SUMMARY OF MEETING
TOUR OF AMEREN MISSOURI
OSAGE HYDRO-ELECTRIC PLANT
AND WILMORE LODGE
LAKE OZARKS, MISSOURI
August 6, 2013

On Tuesday, August 6, 2013, from 10:00 a.m. until 12:30 p.m. a tour was held at the Osage Hydro-Electric Plant and Wilmore Lodge at the Lake of the Ozarks.

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

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

Commissioner Steve Stoll
Commissioner Bill Kenney
Mark Hughes
Judge Kim Burton
Judge Mike Bushmann
Judge Dan Jordan
Judge Morris Woodruff
Annette Slack
Joyce Lafontaine
Angelina Whitfield
Jonathan Whitfield
Ethan Todd
Jennifer Hernandez
John Borgmeyer

Gaye Suggett welcomed everyone to the Osage Hydro-Electric Plant (Bagnell Dam). Warren Witt gave a presentation of the history of the Osage Hydro-Electric Plant. The presentation is attached. Following the tour of the plant, the group traveled to Wilmore Lodge and participated in a tour with Karen Kopis, Staff Member of Wilmore Lodge.

Osage 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

Osage Energy Center Basics

- Built in 1931
- 234 MW, ~700,000 MWhr/yr
- 8 main units, 2 house units
- 12 spill gates
- Staff of 25 people
- Lake:
  - Over 1100 miles of shoreline
  - 100 feet deep
  - 93 miles long
  - Drainage basin is Springfield to just south of KC, 150 miles into Kansas

The Construction of Bagnell Dam

- In August of 1929, men and women from all over the world came to a little known place on the Osage River, just upstream of the town of Bagnell, Missouri.
- Barely over two years later, they had completed what is now known as Bagnell Dam... and the Lake of the Ozarks was born.

Construction Begins August 6, 1929

- Sept. 24, 1929
- Clearing on the west hill - the area now known as “the strip”

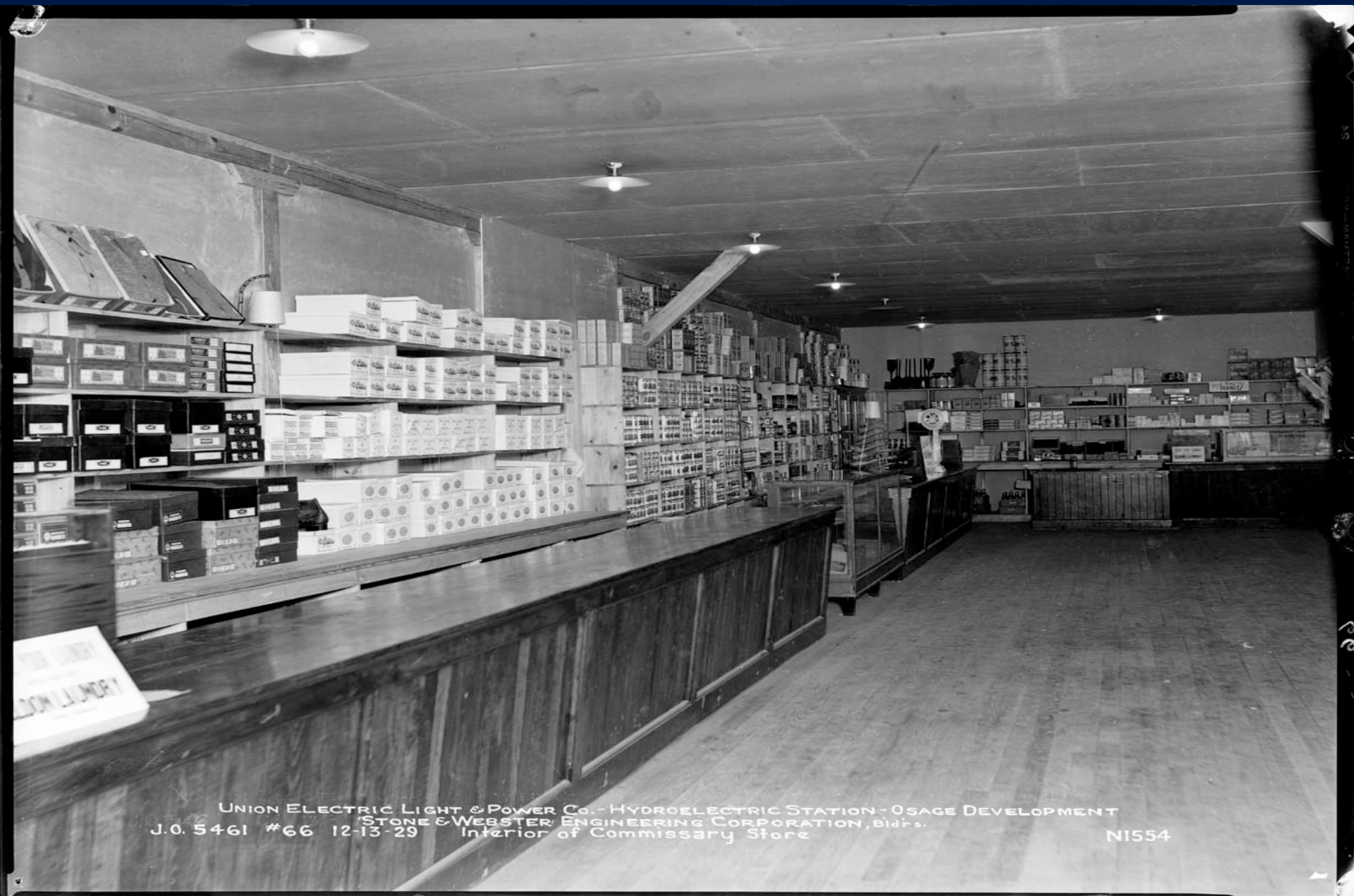
Oct. 25, 1929 Mess Hall

Oct. 11, 1929 Camp Hospital

Water Tower and Village Housing

- Tower is still in use today

Dec. 13, 1929 Company Store



Dec. 31, 1929 Bakery

Oct. 1929 East Abutment hill cut

Dec. 1929 Cutting bank for spillway

Mar, 1930 Spillway coffer dam and excavation

Jul, 1930 "New" Grand Glaize Bridge piers

Dec, 1930 Grand Glaize bridge complete

July, 1930

- Spillway nearly done. Coffer dam built.
- Ready to pump out "the hole".
- Notice river bypass through spillway

Aug, 1930 East hill forming for concrete

- Notice air hoses

Aug, 1930 Concrete mixing plant conveyor

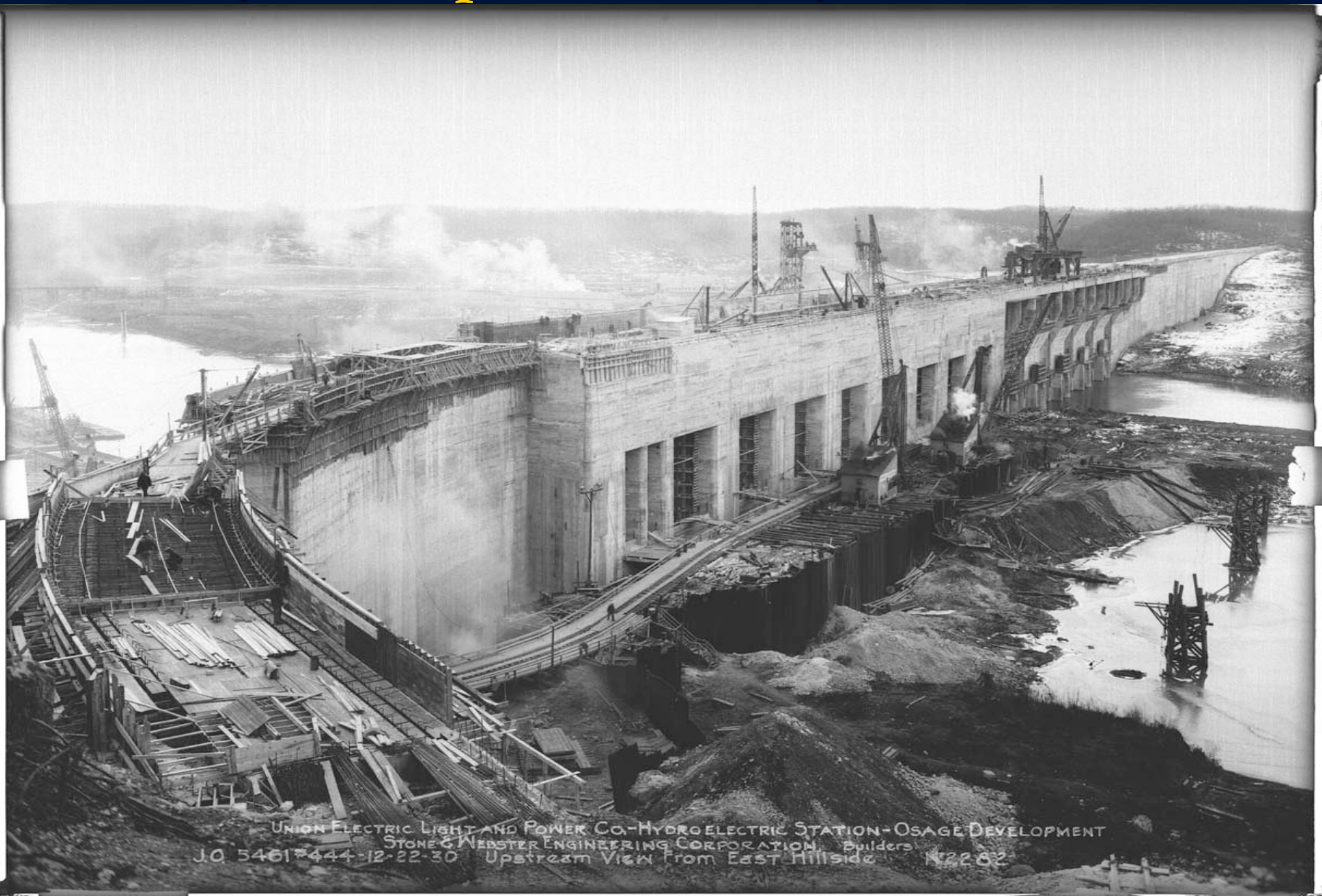
Aug, 1930 Powerhouse construction

- Barely one year into the job

Sept, 1930 Powerhouse construction

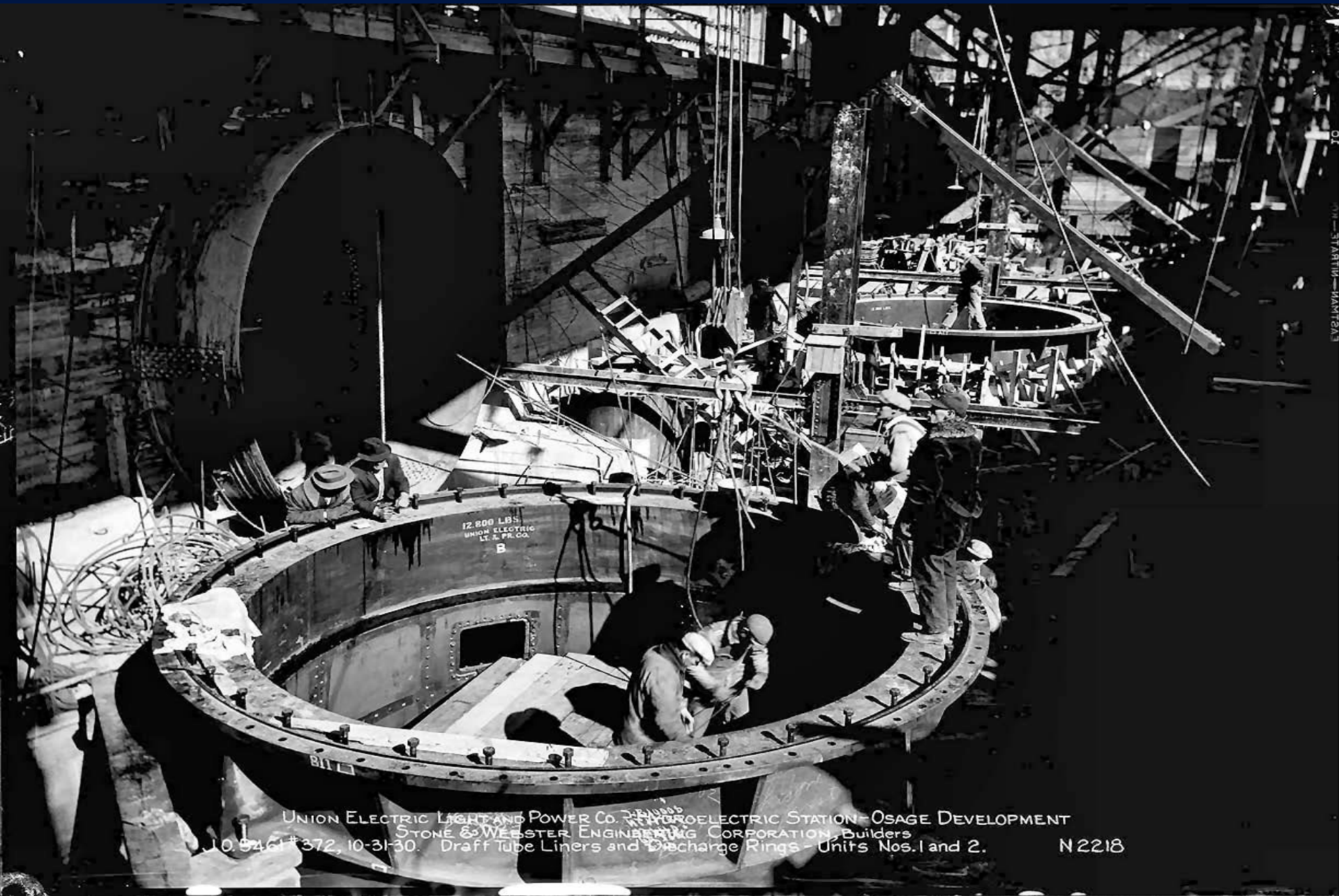
Oct, 1930 Looking upstream through spillway

Dec, 1930 Upstream side, turbine intakes



Aug, 1930 Permeability testing of concrete

Oct, 1930 Penstock and Draft Tube



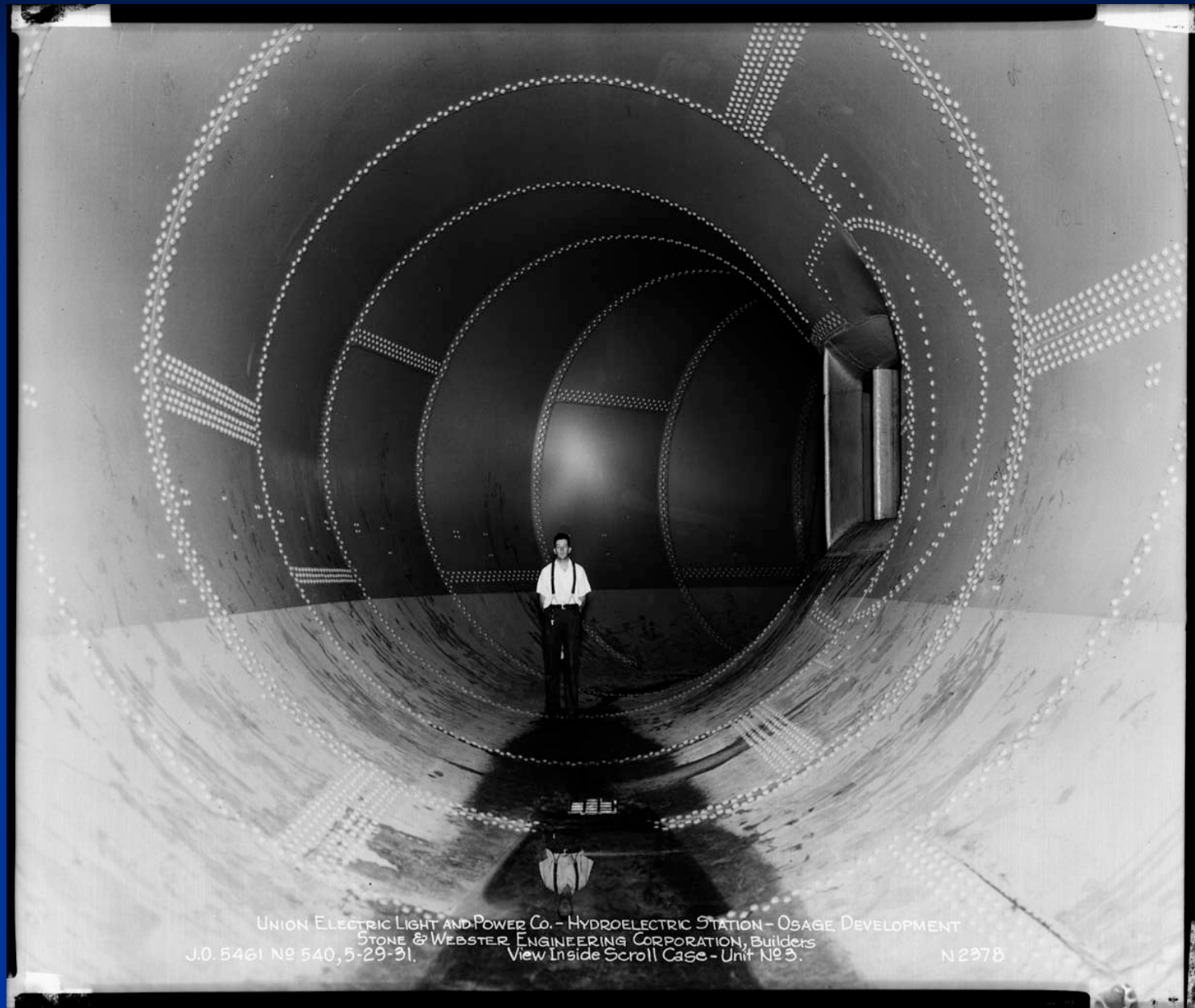
May, 1931 Original control board

- Replaced in 1993

May, 1931 Lifting generator rotor

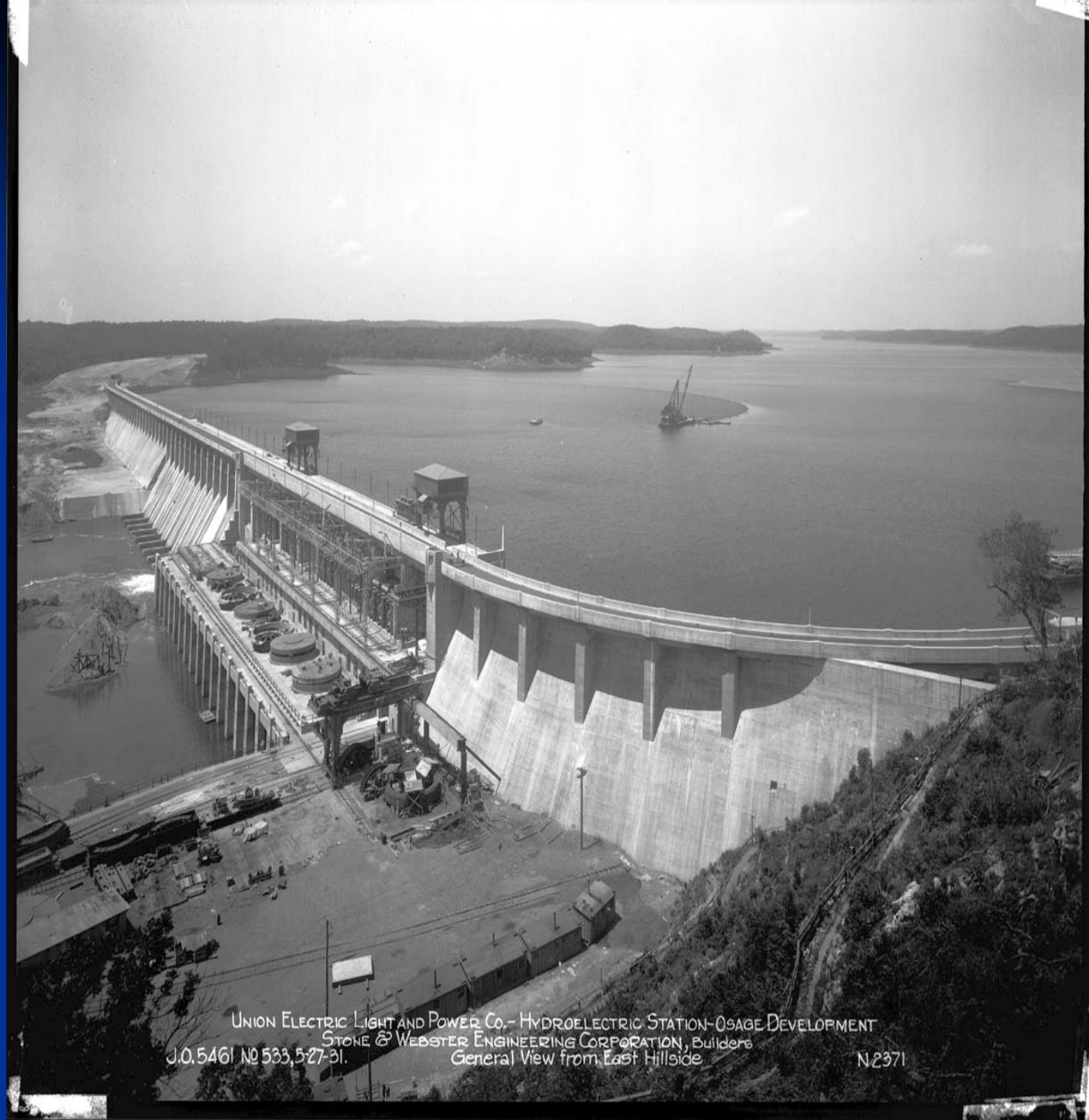
- May, 1931 Penstock Headgate

- May, 1931
- Main Unit scroll case



1931, Spare turbine, Unit 7 in 1950's

- May, 1931
- Dam nearly complete, lake is filling…all in less than two years!!



FERC License

- Original license from 1926-1976
  - 16 pages
- Second license from 1976- 2006
  - 30 pages
- Third license from 2007- 2047
  - 91 pages plus half a dozen required management plans

Recent Plant Upgrades

- Automated plant in 1990's
  - Operate all three hydro plants (25 units) from Osage
- Turbine/generator upgrades
  - 2 units in 2002
  - 4 aerating units in 2008 and 2009
  - 2 complete new house units in 2010
- New automated turbine loading and venting system in 2008

Recent Plant Upgrades

- ~20% increase (120,000 MWhrs) in plant generation capability for the same water flow rates
- > $50 Million for upgrades
- ~ $25 Million in federal tax credits/incentives for upgrades
- First two gas insulated step-up transformers in the Western Hemisphere (soon to be three)

Recent Environmental Upgrades

- Aerating turbines and automated venting system
- Fish net upstream of powerhouse
- Spill gate operational changes
- New minimum flow and flood ramp rate restrictions
- Management Plans:
  - Shoreline, Historical Property, Lower Osage River Enhancement, Fish Protection, Dissolved Oxygen Enhancement, Recreation Enhancement