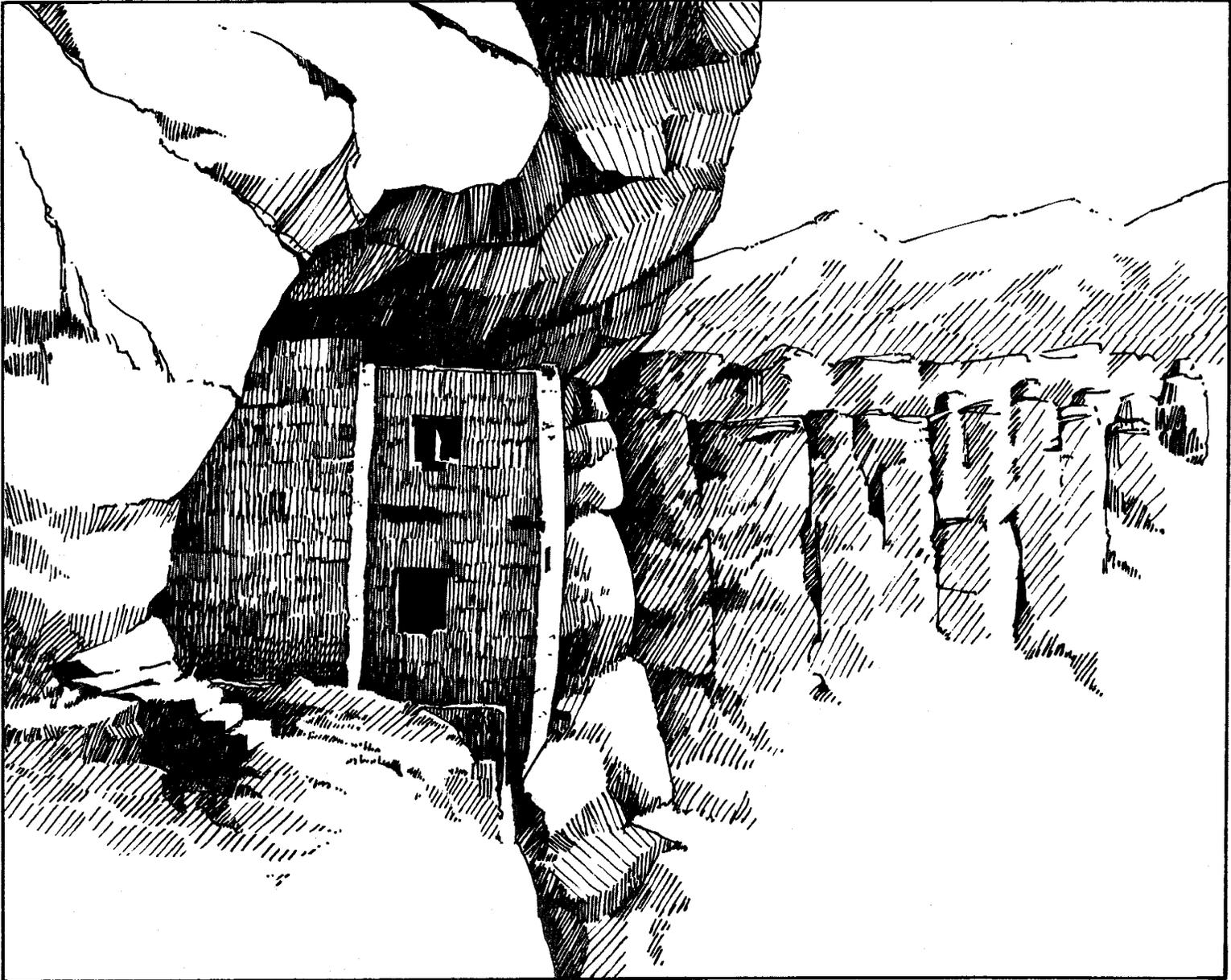
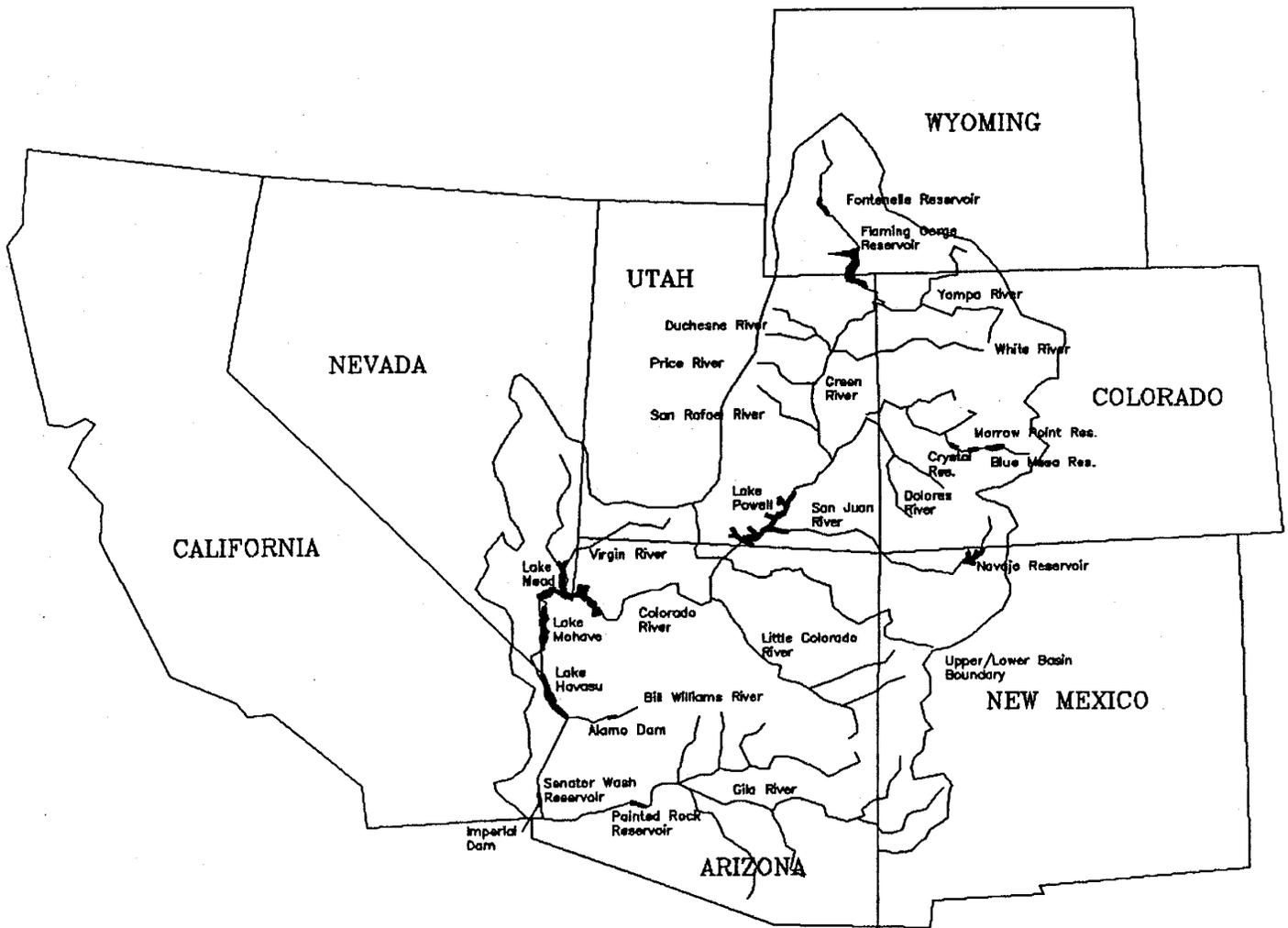


17th Annual Report

**Operation of the
Colorado River Basin 1987
Projected Operations 1988**



Colorado River Basin



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United States
Department of the Interior
Bureau of Reclamation

January 1988

Prepared pursuant to the Colorado River
Basin Project Act of 1968
Public Law 90-537

Introduction

The operation of the Colorado River Basin during the past year and the projected operation for the current year reflect flood control, domestic use, irrigation, hydroelectric power generation, water quality control, fish and wildlife propagation, recreation, and Colorado River Compact requirements.

Storage and release of water from the Upper Basin reservoirs are governed by all applicable laws and agreements concerning the Colorado River, including the impoundment and release of water in the Upper Basin required by Section 602(a) of the Colorado River Basin Project Act of September 30, 1968 (Public Law 90-537). The operation of the Lower Basin reservoirs reflects Mexican Treaty obligations and Lower Basin contractual commitments.

Nothing in this report is intended to interpret the provisions of the Colorado River Compact (45 Stat. 1057), the Upper Colorado River Basin Compact (63 Stat. 31), the Water Treaty of 1944 with the United Mexican States (Treaty Series 994, 59 Stat. 1219), the Decree entered by the Supreme Court of the United States in *Arizona v. California et al.* (376 U.S. 340), the Boulder Canyon Project Act (45 Stat. 1057), the Boulder Canyon Project Adjustment Act (54 Stat. 774; 43 U.S.C. 618a), the Colorado River Storage Project Act (70 Stat. 105; 43 U.S.C. 620), the Colorado River Basin Project Act (82 Stat. 885; 43 U.S.C. 1501), or the Hoover Power Plant Act of 1984 (98 Stat. 1333).

Authority for Report

Pursuant to the Colorado River Basin Project Act (Public Law 90-537) of 1968, I am pleased to present to the Congress, and to the Governors of the Colorado River Basin States, the seventeenth annual report on the Operation of the Colorado River Basin.

This report describes the actual operation of the reservoirs in the Colorado River drainage area constructed under the authority of the Colorado River Storage Project Act, the Boulder Canyon Project Act, and the Boulder Canyon Project Adjustment Act during water year 1987 and the projected operation of these reservoirs during water year 1988 under the "Criteria for Coordinated Long-Range Operation of Colorado River Reservoirs," published in the Federal Register June 10, 1970.

Donald Paul Hodel, Secretary
United States Department of the Interior

Actual Operations Under Criteria - Water year 1987

The initial plan of operation for water year ending September 30, 1987, based on forecasted inflow conditions for October through January and average inflow conditions through the rest of the water year 1987 called for scheduled releases from Lake Powell of 14.7 million acre-feet (MAF). This plan of operation would have created 5.5 MAF of vacant space in the Colorado River reservoir system by the end of September 1987, of which 2.0 MAF would have been in Lake Powell. With this plan of operation the contents of Lakes Powell and Mead would have been within 1.6 MAF of each other at the end of September 1987.

The April through July forecast of runoff into Lake Powell made on January 1, 1987, was 9.5 MAF or 116 percent of the long term average. This long term average is calculated by the Bureau of Reclamation using 80 years of natural flow data (1906-1985) and current depletion levels. Accordingly, releases from Glen Canyon powerplant were maintained at 28,000 cubic feet per second (cfs) for January. The monthly April-July forecasts decreased each month until on May 1, it was at 7.0 MAF or 86 percent of average. In response to the lower forecasts and to insure filling Lake Powell the releases averaged about 65 and 40 percent of maximum powerplant capacity for the months of February, and March through May, respectively.

Lake Powell inflows remained about average through the spring runoff with a snowmelt runoff peak of 52,800 cfs being observed on May 21, 1987. The actual unregulated April-July runoff into Lake Powell was 7.8 MAF in 1987, or 96 percent

of average. The lake reached its maximum elevation on June 25, of 3,698.47 feet, or 99 percent full. Unregulated runoff is the inflow to Lake Powell adjusted for the change in storage of the upstream reservoirs discussed in this report.

The total unregulated runoff for water year 1987 at Lake Powell was 13.6 MAF or 114 percent of the long-term average. Water supply for the San Juan River above Navajo Dam for the water year was at 185 percent, while the Gunnison River above Blue Mesa Dam was at 103 percent and the Green River above Flaming Gorge Dam was at 94 percent of the long-term average. Total releases from Glen Canyon were 13.6 MAF while the regulated inflow for the year was 14.1 MAF. Aggregate Colorado River storage at the end of the year was 55.0 MAF representing a decrease of 0.7 MAF from the previous year.

Commencing in 1986 the operation of the Colorado River Reservoir System was coordinated with Federal and State interests in the Colorado River Management Task Force. The task force is comprised of representatives from each of the Seven Basin States, the Upper Colorado River Commission, the International Boundary and Water Commission, Western Area Power Administration, and the Bureau of Reclamation. The Task Force and was implemented by Secretary of the Interior Donald P. Hodel. It represents a comprehensive effort by the Seven Colorado River Basin States and numerous Federal agencies and serves as a technical forum for resolving operational issues on the Colorado River.

Projected Plan of Operation Under Criteria - Water Year 1988

Determination of "602(a) Storage"

Section 602(a)(3) of the Colorado River Basin Project Act of September 30, 1968 (Public Law 90-537), provides for the storage of Colorado River water, not required to be released under article III(c) and III(d) of the Colorado River Compact in Upper Basin reservoirs, to the extent the Secretary of the Interior (Secretary) finds it necessary to assure Compact deliveries without impairment of annual consumptive uses in the Upper Basin.

Article II of the "Criteria for Coordinated Long-Range Operation of Colorado River Reservoirs" (Operating Criteria) provides that the annual plan of operation shall include a determination by the Secretary of the quantity of water considered necessary to be in Upper Basin storage as of September 30 of the current year.

This determination shall consider all applicable laws and relevant factors including, but not limited to the following: (a) historic streamflows; (b) the most critical period of record; (c) probabilities of water supply; (d) estimated future depletions in the Upper Basin, including the effects of recurrence of critical periods of water supply; (e) the "Report of the Committee on Probabilities and Test Studies to the Task Force on Operating Criteria for the Colorado River," dated October 30, 1969, and such additional studies as the Secretary deems necessary; and (f) the necessity to assure that Upper Basin consumptive uses are not impaired because of failure to store sufficient water to assure deliveries under Section 602(a)(1) and (2) of Public Law 90-537.

Taking into consideration these relevant factors, the Secretary has determined that the active storage in Upper Basin reservoirs forecast for September 30, 1988, exceeds the "602(a) Storage" requirement under any reasonable range of assumptions which might be applied to those items previously listed. Therefore, the accumulation of "602(a) Storage" is not the criterion governing the release of water during the current year.

Mexican Treaty Obligations

Annual calendar year schedules of monthly deliveries of water in the limitrophe section of the Colorado River, allotted in accordance with the Mexican Water Treaty signed in 1944, are formulated by the Mexican Section and presented to the United States Section, International Boundary and Water Commission (Commission), before the beginning of each calendar year.

Upon 30 days advance notice to the United States Section, Mexico has the right to modify, within the total schedule, any monthly quantity prescribed by the schedule by not more than 20 percent. During water year 1987, Mexico received a total delivery of 6,130,000 acre-feet at the Northerly International Boundary (NIB).

Of the 6,130,000 acre-feet of mainstem Colorado River water reaching the NIB, about 3.36 MAF were delivered through the Pilot Knob Powerplant and Wasteway from the All-American Canal. An estimated 2.59 MAF were released through Laguna Dam. The remainder of the flow at NIB was made up of return flows to the Colorado River below Laguna Dam, and returns to the Gila River below the gaging station near Dome, as well as small Gila River releases from Painted Rock Reservoir.

Because of the current water supply conditions, the United States will make scheduled deliveries of 1.7 MAF of Colorado River water to Mexico in calendar year 1988. Under most probable water supply conditions, flow at the NIB would total approximately 4.3 MAF during calendar year 1988. Such release of water is based upon average runoff conditions for the year. Should the runoff during 1988 be substantially above average, significant releases for flood control purposes could be required from Hoover Dam. Representatives of the Republic of Mexico will be kept informed of operating schedules through the United States Section of the Commission.

Projected Plan of Operation - Water Year 1988

A proposed operation plan for water year 1988 for major reservoirs of the Colorado River system was formulated and distributed to representatives of the Colorado River Basin States in November 1987. This plan was prepared in accordance with the Operating Criteria published June 4, 1970, in compliance with Section 602, Public Law 90-537. The plan reflects operation for flood control, domestic and irrigation use of water, hydroelectric power generation, water quality control, fish and wildlife propagation, recreation, and Colorado River Compact requirements.

During the first three months of water year 1988, releases will be at 33 percent of powerplant capacity at Glen Canyon, then releases will increase during January 1988 in order to develop sufficient vacant reservoir space to reduce the risk of spilling. This also reduces the risk of damaging flood releases from Hoover, Davis, and Parker Dams, should large runoff forecasts occur during the 1988 runoff period. Releases from January through July will be based upon the runoff forecasts received during that time but will result in greater available space on August 1, 1988, than the minimum flood control requirement of 1.5 MAF.

The plan calls for a total Glen Canyon release in water year 1988 of 8.2 MAF under reasonable minimum inflow conditions. An annual release of 11.2 MAF would be required under most probable inflow conditions, which would fill Lake Powell to 98 percent full at the end of the runoff season and also equalize the active contents of Lake Powell and Lake

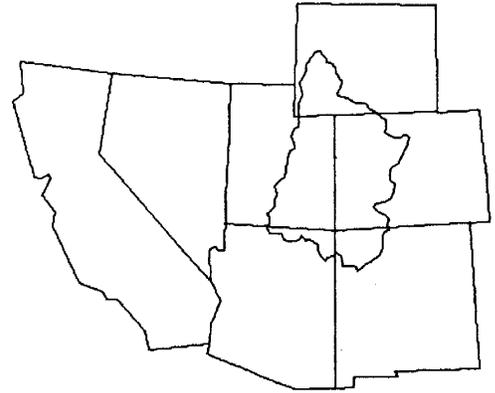
Mead to within 1.4 MAF of each other by September 30, 1988. With a reasonable maximum inflow during water year 1988, the projected Glen Canyon releases would be 15.5 MAF. This volume of inflow would require 85 percent of maximum powerplant releases during April through June, 80 percent during July, 75 percent during August, and 60 percent of powerplant capacity during the remainder of the water year to avoid the use of Glen Canyon's river outlet works or spillways.

The projected operation for most probable runoff conditions for the major reservoirs in the Colorado River Basin for water year 1988 is described in the following pages.

Charts showing the projected monthly outflows from each reservoir for the three assumed hydrologic conditions are presented with each reservoir operation. Each of these assumptions uses the most current hydrologic information available by including actual forecasted October through December 1987 inflows. The monthly inflows for the remainder of the year were based upon the following assumptions: (1) reasonable maximum based upon the annual volume of inflow which would be exceeded about 10 percent of the time. (2) most probable based upon the 1906 through 1985 natural flows developed for the Colorado River Simulation System (CRSS) model depleted up to current levels; and (3) reasonable minimum based upon the annual volume of inflow which would be exceeded about 90 percent of the time.

UPPER BASIN RESERVOIRS

FONTENELLE RESERVOIR (GREEN RIVER)



Water Year 1987

The water year 1987 plan of operation for Fontenelle Reservoir was to maintain the water surface elevation as near as possible to 6,443 feet. This elevation restriction was imposed due to ongoing modification work to correct excessive seepage from the reservoir.

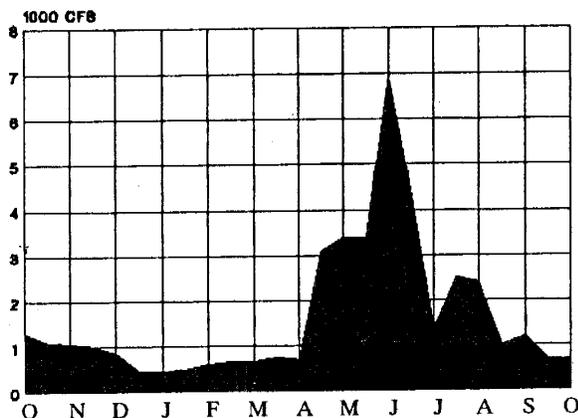
The January 1, 1987 forecast of April through July runoff was 116 percent of average and gradually declined to 81 percent of average on April 1, 1987. The forecast continued to decline through the spring runoff, until on June 1, it was 74 percent of average. This low forecast was a result of a persistent high pressure zone over much of the western states causing low precipitation. With the combination of low runoff and releases matching inflows, the reservoir elevation at Fontenelle was maintained near 6,443 feet throughout water year 1987. On

April 3, releases were increased as the spring runoff began, maximum releases of 6,900 cfs occurred on May 21-22 as the inflow into the reservoir peaked on May 22. Fontenelle Reservoir reached a peak elevation of 6445.2 feet on April 6, 1987.

The actual April through July runoff into Fontenelle Reservoir was 736,000 acre-feet which was 88 percent of average. Inflow for the entire water year 1987 was 1,154,000 acre-feet or 96 percent of average. The total release from Fontenelle Dam for water year 1987 was 1,148,000 acre-feet. Since the reservoir level was below the minimum power elevation for most of the year the powerplant at Fontenelle was not used during water year 1987.

ACTUAL RELEASES

WY 1987



FONTENELLE RESERVOIR

Reservoir	Acre-feet	Elevation, feet
Maximum Storage	344,834	6,506
Rated Head	233,789	6,491
Minimum Power	194,962	6,485
Surface Area, full		8,058 Acres
Reservoir Length, full		18 Miles

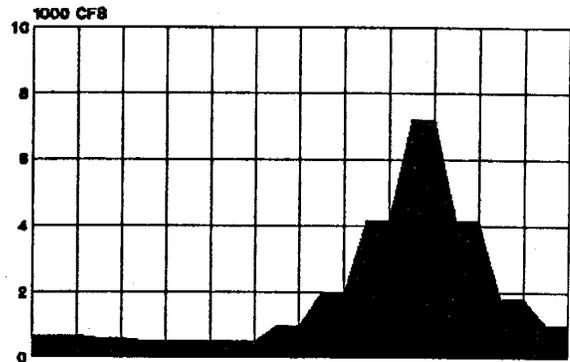
Powerplant

Number of Units	1
Total Capacity	10,000 KW

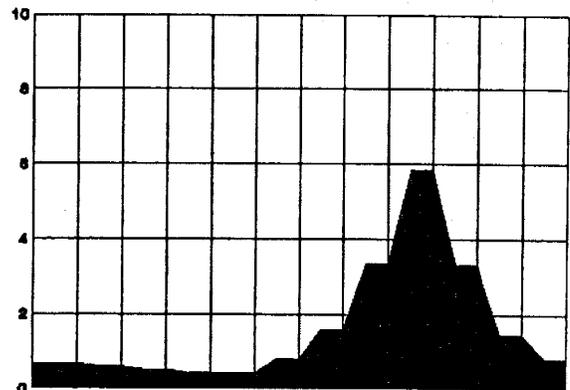
Water Year 1988

The projected plan of operation for Fontenelle Reservoir for water year 1988 is essentially the same as for water year 1987. Due to the construction modification activities involving the installation of a diaphragm wall located along the centerline axis of the dam, the reservoir elevation will be maintained at elevation 6443 feet. Based on the reasonable maximum and minimum inflow operation studies, releases are expected to stay between the 400 and 10,000 cfs throughout water year 1988.

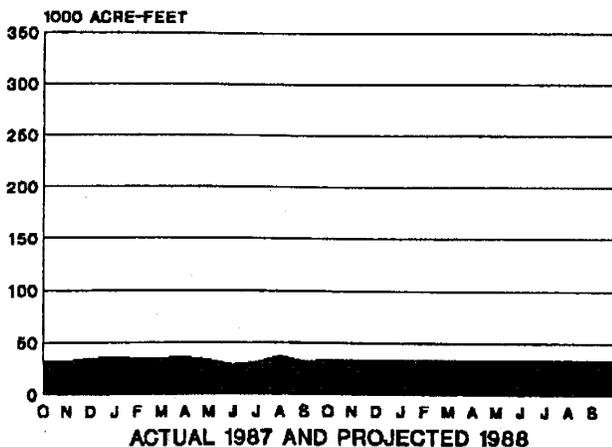
PROJECTED OPERATION 1988 REASONABLE MAXIMUM RELEASES



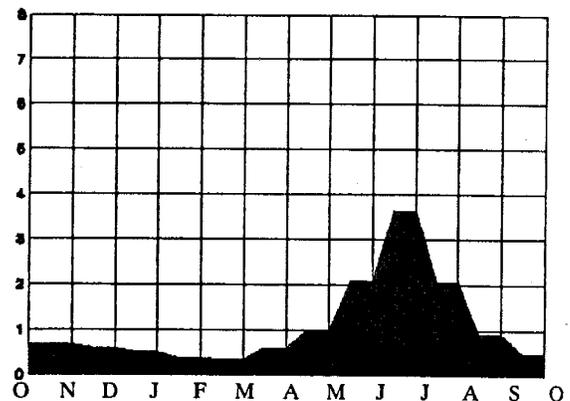
MOST PROBABLE RELEASES



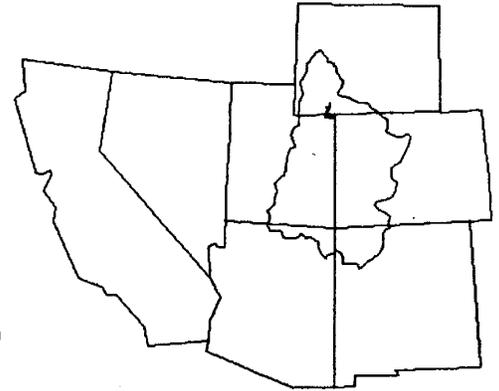
FONTENELLE STORAGE



REASONABLE MINIMUM RELEASES



FLAMING GORGE RESERVOIR (GREEN RIVER)



Water Year 1987

Flaming Gorge Reservoir started water year 1987 at elevation 6,037.3 feet with an active storage of 3,638,000 acre-feet. Releases from Flaming Gorge Dam for water year 1987 were projected to be 2.29 MAF for the most probable operating plan based on the October forecast of an unregulated inflow of 2.32 MAF.

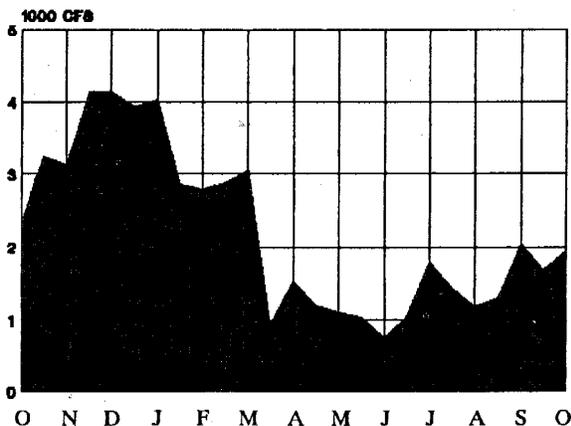
Flaming Gorge Reservoir was gradually drawn down to elevation 6,027.47 feet by January 1, 1987. The forecast of April through July runoff made on January 1, 1987, was 1.35 MAF or 112 percent of average. Powerplant releases for January and February averaged 3,200 cfs. On March 1, 1987, the April through July forecast had decreased to 81 percent of average, subsequently powerplant releases were decreased to an average release of 1,300 cfs for the months of March and April. With the continuance of the dry weather pattern over the western states, the May 1, 1987 forecast had decreased to only 65 percent of average. In expectation of increased runoff into Flaming Gorge resulting from warm temperatures melting the snowpack, releases from the powerplant were increased to an average of 1,600 cfs for the month of May. The months of May and June continued to be hot and dry and the

spring runoff dropped considerably by the end of June. Flaming Gorge reached a maximum elevation of 6,034.0 on June 30, with a storage of approximately 3.50 MAF.

Releases from Flaming Gorge Dam were constrained to a maximum of 2,600 cfs during the months of August and September to provide interim protection to the endangered Colorado Squawfish. This species is currently being studied as part of the Recovery Implementation Program in the Upper Colorado River Basin and restricted summer flows are thought to enhance the downstream habitat of the fish.

The actual April through July unregulated runoff into Flaming Gorge Reservoir was 952,000 acre-feet or 79 percent of average. The peak inflow during the runoff was 11,100 cfs on May 22, 1987, and the peak total discharge was 3,990 cfs May 3-6. The total unregulated inflow for water year 1987 was 1.55 MAF or 94 percent of average. Total releases for the water year was 1,616,000 acre-feet, all of which was passed through the powerplant. The spillway was not used during the water year.

ACTUAL RELEASES WY 1987



FLAMING GORGE RESERVOIR

Reservoir	Acre-feet	Elevation, feet
Maximum Storage	3,749,000	6,040
Rated Head	1,062,000	5,946
Minimum Power	233,000	5,871
Surface Area, full		42,020 Acres
Reservoir Length, full		91 Miles

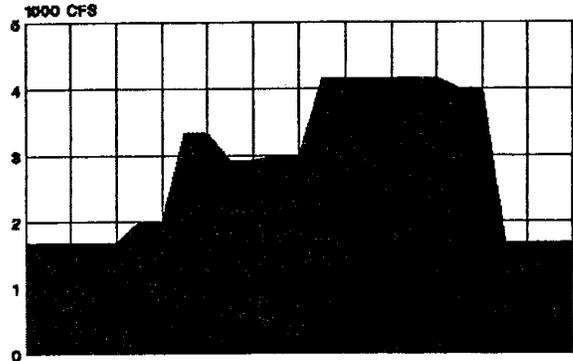
Powerplant

Number of Units	3
Total Capacity	108,000 KW

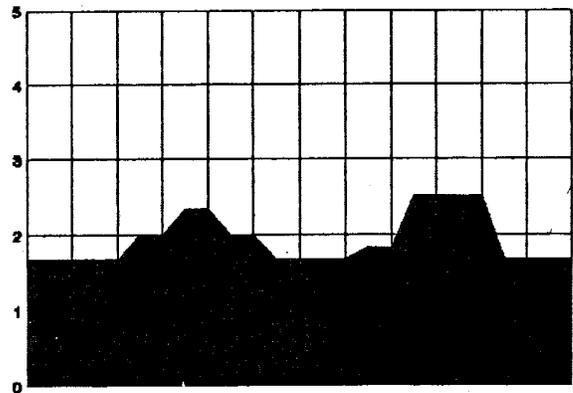
Water Year 1988

It is projected that the water surface at Flaming Gorge will be drawn down to about elevation 6,022 feet before the 1988 spring runoff. This drawdown will reduce the risk of powerplant bypasses during the 1988 runoff season. The releases from Flaming Gorge will most probably be maintained near 50 percent of maximum powerplant capacity during the majority of the year in order to accommodate the expected inflow and filling of the reservoir. Under the most probable operation the total water year 1988 releases will be 1.39 MAF with a total unregulated inflow of 1.64 MAF.

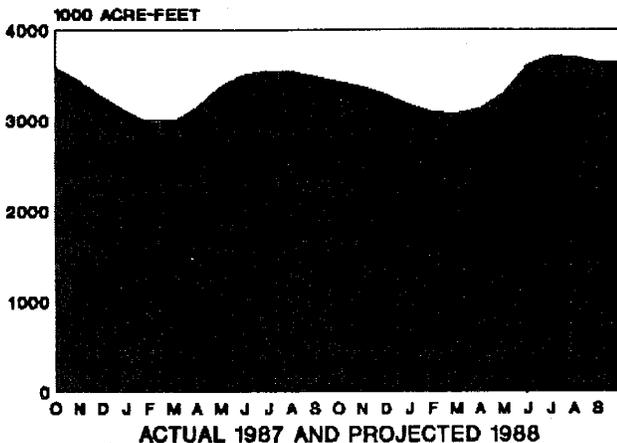
PROJECTED OPERATION 1988 REASONABLE MAXIMUM RELEASES



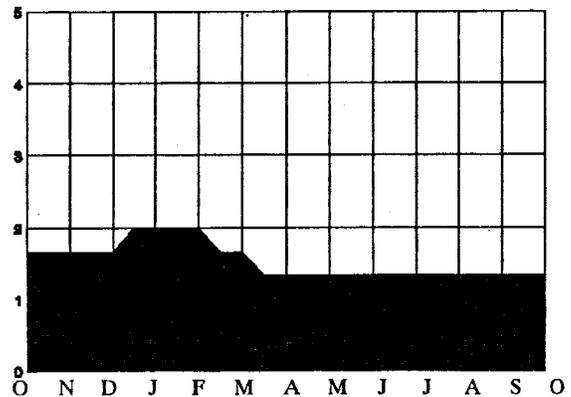
MOST PROBABLE RELEASES



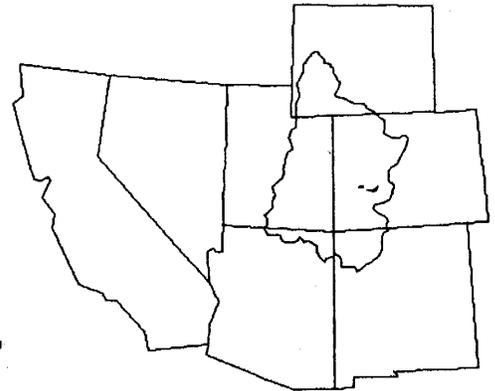
FLAMING GORGE STORAGE



REASONABLE MINIMUM RELEASES



WAYNE N. ASPINALL UNIT BLUE MESA, MORROW POINT, AND CRYSTAL RESERVOIRS (GUNNISON RIVER)



Water Year 1987

The Wayne N. Aspinall Unit is comprised of Blue Mesa, Morrow Point, and Crystal Reservoirs. Blue Mesa provides nearly all of the long term storage and regulation for all three powerplants. Morrow Point provides peaking power, and thus has highly variable releases. The primary function of the Crystal Reservoir is to regulate the variable Morrow Point releases.

Blue Mesa Reservoir began water year 1987 at elevation 7,509.4 feet with a storage of 740,000 acre-feet. Releases from Blue Mesa for water year 1987 were projected to be 1.20 MAF based on the most probable unregulated annual inflow of 1.17 MAF which had been forecasted in October 1986.

On January 1, 1987, Blue Mesa Reservoir had been gradually lowered to elevation 7,489 feet. The January 1, 1987 forecast of April through July runoff was 765,000 acre-feet or 100 percent of average. The April through July runoff forecast for Blue Mesa continued to decline for each month's forecast through the entire runoff season. On May 1, the forecast had decreased to 675,000 acre-feet or 88 percent of average. Releases from Blue Mesa Powerplant for January through March averaged about 2,000 cfs and releases for April through June averaged about 1,000 cfs, or 80 and 40 percent of maximum powerplant capacity, respectively. The decrease in power releases for April through June were prompted over concern of not being able to fill the reservoir. By July 2, 1987,

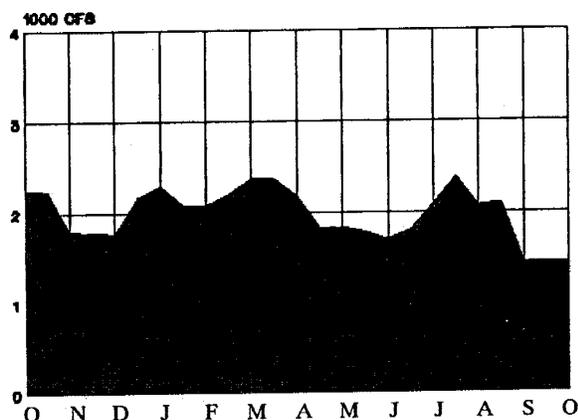
Blue Mesa Reservoir reached a maximum elevation of 7,516.2 feet with a storage of 800,700 acre-feet. The maximum inflow to the reservoir was 8,240 cfs which occurred on June 13, 1987.

The actual April through July unregulated runoff into Blue Mesa Reservoir was 797,000 acre-feet or 104 percent of average. The total water year 1987 inflow was 1,119,000 acre-feet or 103 percent of average. Releases from Blue Mesa Dam totaled 1,157,000 acre-feet for the water year, all of which passed through the powerplant.

Morrow Point Reservoir operated at or near capacity between elevations 7,150 and 7,160 feet. The April through July side inflow into Morrow Point Reservoir was 81,000 acre-feet which was 140 percent of average. A total of 1,272,000 acre-feet was released during the water year, all of which passed through the powerplant.

Crystal Reservoir was also operated at or near its capacity during water year 1987, fluctuating between elevations 6,748 and 6,754 feet. The April through July side inflow to Crystal was 98,000 acre-feet which was 111 percent of average. A total of 1,222,000 acre-feet was released during the water year of which 214,000 acre-feet bypassed the powerplant. During water year 1987 the maximum total release from Crystal was 2,380 cfs from July 2, through July 23, 1987.

ACTUAL CRYSTAL RELEASES WY 1987



BLUE MESA RESERVOIR

Reservoir	Acre-feet	Elevation, feet
Maximum Storage	829,523	7,519
Rated Head	249,395	7,438
Minimum Power	81,070	7,393
Surface Area, full		9,180 Acres
Reservoir Length, full		24 Miles

Powerplants (Blue Mesa, Morrow Point, & Crystal)

Number of Units	5
Total Capacity	208,000 KW

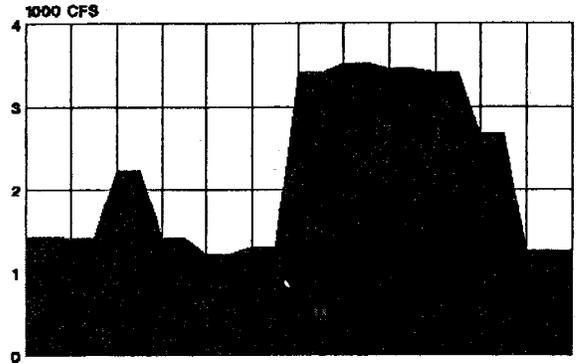
Water Year 1988

Blue Mesa powerplant will be operated to minimize powerplant bypasses at Crystal Dam. Assuming near average inflow during water year 1988, a low elevation of 7,471 feet is expected by the end of March with a maximum elevation of 7518 feet in July.

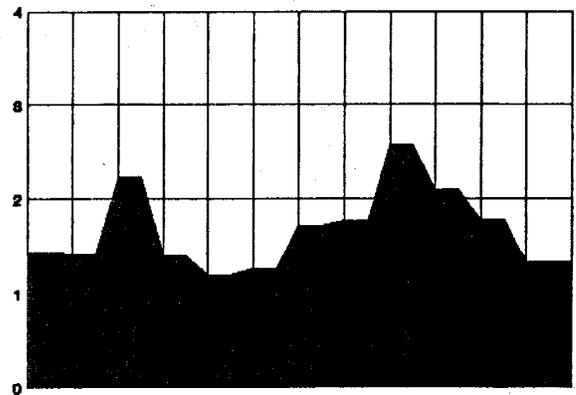
Morrow Point Reservoir will fluctuate up to its capacity during the coming year. Crystal Reservoir will operate at full capacity to regulate the releases from Morrow Point and to meet downstream requirements for fish habitat and diversions through the Gunnison Tunnel.

With reasonable maximum inflows, releases from Crystal Dam will be at least 3,500 cfs and possibly higher. Assuming near average inflow conditions, releases from Crystal Reservoir will be at maximum powerplant capacity of 1,700 cfs in addition to scheduled bypasses of up to 1,000 cfs. Under reasonable minimum inflow conditions, releases will range from 1,000 cfs to powerplant capacity of 1,700.

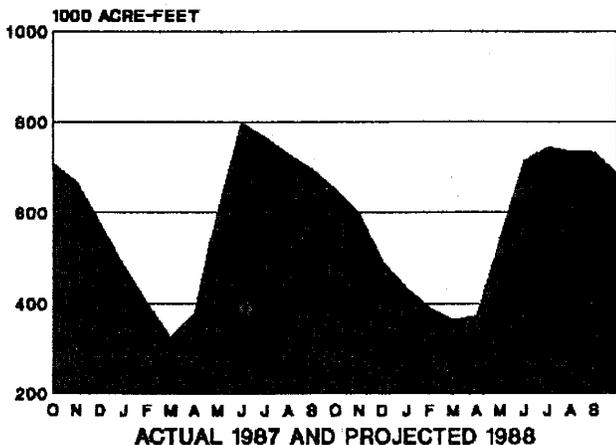
PROJECTED OPERATION 1988 REASONABLE MAXIMUM CRYSTAL RELEASES



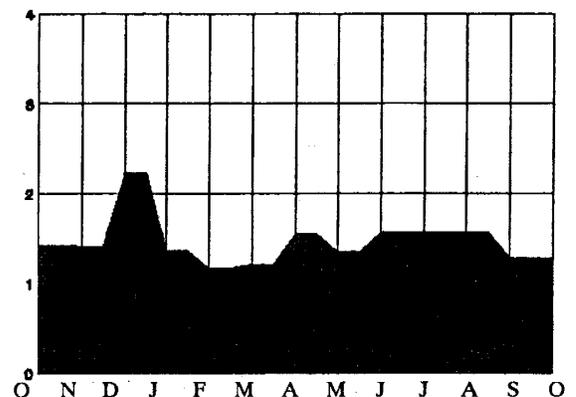
MOST PROBABLE RELEASES



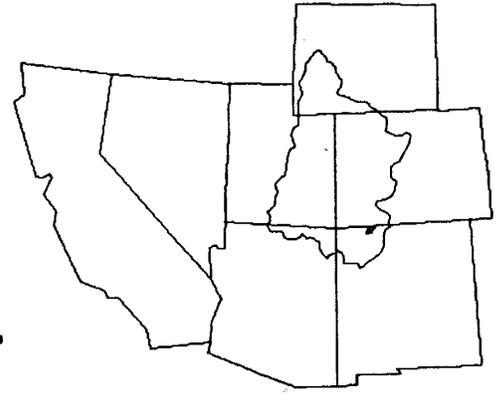
BLUE MESA STORAGE



REASONABLE MINIMUM RELEASES



NAVAJO RESERVOIR (SAN JUAN RIVER)



Water Year 1987

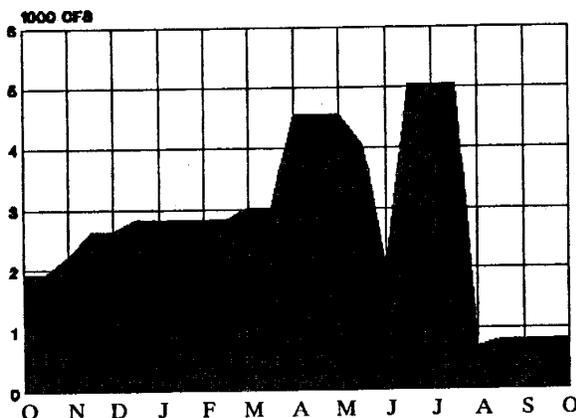
The completion of the concrete cutoff wall, part of the dam safety modification work on Navajo Dam, was finished during water year 1987. The elevation of Navajo Reservoir at the beginning of the water year was 6,072.3 feet with 1,508,000 acre-feet of active storage. It was planned that Navajo Reservoir with an average 1987 runoff year would be drawn down to near elevation 6,042 feet by April 1987, in preparation for the completion of the dam modification work.

Navajo Reservoir was gradually drawn down to elevation 6,066.3 feet by January 1, 1987, and the April through July runoff forecast at this time was 775,000 acre-feet or 122 percent of average. Releases of 2,820 cfs were maintained through January and most of February. On March 1, the runoff forecast increased to 825,000 acre-feet, which was 130 percent of average. This dictated that releases be increased to 3,020 cfs for the month of March. The forecast made on April 1 increased again, to 925,000 acre-feet or 146 percent of

average. Subsequently, releases of 4,540 cfs were held constant for the entire month of April and for the first few weeks of May. On June 1, the forecast remained unchanged, although inflows increased rapidly due to the snowpack melting from warmer weather. An inflow of 7,380 cfs occurred on June 16, resulting in releases being increased to 5,040 cfs in order to keep the reservoir surface elevation from rising.

The actual April through July 1987 runoff volume into Navajo Reservoir was 1,072,000 acre-feet, or 169 percent of average. The total water year 1987 inflow was 1,771,000 acre-feet which was 185 percent of average. Peak inflow to Navajo reservoir occurred on April 25, at 7,520 cfs and the peak releases were 5,040 cfs from June 3 through July 20. The reservoir reached a peak elevation of 6,055.7 feet on June 19, and the desired drawdown elevation of 6,042 feet was reached on April 7, 1987. The spillway at Navajo Dam was not used during the water year.

ACTUAL RELEASES WY 1987



NAVAJO RESERVOIR

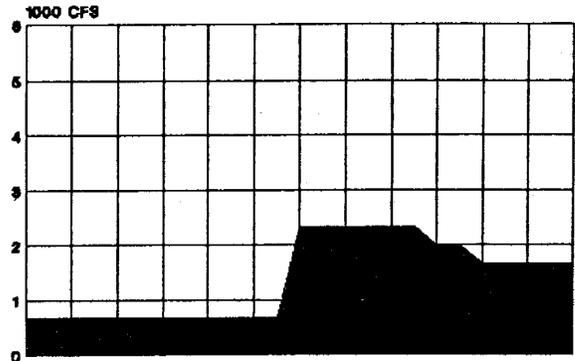
Reservoir	Acres-foot	Elevation, feet
Maximum Storage	1,696,400	6,085
Inactive Storage	660,500	5,990
Surface Area, full		15,610 Acres
Reservoir Length, full		33 Miles

Water Year 1988

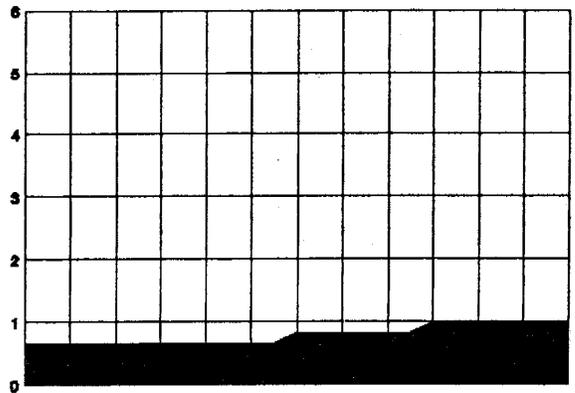
Navajo Reservoir is scheduled to be refilled during water years 1988 and 1989. It is projected that the reservoir will be drawn down to near elevation 6,034 feet by January 1988, in preparation of refilling the reservoir. Constant releases averaging 670 cfs per month for October through March, 830 cfs during April through June, and 1,000 cfs during July through September are projected to gradually fill Navajo Reservoir under most probable inflow conditions.

With a probable maximum runoff water year, Navajo Reservoir is expected to fill with maximum releases of 2,300 cfs during the months of April through June. A reasonable minimum level of inflow would cause releases to be held at a constant 670 cfs per month through the entire 1988 water year.

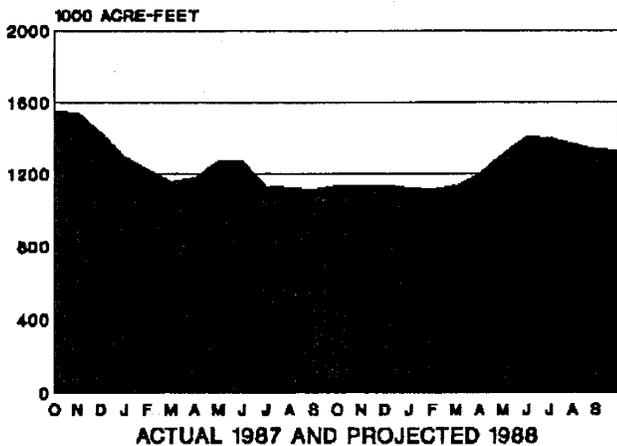
PROJECTED OPERATION 1988 REASONABLE MAXIMUM RELEASES



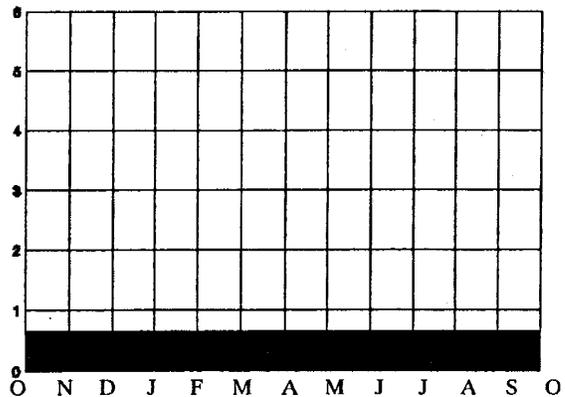
MOST PROBABLE RELEASES



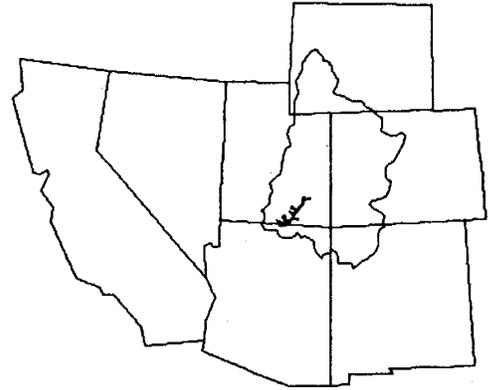
NAVAJO STORAGE



REASONABLE MINIMUM RELEASES



LAKE POWELL (COLORADO RIVER)



Water Year 1987

Lake Powell, which is impounded by Glen Canyon Dam, was operated as part of the Colorado River Storage Project (CRSP) in accordance with governing contracts and laws to provide conservation storage, river regulation, power generation, recreation, and fish and wildlife enhancement during water year 1987.

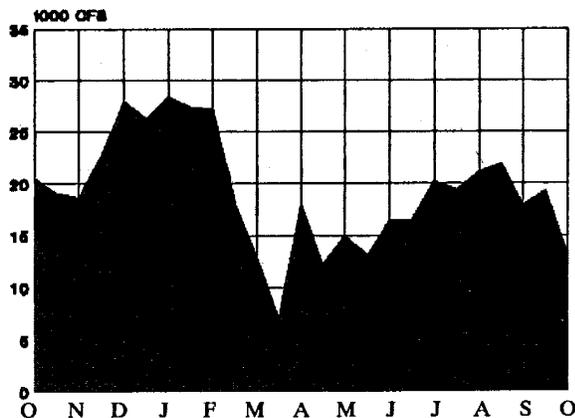
At the start of water year 1987, Lake Powell had an active content of 23,362,000 acre-feet at elevation 3,689.6 feet (93 percent full). The most probable operating plan based on the October forecast called for total water year releases of 11.2 MAF based on an unregulated inflow of 12.4 MAF. The reasonable maximum (upper decile) water supply had scheduled water year releases of 15.5 MAF based on an unregulated inflow of 17.7 MAF.

On January 1, 1987, Lake Powell was at elevation 3,684 with an active content of 22,534,000 acre-feet. The January 1 forecast of April through July runoff for Lake Powell was 9.5 MAF or 116 percent of average. Discharges from Glen Canyon powerplant averaged 27,300 cfs (82 percent of maximum capacity) for the month of January. The February runoff forecast was decreased to 8.5 MAF and subsequently

powerplant releases were decreased to an average 64 percent of capacity. In March, the forecast dropped to 7.5 MAF and was 7.0 MAF or 86 percent of average on May 1. To insure filling Lake Powell by the end of June, powerplant releases were lowered to an average 40 percent of capacity during the months of March through May. The elevation of Lake Powell on June 1 was 3,694.7 feet (97 percent full) and the June forecast had increased slightly to 7.1 MAF. To contain this volume and completely fill Powell without spilling, releases were increased to average 50 percent of powerplant capacity for June. The Maximum lake elevation of 3,698.5 feet (99 percent full) was reached on June 25. Lake Powell recorded a peak regulated inflow of 52,800 cfs on May 21, with maximum releases from the powerplant of 20,000 cfs (60 percent capacity) on June 17 through June 30, 1987.

The total 1987 water year unregulated inflow to Lake Powell was 13,625,000 acre-feet which is equivalent to a most probable water year supply. Total water year releases below Glen Canyon were 13,605,000 acre-feet all of which passed through the powerplant. The spillways at Glen Canyon were not used.

ACTUAL RELEASES WY 1987



LAKE POWELL

Reservoir	Acre-feet	Elevation, feet
Maximum Storage	25,002,000	3,700
Rated Head	9,428,000	3,570
Minimum Power	4,126,000	3,490
Surface Area, full		161,390 Acres
Reservoir Length, full		186 Miles

Powerplant

Number of Units	8
Total Capacity	1,247,000 KW

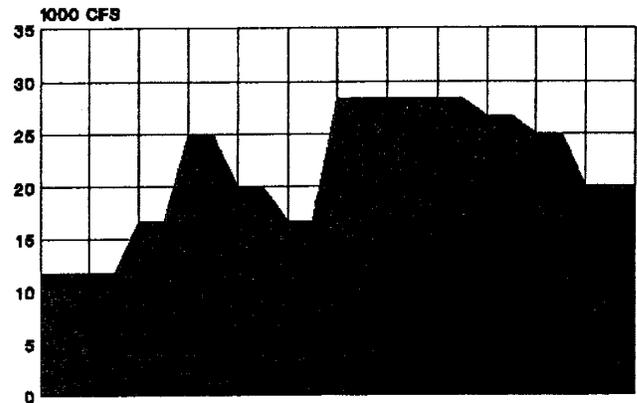
Water Year 1988

Lake Powell begins the water year at elevation 3,687.9 feet with an active content of 23.1 MAF (92.4 percent full). The plan of operation through December is to maintain releases at about 40 percent of maximum powerplant capacity. Beginning in January, assuming a most probable unregulated runoff water year of 12.4 MAF, discharges from the powerplant would be increased to average 55 percent of capacity through February, lowering to about 40 percent of capacity during the months of March through June. The months of July through September would be operated for power and recreation demands with discharges at 65 percent of powerplant capacity. Total discharges for the water year would be 11.2 MAF.

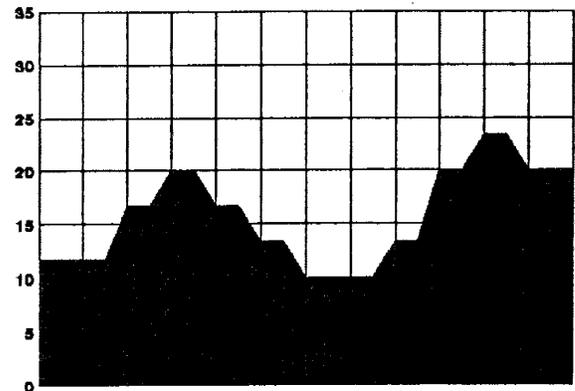
Under a probable maximum inflow (upper decile), the operation for October through December is the same as for the most probable inflow. For January through March, releases would average 62 percent of maximum powerplant capacity and increase to 85 percent of capacity for April through July. Powerplant releases would then be lowered to about 70 percent capacity for the remaining water year. Total water year releases of 15.5 MAF based on an unregulated inflow of 17.7 MAF would be required to fill Lake Powell during the month of July. A reasonable minimum level of inflow would produce an annual release of 8.2 MAF based on a unregulated inflow volume of 7.9 MAF.

The actual releases from Lake Powell after January 1, 1988, will be reevaluated based upon runoff forecasts reflecting current hydrologic conditions. It is expected that powerplant bypasses will be avoided in all three operating plans.

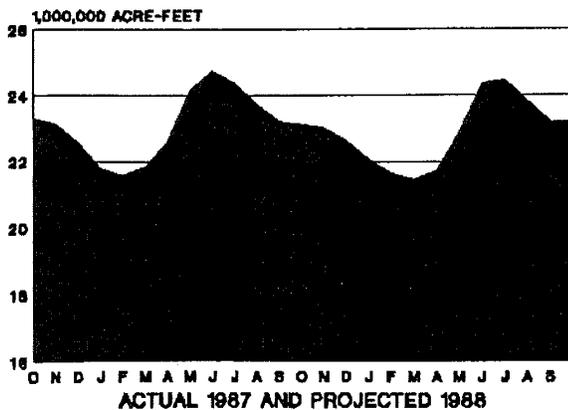
PROJECTED OPERATION 1988 REASONABLE MAXIMUM RELEASES



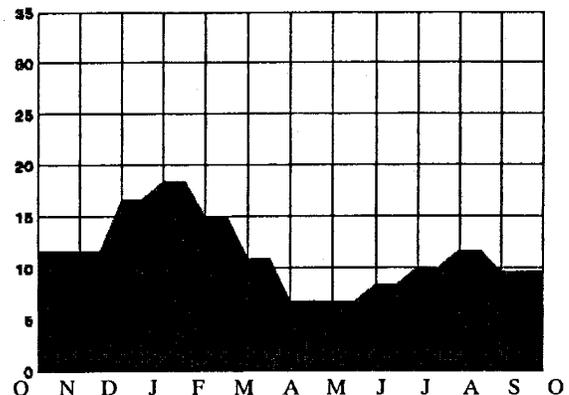
MOST PROBABLE RELEASES



LAKE POWELL STORAGE



REASONABLE MINIMUM RELEASES



LOWER BASIN RESERVOIRS

LAKE MEAD (COLORADO RIVER)



Water Year 1987

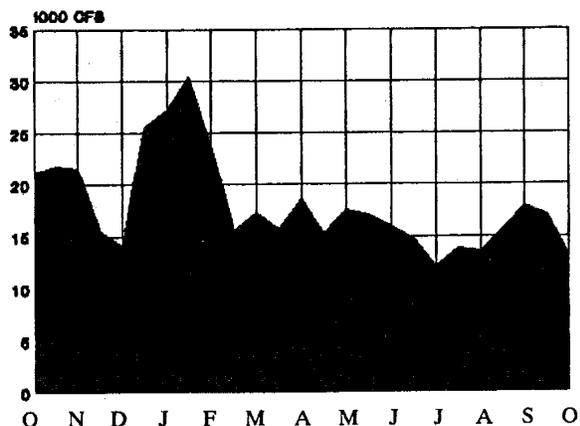
At the beginning of water year 1987, Lake Mead, impounded by Hoover Dam, had a water surface elevation of 1,209 feet and an active storage of 24,220,000 acre-feet. During the winter months, the water level gradually rose to 1,211 feet near the middle of February 1987. By the end of May the water level had gradually declined to elevation 1206 feet. During the high inflow conditions of June and July, Lake Mead reached a high elevation of 1,208 feet in the last week of July, with a active storage of 24,066,000 acre-feet.

During the water year, releases were made to meet downstream water use requirements in the United States and Mexico, flood control requirements, programmed levels of Lakes Mohave and Havasu, and transit losses which include

river and reservoir evaporation, uses by phreatophytes, changes in bank storage, unmeasured inflows, and diversions to the Las Vegas, Nevada area via the Robert B. Griffith Water Project (Project). The total release from Lake Mead through Hoover Dam during water year 1987 was 13,140,000 acre-feet. All of that amount passed through the turbines for power production. In addition, 180,000 acre-feet were diverted from Lake Mead by the Project. At the end of the water year, Lake Mead had a water surface elevation of 1,210 feet and an active storage of 24,365,000 acre-feet which reflects an increase in storage during the water year of 145,000 acre-feet. On September 30, 1987, the active storage of Lake Mead was 1,255,000 acre-feet greater than the active storage in Lake Powell.

ACTUAL RELEASES

WY 1987



LAKE MEAD

Reservoir	Acre-feet	Elevation, feet
Maximum Storage	27,377,000	1,229
Rated Head	13,653,000	1,123
Minimum Power	10,024,000	1,083
Surface Area, full		162,700 Acres
Reservoir Length, full		18 Miles

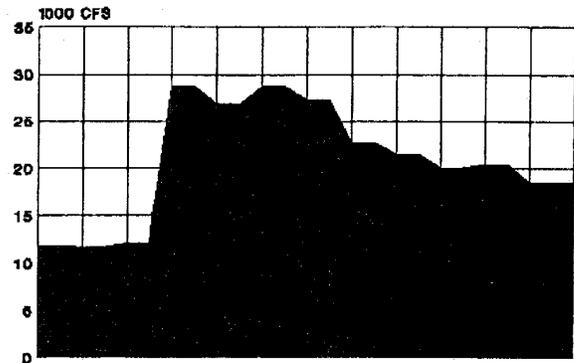
Powerplant

Number of Units	17
Total Capacity	1,429,000 KW

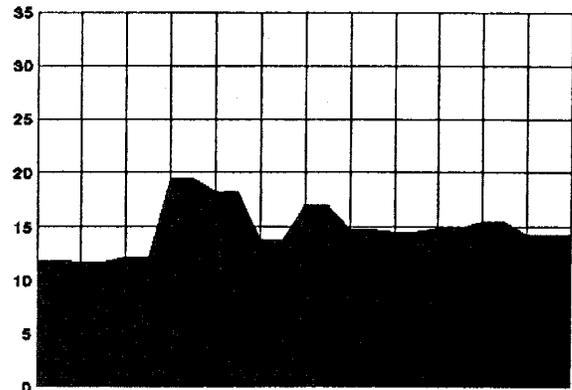
Water Year 1988

Under most probable inflow conditions during the 1988 water year, the Lake Mead water level is scheduled to be drawn down to elevation 1,206 feet at the end of June 1988. At that level, the lake will have in active storage approximately 23.7 MAF. During water year 1988, a total of about 10.7 MAF is scheduled to be released from Lake Mead under most probable conditions, all passing through the powerplant.

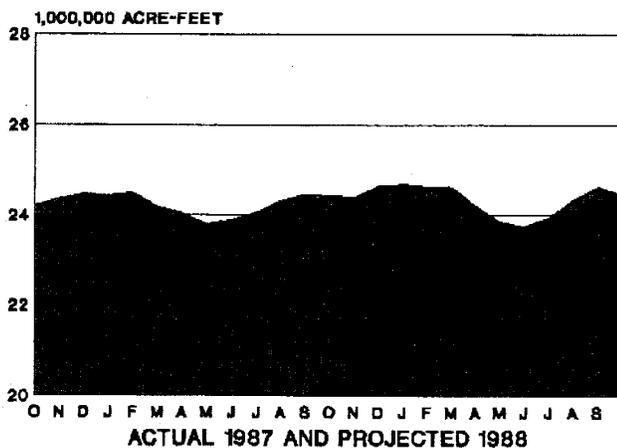
**PROJECTED OPERATION 1988
REASONABLE MAXIMUM RELEASES**



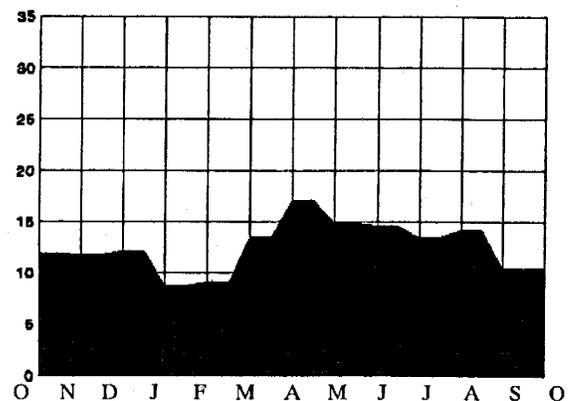
MOST PROBABLE RELEASES



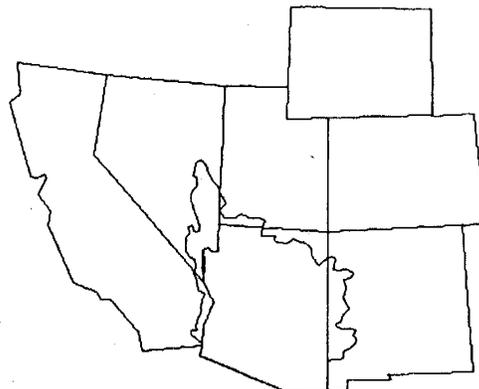
LAKE MEAD STORAGE



REASONABLE MINIMUM RELEASES



LAKE MOHAVE (COLORADO RIVER)



Water Year 1987

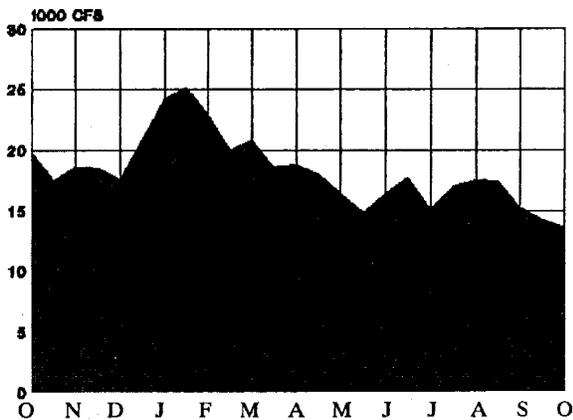
At the beginning of water year 1987, the water surface elevation of Lake Mohave, which is impounded by Davis Dam, was 631.4 feet, with an active storage of 1,395,000 acre-feet.

During the winter months, the water level was gradually raised to approximately 644 feet, with an active storage of 1,730,000 acre-feet in the first part of February 1987. The water level was then gradually raised during March. The reservoir reached elevation 645.8 feet during the first part of April 1987. During April and May, Lake Mohave fluctuated between an elevation of about 645 and 643 feet, with an active storage of approximately 1.76 MAF at the end of May. Lake Mohave was at an elevation of about 633 feet by the end of July 1987. The

reservoir ended the water year at an elevation of 633.0 feet with 1,436,000 acre-feet in active storage.

Lake Mohave releases were made to satisfy flood control requirements and downstream water use requirements, including diversions by The Metropolitan Water District of Southern California (MWD) and by the Central Arizona Project (CAP). A small amount of regulation occurred at Lake Havasu. During the water year 13,020,000 acre-feet were released at Davis Dam, all of which passed through the turbines for power production. Of that amount, 1,313,000 acre-feet were pumped from Lake Havasu by MWD and 356,000 acre-feet were pumped for the CAP.

ACTUAL RELEASES WY 1987



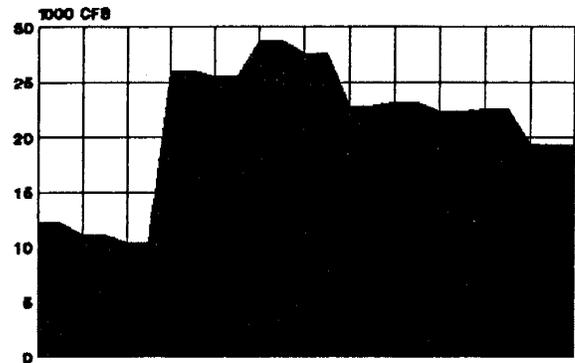
LAKE MOHAVE

Reservoir	Acre-feet	Elevation, feet
Maximum Storage	1,810,000	647
Rated Head	1,188,000	623
Minimum Power	217,500	570
Surface Area, full		28,200 Acres
Reservoir Length, full		67 Miles
Powerplant		
Number of Units		5
Total Capacity		240,000 KW

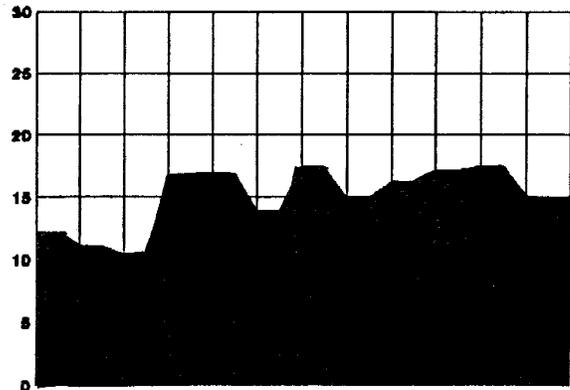
Water Year 1988

Under most probable inflow conditions, the water level of Lake Mohave is scheduled to reach an elevation of 642 feet by the end of January 1988 and then rise to elevation 645 feet by the end of May. The reservoir will gradually drop to an elevation of 631 feet by the end of the water year. During the water year a total of 10.8 MAF is scheduled to be released from Lake Mohave to meet all downstream and flood control requirements. All of that total is scheduled to pass through the powerplant.

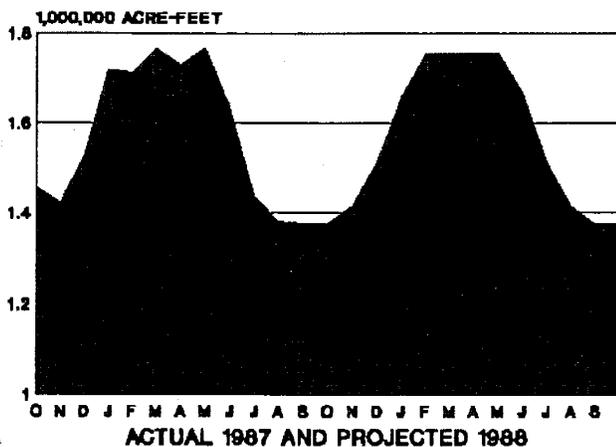
PROJECTED OPERATION 1988 REASONABLE MAXIMUM RELEASES



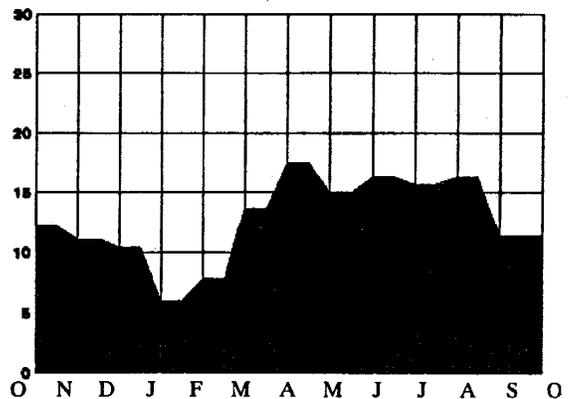
MOST PROBABLE RELEASES



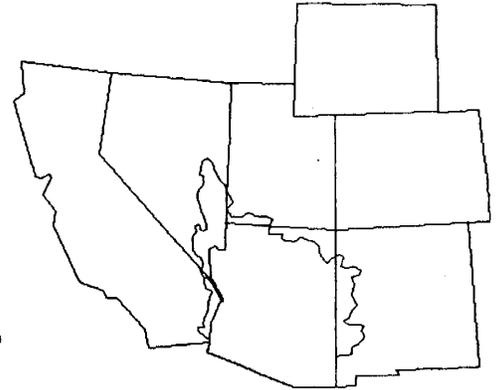
LAKE MOHAVE STORAGE



REASONABLE MINIMUM RELEASES



LAKE HAVASU (COLORADO RIVER)



Water Year 1987

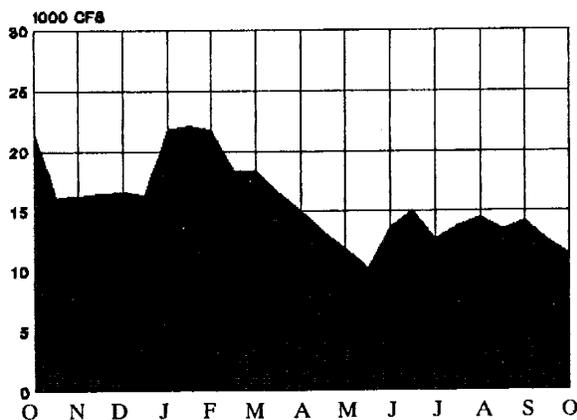
At the beginning of water year 1987, the water level of Lake Havasu, impounded by Parker Dam, was at elevation 448 feet with an active storage of approximately 580,000 acre-feet. During October, November, and December 1986, the reservoir fluctuated between elevation 446 feet and 448 feet. In early April 1987, the reservoir was at elevation 446 feet to provide vacant space for runoff from the drainage area between Davis and Parker Dams. The water level was then raised to an approximate elevation of 450 feet near the end of May, with an active storage of about 620,000 acre-feet. At the end of the water year, Lake Havasu was at an elevation of about 448 feet with an active storage of 570,000 acre-feet.

During the water year 11,360,000 acre-feet were released at Parker Dam, all of which passed through the turbines for

power production. The total release amount included releases from Alamo Dam on the Bill Williams River. In addition to the releases from Parker Dam, approximately 1.31 MAF were diverted from Lake Havasu by MWD. Diversions from Lake Havasu for the CAP were 356,000 acre-feet during the water year.

Space in the top 10 feet of Lake Havasu (about 180,000 acre-feet) is reserved by the United States for control of floods and other uses, including river regulation. Normally, only about the top 4 feet, or 77,000 acre-feet of space, have been used for this purpose since the Alamo Reservoir on the Bill Williams River has been in operation.

ACTUAL RELEASES WY 1987



LAKE HAVASU

Reservoir	Acre-feet	Elevation, feet
Maximum Storage	619,400	450
Rated Head	619,400	450
Minimum Power	439,400	440
Surface Area, full		20,400 Acres
Reservoir Length, full		35 Miles

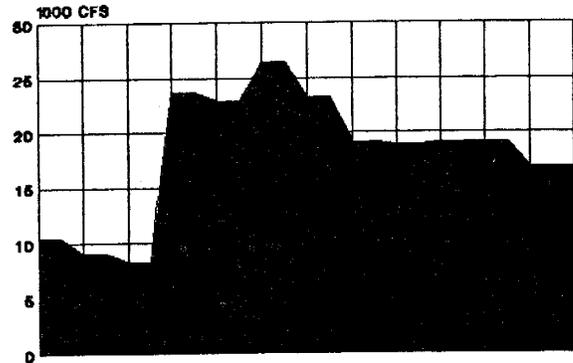
Powerplant

Number of Units	4
Total Capacity	120,000 KW

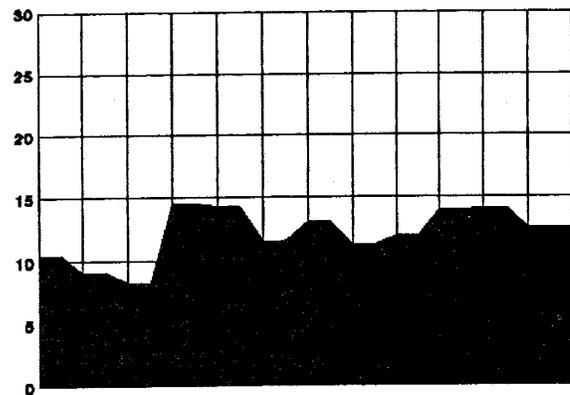
Water Year 1988

Lake Havasu is scheduled at the highest levels consistent with the requirements for maintaining reservoir regulation space. The yearly low elevation of approximately 446 feet is scheduled for the October through January high flood hazard period. The yearly high of about 450 feet is scheduled for the low flood hazard months of May and June. During water year 1988, a total of approximately 8.7 MAF is scheduled to be released from Lake Havasu to meet all downstream and flood control requirements. All of that amount is scheduled to pass through the Parker Powerplant.

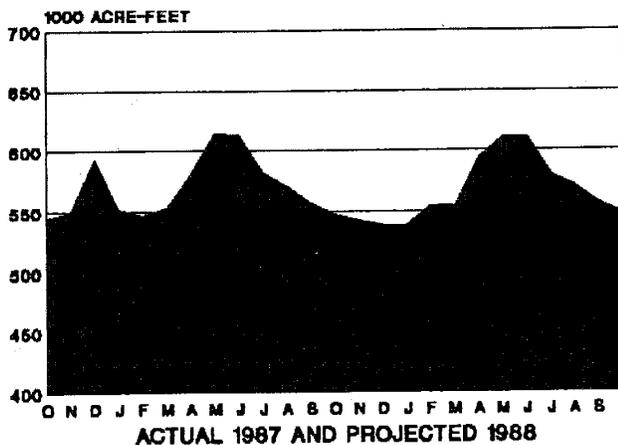
PROJECTED OPERATION 1988 REASONABLE MAXIMUM RELEASES



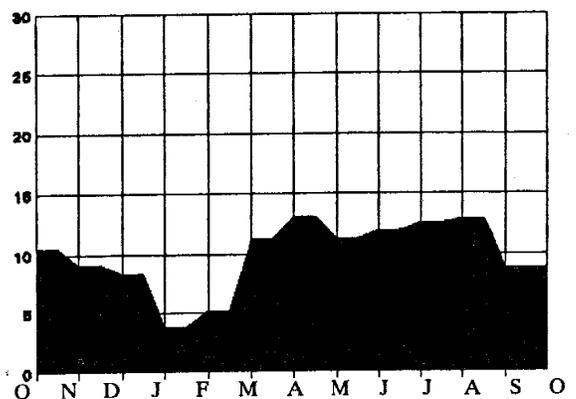
MOST PROBABLE RELEASES



LAKE HAVASU STORAGE



REASONABLE MINIMUM RELEASES



River Regulation

Daily releases are made from the storage reservoirs in the Lower Basin to meet the incoming orders of the water user agencies or for the regulation of higher flood control and releases of excess water. When possible, all water passes through the powerplant units. The daily releases are regulated on an hourly basis to meet as nearly as possible the peaking power needs of the hydroelectric power customers. Minimum daily flow objectives are provided in the river to maintain fishery habitat.

The combination of high runoff conditions and river regulation below Hoover Dam resulted in a total water year 1987 delivery to Mexico of approximately 4.7 MAF in excess of the scheduled treaty quantity (1.7 MAF per calendar year). Of that amount, 125,000 acre-feet of drainage waters were bypassed to the Gulf of California via the Bypass Drain during water year 1987. This bypass channel was constructed pursuant to provisions of Minute No. 242 of the International Boundary and Water Commission.

Flood Control

Lake Mead is operated in accordance with updated flood control regulations which are specified in the Field Working Agreement between Reclamation and the Corps of Engineers, signed in 1982. The regulations stipulate minimum release levels from Lake Mead to route the reasonable maximum inflow. The reasonable maximum inflow is the estimated inflow volume that, on the average, will not be exceeded 19 out of 20 times. This volume is derived by adding an "uncertainty" term to the most probable runoff forecast. In 1983, unusual hydrometeorological events resulted in unprecedented large forecasting errors. Subsequent reassessment of the estimate of the "uncertainty" term led to adoption of larger values for use in determining the probable maximum inflow in 1984 and thereafter.

Routine maintenance and repair of bankline damage was carried out during water year 1987. The majority of the bankline erosion problems experienced in the Lower Basin stemmed from increased boating and other recreational river traffic.

Scouring in some reaches of river channel has continued, therefore river levels have been lower in some areas than they were with the same release levels during the last 4 years. In a few areas, however, reaches have refilled due to heavy sediment loads.

Total Colorado River reservoir system storage at the start of water year 1987 was approximately 55.61 MAF and about 54.92 MAF at the end of the water year, representing a 691,000 acre-foot increase in total remaining available reservoir space.

In addition to the mainstem structures, Alamo Dam on the Bill Williams River (in the Lower Basin) received minor flood inflow during water year 1987. During water year 1988, Painted Rock and Alamo Reservoirs are scheduled to be operated in accordance with established flood control criteria to maximize the available flood control space in their respective reservoirs.

Water Quality Operations

In recognizing the need to manage the water quality of the Colorado River, it was recommended that long-term salinity increases in the river be controlled through a water quality improvement program as described in the report "Colorado River Water Quality Improvement Program" dated February 1972.

The program called for a basin-wide approach to salinity control while the Upper Basin continues to develop its compact-apportioned waters. The initial step toward improvement of the future water quality in the basin was the passage by Congress of the Colorado River Basin Salinity Control Act of 1974 (Act) (Public Law 93-320) on June 24, 1974, authorizing the construction of various features for the enhancement and protection of the quality of water available in the Colorado River for use in the United States and Mexico.

Title I of the Act enables the United States to comply with its obligation under the agreement with Mexico of August 30, 1973 (Minute 242 of the International Boundary and Water Commission, United States and Mexico), which was concluded pursuant to the Treaty of February 3, 1944 (TS994). Title I authorized the construction of the Yuma Desalting Plant and a bypass drain to ultimately discharge the plant's brine. These facilities, and others, will enable the delivery of water at Morelos Dam, for subsequent use in Mexico, having an average salinity no greater than 115 ppm plus or minus 30 ppm (United States count) higher than the annual average salinity of the Colorado River water at Imperial Dam.

Title II of the Act authorized the Secretary to construct a number of units in the basin above Imperial Dam, as well as the investigation of several other potential salinity control units.

The Act, and its amendment by Public Law 98-569 of October 30, 1985, directs the Secretary to submit a biennial report to the President, the Congress, and the Colorado River Basin Salinity Control Advisory Council. Since the water quality aspects of Colorado River operations are extensively described in that biennial series, the latest of which is Report No. 13 entitled, "Quality of Water, Colorado River Basin," dated January 1987, only minimal discussion of this aspect of the operation below Imperial Dam is presented in this report.

During water year 1987, the United States bypassed a total of 125,000 acre-feet through the Bypass Drain. As the river was in an excess flow condition during 1987 due to the high runoff in the basin, no specific releases from the upstream reservoirs were necessary to replace this water to meet the quantity requirements of the Mexican Treaty of 1944.

During water year 1987, the average annual salinity of the Colorado River water arriving at Imperial Dam was 595 parts per million (ppm). During this same period, the salinity of the waters arriving at Morelos Dam was 623 ppm, resulting in an annual average salinity differential of only 28 ppm, well within the requirement of Minute 242 of the International Boundary and Water Commission.

The total flows in the bypass drain during water year 1988 are projected to be 125,000 acre-feet. A minor amount of drainage water could be returned to the Colorado River below Morelos Dam during 1988. Due to the excess flow conditions that are expected, it will not be necessary to provide replacement water to Mexico for the bypassed flows.

Beneficial Consumptive Uses

An extensive discussion of consumptive uses is not attempted in this report as that subject has been treated in detail in Reclamation's "Colorado River System Consumptive Uses and Losses Report, 1981-1985." This report has been prepared jointly by the Upper and Lower Colorado Regional Offices and is due to be released in 1988. It presents estimates of the consumptive uses and losses from the Colorado River System for each year from 1981 through 1985. The table on the following page summarizes annual water use from the system by States, including water use supplied by ground-water overdraft.

Upper Basin Uses and Losses

The three largest categories of consumptive use in the Upper Colorado River Basin are agricultural uses within the basin, transbasin diversions to adjacent drainages, and evaporation losses from the major reservoirs of the Colorado River System. During water year 1987, the estimated use for municipal and industrial supply and for agriculture in the Upper Basin was 2,900,000 acre-feet. Estimated evaporation losses were 610,000 acre-feet from mainstem reservoirs. About 670,000 acre-feet was diverted for use in adjacent drainages. Total estimated consumptive use amounted to 3,800,000 acre-feet. Storage in the Upper Basin mainstem reservoirs decreased by approximately 871,000 acre-feet during water year 1987.

Lower Basin Uses and Losses

During water year 1987, an estimated 5.2 MAF of water were released from Lake Havasu to meet the requirements for water deliveries at Imperial Dam, as well as those of the Colorado River Indian Reservation near Parker, Arizona, the Palo Verde Irrigation District near Blythe, California, other miscellaneous users along the river, and transit losses between Parker Dam and Imperial Dam.

The major water diversions above Parker Dam were by MWD and the CAP. MWD pumped approximately 1.31 MAF from Lake Havasu during water year 1987 and approximately 356,000 acre-feet were pumped for the CAP.

Releases of approximately 6.9 MAF were made from Lake Mohave during water year 1987, to provide for releases to meet minimum downstream needs in the United States at Parker Dam; to supply diversion requirements of MWD and CAP, miscellaneous contractors, and other users; to offset evaporation and other transit losses between Davis and Parker Dams; and to maintain the scheduled levels of Lake Havasu.

During water year 1987, releases of approximately 6.8 MAF were made from Lake Mead at Hoover Dam to regulate the levels of Lake Mohave and to provide for the small users from that reservoir, and to provide for releases at Davis Dam to meet needs in the United States. In addition, 180,000 acre-feet were diverted from Lake Mead for use by the Lake Mead National Recreation Area, Boulder City, Basic Management, Inc, and contractors of the Colorado River Commission of Nevada. Total releases and diversions from Lake Mead during water year 1987 were an estimated 13.32 MAF.

For water year 1988, a total release of 8.7 MAF from Lake Havasu is projected, including consumptive use requirements in the United States below Parker Dam, transit losses and regulation in the river between Parker Dam and the Mexican Border, flood control requirements, and treaty deliveries to Mexico.

During water year 1988, MWD is expected to divert 1.34 MAF by pumping from Lake Havasu. The CAP is expected to pump approximately 747,000 acre-feet. Consumptive uses by small users, river losses or gains, and reservoir losses between Davis Dam and Parker Dam are projected to be a net loss of 7,000 acre-feet.

There are no major users between Hoover Dam and Davis Dam. During water year 1988 the net diversions from Lake Mead are projected at 140,000 acre-feet. Evaporation from Lake Mead is projected to be about 980,000 acre-feet and net gain between Glen Canyon Dam and Lake Mead is expected to be about 780,000 acre-feet.

Water Use by States

1981-1985

(1,000 acre-feet)

State	1981	1982	1983	1984	1985	Average 1981-1985
Arizona	6,896	5,609	4,533	5,508	5,398	5,589
California	4,836	4,346	3,950	4,676	4,707	4,503
Colorado	2,235	2,227	2,043	1,973	2,113	2,118
Nevada	212	212	195	206	209	207
New Mexico	345	477	477	444	440	437
Utah	836	795	762	810	933	827
Wyoming	327	316	331	289	320	317
Other	1,548	1,483	1,716	1,657	1,713	1,623
Total						
Colorado River Basin	17,235	15,465	14,007	15,563	15,833	15,621
Water Passing to Mexico						
Treaty	1,751	1,495	1,646	1,694	1,671	1,651
Minute 242	131	146	166	138	131	142
Excess Releases	2,115	176	7,970	15,160	11,594	7,403
Total						
Water Passing to Mexico	3,997	1,817	9,782	16,992	13,396	9,196
Total - Colorado River System and Water Passing to Mexico	21,232	17,282	23,789	32,555	29,229	24,817

NOTE:

Onsite consumptive uses and losses; includes water uses satisfied by groundwater overdrafts.
 "Other" water uses represents mainstem reservoir evaporation in the Upper Basin and mainstem reservoir evaporation below Lee Ferry in the Lower Basin.

Power Operations and Major Maintenance Activities

Upper Basin - Colorado River Storage Project

Westinghouse Electric Corporation finished contract work to uprate the generators at Glen Canyon Powerplant in the early part of fiscal year 1986. Work was completed on generator unit 4, which was back on line by the end of December 1986.

The following table summarizes CRSP generation, purchases, disposition, and revenues from power operations for water year 1987, and presents projections for water year 1988. A breakdown by percent of power sources, disposition, and revenues for water year 1987 is charted on the opposite page. The total revenue from power operations in water year 1987 was \$106,434,547.

CRSP Power Generation

Water Year 1987

Sources of Energy	Kilowatt-hours
Net Generation	
Blue Mesa	342,681,994
Crystal	232,201,653
Flaming Gorge	588,307,000
Fontenelle	-427,780
Glen Canyon	6,538,606,304
Morrow Point	424,087,344
Sub-total-	
Net Generation	8,125,456,515

Miscellaneous	Kilowatt-hours
Purchases	205,692,000
Interchange Receipts	1,339,000,000
Energy Charges	
to Transmission	
Service Customers	243,405,000

Sub-total-Miscellaneous	1,788,097,000
Total Energy From	
All Sources	9,913,553,515

Disposition of Energy	Kilowatt-hours
Firm Energy Sales	6,969,217,000
Nonfirm Energy Sales	2,475,067,000
Emergency	
Fuel Replacement	
(Oil Conservation)	-0-
Interchange Deliveries	285,000,000
System Losses	184,269,515
Total Energy Distributed	9,913,553,515

Revenue	Dollars
Firm Power Sales	\$ 65,843,534
Non Firm Power Sales	37,659,956
Emergency	
Fuel Replacement	
(Oil Conservation)	-0-
Reserve Capacity	-0-
Parker-Davis Project	
Firming	-0-
Transmission Service	2,485,294
Miscellaneous Revenue	445,763
Total Gross Revenue	\$106,434,547

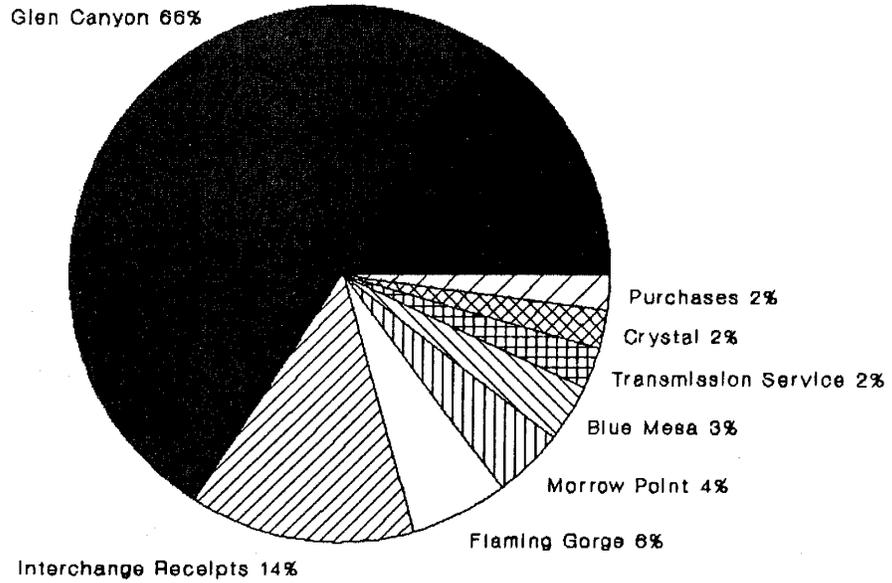
Water Year 1988

(Projected)	Kilowatt-hours
Estimated Energy Sales	6,425,000,000
Estimated Purchases	585,000,000
Estimated Peaking	
Capacity Sales	
Winter 1986-87	48,000
Summer 1987	100,000
Estimated Revenue	\$ 93,000,000

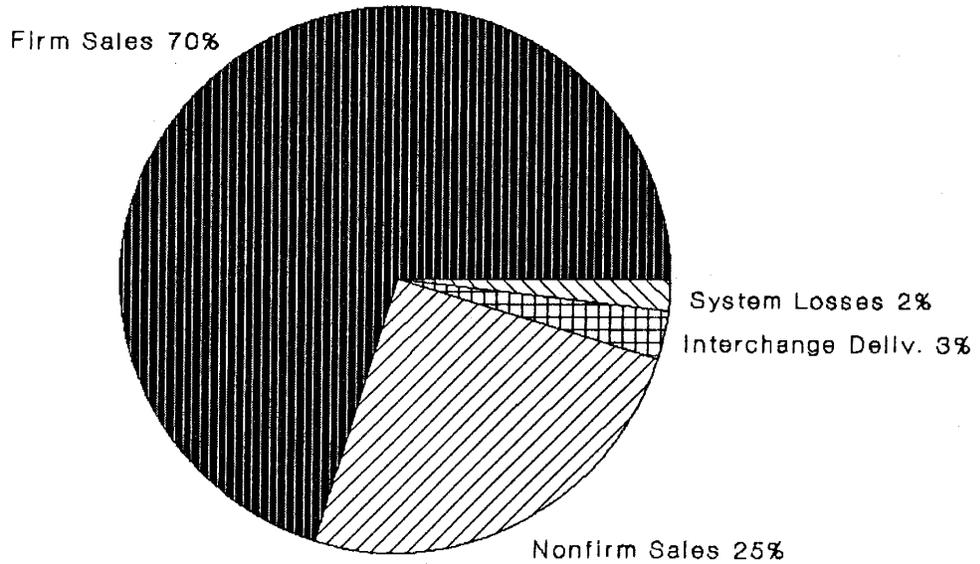
Colorado River Storage Project Power Operations

(Water Year 1987)

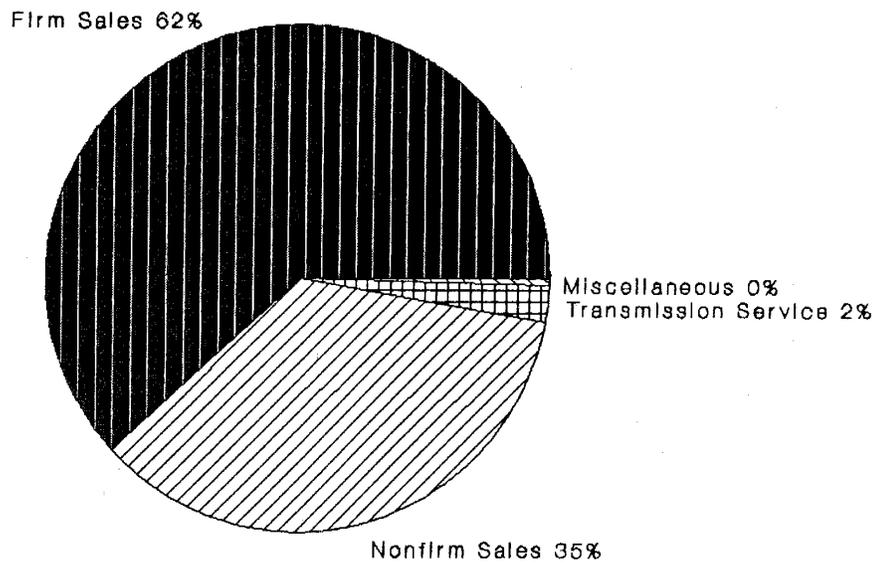
Energy Sources



Energy Disposition



Revenue



Power Operations [Cont.]

Lower Basin

Water Year 1987

The total energy delivery to the Hoover allottees during the 1987 operating year (June 1, 1986 - May 31, 1987) was 7,287,747,600 kilowatt-hours (kWh). Of that amount, 3,343,770,474 kWh was secondary energy in excess of contract defined firm energy.

On June 1, 1987, the United States took over the operation of the Hoover powerplant. The Bureau of Reclamation became the operator of the powerplant and the Western Area Power Administration the scheduler, contracting officer and transmitter of the energy generated.

The period June 1, 1987, through September 30, 1987, served as an interim transition period. During that time, approximately 1.68 Billion kWh of gross energy was generated.

Related regulations include Public Law 98-381 of August 17, 1984 (the Hoover Powerplant Act of 1984) and the "General Regulations for the Charges for the Sale of Power From the Boulder Canyon Project; Final Rule" (Federal Register, November 28, 1986, 10 CFR Part 904).

The remote control operation of Davis and Parker powerplants, which first began during water year 1982, continued without event. These generator units are computer operated from the Western Area Power Administration's Phoenix District Office, using hourly gate opening and megawatt schedules input and modified by Reclamation's water scheduling branch in Boulder City, Nevada.

A contract was awarded in water year 1985 for modification and repair work in both the Nevada and Arizona spillway tunnels at Hoover Dam. The work consisted of construction of slotted ring air-inducing devices in the inclined sections of the spillway tunnels and the repair of tunnel concrete lining. Work on the Nevada spillway began in October 1985 and was completed August 1986. The Arizona spillway work began in September 1986 and was completed in July 1987.

Scheduled maintenance at Hoover Dam for water year 1987 included normal replacements of stators, thrust bearings, water pipes, and transformers.

Water Year 1988

In operation studies of Lake Mead and Lake Powell for the Hoover operating year, which ends September 30, 1988, the amounts released at Hoover Dam have been projected to satisfy both downstream water requirements, including

diversions by MWD and CAP, while also complying with the overall requirements to meet Compact, flood control, and operating criteria release provisions. The water scheduled to be released will generate Schedules A and B energy and in some months excess energy. The estimated monthly Hoover releases during Water Year 1988 total 10.7 MAF. It is estimated that generation from these Hoover releases, along with the Hoover to Parker-Davis interchange, will result in delivery to the approved contractors of about 5.0 billion kWh of electrical energy.

A \$7,637,385 Reclamation contract has been awarded for uprating generators N-3 and N-4 at Hoover Dam in Nevada. The contract was awarded to General Electric Company of Denver, Colorado. Work will begin in 1988 and is scheduled to be completed in 1988.

Principal work under the contract includes conducting a study of the existing generator design, furnishing and installing necessary new components, and modifying the two generators, as required to accomplish the proposed uprating. The objective is to uprate the generators by the optimum amount, based on water availability and economic feasibility. Studies show that sufficient water, head, and turbine capacity are available to produce significantly more generator output than the existing generator ratings will allow. The generators were manufactured by Westinghouse. Generator N-3 was installed in 1937 and generator N-4 in 1936.

An additional \$10,620,722 contract has been awarded, also to the General Electric Company of Denver, Colorado, to uprate generating units A1, A2, A6, and A7 at Hoover Dam in Arizona. After starting work on those units, the contractor will have 2 years to complete the job. Upon completion of this contract, eight of the 17 generating units in the powerplant will have been uprated.

The Hoover Uprating Program was authorized by the Hoover Powerplant Act of 1984 (Act), which finalized a historic three-State agreement on the marketing of Hoover power after the original contracts terminated on June 1, 1987. The Act also requires that the Hoover Uprating Program be undertaken with funds advanced by the non-Federal purchasers of Hoover power.

Scheduled for completion in 1992, the Hoover Uprating Program will be funded with an estimated \$126 million from non-Federal sources in Arizona, California, and Nevada. Arizona and Nevada will each fund about 37 percent of the costs, with the remainder being financed by nine municipalities in southern California.

