Puget Sound Power and Light Company,
White River Hydroelectric Project
~~Buckley to Dieringer~~ 600 N. RIVER AVENUE
Dieringer
Pierce County
Washington

HAER No. WA-64

HAER
WASH
27-DIER,
1-

PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

REDUCED COPIES OF MEASURED DRAWINGS

Historic American Engineering Record
National Park Service
U. S. Department of the Interior
Washington, D.C. 20013-7127

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HISTORIC AMERICAN ENGINEERING RECORD

PUGET SOUND POWER & LIGHT COMPANY, WHITE RIVER HYDROELECTRIC PROJECT HAER No. WA-64

Location:	The White River Hydroelectric Project extends 10.2 miles from the headworks at Buckley to the powerhouse at Dieringer, Pierce County, Washington. The powerhouse address is: 2111 East Valley Highway. The UTM location of the powerhouse is given below: UTM: 10.558800.5231730 Quad: Dieringer Scale: 1:24,000
Date of Construction:	The hydro project was completed in 1912; powerhouse additions were executed in 1917 and 1924.
Engineers:	A. McLean Hawks, Charles H. Baker, Samuel Shuffleton
Builder:	Pacific Coast Power Company (Stone & Webster)
Present Owner:	Puget Sound Power & Light Company.
Present Use:	Electric power production, specifically for peaking loads.
Significance:	A combination run-of-the-river and large-storage hydroelectric operation, the White River Hydroelectric Project, when completed in 1911, served as the controlling works in western Washington's largest hydroelectric system. It was designed and constructed by the Pacific Coast Power Company, a subsidiary of the Boston-based firm of Stone & Webster.
Historian:	Gray Fitzsimons, 1993
Acknowledgments:	The author would like to thank Barry Lombard, Senior Environmental Scientist, Puget Sound Power & Light Company, for sharing his research notes and preparing the section dealing with the construction history of the White River project and the summary conclusion.

Introduction[1]

Constructed between 1910 and 1912, the White River Hydroelectric Project represented for the Stone & Webster Engineering Corporation more than a successful work of civil and electrical engineering. The hydro project also played a prominent role in Stone & Webster's business strategy that saw the Boston-based utility-construction and management firm gain control of an extensive electric power production and distribution system in western Washington. To achieve this end, Stone & Webster outmaneuvered one of its chief rivals, Charles H. Baker, a civil engineer and president of the Snoqualmie Falls Power Company which also sought to develop the White River property. Stone & Webster's defeat of the Baker interests affirmed its position as the dominant utility in the early-twentieth-century Pacific Northwest.

The history of the White River project reveals the strong link between engineering and business, as well as the way in which late nineteenth-century engineering practice was shaped not only by technological concerns, but also by business decisions and local political conditions. As with virtually all engineering works, economic considerations were paramount in formulating designs for the White River project. Yet, as will be seen, the designs and strategies for Cascade Mountain hydro developments, as proposed by rival engineering interests, were often overshadowed by the business and legal maneuvering of competing parties, each of which sought to control a single, large, inter-connected electrical power system. The fierce contest to develop streams such as the White River summoned images of a Darwinian struggle -- an image popular among American businessmen of this period[2] -- the survivor of which would reign over western Washington's electrical utilities. In the early 1900s, the key to this empire was to harness the waterpower of the glacially fed White River.

Of Mount Rainier's many massive glaciers, the Emmons Glacier is the largest. This icy mass sprawls across the east face of the mountain, its terminus marking the origin of one of the principal forks of the White River. Bearing large amounts of glacial silt, the tan-colored waters of the shallow, boulder-filled White River flow swiftly through glacial moraines, descending into the valley's densely forested woodlands. The path of the White River is laden with sandbars and snags as it follows a northerly course, then turns westward at its confluence with the Greenwater River. It extends around the northern margin of the Enumclaw plateau, then flows south where it joins the Puyallup River. In all, the White River is about fifty-seven miles long, from its origin at the base of Emmons Glacier to its junction with the Puyallup.[3]

Early History

Prior to the arrival of whites, native Americans inhabited the White River Valley. Although little is known of the region's long history of native-American life, archeological evidence points to a number of settlements, as well as to hunting and gathering activities in the surrounding forests, streams, and prairie lands.[4] Much more information exists on the first white settlers, who established themselves in the vicinity of the White River as early as 1853. Few in number, these settlers filed land claims which ranged in size from 160 acres to 320 acres. Most of these early claims encompassed the valley's fertile prairie land where white settlers, such as Michael Connell and James E. Williamson, built cabins and engaged in subsistence farming. Soon after white settlers entered the region, however, hostilities between whites and Indians arose, culminating in the Indian War of 1855-56. After the combined forces of federal troops and territorial volunteers defeated the native-American warriors, Indian reservations were established and a few whites returned to the White River Valley.[5]

From the mid 1850s to the 1880s, the White River Valley remained sparsely populated by whites. In contrast, the neighboring Puyallup Valley received larger numbers of homesteaders, led by Ira Meeker, who cultivated the land and established a lucrative hop-growing economy. The construction of the Northern Pacific Railroad to Tacoma in 1883 fueled this development and sparked a land boom in both the White and Puyallup river regions. Four years later the Northern Pacific completed its route through the Cascades via Stampede Pass and extended a branch line into the White River Valley.[6] In addition, settlers had improved the Naches Pass wagon road, which eased travel through the upper White River Valley. By 1888, the towns of Buckley and Enumclaw boasted the largest population centers in the upper reaches of the valley and logging quickly rivaled farming as the region's most important economic activity.[7]

The earliest engineering surveys of the White River Valley were conducted in the 1860s by surveying parties of the Northern Pacific Railroad. General James Tilton, appointed chief engineer of the Northern Pacific Railroad's Western Division in 1867, began the work of locating potential routes for a line through the Cascades. Tilton and other railroad surveyors explored the White, Green, and Cedar River watersheds, ascertaining elevations through the mountain passes.[8] Although these survey parties gathered only rudimentary hydraulic data on the rivers, their maps included valuable topographic information on the watersheds.[9]

The first comprehensive hydraulic study of the White River was probably undertaken in the early 1890s by Tacoma civil engineer E. H. McHenry, who later served as chief engineer of the Canadian Pacific Railway. McHenry filed for water rights on the White River and proposed a hydro-power development to the Westinghouse Electric & Manufacturing Company, which had completed Oregon City's Willamette Falls hydroelectric project in 1891, one of the first single-phase alternating-current transmission systems in the United States.[10] Lacking financial support, however, McHenry failed to interest Westinghouse and little more was accomplished in furtherance of his scheme until 1895 when the White River Power Company was incorporated in Tacoma.[11]

The chief engineer of the fledgling White River Power Company, A. McLean Hawks, undertook a new study of the watershed while his partner, Tacoma attorney Charles E. Warner, filed for water rights. Formerly chief engineer of Tacoma Light & Water Company, Hawks conceived a plan for diverting water from the White River at Buckley, then conveying it via a ten-mile-long canal to a lake on the Enumclaw Plateau, where penstocks would conduct it some 480 feet down to the powerhouse situated at the base of the plateau.[12] In 1895, Hawks worked up this scheme with the aim of attracting East Coast capital and he forwarded his plans to the renowned hydraulic engineer Rudolph Herring of New York City.[13] In the meantime Charles Warner was awarded the right to appropriate 2,000 cubic feet of water per second from the river for a power development. Warner and Hawks' bid to interest investors in their scheme, however, fared no better than McHenry's. The economic depression of the 1890s hit western Washington particularly hard and few were willing to invest in such enterprises. As another of Seattle's depression-era hydro-power promoters observed, the willingness of East Coast capitalists to bankroll Northwestern entrepreneurs was "a long way between promise and performance."[14]

The inability of Hawks and his partner to find the necessary capital to undertake their hydro scheme brought the project to a halt. Apart from conducting periodic stream-gauging projects and posting water-right notices, the company accomplished little to harness the water power of the White River.[15] For over five years Hawks' design languished until 1901, when Charles H. Baker assumed control of the White River Power Company. Just two years earlier, in 1899, Charles Baker had completed the Snoqualmie Falls plant, the largest hydroelectric facility in the Northwest. With the financial backing of his father, wealthy Chicagoan William T. Baker, Charles Baker now sought to expand his electrical power holdings by developing the White River project. Unlike the Snoqualmie plant, however, the White River hydro facility, as proposed by Hawks, offered a reserve water supply in

a reservoir on the Enumclaw Plateau. Thus, when the stream flow dropped in the Snoqualmie River, Baker could offset the resulting loss in this plant's electrical power generation by raising production at the White River plant. Increasingly, Baker, as well as his rivals, recognized the strategic importance of the White River project.

Struggle on the White River

Baker's chief rival for the White River project emerged in 1899 in the form of the Stone & Webster Company, led by electrical engineers Charles Stone and Edwin Webster. The two men had founded the firm ten years earlier, shortly after they graduated from the electrical engineering program at the Massachusetts Institute of Technology. Initially involved in the design of electrical machinery for powerhouses and the testing of electrical equipment, Stone and Webster expanded their business to include the financial and technical evaluation of distressed electric properties. They forged an alliance with General Electric, which had substantial investments in many of the financially unstable electric companies.[16] With the encouragement of financial titan J. P. Morgan, the man largely responsible for organizing General Electric, Stone and Webster began acquiring poorly performing electrical properties. They often reorganized the financial and technical management of these companies, designed improvements to their physical plants, and oversaw all construction work.[17]

One such poorly performing electrical concern was Seattle's Union Electric Company. The largest electric utility in the city, Union Electric emerged in 1892 out of a consolidation of the Home Electric and Seattle General Electric companies. Dr. Edward C. Kilbourne, a Seattle dentist who speculated in real estate, street railways, and electrical properties, led Union Electric which operated two steam plants in Seattle's downtown.[18] Kilbourne, however, proved to be a poor manager, spending a great deal of time on outside business investments. Union Electric also lacked technical expertise and its electrical generating equipment, though only a few years old, was rapidly becoming obsolete.[19] With the company threatening to default on its bonds in 1897, the Pacific Northwest's General Electric agent Sidney Z. Mitchell recommended a reorganization of Union Electric. At Mitchell's urging, a group of Seattle businessmen, including William G. Grambs, manager of the Seattle Steam Heat & Power Company and a rival of Kilbourne, sought to form a new, larger electrical concern that would assume control of Union Electric's property. As a result of Mitchell's initiative, a syndicate composed of East Coast investors hired the firm of Stone & Webster to study Seattle's electric companies and street railways with the aim of forming one large concern. Charles Stone visited

Seattle in the fall of 1898 and the following year the syndicate hired Stone & Webster to undertake the consolidation venture.[20]

Under the Stone & Webster plan, the Seattle Electric Company was organized on January 19, 1900, for the purpose of taking over electrical properties. Agents of the banking syndicate proceeded to acquire either the plants or securities of the city's many small electric concerns and turned them over to the Seattle Electric Company. An agreement was made between the syndicate and the Seattle Electric Company, such that as properties were acquired and put into good operating condition, they were absorbed by the company, which would then issue its own securities in payment.[21] In this way, sixteen electric railway, light, and power companies operating in Seattle, including the Union Electric Company, were consolidated under Stone & Webster management by 1903. Although Stone & Webster served as general manager of the Seattle Electric Company, the firm never actually owned more than a small percentage of this company.[22]

In addition to developing the plan that led to the formation of the Seattle Electric Company, Stone & Webster underscored the need for greater electric power generation through the development of hydro power in nearby Cascade Mountain streams. The initial attempt to achieve this end saw Stone & Webster, in concert with Mitchell and Grambs, launch the Washington Power Transmission Company in early 1899. Their plan to develop a hydroelectric plant near Cedar Falls, however, was blocked by Seattle city officials who were completing a municipal waterworks in the Cedar River watershed. Aiding the municipal ownership advocates in their battle with Washington Power Transmission Company was a newly emergent and principal foe of Stone & Webster's interests in the Northwest, Charles H. Baker.

Nearing completion of his Snoqualmie Falls plant at the same time the Washington Power Transmission Company was pushing its Cedar Falls development, Baker recognized this rival firm, joined with the Mitchell-Grambs interests in Seattle, could effectively bar his Snoqualmie enterprise from doing business in Washington's largest city. Although his attempt to aid the municipal campaign against the Stone & Webster forces nearly backfired when a plaintive in a suit against the city to oust all private landholders in the watershed was revealed to be a close friend of Baker, the municipal ownership advocates defeated the Washington Power & Transmission Company in the summer of 1899.[23]

Much to Baker's chagrin, however, Stone & Webster's failure to develop a hydroelectric plant on the Cedar River was only a temporary setback for the Boston-based firm. In 1902, Stone & Webster formed the Columbia Improvement Company to construct a hydro plant, called Electron, on the Puyallup River in Pierce

County.[24] In the meantime, with Baker pushing forward his plan to build the White River project, Stone & Webster and Sidney Mitchell developed a two-part strategy for outmaneuvering the Baker interests: complete the Electron plant and block Baker's efforts on the White River.

The year 1904 saw Stone & Webster complete its first hydroelectric facility in the Northwest, the Electron plant.[25] Looking to challenge the Baker forces in the Cascades, Stone & Webster replaced the recently departed Sidney Mitchell with Samuel Shuffleton to take charge of its construction projects in Washington state. A self-taught engineer with only a primary-school education, Shuffleton, nonetheless, possessed virtually all of the qualities that Stone and Webster demanded of their engineers.[26] He toiled tirelessly, possessed an exceptional memory for detail, and was completely dedicated to the company. As one of his fellow engineers later recalled, Shuffleton "was second to none when it came to handling difficult construction, no matter how large or complicated."[27] He also enjoyed working with his hands and often cut a striking figure in the field, wearing grease-stained suits and a formal black derby. Though never well known outside of Stone & Webster circles, Shuffleton was one of the company's most successful engineers.

For Charles Stone and Edwin Webster, Shuffleton proved the crucial figure in their challenge to the Baker interests. As early as 1901, with financial backing from Stone and Webster, Shuffleton had begun acquiring land along the White River below the section on which Baker proposed to construct an intake for his hydroelectric works. In 1902, Shuffleton established the Tacoma Industrial Company, capitalized at a modest $150,000, for the purpose of developing a water power project on the White River. Shortly after this company was founded, Shuffleton conveyed to Tacoma Industrial all of the White River property to which he held title. Shuffleton then filed for water rights on the river and posted notices of the company's intentions near the Baker property.[28]

About the same time Shuffleton was filing his claim for water rights, Charles Baker was readying his plan for his White River project. He consolidated the Snoqualmie Falls Power Company, Seattle Cataract Company, and the Tacoma Cataract Company into the Snoqualmie Falls and White River Power Company. Capitalized at $3 million dollars, this new concern issued 20,000 shares of stock with all but five shares held by Charles Baker's father, William. The younger Baker assumed the role of company president and chief engineer. Borrowing heavily from Hawks' original White River hydroelectric design (though Baker never publicly acknowledged the work of Hawks), Baker publicized his project in one of the nation's leading engineering trade

journals. The project called for an intake on the river near Buckley and an eight-mile long canal, discharging water into Lake Tapps. (Baker proposed to rename this body of water Lake Dorothy, after his young daughter.) At the western end of the lake, a tunnel was to convey water into steel penstocks, which descended 450 feet to the base of the plateau and into the turbines, housed in a brick and steel-frame powerhouse. Water was to be discharged from the powerhouse into the nearby Stuck River. Baker claimed that the powerhouse was being designed for 10,000 horsepower but his future plans called for an additional 40,000 horsepower.[29] It was a plan Baker would never realize.

In December 1903 Baker decided to move against Shuffleton and his Tacoma Industrial Company, filing suit against the intruding firm in the Pierce County Superior Court. Baker claimed prior appropriation of water and sought to condemn the holdings of Shuffleton and others in the watershed. Shuffleton met this action with his own condemnation proceeding. He claimed his power development below Buckley would simply draw water from the White River, convey it a short distance to the powerhouse, and return it into the same stream. This legal action continued through 1903 when, in October, Charles Baker received news from Chicago that his father had died in his sleep.[30]

For Charles Baker, the several months after his father's death proved disastrous. In late October a fire struck his Snoqualmie Falls plant, putting it out of commission for a number of weeks. This was followed by a dispute between Charles Baker and his brother, Howard H. Baker, who was appointed administrator of their father's estate. At the instigation of Donworth and Howe, attorneys for Stone & Webster's Northwest interests, Howard Baker was asked to sell the Snoqualmie Falls and White River Power Company to his brother's competitors. Though Charles Baker vehemently opposed this action there was little he could do since he did not hold title to the property and controlled only a minority of shares in the Snoqualmie Falls and White River Power Company. Charles Baker also faced an insurrection led by company officer N. H. Latimer, who joined Howard Baker in calling for an alliance with the Stone & Webster interests. Although as president Baker vigorously tried to maintain the independence of his company, in the end he lost.[31] In October 1904, one year after the death of his father, Charles Baker was replaced as president by Latimer.[32] He ceased his engineering work in the Northwest, moving his family to New York where he was one of the organizers of the Muscle Shoals Hydroelectric Power Company. Baker later served as vice president of the American Cyanamid Company. He retired to Florida where he died in 1924.[33]

With the removal of Baker, the victorious Stone & Webster began planning an expansion to its newly acquired Snoqualmie

Falls plant while the firm looked to undertake the long-sought White River project. Under new management the Snoqualmie Falls and White River Power Company was reorganized as the Seattle-Tacoma Power Company. Though condemnation proceedings and a legal battle between a lumber company and the Stone & Webster interests delayed construction of the White River hydro works, the Pacific Coast Power Company, a Stone & Webster subsidiary, began work on the project in 1910.[34]

Construction History

Almost a half-dozen years lapsed after the Stone & Webster interests defeated Baker before construction commenced on the White River. While Stone & Webster's design was similar to the one of Hawks-Baker, it differed slightly in the location of the diversion dam and canal system, the position of embankments around Lake Tapps, and the site of the powerhouse and tailrace. Taking advantage of the topography, a part of the flow of the White River was diverted from its course near the town of Buckley and led across the low-lying plateau, through a seven-mile system of flumes, canals and settling basins, and into the large natural basin on the Enumclaw plateau, which contained four lakes named Tapps, Kirtley, Church, and Crawford. Through the construction of earthen embankments, the level of water within the basin was raised 35 feet, creating a large reservoir. At the western end of the reservoir, an outlet canal was built leading to the tunnel intake. Water was then delivered through the tunnel into the forebay and into steel penstocks, which conveyed water into powerhouse's turbines. Water was then returned to the river through a 2,000-foot long tailrace.[35]

Construction of the project was a major undertaking for the time, and the most up-to-date equipment and state-of-the-art construction techniques were used. Construction equipment for the job included fourteen locomotives, 130 ballast and dump cars, six steam shovels, twenty logging and hoisting engines, pile drivers, road rollers, Bagley scrapers, slip scrapers, well drilling machines and motors of up to 150 horsepower. Construction began early in 1910 with a crew of 100 men and by September of that year the workforce numbered over 1,500 men. The Pacific Coast Power Company housed its workers in seventeen camps between Buckley and Dieringer.[36] The project involved the construction of nineteen embankments and an extensive waterway system of settling basins, flumes, canals and tunnels, requiring the excavation of over 1.6 million yards of earth. The construction of the headworks included a 352-foot-wide, rock-filled, timber crib dam, a concrete intake structure, and a timber flume. A three-story concrete powerhouse was constructed to house the turbine-generator units. Numerous additional small buildings were built for project operation purposes. Lumber for

the project was supplied through the auxiliary construction of a sawmill. This was built near the outlet end of Lake Tapps in heavy-timbered country and could handle over 70,000 board feet per day.

The auxiliary construction of 17.5 miles of railroad greatly facilitated the development of the project. Railroad spurs were built from the Northern Pacific's main line at Dieringer and its branch line through Buckley. A standard-gauge railway was built on the plateau above the powerhouse and this ran around the northern edge of Lake Tapps to Buckley. The Pacific Coast Power Company also constructed an incline railway from the powerhouse to the top of the plateau. The incline railway was equipped with an electric hoist capable of pulling standard locomotives and loaded freight cars. This meant that freight cars containing supplies and equipment could be shifted directly from the Northern Pacific's main line into work areas on the plateau.

The railroad on the plateau and along the hydraulic canal was also useful in the construction of embankments. Steam shovels worked in cuts excavated for the canal system. Railroad tracks were laid into the cuts and dump cars were filled directly by steam shovels. These cars were hauled out of the cuts by means of locomotives and driven to the top of trestles which either spanned the natural outlet ravines of the Lake Tapps basin or bordered the northern margin of the settling basins. The excavated material was dumped over the trestle work and later compacted with steam rollers, kneaded with Bagley scrapers and puddled. The trestle work was gradually buried beneath the embankments.[37]

Through the construction of earthen embankments, the water level of four small lakes was raised 35 feet, creating a single large reservoir. Although the project was built with future expansion in mind, the initial development included two turbine-generator units which had a combined capacity of 25,000 KVA. At the time of installation, the horizontal Francis-type turbines utilized in the project were reported to be the largest of their kind in the world.[38] The entire project was completed in just twenty months, and power was delivered commercially for the first time on November 1, 1911.

Conclusion

As a result of the 1912 merger which created the Puget Sound Traction, Power & Light Company, the largest investor-owned utility in the state, western Washington's three major hydroelectric projects--the Snoqualmie Falls, Electron and White River--were organized under one company and operated as part of larger single generating system. The White River Project served

as the controlling plant of the system, accumulating water in its storage reservoir during off-peak periods and running at full capacity during peak periods. Storage could also be used to operate the plant continuously at full capacity for a considerable period of time, when the other plants broke down or during periods of low flow. Describing this system in 1915, Henry Gray reported:

> There is probably no hydroelectric system in the world which can compare in economy of construction and operation, and in general desirability, to the three plants in question. They have repeatedly demonstrated their worth and this will increase in the future. They utilize the best power sites on the western slope of the Cascade Mountains, and this is not to be wondered at, for as these sites were the first selected, they should in all reason be the best.[39]

Although the project has undergone continual maintenance and some structures have been modified, added, or removed, it retains the salient features of the 1911 system.[40] The major physical structures remain intact and the project now operates essentially as it did when it was originally constructed.[41]

ENDNOTES

1. This historical report was prepared by Gray Fitzsimons, Historian, HABS/HAER Division, National Park Service, and Barry M. Lombard, Environmental Scientist, Puget Sound Power & Light Company. The sections titled "Introduction," "Early History," and "Struggle on the White River" were prepared by Gray Fitzsimons which he adapted from Chapter 4 of his master's thesis, "The Perils of Public Works Engineering: The Early Development of Utilities in Seattle, 1890-1912," MA thesis, University of Washington, 1992. The sections "Construction History" and "Conclusion" were written by Barry Lombard.

2. Richard Hofstadter, Social Darwinism in American Thought (Boston, revised edition [1955]), 44-46.

3. Before a log jam in 1906 altered its path, the main channel of the White River flowed north at Auburn and joined the Green River which, at its confluence with the Black River, formed the Duwamish. Another fork of the White River at Auburn extended south to the Stuck River, a tributary of the Puyallup. After a severe flood deposited a mass of logs across the White River and completely obstructed the north channel, the entire flow of the river emptied into the Stuck River. See Puget Sound Power & Light Company, "White River Project: Application for License [of] Major Project at Existing Dam, Before the Federal Energy Regulatory Commission, November 1983," E3-1 to E3-3.

4. Hal Kennedy and Patrice Teltser, "Cultural Resource Overview," which appears in "White River Project: Supporting Cultural Resource Reports [for] the Federal Energy Regulatory Commission, FERC Project No. 2494, November 1983," copy in possession of Puget Sound Power & Light Company, 6-9.

5. Kennedy and Teltser, 10-15.

6. Richard White, "It's All Your Misfortune and None of My Own": A New History of the West (Norman and London, 1991), 249-50, 255.

7. Kennedy and Teltser, 15-16.

8. Before his appointment to the Northern Pacific, Tilton was surveyor for Washington Territory. See Edward F. Johnson, "Report of Edwin F. Johnson, Engineer-in-Chief, to the Board of Directors," in Northern Pacific Railroad: Charter and Amendments (Hartford, CT, 1869), 12-20, 79. For a recently published history of this railroad see Louis Tuck Renz, The History of the Northern Pacific Railroad (Fairfield, [WA], 1980).

9. See map produced by Tilton in Johnson, "Report of Edwin F. Johnson," 79.

10. Charles F. Scott, "Long Distance Transmission for Lighting," The Electrical Engineer, v. 13 (June 15, 1892), 601-03.

11. See W. E. Herring, "Water Powers of the Pacific Northwest," v. 1 (unpublished manuscript in the possession of the Puget Sound Power & Light Company), 313. After McHenry filed for water rights on the White River a number of other persons filed for the right to appropriate the river's water for "manufacturing purposes." None of these individuals were able to develop a power project. See Fidelity Security Abstract Company, "Abstract of Title to the following described Real Estate in Pierce County, Washington," (1893-1897), a copy of which is in the possession of Puget Sound Power & Light Company.

12. Born in Detroit in 1865, Archie McLean Hawks received a high school education in Rhode Island, after which he was apprenticed to J. Herbert Shedd, a well-known hydraulic engineer. In 1886 Hawks went west to work as a construction engineer for the Union Pacific Railroad in Wyoming and Colorado. One year later he was appointed assistant engineer for the Chicago, Milwaukee, St. Louis & Pacific Railroad on the construction of a bridge across the Missouri River in Kansas City, Missouri. Soon after, Hawks served as consulting engineer for water and power projects in St. Louis and Monmouth, Arkansas. In 1889 he relocated to Denver where he was chief engineer and general manager of the city's West End & Electric Railway Company. Hawks moved to Tacoma in 1891, remaining there until his death at the age of ninety-seven in 1963. For information on Hawks see Harold Prosser, History of the Puget Sound Country, v. 2 (New York and Chicago: Lewis Publishing Company, 1903), 477-79; and Hawks' obituary in The Tacoma News Tribune, March 14, 1963.

13. W. H. Code to the U.S. Department of the Interior, U.S. Indian Services, June 25, 1903, Record Group No. 75, National Archives, Federal Records Center, Sandpoint, WA.

14. This quote is from Daniel Gilman, a business promoter of the Snoqualmie Falls hydroelectric project in the 1890s, in Robert C. Nesbit "He Built Seattle": A Biography of Judge Thomas Burke (Seattle: University of Washington Press, 1961), 284.

15. William Code, U.S. Indian Inspector to the Secretary, U.S. Department of the Interior, June 25, 1903. A copy of this letter is in the possession of the Puget Sound Power & Light Company.

16. As historian Thomas Hughes has noted, a syndicate called the Street Railway and Illuminating Properties Trustees was established during the panic of 1893 and received control of unseasoned and salable securities of street railway and electric light companies. General Electric had held many of these

securities in lieu of cash from the companies it had licensed and provided with electrical machinery. With the Trustees unable to evaluate these poorly performing companies, the syndicate requested the services of Stone & Webster. See Hughes, "Stone, Charles Augustus and Edwin Sibley Webster," Dictionary of American Biography: Supplement 3, 1941-1945 (New York, 1973), 745.

17. This kind of work constituted one of the major activities of the Stone & Webster organization. In several cases, most notably the rehabilitation of the failing Nashville Electric Light & Power Company of Nashville, Tennessee, the Stone & Webster was highly successful. As the son of Charles Stone observed, "By 1898 ... Stone & Webster's activities were expanded to include a financial interest in several additional electrical properties which their experience identified as bright prospects for development through the application of sound engineering, skill in management and conservative financing." See Whitney Stone, "History of Stone & Webster, 1889-1966," (n.p., May 1966), 7.

18. Born in Vermont in 1856, Edward C. Kilbourne followed his father and grandfather into the dentistry profession. He received a public school education and then learned the practice of dentistry from his father. In 1883, Kilbourne moved to Washington state and established a dental business in Seattle. Five years later he gave up dentistry to promote his other business interests, including real estate and street railways. One of these railways, the West Street and Lake Union, was among the first electric lines on the Pacific Coast. In 1890 Kilbourne shed his interests in street railways to concentrate on electric power and lighting. He formed the Pacific Electric Company, which was succeeded by the Home Electric Company. In 1892, following the formation of Union Electric (which was a consolidation of Home Electric and the Seattle General Electric Company), Kilbourne was named its president and general manager. See the biographical sketch on Kilbourne in Bagley, History of Seattle, v. 2, 766-69.

19. Of the two plants that Union Electric acquired with the consolidation of the Seattle General Electric Company and the Home Electric Company, the plant of Seattle General Electric was the larger of the two operations. Its powerhouse included a 650-horsepower Corliss steam engine and a 100-horsepower Ball Automatic steam engine, two Edison 800-light dynamos, two Edison 1,000-light incandescent dynamos, two Edison 1,075 incandescent-light dynamos, one Edison fifty arc-light dynamo, and seven Thomson-Huston fifty arc-light dynamos. The company also owned 355 double-arc lamps, sixty single-arc lamps, 900 Edison incandescent lamps for municipal lighting, and 1,950 Edison incandescent lamps for domestic lighting.

The smaller plant of the old Home Electric Company featured two 160-horsepower and three 200-horsepower Armington-Sims steam engines, three Thomson-Huston 1,300-light incandescent dynamos, two Westinghouse 750-light incandescent dynamos, four Thomson-Huston fifty arc-light dynamos, three Waterhouse thirty-five arc-light dynamos, and one fifty-kilowatt Edison alternating-current generator. Home electric served mostly homes and commercial establishments and owned 253 double-arc lamps and 5,069 domestic incandescent lamps. This property is listed in the Puget Sound Power & Light Company Papers, University of Washington, University Archives and Manuscripts Division (hereafter PSP&L Papers), Box 220, File "Union Electric Company," in the "Minutes of the Board of the Union Electric Company, February 29, 1892."

20. For information on the financial difficulties of Union Electric see "Minutes from the Board of the Union Electric Company" for June, and July, 1897, in the PSP&L Papers, Box 220, File: Union Electric; Mitchell's role in the directing the affairs of Union Electric and his link to the Stone & Webster interests see "Minutes from the Board of the Union Electric Company for March and May, 1899, as well as the Seattle Times, April 29, 1899. Frank Dabney, "Twenty-five years of Operation under the Stone and Webster Management of the Light and Power Properties of Seattle" Seattle Electric Journal (March, 1925), 1.

21. Henry L. Gray, "Report on the Puget Sound Traction, Light and Power Company," unpublished report in the possession of Puget Sound Power & Light Company, dated 1915, 38.

22. Puget Sound Power & Light Company, "Handbook of Puget Sound Power & Light Company," handbook published in 1923 by Puget Sound Power & Light Company (copy in possession of Puget Sound Power & Light Company), 7.

23. Seattle Post-Intelligencer, April 19, 1899. When Charles Baker instituted a suit against the city to block Stone & Webster's Cedar Falls development, Seattle residents found themselves caught in the middle of a battle not only between two rival power companies, but also between two giant competing electrical manufacturers, Westinghouse and General Electric. One of Seattle's newspapermen observed that the Baker interests, supported by Westinghouse, were "fighting to the death the Union Electric Company of Seattle, which is a branch of the General Electric Company of New York." At the same time, the Washington Power Transmission Company sought to build its plant above the city's Cedar River water supply. If the company realized this power project, the same newspaperman wrote,

> [it] will then be in a position to say to its rival: 'we've got you just where we want you.

> Unless you sell us the Snoqualmie plant and get out of the country we will go to Cedar River, build a plant and run you out. We have the Seattle business now and you will not be able to cut under out rates for power.' The expectation is that the Bakers would see the advisability of selling and then the General Electric, alias the Union Electric, alias the Washington Power [Transmission] Company, would purchase the Snoqualmie Plant, make no further move to placing a plant on Cedar River and would have the wished for monopoly on Puget Sound.

For this quote and coverage of the growing rivalry between Baker and the Stone & Webster forces see the Seattle Star, April 19, 1899. For the Seattle city engineer's report that supported condemnation of the Washington Power Transmission Company's Cedar River property see the Seattle Star, August 9, 1899.

24. Whitney Stone "History of Stone & Webster," 9-11.

25. "The Puyallup River Water Power Development Near Tacoma Washington -- I," Electrical World and Engineer, v. 44 (October 1, 1904), 553-58; and "The Puyallup River Water Power Development Near Tacoma Washington -- II," Electrical World and Engineer, v. 44 (October 8, 1904), 612-15.

26. Shuffleton left school after the sixth grade and subsequently worked as a machinist in his hometown of Eureka, California. In 1890, at the age of twenty-six he moved to Seattle where he obtained a job in the Spring Hill Water Company's Lake Washington pumping plant. After working there for a short time, he found employment as a realtor and business agent. In 1892 Shuffleton accepted an offer from Seattle businessman Daniel Gilman to manage the operations of the powerhouse of the West Street & North End Railway. Prior to his taking over, the powerhouse had been a drain on the company's finances. Under Shuffleton's management, however, it was operated efficiently and its expense decreased substantially.

As a result of his skillful operation of street railway's powerhouse, Shuffleton caught the attention of Judge Thomas Burke, a partner in the West Street & North End, and in 1894 he accepted a position as manager of the Burke Block. Judge Burke owned this downtown office building which contained in its basement a power plant, constructed in 1889, to light the multi-story structure. By 1895 Shuffleton was serving manager of the Seattle Consolidated Railway Company. This was followed by his appointment as president and general manager of Burke's financially troubled West Street & North End Railway. After this

line fell into the hands of a receiver in 1900, Shuffleton returned to the Burke Block. He remained there for only a short while before Stone & Webster hired the self-taught engineer to work on a series of stream-gauging projects in the Cascade Mountains. For biographical information on Samuel Shuffleton see William D. Shannon, "Samuel L. Shuffleton: Vice President, Stone and Webster Engineering Corporation," unpublished manuscript dated June 1969, in a file titled "Shuffleton, S. L." in the William D. Shannon Papers, University of Washington, University Archives and Manuscripts Division.

27. David H. Redinger The Story of Big Creek, (Los Angeles, 1949), 33-34.

28. See the minutes from the first meeting of the Tacoma Industrial Company, October 14, 1902, in the PSP&L Papers, Box 217, File: "Tacoma Industrial Company."

29. "A Hydroelectric Power Development," The Engineering Record, v. 46 (November 29, 1902), 522.

30. Charles H. Baker, Life and Character of William Taylor Baker (New York, 1908), 256.

31. This account of Baker's struggle to retain his company is drawn in part from Baker, Life and Character, 256-66. Although Charles Baker's version of this excruciatingly stressful struggle is often self-serving and occasionally paranoid in tone, his facts are generally accurate. A look at the minutes from the board meetings of the Seattle-Tacoma Power Company from 1905 bears witness to Baker's account of these facts. These minutes are found in the PSP&L Papers, Box 167 and 216.

32. This meeting of the trustees of the Snoqualmie Falls and White River Power Company in October, when Baker was replaced as president, signaled the reorganization of this concern into the Seattle-Tacoma Power Company. See the PSP&L Papers, Box 216, "Minute Book of the Snoqualmie Falls and White River Power Company," October 20, 1904 and October 28, 1904.

33. "Charles Hinckley Baker," Transactions of the American Society of Civil Engineers, v. 89 (New York; 1926), 1552.

34. In November 1908, the Pacific Coast Power Company began condemnation proceedings against members of the Muckleshoot Indian reservation who had been allotted land along the White River. Preliminary hearings were held in the Superior Court at Seattle in December 1908, in which the proper order adjudging public use was entered in each case and the question of compensation was directed to be tried by jury. Hearings were

eventually held before the Superior Court of the State of Washington, and decrees appropriating the right to divert water were issued in April 1910. See copy of memorandum from George Donworth, "General History of White River--Lake Tapps Power Enterprise," May 14, 1909, in W. E. Herring, Water Powers of the Pacific Northwest (Puget Sound Power & Light Company, Bellevue, Washington, 1916), vol. I, 322. For the case involving the lumber company see the testimony of Samuel L. Shuffleton, Sumner Lumber and Shingle Company v. Pacific Coast Power Company, in the Superior Court of the State of Washington for Pierce County, 1911.

35. Unless otherwise noted the construction history of this section is drawn from Stone and Webster Engineering Corporation, White River Development in the Puget Sound District of the State of Washington (Boston, 1912).

36. Testimony of Samuel L. Shuffleton, Sumner Lumber and Shingle Company v. Pacific Coast Power Company, in the Superior Court of the State of Washington for Pierce County, 1911, 330-331.

37. Stone and Webster, Construction Photographs of the White River Hydroelectric Project, housed in the University of Washington's Northwest Collection, Photograph Nos. 412, 436, 440, 455, 458, 460, 535, 543, 570, all dating from 1910-11.

38. Arnold Pfau, "The Largest Hydraulic Turbines in the World," Engineering News, v. 67 (April 18, 1912), 730-734. F. Schmidt, "The Most Powerful Turbine in the World," Journal of Electricity, v. 40 (February 15, 1918), 168.

39. Henry L. Gray, "Report on the Puget Sound Traction, Light and Power Company," unpublished report in the possession of Puget Sound Power & Light Company, dated 1915, 38.

40. Lentz, "The White River Hydroelectric Project: An Historical Assessment," in "White River Project: Supporting Cultural Resource Reports [for] the Federal Energy Regulatory Commission, FERC Project No. 2494, November 1983," 29.

41. Richard E. York, "Pioneering Electric Progress for More Than 50 Years in the Puget Sound Area," published by the Public Relations Department, Puget Sound Power & Light Company, 1962), 4; Lentz, 28.

APPENDIX: HISTORIC BUILDINGS AND STRUCTURES OF THE WHITE RIVER HYDROELECTRIC PROJECT

WRITTEN BY GRAY FITZSIMONS, HAER, 1994

HEADWORKS

Timber Crib Diversion Dam at Buckley

The timber dam across the White River at the Buckley headworks was completed in 1910 and diverted water through the headworks and into the hydraulic canal, which delivered water to Lake Tapps, the reservoir for the powerhouse. Stone & Webster engineers designed the dam in accordance with the wildly fluctuating flow of the White River. Measuring 352′ in length, the low dam--the crib structure is 4′ high and supports the 7′ high flashboards--permitted the passage of flood waters and drift without damage to the permanent crib structure. The dam was intended not to store water but to control its flow through the headworks. The flashboard system was constructed to allow the water level to be raised 7′ to an elevation 671′ mean-sea-level and was designed to collapse automatically in flood waters. The dam contains a mat of mass concrete, resting on timber piles driven into impervious hardpan, and gravel-filled timber cribbing. The sill beams of the timber cribbing are embedded in the concrete. Timber planking, spiked on top of the cribbing, was installed to carry the water over the mat without washing out the gravel. Reinforced concrete wing-walls confined the river to its course and protected the banks from erosion.

Prior to the construction of the crib dam, the Pacific Coast Power Company built a coffer dam upstream which diverted water around the site of the crib dam on the side of the river opposite the headworks intake. A wooden trestle was then erected across the river along the length of the proposed crib dam. Railway tracks were laid upon the trestles for moving equipment and materials during construction. Pile drivers were later used to drive a row of piles along either side of the trestles prior to pouring the concrete mat.

Three years after the Pacific Coast Power Company completed the dam, construction workers returned to the site to upgrade the fish ladder. Excavation at the dam, which began in August 1913, was marred by the death of a worker, Robert Jay, who was killed during the blasting for the new ladder. Work continued through September and the end of October when White River superintendent George Sears observed, "the Fish Ladder at Buckley will be completed early in the week." This fish ladder remained substantially unaltered until 1940 when the U.S. Army Corps of Engineers built a fish trap to capture spawning salmon and truck them above the newly completed Mud Mountain Dam.

In 1918 an aerial tram was erected for servicing the dam. As the White River superintendent noted in his January report, "Work has commenced on the installation of a cableway over the dam at Buckley. This is to be used for placing and removing flashboards from the dam and also for removing drift lodged against the dam." Originally wood towers supported the cable

which was anchored with a concrete deadman on the south side of the dam and was attached to a tree on the north side. In May 1926 the superintendent reported that workers were constructing a concrete deadman in place of the tree because the wood had deteriorated. Three years later a new creosoted wood A-frame was built on the north shore to support the cable. Further changes to the aerial tram occurred in 1930 when the wood A-frame on the south side was replaced with a steel tower. (Subsequently, Puget Power erected a steel tower on the north side of the dam; these towers remain standing.)

The flashboard system functions today much as it did when the dam was completed in 1910. The flashboards of the dam are supported by steel posts which are hinged to an indented flat steel plate drift-bolted into the wood beams of the crib dam. Tie rods support the posts on the upstream side and are permanently secured to the dam structure at their lower end. They are connected to the top of the posts by resting in a double U-type slot. These are designed to break free at flows in excess of 3,000 cubic-feet-per-second or they can be removed manually. With the exception of the steel posts, the dam retains much of its original appearance.

References:

Pacific Coast Power Company, "Details of Gatehouse at Headworks," 1 sheet of drawings, June 27, 1911, drawings in possession of Puget Sound Power & Light Company, White River Powerhouse.

Stone & Webster Engineering Corporation, White River Development in the Puget Sound District of the State of Washington (Boston: Stone & Webster Engineering Corporation, 1912).

Superintendent, White River Station, "Monthly Report," August 1913, September 1913, October 1913, January 1918, May 1926, August 1929, and August 1930, in the possession of Puget Sound Power & Light Company, White River Powerhouse.

Telephone interview with Orion Osgood by Gray Fitzsimons, April 12, 1985.

Buckley Headworks Intake and Vertical Lift (Stoney) Gates

In 1909, Samuel L. Shuffleton, the chief engineer of Stone & Webster's western operations, ordered a small crew of men to commence clearing and grubbing the intake site of the future White River hydroelectric project. Located on the White River near the town of Buckley, the headworks intake was initially excavated by hand. Early the following year, the Pacific Coast Power Company, a subsidiary of Stone & Webster and contractor for the White River project, began construction of the entire headworks and flowline. Workers laid a rail line called the

"Webstone spur" from the Northern Pacific Railroad tracks at Buckley to the headworks site, a distance of about one-half mile. Steam shovels and railway dump cars were then brought in to handle the heavy excavation work. Excavation for the intake and flow line continued over the next year. By June 1911, the concrete retaining walls around the intake were complete and by late-August the contractor finished the headgate house and the vertical lift gates.

The two Stoney gates, separated by a concrete pier, each measure 15'-6" in width and 13'-0" in height. Each gate was designed to accommodate about a dozen stop logs (12" x 12" timbers measuring 15'-6" in length), inserted across the steel frames of the gates. The Stoney gates are raised and lowered by a series of worm wheels and steel shafts connected to cast steel pinions. Inside the headgate house, a nine-horsepower Fairbanks-Morse gasoline engine was orginally used to power the gates.

Upstream from the Stoney gates, a steel frame was erected across the intake to hold another set of stop logs and to serve as a walkway from the operator's cottage to the headgate house. At the mouth of the intake, parallel to the river's flow, a log boom was employed to keep drift away from the intake. In July 1911, Samuel Shuffleton ordered the removal of the stop logs from the steel frame below the walkway; thus, for the first time White River water flowed into the headworks. In November 1911, the White River Powerhouse came on line and thereafter the Buckley headworks has been in continuous operation.

The intake and Stoney gates have undergone little alteration over the years. In 1918, the Fairbanks-Morse gasoline engine in the headgate house was replaced with an electric motor. During the 1930s, Puget Power removed the old "Webstone spur," which ran along the south side of the headworks. By then, materials were simply trucked to the headworks. Although periodic flooding of the White River, prior to the Army Corps of Engineer's Mud Mountain Dam in 1940, posed a threat to the intake it was never seriously damaged. The entire Buckley headworks continues to function much as it did in 1911.

References:

Pacific Coast Power Company, "General Arrangement of Headgates and Operating Machinery," 1 sheet of drawings, May 11, 1911, drawings in possession of Puget Sound Power & Light Company, White River Powerhouse.

Stone & Webster Engineering Corporation, White River Development in the Puget Sound District of the State of Washington (Boston: Stone & Webster Engineering Corporation, 1912).

Superintendent, White River Station, "Monthly Reports," November 1918 and March 1939, reports in the possession of Puget Sound Power & Light Company, White River Powerhouse.

"The White River Power Development in Washington," Engineering News, v. 67 (April 11, 1912): 704-07.

Headgate House

Constructed at the Buckley headworks in 1910-11, the concrete-frame headgate house is similar in appearance to two other gatehouses of the White River hydroelectric system. The Pacific Coast Power Company, under the auspices of Stone & Webster, designed the one-story, square-shaped buildings in a uniform fashion with some fine detailing in the concrete work. Pilasters at the four corners of each of the gatehouses included concrete entablatures. Parapet walls were designed at slightly varying heights to give each building a uniformly square appearance (the roofs actually slope slightly to facilitate the drainage of rainwater). All buildings originally contained wire glass panes for the double-hung sashes and the transoms. The headgate house at the Buckley headworks, measuring 14′ x 14′, was built to control the vertical intake gates. Water was allowed to first enter through the intake on July 1, 1911. Orion Osgood, the first headgate operator, supervised the control of the headgates for nearly forty years. Complaining that the wire glass permitted too little light into the building, Osgood had clear glass panes installed their place. The building is presently in good condition and retains much of its original appearance.

References:
Pacific Coast Power Company, "Details of Gatehouse at Headworks," 1 sheet of drawings, June 27, 1911, drawings in possession of Puget Sound Power & Light Company, White River Powerhouse.

Stone & Webster Engineering Corporation, White River Development in the Puget Sound District of the State of Washington (Boston: Stone & Webster Engineering Corporation, 1912).

Telephone interview with Orion Osgood by Gray Fitzsimons, April 12, 1985.

Headgate Tool House

As early as 1918, a timber-frame tool shed was erected near the headgate house at the Buckley headworks. During the early 1930s this tool house consisted of a one-story building with a shed roof and clapboard siding. Fixed sashes (the same ones that exist along the south facade of the present tool house) provided the interior with natural light. In March 1937, the tool house was remodeled and enlarged. The building, raised to one-and-one-half-stories, contained a gable roof covered with corrugated metal. Orion Osgood, the headworks attendant, supervised the

erection of the tool house and he likely oversaw the construction of an improved fish trap and hauling mechanism. A concrete foundation wall supported the building in its new location. At an unknown date a brick chimney was installed along the east facade to serve as a flue for a wood stove. With the exception of the brick chimney, the building retains its 1940s appearance.

References:
Superintendent, White River Station, "Monthly Report," March 1937, in the possession of Puget Sound Power & Light Company, White River Powerhouse.

Telephone interview with Orion Osgood by Gray Fitzsimons, April 12, 1985.

Headworks Machine and Blacksmith Shop and Tram-Control House

Although the machine and blacksmith shop probably dates from c. 1912, the wing containing the tram-control house was built in 1918. Its construction accompanied that of the overhead tram which was installed to service the flashboards of the timber crib diversion dam. The building housed an electrically powered windlass consisting of wire rope cable wound around steel drums attached to the overhead tram. Narrow slits cut along the north wall permitted the cable to pass through the building. A glass double door overlooking the White River provided the hoist operator with an unobstructed view of the tram. Initial operation of the tram and hoist occurred in late summer of 1918 when repair of the dam, severely damaged form the high water of the previous winter, was carried out. Orion Osgood, the headworks attendant, supervised the work. The tramway saw frequent use thereafter in the replacement of flashboards and the removal of debris around the dam. A new electric motor was installed in the hoist house in 1923. In 1940, the tram was operated to transport the newly installed U.S. Army Corps of Engineers fish trap from the headworks fish ladder to a tank truck. The Corps then deposited the fish in streams above the Mud Mountain Dam after its completion in the 1940s.

The interior of the machine and blacksmith shop, as well as the interior of the tram-control house, appears to be little altered from its original condition. At an unknown date an asphaltic covering was placed on the gable roof; however, the entire building retains much of its early twentieth century appearance.

References:
Superintendent, White River Station, "Monthly Reports," April 1914, January 1918, July 1918, September 1918, May 1923, and October 1940, reports in the possession of Puget Sound Power & Light Company, White River Powerhouse.

Headworks Aerial Tram

In order to repair the flashboards of the timber crib dam, the Puget Sound Traction, Light & Power Company installed an aerial tramway and electric hoist in 1918. Construction began in January 1918 with Orion Osgood, the headworks attendant, supervising the work. By late summer the tramway was placed in operation, facilitating repair of the dam which had suffered extensive damage during the previous winter flooding. Originally the tramway consisted of a wire-rope main-cable, 1-3/4" in diameter, spanning nearly 350' across the White River. Timber "A" frames on the north and south river banks served as the towers for the cable. On the south side of the river, the cable was attached to a large U-bolt anchored into a concrete deadman. The cable on the north river bank was merely attached to a large tree. George C. Sears, Superintendent of the White River Power Project, reported in September 1918 that the new tramway was very helpful in removing drift and repairing the dam.

The hoist operator controlled the aerial tram from the electric-powered winch situated in an addition to the timber-frame machine and blacksmith shop. Located on the river's south side on the hill overlooking the headworks, the tram control house contained double glass doors through which the operator had an unobstructed view of the tramway. In 1926, the company installed a concrete deadman on the north side of the river replacing the old tree which had anchored the main cable. Three years later a new creosoted and pressure-treated wood A-frame replaced the original wood tower on the north shore. In 1930 the wood A-frame on the south side of the dam was replaced with a fabricated steel tower. Following a 1933 inspection of the tramway, the company assigned a maximum live load of five tons at center of the cable. In 1936, a 2-1/4" diameter wire rope replaced the original main cable. At an unknown date (probably the 1940s), the wood A-fame tower on the north side of the dam was replaced with a steel structure similar to the tower on the south side. Presently the tramway functions in similar fashion to its original operation.

References:

Puget Sound Traction, Light & Power Company, "Cable Way for Headworks at Buckley," 1 sheet of drawings, August 15, 1918, in the possession of Puget Sound Power & Light Company, White River Powerhouse.

Superintendent, White River Station, "Monthly Reports," January 1918, September 1918, May 1926, August 1929, October 1930, August 1933, and December 1936, reports in the possession of Puget Sound Power & Light Company, White River Powerhouse.

Headworks Operators's Cottage, Shed and Garage

Along with the construction of the timber crib diversion dam, concrete gatehouse, intake gates and wood flume, Stone Webster's Pacific Coast Power Company erected this one-and-one-half-story bungalow as a residence for the Buckley headworks operator. Orion Osgood, the first attendant, supervised the building of the cottage which he was to occupy for over forty years. (Prior to the completion of this house, Osgood lived in a tent at the headworks.) When completed in early 1912, the cottage contained a steeply-pitched, cedar shingle gable roof, two brick chimneys, shiplap siding painted white, long, narrow double-hung sashes, wood and glass-pane doors, and a wrap-around front (west) porch. The house measured approximately 38' x 28'. A woodshed, located at the rear of the house, contained a shed roof and matching rustic siding painted white.

Several years after the cottage was completed, Osgood built a wood frame garage which he attached to the woodshed. An east wing was also added to the cottage. At an unknown date the wrap-around porch and wood railing along the entire west facade was removed. Only the porch along the north facade was retained. The northernmost chimney was also removed at an unknown date. Other alterations include the replacement of the original wood and glass-panel front door with an all-wood door, the removal of most of the double hung-sash windows in favor of large, fixed glass panes, the elimination of the doorway along the north facade, the installation of a new doorway along the west wall, and finally the replacement of cedar roof shingles with asphaltic shingles. The present concrete walkway around the front of the house may date from the 1920s--originally an elevated wood walkway ran from the front porch to the wooden stairway leading down to the headgate house. The cottage continues to serve as a residence for the headgate operator.

References:

Pacific Coast Power Company, "Four-Room House at Headworks," 1 sheet of drawings, September 16, 1911, drawings in possession of Puget Sound Power & Light Company, White River Powerhouse.

Stone & Webster Engineering Corporation, White River Development in the Puget Sound District of the State of Washington (Boston: Stone & Webster Engineering Corporation, 1912), 5, 9.

Telephone interview with Orion Osgood by Gray Fitzsimons, April 12, 1985.

Headgate Relief Operator's Cottage

Following Japan's surprise attack on Pearl Harbor on December 7, 1941, thousands of civilians and military personnel

mobilized to defend the West Coast against a possible invasion. The U.S. Army assigned numerous officers and enlisted men the task of guarding against sabotage the nation's major industrial plants and power generating facilities. Puget Power employees of both the White River and Electron hydroelectric stations witnessed the presence of army troops as two small squads were sent to patrol the hydro-projects. Orion Osgood, the Buckley headworks attendant for over forty years, beginning with its initial operation in 1911, claimed that the residence now known as the "relief operator's cottage" and overlooking the intake, was built with his help in c. 1942 to house the soldiers. Mr. Osgood recalled that Puget Power paid for the construction of the cottage. The site of the small, frame cottage, according to Osgood, contained an old homestead cabin that had burned to the ground a few years after operations commenced at the headworks. After completing the new residence, a captain and three enlisted men stayed at the Buckley headworks for several months. When it became apparent that there was little chance of sabotage at the White River project, the army transferred these men elsewhere. Immediately thereafter, Osgood's relief man moved into the cottage. (Previously the relief operator shared the headgate operator's cottage that Osgood, his wife, and three children occupied.)

Although the original appearance of the relief operator's cottage is not known, its exterior has undergone a few alterations. Several of the double-hung sash windows have been replaced with fixed glass panes and a contemporary aluminum screen door was installed at the front (south) entrance. The cedar-shingled roof, asbestos siding, and wood-frame screen door at the side (east) entrance appear to date from c. 1942. The only ornamentation on the exterior is found in the slightly curved roofs and wooden brackets which extend above each entrance of the cottage.

References:

Oral interview with Emmitt Chase, Puget Power Mechanic, Foreman, and Operator of the Electron Powerhouse from 1933-56, by Martin E. Vaughn and Barry M. Lombard of Puget Power, and Lisa E. Soderberg, State of Washington, Office of Archeology and Historic Preservation, August 8, 1984, transcript in possession of Puget Sound Power & Light Company.

Stone & Webster Engineering Corporation, White River Development in the Puget Sound District of the State of Washington (Boston: Stone & Webster Engineering Corporation, 1912), 5, 9.

Telephone interview with Orion Osgood by Gray Fitzsimons, April 12, 1985.

Headworks Crew Quarters

The timber-frame Crew Quarters was probably built in the 1930s when Puget Power transferred its lumber treatment operation from Electron to White River. At this time, the sawmill at the Buckley headworks expanded to handle greater amounts of lumber. In the late-1920s, the company purchased larger vats for treating an even larger volume of lumber. Workers using an overhead crane dipped the wood members into a heated arsenic solution. The lumber was then used in the repair of the timber flume and lined canal at White River, and the flume at Electron. Located near the sawmill, the Crew Quarters served as lunch room and rest area for the sawmill and wood treatment crews, the flume repairmen, and the headworks crew. In addition, a large windowless section of the building was used as a warehouse. With the exception of the recently installed interior finishes in the office, the Crew Quarters remains largely unaltered. Its rustic style, namely the cedar shingle and board-and-batten siding, harmonize well with the other timber frame utility buildings. The Crew Quarters is located on the site where a large, timber-frame warehouse and carpenter shop existed which Stone & Webster's Pacific Coast Power Company constructed along with the headworks in 1910-11. Nothing is left of this earlier structure.

References:
Superintendent, White River Station, "Monthly Report," June 1935, report in the possession of Puget Sound Power & Light Company, White River Powerhouse.

Northern Pacific Railroad, Concrete Arch Culvert

With the completion of the Northern Pacific Railroad across the Cascades via Stampede Pass in May 1888, Eastern and Western Washington were at last directly linked by a railway. The route of the Northern Pacific west of the Cascades followed the Green River to Palmer junction where it divided with one line veering southwest through the towns of Enumclaw, Orting, and Puyallup. The railroad crossed the White River south of Enumclaw near Buckley. In 1910, Stone & Webster's Pacific Coast Power Company began excavating for the timber flume at the Buckley headworks crossing underneath the Northern Pacific line. A temporary steel plate girder bridge was used by the railroad while the centering for the new concrete arch culvert was erected. Stone & Webster engineers designed the culvert to span across the 28′ wide flume. When completed the arch contained a clear span of 31′ and its width of 100′ was designed to accommodate two lines of track. The letters "P.C.P.Co." (for Pacific Coast Power Company) were inscribed in the key of the arch. By the fall of 1911, workers had finished placing the earth fill over the culvert. Double tracking was then laid across the new railroad bed.

Recently, the Burlington Northern Railroad, owner of the old NPRR, eliminated the Stampede Pass route, removing the trackage and many of the bridges. The old trestle crossing the White River was demolished and the tracks crossing the timber flume were taken up. The concrete arch culvert, however, still stands retaining much of its original appearance. The inscription "P.C.P. Co." is the sole identifying marker of the Pacific Coast Power Company throughout the entire White River project.

References:
Charleton Ogburn, Railroads: The Great American Adventure (Washington, D.C.: National Geographic Society, 1977), 58, 68.

Stone & Webster Engineering Corporation, White River Development in the Puget Sound District of the State of Washington (Boston: Stone & Webster Engineering Corporation, 1912), 7-9.

Gatehouse and Main Tunnel Intake

During the spring and summer of 1911, Stone & Webster's Pacific Coast Power Company erected the gatehouse and portal of the main tunnel intake. A rail spur running eastward from the incline railroad at Dieringer was built to carry construction materials to the site. By late July, the massive reinforced concrete wingwalls capped with concrete pylons were complete. The entrance to the 3,000' long, 12' diameter, concrete-lined tunnel was located at the base of the portal. Workers completed construction of the gatehouse during the month of August. It measured 17'-7" x 17'-7" and contained wood double doors and wire glass transoms at the east and west facades. A pair of large double hung sashes with wire glass were installed at the north and south facades. In October 1911, engineers permitted water to flow into the main tunnel when the penstock lines and turbines were initially tested. An electric motor raised and lowered the large steel gate. (A smaller bypass gate was manually operated.) Specially designed rakes, running up and down the steel trash racks, were controlled by electrically powered windlasses. The operator used the rakes to remove any debris that accumulated around the intake. Stone & Webster retained the rail spur to the gatehouse in order to service the intake operation. After the White River powerhouse went on line in November 1911, the main tunnel gate was rarely closed. Only during inspection of the concrete-lined tunnel and the steel penstocks was the main gate closed.

Over the years, a number of changes were carried out at the intake and gatehouse. The rail spur serving the gatehouse was abandoned probably in the early 1920s. In 1927, Puget Power removed the rail spur and built a dirt road along the old railroad grade. By 1939, all the wire glass sashes had been replaced with galvanized sheet metal. Only the glass transoms

above the wood double doors permitted natural light into the building. At an unknown date, the double door on the west side of the building was replaced with a single wood door. Recently, because of problems with vandalism, the window openings were infilled with concrete block and a tall chain-link fence was installed around the intake. In addition, Puget Power removed the original overhead electric line which ran to the gatehouse replacing it with a buried cable. Despite these alterations (the most drastic being the infilling of the windows), the gatehouse and the main tunnel intake retain much of their original fabric, including their distinctive concrete work. Though designed to appear utilitarian, in accordance with its function, the gatehouse contains some neo-Classical elements, namely symmetrically placed pilasters, and an inscribed cornice, parapet walls, and inscribed entablature.

References:
Pacific Coast Power Company, "Section thru Centerline 12′-0" Diameter Tunnel Forebay at Tunnel Entrance," 2 sheets of drawings, June 1, 1911 and June 23, 1911, in possession of Puget Sound Power & Light Company, White River Powerhouse.

Stone & Webster Engineering Corporation, photographs of White River hydro construction, 1910-11, photo nos. 787, 839, 864, 880, and 990, in possession of Puget Sound Power & Light Company, White River Powerhouse.

Superintendent, White River Station, "Monthly Reports," September 1927 and June 1939, in possession of Puget Sound Power & Light Company, White River Powerhouse.

Telephone interview with Robert G. Vogeler, White River Hydro Superintendent, by Gray Fitzsimons, April 29, 1985.

Circular Forebay and Gatehouse

The circular forebay marks the terminus of the 3,000′ long main tunnel and the origin of three concrete pipes that connect with the penstock lines which, in turn, extend down to the powerhouse. At its junction with the circular forebay, the main tunnel is 73′ below the floor of the gatehouse and about 70′ below ground level. Water is delivered into a circular concrete chamber with a radius of 30′. Part of the concrete chamber extends above grade and is covered with a flat wood roof which, in turn, is covered with asphalt; a steel grate extends across the top of its east wall and opens into an earthen well designed to received overflow from the concrete chamber.

The forebay gatehouse is also situated above the concrete chamber and contains the control valves for operating the penstock gates. The gatehouse measures 39′-0" x 18′-6" and is

19′-6" tall. It originally featured large paired double-hung sash windows, although these have since been boarded over. The interior contains three electric motor-driven release mechanisms for operating the sluice gates in the forebay. The sluice gates are of iron construction and have the same diameter as the concrete pipes. The concrete pipes that connect with the steel penstocks measure 8′ in diameter and 3′ in thickness. These heavily reinforced pipes measure about 200′ in length. The release mechanisms are now encircled by metal safety railings and the air wells through the floor, originally covered with a steel grate, are now enclosed by welded steel pipes which extend up through the roof of the building. (This was done as a safety measure to prevent water in the chamber from surging through the air well and spilling into the headgate house.) The release mechanisms and sluice gates function as they did when the structure was completed in 1911.

References:
Pacific Coast Power Company, "Details of Gatehouse at 30′-0" Dia. Forebay," 1 sheet of drawings, June 15, 1911, in possession of Puget Sound Power & Light Company, White River Powerhouse.

Stone & Webster Engineering Corporation, photographs of White River hydro construction, 1910-11, photo nos. 748, 773, 816, 923, 924, and 947, in possession of Puget Sound Power & Light Company, White River Powerhouse.

Penstocks, Standpipes and Valve Houses

When completed in 1911, the White River project contained two steel penstocks. Seven years later a third penstock was installed. Each of these penstocks was connected to concrete pipes which extended from the circular forebay. The penstocks measured 8′ in diameter at the junction with the concrete pipes and 6′-6" in diameter at the powerhouse. Also, at the junction with the concrete pipes and steel penstocks, a cylindrical riveted-steel standpipe was constructed for each penstock. These standpipes were designed to prevent water hammer in the event of a sudden change in pressure within the penstocks.

The construction of a fourth penstock in 1924 was accomplished by tapping into penstock no. 1 and no. 2. Two steel pipes, one from penstock no. 1 and the other from no. 2, run perpendicular to the penstocks and connect to a fourth steel penstock, which then extends down to the powerhouse. Above each junction between the steel pipe and penstock nos. 1 and 2, sits a valve house. Called the "four-one" and "four-two" valve houses, each are identically constructed of reinforced concrete. They measure 18′ x 18′ and contain flat roofs. The interior contains the electrically operated valves which control the flow from the no. 1 and no. 2 penstocks into penstock no. 4. Although the

windows have been boarded over, each valve house retains its original appearance.

References:
Journal of Electricity, v. 53 (September 1, 1924).

Stone & Webster Engineering Corporation, photographs of White River hydro construction, 1910-11, photo nos. 748, 787, 816, 923, and 947, in possession of Puget Sound Power & Light Company, White River Powerhouse.

White River Powerhouse

The White River powerhouse is situated at the base of the broad Enumclaw Plateau, about 20 miles east of Tacoma and 40 miles south of Seattle. It is a reinforced concrete structure measuring 259′ x 82′. Its generator room occupies the western section of the building and measures about 230′ x 45′-6". Below the generator room, in the basement, is the oil cleaning room, the pump room, the rheostat room, and the central oil room. A subway extends the length of the building and provides access to each of these rooms, as well as access to the relief valves for each of the turbines.

The eastern section of the building measures 32′ in width and contains the transformer and low tension bus rooms (located on the first--ground--floor, switchboard room and office, the battery room, and the low tension switch room, (all located on the second floor), and the transformer and high tension bus and switch rooms (located on the third floor). All of the transformers, buses, and switch equipment have been removed. The floors are composed of reinforced concrete slabs resting on concrete beams which, in turn, are supported on concrete columns. The roof over the generator room is composed of riveted-steel trusses. A monitor runs the full length of the generator room. The rear section of the powerhouse containing the office and switchboard (and formerly housed the transformers, buses, and switching equipment) rises above the generator room and also has a flat roof. Its roof is composed of concrete beams supporting a composition wood, tar, and asphaltic covering. In 1913 the roof contained a large steel frame which supported an electric light sign, proclaiming "Puget Sound Traction, Light & Power Company," "Bellingham, Everett, Seattle, Tacoma," and "White River." The "White River" part of the sign was circumscribed by a keystone through which ran a series of light bulbs arranged to simulate a torrent of rushing water. Superintendent George Sears recorded that on August 29, 1913, at 6:10 pm the sign was illuminated for the first time.

The workforce at the powerhouse during its early years of operation included a superintendent, a chief operator, ten station attendants (three operators, a relief operator, three

operator's helpers, and three oilers), a machinist, and a machinist's helper. In addition, the White River project employed a headworks attendant and a patrolman. Originally, the powerhouse contained two turbine-generator units. The turbines were manufactured by the Allis-Chalmers Company of Milwaukee, Wisconsin. When fabricated in 1911, the powerhouse's high-head, double-discharge, single-runner Francis turbines were reportedly the largest of their kind in the world. Operating under a head of 440', each turbine was rated at 18,000 horsepower and was directly connected to a 10,000 kw General Electric generator.

The powerhouse underwent two major expansions, one in 1918 and the other in 1924. The 1918 expansion witnessed the installation of a third turbine-generator unit, along with a third penstock line and accompanying surge tanks and standpipe. The turbine-generator unit was nearly identical to the original units; however, the turbine and generator were rated at 23,000 horsepower and 16,000 kw respectively. Unit no. 4 was installed in 1924 and its generator produced 20,000 kw of power. The capacity of the plant at this time amounted to 72,600 kva.

Throughout the 1920s and 1930s the company employed as many as forty-two men at the White River project and as few as nineteen. With the rise of the Congress of Industrial Organizations (CIO) during the 1930s industrial unions were organized in such basic industries as steel, glass, rubber, and automobiles, as well as in the electrical industry. Despite the opposition of Puget Power, utility workers including the hourly employees at White River formed a local of the International Brotherhood of Electrical Workers (IBEW). After the establishment of this IBEW local in 1935, relations between the company and workers remained cordial throughout the Depression. The only strikes at the White River project were conducted by Works Progress Administration laborers who were dissatisfied with hours, pay, and working conditions while constructing fish screens on the hydraulic canal.

The powerhouse has undergone a number of changes since the early 1940s. Most pronounced was the removal in the 1950s of the large incandescent sign from the roof of the building. Also, the construction of a new transmission and switching system was followed by the removal of the early high and low tension switches, the bus bars, and the transformers. Cosmetic changes to the building include the replacement of the original multi-light wood sash windows with metal-frame windows. The original turbine-generator units remain intact as do the exciter units.

References:

Superintendent, White River Station, "Weekly Report," May 2, 1913 and September 1, 1913, reports in the possession of Puget Sound Power & Light Company, White River Powerhouse.

Superintendent, White River Station, "Monthly Report," for years 1911, 1913, 1918, 1925, 1934, and 1935, reports in the possession of Puget Sound Power & Light Company, White River Powerhouse.

Arnold Pfau, "The Largest Hydraulic Turbines in the World," Engineering News, v. 67 (April 18, 1912): 730-34.

Arnold Pfau, "High-Head Francis Turbines and Their Operating Records," Journal of Electricity, v. 40 (February 1, 1918): 157-58.

W.E. Herring, "Water Powers of the Pacific Northwest in Four Volumes: A Compilation of Data and Reports," v. 1, unpublished manuscript in the possession of Puget Sound Power & Light Company, Bellevue, Washington, 309-30.

F. Schmidt, "The Most Powerful Turbine in the World," Journal of Electricity, v 40 (February 15, 1918): 168-70.

Stone & Webster Engineering Corporation, White River Development in the Puget Sound District of the State of Washington (Boston; 1912).

"Developments along Puget Sound: Hydroelectric System of the Puget Sound Traction, Light & Power Company on the Snoqualmie, Puyallup, and White Rivers," Electrical World, v. 59 (June 1, 1912): 1161-1182

"The White River Power Development in Washington," Engineering News, v. 67 (April 11, 1912): 704-07.

"White River Electric Sign," Journal of Electricity, Power and Gas, v. 36 (November 15, 1915), 440.

Carpenter and Machine Shop

Measuring approximately 90′ x 20′, the carpenter and machine shop stands south of the powerhouse and was one of the first buildings erected at the White River project. It is a wood-frame structure with wood siding, large multi-light wood-frame sash windows, a corrugated metal roof, and a concrete foundation. A railroad spur ran along the west side of the carpenter and machine shop which contained a large wooden loading dock. Workers unloaded construction supplies from rail cars and moved them into the shop. In addition to the carpenter and machine shop, the Pacific Coast Power Company erected a blacksmith shop, warehouse, and cookhouse, in the vicinity of the powerhouse. The shops and warehouse aided the construction of the powerhouse, penstocks, and gatehouses. Only the carpenter and machine shop was retained. In the 1930s, this building was used to fabricate

the fish screens at Dingle Basin. The carpenter and machine shops continues to serve its original function.

References:

Stone & Webster Engineering Corporation, photographs of White River hydro construction, 1910-11, photo no. 429, in possession of Puget Sound Power & Light Company, White River Powerhouse.

Superintendent, White River Station, "Monthly Report," April 1936, in possession of Puget Sound Power & Light Company, White River Powerhouse.

Clubhouse

As part of the company housing development above the powerhouse at Dieringer, Stone & Webster's Pacific Coast Power Company designed and constructed their large, two-story frame structure called the clubhouse. Perched above the White River powerhouse on the hillside of a broad plateau and overlooking the entire Stuck River valley, the clubhouse commanded a most impressive view. Three cedar-shingled cottages, also built in 1912, were located just south of the clubhouse, in single file fashion. Each of these cottages contained large frame porches along the western facades. Exterior wood stairways located in the center of each house ran down from the porches to an elevated wooden walkway. The exterior of the clubhouse and the cottages were completed in late-1912. Shortly thereafter, White River employees moved into the new company-owned residences. By December 1913, the housing development at Dieringer was fully occupied.

The clubhouse was indeed the showcase of the White River housing development. Its large hip-roof covered with cedar shingles capped the cedar-shingled, second-story exterior. It also complemented the hip-roof extension located below and covering the wrap-around porch. The first floor exterior, clad with a whitewashed rustic siding, stood in sharp contrast to the dark brown stained cedar shingles. An ornamented wood lattice-work formed the skirting around the large western porch. Originally, the main entrance to the clubhouse was located along its west facade. A vestibule projecting onto the wrap-around porch and situated in the center of the building served as the entrance-way. It led into the living room (17′ x 20′) which contained a brick fireplace and hearth. Off to the north stood the dining room (11′-9" x 15′-9") with its distinctive finishes including a board-and-batten wainscot and handsome wood window trim. Swinging wood doors led into the pantry room (2′-8" x 6′-8") which contained custom designed wood cabinets. The pantry was adjacent to the kitchen. Also located on the first floor was a small cook's bedroom, a storeroom, and a toilet room. The

second floor, accessible by way of a central staircase which contained a handsome wood bannister, held six bedrooms (each about 10′ x 13′), a main hall, a single bathroom and one-half dozen closets. White River powerhouse employees desiring inexpensive housing often boarded in one of the upstairs rooms.

Over the years, a number of changes have occurred to the clubhouse. At an unknown date the main entrance was changed from the west to the east side of the building. The original 6′-wide central stairway, which led up to the wrap-around porch and to the vestibule on the west side of the clubhouse, was removed. A wooden railing matching the existing porch railing was installed across the opening of the stairway. At an unknown date the veranda was altered with a concrete slab that replaced the original wood tongue-and-groove floor. The veranda was also extended the full length of the house and a portion of it was enclosed. Despite several other alterations--asphaltic roof shingles replaced those of cedar, and the interior underwent a number of minor renovations--the clubhouse retains much of its original appearance.

Cottage No. 9 (Superintendent's Residence) and Garage

Accompanying the construction of the White River powerhouse, Stone & Webster's Pacific Coast Power Company erected several employee cottages and numerous tent frames upon the broad hill overlooking Dieringer and the entire Stuck River valley. The superintendent resided in the largest of these company houses, all of which were located north of the penstock line. In 1912 following the initiation of the powerhouse operation, three new frame cottages and a two-story, employee clubhouse were built south of the penstock lines. R. V. Sprague, first superintendent of the White River station, continued to live in one of the older residences. Late in the year, George C. Sears replaced R. V. Sprague as superintendent and moved into Sprague's old cottage. This residence burned in January 1913 and within one month, workers began clearing land for a new superintendent's cottage. By July 1913, the timber frame residence was completed and Sears moved in. The cottage was occupied by Sears and subsequent superintendents for many years thereafter.

During the 1920s and 1930s, Puget Power erected over a dozen more company cottages at the Dieringer site. The last of the original construction shacks from 1909-10 were replaced in 1922 when four of these cottages were moved in January of that year from the old D & M Lumber Company mill near Lake Kirtley to the headworks. Further additions to the community above the powerhouse occurred over the following decade with the construction of wood-frame garages, including the one adjacent to the superintendent's house.

As fewer employees lived in company houses after 1940, the vacant cottages were gradually removed or razed. By the mid-

1970s, only two residences and the clubhouse remained at Puget Power's Dieringer housing development. At about this time the utility company sought to remove the vacated superintendent's cottage. Only the danger of damaging the buried penstocks while transporting the house prevented its removal. The residence was reoccupied in the late-1970s when superintendent Robert G. Vogeler moved in.

References:

Stone & Webster Engineering Corporation, White River Development in the Puget Sound District of the State of Washington (Boston: Stone & Webster Engineering Corporation, 1912), 22.

Superintendent, White River Station, "Monthly Report," October 1912, June 1915, June 1918, June 1921, January 1922, September 1934, February 1935, October 1935, April 1940, reports in the possession of Puget Sound Power & Light Company, White River Powerhouse.

Cottage No. 5 (Operator's Cottage)

Following the completion of the powerhouse in the fall of 1911, Stone & Webster's Pacific Coast Power Company began constructing wood-frame cottages for its employees at the hydro-project. Engineers selected a stretch of property on the hillside above the powerhouse as the site for three operator's cottages and an employee clubhouse. The residences were to command a broad panoramic view of the Stuck River valley to the west. Although several cottages already existed north of the penstock line--the company had built three frame houses in 1911 while the powerhouse was under construction--the other residences consisted of temporary wood shacks and tent frames. The Puget Sound Traction, Light & Power Company, which emerged following a reorganization of Stone & Webster's northwest utilities, proceeded to construct new company housing.

By the fall of 1912, the new cottages, each designed and constructed in a uniform manner, were complete. Each measured approximately 24′ x 28′ including the full-length porches which ran along the west facades. Measuring 6′ in width, the porches were sheltered by cedar-shingle roofs extending off the main gable roof. Handsome wood railing ran between the milled, timber porch columns. The exteriors of all the cottages were covered with cedar shingles as were the roofs. Each of the first floors contained two bedrooms, a living room, a kitchen and a pantry. The second floors contained just two bedrooms under the sloping gable roof. According to the original plans none of the three new cottages had indoor toilets or baths. In June 1915, though, the Superintendent noted the installation of bathrooms in two of the White River residences.

The housing complex underwent the most remarkable development between 1918 and 1933. During this time a number of new cottages were erected, four small frame houses were brought in from the old D & M lumber mill at Lake Tapps, and several garages were installed. In addition, Puget Power continually improved, repaired, and altered the existing structures. Occasionally employees remodeled their own residences bearing all the costs themselves. (Puget employees always rented their cottages from the company.) Porch enclosures and small additions were not uncommon. Gradually the residences which saw the most use became greatly altered. Those which were unoccupied for long periods of time fell into disrepair.

In 1940, several of the abandoned cottages were sold to a local man in Dieringer and removed. Over the next thirty years, the company razed or sold for removal the majority of its residences. By the late 1960s, all but one of the three cottages dating from 1912 were gone. The sole survivor, known as Cottage No. 5, bears little resemblance to its original appearance. The 1912 section is primarily visible along the south facade where the gable roof ridge may be seen running north-south, parallel with the ridge of the hill. This gable is now intersected with a long, narrow, gable roof addition running east-west. The date of this new wing is unknown though it may be as early as the 1930s. Two other smaller additions to the west and to the east were carried out at unknown dates. Only Cottage No. 5, Cottage No. 9--the Superintendent's residence--and the Clubhouse remain in use as company housing at Dieringer. All the other cottages, with the exception of a dilapidated frame structure, have been demolished.

References:

Pacific Coast Power Company, "General Plans of Operators Cottages," 3 sheets of drawings, March 25, 1912, March 29, 1912, and April 5, 1912, drawings in possession of Puget Sound Power & Light Company, White River Powerhouse.

Stone & Webster Engineering Corporation, White River Development in the Puget Sound District of the State of Washington (Boston: Stone & Webster Engineering Corporation, 1912), 22.

Superintendent, White River Station, "Monthly Reports," October 1912, June 1915, June 1918, June 1921, January 1922, September 1934, February 1935, October 1935, April 1940, reports in the possession of Puget Sound Power & Light Company, White River Powerhouse.

ADDENDUM TO:
PUGET SOUND POWER & LIGHT COMPANY, WHITE RIVER HYDROELECTRIC PROJECT
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