

SUMMARY OF MEETING
TOUR OF AMEREN MISSOURI
TAUM SAUK FACILITY
AUGUST 8, 2013

On Thursday, August 8, 2013, from 11:00 a.m. to 2:00 p.m. a tour was held at the Ameren Missouri Taum Sauk Facility.

Those participating from Ameren Missouri included:
Vice President of Power Operations Kevin DeGraw
Director of Hydro Operations Warren Witt
Plant Superintendent Bart Mabry
State Regulatory Liaison Gaye Suggett

The following individuals from the Missouri Public Service Commission participated in the tour.

Commissioner Steve Stoll
Mark Hughes
Goldie Tompkins
Rachel Lewis
Judge Kim Burton
Judge Mike Bushmann
Judge Morris Woodruff
Judge Kim Burton
Annette Slack
Joyce Lafontain
Ethan Todd
John Cassidy
Lisa Hanneken
Dana Eaves
Randy Gross
Hunter Hughes

Gaye Suggett welcomed everyone to the Taum Sauk Facility. Warren Witt gave a presentation of the history and operation of Taum Sauk. The presentation is attached. Following the presentation the group went on a tour of the facility.

Taum Sauk Pumped Storage Energy Center

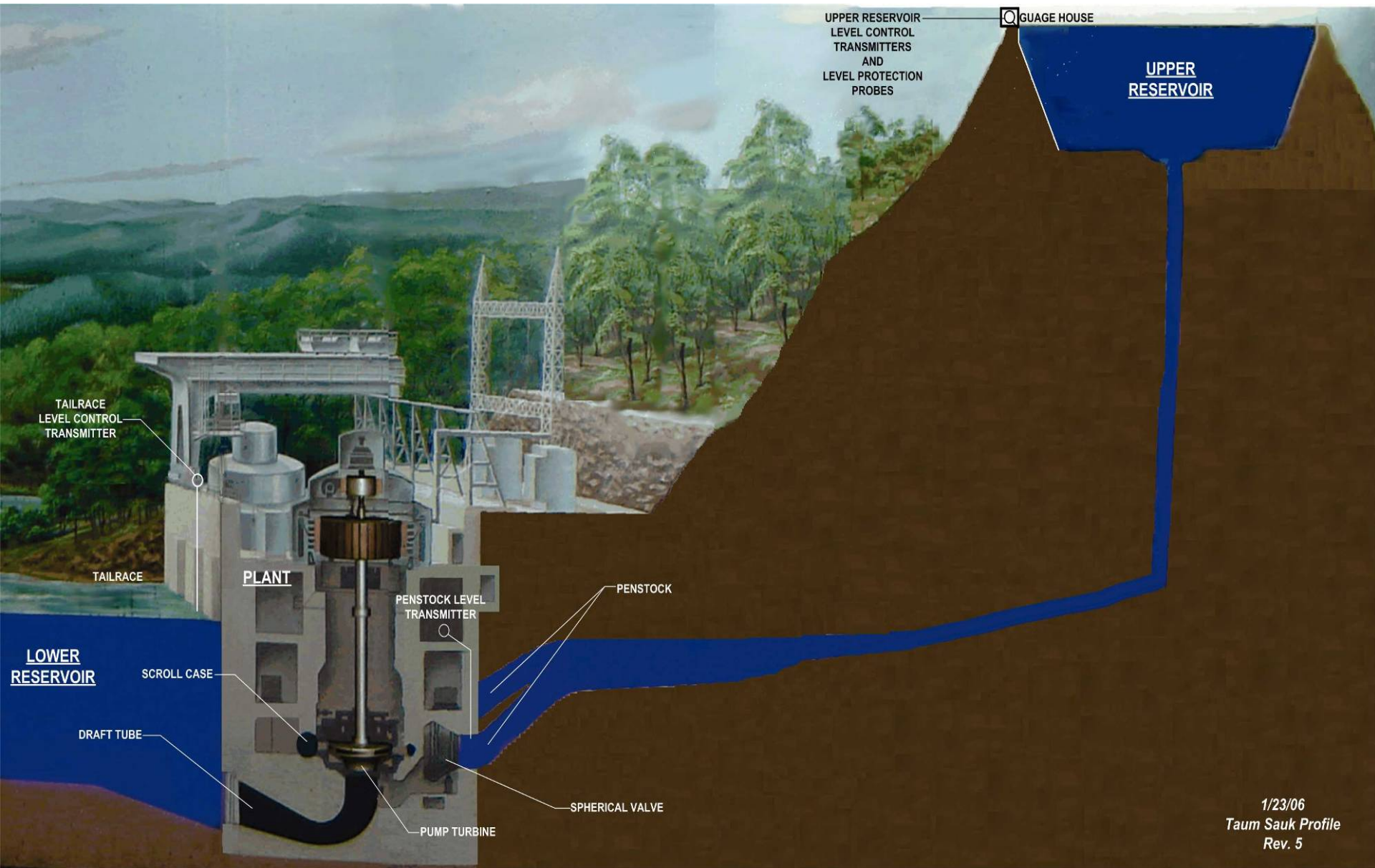
Warren A. Witt
Director of Hydro Operations
Ameren Missouri



AMEREN HYDRO GENERATION

- Keokuk Energy Center
 - 15 units, 140 MW, 100 years old
- Osage Energy Center
 - 8 units, 240 MW, 82 years old
- Taum Sauk Pumped Storage Energy Center
 - 2 units, 440 MW, 50 years old
- ~2% of Ameren generation

PUMPED STORAGE OPERATION OVERVIEW

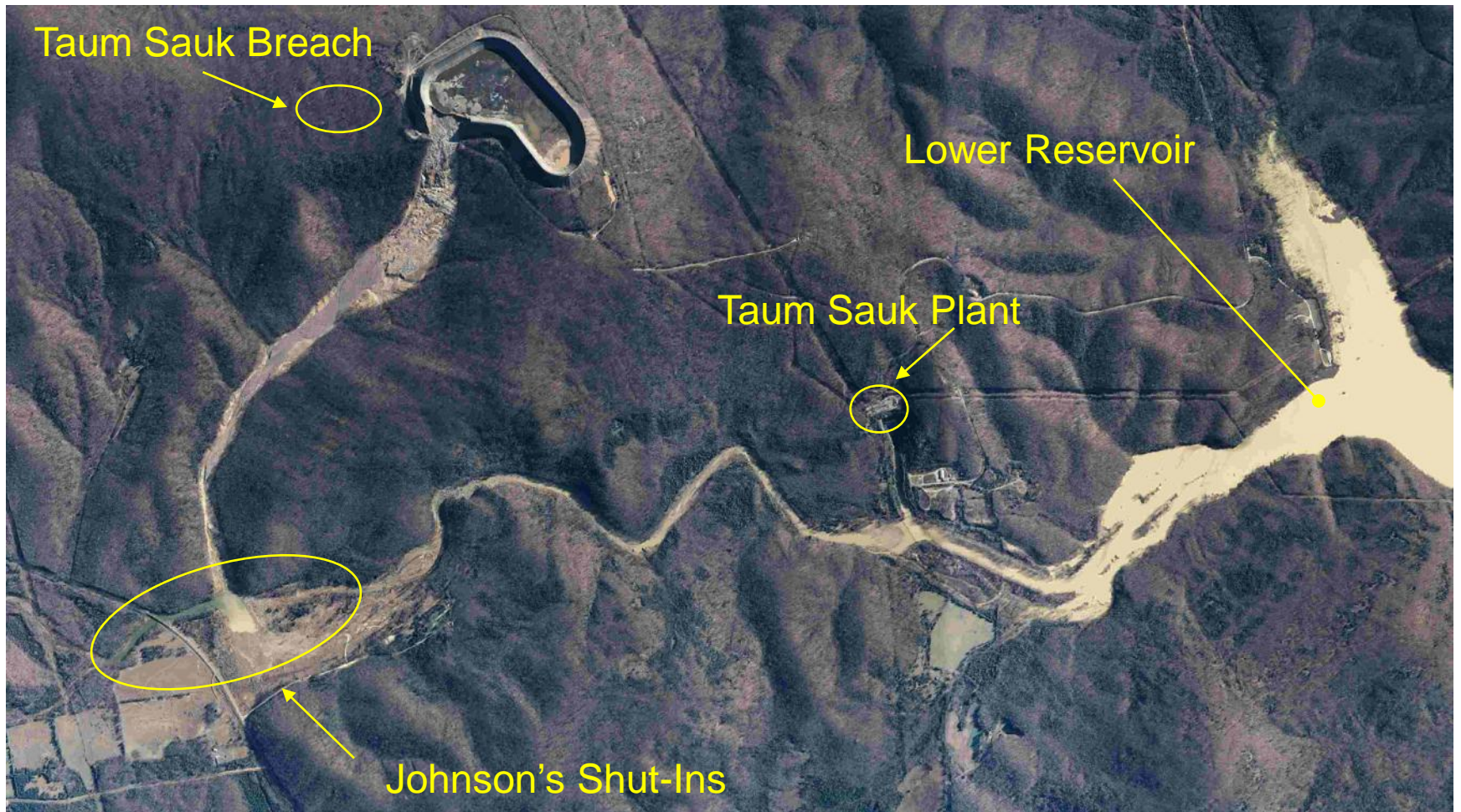


TAUM SAUK BASICS

- ❑ 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



INCIDENT SITE



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**

UR WARRICK
CABINET 1

UR WARRICK
CABINET 2

UR WARRICK
CABINET 3

WARNING

WARNING
DANGER OF ELECTRIC SHOCK
DO NOT OPEN THIS CABINET
UNLESS YOU ARE QUALIFIED

WARNING

WARNING

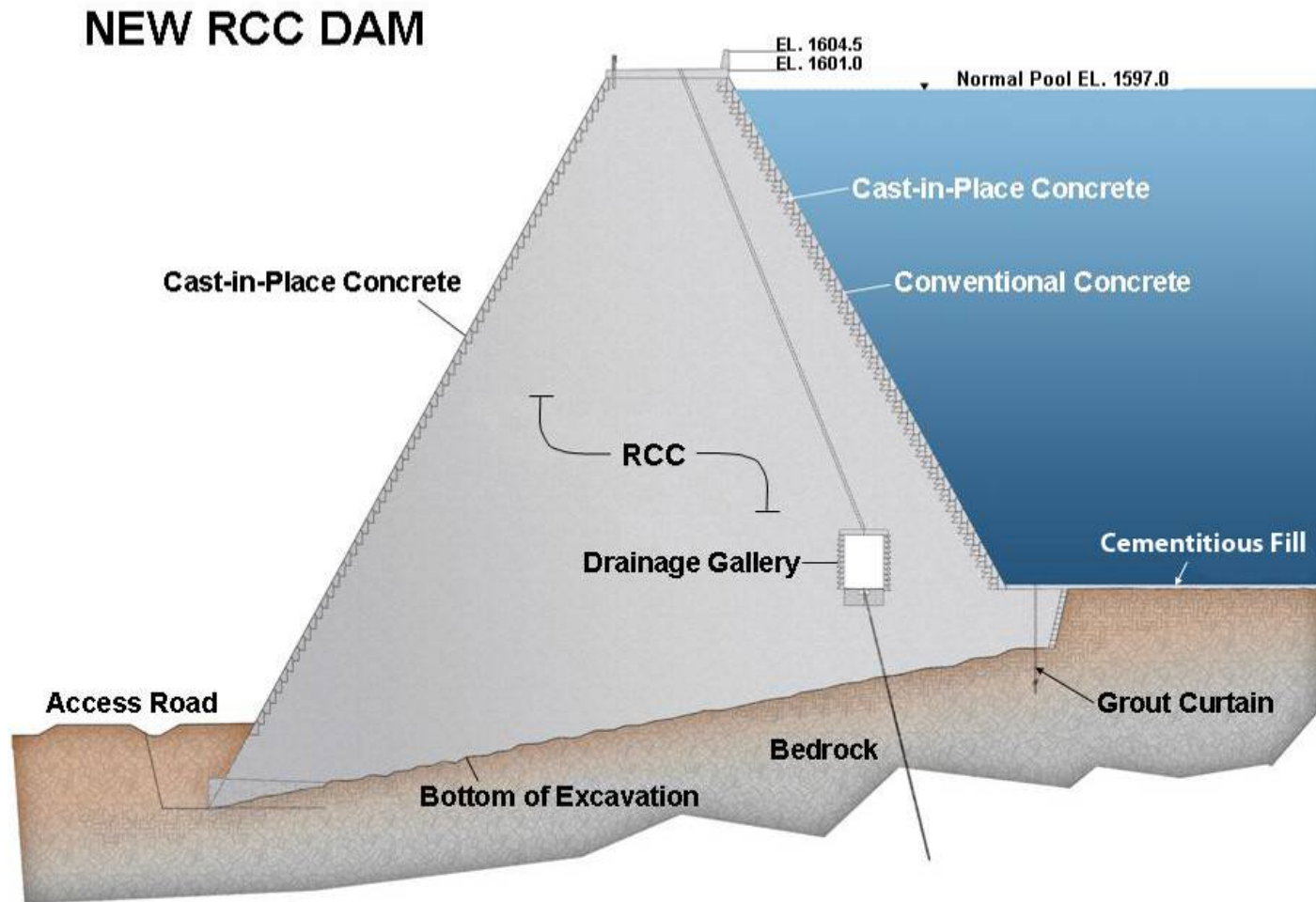




02/06/2010 11:33

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DESIGN CROSS SECTION



FOUNDATION EXCAVATION



AGGREGATE PRODUCTION



04/11/2008 07:34

Ozark crushed and stockpiled coarse and fine aggregate in the upper reservoir bowl area.

ON-SITE RCC BATCH PLANTS



12/29/2007

UPPER RESERVOIR OCTOBER 29, 2008



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



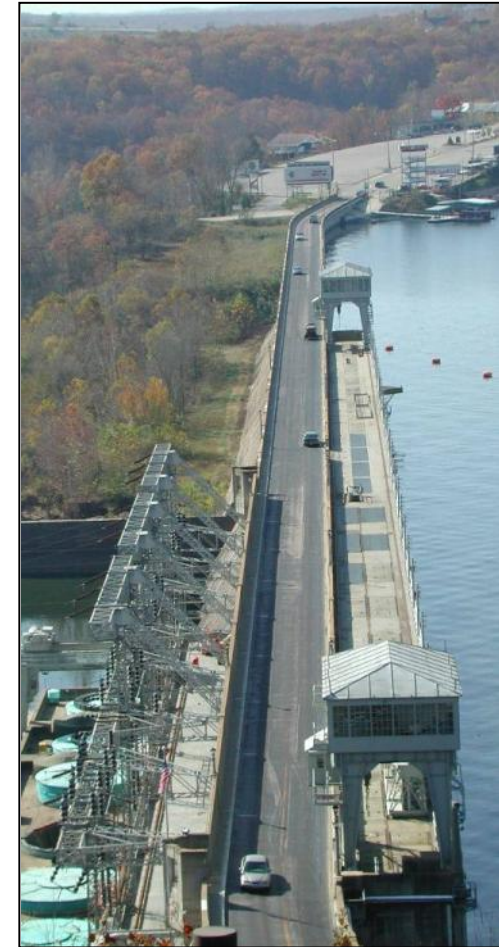
Hoover Dam

- **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
- Commitment of full regulatory compliance
- Renewed dedication to dam safety at all facilities
- QMS Implementation



TAUM SAUK RECENT ACTIVITIES

- New staff, all management and 14/18 staff in last 5 years
 - Positives and negatives
- Complete electrical systems upgrade (ICE) during rebuild outage
- Unit 1 generator failure in June, 2011
 - Returned to service in April, 2012 (10 months)
 - Rewinding Unit 2 generator this fall (~ 6 months)
- Reliability issues with wicket gate (turbine control valve) operation
 - Larger servomotors to be installed this fall
- Outage this fall to replace inlet valve seals
 - First drain of upper reservoir since extended operation after rebuild
 - Penstock inspection
 - Scroll case weld repairs

TAUM SAUK LICENSING ACTIVITIES

- Original license 1960 – 2010
- New license application filed with FERC in June, 2008
 - On annual license extensions pending FERC rulings
 - Breach necessitated many new environmental studies
- Water Management Plan with MDC, MDNR, and USFWS