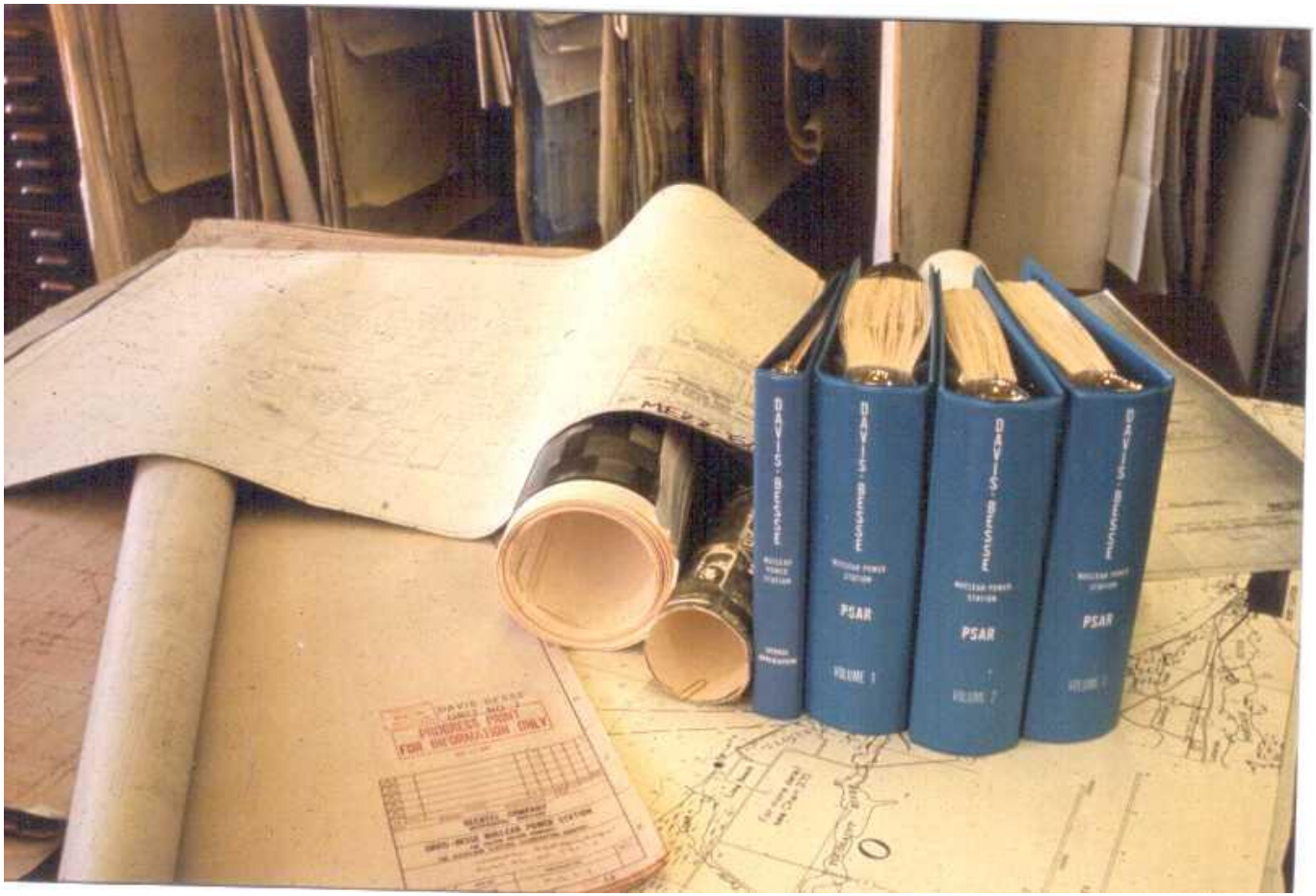
Davis Besse NPP Construction

Pushing Dirt and Digging Holes Actually started in 1969 below grade. When the AEC issued a Construction Permit (CP) above grade work could proceed. Below grade work was allowed without a CP with the requirement that if you bailed on the project the Site would be returned to “As found” condition.

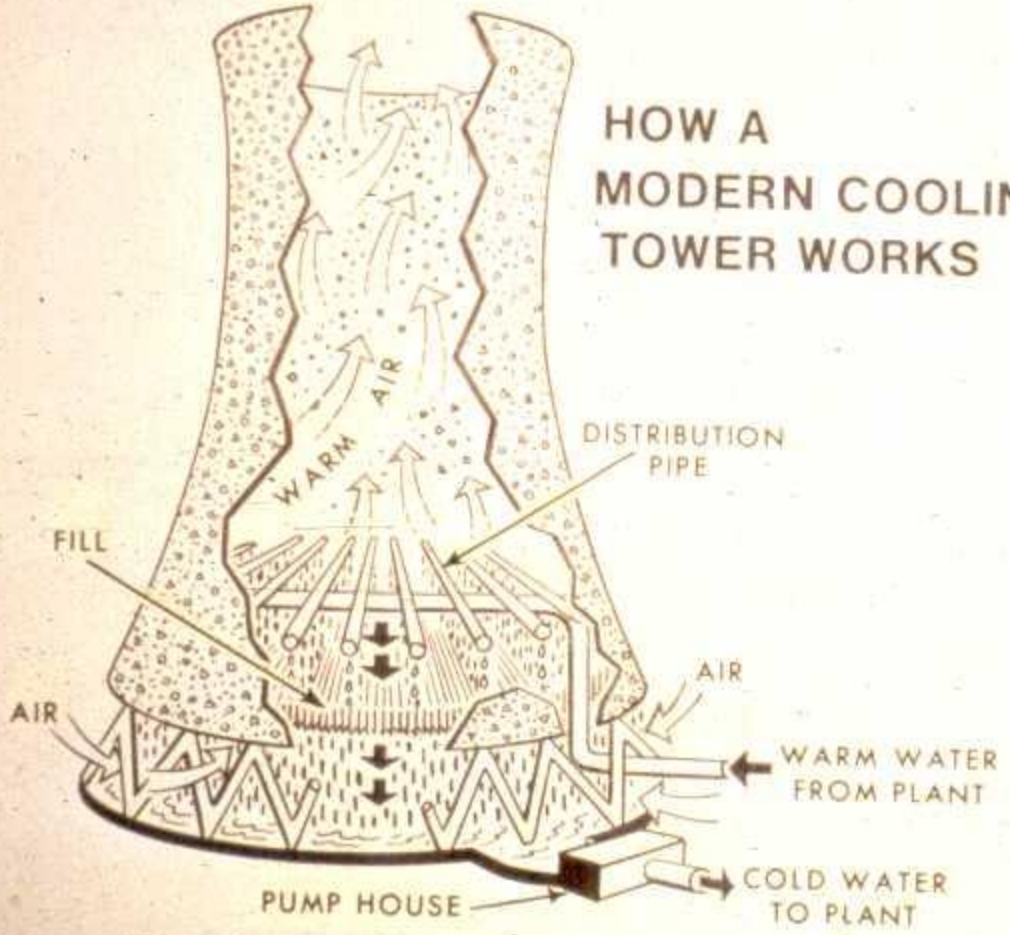
Planned Commercial NPP construction enjoyed a huge growth spurt in the ‘70s, encouraged by the optimistic load growth projections and the Atoms for Peace program. It was almost as if anyone who could write the check could buy a nuke. Orders for new Nuke Plants peaked in 1975 at ~210 projected plants. By 1978, 40% of these new plant orders had been cancelled. So it wasn’t the TMI 2 Accident in 1979 that directly killed enthusiasm for NPPs.

If you happened to find one for sale in the Sears and Roebuck Catalog, it came with an asterisk, “Some Assembly Required.” This slide show should help.



The original Licensing Basis Document was the 4 volume Preliminary Safety Analysis Report (PSAR) shown here. You couldn't get an Operating License for the plant until this document had grown in width until it expanded to 17 volumes for the Final Safety Analysis Report (FSAR). Who'da thunk it, just that extra paper could triple the cost of the Plant.

HOW A MODERN COOLING TOWER WORKS



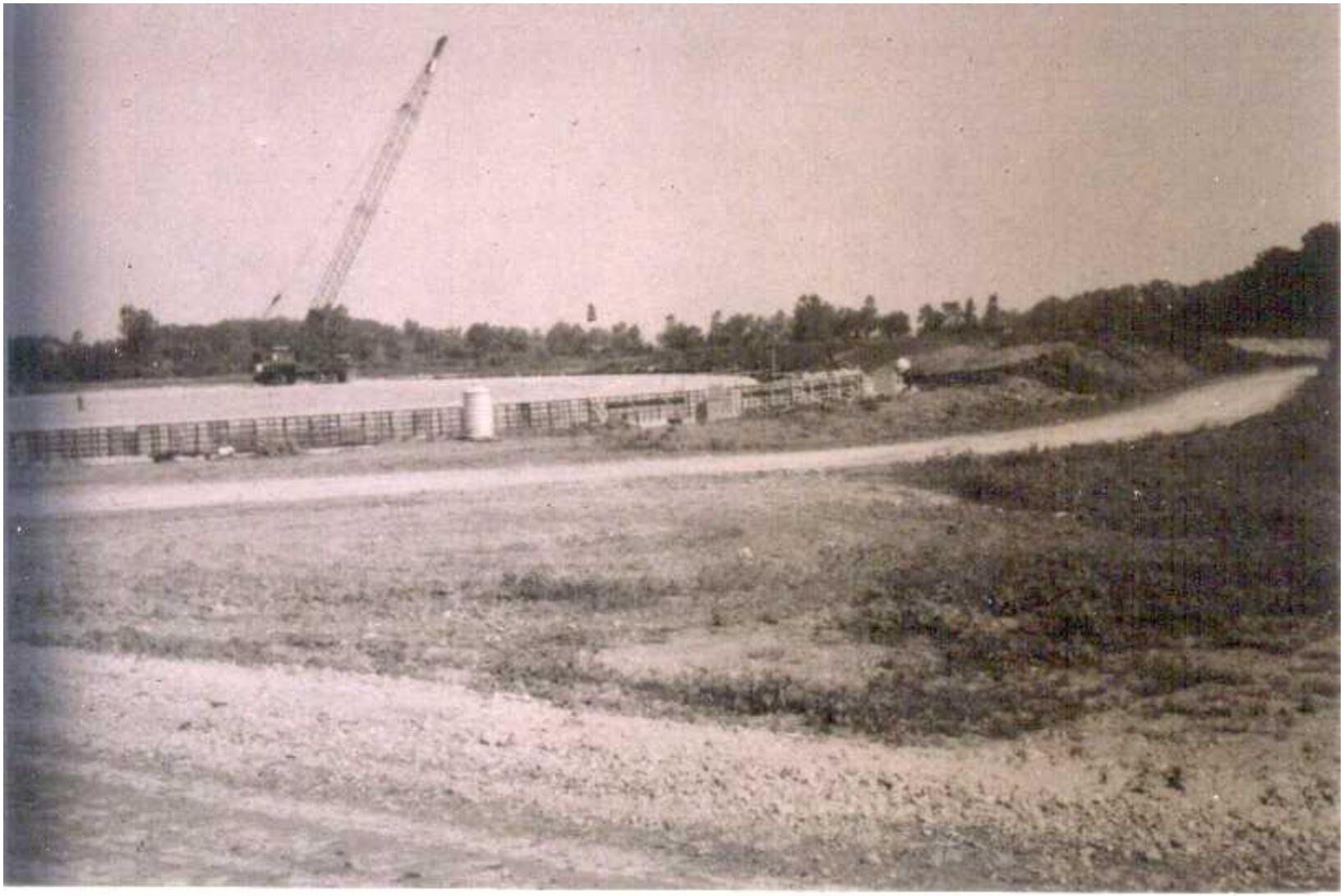
The Davis Besse Plant Cooling Tower was an optional decision by the Toledo Edison Company, after all the Plant was on the shore of Lake Erie. The Cooling Tower supplier was the Research-Cottrell Company.

At the time we were the northern most location for operation of a Research-Cottrell Cooling Tower, so they didn't have a lot of experience operating a tower that far north with cold winters.

The concern was as the tower operated on cold windy days ice would build up on the open space at the bottom provided for the cooling air inlet. This ice build up effectively blocked the cooling air inlet flow path, thus the Main Condenser Cooling Water Temperature could increase, affecting the Main Condenser vacuum and by that Plant Generator electrical output.

To offset that possibility a de-icing spray header was installed at the top of the air inlet section to redirect some warm Cooling Water to melt the ice build up. But winters can get really cold on Lake Erie, so using the de-icing header could make more ice than the local ice supplier.

We found out the best thing to do was basically leave it alone and let Mother Nature naturally self-regulate the ice build up. It never affected the Main Condenser vacuum to the point of affecting the plant load output.



I started working for Toledo Edison in 1970, so I missed this initial construction work on the Cooling Tower foundation. But I did see most of it proceed, driving to work every day in Toledo.

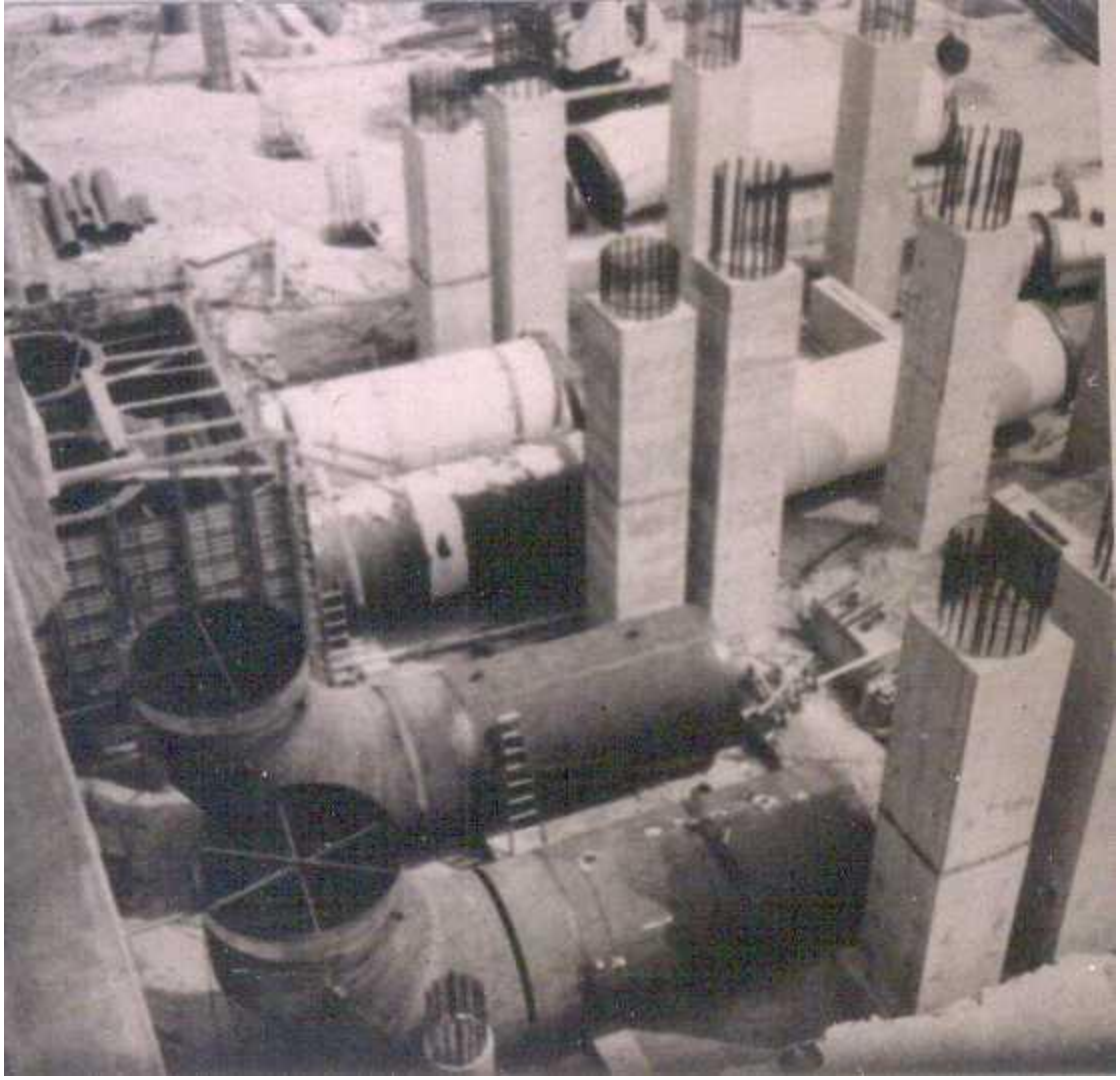
This is a view from the direction of the lake shore by the Intake Canal at about the eventual location of the Submarine Net. During construction the canal was open to the lake for large component delivery by barge. It would later be diked off, separated by an underwater concrete pipe extending a half mile into the lake and become our Ultimate Heat Sink. The lake end of the pipe was covered with a wooden crib, complete with an air bubbler system to keep the fish away. That idea didn't work so hot either as the fish liked the air bubbles, but you could always find the crib; it was where all the fishing boats were anchored. The plant was a self-contained city, having our own water, sewer, fire protection system, emergency electrical power, etc. Since we had a semi closed loop Cooling Tower for the Main Condenser cooling, this Intake Canal was the source of water for Auxiliary Cooling Water functions, tower makeup water to replace the tower vapor plume, etc.

In this view the Containment Vessel Shield Building and Cooling Tower are complete. Construction of the Turbine Building is on going. The 2 large tanks in the Turbine Building are the Condensate Storage Tanks.

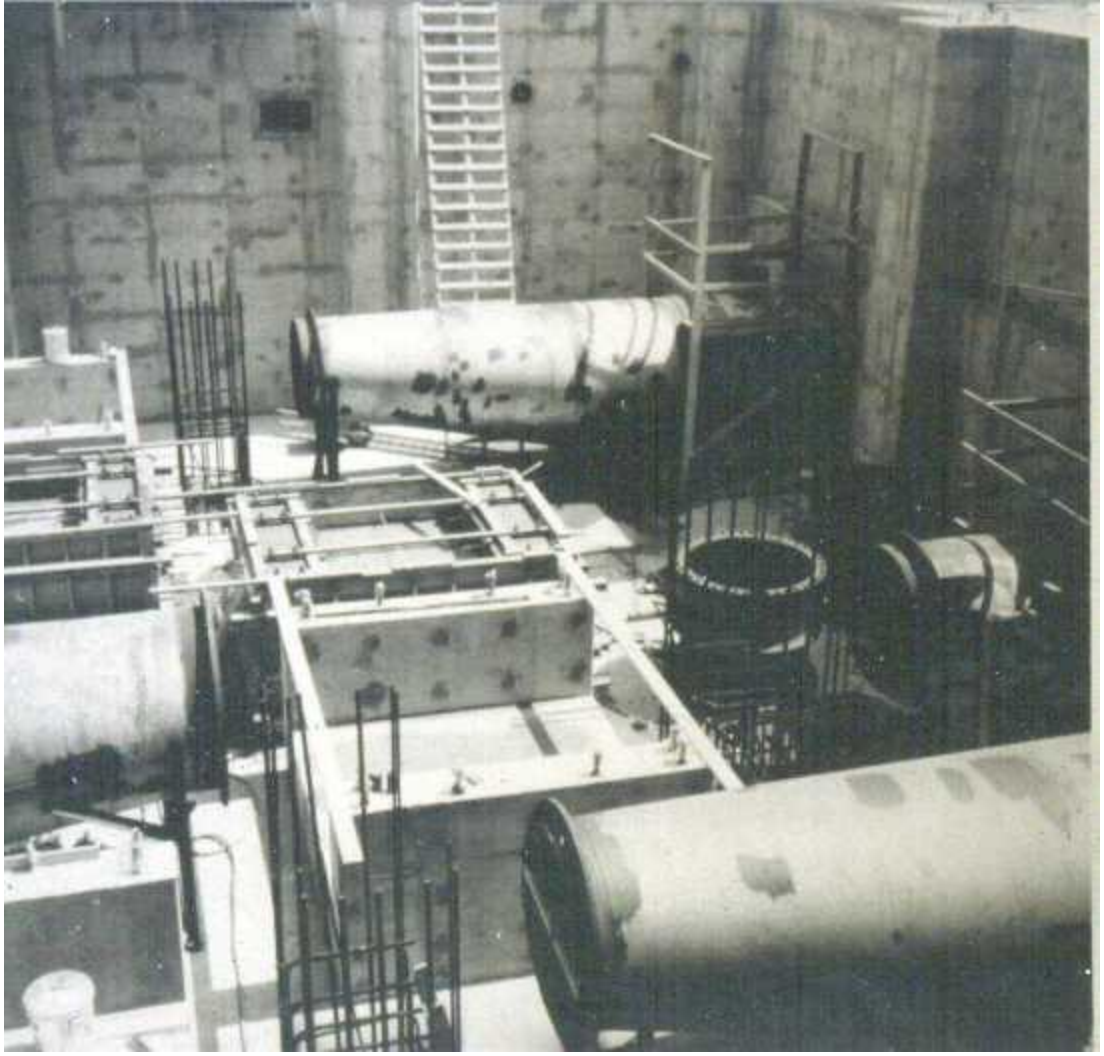
Construction of the concrete Cooling Tower return water canal near the Turbine Building end.

Turbine Building support column construction.

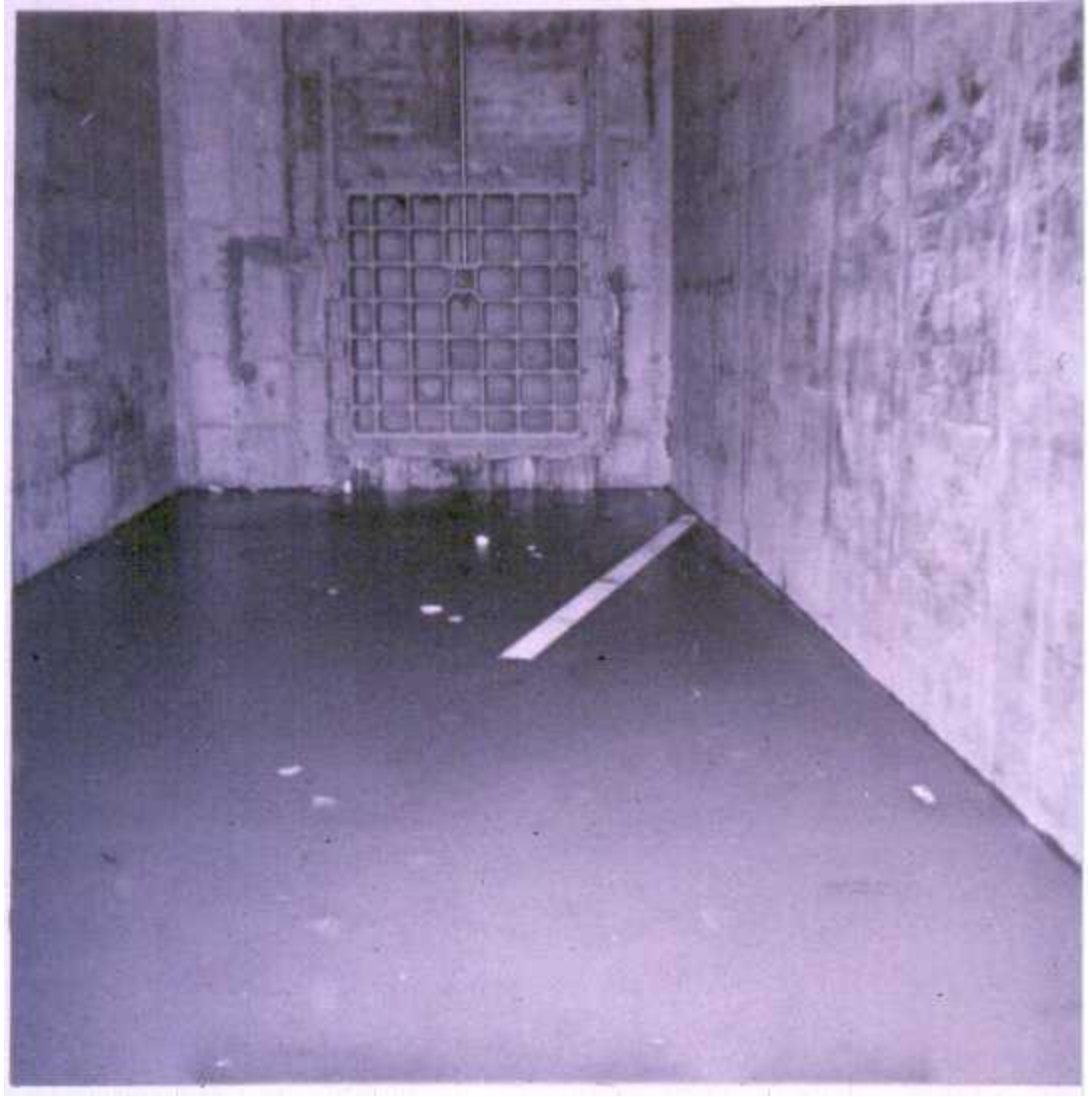
This plant is so old that color film was just experimental. The center structure is the Turbine Building (TB) with Circ Water pipes to the Cooling Tower, and at the lower left of the TB is the start of the Intake Screen House. The structure to the left center is the Spent Fuel Pool. The Containment Vessel Shield Building shows rows of holes that will become pipe and electrical penetrations. The large hole will become the Personnel Access Hatch, the one above a Main Steam Line penetration, and the right one the Containment Purge penetration.



Circ Water Pump House showing Circ Water Pump discharge piping.



Circ Pump Suction Piping and construction of the pump pedestals.

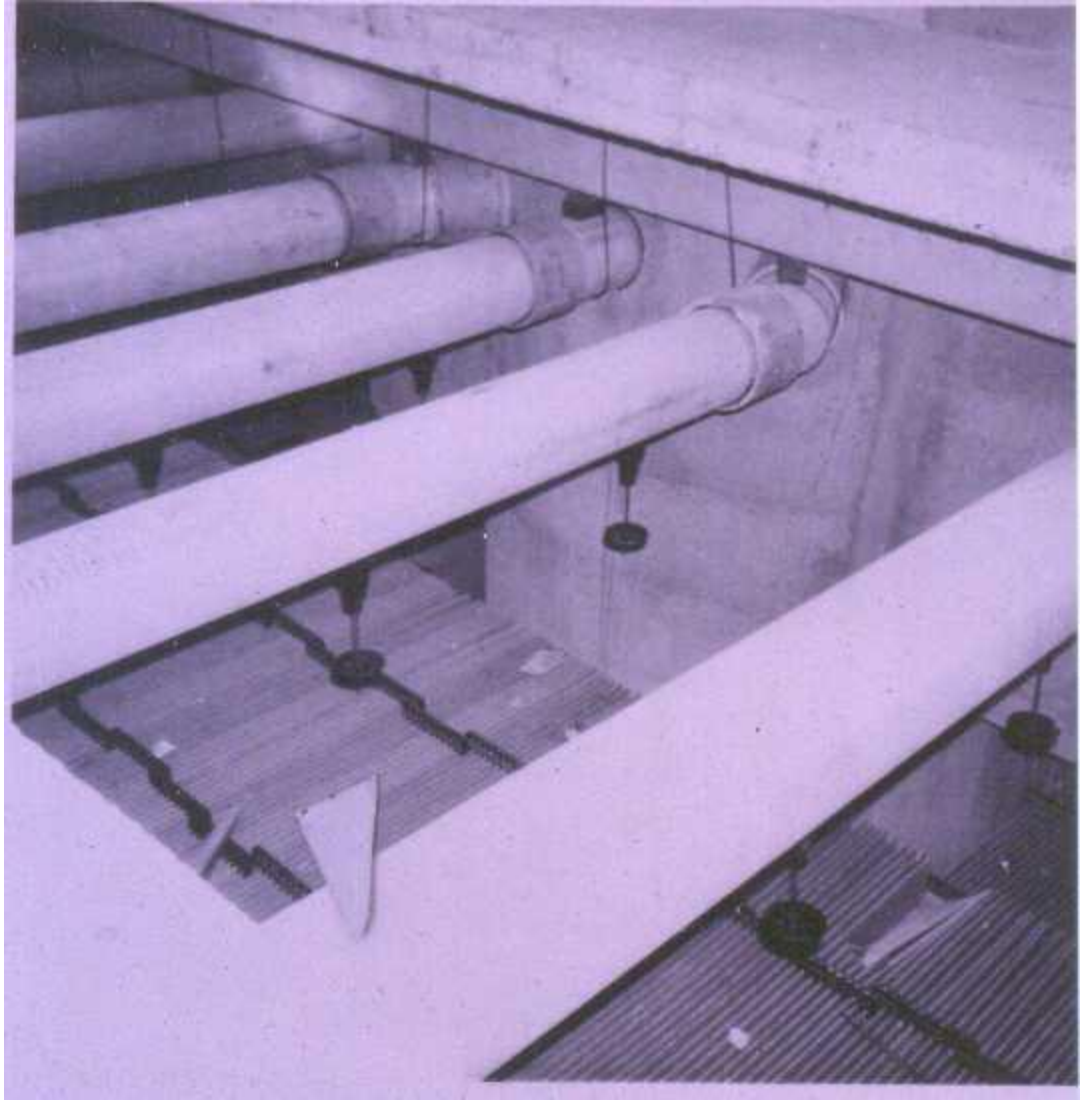


Not positive on this, either a sluice gate for the Intake Structure or the Circ Pump House.

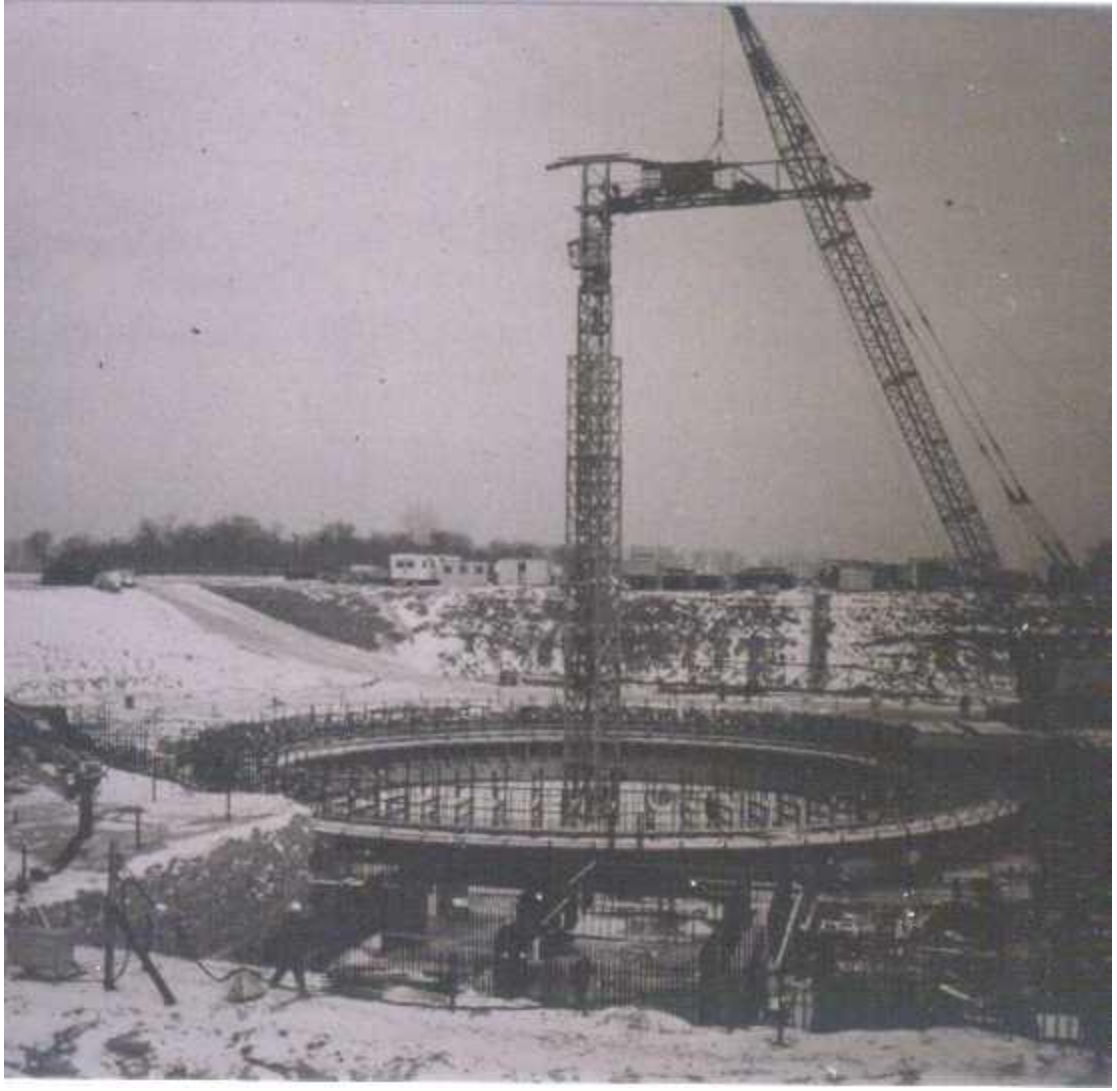
But this guy probably knows… is that you JD?

The water distribution area in side the Cooling Tower, about 50’ off the ground, is called the “Fill”. These concrete beams hold up the Fill. Looks like some concrete beams will be involved in “Let’s do it over.”

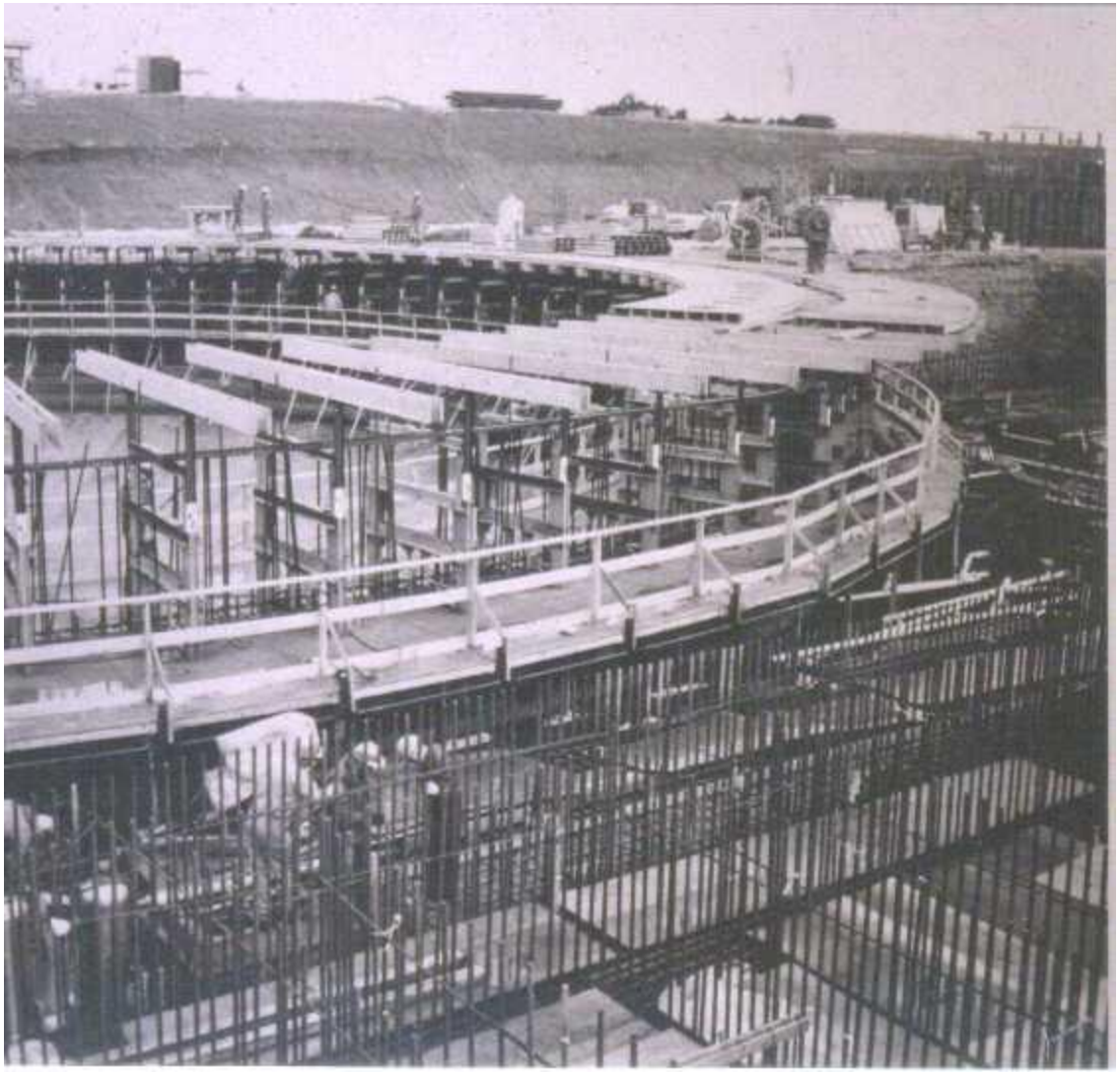
Installation of water distribution baffles in the Cooling Tower.



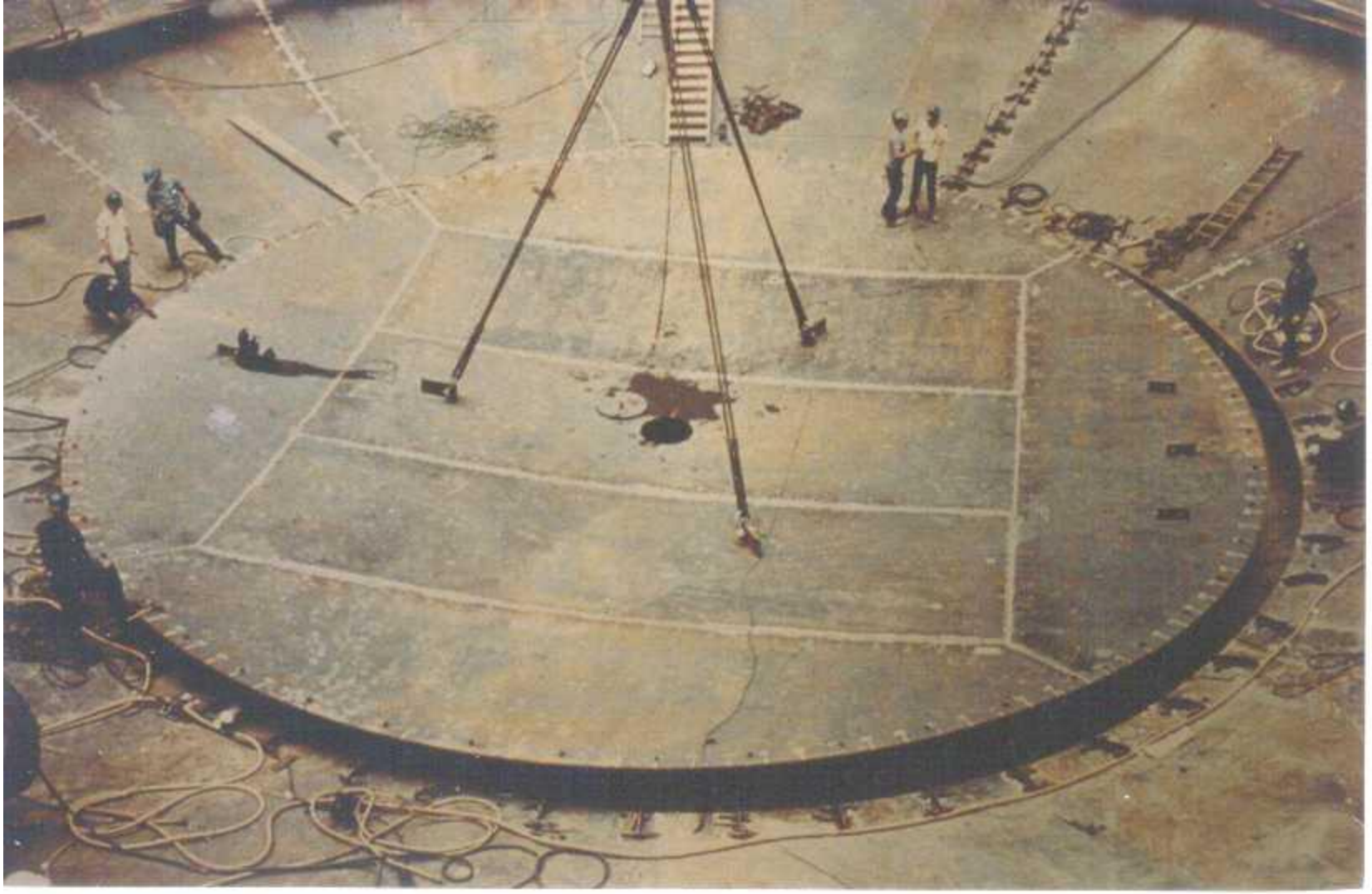
Water distribution pipes inside the Cooling Tower above the water distribution baffles below. Note the up-side-down umbrellas below the pipes to spread the water flow.



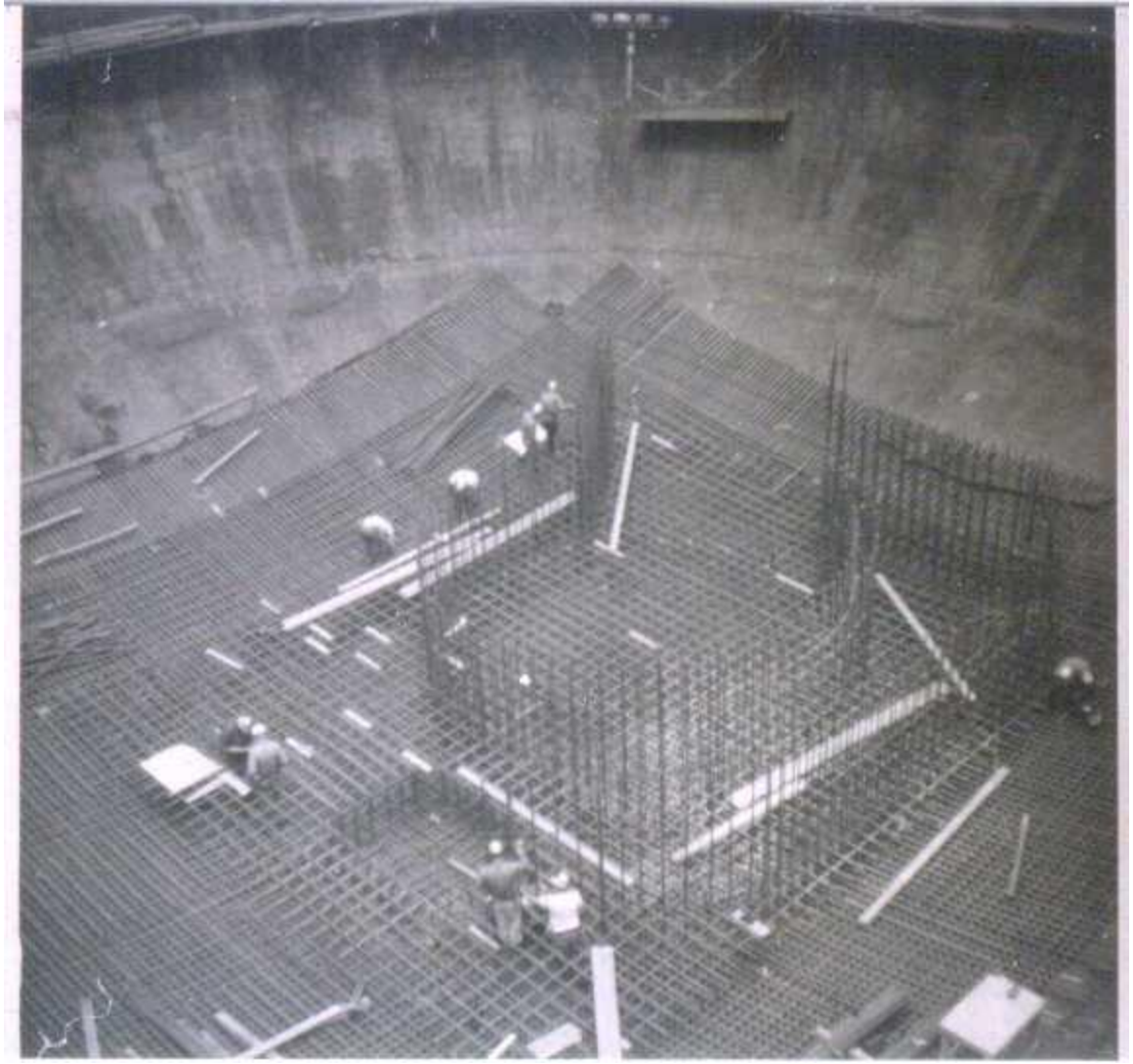
Sub-grade work starting on the Containment Vessel and Shield Building.



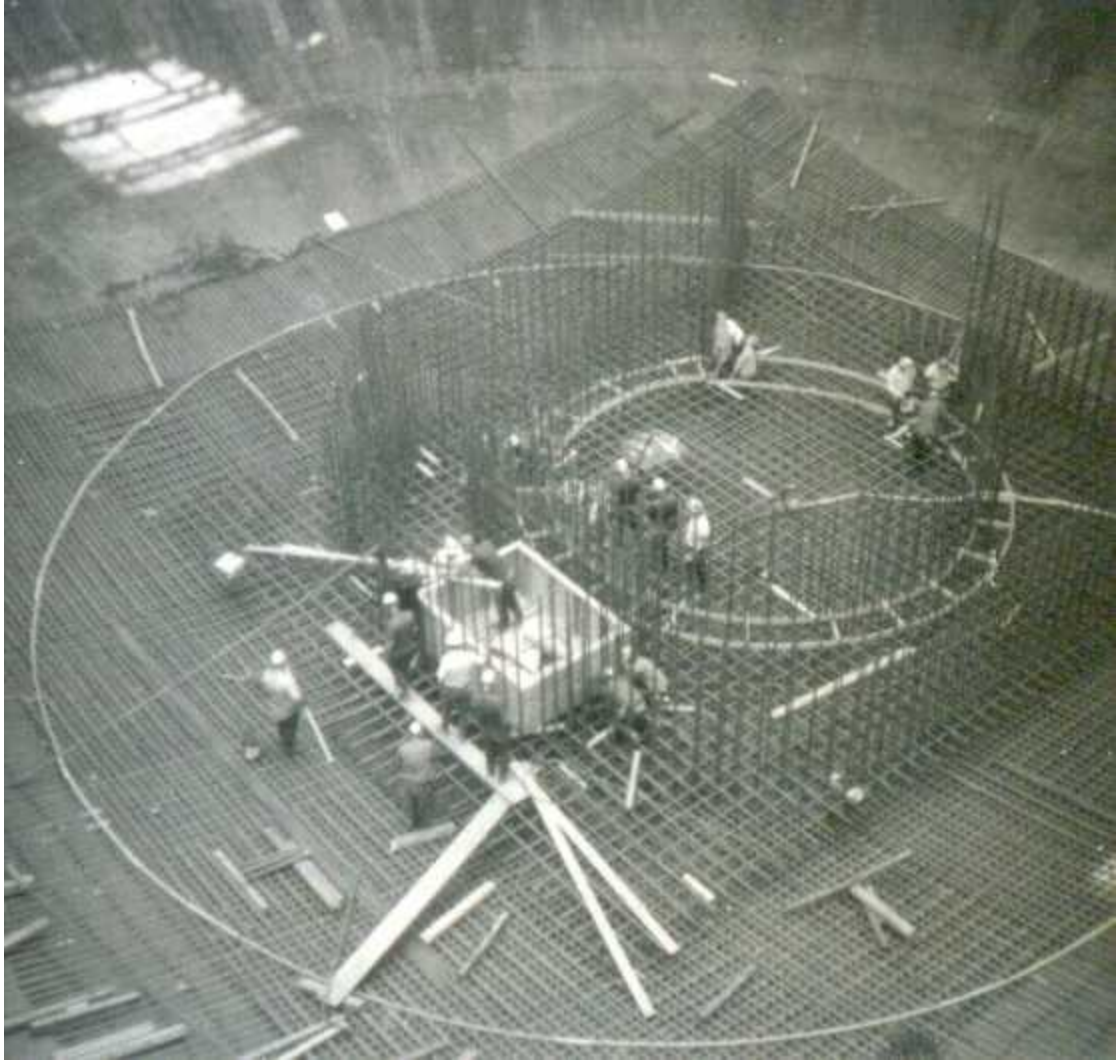
Work on the bottom of the 2” thick steel Containment Vessel container, the actual pressure boundary to atmosphere. The concrete Shield Building is a biological radiation shield and an external missile shield for the steel Containment Vessel.



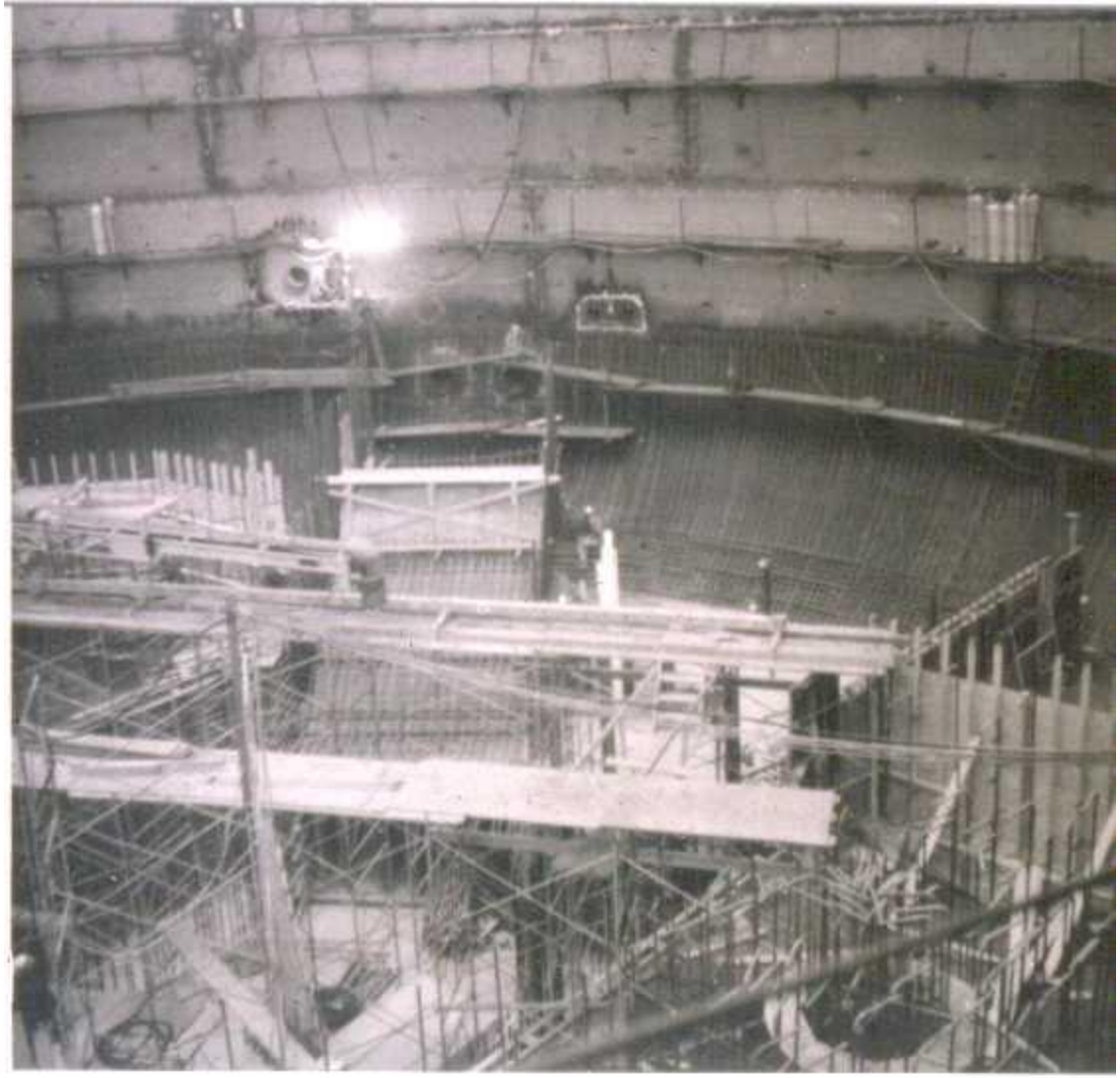
Placing the bottom of the Containment Vessel, the manhole cover for the drain to China isn’t installed yet (just kidding!).



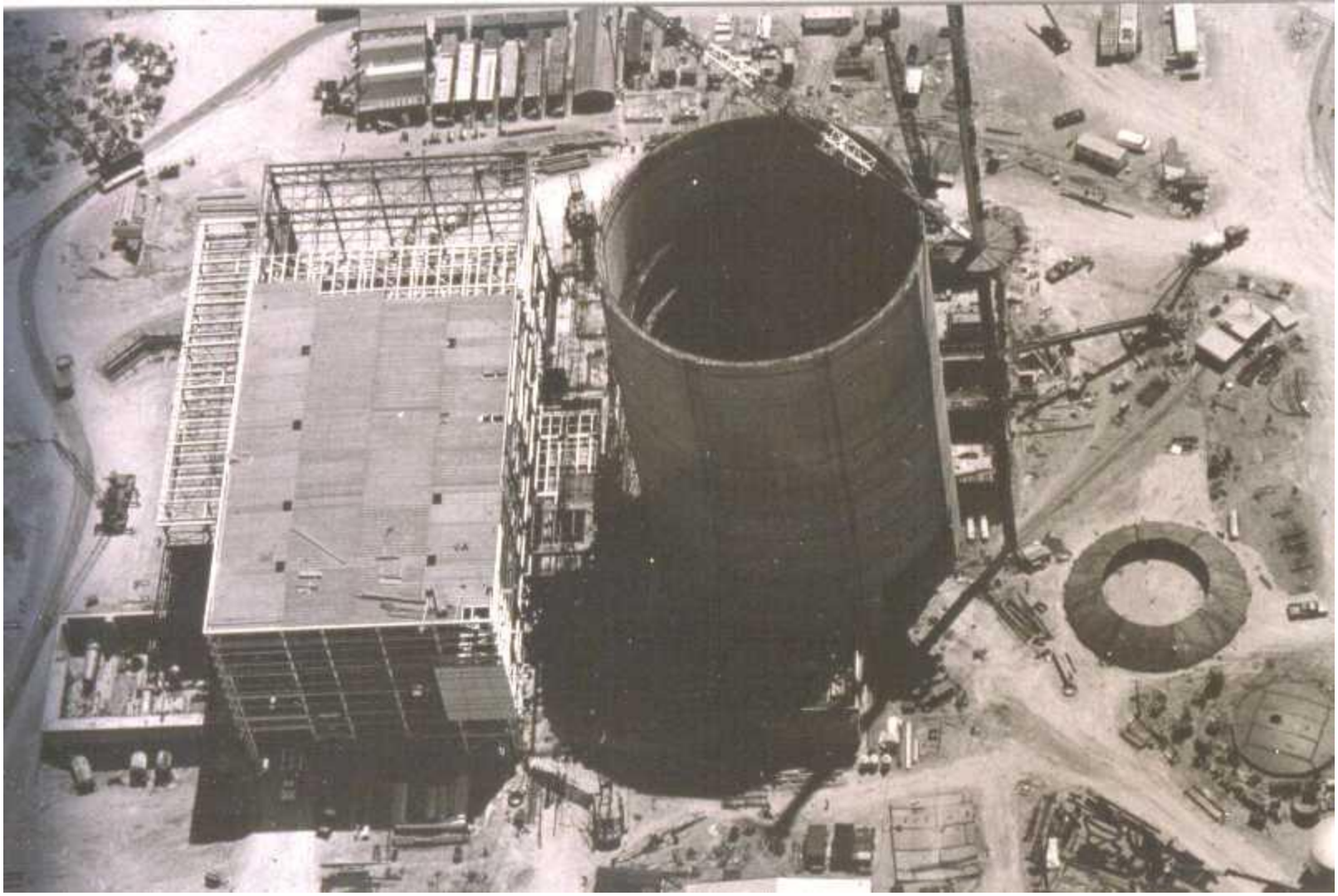
Starting the rebar for the area directly under the Reactor Pressure Vessel. The circular rebar section will become the Containment Normal Sump.



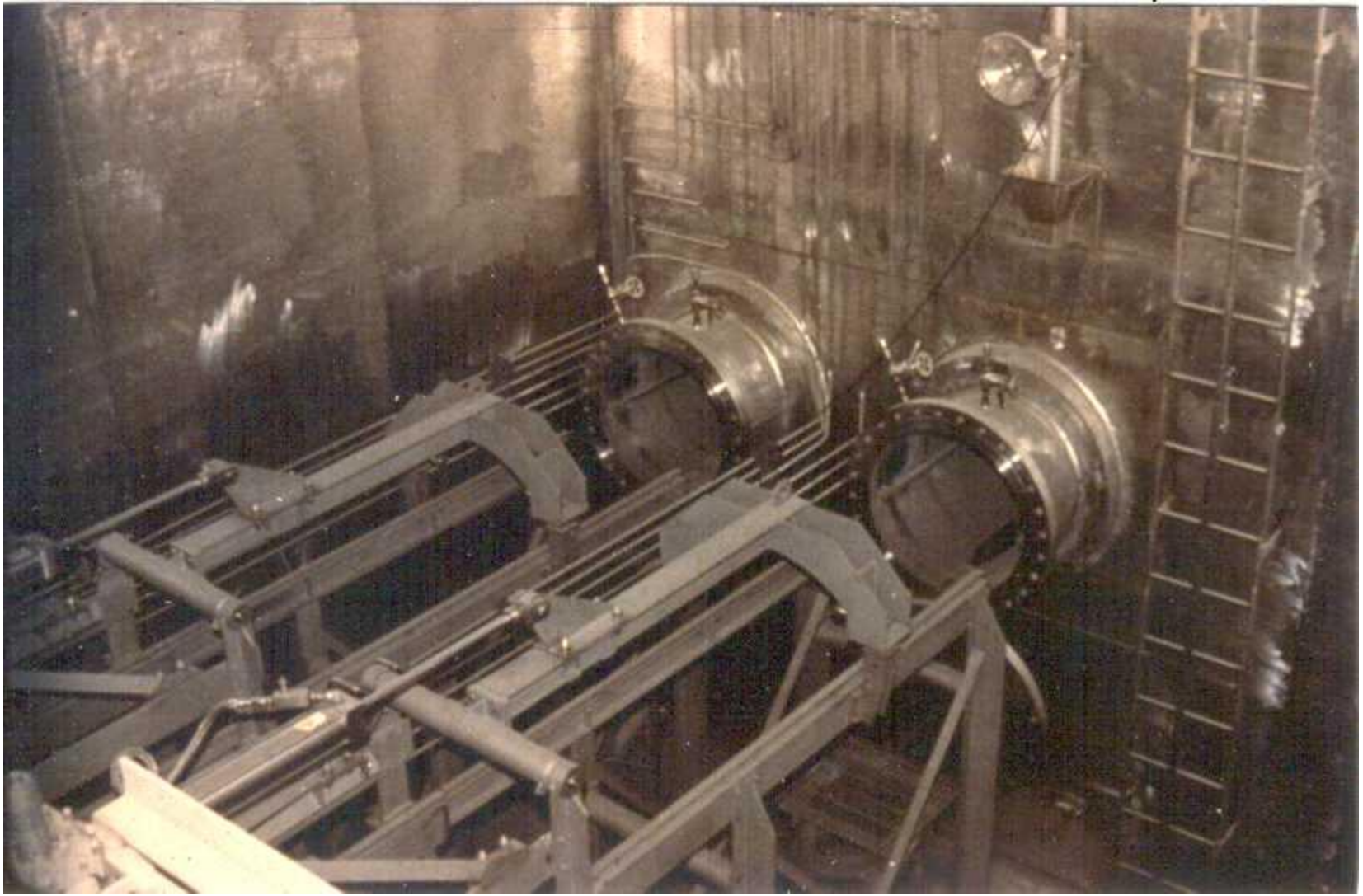
The white box is the actual concrete sump where the Containment Sump Pumps will end up. You can see the rebar that will form the tunnel from the sump area to below the Reactor Vessel.



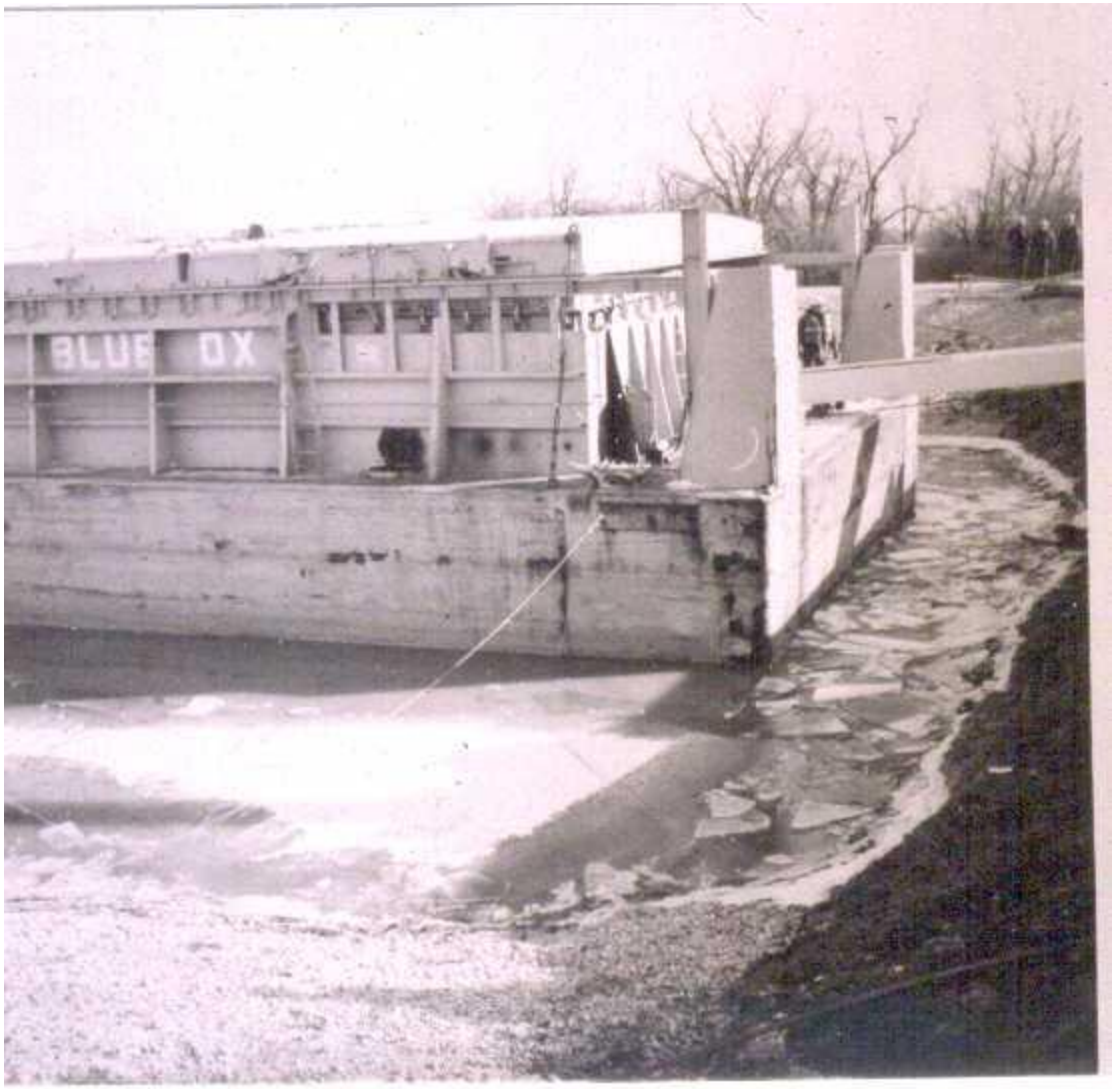
The concrete pit enclosing the Reactor Vessel is shaping up.

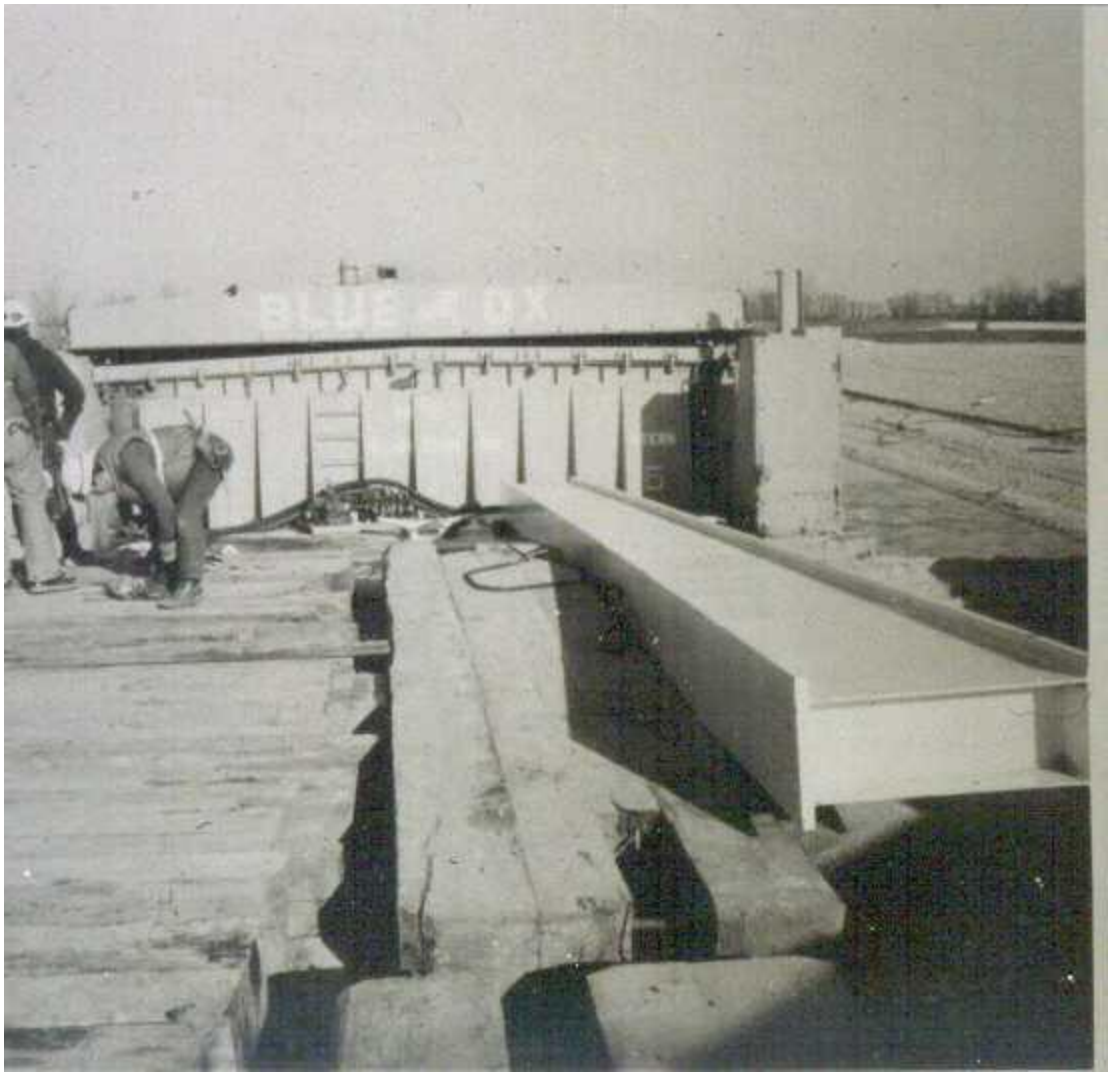


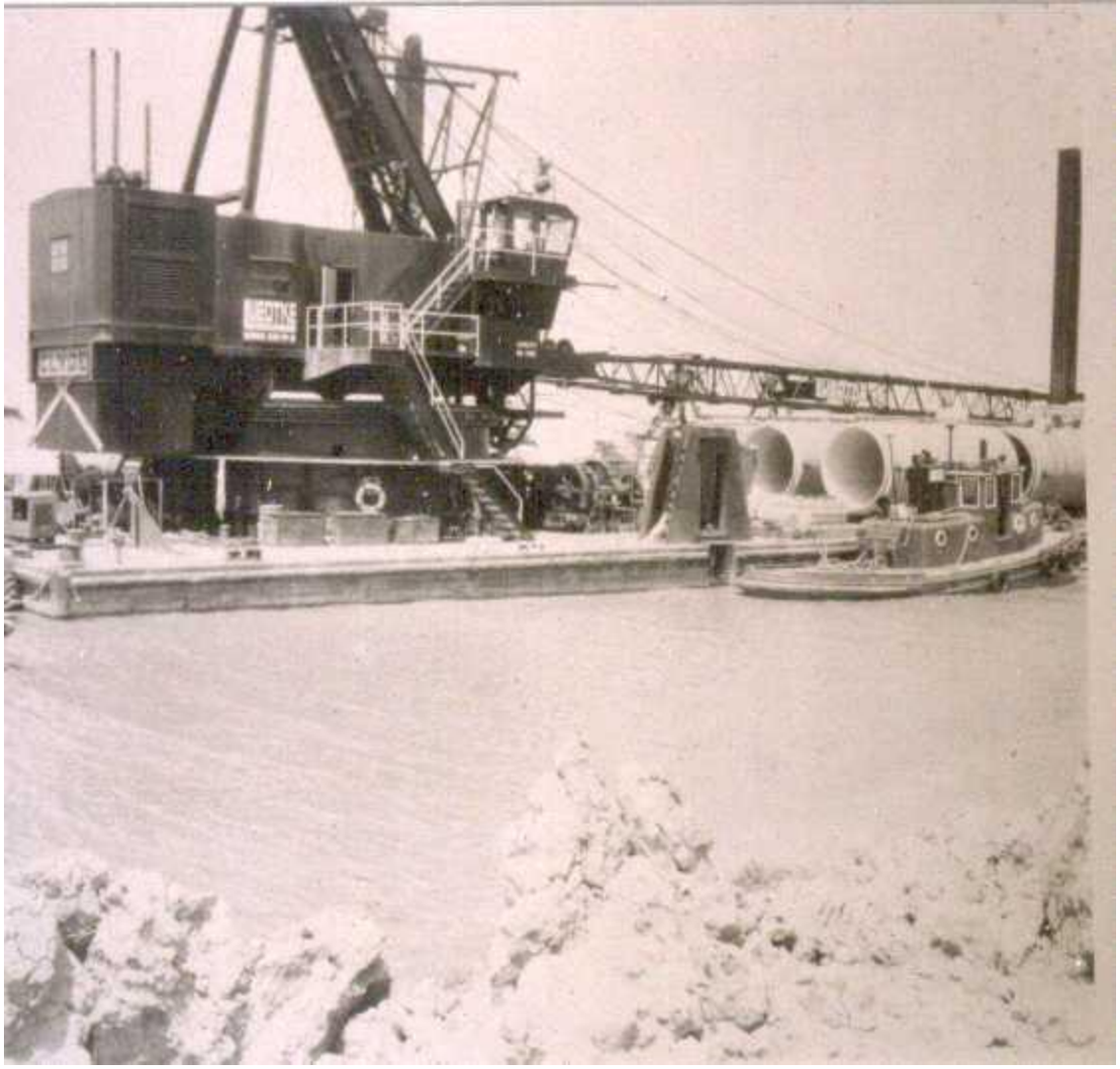
Containment, top still open with top steel pieces in the lay-down area. The building to the right is the Turbine Building with the Circ Pump House in its lower left corner.



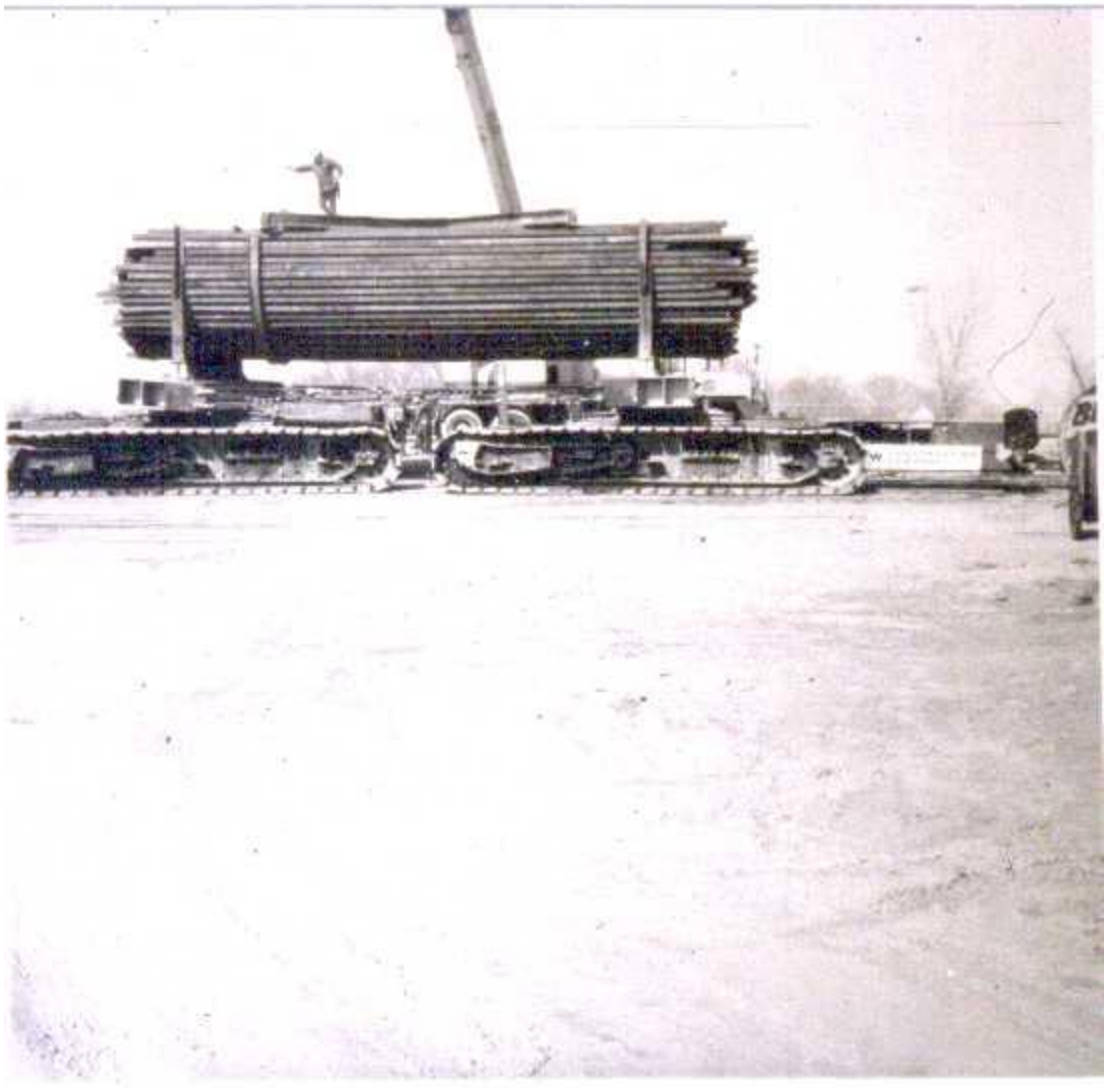
Fuel Transfer Tubes with “up-ender” device shown. These are used to transfer fuel, under water for radiation shielding, between the Containment Refueling Canal and the Spent Fuel Pool in the Auxiliary Building.


BLUE OX



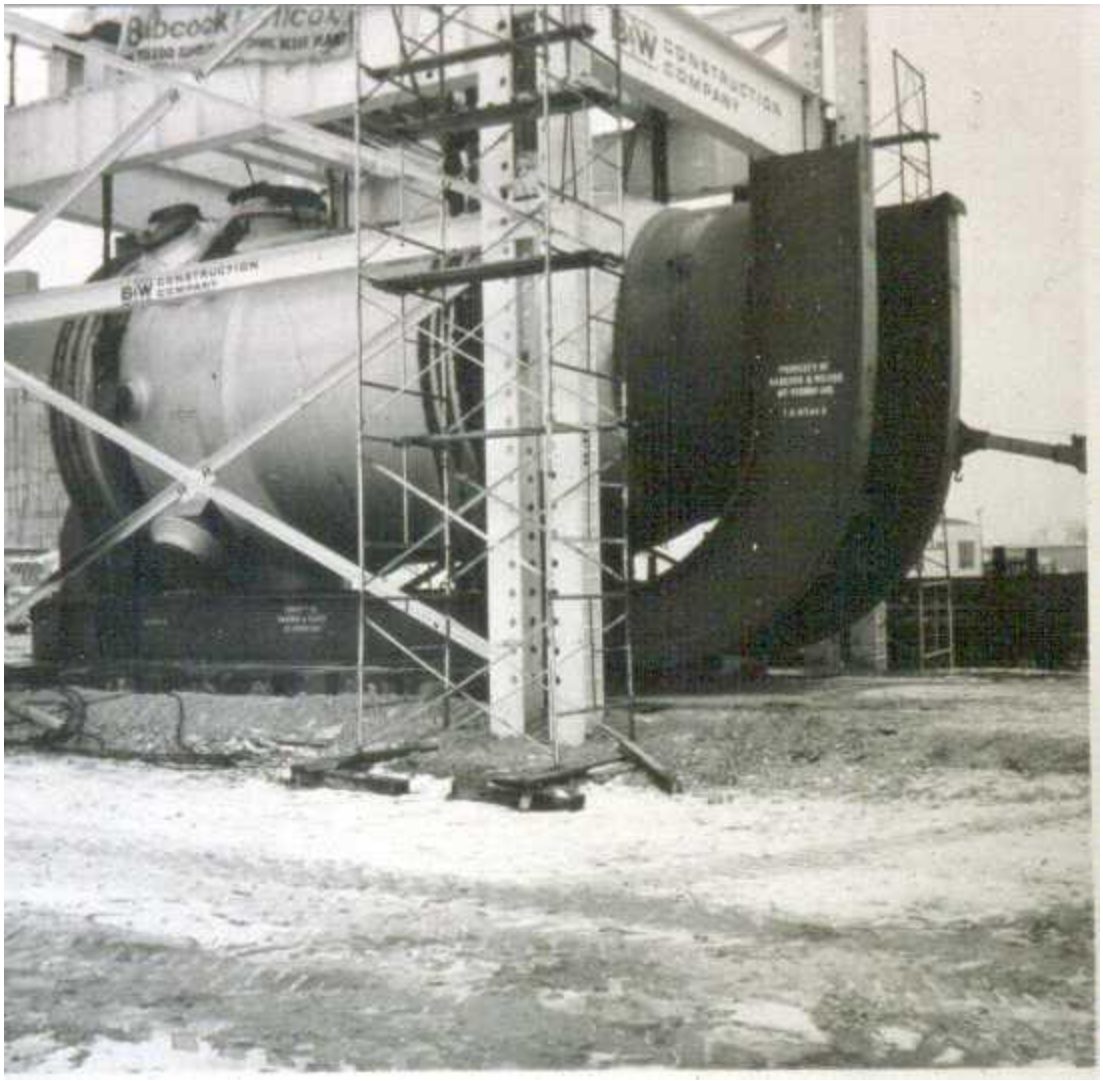


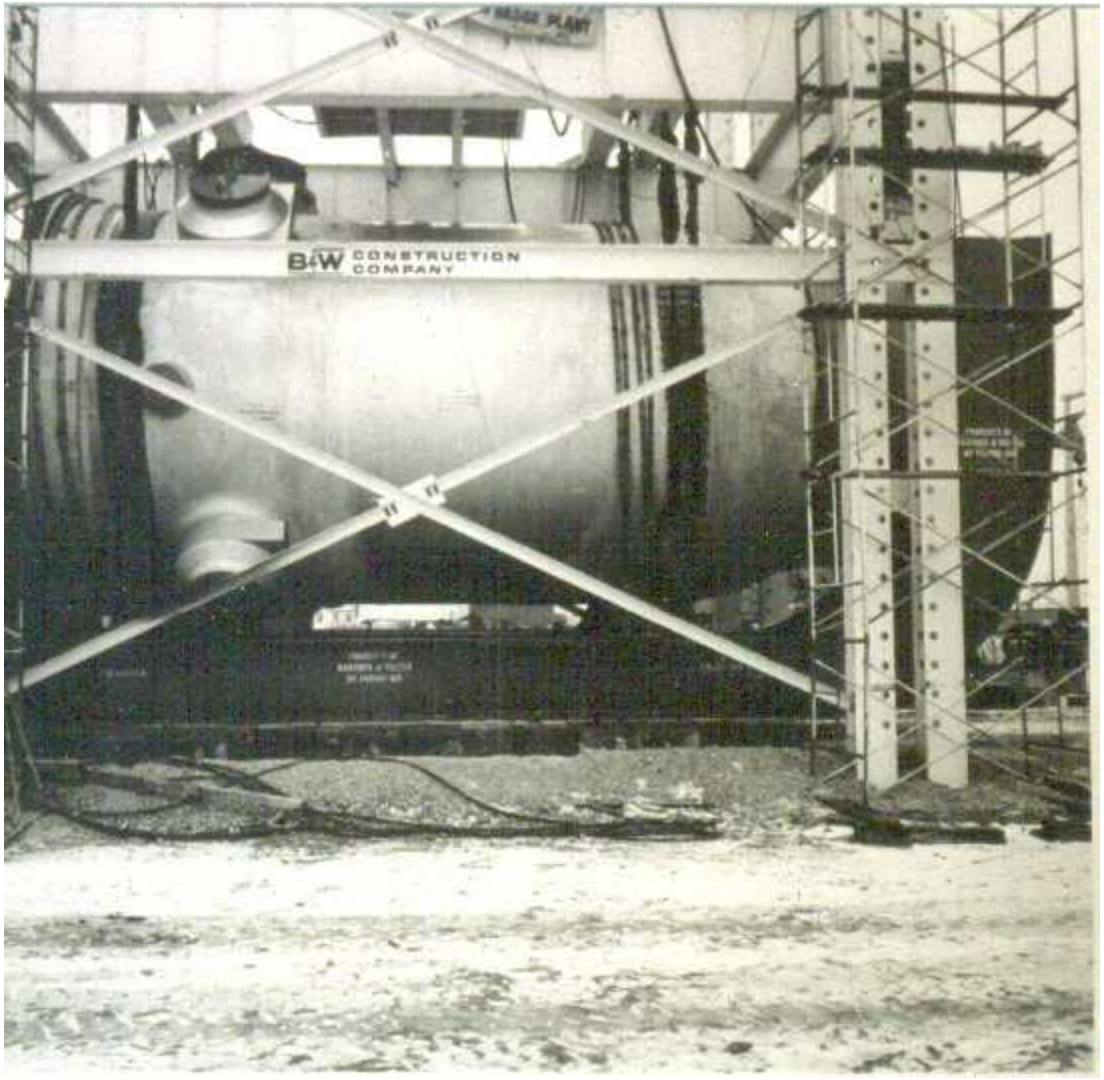
Barge and Tugboat delivering Circ Water pipes.



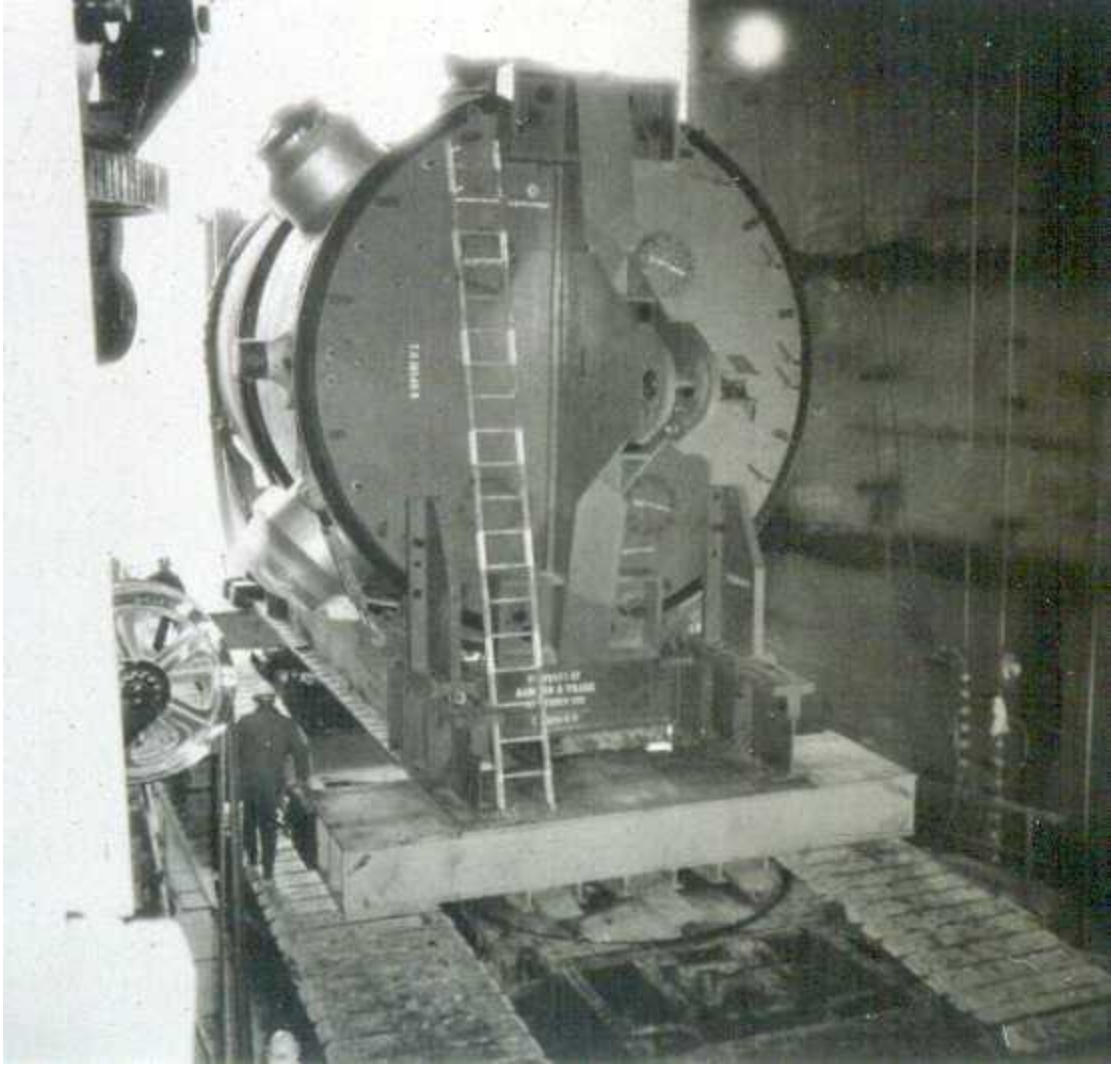
Hard to guess, but since it is on the “super crawler”, some heavy component shored up with timbers.

Reactor Pressure Vessel. The 2 Hot Leg (outlet) nozzles are at very top and bottom. Two of the 4 Cold Leg (inlet) nozzles are the offsets. The Core Flood – Low Pressure Injection nozzle is the small one.

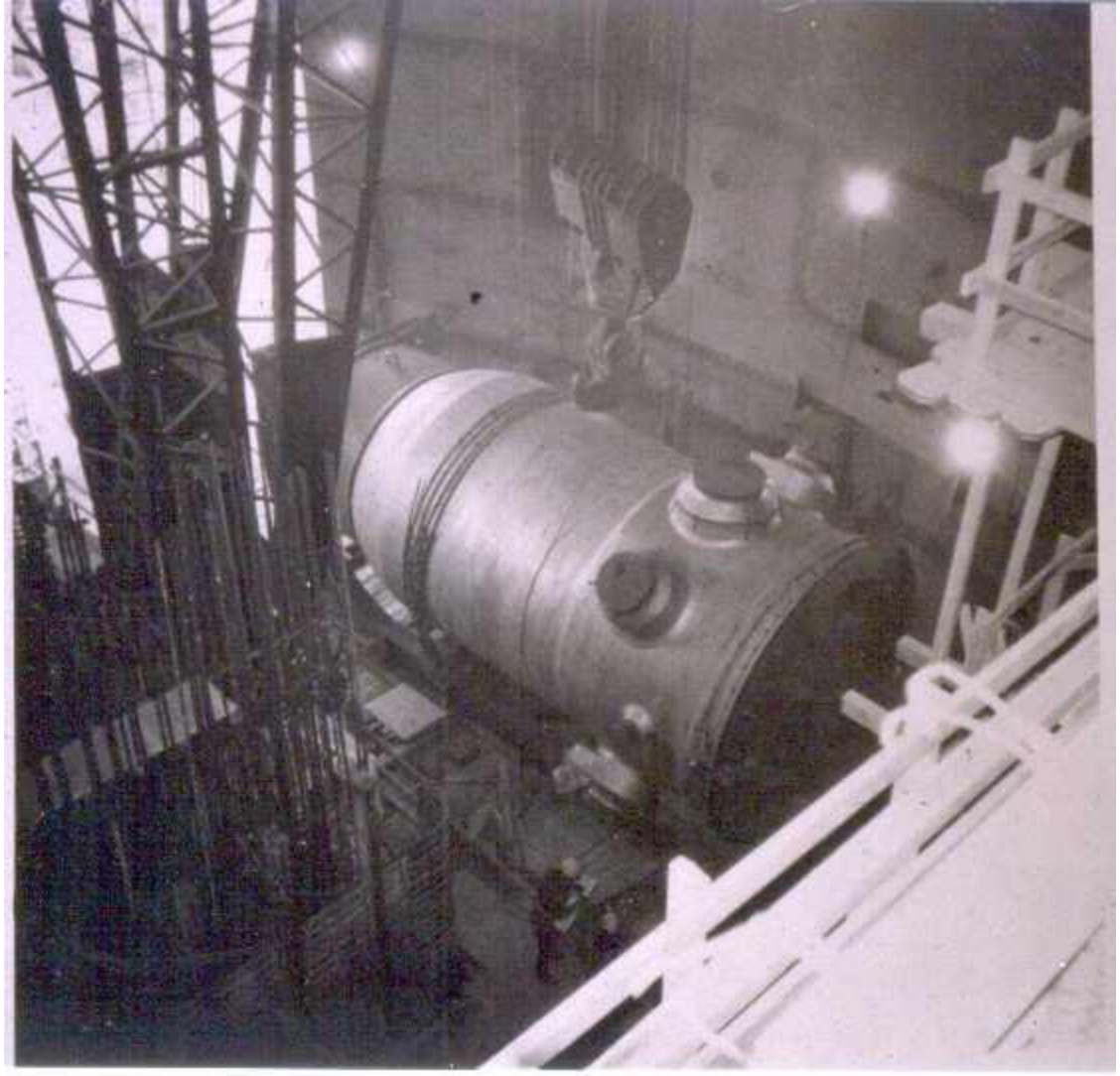

B&W CONSTRUCTION COMPANY


B&W CONSTRUCTION COMPANY

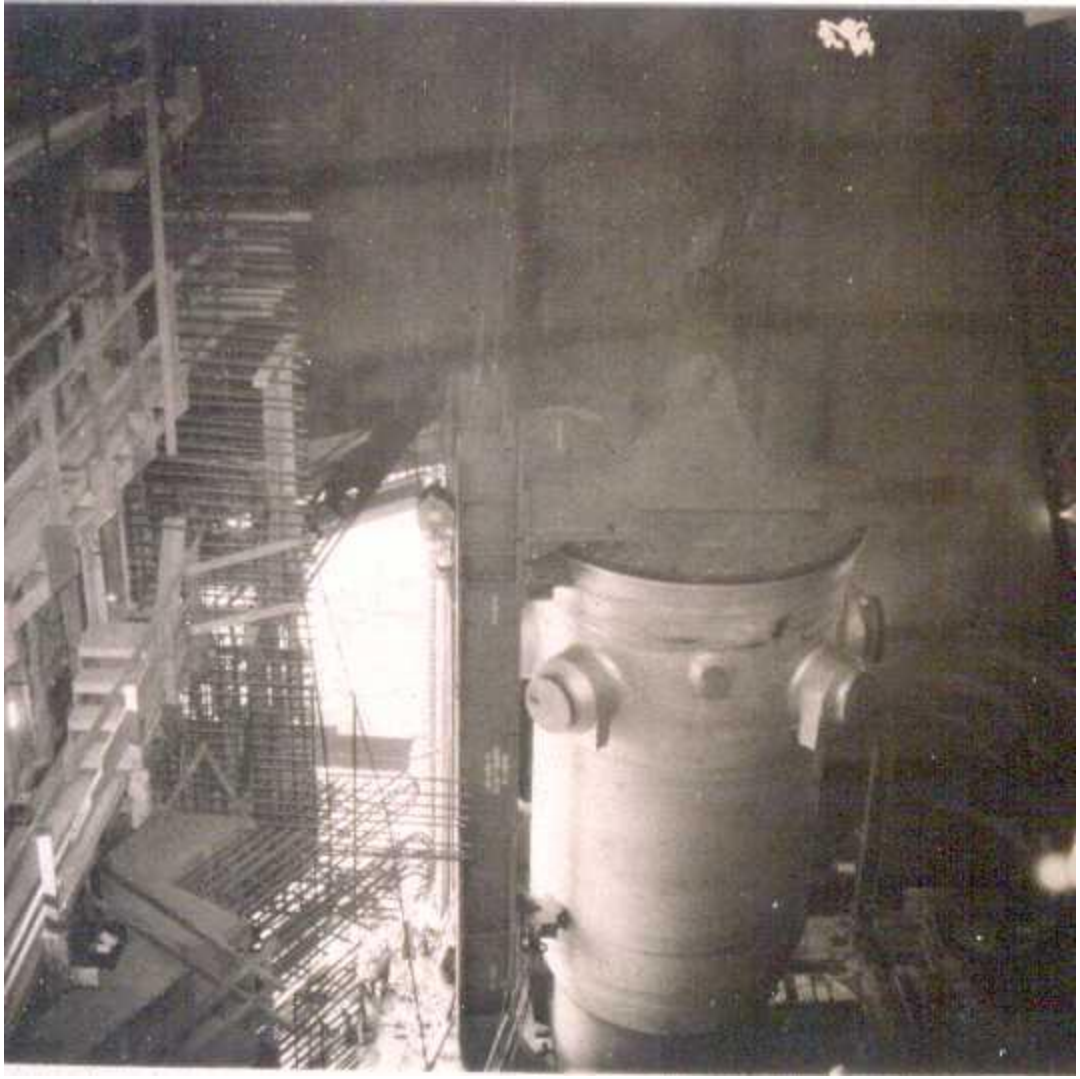
“Hey, you got the crawler keys”; nope, thought you had’m”. Note the 345KV switchyard.



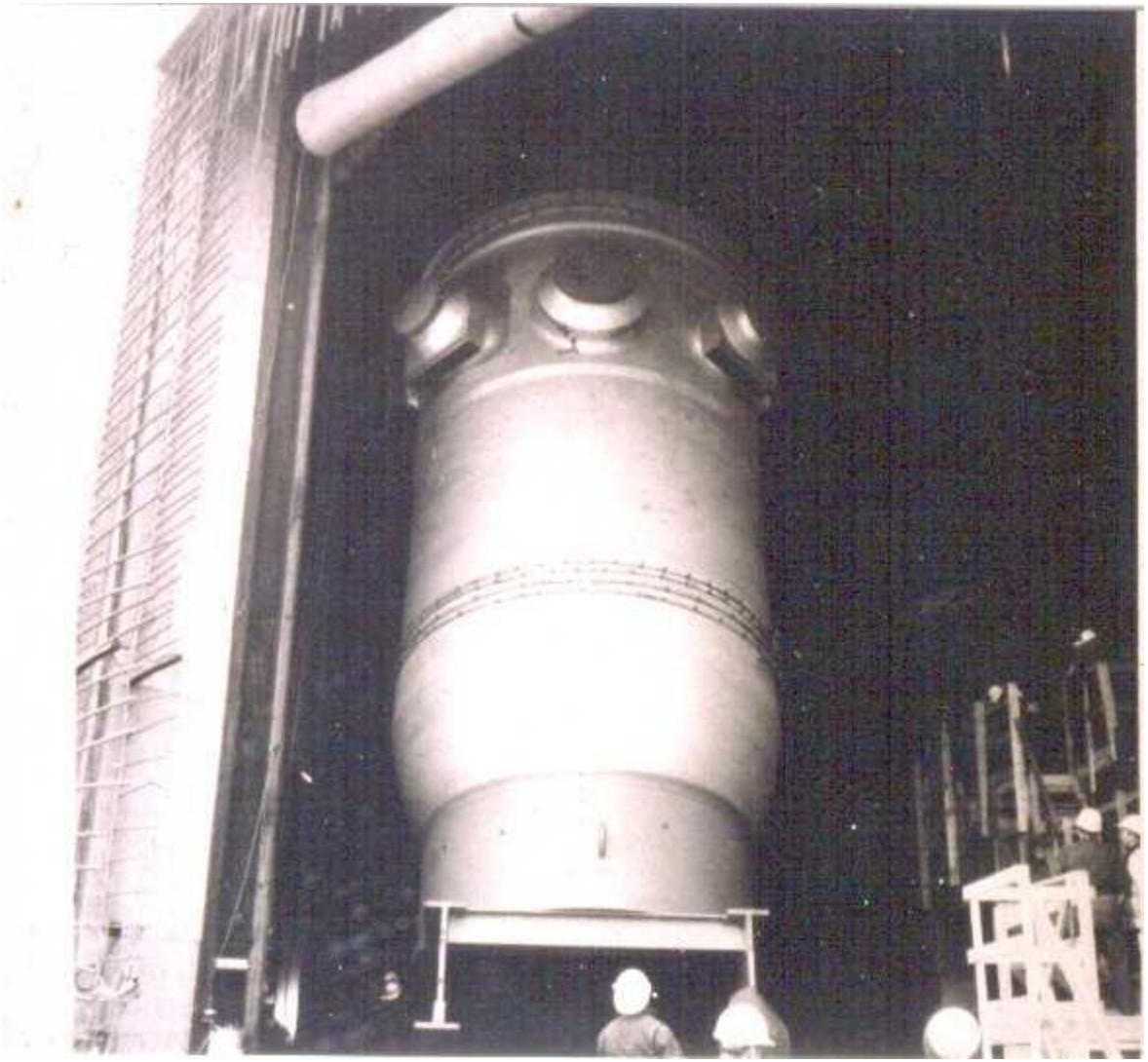
Into the Containment Vessel.



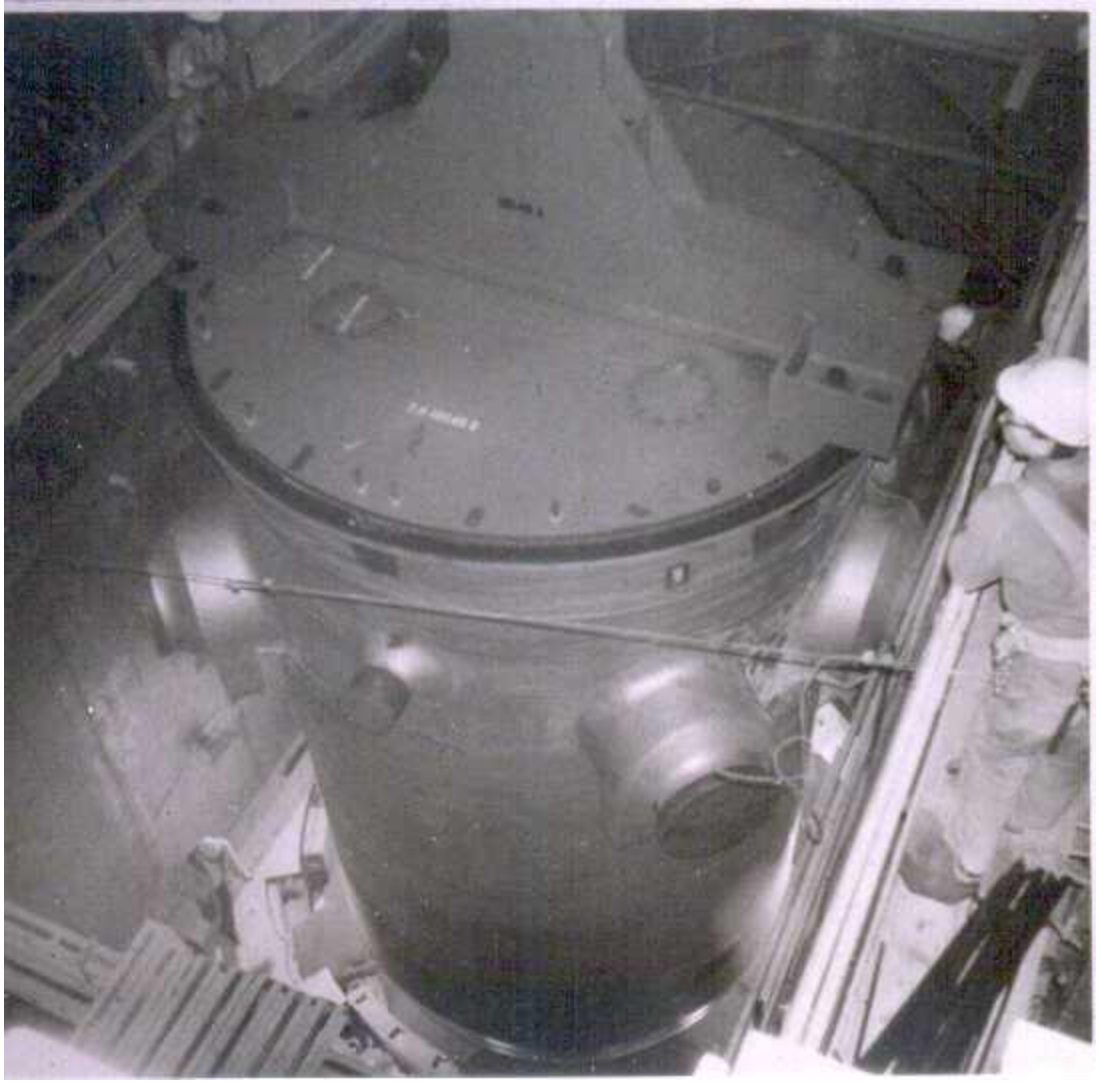
Positioning for Polar Crane lift.



Upright, it pivots on its shipping cradle.



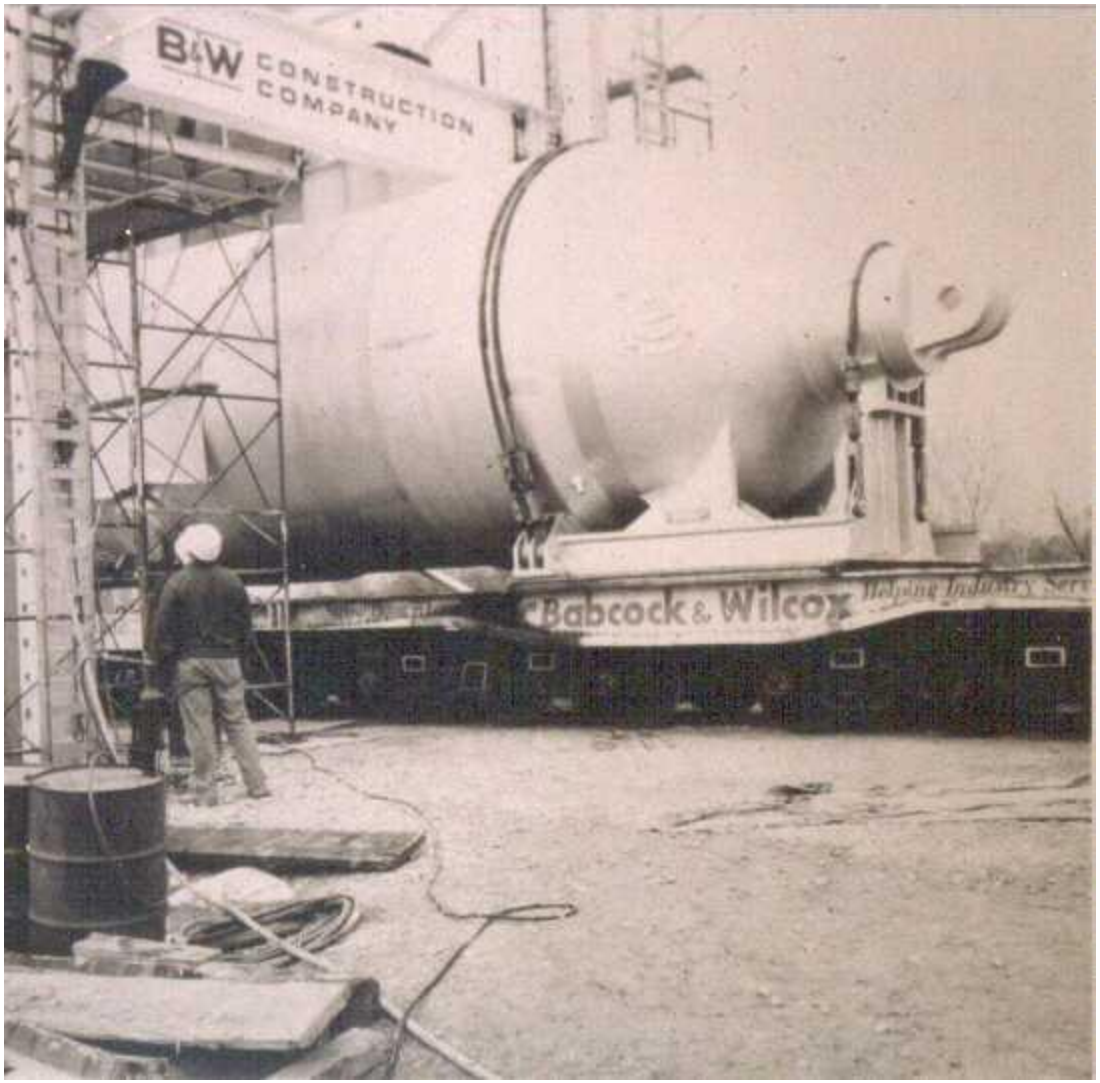
This is the concrete enclosure pit the Reactor Pressure Vessel will sit inside. They appear to be measuring the Hot Leg pipe outlet hole clearance. I think they’re using a yardstick from Brinnon’s Paint Supply; I still have mine.



Down through the Refueling Canal.

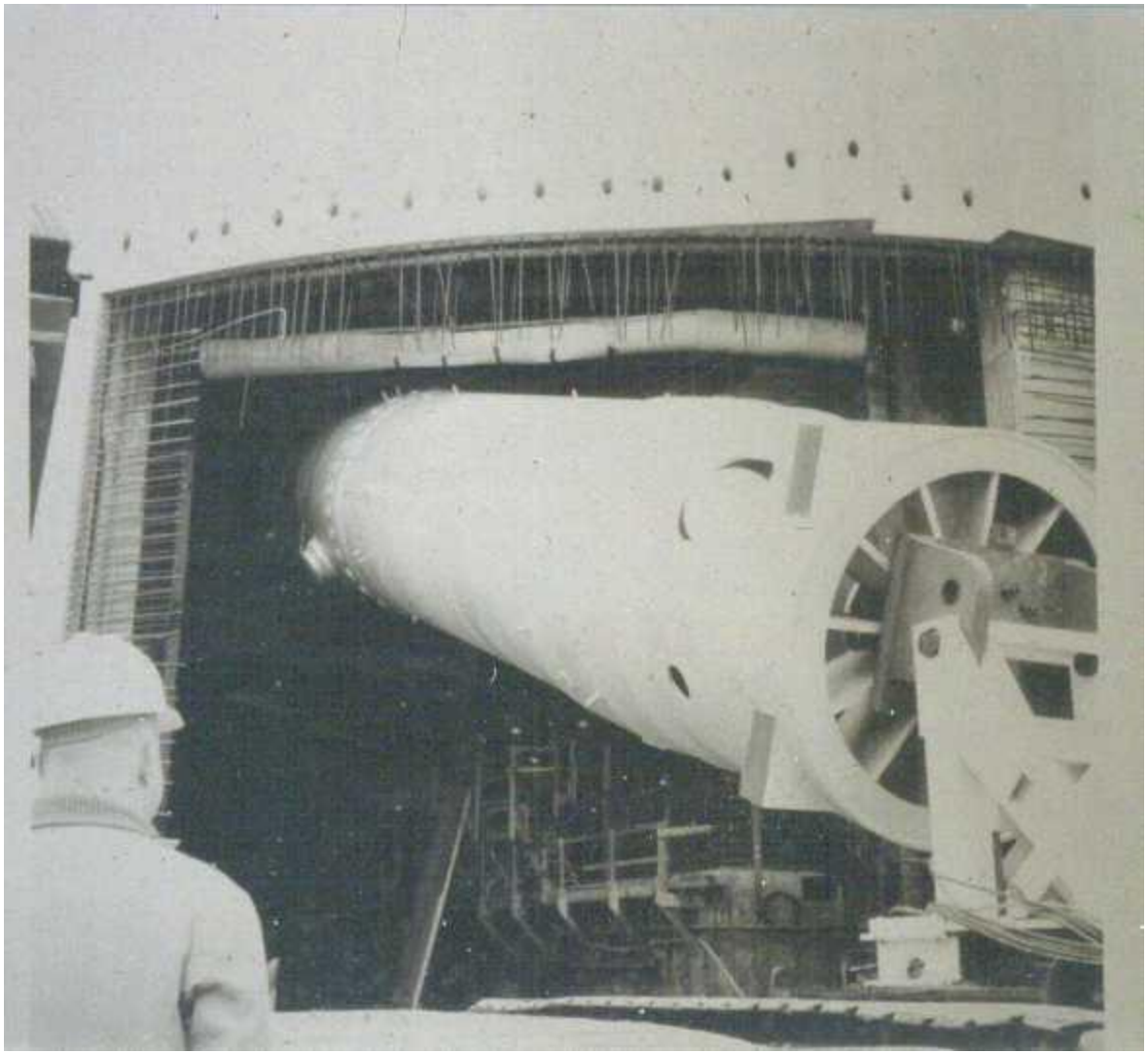
Once Through Steam Generator (SG). These were the longest lasting SGs in the US PWR industry, thanks to the efforts of Dave Briden, the original plant Chief Chemist. They made it forty years without replacement, until the 2014 refueling outage

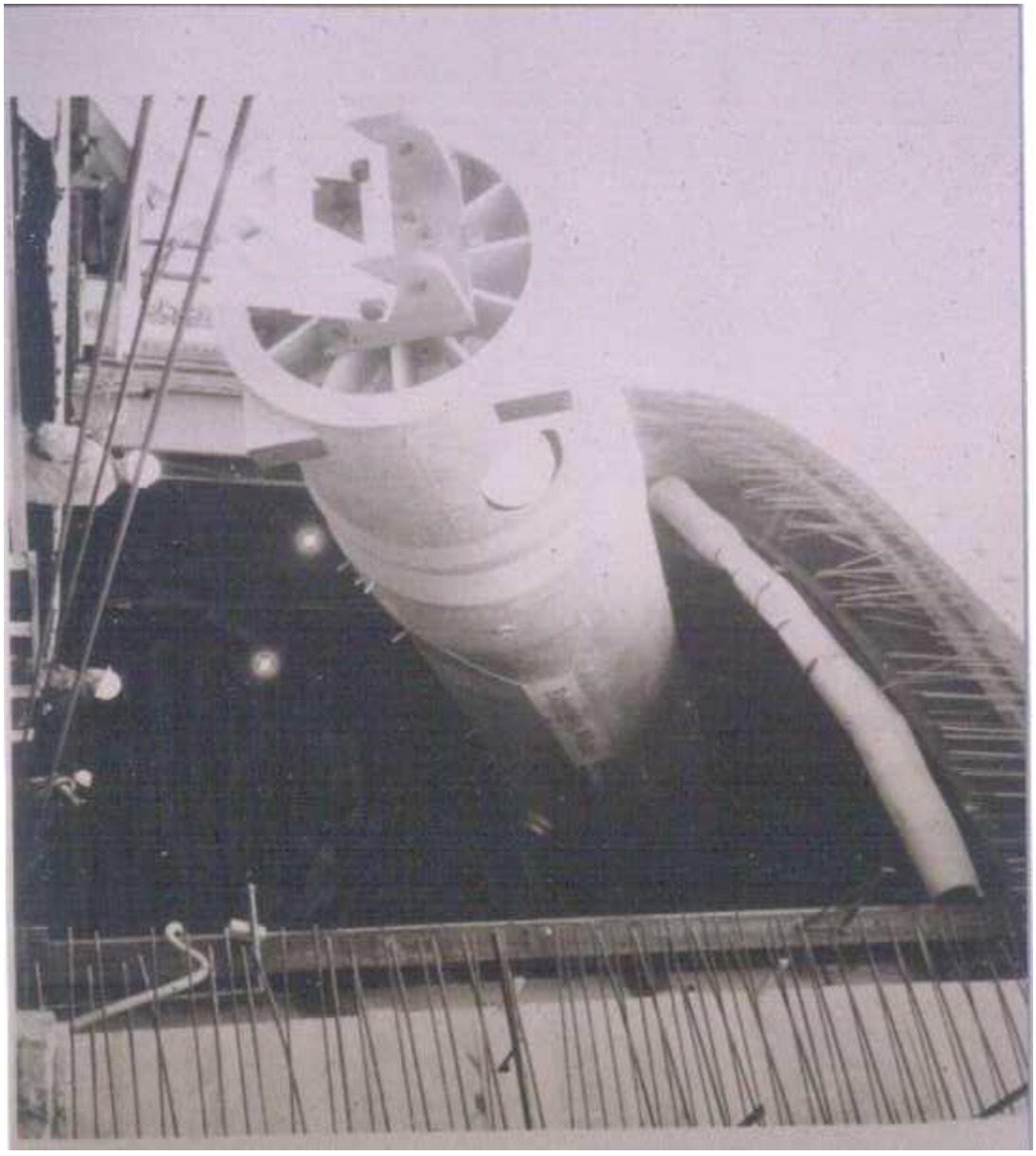

Babcock & Wilcox

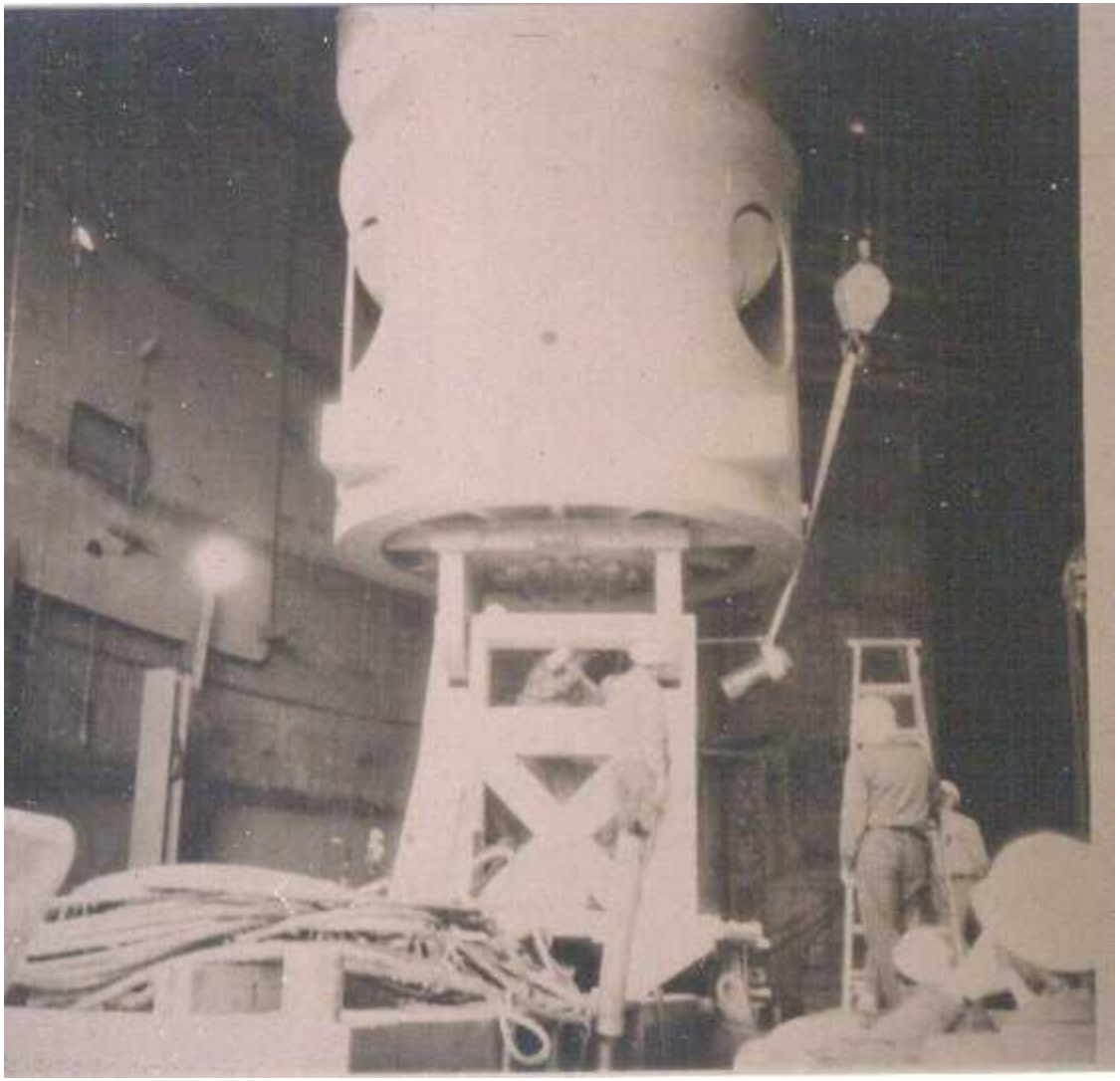

B&W CONSTRUCTION COMPANY
Babcock & Wilcox

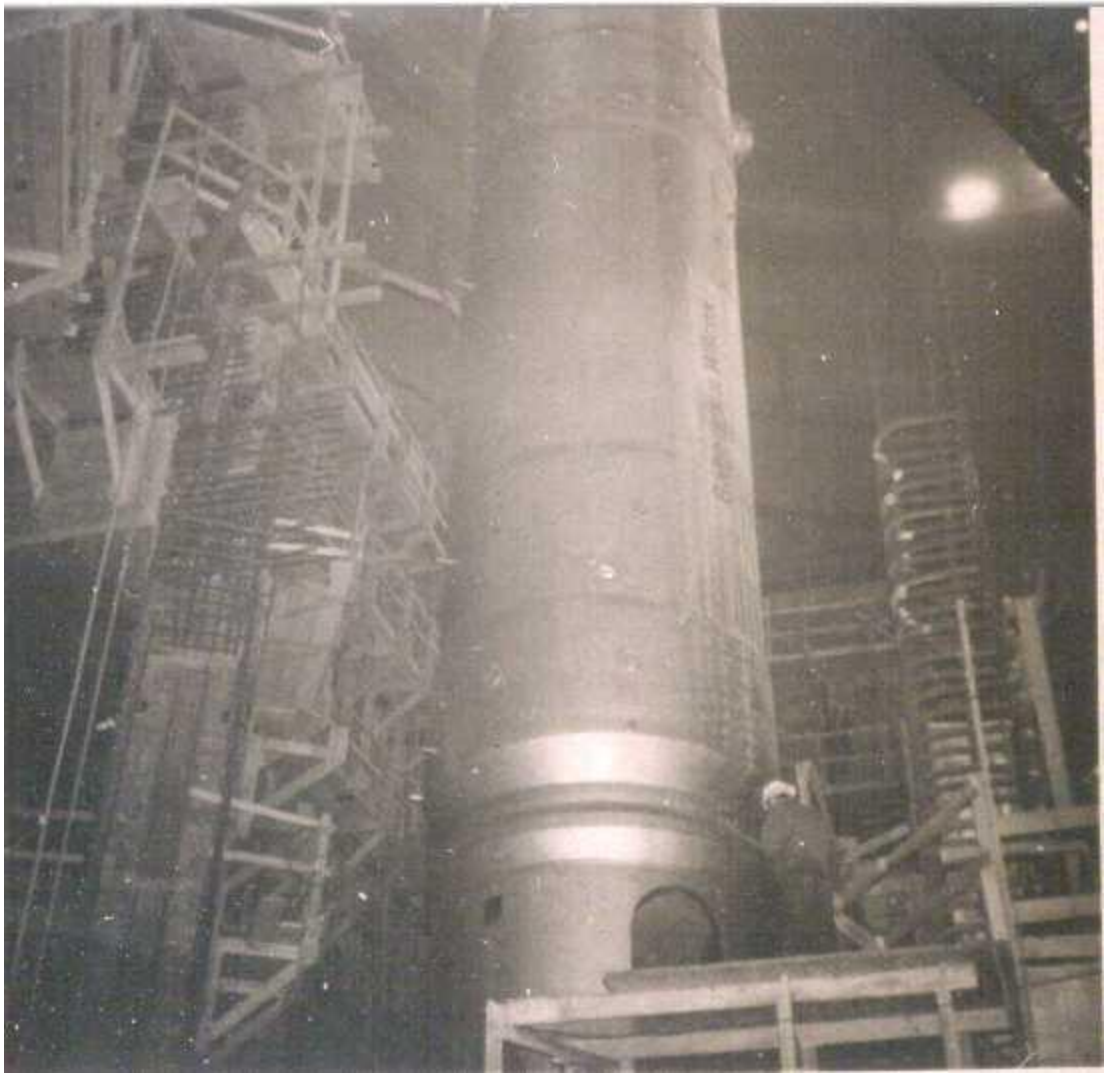

B&W CONSTRUCTION COMPANY

Polar Crane Lift.

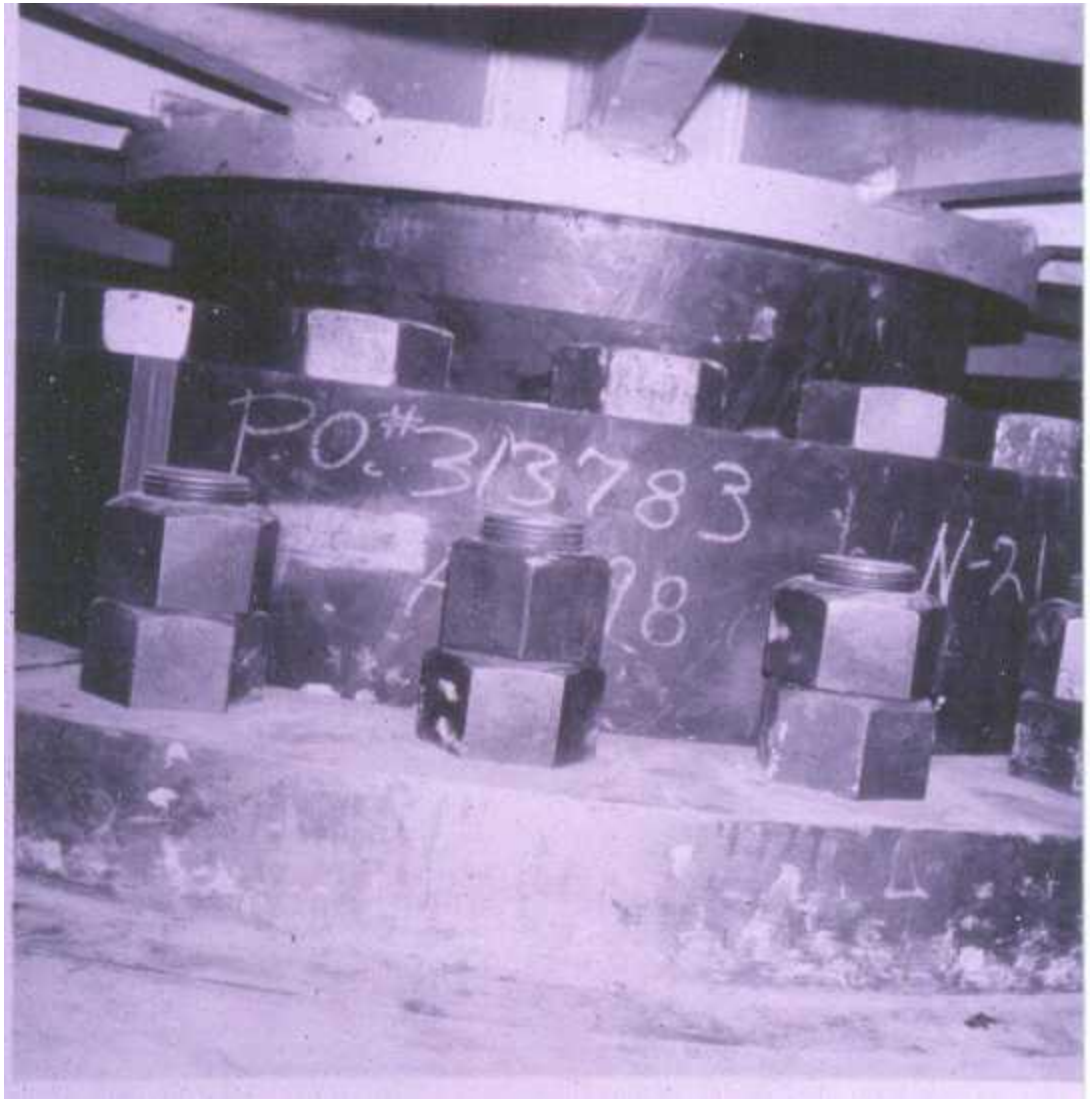


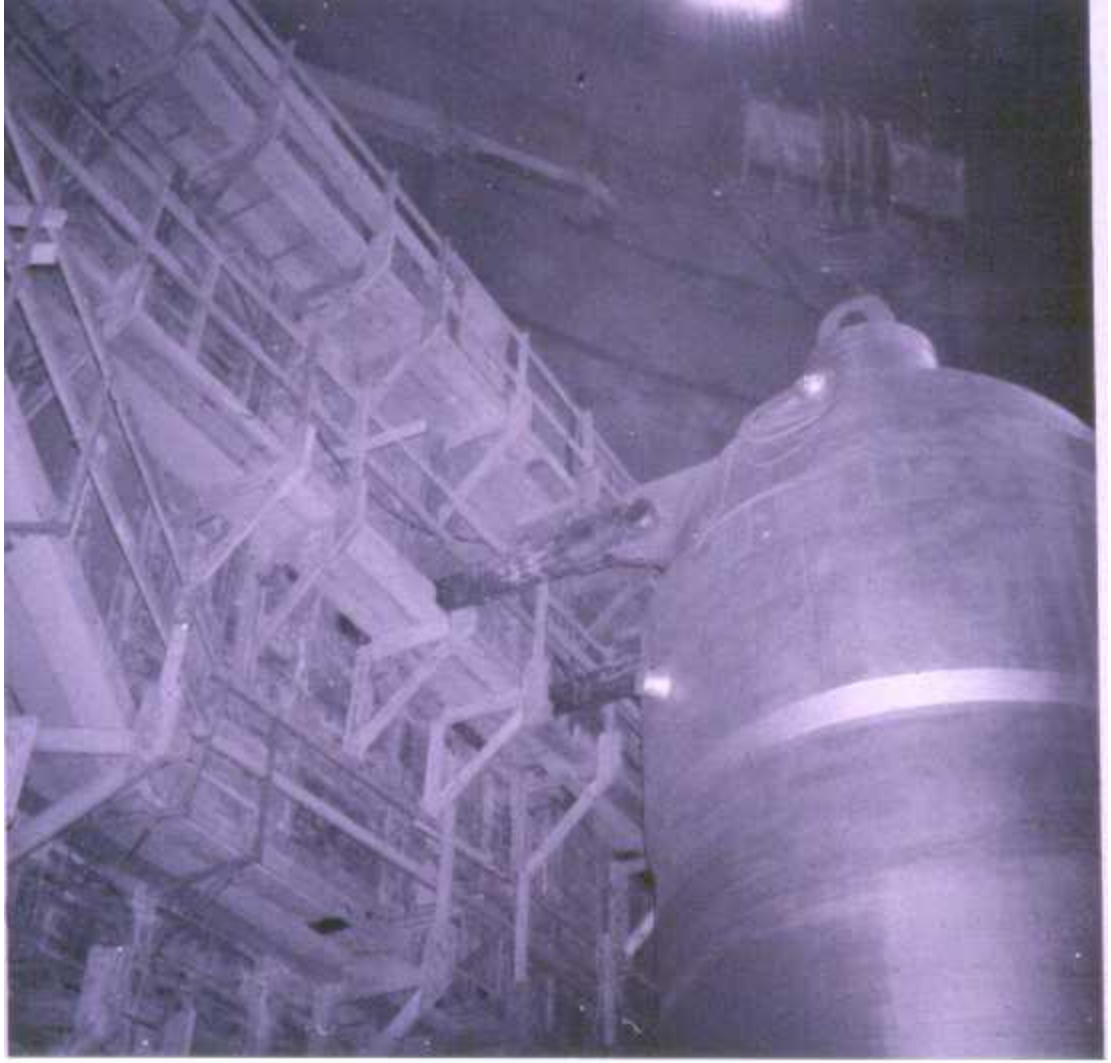




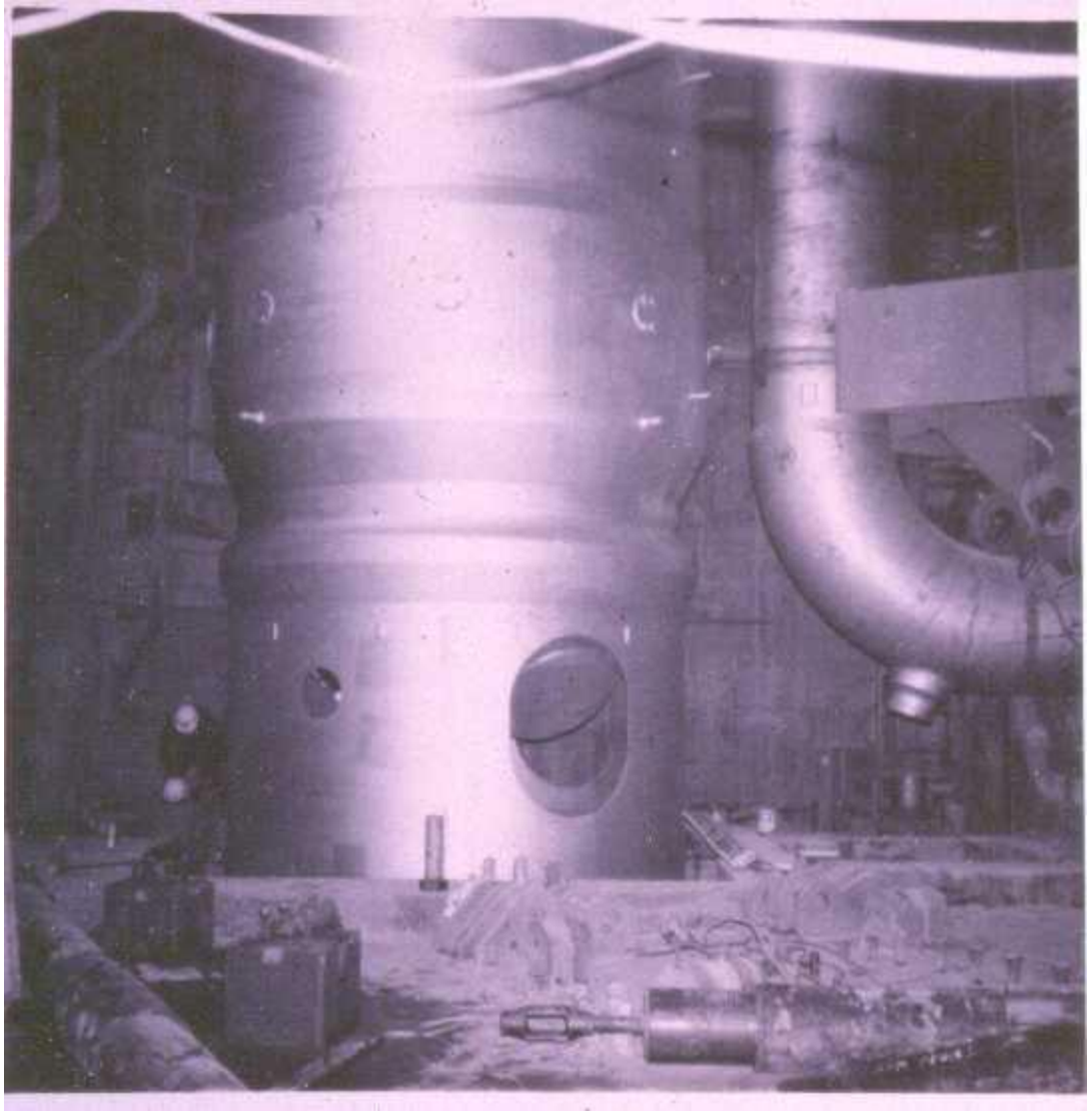


That’s where it will sit

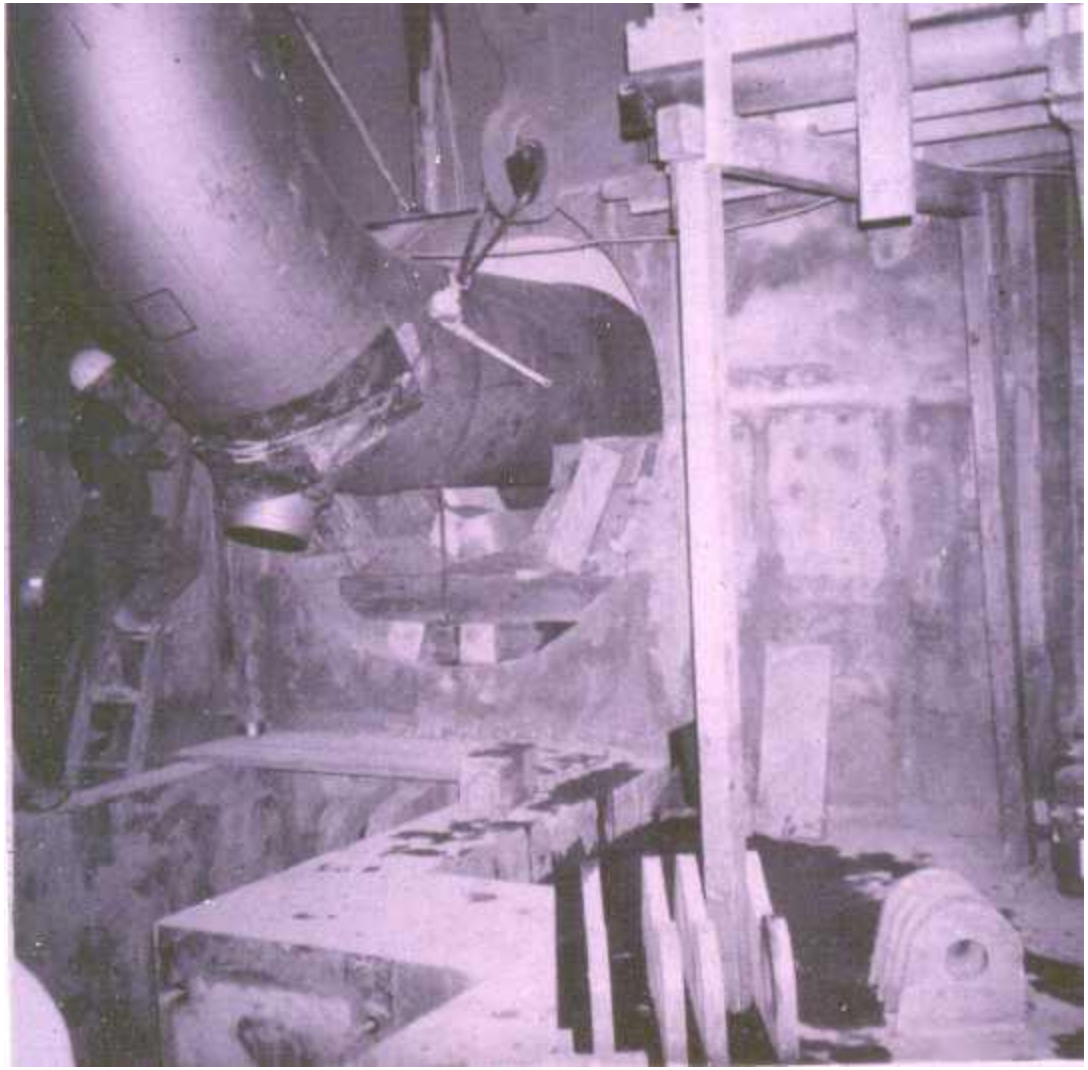

P.O.# 313783
N-21



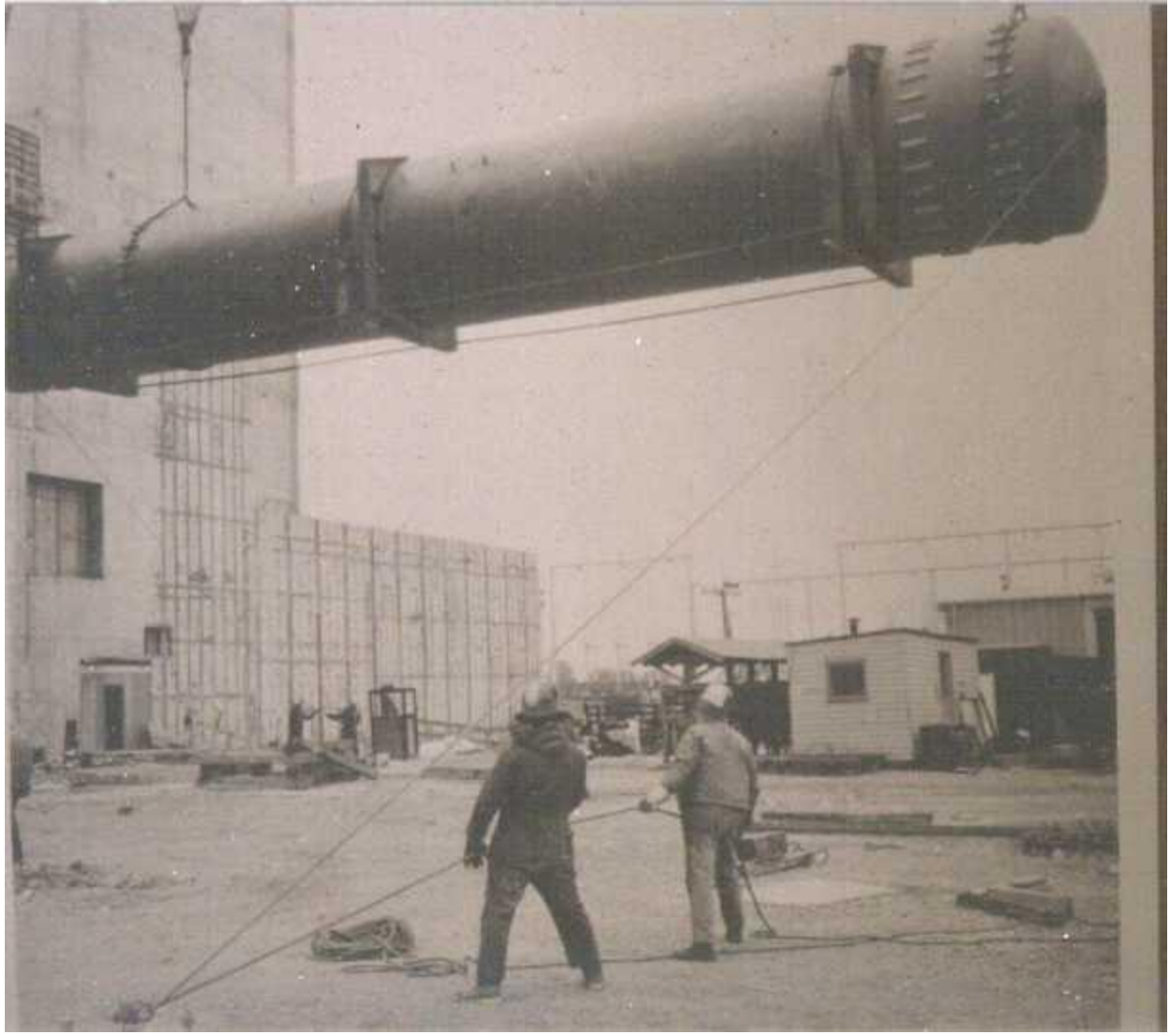
Top anchor attachments



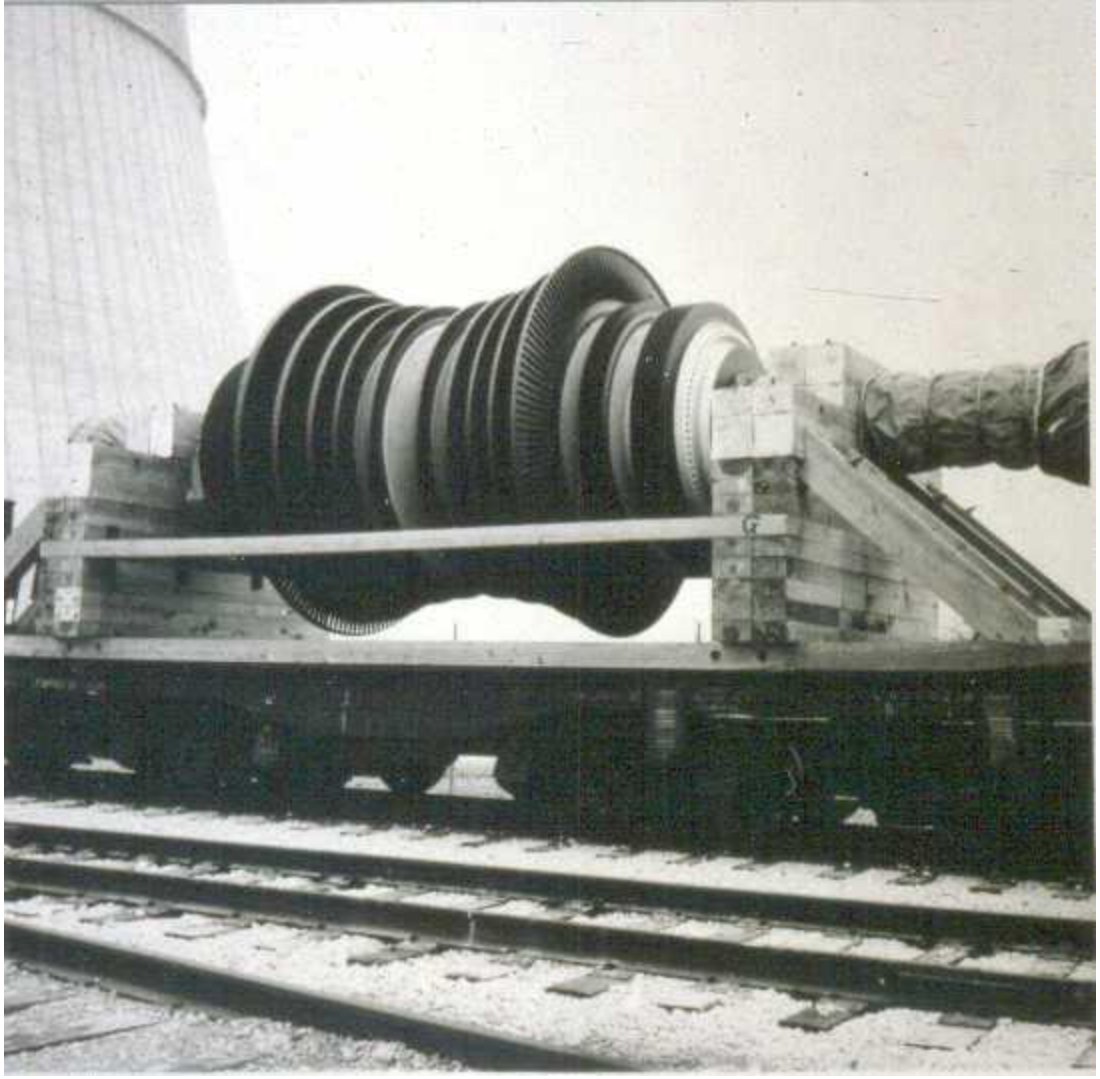
Lower end of SG showing the lower tube sheet access manhole. The small hand holes just above are for access to the internal movable orifice plate. The 80’ Hot Leg pipe to the top of the SG is to the right. The smaller nozzle on the Hot Leg is the Decay Heat “drop line” to the Decay Heat Removal Pump Suction.



Heat Exchanger about to go through the Turbine Building Train Bay door.



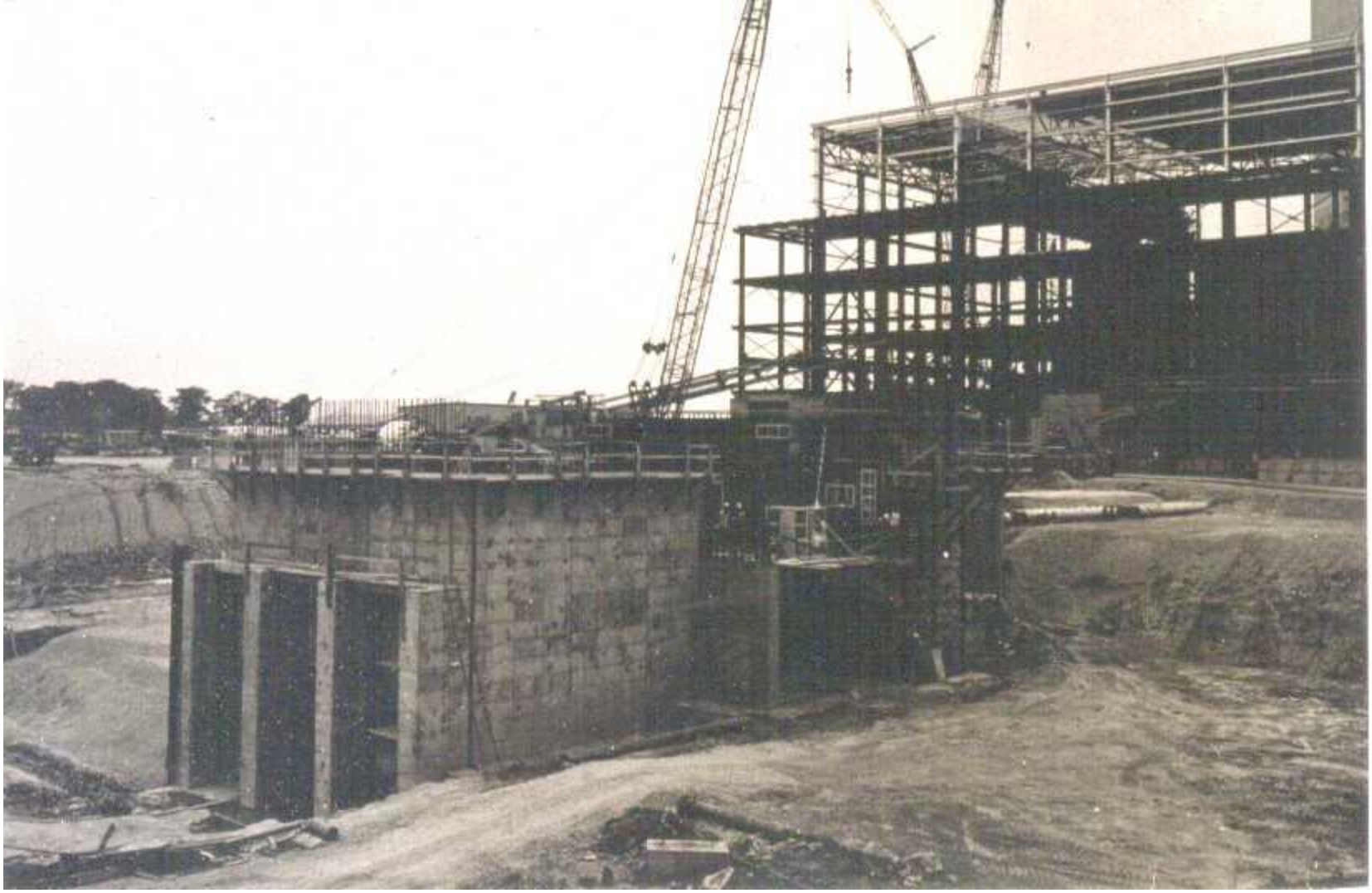
Best guess is it is the Pressurizer about to go into the Containment Vessel.



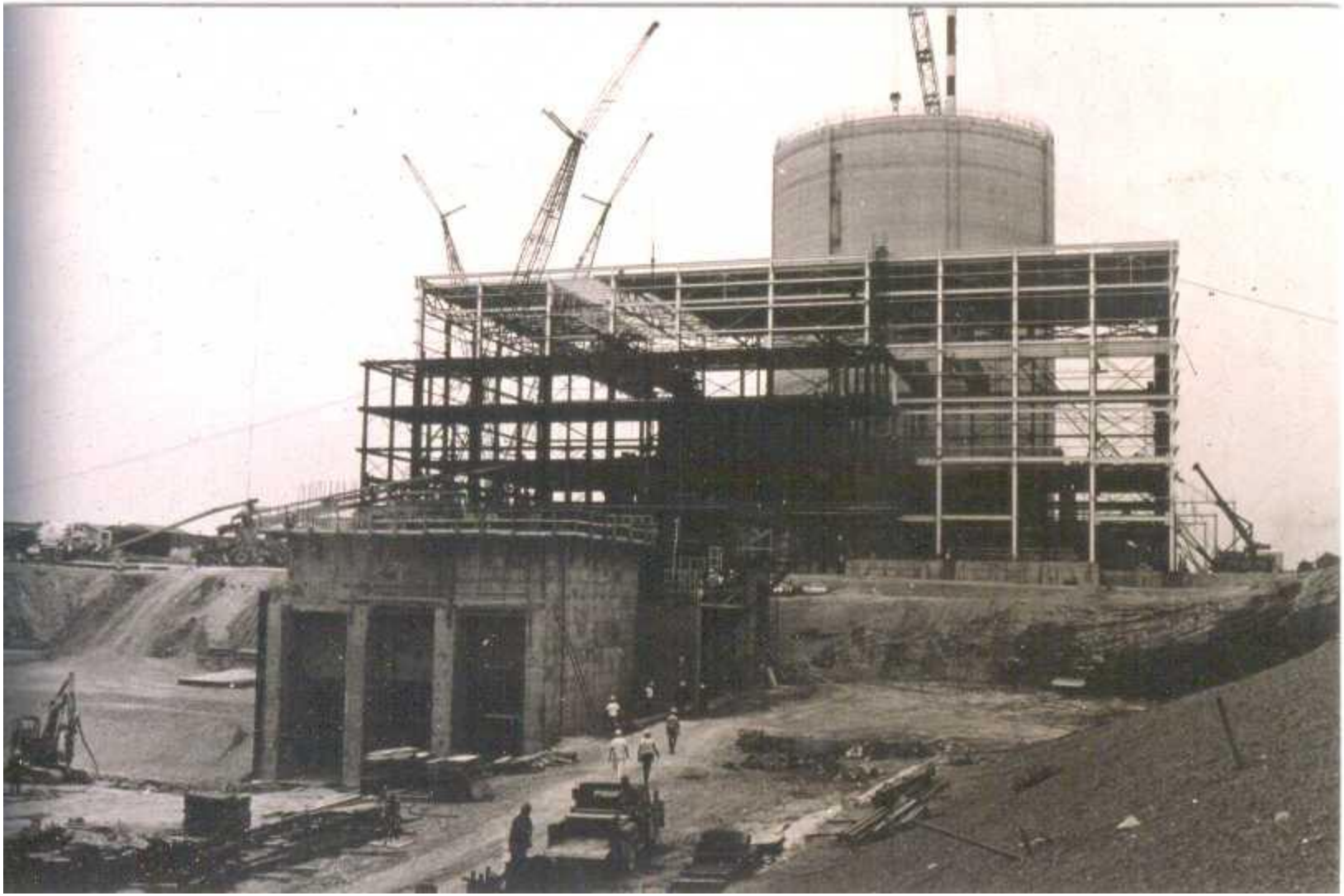
A Main Turbine Rotor Section

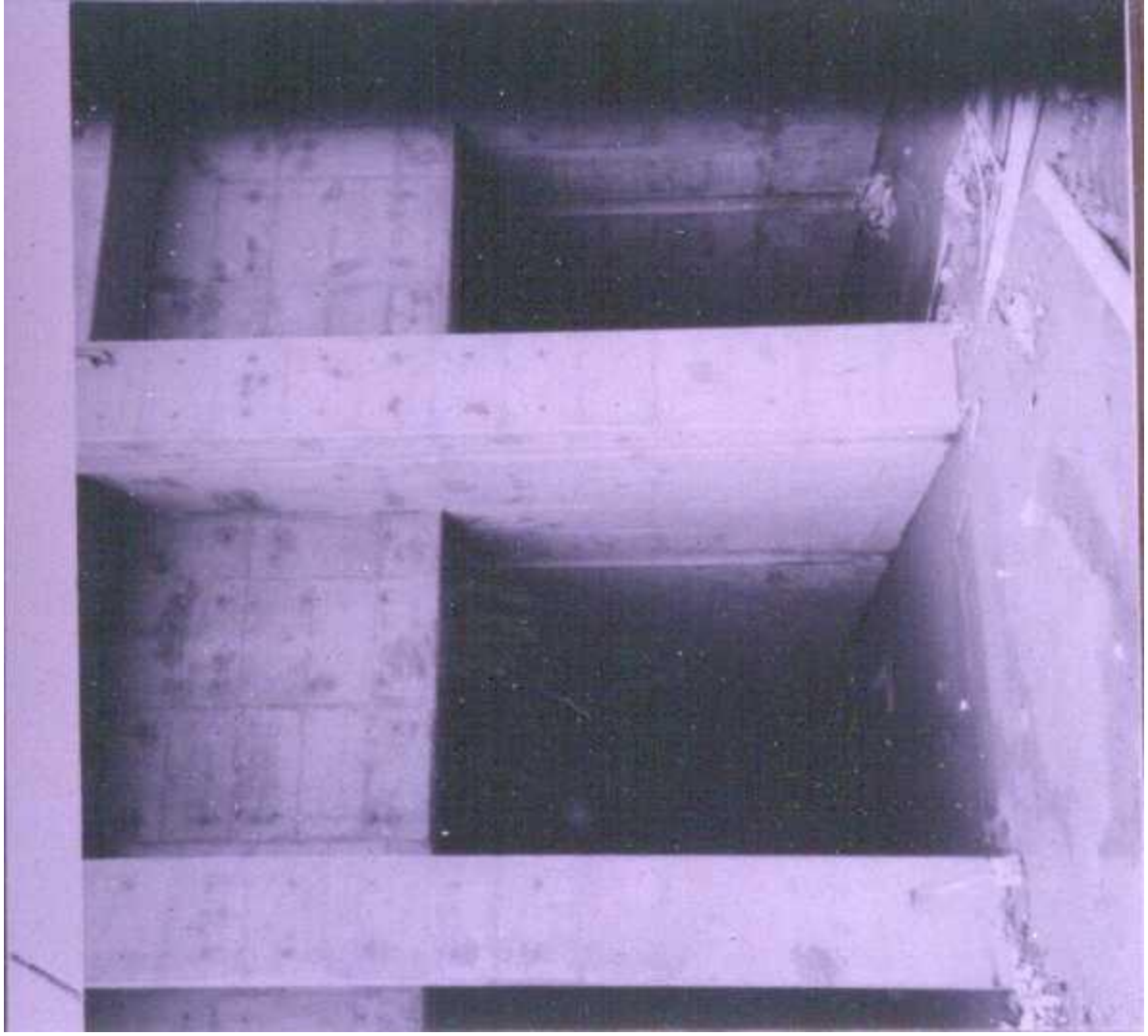

R.445
4P1

Intake Canal with Intake Structure Gantry Crane at upper left.

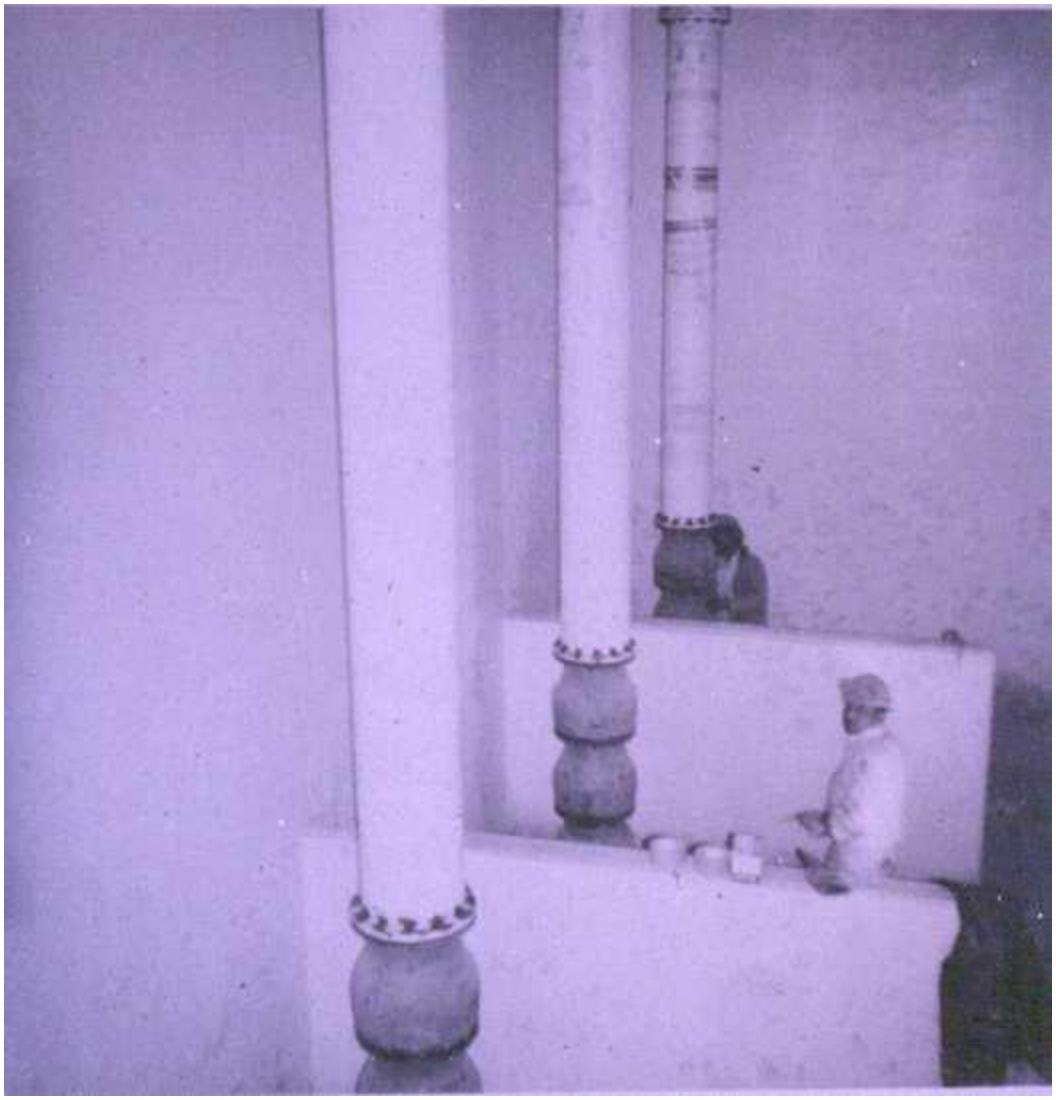


Construction of Intake Structure Screen House inlet bays.
This work was done before the Intake Canal was flooded.



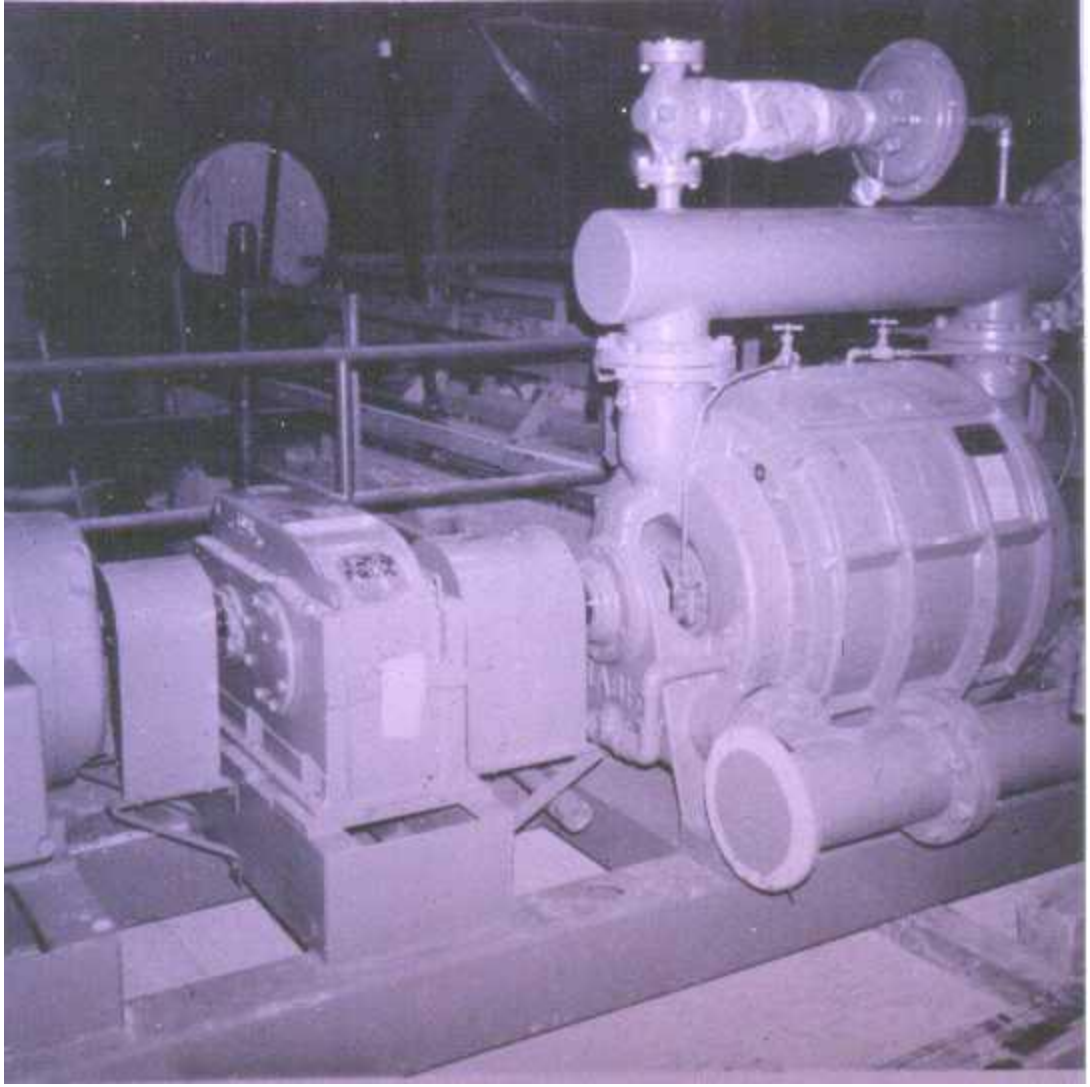


Access pits for pump suctions on the Plant side of the Intake Structure Traveling Screens (fish and debris strainers)

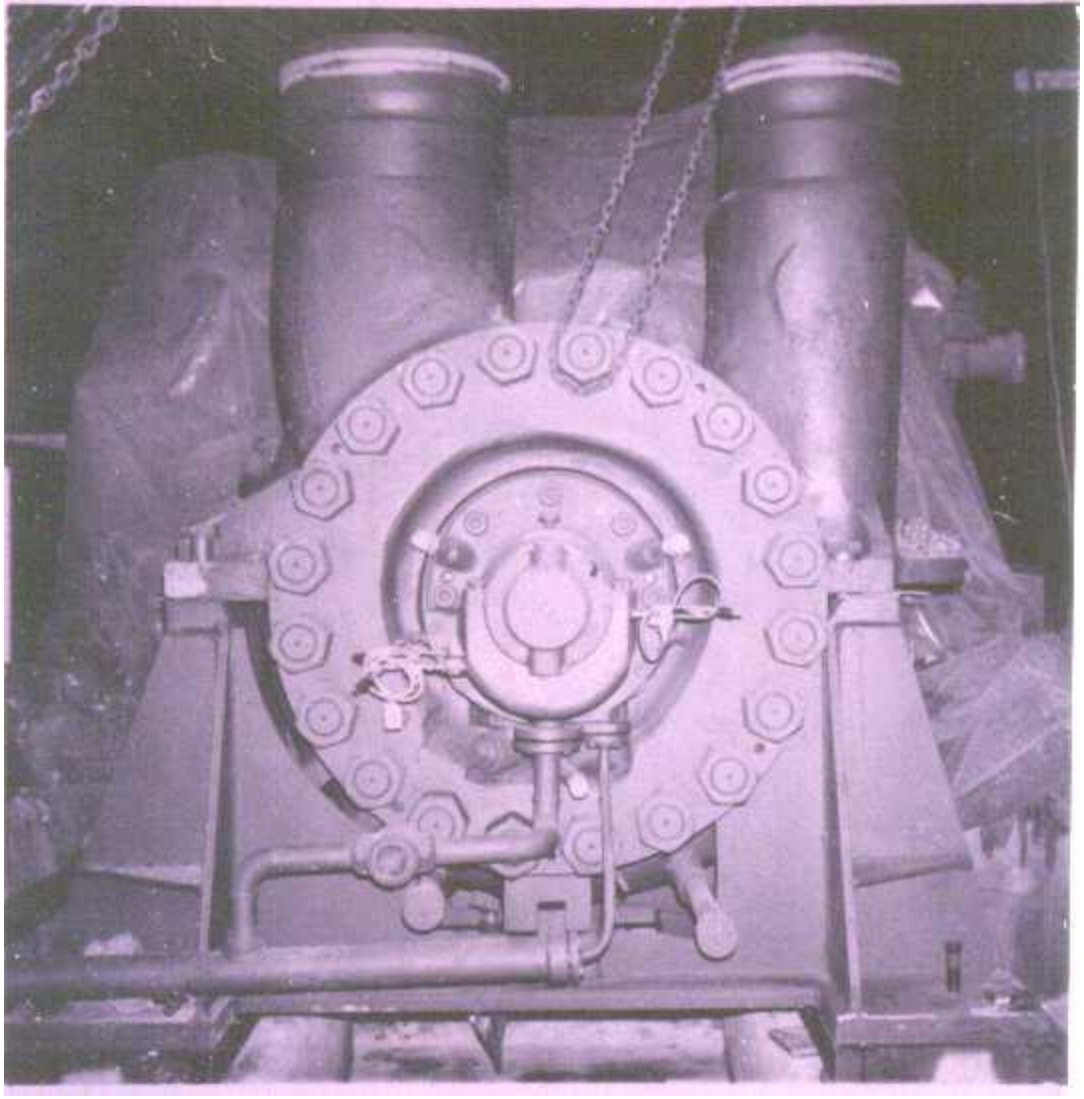


Service Water System pump suction lines in the Screen House. The gizmos are probably foot valves on the suction lines.

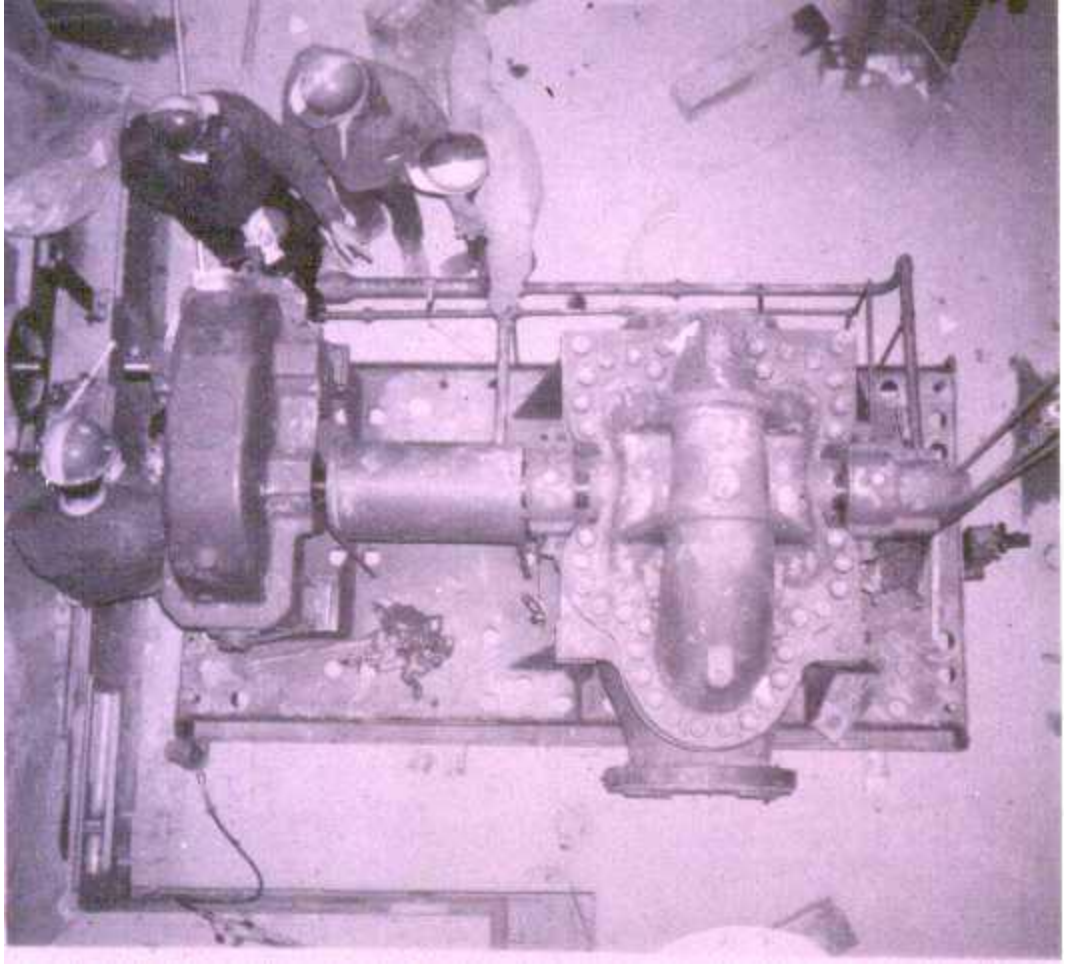
Not even a clue.



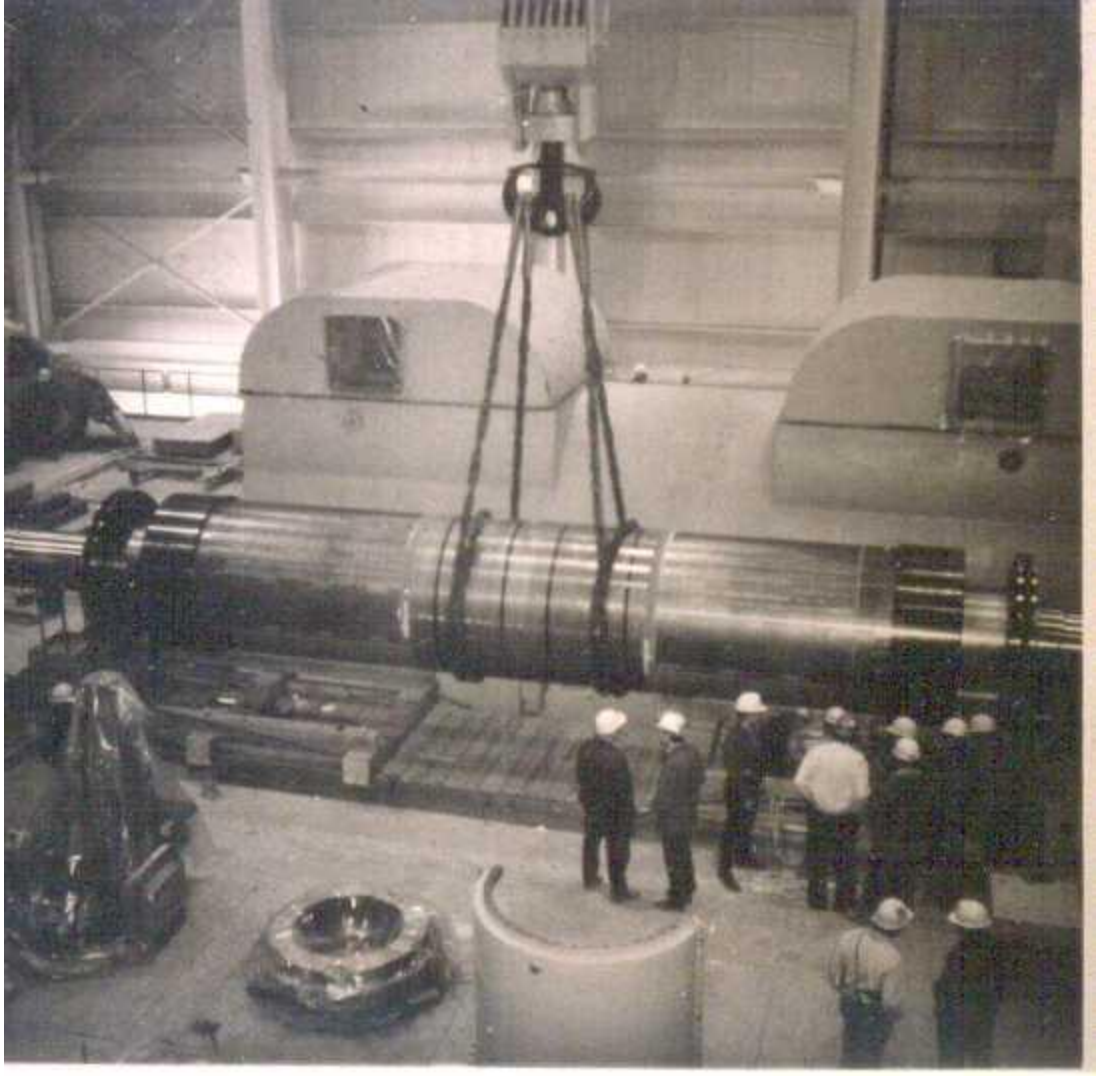
Mechanical Hogger (high capacity vacuum pump) for drawing a vacuum in the Main Condenser.



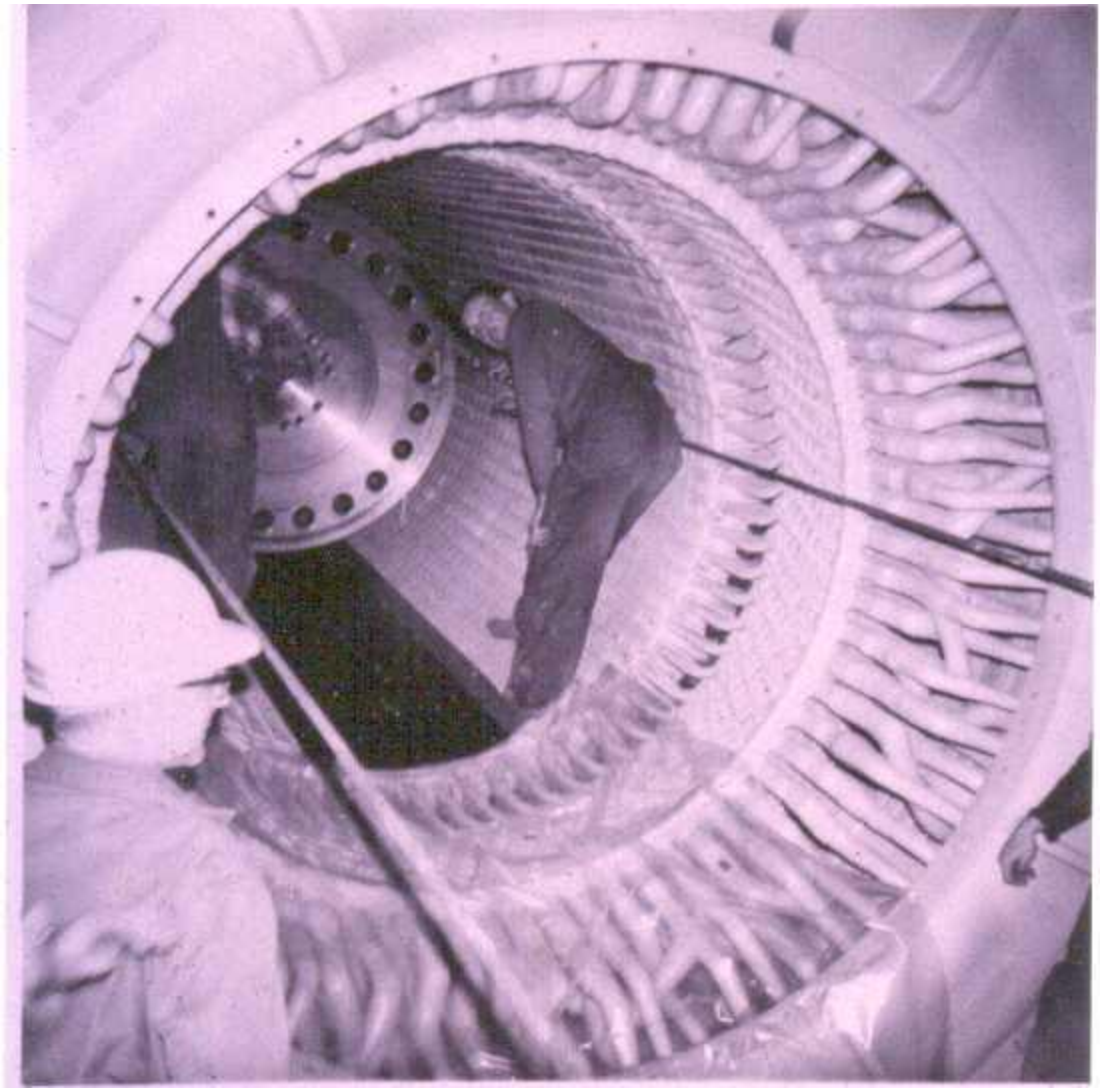
Booster Feed Pump end of a Main Feed Pump.



Reduction Gear, coupled a Main Feed Pump Turbine to the Main Feed Pump.



Main Generator Rotor lifted with
the Turbine Building Crane.



Auxiliary Feed Pump Turbine Steam Exhaust. The white building is the Administration Office Building, proof that there was an “Ivory Tower.”