**U.S. Hydropower Resource Assessment
for
Arizona**

MASTER

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ABSTRACT

The U.S. Department of Energy is developing an estimate of the undeveloped hydropower potential in the United States. The Hydropower Evaluation Software (HES) is a computer model that was developed by the Idaho National Engineering Laboratory^a for this purpose. HES measures the undeveloped hydropower resources available in the United States, using uniform criteria for measurement. The software was developed and tested using hydropower information and data provided by the Southwestern Power Administration. It is a menu-driven program that allows the personal computer user to assign environmental attributes to potential hydropower sites, calculate development suitability factors for each site based on the environmental attributes present, and generate reports based on these suitability factors. This report describes the resource assessment results for the State of Arizona.

a. In January 1997, the name of the Idaho National Engineering Laboratory (INEL) was changed to the Idaho National Engineering and Environmental Laboratory (INEEL). INEEL will be used throughout the text of the document, except where the use of INEL is historically important.

ACKNOWLEDGMENTS

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U.S. Hydropower Resource Assessment for Arizona

INTRODUCTION

In June 1989, the U.S. Department of Energy initiated the development of a National Energy Strategy to identify the energy resources available to support the expanding demand for energy in the United States. Public hearings conducted as part of the strategy development process indicated that undeveloped hydropower resources were not well defined. As a result, the Department of Energy established an inter-agency Hydropower Resource Assessment Team to ascertain the undeveloped hydropower potential. In connection with these efforts by the Department of Energy, the Idaho National Engineering Laboratory designed the Hydropower Evaluation Software (HES), which has been used to perform a resource assessment of the undeveloped conventional hydropower potential in over 30 states. This report presents the results of the hydropower resource assessment for the State of Arizona. Undeveloped pumped storage hydropower potential is not included.

The HES was developed as a tool to measure undeveloped hydropower potential regionally or by state. The software is not intended to provide precise development factors for individual sites, but to provide regional or state totals. Because the software was developed as a generic measurement tool encompassing national issues, regional and state totals must be considered judiciously; various local issues may skew undeveloped hydropower potential totals. The information for the resource assessment was compiled from the Federal Energy Regulatory Commission's Hydroelectric Power Resources Assessment database and several other sources. Refer to DOE/ID-10338, the *User's Manual* (Francfort, Matthews, Rinehart 1991) for the specifics of the software and to DOE/ID-10430.1, the *Status Report* (Conner, Francfort, Rinehart 1996) for an overview of all resource assessment activities to date.

Model Development

Hydropower Evaluation Software, both a probability-factor computer model and a database, is a menu-driven program that is intended to be user-friendly. Computer screens and report-generation capabilities were developed to meet the needs of users nationwide. The software uses environmental attribute data to generate an overall project environmental suitability factor (PESF) between 0.1 and 0.9, where 0.9 indicates the highest likelihood of development and 0.1 indicates the lowest likelihood of development. The suitability factors depend on the unique environmental attributes of each potential site. They reflect the considerations that (a) environmental concerns can make a potential site unacceptable, prohibiting its development (for a suitability factor of 0.1), or (b) if there are no environmental concerns, there is no negative effect on the likelihood of site development (for a suitability factor of 0.9). A combination of attributes can result in a lower suitability factor because multiple environmental considerations would reduce the likelihood that a site may be developed to its physical potential.

Model Goal

The goal of the HES is to assemble an accurate resource database of all sites with undeveloped hydropower potential in the United States for use as a planning tool to determine the viable national hydropower potential. Undeveloped hydropower potential is not limited to the development of new sites; it also includes the development of additional hydropower-generating capacity at sites that currently have hydropower, but are not developed to their full potential. This undeveloped hydropower potential is a source of nonpolluting, renewable energy available to meet the growing power needs of the United States. The HES should help make this goal obtainable and ensure a set of uniform criteria for national assessment.

Dam Status

The effects of environmental attributes vary by dam status. The dam status classifications used are as follows:

- W = Developed hydropower site with current power generation, but the total hydropower potential has not been fully developed. Only the undeveloped hydropower potential is discussed in this report.
- W/O = Developed site without current power generation. The site has some type of developed impoundment or diversion structure, but no developed hydropower generating capability.
- U = Undeveloped site. The site does not have power generation capability nor a developed impoundment or diversion structure.

ASSESSMENT RESULTS

Summary Results

A total of 21 sites (Table 1) have been identified and assessed for their undeveloped hydropower potential. The HES results for individual site capacities range from 113 kilowatts (kW) to 137 megawatts (MW). The

majority, or 86%, of the HES-modeled sites in Arizona are less than 10 MW each (Figure 1).

The nonmodeled undeveloped hydropower potential total for Arizona was identified as 1,809 MW. The HES results lowers this estimate about 81% to 339 MW. The greatest reduction in undeveloped hydropower potential, by MW, occurs at sites with no current power generation capability nor impoundment or diversion structure in place (undeveloped category [U]). These sites have an HES-modeled undeveloped hydropower potential of 166 MW, an 89% or 1,386-MW reduction in the estimated undeveloped hydropower potential (Figure 2). Figure 3 correlates the number of sites that have undeveloped hydropower potential with the total megawatts of HES-modeled undeveloped hydropower potential. The developed sites with power have the largest average undeveloped hydropower potential of 79 MW per site (Figure 3).

The 21 identified sites are located within two major river basins, the Colorado Main Stream River Basin and the Gila River Basin. There are two sites located within the Colorado Main Stream River Basin and 19 sites within the Gila River Basin (Figure 4). Although the Colorado Main Stream River Basin only contains 2 of the 21 sites, it has more undeveloped hydropower potential than the Gila River Basin (Figure 5). It should be noted that 76% of the HES-modeled undeveloped hydropower potential in the State of Arizona is contained within two sites, AZ007 and AZ008.

Table 1. Undeveloped hydropower potential summary for Arizona. The table contains the nonmodeled undeveloped nameplate potential and the HES-modeled undeveloped potential totals.

	Number of projects	Nameplate potential (MW)	HES-modeled potential (MW)
With Power	2	206.8	157.4
W/O Power	6	50.5	15.4
Undeveloped	13	1,552.1	166.3
State Total	21	1,809.4	339.1

Figure 1. Number of sites, by capacity groups, with HES-modeled undeveloped hydropower potential.

Figure 2. The nonmodeled and HES-modeled undeveloped hydropower potential.

Figure 3. The number of sites with undeveloped hydropower potential and the total megawatts of HES-modeled undeveloped hydropower potential.

Figure 4. Number of sites with undeveloped hydropower potential in the Arizona river basins.

Figure 5. Megawatts of HES-modeled undeveloped hydropower potential in the Arizona river basins.

Detailed Results

The appendices contain, in the form of HES-generated reports, detailed information about the undeveloped hydropower potential in Arizona. The appendices contain the following information:

Appendix A summarizes the undeveloped hydropower potential by dam status groups. The number of sites, nonmodeled undeveloped hydropower potential, and HES-modeled undeveloped hydropower potential is provided based on the dam status.

Appendix B provides the hydropower resource assessment by river basin, which includes the project number, project name, stream name, dam status, nonmodeled undeveloped hydropower potential, and the HES-modeled undeveloped hydropower potential for each site. Subtotals are provided for each river basin.

Appendix C lists the project numbers, plant name, stream name, if a site is Federally owned, nonmodeled undeveloped hydropower potential, and HES-modeled undeveloped hydropower potential. The sites are grouped by dam status.

Appendix D contains a resource database list for the 21 sites in Arizona. Information includes plant name, stream, state, county, river basin and owner names, project number, nameplate and HES-modeled undeveloped hydropower potential, the unit and plant types, dam status, latitude, longitude, and the environmental factors that the HES uses to determine the PESF.

OBTAINING INDIVIDUAL STATE INFORMATION

Additional copies of the hydropower resource assessment results for individual states are available and can be obtained by writing or calling the authors or the National Technical Information Service (NTIS).

Telephone Orders—(703) 487-4650. NTIS sales desk and customer services are available between 8:30 a.m. and 5:00 p.m., Eastern Standard Time.

Fax—(703) 321-8547. Customers may fax their orders to NTIS. These orders may be charged to a NTIS deposit account, American Express, VISA, or MasterCard.

Mail Orders—Mail orders should be sent to National Technical Information Service, Document Sales, 5285 Port Royal Road, Springfield, VA 22161. Call the sales desk for prices before placing an order.

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For Help in Tracing an Order—Call (703) 487-4650 and request the customer service option.

ADDITIONAL HYDROPOWER EVALUATION SOFTWARE INFORMATION

Additional information concerning the HES can be obtained by contacting Ben Rinehart or Jim Francfort at the addresses provided below. Copies of the software and the User's Manual may also be obtained from these individuals.

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REFERENCES

- Conner, A. M., J. E. Francfort, and B. N. Rinehart, 1996, *Uniform Criteria for U.S. Hydropower Resource Assessment, Hydropower Evaluation Software Status Report-II*, DOE/ID 10430.1, Idaho National Engineering Laboratory, Idaho Falls, Idaho.
- Francfort, J. E., S. D. Matthews, and B. N. Rinehart, 1991, *Hydropower Evaluation Software User's Manual*, DOE/ID-10338, Idaho National Engineering Laboratory, Idaho Falls, Idaho.

Appendix A
Summary Report

DATE: 08/26/97

H Y D R O P O W E R C A P A C I T Y S U M M A R Y

<u>State</u>	<u>Category</u>	<u>Number of Projects</u>	<u>Name Plate Capacity (KW)</u>	<u>HES Adjusted Capacity (KW)</u>
AZ	With Power	2	206816	157408
	W/O Power	6	50500	15355
	Undeveloped	13	1552056	166290.40
	STATE TOTAL	21	1809372	339053.40
TOTALS	With Power	2	206816	157408
	W/O Power	6	50500	15355
	Undeveloped	13	1552056	166290.40
GRAND TOTAL		21	1809372	339053.40

Appendix B
River Basins Report

HYDROPOWER RESOURCE ASSESSMENT BY RIVER BASIN

FERC Number	Plant Name/ Stream	Dam Stat	Name Plate Rating (KW)	PESF	PESF * KW
** River Basin COLORADO MAIN STREAM					
AZ008	HUALAPAI COLORADO R	U	1366000.00	0.10	136600.00
AZ005	GLEN CANYON COLORADO R	W	71816.00	0.50	35908.00
** Subtotal **			1437816.00		172508.00
** River Basin GILA RIVER BASIN					
AZ015	YUMA MAIN CANAL YUMA MN CNL(GILA R)	U	1410.00	0.90	1269.00
AZ002	BEARDSLEY CANAL DROP BEARDSLEY CNL(AQUA FRIA R)	U	1000.00	0.90	900.00
AZ003	CAP CANAL TURNOUT CAP CNL(AQUA FRIA R)	U	2500.00	0.90	2250.00
AZ013	WADDELL AQUA FRIA R	U	1500.00	0.90	1350.00
AZ012	ORME 3 ORME CNL(SALT R)	U	20000.00	0.10	2000.00
11057	ROOSEVELT(RWCD) ROOSEVELT CNL(SALT R)	U	3200.00	0.90	2880.00
AZ010	LIVINGSTONE PINAL CR,SALT R	U	11500.00	0.10	1150.00
AZ004	GLEASON FLAT SALT R	U	43500.00	0.10	4350.00
AZ011	MULE HOOF SALT R	U	43500.00	0.10	4350.00
AZ014	WALNUT CANYON SALT R	U	25200.00	0.10	2520.00
AZ009	KNOB SALT R	U	28500.00	0.10	2850.00
11178	TUCSON TUCSON WS PL(CAP AQUADUCT)	U	4246.00	0.90	3821.40
AZ007	HOOVER COLORADO R	W	135000.00	0.90	121500.00

HYDROPOWER RESOURCE ASSESSMENT BY RIVER BASIN

FERC Number	Plant Name/ Stream	Dam Stat	Name Plate Rating (KW)	PESF	PESF * KW
07275	NEW WADDELL AGUA FRIA R	WO	150.00	0.75	112.50
AZ001	ARIZONA FALLS ARIZONA CNL	WO	700.00	0.90	630.00
03953	BARTLETT VERDE R	WO	19400.00	0.50	9700.00
03736	HORSESHOE VERDE R	WO	3500.00	0.50	1750.00
AZ006	HEADGATE ROCK COLORADO R	WO	26000.00	0.10	2600.00
10485	CHANDLER FALLS TEMPE CNL(SALT R)	WO	750.00	0.75	562.50
** Subtotal **			371556.00		166545.40
*** Total ***			1809372.00		339053.40

Appendix C
Arizona Sites List

HYDROPOWER RESOURCE ASSESSMENT BY FERC NUMBER

Plant Name/ Stream	ST	Dam Stat	Name Plate Rating (KW)	PESF	PESF * KW
** FERC Number 11057 ROOSEVELT(RWCD) ROOSEVELT CNL(SALT R)	AZ	U	3200.00	0.90	2880.00
** Subtotal **			3200.00		2880.00
** FERC Number 11178 TUCSON TUCSON WS PL(CAP AQUADUCT)	AZ	U	4246.00	0.90	3821.40
** Subtotal **			4246.00		3821.40
** FERC Number AZ002 BEARDSLEY CANAL DROP BEARDSLEY CNL(AQUA FRIA R)	AZ	U	1000.00	0.90	900.00
** Subtotal **			1000.00		900.00
** FERC Number AZ003 CAP CANAL TURNOUT CAP CNL(AQUA FRIA R)	AZ	U	2500.00	0.90	2250.00
** Subtotal **			2500.00		2250.00
** FERC Number AZ004 GLEASON FLAT SALT R	AZ	U	43500.00	0.10	4350.00
** Subtotal **			43500.00		4350.00
** FERC Number AZ008 HUALAPAI COLORADO R	AZ	U	1366000.00	0.10	136600.00
** Subtotal **			1366000.00		136600.00
** FERC Number AZ009 KNOB SALT R	AZ	U	28500.00	0.10	2850.00

HYDROPOWER RESOURCE ASSESSMENT BY FERC NUMBER

Plant Name/ Stream	ST	Dam Stat	Name Plate Rating (KW)	PESF	PESF * KW
** Subtotal **			28500.00		2850.00
** FERC Number AZ010 LIVINGSTONE PINAL CR, SALT R	AZ	U	11500.00	0.10	1150.00
** Subtotal **			11500.00		1150.00
** FERC Number AZ011 MULE HOOF SALT R	AZ	U	43500.00	0.10	4350.00
** Subtotal **			43500.00		4350.00
** FERC Number AZ012 ORME 3 ORME CNL(SALT R)	AZ	U	20000.00	0.10	2000.00
** Subtotal **			20000.00		2000.00
** FERC Number AZ013 WADDELL AQUA FRIA R	AZ	U	1500.00	0.90	1350.00
** Subtotal **			1500.00		1350.00
** FERC Number AZ014 WALNUT CANYON SALT R	AZ	U	25200.00	0.10	2520.00
** Subtotal **			25200.00		2520.00
** FERC Number AZ015 YUMA MAIN CANAL YUMA MN CNL(GILA R)	AZ	U	1410.00	0.90	1269.00
** Subtotal **			1410.00		1269.00

HYDROPOWER RESOURCE ASSESSMENT BY FERC NUMBER

Plant Name/ Stream	ST	Dam Stat	Name Plate Rating (KW) PESF	PESF * KW
** FERC Number AZ005 GLEN CANYON COLORADO R	AZ	W	71816.00 0.50	35908.00
** Subtotal **			71816.00	35908.00
** FERC Number AZ007 HOOVER COLORADO R	AZ	W	135000.00 0.90	121500.00
** Subtotal **			135000.00	121500.00
** FERC Number 03736 HORSESHOE VERDE R	AZ	WO	3500.00 0.50	1750.00
** Subtotal **			3500.00	1750.00
** FERC Number 03953 BARTLETT VERDE R	AZ	WO	19400.00 0.50	9700.00
** Subtotal **			19400.00	9700.00
** FERC Number 07275 NEW WADDELL AGUA FRIA R	AZ	WO	150.00 0.75	112.50
** Subtotal **			150.00	112.50
** FERC Number 10485 CHANDLER FALLS TEMPE CNL(SALT R)	AZ	WO	750.00 0.75	562.50
** Subtotal **			750.00	562.50
** FERC Number AZ001 ARIZONA FALLS ARIZONA CNL	AZ	WO	700.00 0.90	630.00

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HYDROPOWER RESOURCE ASSESSMENT BY FERC NUMBER

Plant Name/ Stream	Dam ST Stat	Name Plate Rating (KW)	PESF	PESF * KW
** Subtotal **		700.00		630.00
** FERC Number AZ006 HEADGATE ROCK COLORADO R	AZ WO	26000.00	0.10	2600.00
** Subtotal **		26000.00		2600.00
*** Total ***		1809372.00		339053.40

Appendix D
Individual Resource Database List

RESOURCE DATABASE LISTING

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FERC Number	Plant Name	Stream	State Name
03736	HORSESHOE	VERDE R	AZ

County Name	River Basin
MARICOPA	GILA RIVER BASIN

Class	Owner Name
R	MITCHELL ENERGY CO INC

Name Plate Rating (KW)	PESF	PESF*KW	Annual Energy Rating (MWh)	PESF Annual Energy Rating (MWh)
3500.00	0.50	1750.00	17000.00	8500

Unit Type	Plant Type	Project Status	Dam Status	Latitude	3359.00	Longitude	11143.00
C	STG	XX	WO				

Factor	Exist	Prob	Factor	Exist	Prob
Wild/Scenic Protection		0.90	Wildlife Value		0.90
Wild/Scenic Tributary or Upstream/Downstream			Threatened/Endangered Fish		0.90
Wild/Scenic Location	Y	0.75	Threatened/Endangered Wildlife		0.90
Cultural Value		0.90	Federal Land Code 103		0.90
Fish Presence Value		0.90	Federal Land Code 104	Y	0.75
Geologic Value		0.90	Federal Land Code 105		0.90
Historic Value		0.90	Federal Land Code 106		0.90
Other Value		0.90	Federal Land Code 107		0.90
Recreation Value		0.90	Federal Land Code 108		0.90
Scenic Value		0.90	Federal Land Code 198		0.90

RESOURCE DATABASE LISTING

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FERC Number	Plant Name	Stream	State Name
03953	BARTLETT	VERDE R	AZ

County Name	River Basin
MARICOPA	GILA RIVER BASIN

Class	Owner Name
R	ENERGENICS SYSTEMS INC

Name Plate Rating (KW)	PESF	PESF*KW	Annual Energy Rating (MWh)	PESF Annual Energy Rating (MWh)
19400.00	0.50	9700.00	40700.00	20350

Unit Type	Plant Type	Project Status	Dam Status	Latitude	3349.00
C	STG	XX	WO	Longitude	11138.00

Factor	Exist	Prob	Factor	Exist	Prob
Wild/Scenic Protection		0.90	Wildlife Value		0.90
Wild/Scenic Tributary or Upstream/Downstream			Threatened/Endangered Fish		0.90
Wild/Scenic Location	Y	0.75	Threatened/Endangered Wildlife		0.90
Cultural Value		0.90	Federal Land Code 103		0.90
Fish Presence Value		0.90	Federal Land Code 104	Y	0.75
Geologic Value		0.90	Federal Land Code 105		0.90
Historic Value		0.90	Federal Land Code 106		0.90
Other Value		0.90	Federal Land Code 107		0.90
Recreation Value		0.90	Federal Land Code 108		0.90
Scenic Value		0.90	Federal Land Code 198		0.90

RESOURCE DATABASE LISTING

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FERC Number	Plant Name	Stream	State Name
07275	NEW WADDELL	AGUA FRIA R	AZ

County Name	River Basin
MARICOPA	GILA RIVER BASIN

Class	Owner Name
R	GENTRY RESOURCES CORP

Name Plate Rating (KW)	PESF	PESF*KW	Annual Energy Rating (MWh)	PESF Annual Energy Rating (MWh)
150.00	0.75	112.50	340.00	255

Unit Type	Plant Type	Project Status	Dam Status	Latitude	3351.00	Longitude	11216.00
C	STG	XX	WO				

Factor	Exist Prob	Factor	Exist Prob
Wild/Scenic Protection	0.90	Wildlife Value	0.90
Wild/Scenic Tributary or Upstream/Downstream		Threatened/Endangered Fish	0.90
Wild/Scenic Location	0.90	Threatened/Endangered Wildlife	0.90
Cultural Value	0.90	Federal Land Code 103	0.90
Fish Presence Value	0.90	Federal Land Code 104	Y 0.75
Geologic Value	0.90	Federal Land Code 105	0.90
Historic Value	0.90	Federal Land Code 106	0.90
Other Value	0.90	Federal Land Code 107	0.90
Recreation Value	0.90	Federal Land Code 108	0.90
Scenic Value	0.90	Federal Land Code 198	0.90

R E S O U R C E D A T A B A S E L I S T I N G

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FERC Number	Plant Name	Stream	State Name
10485	CHANDLER FALLS	TEMPE CNL(SALT R)	AZ

County Name	River Basin
MARICOPA	GILA RIVER BASIN

Class	Owner Name
R	CHANDLER FALLS HYDRO PNSP

Name Plate Rating (KW)	PESF	PESF*KW	Annual Energy Rating (MWh)	PESF Annual Energy Rating (MWh)
750.00	0.75	562.50	4700.00	3525

Unit Type	Plant Type	Project Status	Dam Status	Latitude	Longitude
C	DIV	XX	WO	3326.00	11151.00

Factor	Exist Prob	Factor	Exist Prob
Wild/Scenic Protection	0.90	Wildlife Value	0.90
Wild/Scenic Tributary or Upstream/Downstream		Threatened/Endangered Fish	0.90
Wild/Scenic Location	0.90	Threatened/Endangered Wildlife	0.90
Cultural Value	0.90	Federal Land Code 103	0.90
Fish Presence Value	0.90	Federal Land Code 104	0.90
Geologic Value	0.90	Federal Land Code 105	0.90
Historic Value	0.90	Federal Land Code 106	0.90
Other Value	0.90	Federal Land Code 107	Y 0.75
Recreation Value	0.90	Federal Land Code 108	0.90
Scenic Value	0.90	Federal Land Code 198	0.90

RESOURCE DATABASE LISTING

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FERC Number	Plant Name	Stream	State Name
11057	ROOSEVELT(RWCD)	ROOSEVELT CNL(SALT R)	AZ

County Name	River Basin
MARICOPA	GILA RIVER BASIN

Class	Owner Name
M	ROOSEVELT WTR CONS DISTRICT

Name Plate Rating (KW)	PESF	PESF*KW	Annual Energy Rating (MWh)	PESF Annual Energy Rating (MWh)
3200.00	0.90	2880.00	28000.00	25200

Unit Type	Plant Type	Project Status	Dam Status	Latitude	3328.00	Longitude	11144.00
C	DIV	XX	U				

Factor	Exist	Prob	Factor	Exist	Prob
Wild/Scenic Protection	0.90		Wildlife Value	0.90	
Wild/Scenic Tributary or Upstream/Downstream			Threatened/Endangered Fish	0.90	
Wild/Scenic Location	0.90		Threatened/Endangered Wildlife	0.90	
Cultural Value	0.90		Federal Land Code 103	0.90	
Fish Presence Value	0.90		Federal Land Code 104	0.90	
Geologic Value	0.90		Federal Land Code 105	0.90	
Historic Value	0.90		Federal Land Code 106	0.90	
Other Value	0.90		Federal Land Code 107	0.90	
Recreation Value	0.90		Federal Land Code 108	0.90	
Scenic Value	0.90		Federal Land Code 198	0.90	

RESOURCE DATABASE LISTING

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FERC Number	Plant Name	Stream	State Name
11178	TUCSON	TUCSON WS PL(CAP AQUADUCT)	AZ

County Name	River Basin
PIMA	GILA RIVER BASIN

Class	Owner Name
M	TUCSON,CITY OF

Name Plate Rating (KW)	PESF	PESF*KW	Annual Energy Rating (MWh)	PESF Annual Energy Rating (MWh)
4246.00	0.90	3821.40	23800.00	21420

Unit Type	Plant Type	Project Status	Dam Status	Latitude	3218.00	Longitude	11104.00
C	ROR	LE	U				

Factor	Exist Prob	Factor	Exist Prob
Wild/Scenic Protection	0.90	Wildlife Value	0.90
Wild/Scenic Tributary or Upstream/Downstream		Threatened/Endangered Fish	0.90
Wild/Scenic Location	0.90	Threatened/Endangered Wildlife	0.90
Cultural Value	0.90	Federal Land Code 103	0.90
Fish Presence Value	0.90	Federal Land Code 104	0.90
Geologic Value	0.90	Federal Land Code 105	0.90
Historic Value	0.90	Federal Land Code 106	0.90
Other Value	0.90	Federal Land Code 107	0.90
Recreation Value	0.90	Federal Land Code 108	0.90
Scenic Value	0.90	Federal Land Code 198	0.90

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FERC Number	Plant Name	Stream	State Name
AZ001	ARIZONA FALLS	ARIZONA CNL	AZ

County Name	River Basin
MARICOPA	GILA RIVER BASIN

Class	Owner Name
M	SALT R PROJ AG IMP P DIST

Name Plate Rating (KW)	PESF	PESF*KW	Annual Energy Rating (MWh)	PESF Annual Energy Rating (MWh)
700.00	0.90	630.00	3000.00	2700

Unit Type	Plant Type	Project Status	Dam Status	Latitude	3330.00	Longitude	11157.00
C	DIV		WO				

Factor	Exist Prob	Factor	Exist Prob
Wild/Scenic Protection	0.90	Wildlife Value	0.90
Wild/Scenic Tributary or Upstream/Downstream		Threatened/Endangered Fish	0.90
Wild/Scenic Location	0.90	Threatened/Endangered Wildlife	0.90
Cultural Value	0.90	Federal Land Code 103	0.90
Fish Presence Value	0.90	Federal Land Code 104	0.90
Geologic Value	0.90	Federal Land Code 105	0.90
Historic Value	0.90	Federal Land Code 106	0.90
Other Value	0.90	Federal Land Code 107	0.90
Recreation Value	0.90	Federal Land Code 108	0.90
Scenic Value	0.90	Federal Land Code 198	0.90

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FERC Number	Plant Name	Stream	State Name
AZ002	BEARDSLEY CANAL DROP	BEARDSLEY CNL(AQUA FRIA R)	AZ

County Name	River Basin
MARICOPA	GILA RIVER BASIN

Class	Owner Name
M	MARICOPA CNTY MUN WTR CONT DIST 1

Name Plate Rating (KW)	PESF	PESF*KW	Annual Energy Rating (MWh)	PESF Annual Energy Rating (MWh)
1000.00	0.90	900.00	2700.00	2430

Unit Type	Plant Type	Project Status	Dam Status	Latitude	3347.00	Longitude	11216.00
C	DIV		U				

Factor	Exist	Prob	Factor	Exist	Prob
Wild/Scenic Protection		0.90	Wildlife Value		0.90
Wild/Scenic Tributary or Upstream/Downstream			Threatened/Endangered Fish		0.90
Wild/Scenic Location		0.90	Threatened/Endangered Wildlife		0.90
Cultural Value		0.90	Federal Land Code 103		0.90
Fish Presence Value		0.90	Federal Land Code 104		0.90
Geologic Value		0.90	Federal Land Code 105		0.90
Historic Value		0.90	Federal Land Code 106		0.90
Other Value		0.90	Federal Land Code 107		0.90
Recreation Value		0.90	Federal Land Code 108		0.90
Scenic Value		0.90	Federal Land Code 198		0.90

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FERC Number	Plant Name	Stream	State Name
AZ003	CAP CANAL TURNOUT	CAP CNL(AQUA FRIA R)	AZ

County Name	River Basin
MARICOPA	GILA RIVER BASIN

Class	Owner Name
M	MARICOPA CNTY MUN WTR CONT DIST 1

Name Plate Rating (KW)	PESF	PESF*KW	Annual Energy Rating (MWh)	PESF Annual Energy Rating (MWh)
2500.00	0.90	2250.00	6300.00	5670

Unit Type	Plant Type	Project Status	Dam Status	Latitude	3347.00	Longitude	11217.00
C	DIV		U				

Factor	Exist	Prob	Factor	Exist	Prob
Wild/Scenic Protection	0.90		Wildlife Value	0.90	
Wild/Scenic Tributary or Upstream/Downstream			Threatened/Endangered Fish	0.90	
Wild/Scenic Location	0.90		Threatened/Endangered Wildlife	0.90	
Cultural Value	0.90		Federal Land Code 103	0.90	
Fish Presence Value	0.90		Federal Land Code 104	0.90	
Geologic Value	0.90		Federal Land Code 105	0.90	
Historic Value	0.90		Federal Land Code 106	0.90	
Other Value	0.90		Federal Land Code 107	0.90	
Recreation Value	0.90		Federal Land Code 108	0.90	
Scenic Value	0.90		Federal Land Code 198	0.90	

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FERC Number	Plant Name	Stream	State Name
AZ004	GLEASON FLAT	SALT R	AZ

County Name	River Basin
GILA	GILA RIVER BASIN

Class	Owner Name
M	SALT R PROJ AG IMP P DIST

Name Plate Rating (KW)	PESF	PESF*KW	Annual Energy Rating (MWh)	PESF Annual Energy Rating (MWh)
43500.00	0.10	4350.00	280000.00	28000

Unit Type	Plant Type	Project Status	Dam Status	Latitude	3345.00	Longitude	11042.00
C	DIV		U				

Factor	Exist	Prob	Factor	Exist	Prob
Wild/Scenic Protection	Y	0.10	Wildlife Value	Y	0.25
Wild/Scenic Tributary or Upstream/Downstream			Threatened/Endangered Fish	Y	0.50
Wild/Scenic Location		0.90	Threatened/Endangered Wildlife	Y	0.50
Cultural Value	Y	0.50	Federal Land Code 103		0.90
Fish Presence Value	Y	0.25	Federal Land Code 104	Y	0.50
Geologic Value	Y	0.50	Federal Land Code 105		0.90
Historic Value		0.90	Federal Land Code 106		0.90
Other Value	Y	0.50	Federal Land Code 107		0.90
Recreation Value	Y	0.25	Federal Land Code 108		0.90
Scenic Value	Y	0.50	Federal Land Code 198		0.90

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FERC Number	Plant Name	Stream	State Name
AZ005	GLEN CANYON	COLORADO R	AZ

County Name	River Basin
COCONINO	COLORADO MAIN STREAM

Class	Owner Name
F	BUREAU OF RECLAMATION

Name Plate Rating (KW)	PESF	PESF*KW	Annual Energy Rating (MWh)	PESF Annual Energy Rating (MWh)
71816.00	0.50	35908.00	367784.00	183892

Unit Type	Plant Type	Project Status	Dam Status	Latitude Longitude	3656.00 11129.00
C	STG	FA	W		

Factor	Exist	Prob	Factor	Exist	Prob
Wild/Scenic Protection		0.90	Wildlife Value	Y	0.75
Wild/Scenic Tributary or Upstream/Downstream			Threatened/Endangered Fish	Y	0.75
Wild/Scenic Location		0.90	Threatened/Endangered Wildlife		0.90
Cultural Value	Y	0.75	Federal Land Code 103		0.90
Fish Presence Value	Y	0.75	Federal Land Code 104	Y	0.75
Geologic Value	Y	0.90	Federal Land Code 105	Y	0.90
Historic Value	Y	0.75	Federal Land Code 106		0.90
Other Value	Y	0.75	Federal Land Code 107		0.90
Recreation Value	Y	0.75	Federal Land Code 108		0.90
Scenic Value	Y	0.90	Federal Land Code 198		0.90

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FERC Number	Plant Name	Stream	State Name
AZ006	HEADGATE ROCK	COLORADO R	AZ

County Name	River Basin
YUMA	GILA RIVER BASIN

Class	Owner Name
F	BUREAU OF INDIAN AFFAIRS

Name Plate Rating (KW)	PESF	PESF*KW	Annual Energy Rating (MWh)	PESF Annual Energy Rating (MWh)
26000.00	0.10	2600.00	135000.00	13500

Unit Type	Plant Type	Project Status	Dam Status	Latitude	Longitude
C	STG		WO	3410.00	11417.00

Factor	Exist	Prob	Factor	Exist	Prob
Wild/Scenic Protection		0.90	Wildlife Value	Y	0.75
Wild/Scenic Tributary or Upstream/Downstream			Threatened/Endangered Fish		0.90
Wild/Scenic Location		0.90	Threatened/Endangered Wildlife		0.90
Cultural Value		0.90	Federal Land Code 103	Y	0.10
Fish Presence Value		0.90	Federal Land Code 104		0.90
Geologic Value		0.90	Federal Land Code 105	Y	0.90
Historic Value		0.90	Federal Land Code 106		0.90
Other Value	Y	0.75	Federal Land Code 107		0.90
Recreation Value	Y	0.75	Federal Land Code 108		0.90
Scenic Value	Y	0.90	Federal Land Code 198		0.90

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FERC Number	Plant Name	Stream	State Name
AZ007	HOOVER	COLORADO R	AZ

County Name	River Basin
COCHISE	GILA RIVER BASIN

Class	Owner Name
F	BUREAU OF RECLAMATION

Name Plate Rating (KW)	PESF	PESF*KW	Annual Energy Rating (MWh)	PESF Annual Energy Rating (MWh)
135000.00	0.90	121500.00	300655.00	270589.50

Unit Type	Plant Type	Project Status	Dam Status	Latitude	Longitude
C	STG	FA	W	3601.00	11444.00

Factor	Exist Prob	Factor	Exist Prob
Wild/Scenic Protection	0.90	Wildlife Value	0.90
Wild/Scenic Tributary or Upstream/Downstream		Threatened/Endangered Fish	0.90
Wild/Scenic Location	0.90	Threatened/Endangered Wildlife	0.90
Cultural Value	0.90	Federal Land Code 103	0.90
Fish Presence Value	0.90	Federal Land Code 104	0.90
Geologic Value	0.90	Federal Land Code 105	0.90
Historic Value	0.90	Federal Land Code 106	0.90
Other Value	0.90	Federal Land Code 107	0.90
Recreation Value	0.90	Federal Land Code 108	0.90
Scenic Value	0.90	Federal Land Code 198	0.90

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FERC Number	Plant Name	Stream	State Name
AZ008	HUALAPAI	COLORADO R	AZ

County Name	River Basin
MOHAVE	COLORADO MAIN STREAM

Class	Owner Name
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NHPS/COE

Name Plate Rating (KW)	PESF	PESF*KW	Annual Energy Rating (MWh)	PESF Annual Energy Rating (MWh)
1366000.00	0.10	136600.00	3560000.00	356000

Unit Type	Plant Type	Project Status	Dam Status	Latitude	3548.00	Longitude	11333.00
C	STG		U				

Factor	Exist	Prob	Factor	Exist	Prob
Wild/Scenic Protection	Y	0.10	Wildlife Value	Y	0.25
Wild/Scenic Tributary or Upstream/Downstream			Threatened/Endangered Fish		0.90
Wild/Scenic Location		0.90	Threatened/Endangered Wildlife		0.90
Cultural Value	Y	0.50	Federal Land Code 103	Y	0.10
Fish Presence Value	Y	0.25	Federal Land Code 104	Y	0.90
Geologic Value	Y	0.50	Federal Land Code 105	Y	0.90
Historic Value	Y	0.50	Federal Land Code 106		0.90
Other Value	Y	0.50	Federal Land Code 107		0.90
Recreation Value	Y	0.25	Federal Land Code 108		0.90
Scenic Value	Y	0.50	Federal Land Code 198		0.90

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FERC Number	Plant Name	Stream	State Name		
AZ009	KNOB	SALT R	AZ		
County Name		River Basin			
GILA		GILA RIVER BASIN			
Class		Owner Name			
M		SALT R PROJ AG IMP P DIST			
Name Plate Rating (KW)	PESF	PESF*KW	Annual Energy Rating (MWh)	PESF Annual Energy Rating (MWh)	
28500.00	0.10	2850.00	136000.00	13600	
Unit Type	Plant Type	Project Status	Dam Status	Latitude 3347.00 Longitude 11024.00	
C	STG		U		
Factor	Exist	Prob	Factor	Exist	Prob
Wild/Scenic Protection		0.90	Wildlife Value	Y	0.25
Wild/Scenic Tributary or Upstream/Downstream			Threatened/Endangered Fish	Y	0.50
Wild/Scenic Location		0.90	Threatened/Endangered Wildlife	Y	0.50
Cultural Value	Y	0.50	Federal Land Code 103		0.90
Fish Presence Value	Y	0.25	Federal Land Code 104	Y	0.50
Geologic Value	Y	0.50	Federal Land Code 105		0.90
Historic Value		0.90	Federal Land Code 106		0.90
Other Value	Y	0.50	Federal Land Code 107		0.90
Recreation Value	Y	0.25	Federal Land Code 108		0.90
Scenic Value	Y	0.50	Federal Land Code 198		0.90

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FERC Number	Plant Name	Stream	State Name
AZ010	LIVINGSTONE	PINAL CR, SALT R	AZ

County Name	River Basin
GILA	GILA RIVER BASIN

Class	Owner Name
M	SALT R PROJ AG IMP P DIST

Name Plate Rating (KW)	PESF	PESF*KW	Annual Energy Rating (MWh)	PESF Annual Energy Rating (MWh)
11500.00	0.10	1150.00	72000.00	7200

Unit Type	Plant Type	Project Status	Dam Status	Latitude	3337.00 Longitude 11055.00
C	STG		U		

Factor	Exist	Prob	Factor	Exist	Prob
Wild/Scenic Protection		0.90	Wildlife Value	Y	0.25
Wild/Scenic Tributary or Upstream/Downstream			Threatened/Endangered Fish	Y	0.50
Wild/Scenic Location		0.90	Threatened/Endangered Wildlife	Y	0.50
Cultural Value	Y	0.50	Federal Land Code 103		0.90
Fish Presence Value	Y	0.25	Federal Land Code 104	Y	0.50
Geologic Value	Y	0.50	Federal Land Code 105		0.90
Historic Value		0.90	Federal Land Code 106		0.90
Other Value	Y	0.50	Federal Land Code 107		0.90
Recreation Value	Y	0.25	Federal Land Code 108		0.90
Scenic Value	Y	0.50	Federal Land Code 198		0.90

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FERC Number	Plant Name	Stream	State Name
AZ011	MULE HOOF	SALT R	AZ

County Name	River Basin
GILA	GILA RIVER BASIN

Class	Owner Name
M	SALT R PROJ AG IMP P DIST

Name Plate Rating (KW)	PESF	PESF*KW	Annual Energy Rating (MWh)	PESF Annual Energy Rating (MWh)
43500.00	0.10	4350.00	280000.00	28000

Unit Type	Plant Type	Project Status	Dam Status	Latitude	3348.00	Longitude	11031.00
C	DIV		U				

Factor	Exist	Prob	Factor	Exist	Prob
Wild/Scenic Protection		0.90	Wildlife Value	Y	0.25
Wild/Scenic Tributary or Upstream/Downstream			Threatened/Endangered Fish	Y	0.50
Wild/Scenic Location		0.90	Threatened/Endangered Wildlife	Y	0.50
Cultural Value	Y	0.50	Federal Land Code 103		0.90
Fish Presence Value	Y	0.25	Federal Land Code 104	Y	0.50
Geologic Value	Y	0.50	Federal Land Code 105		0.90
Historic Value		0.90	Federal Land Code 106		0.90
Other Value	Y	0.50	Federal Land Code 107		0.90
Recreation Value	Y	0.25	Federal Land Code 108		0.90
Scenic Value	Y	0.50	Federal Land Code 198		0.90

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FERC Number	Plant Name	Stream	State Name
AZ012	ORME 3	ORME CNL(SALT R)	AZ

County Name	River Basin
GILA	GILA RIVER BASIN

Class	Owner Name
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Name Plate Rating (KW)	PESF	PESF*KW	Annual Energy Rating (MWh)	PESF Annual Energy Rating (MWh)
20000.00	0.10	2000.00	60000.00	6000

Unit Type	Plant Type	Project Status	Dam Status	Latitude	3337.00	Longitude	11141.00
C	CMB		U				

Factor	Exist	Prob	Factor	Exist	Prob
Wild/Scenic Protection		0.90	Wildlife Value	Y	0.25
Wild/Scenic Tributary or Upstream/Downstream			Threatened/Endangered Fish	Y	0.50
Wild/Scenic Location		0.90	Threatened/Endangered Wildlife	Y	0.50
Cultural Value	Y	0.50	Federal Land Code 103		0.90
Fish Presence Value	Y	0.25	Federal Land Code 104	Y	0.50
Geologic Value	Y	0.50	Federal Land Code 105		0.90
Historic Value		0.90	Federal Land Code 106		0.90
Other Value	Y	0.50	Federal Land Code 107		0.90
Recreation Value	Y	0.25	Federal Land Code 108		0.90
Scenic Value	Y	0.50	Federal Land Code 198		0.90

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FERC Number	Plant Name	Stream	State Name
AZ013	WADDELL	AQUA FRIA R	AZ

County Name	River Basin
MARICOPA	GILA RIVER BASIN

Class	Owner Name
M	MARICOPA CNTY MUN WTR CONT DIST 1

Name Plate Rating (KW)	PESF	PESF*KW	Annual Energy Rating (MWh)	PESF Annual Energy Rating (MWh)
1500.00	0.90	1350.00	3300.00	2970

Unit Type	Plant Type	Project Status	Dam Status	Latitude	3351.00	Longitude	11216.00
C	STG		U				

Factor	Exist	Prob	Factor	Exist	Prob
Wild/Scenic Protection	0.90		Wildlife Value	0.90	
Wild/Scenic Tributary or Upstream/Downstream			Threatened/Endangered Fish	0.90	
Wild/Scenic Location	0.90		Threatened/Endangered Wildlife	0.90	
Cultural Value	0.90		Federal Land Code 103	0.90	
Fish Presence Value	0.90		Federal Land Code 104	0.90	
Geologic Value	0.90		Federal Land Code 105	0.90	
Historic Value	0.90		Federal Land Code 106	0.90	
Other Value	0.90		Federal Land Code 107	0.90	
Recreation Value	0.90		Federal Land Code 108	0.90	
Scenic Value	0.90		Federal Land Code 198	0.90	

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FERC Number	Plant Name	Stream	State Name
AZ014	WALNUT CANYON	SALT R	AZ

County Name	River Basin
GILA	GILA RIVER BASIN

Class	Owner Name
M	SALT R PROJ AG IMP P DIST

Name Plate Rating (KW)	PESF	PESF*KW	Annual Energy Rating (MWh)	PESF Annual Energy Rating (MWh)
25200.00	0.10	2520.00	136000.00	13600

Unit Type	Plant Type	Project Status	Dam Status	Latitude	3348.00	Longitude	11027.00
C	STG		U				

Factor	Exist	Prob	Factor	Exist	Prob
Wild/Scenic Protection		0.90	Wildlife Value	Y	0.25
Wild/Scenic Tributary or Upstream/Downstream			Threatened/Endangered Fish	Y	0.50
Wild/Scenic Location		0.90	Threatened/Endangered Wildlife	Y	0.50
Cultural Value	Y	0.50	Federal Land Code 103		0.90
Fish Presence Value	Y	0.25	Federal Land Code 104	Y	0.50
Geologic Value	Y	0.50	Federal Land Code 105		0.90
Historic Value		0.90	Federal Land Code 106		0.90
Other Value	Y	0.50	Federal Land Code 107		0.90
Recreation Value	Y	0.25	Federal Land Code 108		0.90
Scenic Value	Y	0.50	Federal Land Code 198		0.90

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FERC Number	Plant Name	Stream	State Name
AZ015	YUMA MAIN CANAL	YUMA MN CNL(GILA R)	AZ

County Name	River Basin
YUMA	GILA RIVER BASIN

Class	Owner Name
F	BUREAU OF RECLAMATION

Name Plate Rating (KW)	PESF	PESF*KW	Annual Energy Rating (MWh)	PESF Annual Energy Rating (MWh)
1410.00	0.90	1269.00	11300.00	10170

Unit Type	Plant Type	Project Status	Dam Status	Latitude	3241.00	Longitude	11418.00
C	DIV		U				

Factor	Exist	Prob	Factor	Exist	Prob
Wild/Scenic Protection	0.90		Wildlife Value	0.90	
Wild/Scenic Tributary or Upstream/Downstream			Threatened/Endangered Fish	0.90	
Wild/Scenic Location	0.90		Threatened/Endangered Wildlife	0.90	
Cultural Value	0.90		Federal Land Code 103	0.90	
Fish Presence Value	0.90		Federal Land Code 104	0.90	
Geologic Value	0.90		Federal Land Code 105	0.90	
Historic Value	0.90		Federal Land Code 106	0.90	
Other Value	0.90		Federal Land Code 107	0.90	
Recreation Value	0.90		Federal Land Code 108	0.90	
Scenic Value	0.90		Federal Land Code 198	0.90	