

UNITED STATES DEPARTMENT OF THE INTERIOR  
NATIONAL PARK SERVICE

FOR NPS USE ONLY

RECEIVED **MAR 17 1976**

DATE ENTERED **APR 23 1976**

**NATIONAL REGISTER OF HISTORIC PLACES  
INVENTORY -- NOMINATION FORM**

SEE INSTRUCTIONS IN *HOW TO COMPLETE NATIONAL REGISTER FORMS*  
TYPE ALL ENTRIES -- COMPLETE APPLICABLE SECTIONS

**1 NAME**

HISTORIC *W*

Snoqualmie Falls Cavity Generating Station

AND/OR COMMON

**LOCATION**

STREET & NUMBER

CITY, TOWN

Snoqualmie

VICINITY OF

#3 - Honorable Don L. Bonker

STATE

Washington

CODE

53

COUNTY

King

CODE

033

**CLASSIFICATION**

CATEGORY	OWNERSHIP	STATUS	PRESENT USE
<input type="checkbox"/> DISTRICT	<input type="checkbox"/> PUBLIC	<input checked="" type="checkbox"/> OCCUPIED	<input type="checkbox"/> AGRICULTURE
<input checked="" type="checkbox"/> BUILDING(S)	<input checked="" type="checkbox"/> PRIVATE	<input type="checkbox"/> UNOCCUPIED	<input type="checkbox"/> MUSEUM
<input type="checkbox"/> STRUCTURE	<input type="checkbox"/> BOTH	<input type="checkbox"/> WORK IN PROGRESS	<input type="checkbox"/> COMMERCIAL
<input type="checkbox"/> SITE	<b>PUBLIC ACQUISITION</b>	<b>ACCESSIBLE</b>	<input type="checkbox"/> EDUCATIONAL
<input type="checkbox"/> OBJECT	<input type="checkbox"/> IN PROCESS	<input type="checkbox"/> YES: RESTRICTED	<input type="checkbox"/> ENTERTAINMENT
	<input type="checkbox"/> BEING CONSIDERED	<input type="checkbox"/> YES: UNRESTRICTED	<input type="checkbox"/> GOVERNMENT
		<input checked="" type="checkbox"/> NO	<input checked="" type="checkbox"/> INDUSTRIAL
			<input type="checkbox"/> MILITARY
			<input type="checkbox"/> PARK
			<input type="checkbox"/> PRIVATE RESIDENCE
			<input type="checkbox"/> RELIGIOUS
			<input type="checkbox"/> SCIENTIFIC
			<input type="checkbox"/> TRANSPORTATION
			<input type="checkbox"/> OTHER:

**OWNER OF PROPERTY**

NAME

Puget Sound Power and Light Company

STREET & NUMBER

Puget Power Building, 10608 N.E. 4th

CITY, TOWN

Bellevue

VICINITY OF

STATE  
Washington

**LOCATION OF LEGAL DESCRIPTION**

COURTHOUSE,  
REGISTRY OF DEEDS, ETC.

King County Auditor's Office

STREET & NUMBER

County Courthouse

CITY, TOWN

Seattle

STATE  
Washington

**6 REPRESENTATION IN EXISTING SURVEYS**

TITLE

Washington State Inventory of Historic Places

DATE

1974

FEDERAL  STATE  COUNTY  LOCAL

DEPOSITORY FOR  
SURVEY RECORDS

Washington State Parks and Recreation Commission

CITY, TOWN

Olympia

STATE  
Washington

## 7 DESCRIPTION

CONDITION		CHECK ONE	CHECK ONE
<input checked="" type="checkbox"/> EXCELLENT	<input type="checkbox"/> DETERIORATED	<input type="checkbox"/> UNALTERED	<input checked="" type="checkbox"/> ORIGINAL SITE
<input type="checkbox"/> GOOD	<input type="checkbox"/> RUINS	<input checked="" type="checkbox"/> ALTERED	<input type="checkbox"/> MOVED      DATE _____
<input type="checkbox"/> FAIR	<input type="checkbox"/> UNEXPOSED		

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### DESCRIBE THE PRESENT AND ORIGINAL (IF KNOWN) PHYSICAL APPEARANCE

The construction in 1898 of the cavity generating station at Snoqualmie Falls produced one of the most unusual power generating facilities in the Northwest. It remains today almost exactly as it appeared over 75 years ago.

Generating equipment is located in a narrow chamber 200 feet long, 40 feet wide and 30 feet high which has been excavated about 250 feet below the surface of the river and about 300 feet back from the edge of the falls. Access to the chamber is through a shaft 10 feet x 27 feet which is occupied by a small elevator and the penstock for the generating equipment; power lines from the generators to the transformers on the surface also run through this shaft. A tailrace 12 feet wide and 24 feet deep extends 650 feet from the floor of the chamber to a point near the base of the falls at approximately the high water mark for the river. A narrow wooden catwalk is suspended from the roof of the tailrace and runs the entire length of the tunnel.

The generating plant is composed of four, 1,500 kilowatt Westinghouse stationary field revolving armature alternators, driven by four, 2,500 horsepower Ellipsoidal - Tangential Doble impulse waterwheels. The tangential waterwheel with its ellipsoidal buckets was the development of W. A. Doble, partner in a San Francisco engineering firm. His particular design had a center rib to split the jet of water and direct it into the hollow cups, formed with correct hydraulic curves. These cups or buckets would reverse the direction of the water flow and discharge it over the bucket edge. The design secured exceptionally high efficiency from the water force but reduced wear on the buckets to a minimum. To date, but few buckets have been ever replaced although some have been repaired.

The waterwheels are encased in sheet steel housings with cast iron fronts, three wheels in each housing and two housings to each generating unit. The upper housings are removable and at one time had a tall rectangular vent to permit the indraft of air to replace that blown out of the housing by the action of the wheels. Such openings were apparently not necessary and do not survive at the present.

In 1905, the upper (or southeast) end of the cavity was enlarged and a 10,000 horsepower "Victor" turbine and a 5,000 kilowatt Westinghouse alternator was installed as the fifth generating unit. The turbine was the largest single wheel turbine installed at the time; although others of equal or greater capacity were in use, they were all double wheel machines. The cast iron housing of the turbine had to be specially constructed since all components had to fit within the limited confines of the service elevator, a condition still in operation today.

Originating near the headgate above, a penstock seven-and-a-half feet in diameter leads down the shaft to the cavity below where it connects with a cylindrical horizontal receiver resting on a rock bench about 12 feet off the floor. The receiver extends almost the entire length of the cavity and is 10 feet in diameter for half its length and then reduces to eight feet. At four points along the length of the receiver, branch four feet in diameter extend from the receiver to the individual water motors; a needle valve is placed intermediately between the motor and the source pipe.

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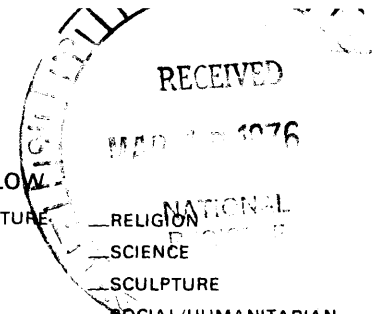
The Transformer Building and the Machine Shop also form a part of this nomination. They are located on the surface adjacent to the elevator house, their long axes parallel to the river. Both are of brick masonry and are painted a light buff, a color which appears to have been used since their original construction.

The Transformer House is 40 feet x 60 feet and scaled to the height of a two-story building although it has no internal divisions. It has a slightly truncated pyramidal roof of ribbed metal. Pilasters running the full height of the building divide it into four bays on its long sides and into three bays on the short sides. The parapet has been decorated in a restrained fashion with a variety of dentil designs. Four rectangular window openings appear on the ground floor of the longer sides; each has a large bulls-eye window centered above it at the second story level. It would appear that the window openings were originally decorated with terra cotta although the entire structure and any ornamentations have now been painted a single color. Large equipment doors penetrate each of the shorter sides and a single bulls-eye window appears centrally in each of these facades. The original transformer installation totaled 13500 kilowatt transformers with wooden tops which were destroyed by fire in 1903. The transformers were replaced at that time by two, 2,500 kilowatt Oil Immersed Water Cooled Step-up Transformers which are still in use, augmented by two others added in 1909 as a result of a voltage change.

The associated Machine Shop is located immediately to the southeast of the Transformer House; it is a long narrow building approximately 30 feet x 70 feet with a gable roof terminated by stepped parapets. Large fully arched window openings are placed evenly on the long sides and are slightly recessed in arched panels. Some window openings continue to the ground as doorways. The Machine Shop, as the name indicates, houses a variety of metal working tools required to maintain the cavity power plant. Its northwest corner is occupied by the office of the plant superintendent.

Changes in the cavity power plant and its associated structures have been slight. The equipment of the generating facility has not changed since its installation, a comment on the durability of the original design as well as the benefits of careful management. The cavity has been painted on the interior although the tailrace is still bare rock. The elevator has been replaced by a more modern device some time ago and the control room and switchboard area has been enclosed, although here again the equipment is original.

# 8 SIGNIFICANCE



PERIOD	AREAS OF SIGNIFICANCE -- CHECK AND JUSTIFY BELOW			
<input type="checkbox"/> PREHISTORIC	<input type="checkbox"/> ARCHEOLOGY-PREHISTORIC	<input type="checkbox"/> COMMUNITY PLANNING	<input type="checkbox"/> LANDSCAPE ARCHITECTURE	<input type="checkbox"/> RELIGION
<input type="checkbox"/> 1400-1499	<input type="checkbox"/> ARCHEOLOGY-HISTORIC	<input type="checkbox"/> CONSERVATION	<input type="checkbox"/> LAW	<input type="checkbox"/> SCIENCE
<input type="checkbox"/> 1500-1599	<input type="checkbox"/> AGRICULTURE	<input type="checkbox"/> ECONOMICS	<input type="checkbox"/> LITERATURE	<input type="checkbox"/> SCULPTURE
<input type="checkbox"/> 1600-1699	<input type="checkbox"/> ARCHITECTURE	<input type="checkbox"/> EDUCATION	<input type="checkbox"/> MILITARY	<input type="checkbox"/> SOCIAL/HUMANITARIAN
<input type="checkbox"/> 1700-1799	<input type="checkbox"/> ART	<input checked="" type="checkbox"/> ENGINEERING	<input type="checkbox"/> MUSIC	<input type="checkbox"/> THEATER
<input checked="" type="checkbox"/> 1800-1899	<input type="checkbox"/> COMMERCE	<input type="checkbox"/> EXPLORATION/SETTLEMENT	<input type="checkbox"/> PHILOSOPHY	<input type="checkbox"/> TRANSPORTATION
<input checked="" type="checkbox"/> 1900-	<input type="checkbox"/> COMMUNICATIONS	<input checked="" type="checkbox"/> INDUSTRY	<input type="checkbox"/> POLITICS/GOVERNMENT	<input type="checkbox"/> OTHER (SPECIFY)
		<input type="checkbox"/> INVENTION		

SPECIFIC DATES 1898

BUILDER/ARCHITECT William T. Baker

## STATEMENT OF SIGNIFICANCE

Although the Pacific Northwest has many facilities for the generation of hydro-electric power, probably none is as innovative as the cavity generating station of the Puget Sound Power and Light Company. It is significant not only as a very early generating facility in the state, but also because of its unusual physical placement and the high percentage of original equipment still in use.

Construction of the cavity plant began in 1898 under the guidance of William T. Baker following his purchase of the property at Snoqualmie Falls the preceding year. His decision to erect the facility 250 feet below the surface of the Snoqualmie River in a dense strata of rock was no doubt prompted by the excellent head of water offered at Snoqualmie Falls, some 270 feet high and with an available energy of 30,000 to 100,000 horsepower. To erect the plant at the base of the falls, however, would have meant the constant exposure of the generating machinery to heavy mist and freezing weather. The rock over which the Snoqualmie spills is basaltic and without significant internal cleavage; hollowing out the generating plant within this mass provided a completely dry unit with a constant temperature throughout the year regardless of external weather conditions.

Compressed air drills were used to bore two intersecting shafts, one vertical and the other horizontal. Most of the spoil was removed through the vertical shaft and distributed along the river edge forming a fill for the construction of the transformer building, office and machine shop. Partial operation of the plant began in 1899.

The generating plant served the communities of Seattle and Tacoma, about 30 and 35 miles to the west and southwest, respectively. The first generator in actual operation delivered current to Seattle on July 31, 1899 and to Tacoma on November 1, 1899, and supplied the majority of the electrical needs of those communities, totaling at that time a joint population of some 120,000. Street railway systems absorbed much of the power supplied as did a variety of manufacturing concerns such as flour mills, car chops, iron works, elevators, machine shops, a smelter and the electrical equipment of a coal mine. The plant also illuminated three small communities located near substations on the main transmission line.

An elaborate switchboard at the main station was duplicated by similar boards at the substations and permitted the entire line considerable flexibility. The combination of the various lines was used in a demonstration in November of 1900 to underscore the practicality of the long distance transmission of electrical power. By manipulating the switchboards, a circuit was created originating at the

# 9 MAJOR BIBLIOGRAPHICAL REFERENCES

Young, Lewis F. "History of the Cavity Generating Station of the Puget Sound Power and Light Company". Monograph in the Puget Sound Power and Light Company Library.

# 10 GEOGRAPHICAL DATA

ACREAGE OF NOMINATED PROPERTY Less than one  
 UTM REFERENCES

A	1,0	5,8,7,6,4,5	5,2,6,5,7,0,0	B			
	ZONE	EASTING	NORTHING		ZONE	EASTING	NORTHING
C				D			

VERBAL BOUNDARY DESCRIPTION

LIST ALL STATES AND COUNTIES FOR PROPERTIES OVERLAPPING STATE OR COUNTY BOUNDARIES

STATE	CODE	COUNTY	CODE
STATE	CODE	COUNTY	CODE

# 11 FORM PREPARED BY

NAME / TITLE

David M. Hansen, Chief, Office of Archaeology and Historic Preservation

ORGANIZATION

Washington State Parks and Recreation Commission

DATE

November, 1975

STREET & NUMBER

P. O. Box 1128

TELEPHONE

(206) 753-4117

CITY OR TOWN

Olympia

STATE

Washington

# 12 STATE HISTORIC PRESERVATION OFFICER CERTIFICATION

THE EVALUATED SIGNIFICANCE OF THIS PROPERTY WITHIN THE STATE IS:

NATIONAL     

STATE X

LOCAL     

As the designated State Historic Preservation Officer for the National Historic Preservation Act of 1966 (Public Law 89-665), I hereby nominate this property for inclusion in the National Register and certify that it has been evaluated according to the criteria and procedures set forth by the National Park Service.

STATE HISTORIC PRESERVATION OFFICER SIGNATURE

*David M. Hansen*

TITLE

State Historic Preservation Officer

DATE

March 4, 1976

FOR NPS USE ONLY

I HEREBY CERTIFY THAT THIS PROPERTY IS INCLUDED IN THE NATIONAL REGISTER

Acting

*David M. Hansen*

DATE

9/23/86

DIRECTOR, OFFICE OF ARCHAEOLOGY AND HISTORIC PRESERVATION

ATTEST:

*Charles W. Smith*

DATE

4-21-76

KEEPER OF THE NATIONAL REGISTER

UNITED STATES DEPARTMENT OF THE INTERIOR  
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cavity plant and running to Seattle, back to the plant, then to Tacoma and returning again to the plant, a total distance of 153 miles. Thusly it was possible to power an electric moter through this circuit, covering a distance at the time considered quite remarkable.

The cavity generating plant remains in use today, providing necessary power to communities in the Puget Sound basin. Not only is it important as a perhaps unique facility but also as a true pioneer in the generation of electric power for public consumption.

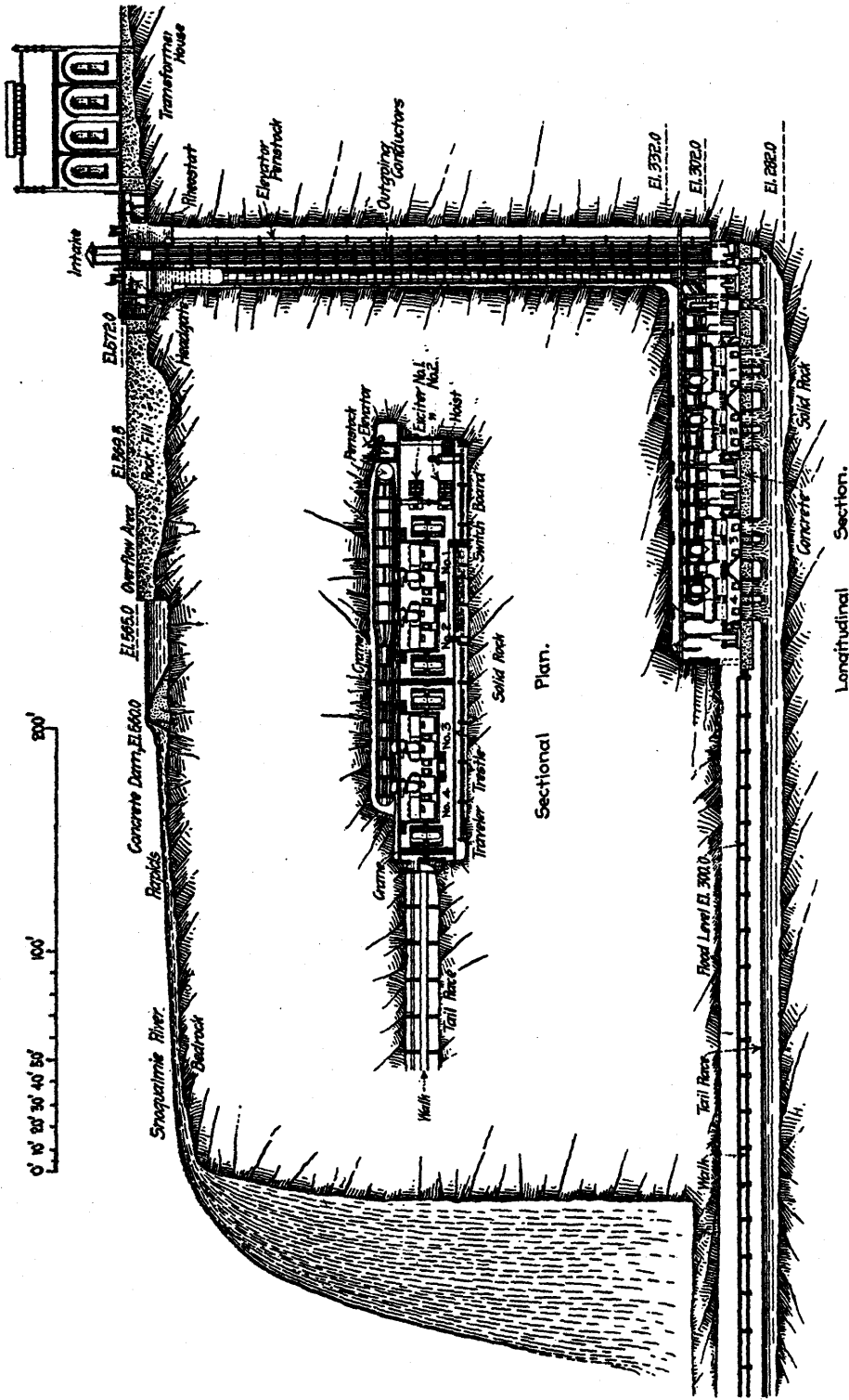


FIG. 5.—SECTIONAL ELEVATIONS OF PLANT.

**United States Department of the Interior  
National Park Service**

**National Register of Historic Places  
Continuation Sheet**

Section number \_\_\_\_\_ Page \_\_\_\_\_

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Snoqualmie Falls Cavity Generating Station      King County, WASHINGTON

ADDITIONAL DOCUMENTATION APPROVAL

Autaweltt Blue      10/24/92