

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 Suggestt

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 Suggestt 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



UNION ELECTRIC LIGHT & POWER CO. HYDROELECTRIC STATION-OSAGE DEVELOPMENT
STONE & WEBSTER ENGINEERING CORPORATION, Bldg.
J.O. 5461 #2 8-19-29 Looking SW of Dam Site

N 988

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



Oct. 25, 1929 Mess Hall



UNION ELECTRIC LIGHT & POWER Co - HYDROELECTRIC STATION - OSAGE DEVELOPMENT
STONE & WEBSTER ENGINEERING CORPORATION - Builders
Mess Hall and Foremen's Bunk Houses

J. O. 5461 #45 10.25.29

N1317

Oct. 11, 1929 Camp Hospital



UNION ELECTRIC LIGHT & POWER CO. HYDROELECTRIC STATION - OSAGE DEVELOPMENT
J.O. 5461 #36 10-11-29 STONE & WEBSTER ENGINEERING CORPORATION, Bldr.
Camp Hospital

NI305

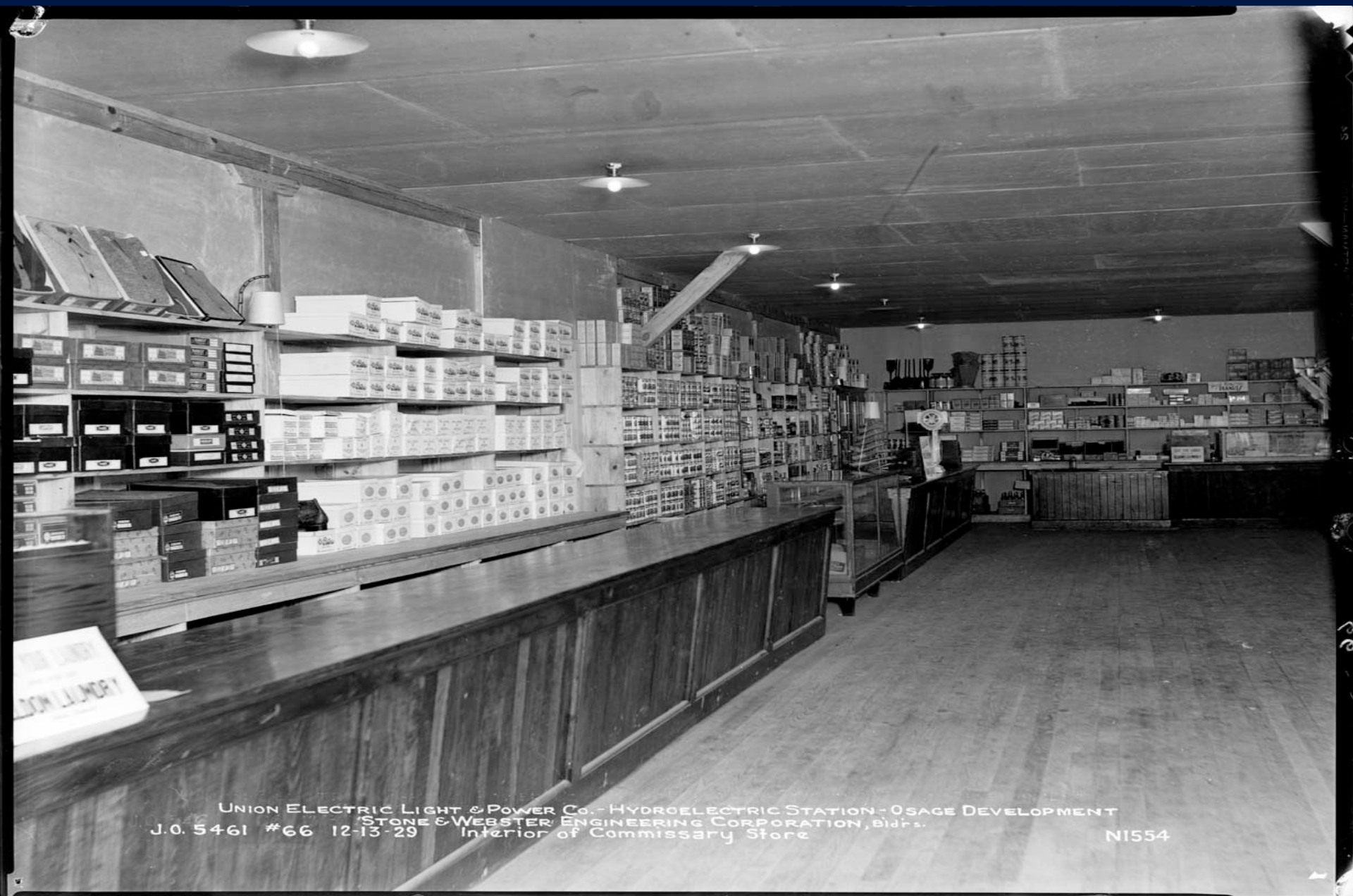
Water Tower and Village Housing

■ Tower is still in use today



UNION ELECTRIC LIGHT & POWER Co., HYDROELECTRIC STATION & VILLAGE DEVELOPMENT
STONE & WEBSTER ENGINEERING CORPORATION
L.O. 5461 #30 100 24 3 Room cottages, looking N.E. N1308

Dec. 13, 1929 Company Store



UNION ELECTRIC LIGHT & POWER Co. - HYDROELECTRIC STATION - OSAGE DEVELOPMENT
STONE & WEBSTER ENGINEERING CORPORATION, Bldg.
J.O. 5461 #66 12-13-29 Interior of Commissary Store

NI554

Dec. 31, 1929 Bakery



UNION ELECTRIC LIGHT & POWER CO. HYDROELECTRIC STATION - OSAGE DEVELOPMENT.
STONE & WEBSTER ENGINEERING CORPORATION, Builders
J. O. 5461 # 81 12-31-29

N1641

Oct. 1929 East Abutment hill cut



UNION ELECTRIC LIGHT & POWER CO. HYDROELECTRIC STATION DRAINAGE DEVELOPMENT
STONE & WESSLER ENGINEERING CORPORATION, ENGRS.
J.O. 5461 #48 10/25-29 Looking East over Dam Site from West
end of Dam

N1320

Dec. 1929 Cutting bank for spillway



UNION ELECTRIC LIGHT & POWER CO. - HYDROELECTRIC STATION - OSAGE DEVELOPMENT
STONE & WEBSTER ENGINEERING CORPORATION, Builders
J. O. 5461 #82 12-31-29 Looking West across Dam Site from Observation Platform, N1642

Mar, 1930 Spillway coffer dam and excavation



UNION ELECTRIC LIGHT & POWER CO. - HYDROELECTRIC STATION - OSAGE DEVELOPMENT
STONE & WEBSTER ENGINEERING CORPORATION, Builders
I.O. 5461 * 133 3-28-30 General View of Job from East Hillside (taken with Wide Angle lens for comparison with * 132) N 2003

Jul, 1930 "New" Grand Glaize Bridge piers



UNION ELECTRIC LIGHT & POWER CO. - HYDROELECTRIC STATION - OSAGE DEVELOPMENT.
STONE & WEBSTER ENGINEERING CORPORATION, Builders
J.O. 5462 #248. 7-31-30
View of Grand Glaize Bridge
N 2110

Dec, 1930 Grand Glaize bridge complete



UNION ELECTRIC LIGHT AND POWER Co - HYDROELECTRIC STATION - OSAGE DEVELOPMENT
STONE & WEBSTER ENGINEERING CORPORATION, Builders
J.C. 5461 #416, 12-1-30 Aerial View of Grand Glaize Creek Bridge - Looking North N 2255

July, 1930

- Spillway nearly done. Cofferdam 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



UNION ELECTRIC LIGHT & POWER CO - HYDROELECTRIC STATION - OSAGE DEVELOPMENT
STONE & WEBSTER ENGINEERING CORPORATION BUILDERS
J.O. 5461 # 261. 8-8-30. Looking North-East from Stocking Conveyor Tracis. N 2120

Aug, 1930 Powerhouse construction

■ Barely
one
year
into
the
job



UNION ELECTRIC LIGHT & POWER CO. - HYDROELECTRIC STATION - OSAGE DEVELOPMENT
STONE & WEBSTER ENGINEERING CORPORATION, Builders
J.O. 5461 #282, 8-29-30. General View from East Hillside

N 2138

Sept, 1930 Powerhouse construction



UNION ELECTRIC LIGHT & POWER CO. - HYDROELECTRIC STATION - DRAINAGE DEVELOPMENT
STONE & WEBSTER ENGINEERING CORPORATION, Builders
J.O. 5461 # 323, 9-29-30 General View from East Hillside N 2176

Oct, 1930 Looking upstream through spillway



UNION ELECTRIC LIGHT & POWER CO. - HYDROELECTRIC STATION - OSAGE DEVELOPMENT
STONE & WEBSTER ENGINEERING CORPORATION, Builders
J.O. 5461 # 343, 10-10-30 View Upstream through Spillway N 2191

Dec, 1930 Upstream side, turbine intakes



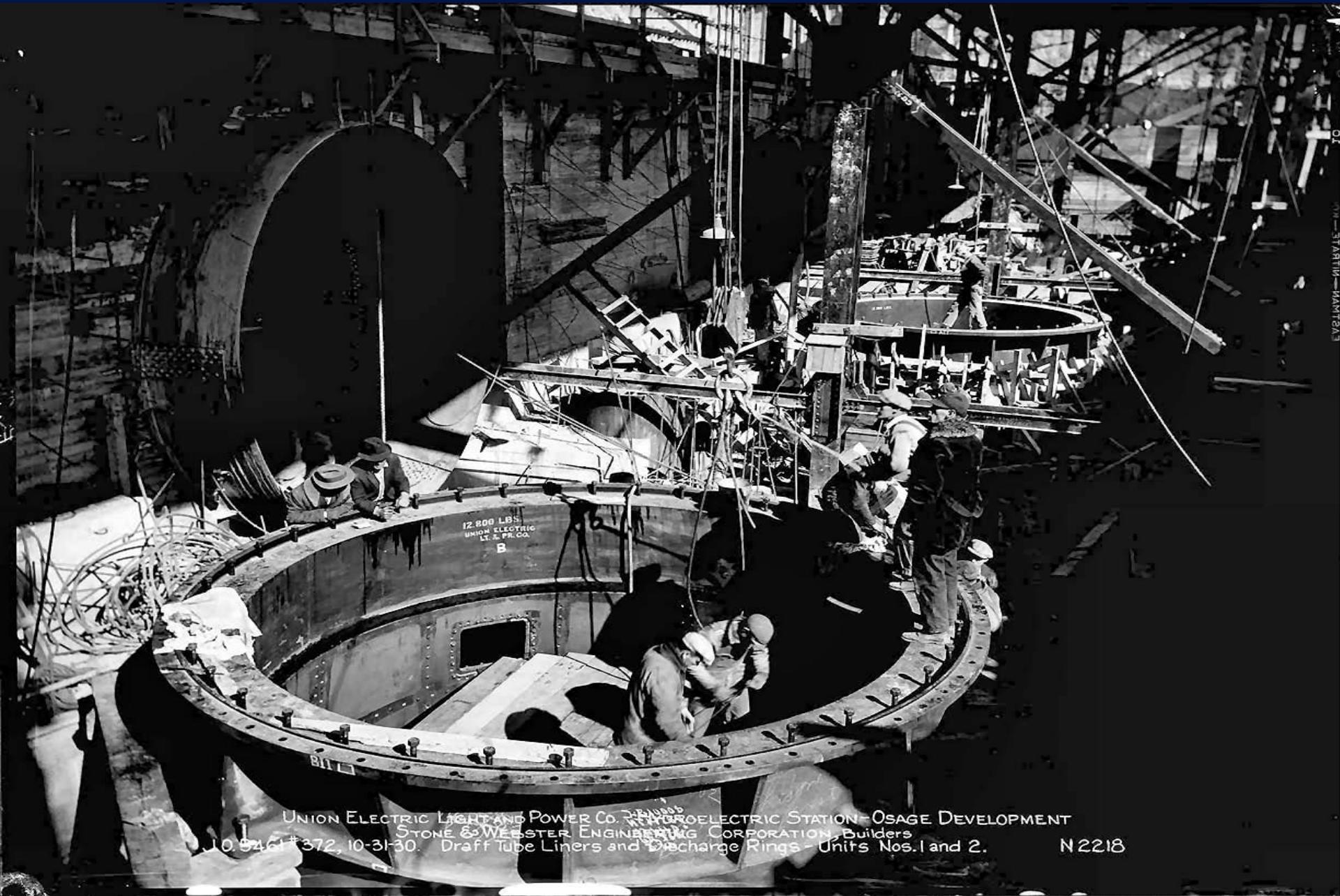
UNION ELECTRIC LIGHT AND POWER CO.-HYDROELECTRIC STATION-OSAGE DEVELOPMENT
STONE & WEBSTER ENGINEERING CORPORATION Builders
J.O. 5461-444-12-22-30 Upstream View From East Hillside N2262

Aug, 1930 Permeability testing of concrete



UNION ELECTRIC LIGHT & POWER Co. - HYDROELECTRIC STATION - OSAGE DEVELOPMENT
STONE & WEBSTER ENGINEERING CORPORATION, Builders
J.O. 5461 * 287, 8-27-30 Concrete Laboratory, Close-Up of Apparatus for Permeability Tests of Concrete Blocks N2141

Oct, 1930 Penstock and Draft Tube



12,800 LBS
UNION ELECTRIC
LT. & P. CO.
B

UNION ELECTRIC LIGHT AND POWER CO. ENGINEERS
STONE & WEBSTER ENGINEERING CORPORATION, BUILDERS

10,9461#372, 10-31-30. Draft Tube Liners and Discharge Rings - Units Nos. 1 and 2.

N 2218

TOP
LEFT
RIGHT
BOTTOM

May, 1931 Original control board

- Replaced in 1993



UNION ELECTRIC LIGHT AND POWER CO.-HYDROELECTRIC STATION-OSAGE DEVELOPMENT
STONE & WEBSTER ENGINEERING CORPORATION, Builders
J.O. 5461 No 544, 5-29-31. N 2382

May, 1931 Lifting generator rotor



UNION ELECTRIC LIGHT AND POWER CO.-HYDROELECTRIC STATION-OSAGE DEVELOPMENT
STONE & WEBSTER ENGINEERING CORPORATION, BUILDERS
J.O. 5461 No 538, 5-29-31. 150 Ton Crane Handling Rotor for Generator No 4 N 2376

■ May, 1931
Penstock
Headgate



UNION ELECTRIC LIGHT AND POWER Co. - HYDROELECTRIC STATION - OSAGE DEVELOPMENT
STONE & WEBSTER ENGINEERING CORPORATION, Builders
J.O. 5461 No 539, 5-28-31. Headgates for Unit No 3 from Penstock N2377

- May, 1931
- Main Unit scroll case



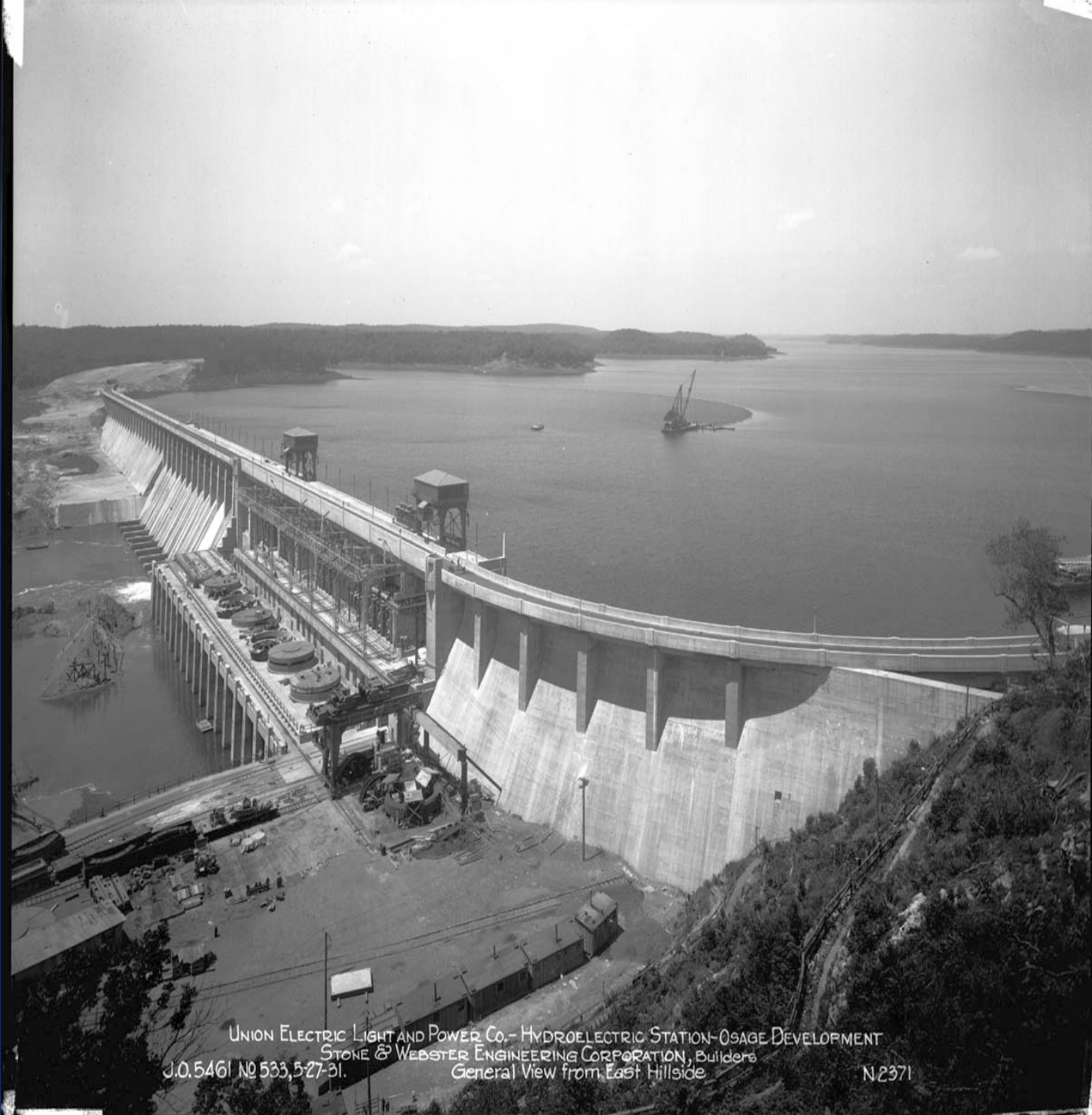
UNION ELECTRIC LIGHT AND POWER Co. - HYDROELECTRIC STATION - OSAGE DEVELOPMENT
STONE & WEBSTER ENGINEERING CORPORATION, Builders
View Inside Scroll Case - Unit No. 3. N 2978

1931, Spare turbine, Unit 7 in 1950's



UNION ELECTRIC LIGHT AND POWER Co.-HYDROELECTRIC STATION-OSAGE DEVELOPMENT
STONE & WEBSTER ENGINEERING CORPORATION, builders
J.O. 5461 No 561, 6-29-31. View of Spare Water Wheel Runner N 2399

- 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

