



BLUE RIDGE PENSTOCK REHABILITATION



The Project

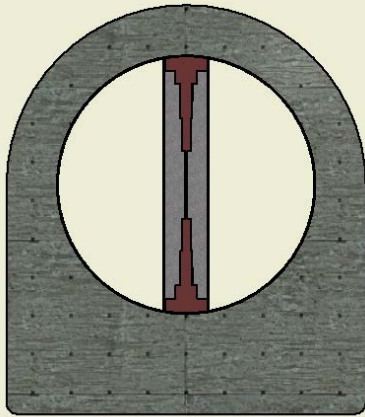
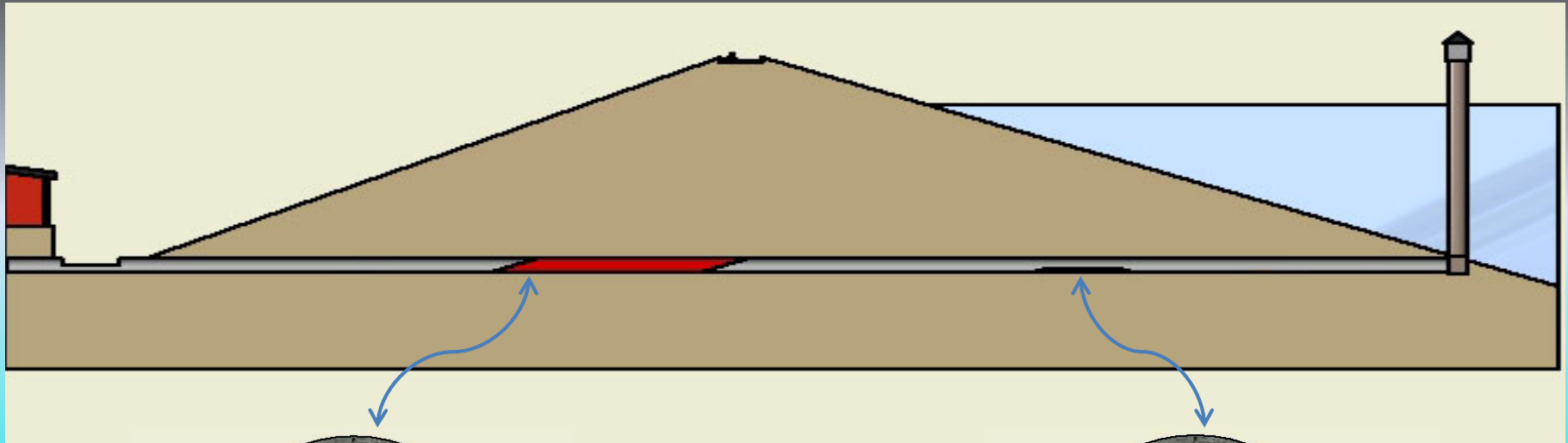


- TVA (Tennessee Valley Authority) is the owner and operator of the Blue Ridge Dam which is nearly 90 years old
- A 168" riveted steel penstock under this dam leads to a 25 MW hydroelectric power plant at dam base
- Shortly after construction a section of the penstock began to deform from external loading and required structural reinforcement.
- Original remedy was to install a steel reinforced, concrete filled girder through the center of the penstock 160' long by 18" thick and weighing 300 tons
- TVA/Paul Rizzo Assoc. Engineers remedy was to remove the girder and install a 147" x 1" thick steel liner within the penstock then grout the annular void
- **National Welding Corp.** was hired by **Garney Companies** to remove the girder, develop the installation means and install the new penstock
- **Northwest Pipe** laid out and provided the new penstock and reducers

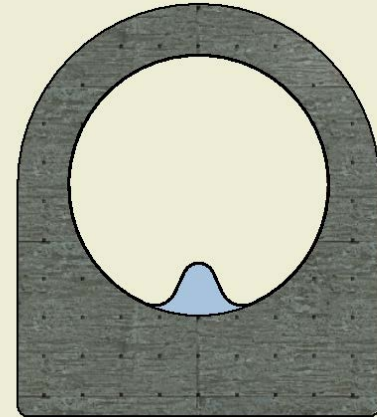
Blue Ridge Dam Aerial View



Dam and Penstock Section View



PENSTOCK GIRDER



PENSTOCK BULGE

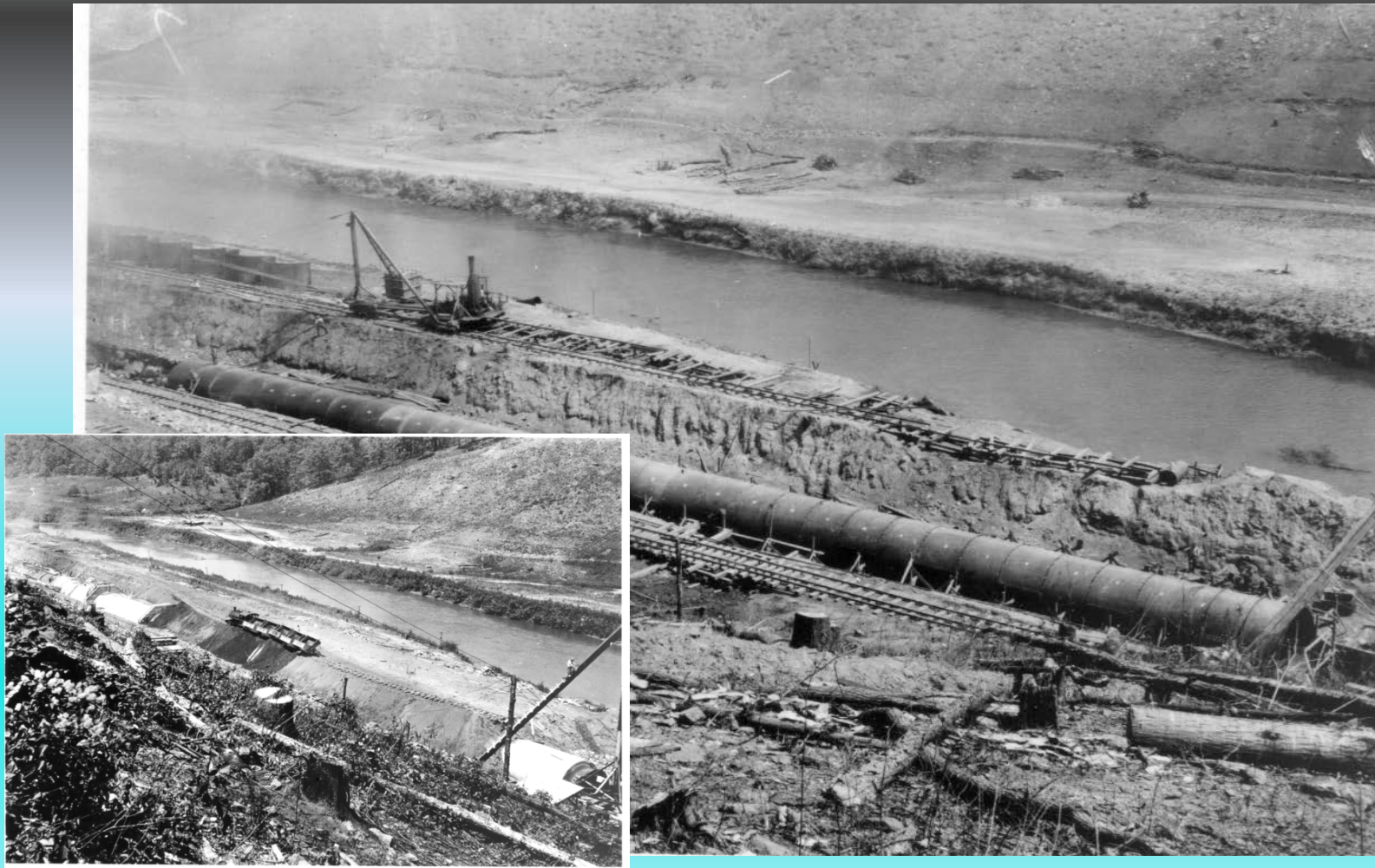
Powerhouse



Intake Tower



Original Penstock Construction



- Penstock 1050 ft long x 14 ft diameter riveted steel , encased in 4 ft reinforced concrete
- Penstock/Dam constructed between 1923 - 1931

Penstock Buckling 60' Long x 36" Tall



PENSTOCK BUCKLING OCCURRED DUE TO EXTERNAL LOADING. BULGE WAS A WATER FILLED CAVITY



300 Ton Steel/Concrete Girder



GIRDER MEASURED 160 FEET LONG X 18" THICK AND 14' TALL (FLOOR TO CEILING). CONTAINED STEEL AND CONCRETE MIX WITH LIMITED ACCESS.



Reduce Pressure & Remove Bulge



**PENSTOCK STABILIZED BY REDUCING
EXTERNAL PRESSURE WHICH ALLOWED
REMOVAL OF BULGE**

Removed 300 Ton Girder



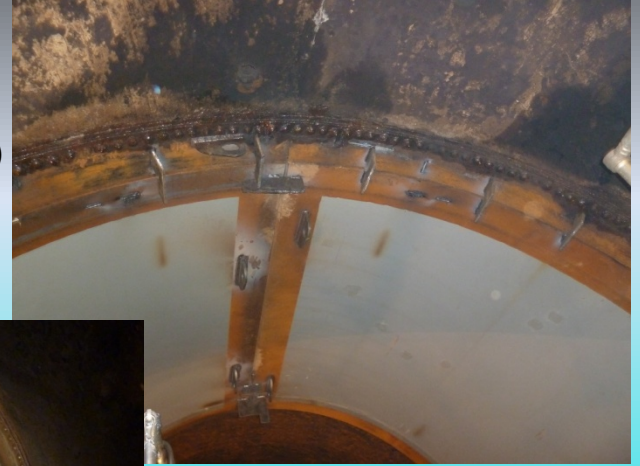
**THERMIC (OXYGEN)
LANCE CUTTING TO
REMOVE STEEL AND
CONCRETE GIRDER**



Reducer Assembly



168" TO 147" REDUCER
INSTALLED IN QUARTER
SECTIONS WEIGHING 4000
LBS EACH



Install Rail Sections & Carrier



RADIAL MOUNTED
RAIL UNIQUE CARRIER



Penstock Installation

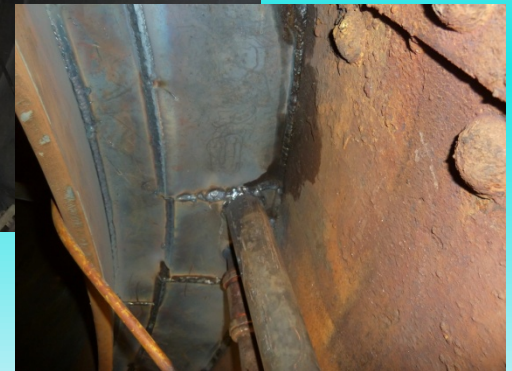
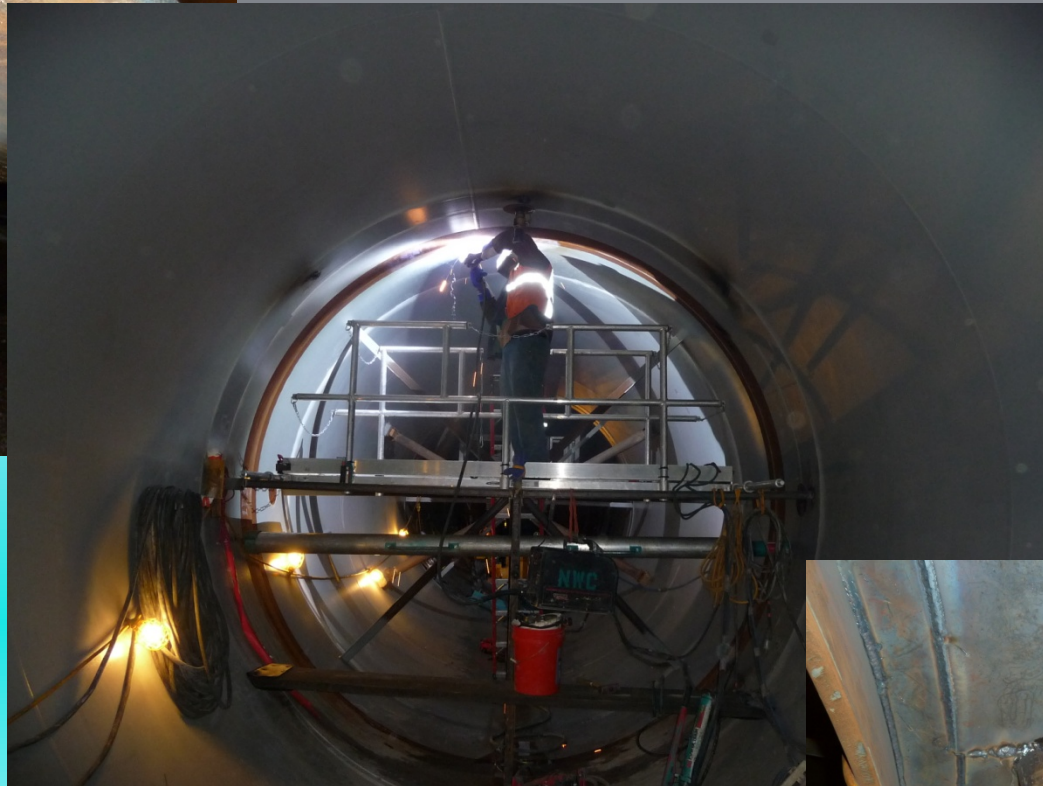


8" ANNULAR SPACE WITH
50,000 LB PIPE REQUIRED VERY
ACCURATE TOLERANCES &
GOOD CONTROLS

Supports, Weld and Grout Dams



UNIQUE SUPPORTS,
DAMS AND WELDING
WERE REQUIRED



Final Section (tight fit!)





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QUESTIONS ?

