Taum Sauk Pumped Storage Energy Center

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Keokuk Energy Center
- 15 units, 140 MW, 102 years old

Osage Energy Center
- 8 units, 250 MW, 84 years old

Taum Sauk Pumped Storage Energy Center
- 2 units, 440 MW, 52 years old

~3% of Ameren generation
TAUM SAUK BASICS

- Location: Reynolds County, Missouri
- Production Capacity: 440 MW
- Maximum Operating Head: 860 ft
- Number of Units: 2 pump turbines
- Began Operation: 1963
- Reservoir Size:
  - Upper: 51 acres
  - Lower: 370 acres
- Type:
  - Upper: Concrete Gravity—Sym. RCC
  - Lower: Concrete Gravity
- Height:
  - Upper: Approx. 125 ft above bedrock
  - Lower: 55 ft
- Length:
  - Upper: 6800 ft
  - Lower: 390 ft
WATER LEVEL CONTROL SYSTEMS

• **Level Control** – Normal Operations
  – Low & High Probes
    • Differential Pressure & Radar
    • Run-time Checks

• **Level Protection**
  – High Level & High-High Level Probes
    • Conductivity
    • Mechanical Float Switch

• **Continuous Video Camera & Staff Gage**
  – Including adequate lighting

• **Overflow Release Structure (ORS)**
  – Ultrasonic Gap Switch

• **Redundant Power Systems, Including a UPS**
DESIGN CROSS SECTION

NEW RCC DAM

- Cast-in-Place Concrete
- Conventional Concrete
- Cementitious Fill
- Grout Curtain
- Bedrock
- Bottom of Excavation
- Access Road
- Drainage Gallery
- RCC
- Normal Pool EL 1597.0
- EL 1601.0
- EL 1604.5
FOUNDATION EXCAVATION
Ozark crushed and stockpiled coarse and fine aggregate in the upper reservoir bowl area.
ON-SITE RCC BATCH PLANTS
COMPLETED REBUILD NOVEMBER, 2009
UPPER RESERVOIR MILESTONES

- Breach occurred December 14, 2005
- FERC authorization to reconstruct the Upper Reservoir Dam on August 15, 2007
- Initial RCC placement October 10, 2007
- Final RCC placement November 2009 (2,838,216 C.Y. RCC)
- Total concrete required was 3,200,640 C.Y.
- Over 800 personnel on-site at height of construction
- First filling of the Upper Reservoir on February 27, 2010
- Plant returned to commercial operation on April 15, 2010
TAUM SAUK DAM VS. HOOVER DAM

**Taum Sauk Dam**
- **Total Concrete** – 3.2 Million Cubic Yards
- Total Cement Used – 1.1 Million Barrels
- Total Excavation – 4.6 Million Cubic Yards
- Personnel at Height – 800
- Construction Duration – 2 Years
- Total Height – Approx. 100 Feet

**Hoover Dam**
- **Total Concrete** – 3.25 Million Cubic Yards
- Total Cement Used – 5 Million Barrels
- Total Excavation – 1.76 Million Cubic Yards
- Personnel at Height – 5,200
- Construction Duration – 2 Years
- Total Height – 726.4 Feet
CHANGES IN AMEREN AFTER INCIDENT

- Settlement agreement between Ameren and FERC required Ameren to implement a Dam Safety Program
- Increased awareness of potential dam hazards
- Developed computerized commitment tracking system
- Renewed dedication to dam safety at all facilities
- QMS Implementation
TAUM SAUK RECENT ACTIVITIES

- Complete electrical systems upgrade (ICE) during rebuild outage
- Unit 1 generator failure in June, 2011
  - Returned to service in April, 2012 (10 months)
- Fall 2013 Outage
  - Rewound Unit 2 generator, completed Feb. 2014
  - Larger servomotors to address wicket gate (turbine ctrl valve) operation
  - Penstock inspection, first drain of upper reservoir
  - Replaced inlet valve seals on both units
  - Scroll case weld repairs
- Summer 2015 Outage
  - Unit 1 Turbine Inlet Valve (TIV) seal wiped
  - Requires draining the upper reservoir to repair (both units out of service)
NEW TAUM SAUK LICENSE – JULY 2014

- Original license 1960 – 2010
- New license is for 30 years, 2014-2044
- New plans required, coordinate with MDC, MDNR, USFWS
  - Water Management Plan
  - Bat Management
  - Fish Recovery
  - Historic Property Management
  - Recreation Management
  - Rock and Sediment Management
NEW TAUM SAUK LICENSE

➢ Annual requirements
  – Water Management report
  – Two USGS gauge payments
  – Fish stocking and fish habitat report
  – Upper and Lower Reservoir re-vegetation report
  – Annual FERC administration fee
  – Rock and Sedimentation report

➢ Modifications required
  – Revise upper reservoir lighting
  – Add fish habitat
  – Remove construction parking lot structures
  – Finalize building plans (security, museum, visitor center)