US Army Corps of Engineers

HARRY S. TRUMAN PUMPBACK

Power Plant Facts

- Six reversible slant axis pump-turbines
- Rated capacity: 160 MW
- Operated at overload capacity: 180 MW
- Average annual energy produced: 244,000,000 kWh
- Remote operates Stockton and Clarence Cannon (St. Louis District) Power Plants
- Power Pool: 704 – 706 feet, m.s.l.

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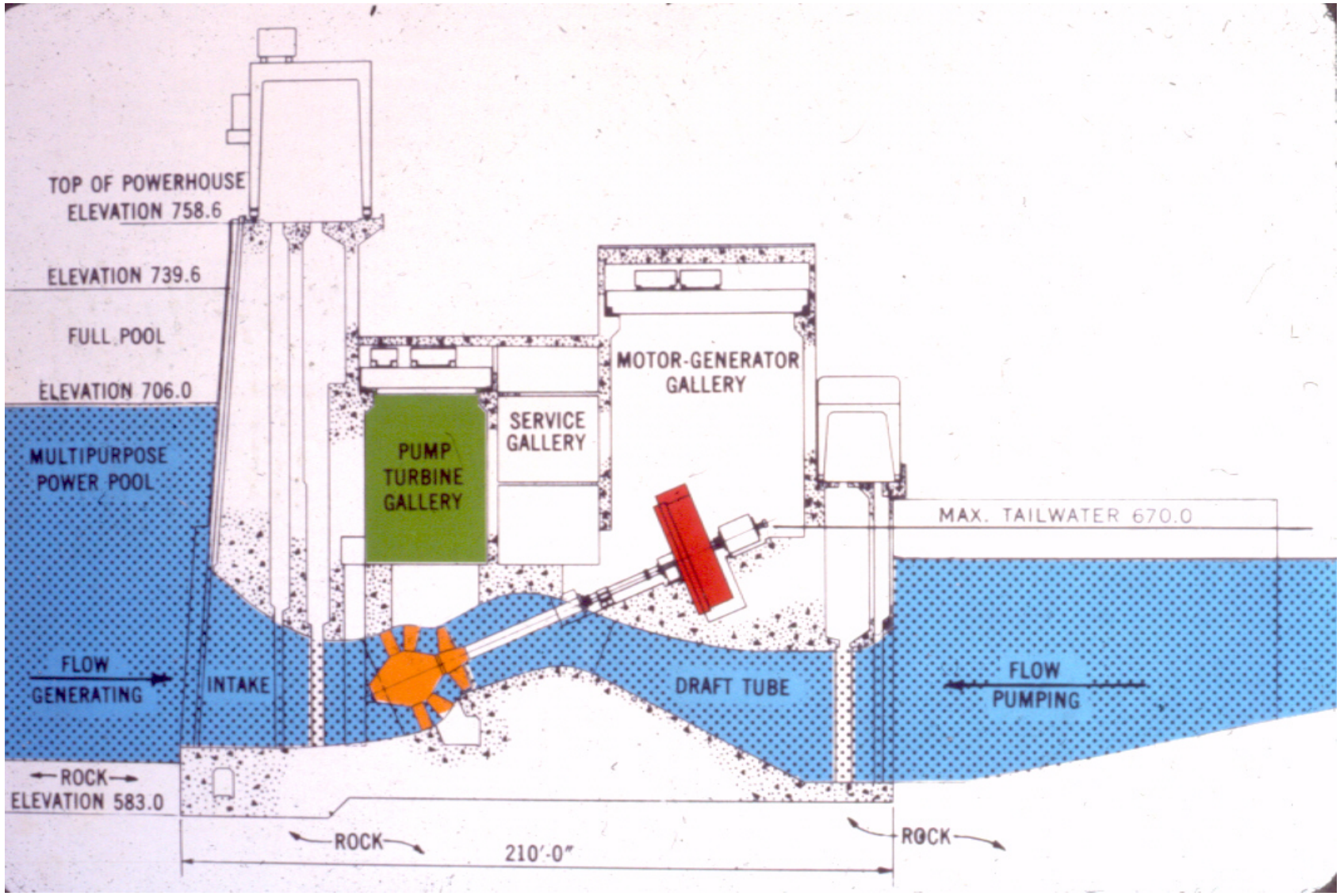

Original Design Parameters

- Number of generating units: 6
- Number of pumpback units: 5
- Generation with all 6 units for 7 ½ hours each weekday during the summer months
- Pumping limited to 8 hours on weekdays and 40 hours on weekends with five units during the summer months

History of Pumpback

April 1982: First pumpback test was performed

- Unit 4 tested for two hours and Unit 5 tested for one hour
- Units performed as designed, however, the mortality of fish occurred during the tests
- Approximately 2,000 pounds of fish were killed
- Kansas City District (KCD) determined that pumpback operations should not be used in operation of the plant until the fish kill problem was resolved

History of Pumpback Cont'd

- Shortly after the pumpback tests, KCD hired Stone and Webster Engineering Corporation (SWEC) to identify short term and long term solutions
- KCD also began various internal and external studies and sampling to obtain data on fish reaction to protection devices and varying water velocities
- The search of a short term solution was eliminated in October 1982 due to the high cost and length of time to construct a barrier net system
- SWEC was redirected to evaluated fish protection systems which could be located closer to the powerhouse
- Laboratory tests indicated fish protection devices would not be effective at full pumping velocities (5,500 cfs)

History of Pumpback Cont'd

The following protection measures were retained for more detailed evaluation with reduced pumpback

(1) Angled screens in the tailrace
(2) Angled louvers in the tailrace
(3) Bar racks in the trash rack slots
(4) Inclined bar racks on the downstream face of the powerhouse
(5) Bar racks across the tailrace parallel to the powerhouse face

History of Pumpback Cont'd

- Controlled pump sampling performed in July and September 1984
- Pumpback sampling plan consisted of three parts
  (1) Performance testing
  (2) Abundance testing
  (3) Survival testing
- Testing of the turbine as a pump did not indicate any mechanical problems, but additional testing and monitoring was recommended
- 18 types of fish captured
- Fish were drawn into the units in increasing numbers with increasing pump discharge
- A substantial decrease in the number of fish drawn into the unit was observed between July and September
- The percentage of fish dead and/or seriously injured was high in all tests

History of Pumpback Cont'd

- Four of the five fish protection measures were eliminated as possible options since they would allow the passage of small fish through the turbines
- The angled screen system was determined to be the only viable system for all seasons
- Cost benefit analysis indicated the angle screen system was economically viable by a small margin
- Biological effectiveness of the angle screen was also questionable
- Reduced pumpback with fish protection was eliminated as a viable option

History of Pumpback Cont'd

- KCD directed demobilization of pump sampling program in November 1984
- In 1985, KCD recommended that the pumpback feature at Truman not be used until means become available to prevent unacceptable losses of the fish population

Future Pumpback Operations at Truman

- Future pumpback operations is highly unlikely without further stakeholder cooperation, studies, determination of environmental impacts, funding, etc.
- Determination of acceptable fish mortality
- Evaluation of new fish protection technologies
- Additional testing and monitoring of power plant equipment will be required
- Truman will continue to operate in accordance with the Consensus Operating Plan until environmental impacts of pumpback are resolved

Questions???