

US Department of the Interior

Bureau of Reclamation

Upper Colorado Region

Environmental Evaluation

Glen Canyon Powerplant

Generating Unit Armature Winding Replacement

Colorado River Storage Project

September 21, 1979

1. Description of the Proposed Action. The proposed action is to increase the generating capacity of each of the eight existing units through rewinding of the stator (non-rotating portion of the generator). This action is necessitated by deterioration of the existing windings and gaining additional capacity is a bonus.

Gaining capacity through rewinding the generators with windings having a higher thermal rating, and thus greater current carrying capacity is possible only where there is unused capacity in the turbine which may be utilized. In most cases, the turbines are sized to provide rated output at what is expected to be the normal lake elevation. At higher lake elevations, the resultant additional power potential cannot be utilized without increasing the generator output.

In the case of Glen Canyon, the plant has a maximum output of 1,150 MW (144 MW/unit). This is based on the generator limits. However, the turbines are capable of a power output under maximum head conditions of 174 MW, 21 percent more than the present maximum generator output. Rewinding will permit using about 77 percent of that excess turbine capacity.

Presently, rewinding of Units Nos. 7 and 2 is complete. The schedule for the remaining units is as follows:

<u>Unit</u>	<u>Planned In-Service Date</u>
4	Dec. 1979
1	Apr. 1980
6	Dec. 1980

3	Apr. 1981
5	Dec. 1981
8	June 1982

Pending results of a study by the E&R Center of mechanical stresses imposed by the increased electrical capacity, none of the units will be operated above the present maximum of 144 MW. This study probably will not be complete until sometime in 1981..

At the present maximum generation of 1,150 MW, approximately 32,000 cfs will be released at a lake elevation of 3,634 feet. Increasing the capacity by 186 to 1,336 MW would result in approximately the same release of 32,000 cfs at a lake elevation of 3,634 feet. However, because of unit uprating, the plant could be operated to 1,336 MW which at lake elevation, 3,686 feet would result in a release of about 33,700 cfs or an increase of approximately 1,700 cfs over the previous maximum release.

The additional release of 1,700 cfs that could occur when the lake is at or above elevation 3,686 represents a river depth increase of about 0.2 feet (12.5 to 12.7 feet) at Lee's Ferry, Arizona, as determined by the rating table for the Geological Survey's river gage at Lee's Ferry.

At lesser elevations, the full uprate potential could not be realized and corresponding releases would also be reduced.

Maximum plant generation and discharge in relation to lake elevation is given in the table below:

<u>Lake Elevation (Feet Above MSL)</u>	<u>Maximum Generation (Megawatts)</u>	<u>Head at 3144 foot Tailwater Elev. (feet)</u>	<u>Plant Discharge at 86% Efficiency (cfs)</u>
3,600	1,028	458	30,797
3,610	1,064	468	31,194
3,620	1,100	478	31,575
3,630	1,136	488	31,940
3,634	1,150	492	32,071
		(Present Maximum Generation)	
3,640	1,172	498	32,291
3,650	1,198	508	32,358
3,660	1,244	518	32,951
3,670	1,280	528	33,263
3,680	1,316	528	33,562
3,686	1,336	544	33,697
		(Maximum Generation with Generators Rewound)	
3,690	1,352	548	33,851
3,700	1,388	558	34,130
		(Maximum Turbine Capacity)	

2. Environmental Impacts:

- A. Effect on Boating. The principle effect on boating will be that there will be a slight decrease of flow during certain off-peak hours, and a slight increase in a period when the additional peak capacity is being utilized. Minimum release criteria shall remain in effect.
- B. Effect on Fishery. Since the change in flow is not significantly different than present operation under peak conditions, no impact on fish life is expected.
- C. Effect on Aesthetics. None.
- D. Air Pollution. All work will be performed within the powerhouse structure and is not of a nature to cause air pollution.
- E. Noise. Some noise will be associated with the work but will be confined to the powerhouse where existing noise levels are relatively high while the generators are operating.
- F. Water Pollution. None.

GLEN CANYON POWERPLANT
 TYPICAL PEAK SUMMER DAY
 POWER RELEASE PATTERN
 AND POTENTIAL RELEASE
 PATTERN WITH ALL UNITS
 REWOUND

