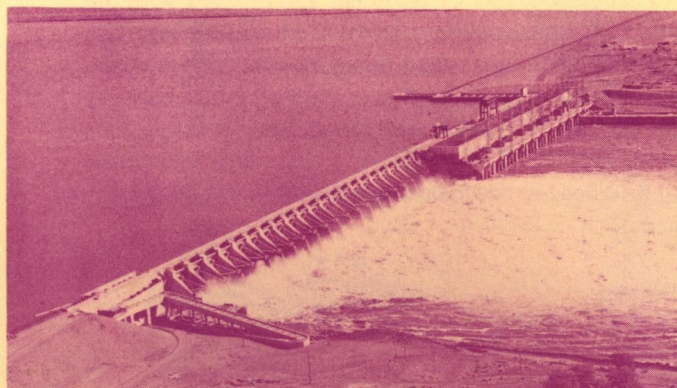
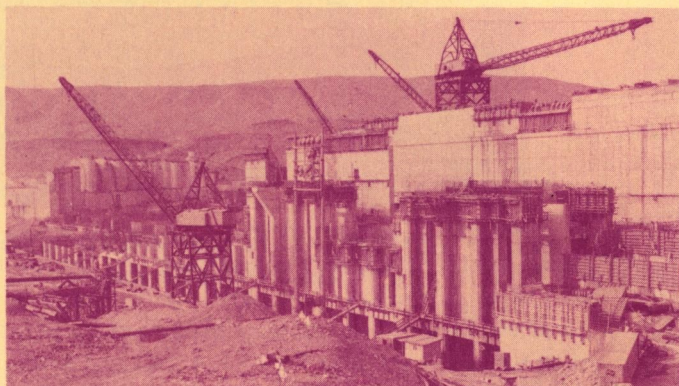


GEOLOGY

PRIEST RAPIDS PROJECT



Priest Rapids Dam
Completed in 1961

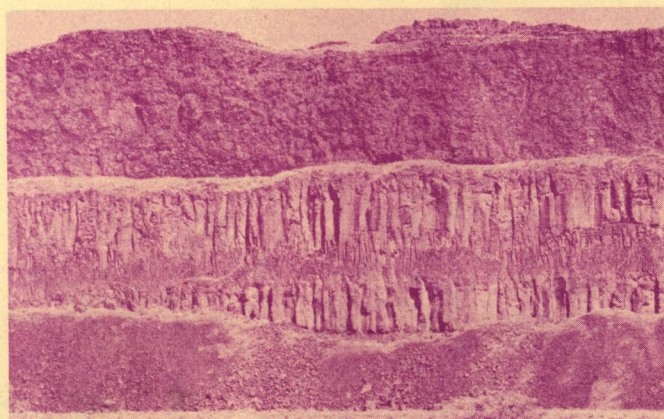


Wanapum Dam
Under Construction

PUBLIC UTILITY DISTRICT
OF GRANT COUNTY
EPHRATA, WASH.

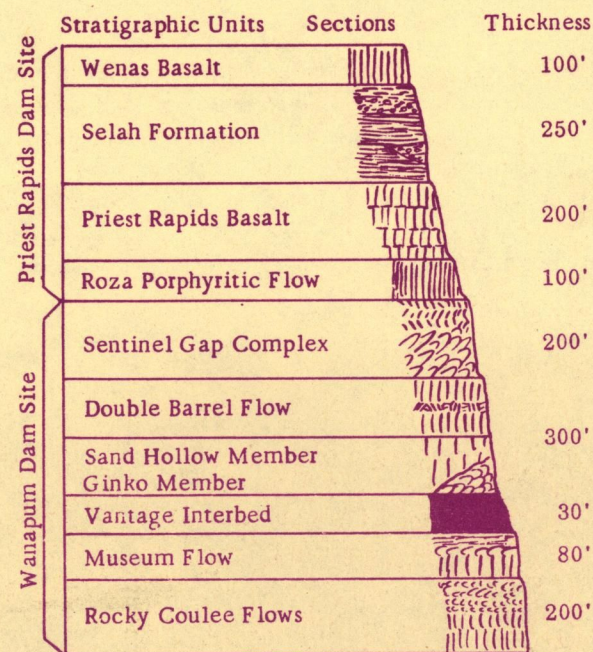
GEOLOGY OF THE PRIEST RAPIDS PROJECT

The Priest Rapids-Wanapum area is in the northwestern part of a vast lava field that makes up most of eastern Washington and adjoining parts of Oregon. Fossils in layers of sediment interbedded with the lava flows indicate that the eruptions occurred during the Miocene epoch, 15 to 20 million years ago. The fossils also indicate that the climate was then mild and humid, and that during periods between the spreading of the lava flows eastern Washington was a forested lowland extending to the Pacific Ocean. Petrified trees and other fossils from the flows and interbedded sediments are on display at the Ginkgo Museum near Vantage.



Double Barrel Flow Overlain by the
Sentinel Gap Complex

The flows consist of black lava known as basalt, similar to that recently erupted by the Hawaiian volcanoes and at the Craters of the Moon in Idaho. The top of each flow is slaggy or cindery basalt, full of round holes representing gas bubbles that were entrapped as the lava solidified. The lower parts of most of the flows are divided into 5- to 7-sided columns caused by shrinkage of the lava as it continued to cool and solidify. The columnar crack pattern is analogous to the familiar pattern of regular cracks which develop in drying mud as a result of shrinkage cracks in the center. The slaggy tops and columnar zones make it possible to count the flows in the walls of the Grand Coulee and the sides of gorges cut by the Columbia River.



Rock Strata of Priest Rapids-Wanapum Area

Starting near the end of the period of basalt eruptions, and continuing for many millions of years, slow movements of the earth's crust changed the monotonous lava plain to the diversified landscape of today. At the same time the basalt flows were folded by lateral pressures in the crust, just as a pile of rugs might be folded by a push from one side. The three east-west ridges of the area - Frenchman Hills, Saddle Mountain and Umtanum Ridge - are upfolds or anticlines, and the intervening lowlands are synclines. In some places the flows responded to the crustal pressures by breaking rather than by bending; the breaks, called faults by the geologist, have a bearing on the selection of sites for the dams. The Columbia River was in its present position on the lava plain before the folding began, the river was able to maintain its course by downcutting through the anticlines as they were raised across its path. Uplift of the Cascade Range, occurring at about the same time as the folding of the basalt, caused the present aridity by cutting off the supply of moisture-bearing winds from the Pacific.

The last noteworthy geologic event, which shaped some of the details of the present landscape, occurred 15 to 25 thousand years ago, when glaciers from Canada covered most of northern Washington. Enormous floods of glacial melt-water, released by the bursting of ice-dammed lakes in the mountains northeast of Spokane, swept southward repeatedly over the Columbia Plateau; the Grand Coulee and Washtucna Coulee testify to their great erosive power.



Air Photo Looking North Through Saddle Mountain Gap

The sites for Priest Rapids and Wanapum dams were selected after careful studies, including the drilling of many exploratory holes, to determine the location of the best available foundation conditions for the concrete and earth embankment segments.

At first glance all of the flows look alike, but they actually differ from each other in many ways, and some individual flows can be traced for long distances. The diagram (on an earlier page) shows the principal flows and interbedded sedimentary layers which underlie the Priest Rapids-Wanapum area.

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