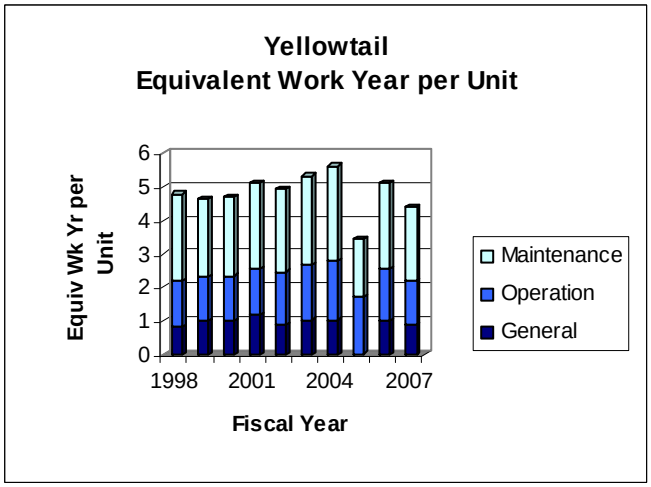


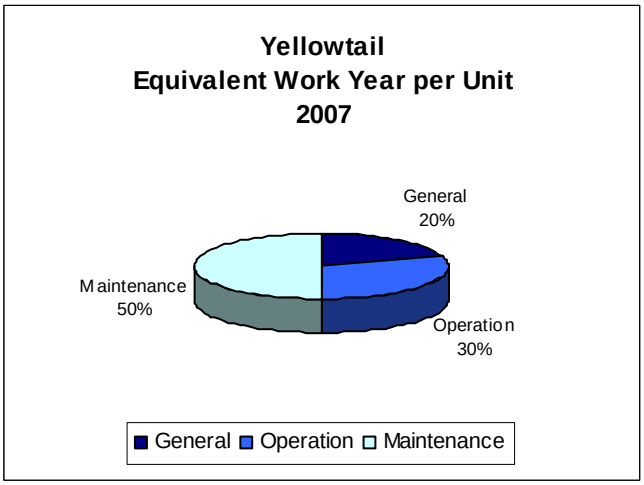


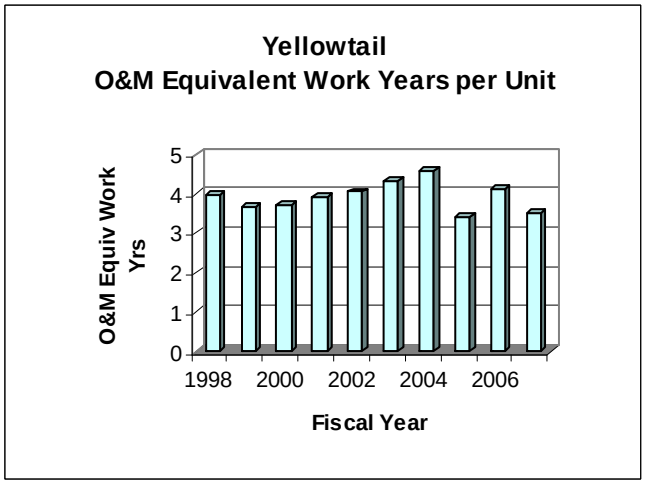


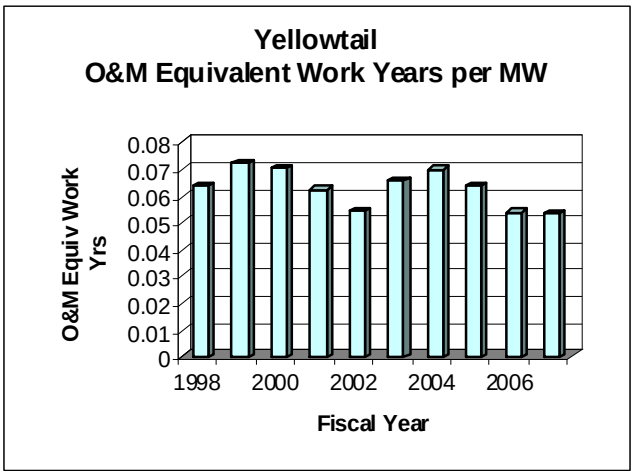
Benchmark 4
Workforce Deployment

Yellowtail 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	3.15	0.36	0.07	3.57	0.89	0.01
Operation	4.70	0.53	0.00	5.23	1.31	0.02
Maintenance	7.35	0.83	0.00	8.18	2.20	0.03
Total Staffing	15.20	1.72	0.07	16.98	4.40	0.07

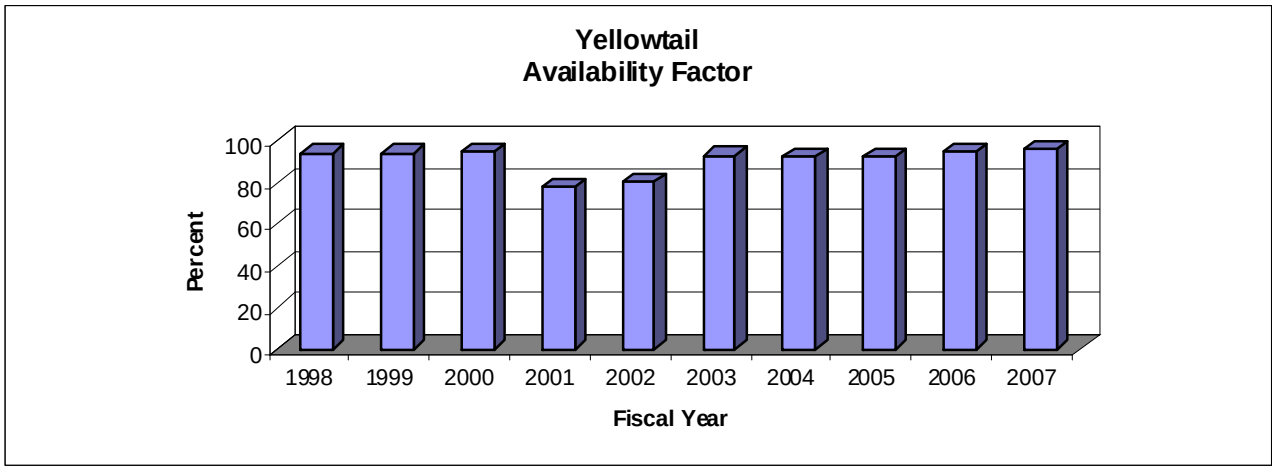






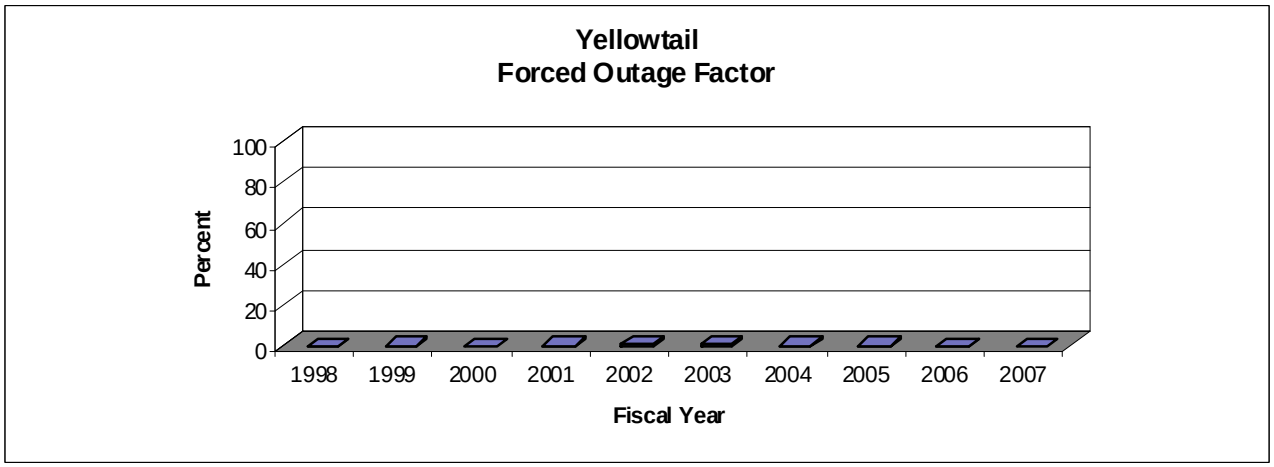


Benchmark 5
Plant Availability Factor

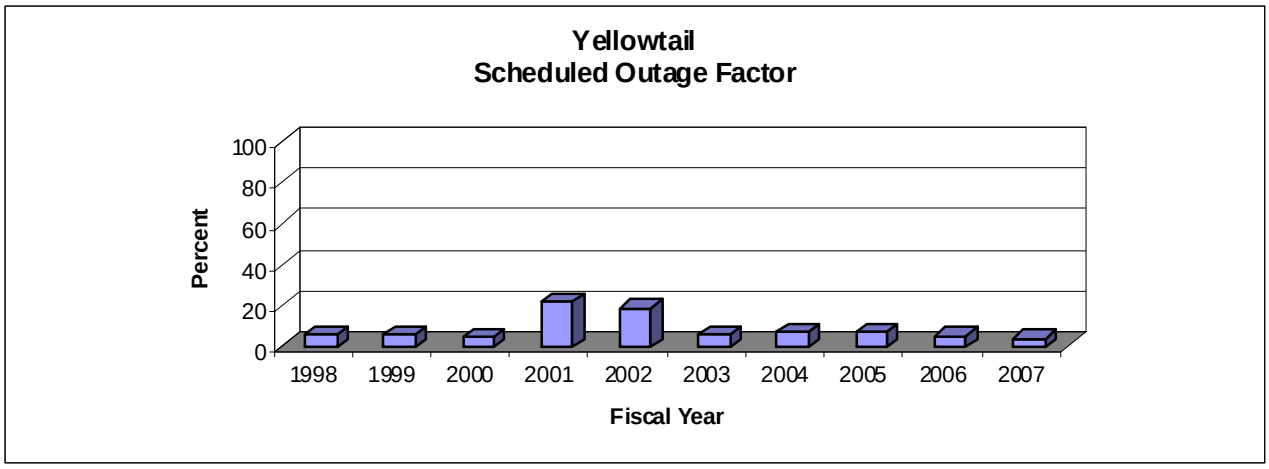


FY-2001 and FY-2002 – Extended outages occurred for replacing of the turbine runners on Units 3 and 4, and for replacing the governors and excitation systems on Units 1, 2, 3, and 4.

Benchmark 6
Plant Forced Outage Factor

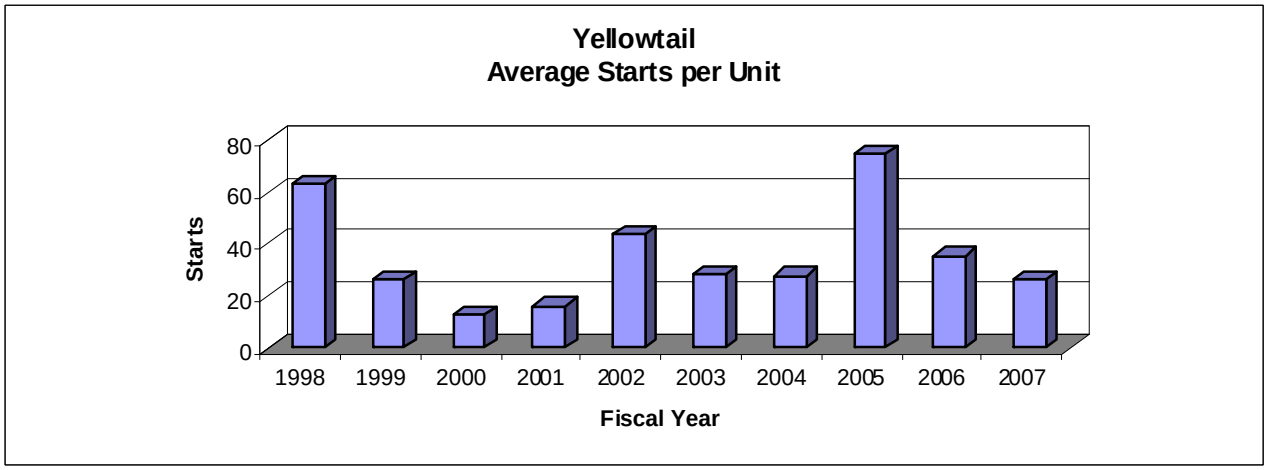


Benchmark 7
Plant Scheduled Outage Factor



FY-2001 and FY-2002 – Extended outages occurred for replacing the turbine runners on Units 3 and 4, and for replacing the governors and excitation systems on Units 1, 2, 3, and 4.

Unit Starts



Benchmark Data Comparison

Fiscal Year 2007	Yellowtail Powerplant	Reclamation Average 100-500 MW Group	Total Reclamation Average	Industry Average	Best Performers
Wholesale Firm Rate Mills/kWh	Units 1&2 16.5 Units 3&4 23.9	Not Applicable	*22.45	Not Available	Not Available
Production Cost as Percentage of Wholesale Firm Rate	Units 1&2 1.28% Units 3&4 2.77%	Not Applicable	12.1%	Not Applicable	Not Applicable
O&M Cost $/MWh	6.59	4.44	2.76	***63.88	1.00
O&M Costs $/MW	9,536	10,502	7,847	***21,167	2,897
O&M Equiv Work Year per MW	0.05	0.04	0.03	Not Available	0.0
Availability Factor	95.8	83.5	82.3	**88.64	98.5
Forced Outage Factor	0.1	1.2	2.6	**2.61	0.0
Scheduled Outage Factor	4.1	15.4	15.1	**8.74	0.0

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

The Bighorn River Basin experienced its sixth consecutive year of drought conditions in FY-2005, which resulted in below average generation.

Yellowtail Units 1 and 2 are part of the Pick-Sloan Billings Rate and Yellowtail Units 3 and 4 are part of the Pick-Sloan Loveland Rate.