

**OSAGE ENERGY CENTER TOUR**

**Wednesday, April 20, 2022**

**1:00 – 4:30**

On Wednesday, April 20<sup>th</sup> a tour of the Osage Energy Center (Bagnell) was given to members of the Missouri Public Service Commission and Office of Public Counsel. Director of Hydro Operations gave a presentation (attached) followed by a tour of the plant.

**Missouri Public Service Commission Attendees:**

Commissioner Jason Holsman  
Scott Stacey  
Carolyn Kerr  
Tyrone Thomason  
Walt Cecil and grandson (Matthew Kollmeyer)

**Office of Public Counsel Attendees:**

Angie Schaben, OPC  
Lindsay VanGerpen, OPC

**Ameren Missouri Attendees:**

Regulatory & Legislative Vice President Warren Wood  
Director Hydro Operations Warren Witt  
Manager Operations Travis Hart  
Manager Regulatory Affairs Gaye Suggett

# Osage Energy Center

*Warren A. Witt*

*Director of Hydro Operations*

*Ameren Missouri*

# Ameren Hydro Generation

- **Keokuk Energy Center**
  - 15 units, 140 MW, 109 years old
- **Osage Energy Center**
  - 8 units, 250 MW, 91 years old
- **Taum Sauk Pumped Storage Energy Center**
  - 2 units, 440 MW, 59 years old
- **~3% of Ameren generation**

# Osage Energy Center Basics

- Built in 1931
- 250 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

# 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 (27 units) from Osage
- **Turbine/generator upgrades**
  - 2 units in 2002
  - 4 aerating units in 2008 and 2009
  - 2 completely 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 three gas insulated step-up transformers in the Western Hemisphere

# 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**



# DAM STABILIZATION ENHANCEMENT/ ANCHORING

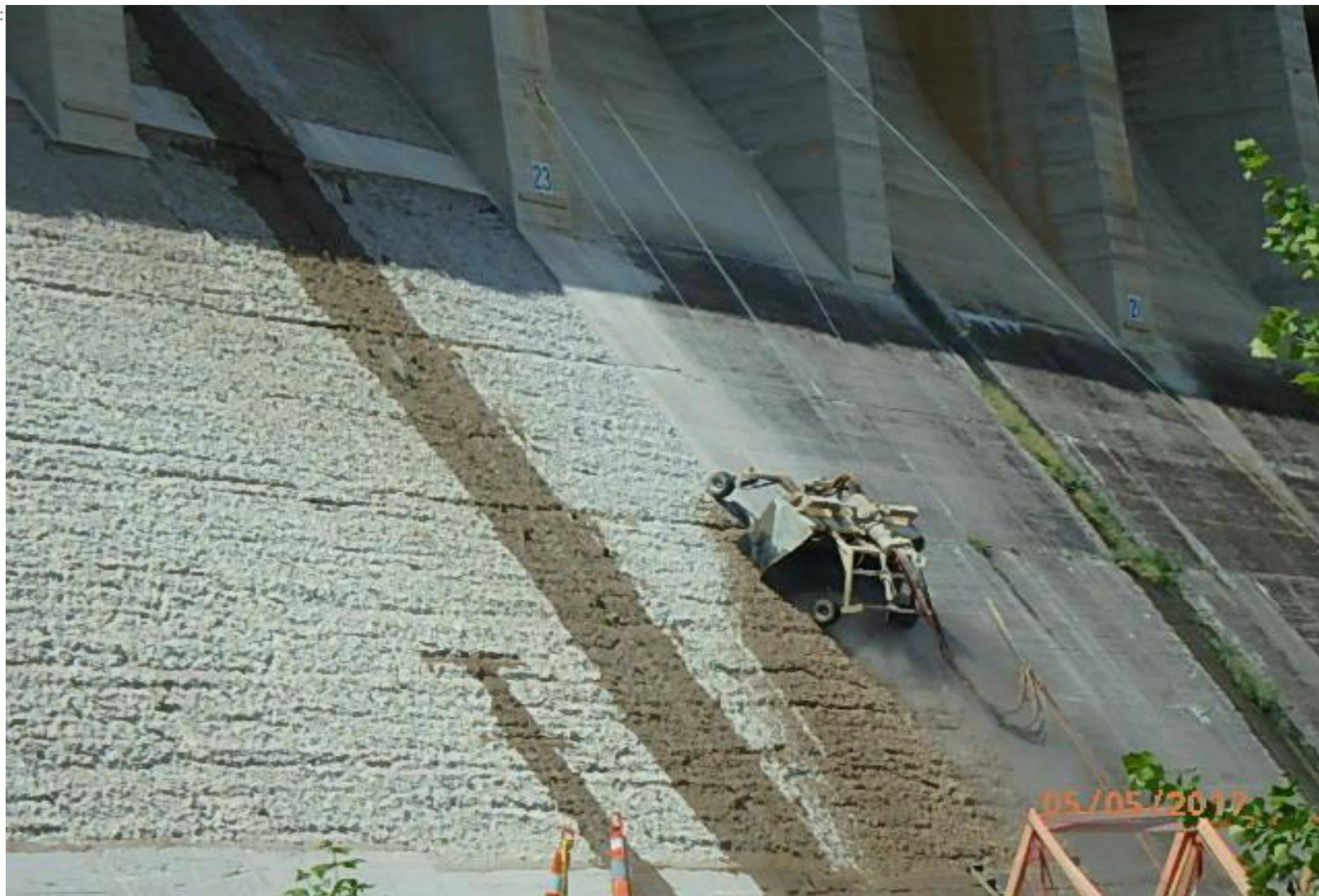
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- Anchored Bagnell Dam in 1980's
- 1980's anchors have an end of life due to minimal corrosion protection
- 2018 Project consisted of:
  - Hydroblasting/removal of surface concrete
  - Adding new anchors
  - Adding mass concrete
  - Adding new drains
- Project impacted:
  - West retaining section
  - Spillway section
  - East retaining section

# WEST RETAINING SECTION



# HYDROBLASTING/HYDRODEMOLITION





# 48" RECESS ANCHOR DRILL HEAD



# ANCHORS



# SPILLWAY PLATFORM AND BARGE



# SITE PROGRESS







04/18/2018



08/10/2018

# 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, Bldrs.  
J.O. 5461 #2 8-19-29 Looking SW of Dam Site

N 988

# September 24, 1929



UNION ELECTRIC LIGHT & POWER CO. - HYDROELECTRIC STATION, OSAGE DEVELOPMENT  
STONE & WEBSTER ENGINEERING CORPORATION, Builders.  
J.O. 5461 # 26 9-24-29 Looking West over dam site. N1182

# December 13, 1929 Job Hospital



UNION ELECTRIC LIGHT & POWER Co. - HYDROELECTRIC STATION - OSAGE DEVELOPMENT  
STONE & WEBSTER ENGINEERING CORPORATION, CHICAGO  
J.O. 5461 #70 12-13-29 Job Hospital NJ558

# October 25, 1929

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

N1320

# March 28, 1930 Cofferdam



UNION ELECTRIC LIGHT & POWER CO. - HYDROELECTRIC STATION - OSAGE DEVELOPMENT  
STONE & WEBSTER ENGINEERING CORPORATION, Builders

10.5461 \* 133 3-28-30 General View of Job from East Hillside (taken with Wide Angle lens for comparison with \* 132)

N 2003



# December 1, 1930 Grand Glaize Bridge



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

# August 29, 1930 Willmore Lodge

ATTACHMENT 8  
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UNION ELECTRIC LIGHT & POWER CO. - HYDROELECTRIC STATION - OSAGE DEVELOPMENT  
STONE & WEBSTER ENGINEERING CORPORATION, Builders  
View of Administration Lodge

J.D. 5461 #284 8-29-30

N 2140

# August 29, 1930 Powerhouse Begins

ATTACHMENT 8

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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

# September 29, 1930

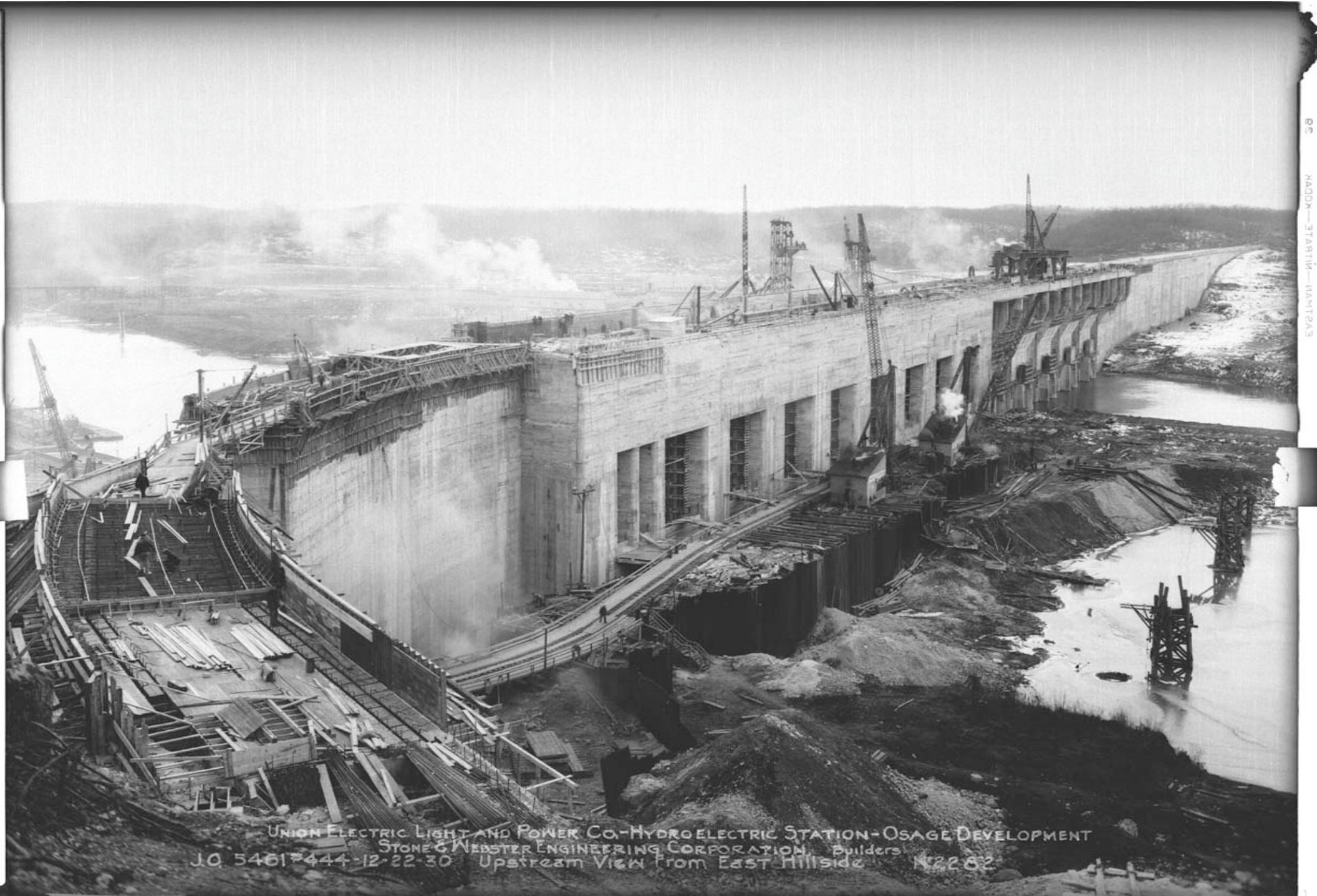
ATTACHMENT 8  
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UNION ELECTRIC LIGHT & POWER CO. HYDROELECTRIC STATION-OSAGE DEVELOPMENT  
STONE & WEBSTER ENGINEERING CORPORATION, Builders  
J.O. 5461 # 328, 9-29-30  
General View from East Hillside  
N 2176

# December 22, 1930

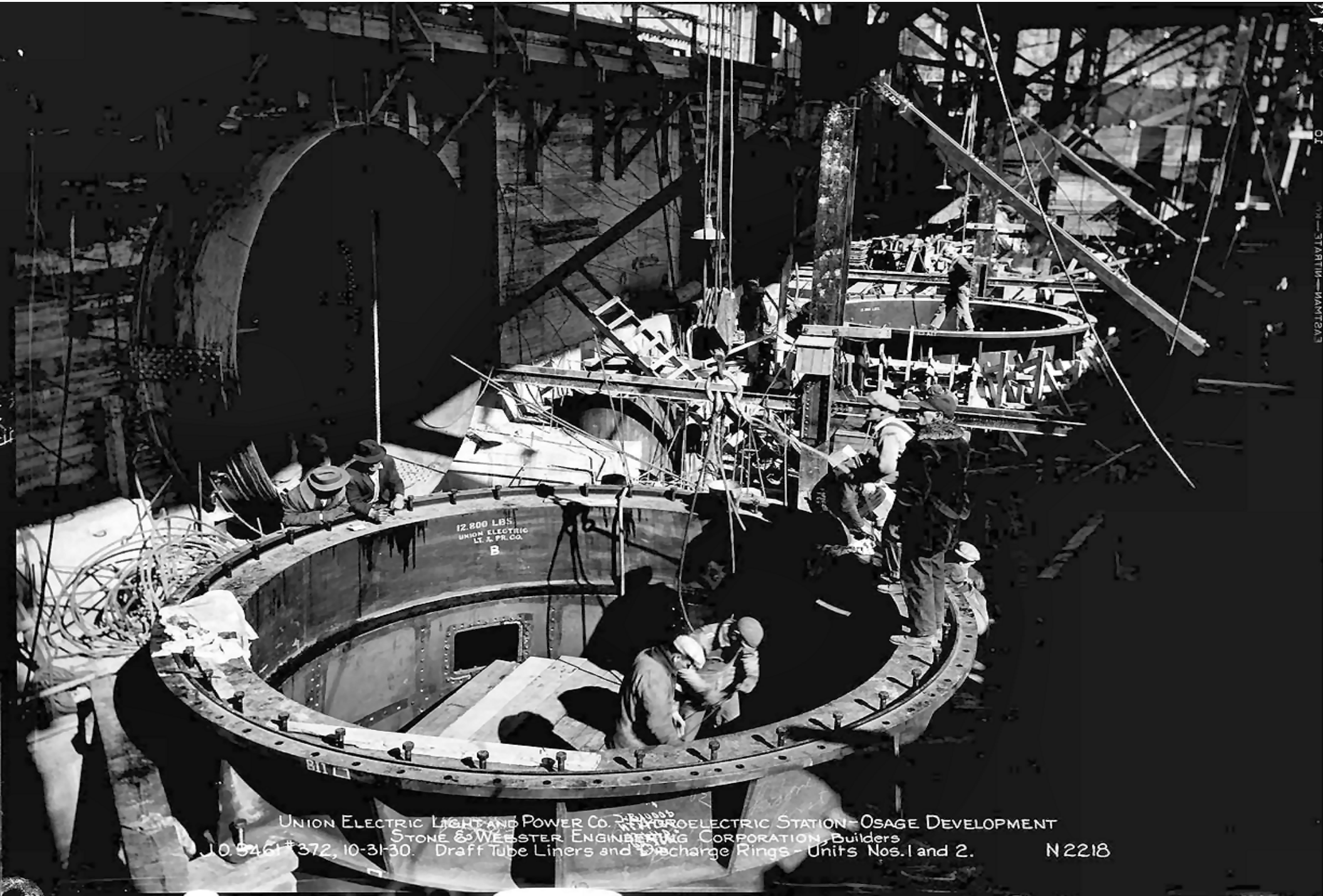
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UNION ELECTRIC LIGHT AND POWER CO.-HYDROELECTRIC STATION-OSAGE DEVELOPMENT  
STONE & WEBSTER ENGINEERING CORPORATION, Builders  
JO 5461-444-12-22-30 Upstream View From East Hillside N2262

95  
MADON—STARTIN—HAMPTON

# October 31, 1930



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

UNION ELECTRIC LIGHT AND POWER CO. HYDROELECTRIC STATION - OSAGE DEVELOPMENT  
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 - STARTING - MANTISA

# May 29, 1931



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

# May 29, 1931

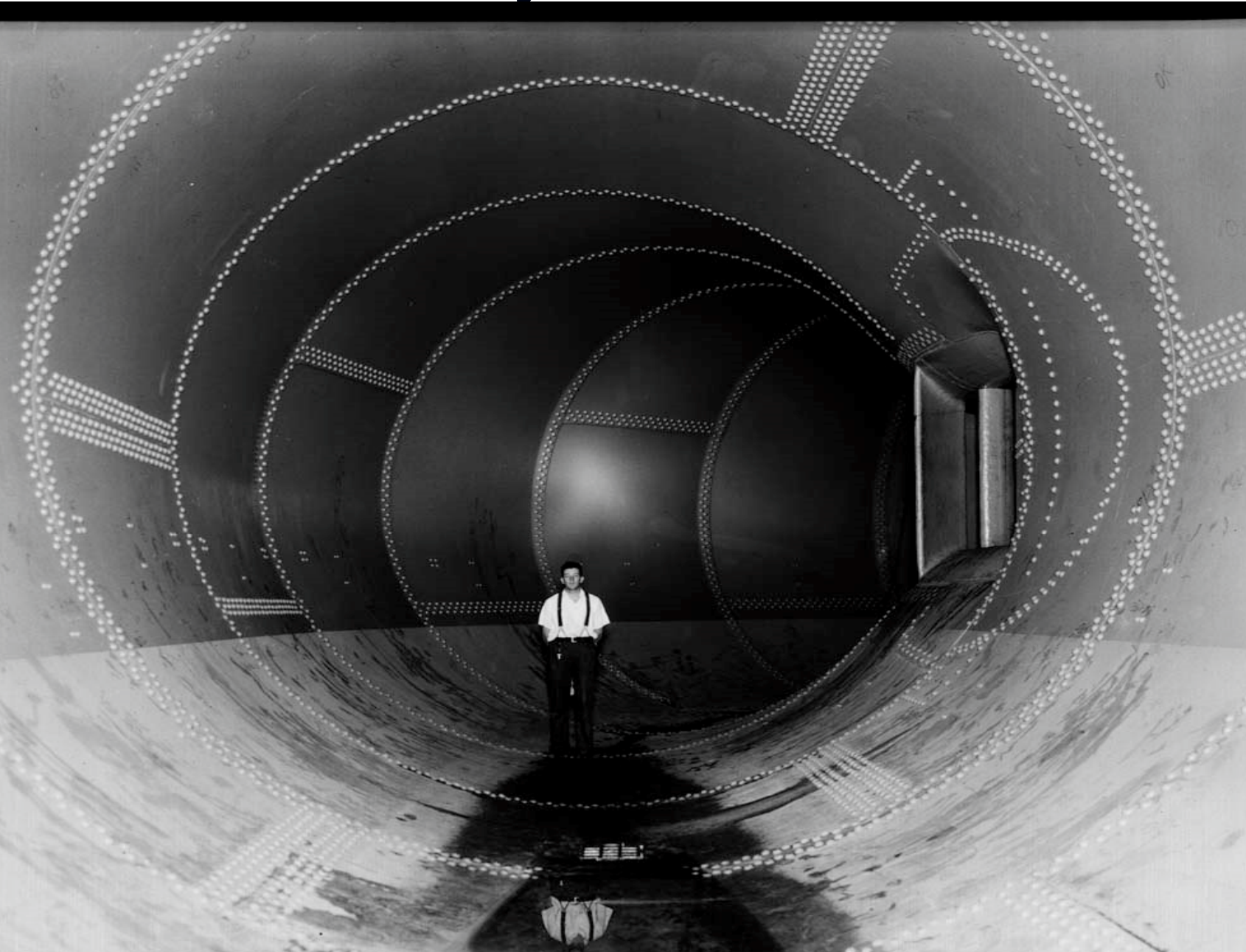


UNION ELECTRIC LIGHT AND POWER CO.-HYDROELECTRIC STATION-OSAGE DEVELOPMENT  
STONE & WEBSTER ENGINEERING CORPORATION, Builders  
J.O.5461 No 538, 5-29-31. 150 Ton Crane Handling Rotor for Generator No4 N 2376



# May 29, 1931

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

J.O. 5461 No 540, 5-29-31.

N 2378

# Lake Filling in Less Than 2 Years

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RECORD.

UNION ELECTRIC LIGHT AND POWER CO. - HYDROELECTRIC STATION - OSAGE DEVELOPMENT  
STONE & WEBSTER ENGINEERING CORPORATION, Builders  
J.O. 5461 NO 533, 5-27-31. General View from East Hillside

N2371