RECLAMATION

Managing Water in the West

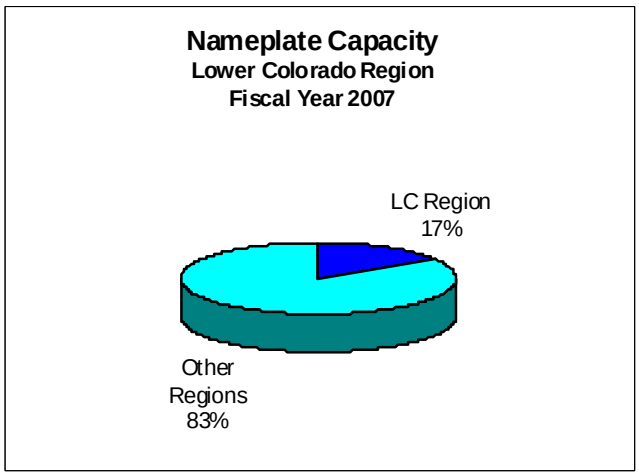
Lower Colorado Region Power Performance

For Fiscal Year 2007

U.S. Department of the Interior
Bureau of Reclamation

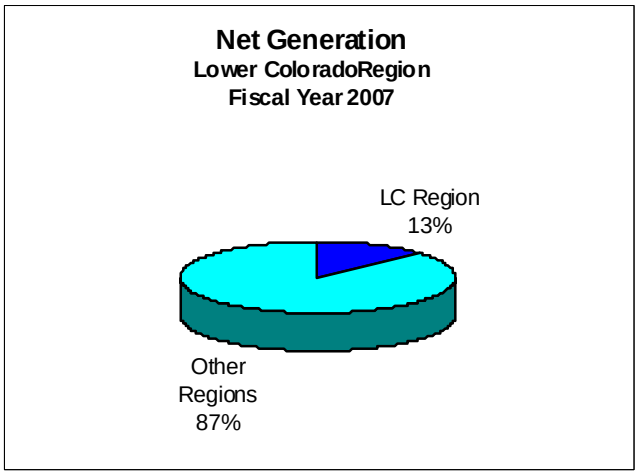
Lower Colorado Regional Power Profile

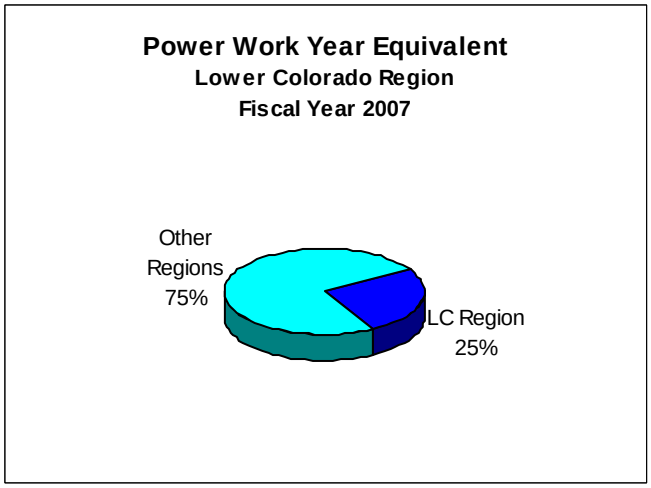
The Lower Colorado Regional Office is located in Boulder City, Nevada. The Lower Colorado Dams Facilities Office oversees the operation of three powerplants: Davis, Hoover, and Parker.



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.

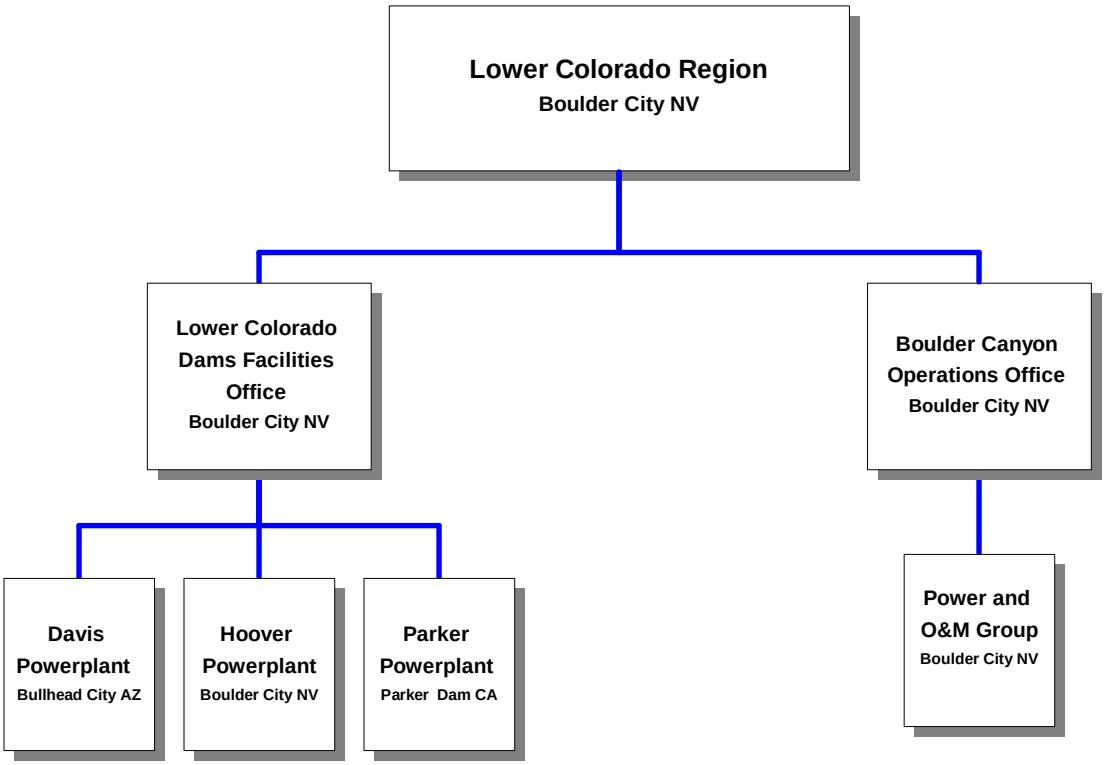
The same year, this region produced 5,408 net gigawatt-hours. This comprised 12 percent of the total net generation for Reclamation in 2007.





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
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CALIFORNIA
Hoover
Davis
Parker
NEW MEXICO
ARIZONA

Davis Powerplant
Parker-Davis Project

Plant Contact:
David Arend
Manager, Davis Dam

Plant Address:
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Bullhead City, AZ 86429-9707

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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

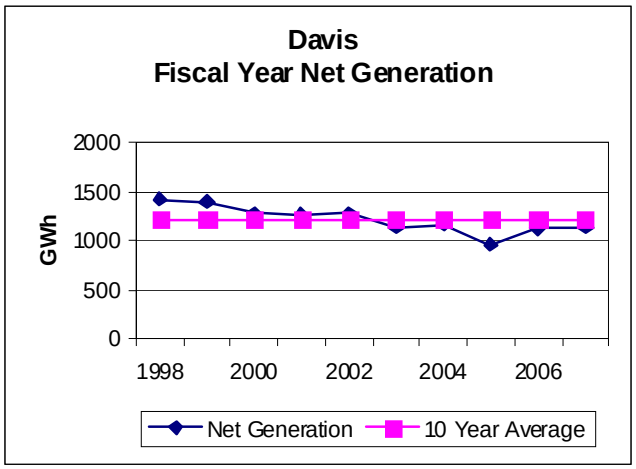
Generator

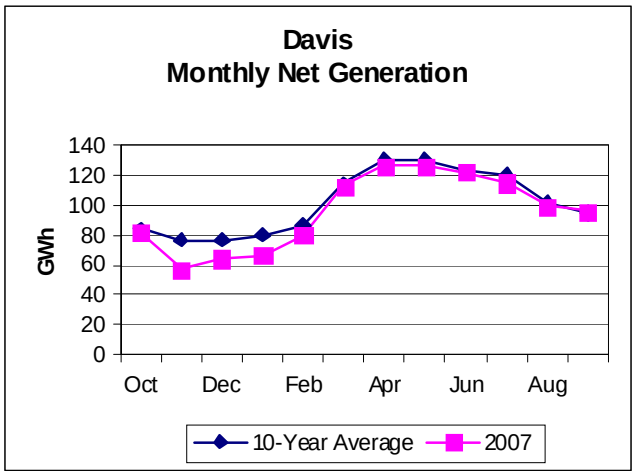
Davis Generators

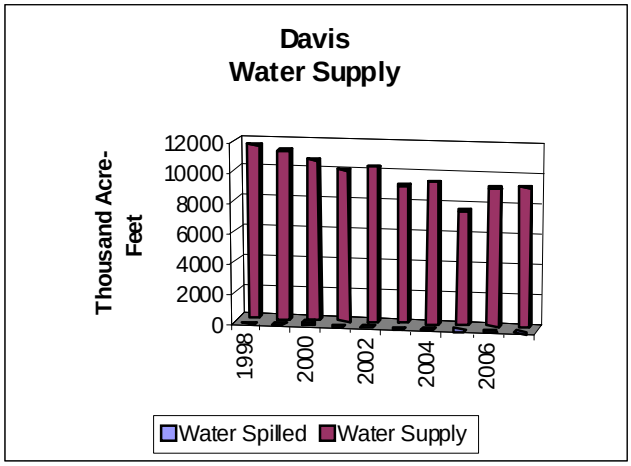
Existing Number and Capacity

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

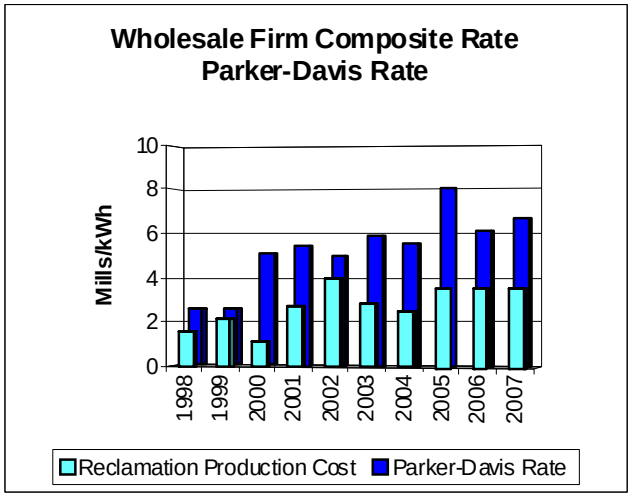

Davis
Fiscal Year Net Generation
GWh
2000
1500
1000
500
0
1998
2000
2002
2004
2006
Net Generation
10 Year Average


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

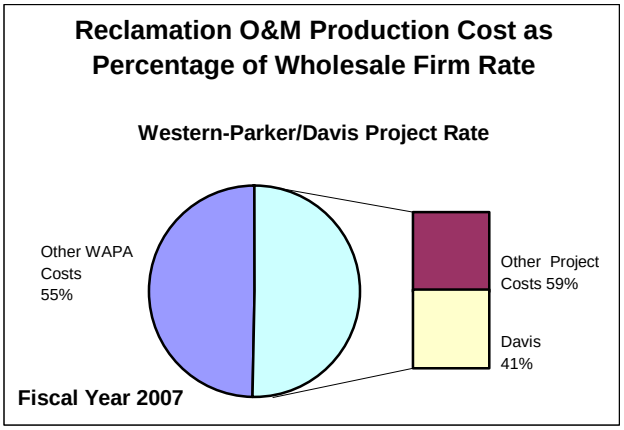

Davis
Water Supply
Thousand Acre-Feet
12000
10000
8000
6000
4000
2000
0
1998
2000
2002
2004
2006
Water Spilled
Water Supply

Prime Laboratory Benchmarks

Benchmark 1
Wholesale Firm Rate

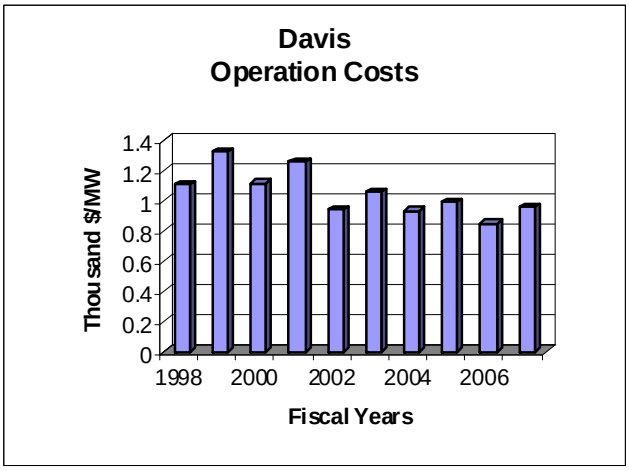


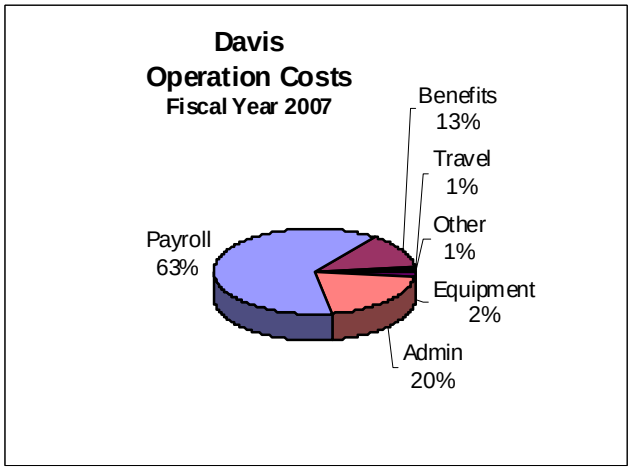
Benchmark 2
Reclamation's Production Cost as Percentage of Wholesale Firm Rate

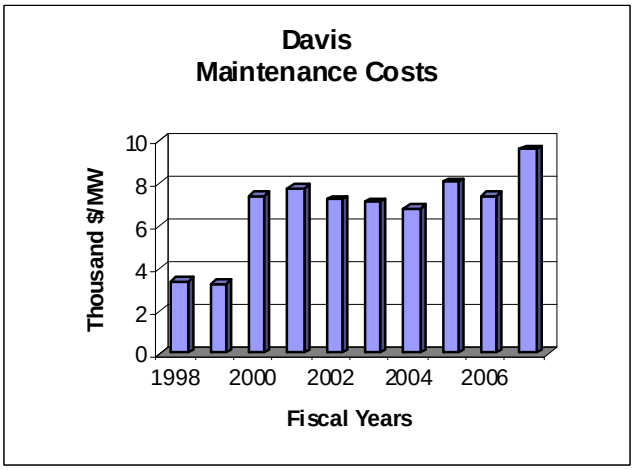


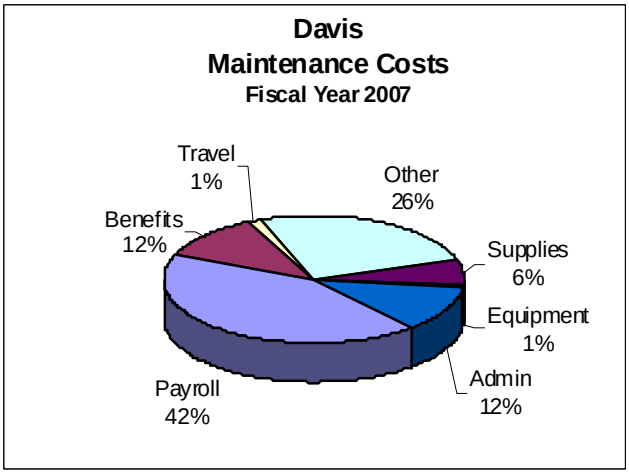
Reclamation expenses as a percentage of the rate do not reflect the total expenditures of this project.

Benchmark 3
Production Cost

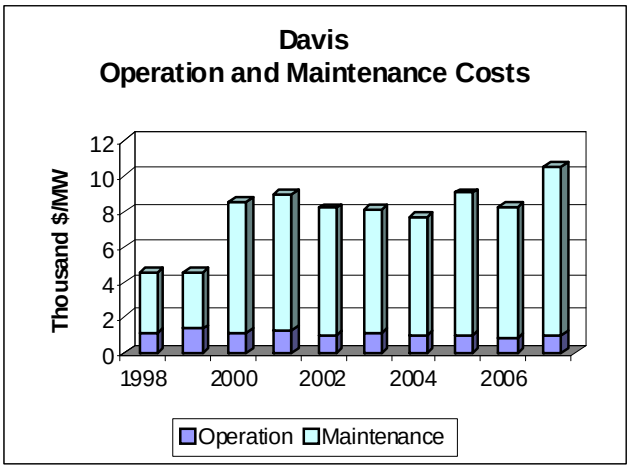


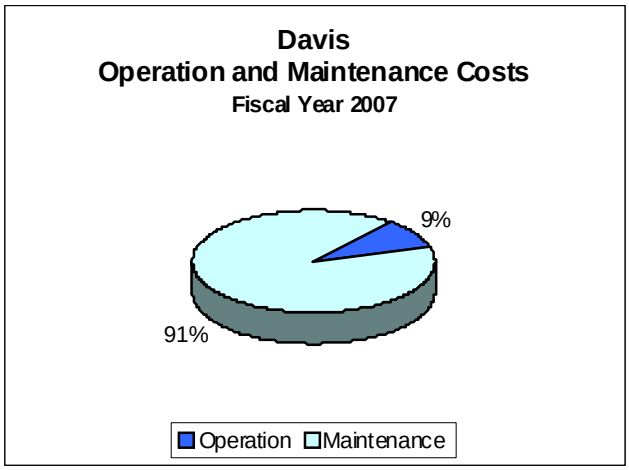


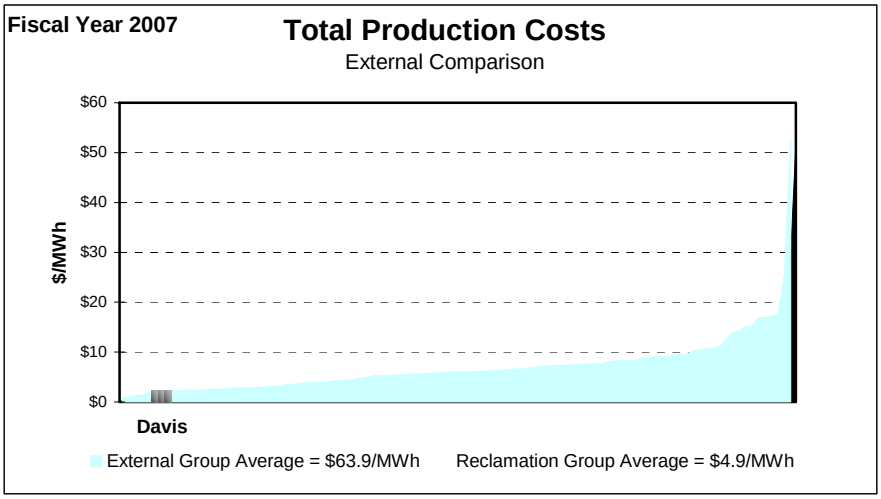


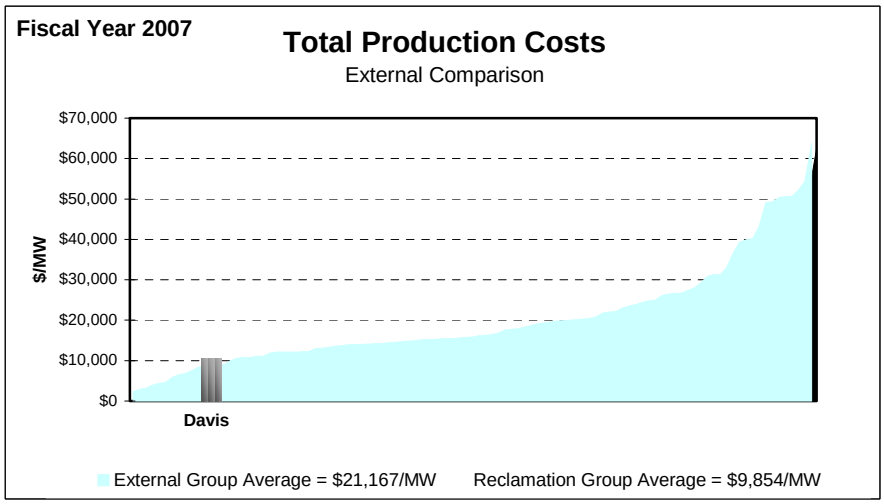


Benchmark 3
Production Cost



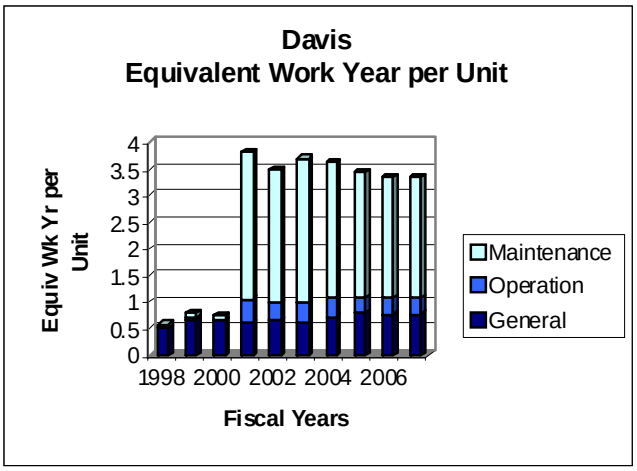


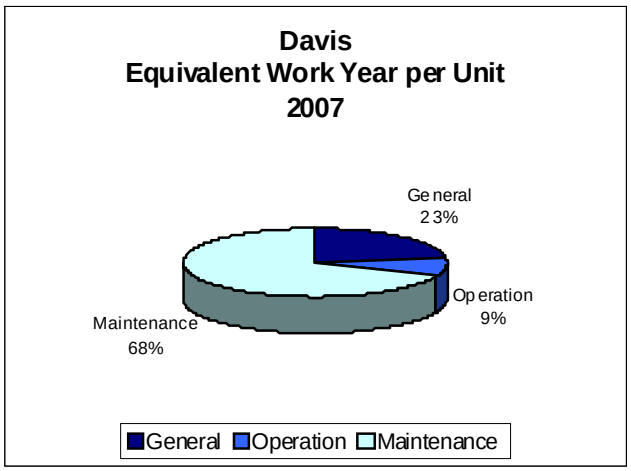


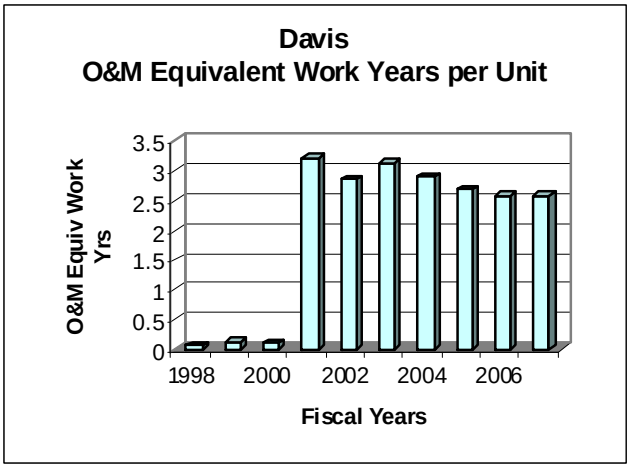


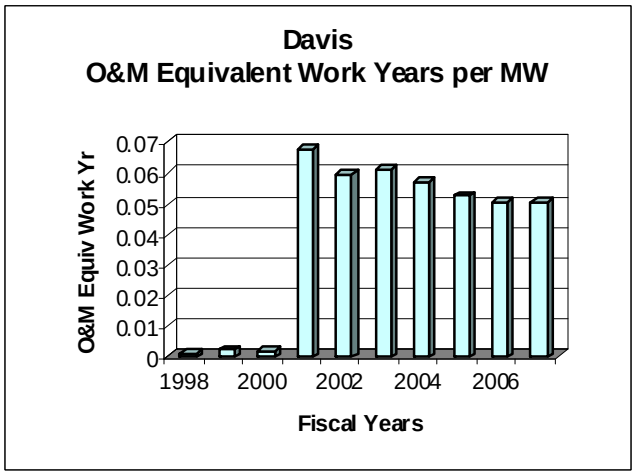
Benchmark 4
Workforce Deployment

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

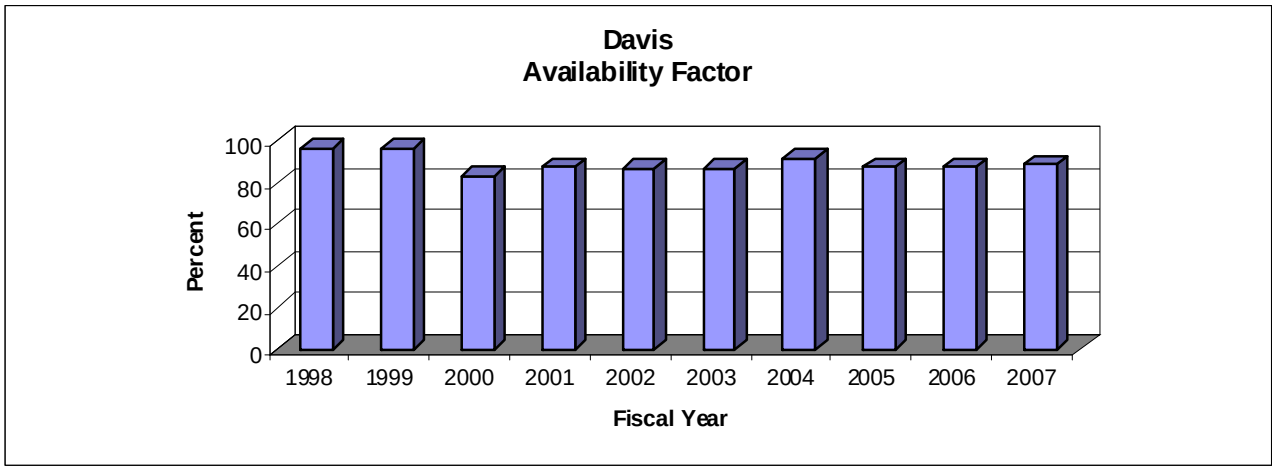




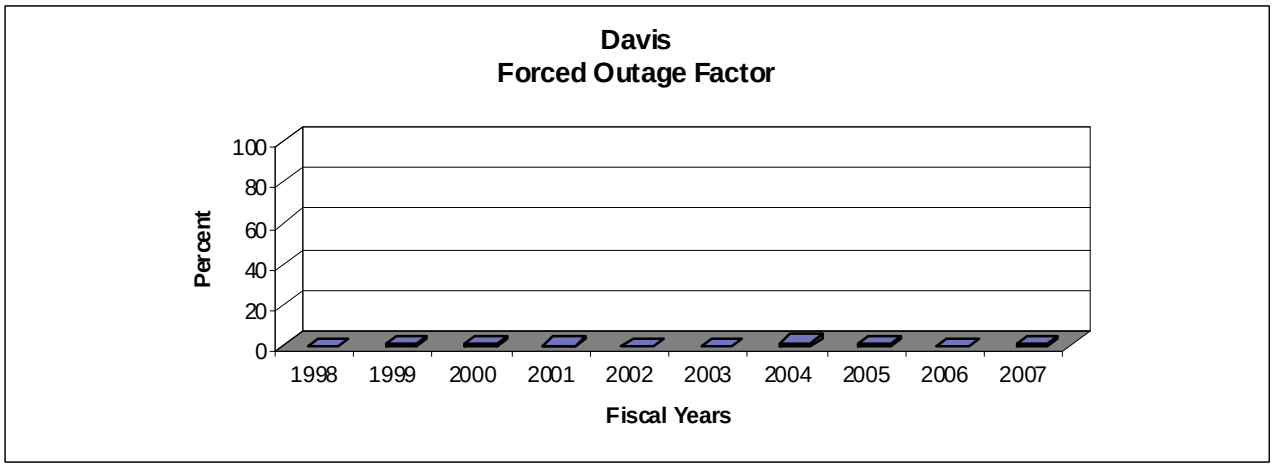




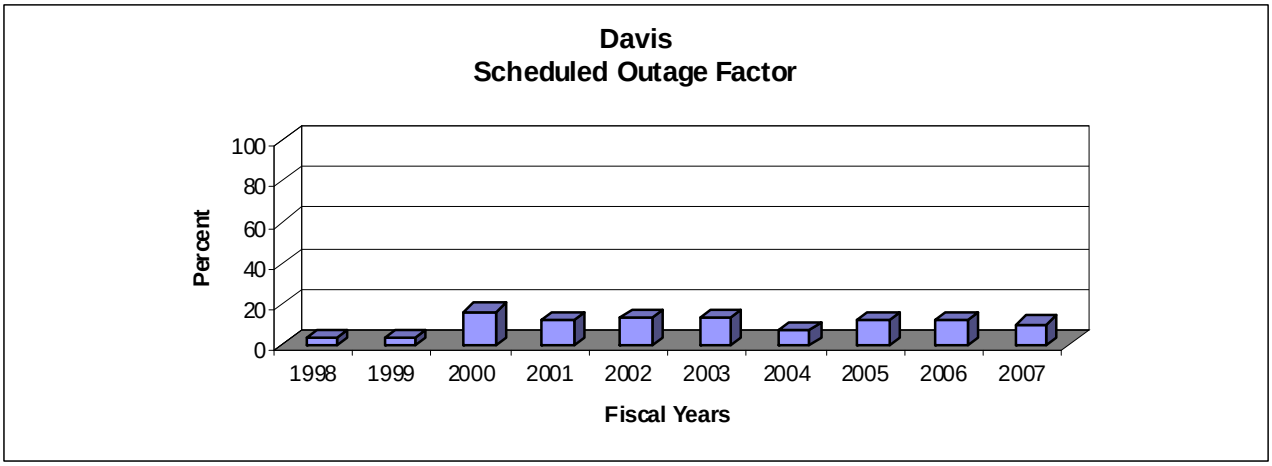
Benchmark 5
Availability Factor



Benchmark 6
Forced Outage Factor

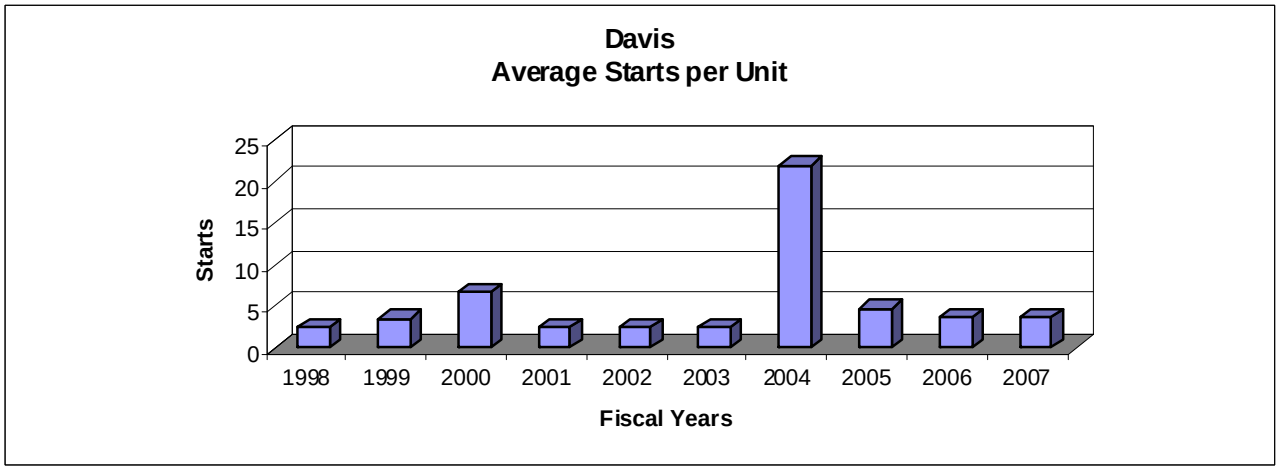


Benchmark 7
Scheduled Outage Factor



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.

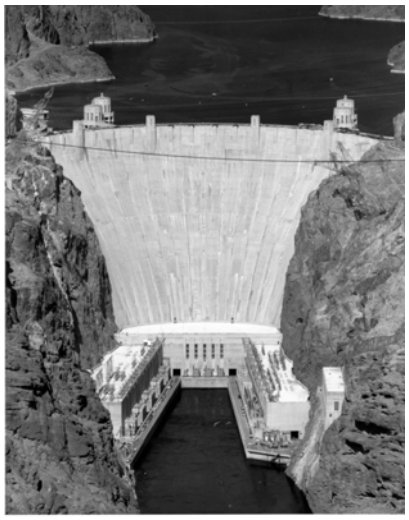
Starts



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:
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Area Manager

Plant Address:
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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

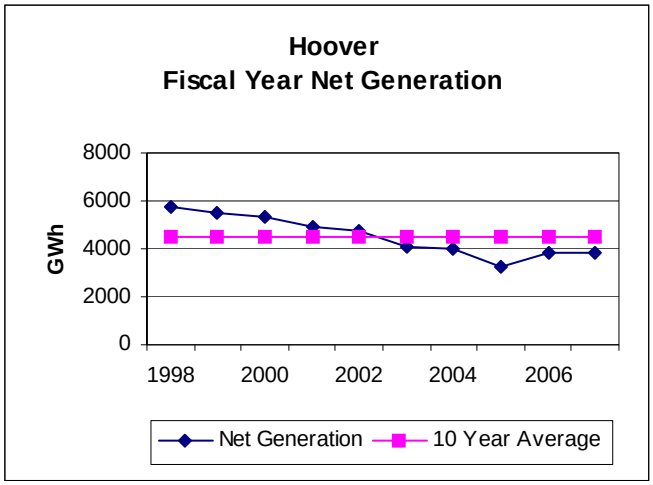
Spinning Reserve	Yes
Non-Spinning Reserve	Yes
Replacement Reserve	Yes
Regulation/Load Following	Yes
Black Start	Yes
Voltage Support*	Yes

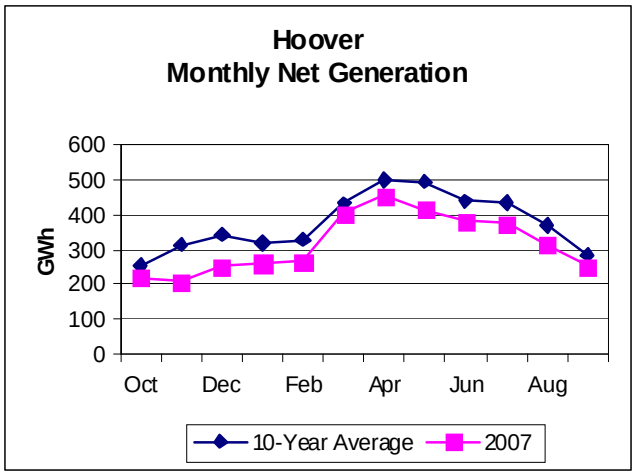
*Customers supply voltage support needed for delivery of capacity and energy to their load centers.

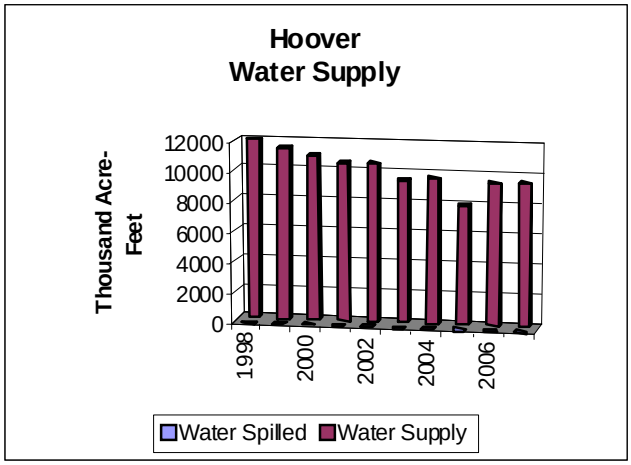
Generators

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



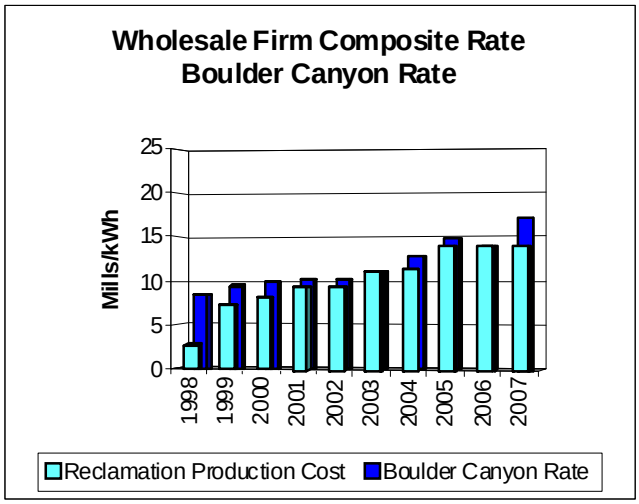




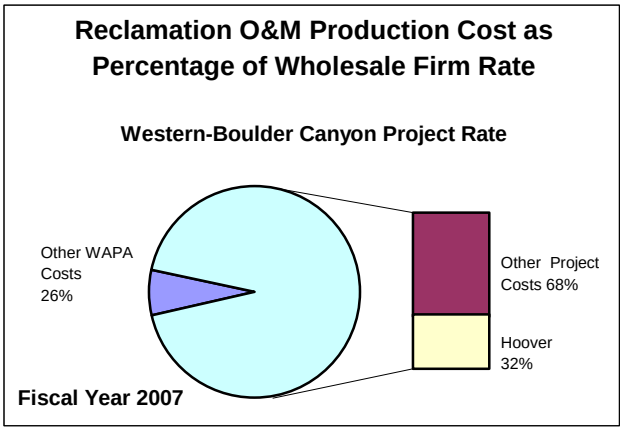
FY 2005 water for generation was 7,934,508 AF
and 190 AF went through the Bypass valves.

Prime Laboratory Benchmarks

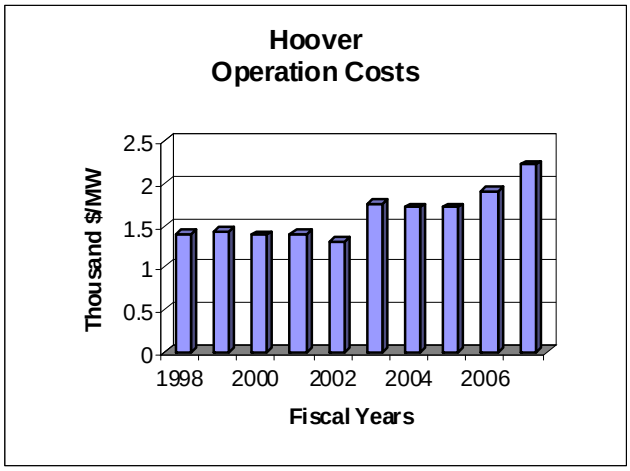
Benchmark 1
Wholesale Firm Rate

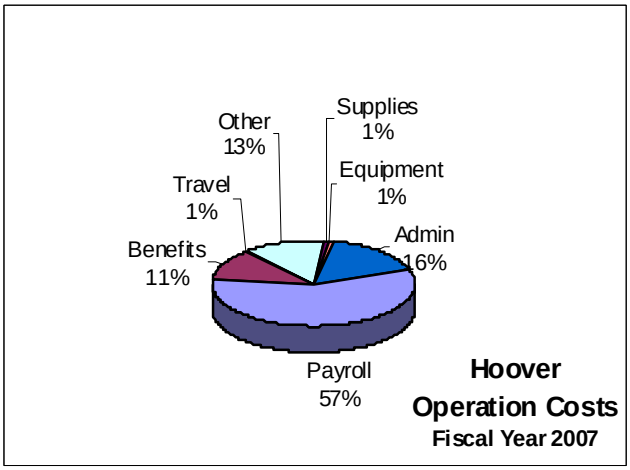


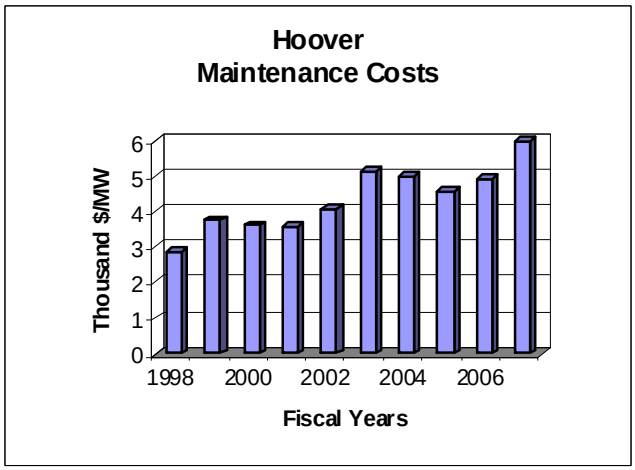
Benchmark 2
Reclamation's Production Cost as Percentage of Wholesale Firm Rate

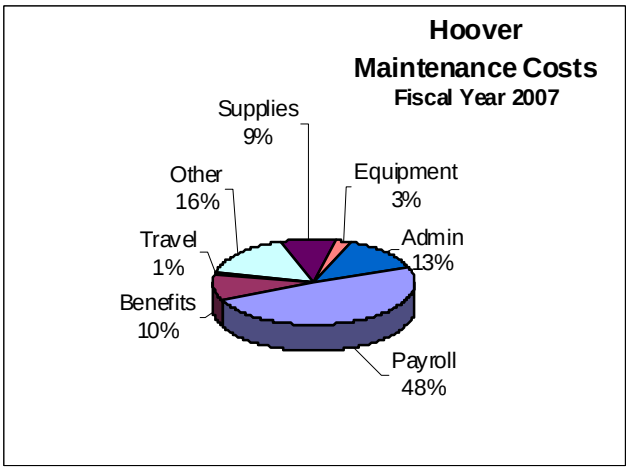


Benchmark 3
Production Cost

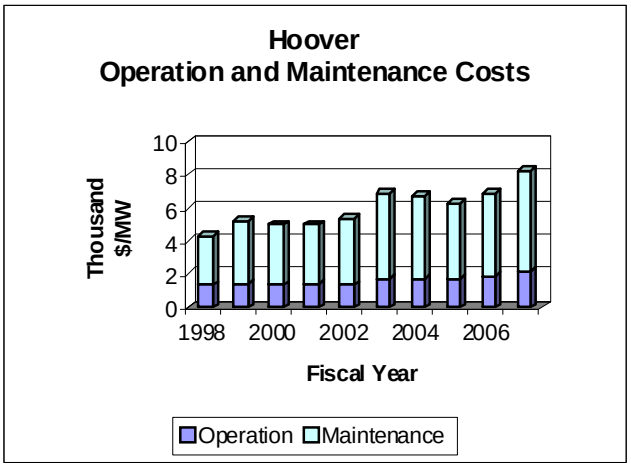


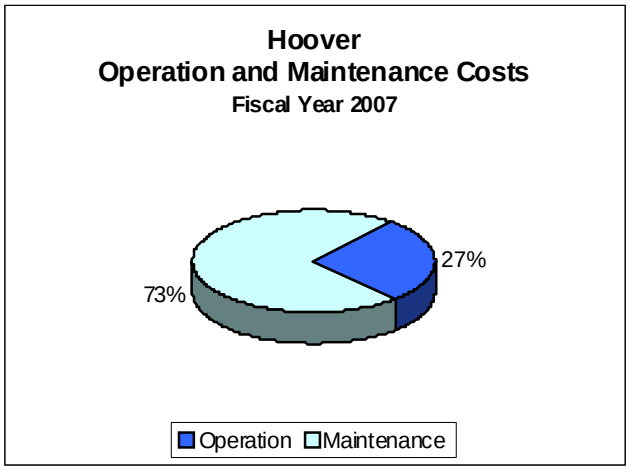


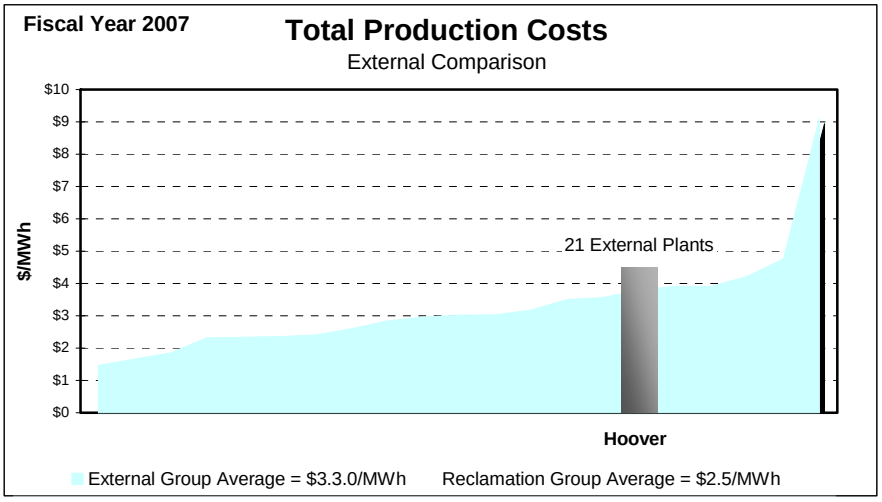


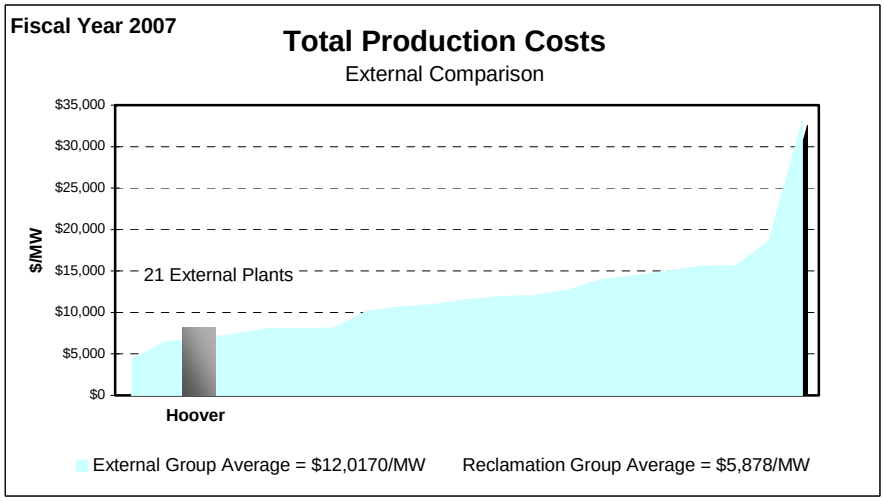


Benchmark 3
Production Cost



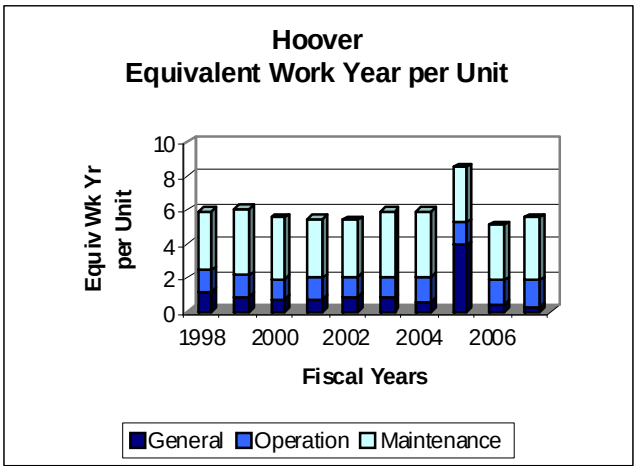


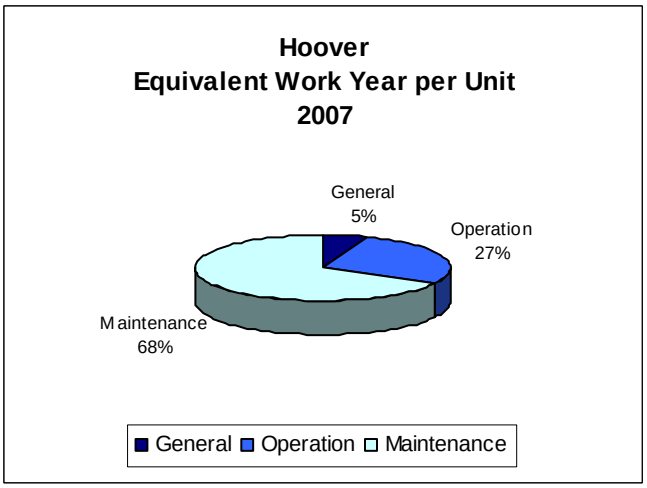


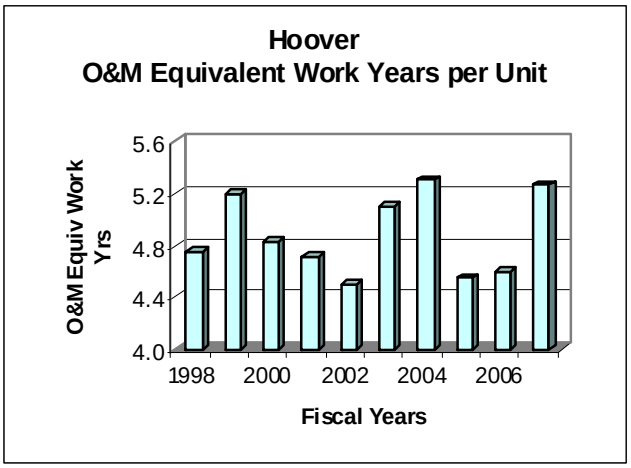


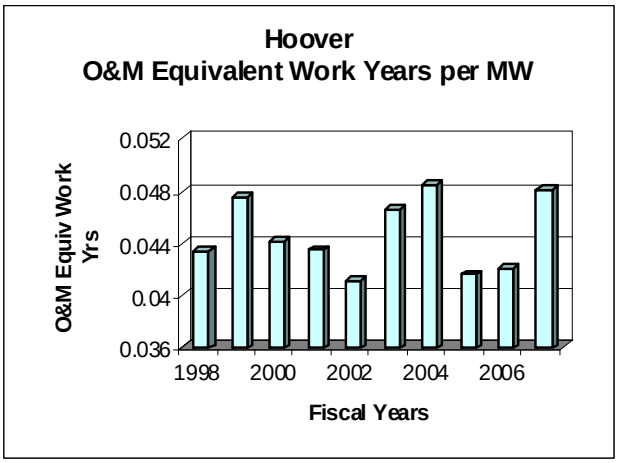
Benchmark 4
Workforce Deployment

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

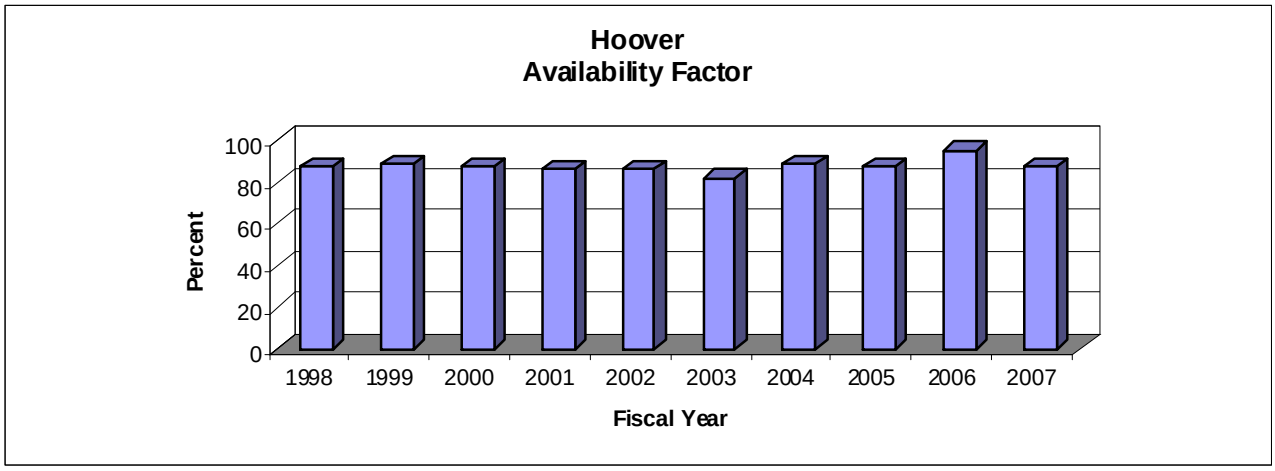






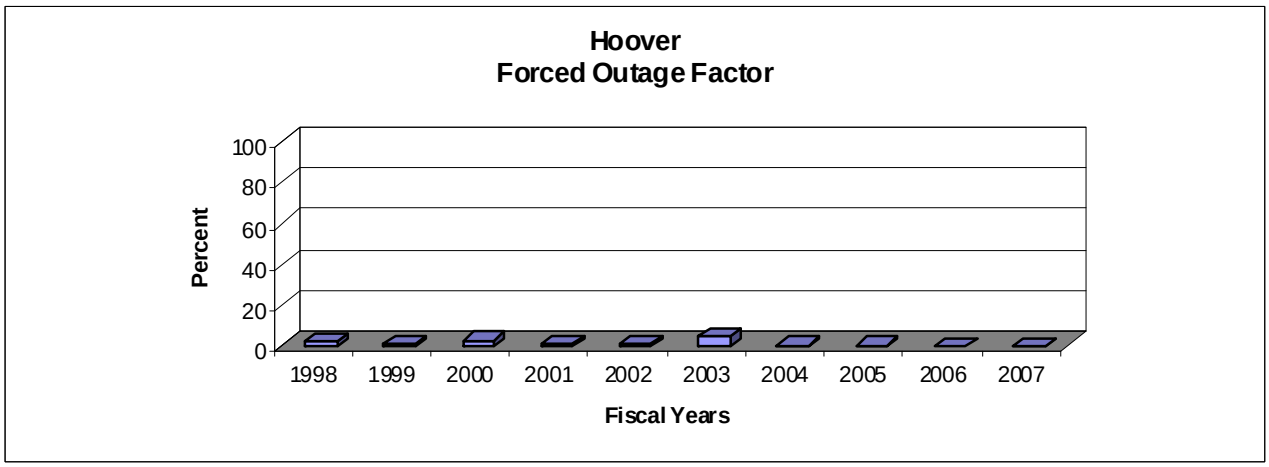


Benchmark 5
Availability Factor

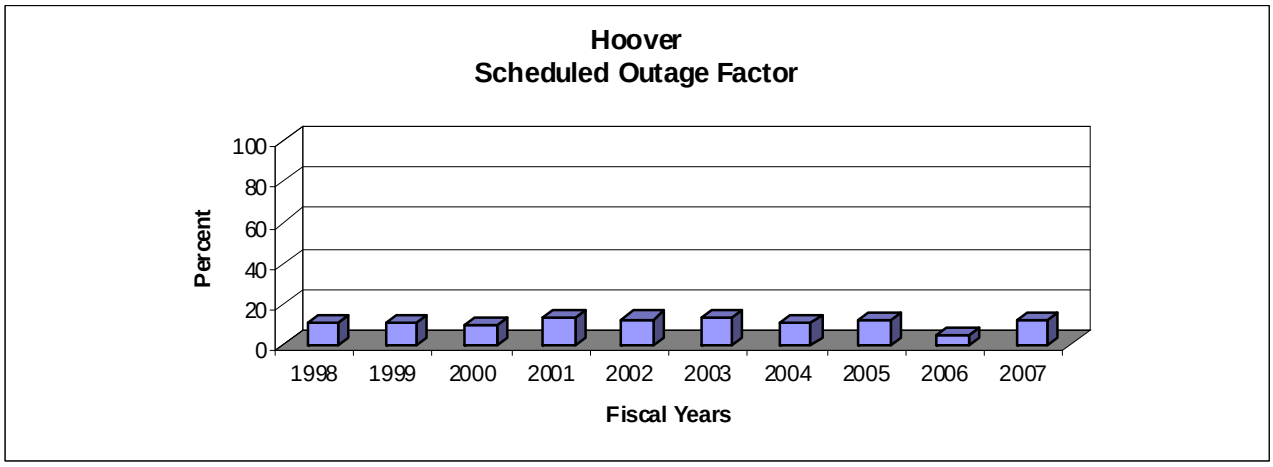


FY-1999 to FY-2012 – Turbine overhauls – Program ongoing

Benchmark 6
Forced Outage Factor

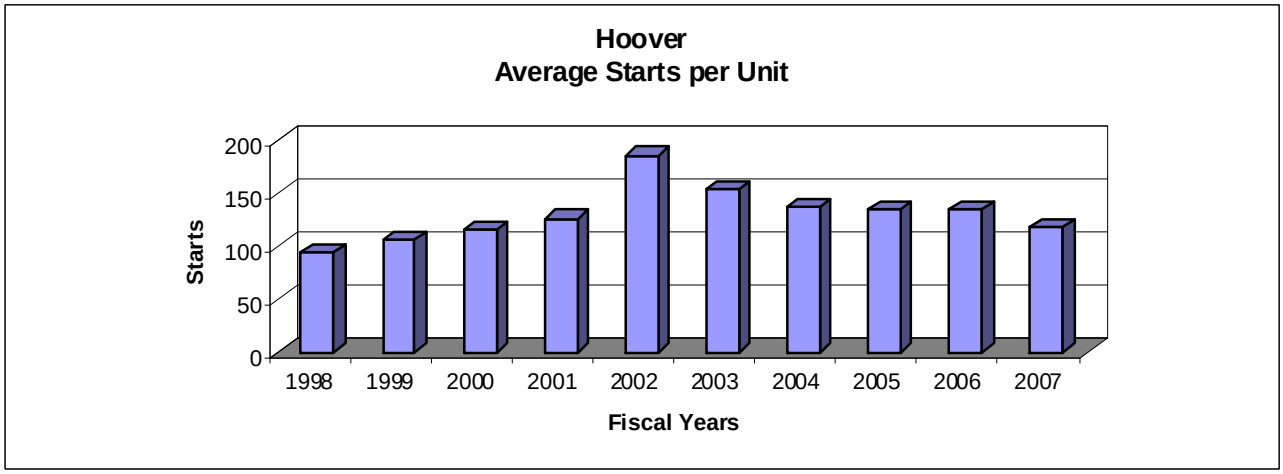


Benchmark 7
Scheduled Outage Factor



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

Starts

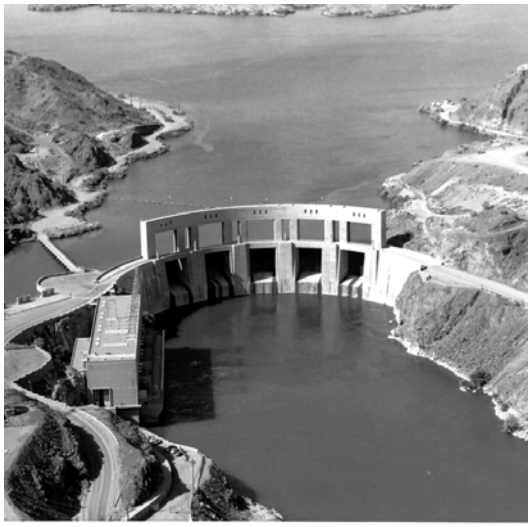


FY-2002 increase due to deregulation.

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

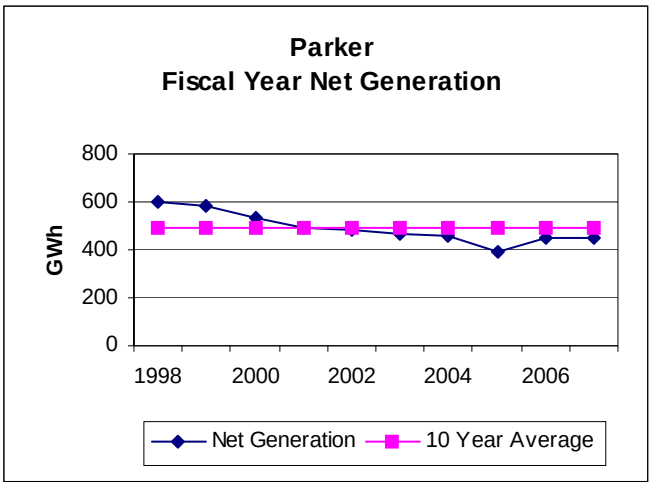
Generators

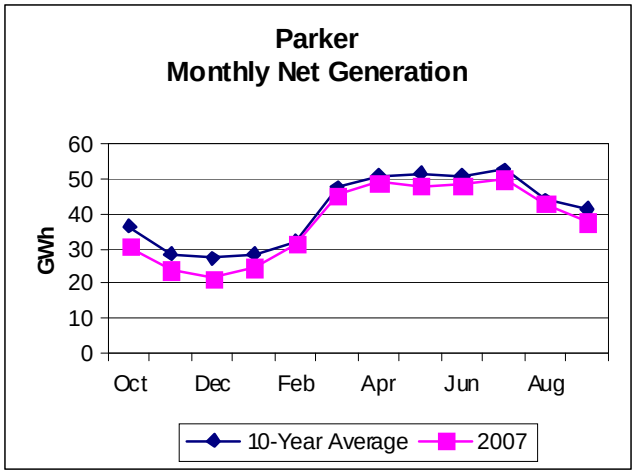
Parker Generators

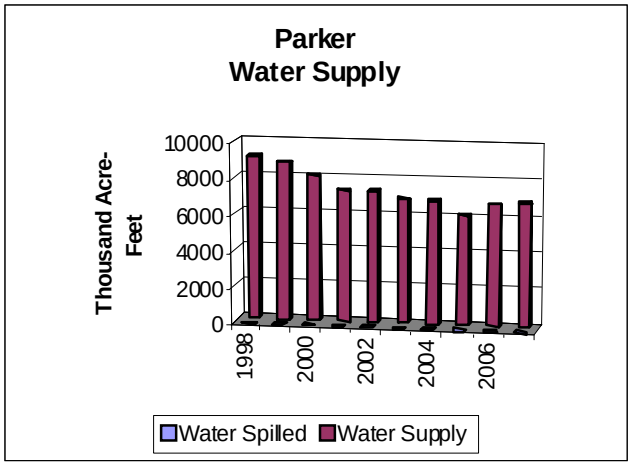
Existing Number and Capacity

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

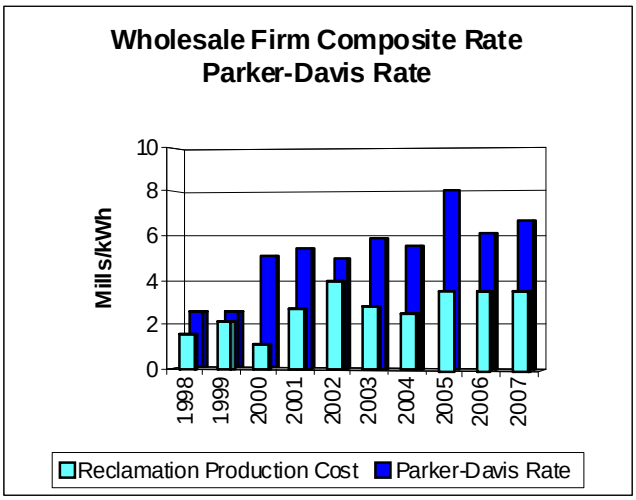

Parker
Fiscal Year Net Generation
GWh
800
600
400
200
0
1998
2000
2002
2004
2006
Net Generation
10 Year Average


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

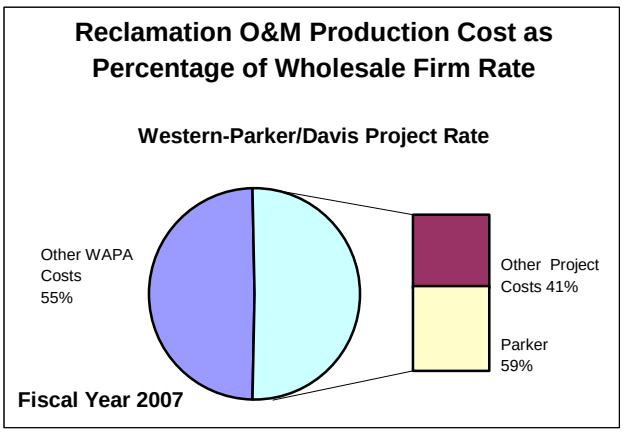

Parker
Water Supply
Thousand Acre-Feet
10000
8000
6000
4000
2000
0
1998
2000
2002
2004
2006
Water Spilled
Water Supply

Prime Laboratory Benchmarks

Benchmark 1
Wholesale Firm Rate

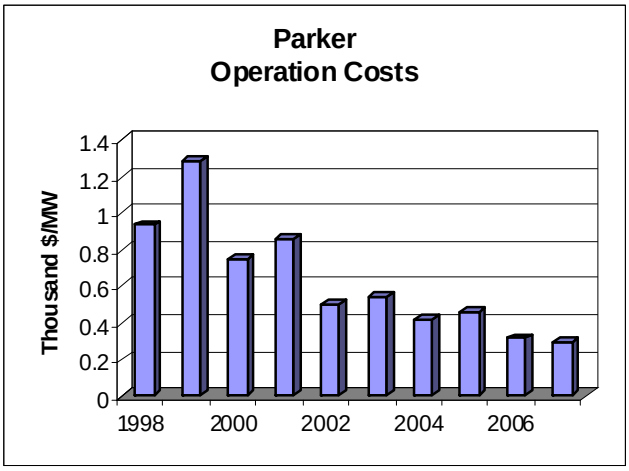


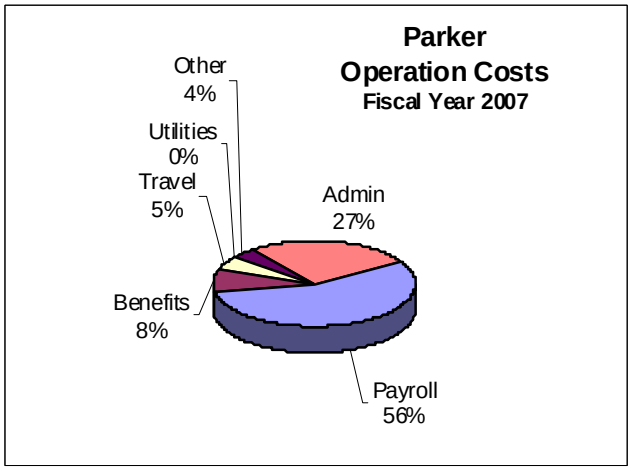
Benchmark 2
Reclamation's Production Cost as Percentage of Wholesale Firm Rate

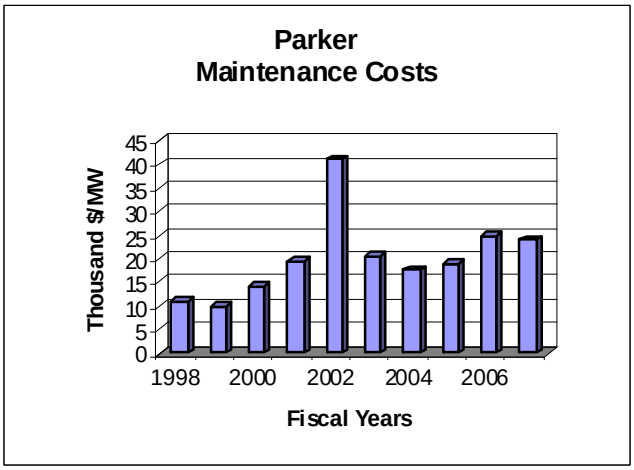


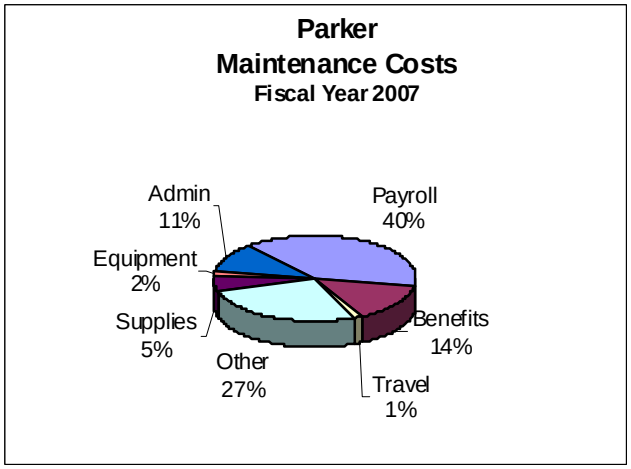
Reclamation expenses, as a percentage of the rate, do not reflect the total expenditures of this project.

Benchmark 3
Production Cost

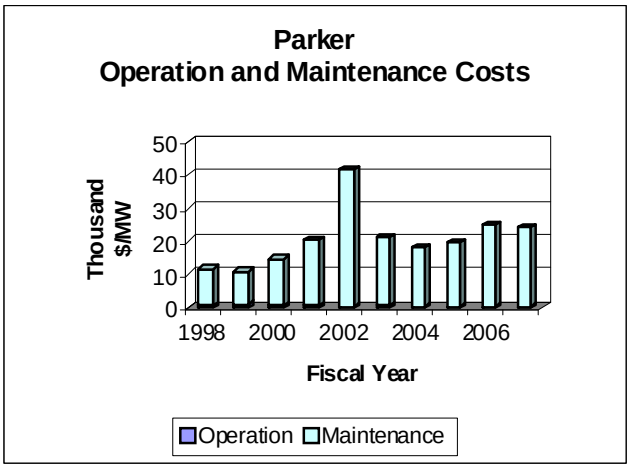


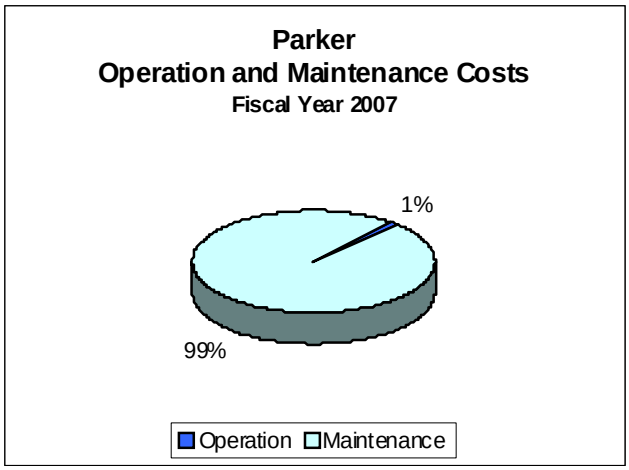


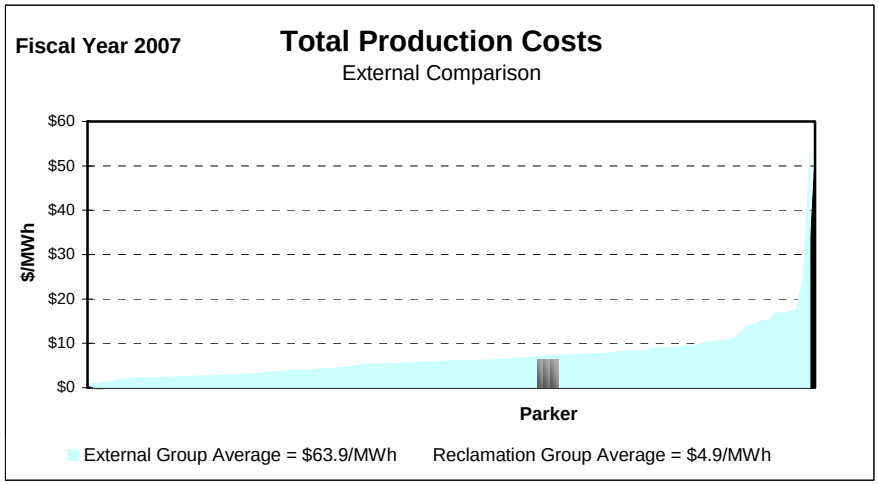


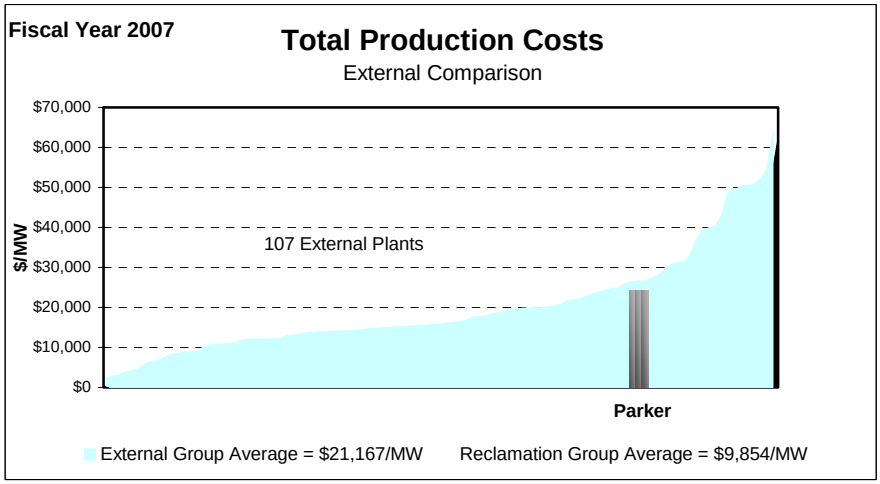


Benchmark 3
Production Cost



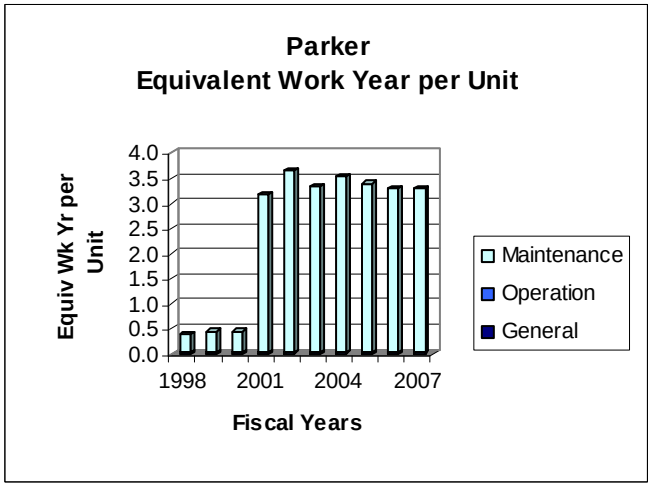


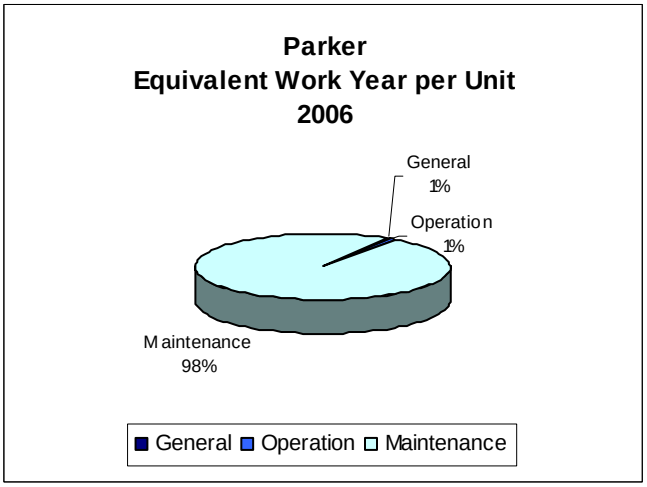


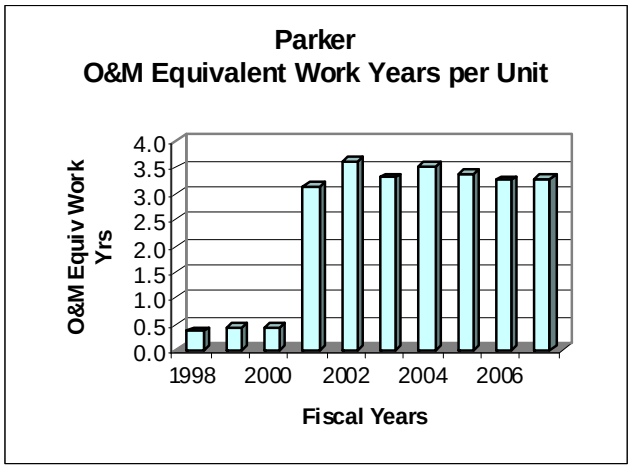


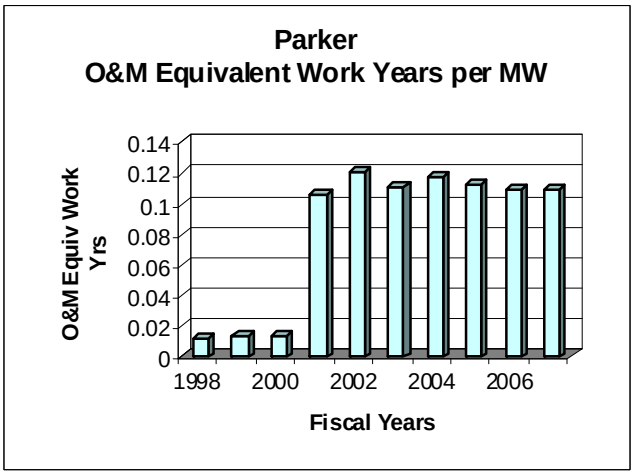
Benchmark 4
Workforce Deployment

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

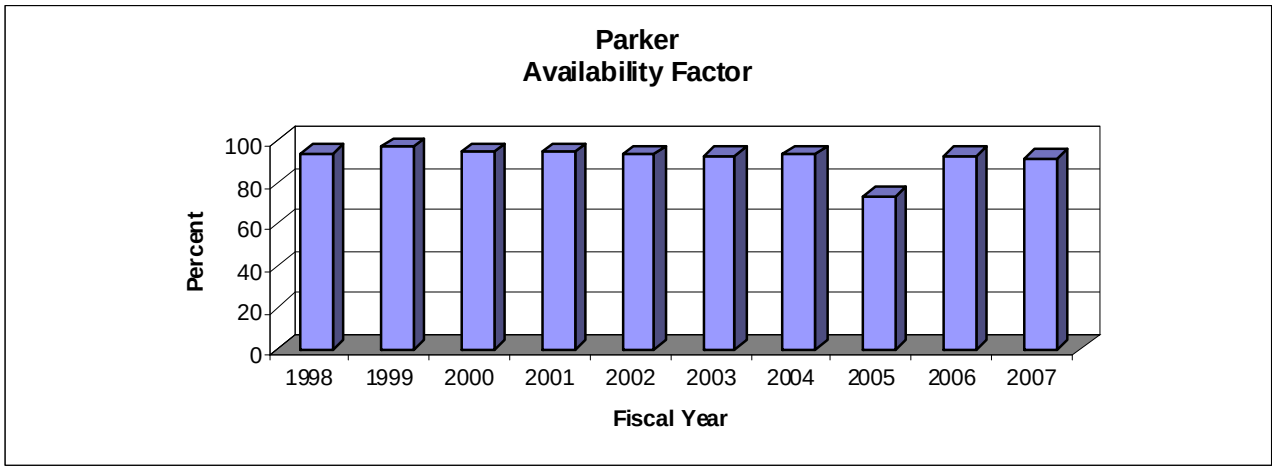




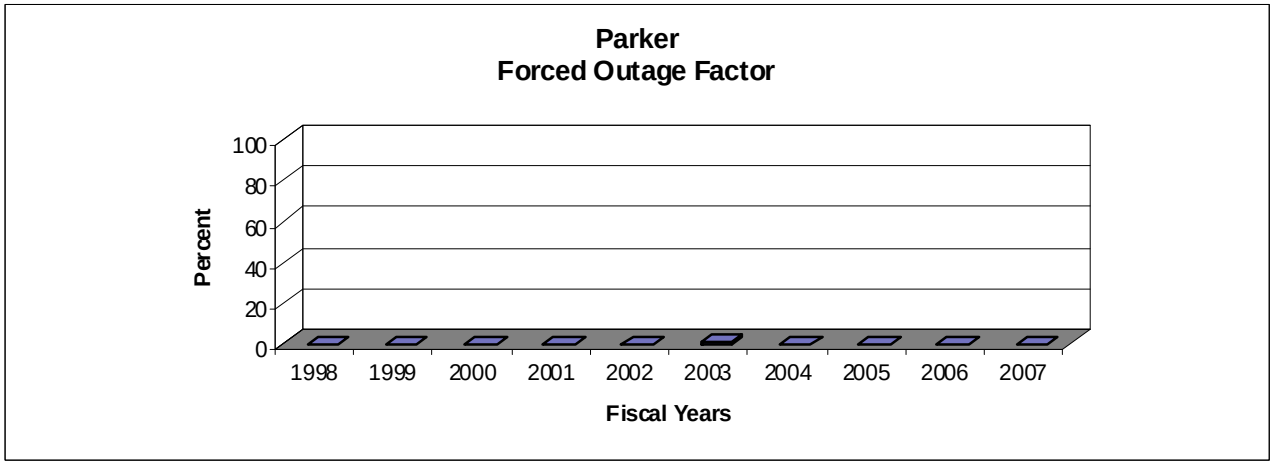




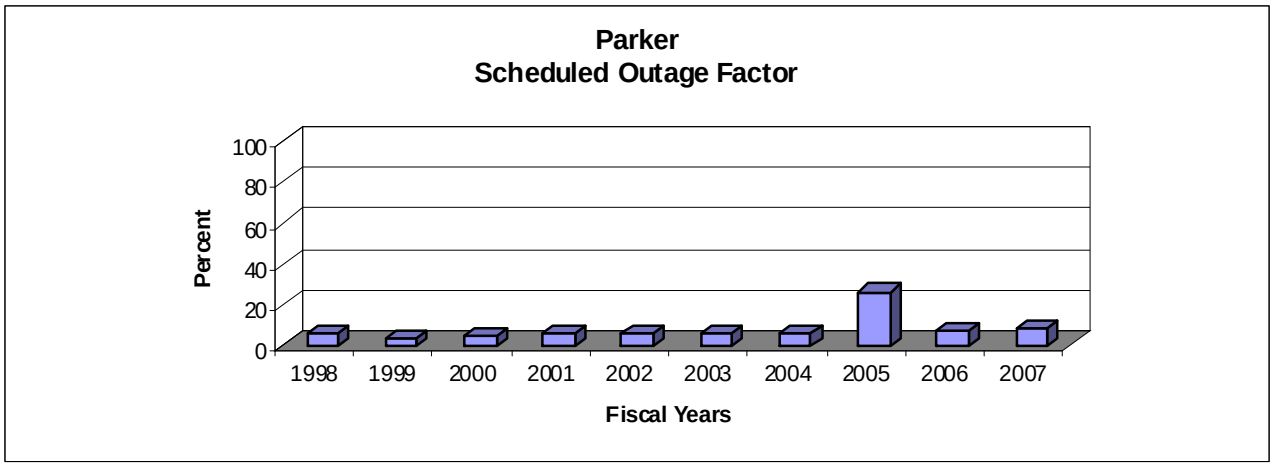
Benchmark 5
Availability Factor



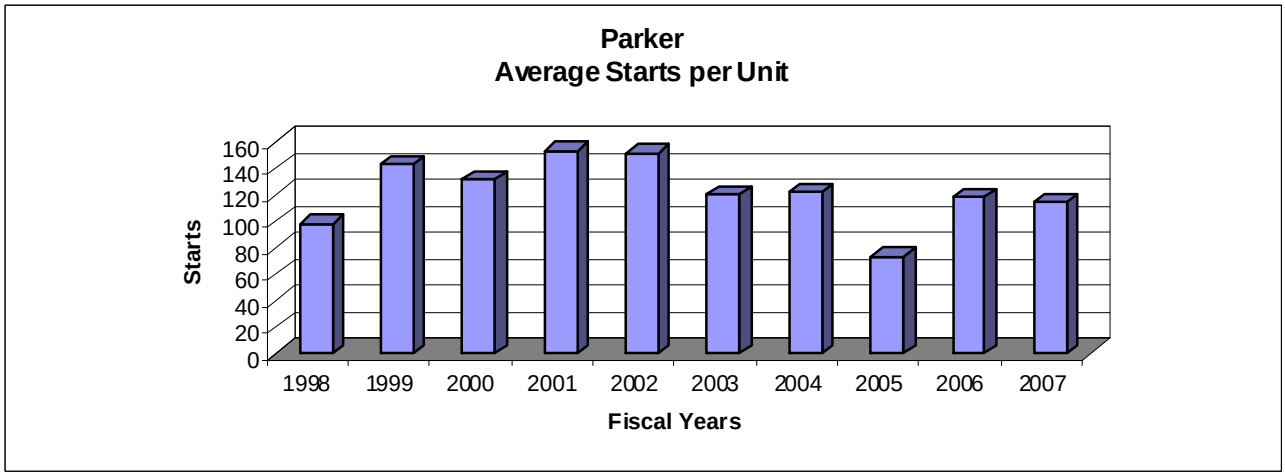
Benchmark 6
Forced Outage Factor



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