

AN ABSTRACT OF THE THESIS OF

George B. Wisner for the degree of Master of Arts in Interdisciplinary Studies in Anthropology, Anthropology and History presented on April 3, 1995. Title: Hull-Oakes Lumber Company's Steam-Powered Sawmill: A Case Study in Industrial Archaeology.

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Abstract approved: _____

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By examining the combined written, ethnographic and physical evidence of a surviving steam-powered sawmill in the Douglas-fir region of the Pacific Northwest, this thesis seeks to supply new insights into the operation and adaptability of antiquated machinery during a period of rapid social and technological change and to develop a descriptive model for the sawmill industry. Steam-powered sawmills, those mills using steam power to operate primary and secondary lumber-cutting saws, are now dinosaurs in the sawmill industry. They are a vanishing example of a mechanical process once common throughout America. This thesis describes a last-of-its-kind commercially-operating medium-sized steam-powered sawmill, the Hull-Oakes Lumber Co., Inc. sawmill in south Benton County, Oregon. It also explores how this sawmill survived through specialization rather than through wholesale adoption of emerging technologies. By examining a surviving sawmill that uses antiquated machinery, this thesis captures, in part, the way of life of the builders and practitioners of the arts the industry represents: it also offers new insights for future researchers seeking to understand and explain industrial adaptability and cultural remains from similar sites. It does this by describing through words, photographs, diagrams and maps how such mills worked, what the machinery and its parts looked like, and what physical traces such mills might be expected to leave after they are gone.

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Hull-Oakes Lumber Company's Steam-Powered Sawmill: A Case Study
in Industrial Archaeology

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Hull-Oakes Lumber Company's Steam-Powered Sawmill: A Case Study in Industrial Archaeology

CHAPTER 1: INTRODUCTION

1.1 Problem Definition

A considerable amount of academic and literary attention has been paid to the logging industry as symbolic of a somewhat romantic identity for the economic and cultural way of life in the Pacific Northwest (Schwantes 1989: 175; Kesey 1963; Robbins 1988: 54-55). Comparatively little notice is given to the less romantic part of that industry, sawmills and the people who worked in them. This thesis focuses on the development of a descriptive model of the Hull-Oakes Lumber Co. sawmill at Dawson in south Benton County, Oregon. The sawmill is representative of largely antiquated steam sawmilling operations in the Douglas-fir region of the Pacific Northwest in general, and the Oregon Coast Range in particular. This thesis also examines a way of life that is largely gone and remaining only in the memories of those few surviving people who worked with early twentieth-century steam engineering.

Steam engineering is a sawmill-powering process that was gradually replaced industry-wide by electricity, culminating in the late twentieth century introduction of computers, lasers and other space-age tools used to more efficiently turn logs into lumber. The change also occurred, in part, because there are few of the large logs left to cut. This left many sawmills with massive and inefficient machinery that the resource could no longer support, forcing many sawmills to adopt new technology to shave labor costs and more efficiently cut smaller-diameter logs or close their doors. The evolution from steam-powered saws to electric-powered and laser-guided ones occurred in an industry that little more than 200 years ago relied in individual sawmills on the strength of two men cutting dimension lumber by muscling a whipsaw through a log balanced atop a platform (Andrews 1994: 44; Cox et al. 1985: 64).

Current efforts to document cultural resources in the Pacific Northwest often focus on prehistoric remains of Native Americans, romanticized bigger-than-life Paul Bunyan-style logging practices, or historic buildings such as homes, schools and churches. But more and more emphasis is being placed on documenting the region's industrial heritage and preserving what might be described as "industrial monuments" or "any relic of an obsolete phase of an industry or transport system" (Buchanan, R. A., in Schuyler, 1978: 53). It is an area of study most closely aligned with industrial archaeology involving a period study "embracing the tangible evidence of social, economic and technological development in the period since industrialization" (Palmer 1990: 275). Tracing that heritage for the steam-powered phase of the sawmill industry often is frustrated by a lack of detailed information on such sawmill practices. Much of that information resides only in the memories of aging people who worked in the industry and who have found no reason to pass along their knowledge as the industry's machinery has evolved to replace steam with electricity. These people are nearing the end of their lives. As they die, researchers lose valuable chances to capture information necessary to explain industrial operations associated with artifacts that cultural resource specialists and industrial archaeologists frequently find in the field. The problem is particularly acute with steam engines and related equipment. As industrial archaeologist R.A. Buchanan said of the need to preserve steam engines and information about them in England: "The number of engineers and millwrights familiar with steam engines is diminishing even more rapidly and irreversibly than the number of engines themselves" (Buchanan and Watkins 1976: 131). The passing of these blue-collar technicians and their learned-on-the-job knowledge also renders it increasingly unlikely that someone lacking that special knowledge could successfully operate a mill such as the Hull-Oakes Lumber Co.

There is little doubt that researchers working in the Pacific Northwest's Douglas-fir region will unearth bits and pieces of sawmill machinery. The remains of sawmill buildings, such as footings, metal piping, and concrete pads abound in the woods of the

Pacific Northwest because sawmills in general, and steam-powered sawmills in particular, were plentiful in the early twentieth century and through The Great Depression. As retired millworker Everett McKeehan, said of the quantity sawmills around Benton County before and during The Depression: "In them days, the woods was full of 'em. They would go broke and we would just move on to the next one" (Wisner 1992: 5). But most of them are gone now, leaving only remnants and memories behind.

1.2 Statement of Purpose

Because little attention has been paid to steam-powered sawmilling, knowledge of the industry's specialized machinery and practices will die with their practitioners. So will detailed information concerning the lifeways of lumber mill employees who worked with the largely-antiquated, and often improvised, technology and vernacular construction associated with the construction of sawmill buildings and equipment. The primary goal of this thesis is to put a last-of-its-kind sawmill on record to serve as a descriptive model for industrial archaeologists and other researchers. The information in this thesis provides a valuable record of the nuts and bolts of how the Hull-Oakes Lumber Co. sawmill and its surrounding community worked. It fills a gap in research knowledge, a gap that will only widen with the death of living informants with first-hand knowledge of steam sawmilling operations.

From a practical standpoint, this thesis gives archaeologists and other cultural resource managers a detailed, although not complete, photographic catalog of sawmill-related industrial artifacts and baseline data to help them piece together a broader view of this region's industrial heritage. It also offers a first-hand account from knowledgeable people on how largely self-taught employees worked with steam-powered lumber-cutting and finishing machinery. That information gives a practical dimension to scholarly efforts to understand and subsequently explain industrial evolution and economics. On the social side, the thesis provides, at the very least, a verbal portrait of those who experienced the

business and social life surrounding the Hull-Oakes Lumber Co. sawmill. The sawmill is particularly unique, adopting unconventional economic and mechanical adaptive strategies to keep operating in an industry continually battered by boom-and-bust cycles.

1.3 Site Location

For purposes of this thesis, the Hull-Oakes Lumber Co. consists of Benton County tax lots 600, 601, 700, 800 and 900, T 14S, R 6W, Sec. 9, 10, 15 & 16 of the Monroe Quadrangle (Fig. 1.1). Parcels are on the north and south sides of Dawson Road at the end of the Southern Pacific Railroad line at Dawson. The mill site covers about 26 acres. It includes the sawmill, related buildings, structures and lumber-storage pads that have historically been part of the sawmill. The sawmill retains historic integrity in what amounts to a narrow valley where the sawmill is located and has operated since 1938-39 when it was founded as the Ralph Hull Lumber Co. Since then, it has operated as the Hull Lumber Co., Inc.; Hull-Oakes Lumber Co.; and the Hull-Oakes Lumber Co., Inc.

The unincorporated area surrounding the sawmill was historically known by the Southern Pacific Railroad as Dawson Station (Austin and Dill 1987:181-182). Dawson Station has since reverted to its abbreviated name of Dawson. The site is along Dawson Road about three miles west of the South Benton County town of Bellfountain, which is about 17 miles southwest of Corvallis, Oregon. It is nestled against the foothills of the Oregon Coast Range to the west, north and south. Those foothills, including Green Peak that overshadows the valley from just west of the sawmill, provide the major timber resources for the company's timber and lumber-cutting operations (Figure 1.2; see Appendix B). Although Hull once owned more than 15,000 acres of timberland in the Coast Range, his sawmill also has historically relied heavily on federal timber from the area to supply much of the large-diameter raw material in which Hull-Oakes has specialized. Much of the Coast Range foothills have been logged during the nineteenth

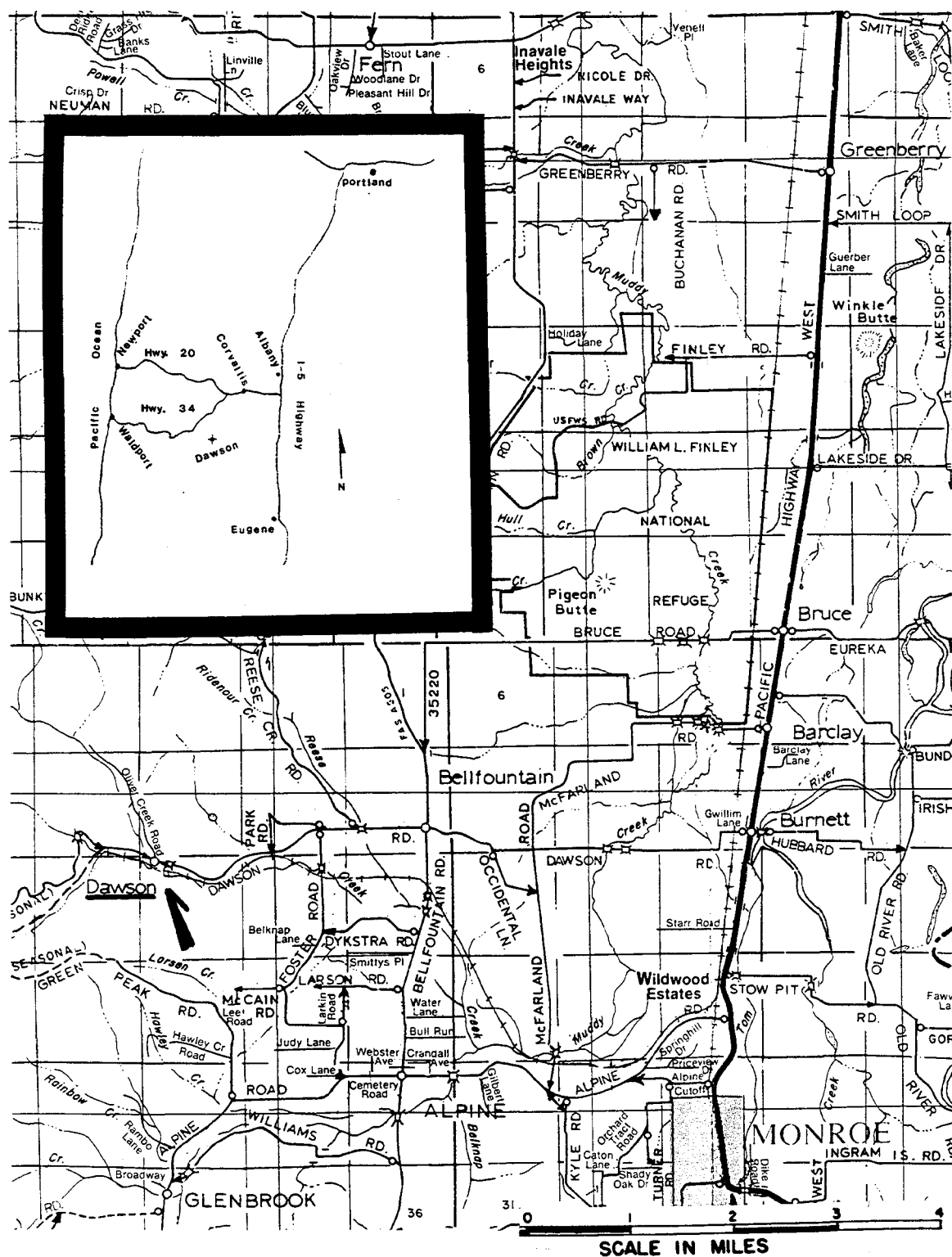


Fig. 1.1: This Benton County road map shows a detailed view of Dawson and its surroundings in relation to towns such as Monroe and Alpine. The hand-traced inset is taken from an Oregon highway map showing Dawson and the Hull-Oakes Lumber Co. sawmill in a general regional context in relation to the Oregon Coast and major cities along the Interstate-5 highway.

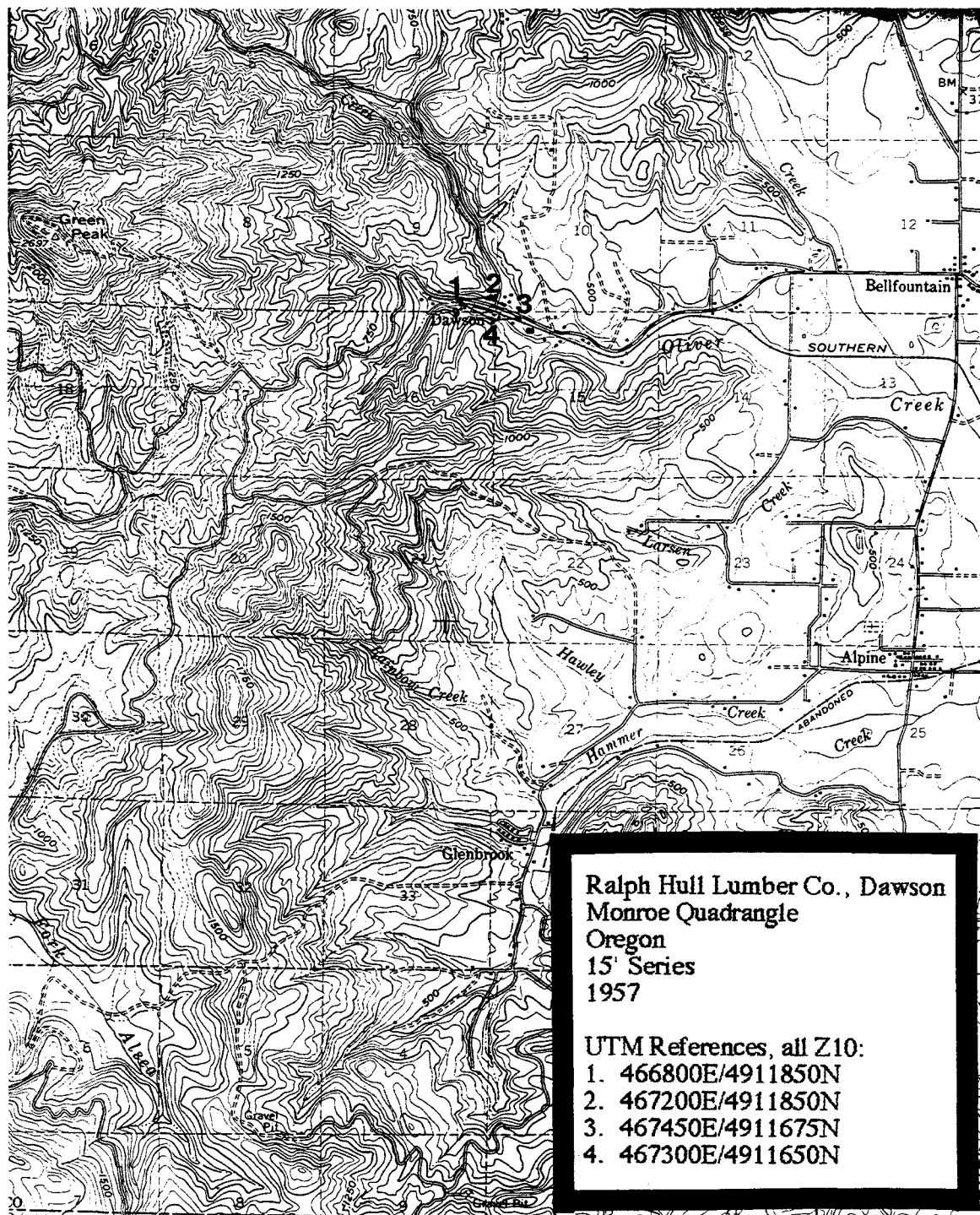


Fig. 1.2: This 15 minute map shows the relationship of Dawson to the surrounding countryside and references the Hull-Oakes sawmill by its UTM coordinates.

and twentieth centuries and are now covered extensively with second-growth timber, a considerable amount of it through natural reseeding (Hull 1992).

1.4 Methodology

The research for this project involved: 1) A review of pertinent literature and documents related to the topic, synthesizing that information, and putting it into historical context within the thesis. 2) Documenting existing Hull-Oakes machinery, processes, buildings and infrastructure. Primary sources of information used in this document include aerial and terrestrial photographs to help visualize the relationships between sawmill buildings, machinery and the land; ethnographic interviews; blueprints; architectural plans; private and public records; original land survey notes; periodical academic and general interest literature; historical documents and maps, company business records, museum collections, and examination of physical remains of previous sawmilling activity at Hull-Oakes Lumber Company's site. 3) Conducting ethnographic interviews with appropriate informants, including present and retired Hull-Oakes employees, to gain historical and operational knowledge of steam-powered sawmilling in general and this sawmill in particular. Ralph Hull, the sawmill's founder and builder, was the principal informant, providing primary insights about this particular sawmill. He provided his personal history as well as a detailed operational history of the sawmill; and many of the photographs in this thesis are from his personal collection. Ralph Kundert, retired Hull-Oakes millwright, provided valuable insight into daily operation of the steam engine; he also discussed dangers associated with steam-powered sawmilling. Ron King, the sawmill's current millwright, added to the discussion and attractions of steam engine operation. Retired Hull-Oakes millworker Chesley Rainey also discussed the dangers of steam-powered sawmilling and of lifeways in the surrounding town of Dawson. Virgil Hall, who helped Hull build his sawmill and performed a variety of jobs over 45 years, also talked about the sawmill's operation and described one machine-related death he

witnessed. Retired Hull-Oakes sawmill workers Orin B. Nye and Harry Wallace contributed information about lifeways in Dawson. Don Oakes, co-owner of the Hull-Oakes sawmill, discussed problems associated with buying bargain steam engines for the mill. Floyd Billings, former Hull-Oakes sawmill superintendent and current lumber-sales manager, provided operational details about the sawmill. Jerry King, the sawmill's fireman for the past 18 years, provided insight into operation of the sawmill's steam-generation boilers.

2. HISTORIC CONTEXT FOR THE SAWMILL INDUSTRY

2.1 National Development

No single industry can be examined in a vacuum. Therefore, no picture of the Hull-Oakes Lumber Co., Inc. sawmill is complete without examining it in the developmental context of the sawmill industry. The sawmill industry has been evolving since its beginnings in America's colonial period. There is considerable debate on when America got its first sawmills. Some authorities put the nation's first commercial sawmills in 1625 at Jamestown, Va., and in 1631 at Berwick, Maine (Brown 1947: 1); others are less specific, saying that artisans were sent "as early as 1620" to set up sawmills in Virginia, which had been producing boards and clapboard by hand as early as 1609 (Wright 1907: 71). Historian Thomas R. Cox states that the first water-powered sawmill was introduced in 1611, "near the site of Richmond" (Cox et al. 1985: 14). But most researchers agree with W.B. Greeley that colonial sawmills often were regarded as "a village institution, like the blacksmith shop" (Greeley 1923: 56) that helped satisfy a growing demand for lumber. In fact, "sawmills often Preceded saloons, general stores, schools and churches in a community. . .not until a sawmill was established could frame dwellings and villages arise" (Cox et al. 1985: 65). The continuing hunger for lumber saw per capita lumber consumption increase from less than 100 board feet before 1840 to 506 board feet by 1906 (Greeley 1923: 56-57), and overall production of lumber increase from 300 million board feet in 1799 to 45 billion board feet in 1909, dropping precipitously to 11 billion board feet in 1932 during the Great Depression (Van Tassel 1940: 1; Brown 1947: 3).

The production history for the national industry reflects that of regional industries, with sawmill centers developing in turn and declining when area timber supplies ran out. As it moved west, sawmilling activity eventually centered in the Pacific Northwest where the country's last and largest timber stands remain. By 1960, most of the nation's forestland was in the South and East; most of the salable timber was in the West, much

of it in old-growth trees on federal land (Cox et al. 1985: 246-247). For example, sawmills that progressed technologically from the muscle power of hand-operated pit saws (Fig. 2.1) through water power to steam-operated circular saws by the early nineteenth century allowed sawmill output per day to increase from 100 board feet to 40,000 board feet by 1863 (Van Tassel 1940: 8). Steam power, along with a rapid transformation in speed and configuration of saws and log-handling mechanical systems, helped deplete the white pine stands of the northeast; they pushed the Great Lakes pineries through their heyday from 1850 to 1900, and enabled the southern pineries to see a peak sawmill production of 16 billion board feet in 1909 (Greeley 1923: 57-58). By 1900, sawmills began rapidly cutting in the Pacific Northwest's Douglas-fir (*pseudotsuga taxifolia*, *Douglasensis*) region. The Douglas-fir region is "a belt along the Pacific Coast extending from well up into Canada, through Oregon and Washington. . .into Northern California" and extending inland to the west slope of the Cascade Range. It is a region characterized by heavy annual rainfall and a mild climate, with most of the region's Douglas-fir found in Oregon and Washington. It also is an area that by the 1940s held 55 percent of the nation's virgin timber (Noel 1948: 2-5) as well as the Hull-Oakes Lumber Co. sawmill. The major lumber centers had shifted to the South and West during the early twentieth century largely because of the country's "economic expansion and physical press westward to the Pacific" (Robbins 1982: 32).

There is little debate about the importance of steam to power the nation's lumber-cutting saws. Nor is it surprising that in its early years industrial America turned to the steam engine for support. Its invention as a practical device in 1712 by British ironmonger Thomas Newcomen has been described as one of the "outstanding triumphs" of human ingenuity comparable in importance to Gutenberg's printing press and the weight-driven clock. It was, in short, a machine credited with launching the Industrial Revolution (Buchanan and Watkins 1976: 3). Sawmill reliance on steam power grew rapidly after the technology arrived in America. In 1869, for example, steam powered 51

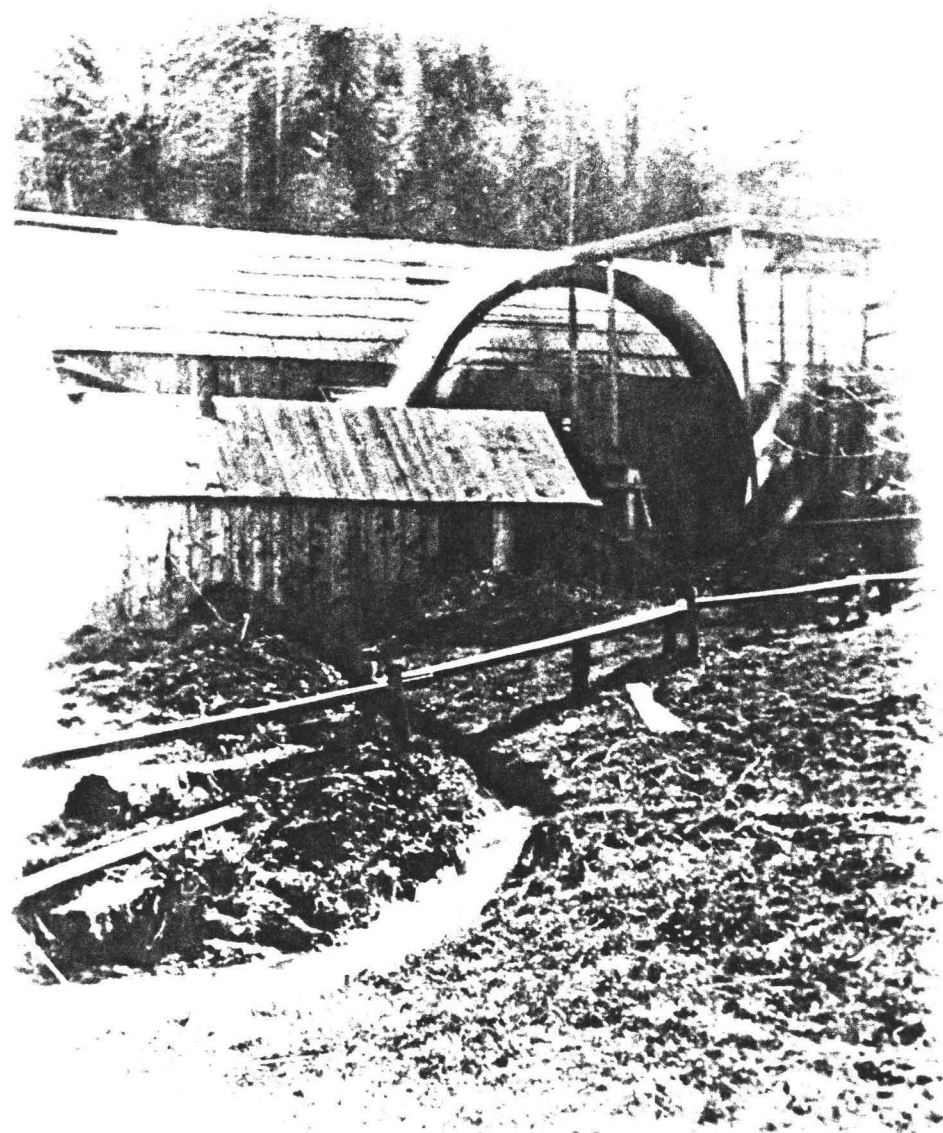


Fig. 2.1: Water power, such as that used to drive this "overshot" water wheel" was the principal saw power for sawmills before steam engines were adopted. The location of this sawmill is not known. Courtesy of Ralph Hull, Dawson.

percent of the nation's sawmills, with water wheels and turbines accounting for the other 49 percent; by 1909, steam accounted for 90 percent of the power in America's sawmills. Steam power also allowed the sawmilling industry to reach its full potential (Van Tassel 1940: 8), boosting to 100,000 board feet and more per day the maximum output of a medium-to-large-sized sawmill with circular saw or band mill (Holmes 1920: 9). Unlike water-powered sawmills, steam-powered mills were not dependent on streams and rivers for power. They could operate in dry spells when streams were low; their boilers were fired by wood waste from the sawmilling process; and they could be hauled closer to the timber, saving on log-hauling costs (Cox et al. 1985: 67).

The idea of using steam as power is thousands of years old; an elementary steam engine was believed to have been invented in the first Century A.D. by "Hero of Alexandria" (Storer 1969: 23). Following Newcomen's invention of the first practical steam engine, the machine was immediately used in Great Britain to drain water from that nation's coal mines. It later was refined and put to other uses that included sawmill applications (Rolt 1977; Buchanan and Watkins 1976: 3). The technology migrated to America in the early 1800s, and 2,000 of the engines operated in the United States by 1838 (Cox et al. 1985: 68). But the first one installed in a sawmill was not welcomed. Workers destroyed the New Orleans, La., mill by fire after the engine was installed in 1811, fearing they would lose their jobs to the new-fangled machine. But one installed in a Maine sawmill in 1822 became so successful that the company's stock rose immediately to \$125 a share from \$75.

Steam-powered sawmilling arrived in Oregon less than 30 years after the first power sawmill began operating. Census reports show two steam-powered sawmills operating in Oregon and Washington in 1850; 27 by 1860; 46 in 1870; and 77 in 1880 (Meany 1935: 304). Sawmills frequently used one or more steam engines to power various pieces of sawmill equipment and work station processes.

Steam power set the industry's standards until about 1904, when mills began converting to electricity. They switched to electricity because it was seen as more economical to produce and transmit to sawmill systems than steam with its attendant maze of equipment. That equipment included furnaces, boilers, steam pipes, belts and assorted rigging that often left sawmills looking like squatter-shacks of deteriorating wood, brick and piping. Electricity cleaned up that mess, centralized power supplies and cut overhead costs by reducing the number of people necessary to operate and maintain steam equipment. Electricity promised to centralize power in one electric generator rather than in several steam engines, while reducing sawmill labor requirements of firemen, engine tenders and other employees constantly needed to repair a "relatively inefficient" and often dangerous system of belts, shafts and pulleys required for steam-power transmission systems. Changing from steam power to electricity allowed one sawmill, for example, to shave overhead costs by cutting employees to 19 from 70 (Van Tassel 1940: 9-23; Prouty 1973; Prouty 1982). It also opened the door to further system refinements and the space-age technology of the late twentieth century that sees sawmills of all types vanishing rapidly as production costs increase and the once-vast and seemingly endless supplies of large-diameter old-growth Douglas-fir and low-cost federal timber dwindle (Van Tassel 1940: 22-24).

Industry-wide, electrification has allowed late twentieth-century sawmills to further refine their operations through computerization, laser technology and retooling to accommodate foreign lumber market demands for metric-sized lumber and more accurately cut small-dimension logs while getting the most from a dwindling supply of large-diameter timber upon which the steam-powered sawmills fed. The phasing-out of steam power in America's sawmill industry is not unlike that of Great Britain's industrial experience that saw steam power dominate industry for more than a century and fade quickly as the more flexible electric power became widespread (Buchanan and Watkins 1976: 135).

2.2 Pacific Northwest Sawmills Develop

Logging and lumbering often are regarded as the Pacific Northwest's twin economic peaks, in a region that the U.S. Forest Service in 1936 said contained an estimated 917 billion board feet of timber, or 55 percent of the national total at that time (Dembo 1985: 51). One historian said that by 1910 census figures showed western states producing 18.4 percent of the nation's lumber, most of it from Oregon and Washington. By 1920, the Pacific Coast was the acknowledged lumber production leader with 10 billion board feet recorded that year (Cox et al. 1985: 167 and 193). As another historian put it: "No economic activity is today more closely identified in the popular mind with the Pacific Northwest than logging and sawmilling, and for good reason" (Schwantes 1989: 175). A total of 63 percent of Washington's wage workers depended upon the forest products industry for jobs in 1910, a year in which Washington was regarded as the nation's top lumber producer (Schwantes 1989: 175; Meany 1935: 301). That figure was to remain high for many years. In 1929, the lumber economy was central to the states of Oregon, Washington and Idaho. None of the region's railroads could have stayed operating without hauling the northwest's lumber, according to the West Coast Lumberman's Association and Pacific Coast Logger's Association (Dembo 1985: 51). In 1929, for example, "forest products made up 70 percent of their tonnage and 45 percent of their revenues" (Dembo 1985: 51). Before World War II, the lumber industry supported 25 percent of the population in Oregon and Washington, and two-thirds of the payroll from both states came from forest products (Noel 1948: 3).

The use of wood is ancient in the Pacific Northwest. Native Americans had long practiced the laborious and non-commercial hand-splitting of the Pacific Northwest's cedar logs to build plank homes long before settlers arrived (Beckham 1977; Stewart 1984). But this activity is not comparable to commercial sawmilling as an industry.

It is difficult to say when the sawmilling industry actually began in Oregon. However, Captain John Meares in 1788 reportedly added Oregon spar timbers to his China-bound

cargo. But the spars never arrived in China; a sudden storm struck Meares' ship, causing him to toss the constantly -rolling timber overboard. But his comment that "The woods of this part of America are capable of supplying with these valuable materials all the navies of Europe" gave a clue of things to come (Carey 1935: 61). Fort Astoria was built in 1811 with hand sawn and split timber, some of which may have come from Native Americans who used split planks from their industry as trade goods (Schwantes 1989: 58; Ficken 1987: 11-12).

Historians differ but slightly on when Oregon's first sawmill was built. Most agree that it was built in about 1827-28 when George Simpson, field governor of the Hudson's Bay Co. in North America, ordered company factor John McLoughlin to build one for better self-sufficiency and forestall what was seen as impending American competition in the field of lumbering (Ficken 1989: 13). Maine residents are believed to have hauled a sawmill by ship around Cape Horn around 1850, where they logged Pacific Northwest timber in Northern California by ox team (Greeley 1923: 96). But when they got here, the new loggers and lumbermen found the British hard at work in lumber production. Lumber was being shipped from the Pacific Northwest as early as 1829 (Meany 1938: 66). The lumber came from McLoughlin's sawmill at Ft. Vancouver. Oregon's first tax roll in 1844 lists two mills: McLoughlin's; and one operated by Methodist missionaries at Oregon City in 1842, called the Island Mill Company (Ficken 1987: 19). By late summer of 1844, Henry Hunt and Tallmadge Wood built a sawmill on a bluff overlooking the Columbia River and about 30 miles above Astoria; and by 1850 a steam-driven sawmill operated near Astoria, and another at Portland (Meany 1938: 79; Ficken 1987: 20). Commercial sawmilling was underway in the Pacific Northwest; it quickly followed a pattern of technological innovation and evolution earlier experienced by its predecessors in the Great Lakes and the East Coast.

2.3 Milling Technology Evolves

Milling technology changed considerably during the last century of sawmilling in the Pacific Northwest. The general flow of logs through sawmills remains largely intact to today's Pacific Northwest. Briefly, logs brought to a sawmill are dumped into a holding pond or stacked in decks on dry land; they are debarked or "hogged" and cut into desired lengths for handling and sent to be scaled, or measured by a sawyer for their board feet content. Workers and machines manipulate the logs into proper position on a log carriage; the carriage moves the logs through the saw at the direction of the sawyer, upon whose judgment lies the success or failure of the job as he must determine each cut to assure maximum lumber production from each log; the carriage is returned, the log may be turned for another cut and the process repeated. From that operation, the rough-cut boards are guided through other saws and along other conveyors to be further cut into specific sizes, shaped and sorted. Some of the lumber then goes to a planer, a machine that shaves, or planes, and shapes the boards for specific uses such as flooring or siding. Waste material from the debarking and sawing processes is either used as fuel within a steam-engine-powered plant, or set aside for sale to papermills or fiberboard processing plants. At one time, it was burned in open-pit fires, within conical-shaped metal "wigwam" burners, or sold as hog-fuel for residential or factory furnaces (Meany 1935: 306-308).

As is common with most industry, wholesale technological conversions do not occur overnight. Methods and technology frequently overlap, a condition often found throughout the Pacific Northwest's lumber industry. For that reason, cultural remains from all the types of equipment used by individual operators might be found on former sawmill sites.

But there are some key refinements to components of the lumber-cutting process that deserve to be mentioned. They include the saws themselves, and the power used to drive them. Early sawmills relied on a metal whipsaw, and sometimes a pit frame saw. These

saws were hand-operated with what might be called a reciprocal, or up-and-down, principle. The standard pit-saw technique worked like this (Fig.2.2): Cutters dug a pit in the ground or built a trestle-like form above the ground. One man stood in the pit or beneath the frame; another stood atop the frame or atop a log squared at the ends and placed atop the frame. A line was marked on the log designating the cutting line. Together, the two men pushed and pulled a saw ranging from six feet long to eight feet long through the log and along the line to obtain the cut desired; cutting occurred on the down-stroke only. On a good day, two men could cut 200 board feet, with lumber running at about 20-to 30-cents a foot in 1850. The pit frame saw worked the same way, but used a thinner saw anchored to a wooden frame by iron Shackles. It was considered to be the forerunner of the so-called muley or sash saws used in most water-powered mills that quickly replaced hand-sawing operations (Cox et al. 1985: 64; Andrews: 1994: 44).

The sash and muley saws have been regarded as little more than hand saws to which water or steam power was applied. The sash saw was fastened in a frame and the muley saw was stretched taut by an overhead spring pole.

When water powered sawmills, both types of saws were propelled by a wooden beam attached to a water wheel that operated when water poured over it [an overshot wheel] or under it [an undershot wheel], (Meany 1935: 309; Cox et al. 1985: 64; Medin 1994: 52). A water-powered sash saw could cut from 2,000 to 3,000 board feet per day; a muley saw, from 5,000 board feet to 8,000 board feet (Van Tassel 1940: 8).

The circular saw and steam were the next two major evolutions the industry took. Circular saws were patented in 1777 by S. Miller, an Englishman. The first such saw was driven by a windmill. The circular saw was manufactured in the United States in 1792 by B. Bruce. It was 320 millimeters in diameter, with six radial slots for cooling (Brown 1947: 69; Food and Agriculture Organization Paper #40). It was believed to have been introduced to the American sawmill market in 1820 (Meany 1935: 309; Cox et al. 1985:

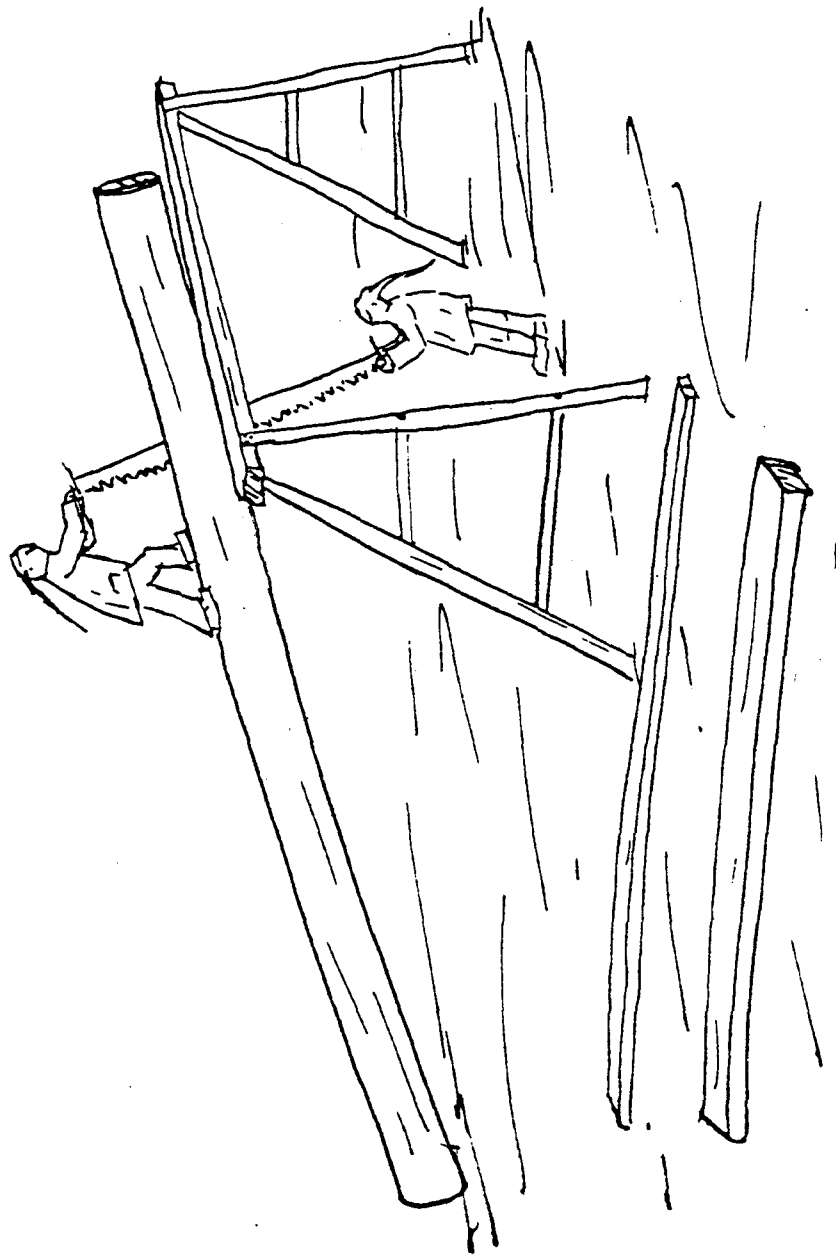


Fig. 2.2: This line drawing illustrates one of the techniques used in pit sawing. Note how the log is stationary and the two men move the hand-operated saw through it (J.F. Holmes 1920: 2). Copy courtesy of Kerr Library.

66). Circular saws became widely used throughout the industry by 1850, with one in use at a sawmill in Oregon City by 1846.

Circular saws ranging in size from 12 inches to 75 inches in diameter bettered their predecessors by being able to cut in a continuous motion (Fig. 2.3). This saw was little more than a disc of steel with a toothed edge. It is mounted on a shaft, which is rotated by gears or belts attached to some power source. Such saws often were used one above the other. A smaller-diameter circular saw was frequently placed on the top and slightly offset from the bottom saw. This arrangement nearly doubled the cutting width, because circular saws generally could only cut slightly less than half their diameter when used alone (Medin 1994: 53; Holmes 1920: 9). Early circular saws contained solid hammered teeth, gradually being replaced by removable teeth that could be changed quickly to cut filing costs and saw downtime. Circular saws generally were used as head saws, or a sawmill's principal lumber-cutting saw (Brown 1947: 69-70). The remains of removable circular saw teeth, as well as rusted circular saw remnants, might be found as cultural debris on some sites. Circular saws were an industry standard for many years.

Band saws gradually replaced them beginning in the 1870s (Cox et al. 1985: 67; Medin 1994: 53). An Englishman developed the principles of the band saw as early as 1808. Adoption of the new tool came slowly, largely because of difficulty in making such saws durable enough to withstand the severe service to which they were put in a commercial lumbering operation (Holmes 1920: 9; Cox et al. 1985: 67). Basically, the band saw is a continuous band of metal containing teeth along one edge, sometimes along both edges (Fig. 2.4). The band is placed on two wheels, one above the cutting field, the other below it, like two pulleys. Power is applied to the lower wheel through belts or shafts. The lower wheel is the heavier wheel and generally acts as a flywheel to keep cutting inertia going. Some band mill wheels can be as much as 10 feet in diameter. Band mills are known as right or left-hand band mills, depending upon the side through



Fig. 2.3: These twin circular saws operated for years in the W.J. Miller sawmill at Dawson. Photographed in 1935, they are typical of the double circular saws operated at the Hull-Oakes Lumber Co. in Dawson for many years before being replaced by a band saw as the primary lumber-cutting saw or "head rig" at the mill built and operated by Ralph Hull. The top saw would kick in when a log too large for the lower saw came down the sawmill carriage. The saws were slightly offset. Early saws had solid teeth. They were replaced by saws with removable teeth for speed and ease in sharpening. Photographer is unknown, but photograph appeared in a 1936 Oregon Agricultural College master's thesis by Gail Myron Thomas and George Harwood Schroeder. George Wisner collection.

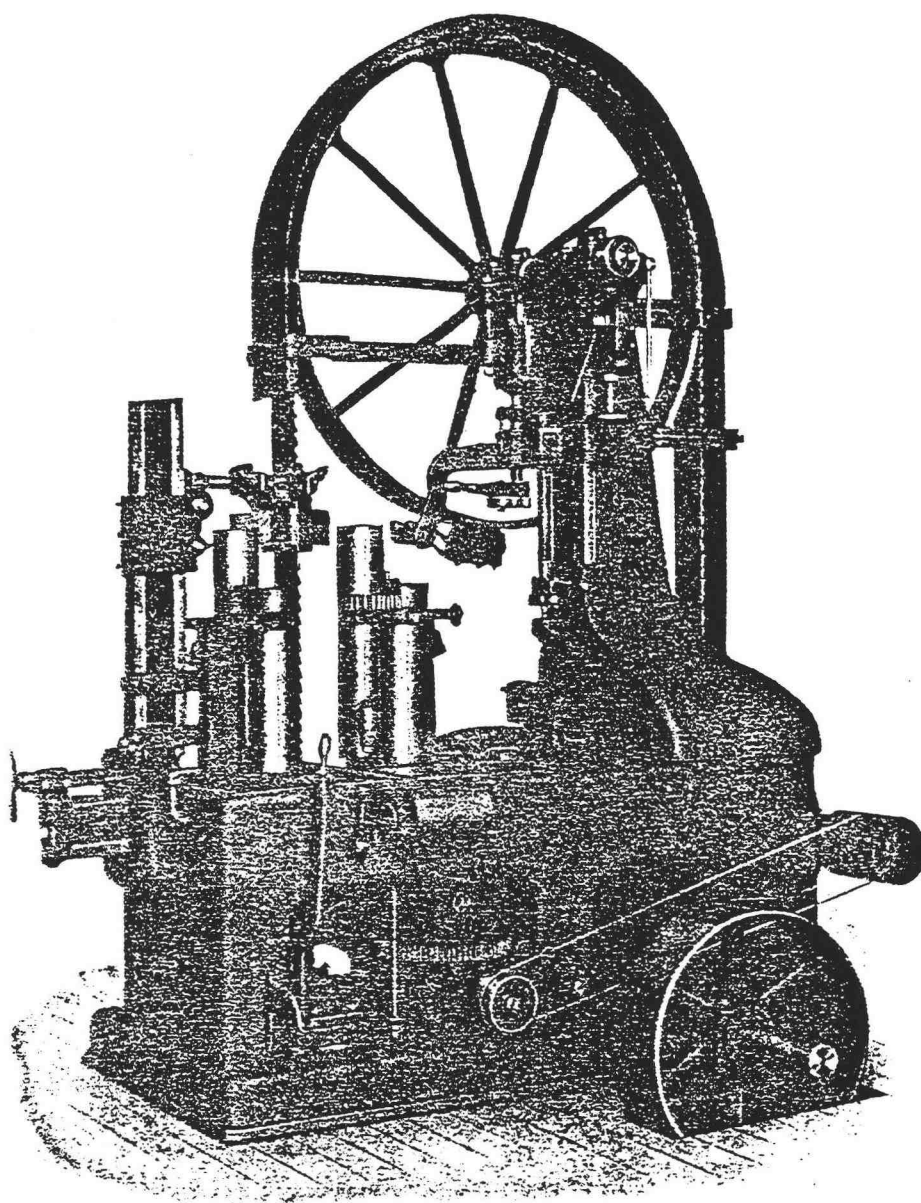


Fig. 2.4: This is a photograph of a band saw commonly used in sawmills as a "resaw." Sawmills also use similar band saws as "head-rig" saws to get primary lumber cuts from logs (J.F. Holmes 1920: 12). Copy courtesy of Kerr Library.

which the log is fed by a mechanical carriage. Band saws are commonly used industry-wide today.

The carriage, usually track-mounted on wooden or metal railroad-like rails, moves the logs endways into the saw. It is pulled by cables, or with a large shaft and piston arrangement mounted horizontally to the floor and frequently driven by steam. Logs on the carriages were turned, at first by hand, and later mechanically, to get desired lumber cuts ordered by the mill's sawyer. Such carriages became necessary as a way to bring the logs to the fixed mechanically-operated saws; with the hand whipsaws, the saw came to the log (Medin 1994: 52-54; Brown 1947: 73-74; Holmes 1920: 9-10).

It must be remembered that all the previously-mentioned saws frequently were used simultaneously within many mills to accommodate different lumber-cutting procedures in the sawmilling process. Parts, or remnants of parts, from any or all of the machinery can be found on former sawmill sites. But much of the heavy metal such as shafts, chains and other hardware generally is sold for scrap and frequently is absent.

Efficiency, accuracy, reliability and speed, as well as putting more money in the pockets of sawmill operators and employees, were the ultimate goals of the continuous mechanical refinements in saws and the methods used to power them. Early water-powered sawmills, with sash and muley saws, were neither accurate nor efficient, judging by the account of one Grande Ronde Valley mill worker named T.T. Gear. He worked in a water-powered sawmill for several years in the latter part of the nineteenth century:

Of course, in a mill of this character it was utterly impossible to saw lumber accurately. Nearly all planks intended to be an inch thick were two inches at one end and half an inch at the other, often a mere feather in the middle. For this reason the house we built was a foot wider at one end and narrower in the middle than at either end and we had great difficulty making a roof that would force water to run from its comb to the eaves [Gear in Andrews 1994: 16].

Water power hit its maximum output at 1,200 board feet a day when driving a circular saw (Van Tassel 1940: 8). The number of water powered mills also grew rapidly, rising

in Oregon to 113 in 1869 from 35 in 1850 and holding at about 112 by 1880 (Meany 1935: 302). Despite the problems associated with water power and earlier mechanical sawing methods, it quickly became evident that the simple hand tool of the pit-sawing period was being transformed into a powerful machine. Given the right kind of power, lumbering could soar. And it did when steam power arrived.

Benton County's sawmilling experiences mirrored those of the region and the nation in growth as well as innovations in power and machinery. There were reportedly eight privately-owned sawmills operating in Benton County in 1890 and one operated by the Yaquina Railroad; four of those mills were water-powered, five produced lumber with steam power. Their total capacity was set at 23.5 million board feet a year, insufficient to meet the local and regional demand for fuel, railroad ties, and general construction that ranged from buildings to doors and furniture. The number of sawmills jumped to 34 by 1935, 40 by 1936, the majority of which were steam powered (Longwood 1940: 69).

By comparison, the *Corvallis Gazette-Times* reported in 1994 that 199 sawmills now remain in Oregon; seven operated in Benton County in 1994, including the Hull-Oakes Lumber Co., Inc. An additional 178 have shut down in Oregon since 1980, the peak of the last significant industry-wide slump; there are only 521 sawmills left operating in Oregon, California, Washington, and Idaho. With the exception of small demonstration sawmills, Ralph Hull's sawmill very likely is the only commercially-operating sawmill in the country powered by steam.

With new technological innovations came a reduction in the number of people in the Pacific Northwest lumber industry needed to turn logs into lumber, according to a 1990 study by Paul Koberstein in *The Oregonian*. In 1979, for example, an average Pacific Northwest sawmill needed 4.5 workers to produce one million board feet of lumber; but fewer than three workers were required in 1990 to produce the same amount of lumber. Between 1980 and 1990 employment in the industry dropped by 20 percent and production increased by 25 percent. Automation moved in quickly: Machines now turn

logs that humans once turned; machines sort lumber also once graded by people; and laser-guided head-rig saws assure lumber-cutting accuracy refinement. In 1979, for example, a total of 81,400 people worked in the Pacific Northwest lumber and plywood industry; in 1990, there were fewer than 70,000 people employed in that industry (Koberstein 1990: 20).

3. GETTING STARTED AND THE DAWSON EXPERIENCE

3.1 Hull Enters Business World of Depression

The story of the Hull-Oakes sawmill is as much a story of Ralph Hull's upbringing and experiences as it is of his adaptation to the era in which he entered the industry (Fig. 3.1). His early life was set in a foundation of religion, thrift and hard-work ethic that shaped his personal and business decisions (Hull 1992, and unless otherwise specified all other Ralph Hull references are from this same source). His entry to the lumber industry began in the 1930s when the timber-based economy of the Pacific Northwest "virtually collapsed" and was on the financial ropes. The industry did not exceed 1929 lumber production levels until the 1950s (Dembo 1985: 51). It was into this environment that Hull and other sawmill workers of the era plunged.

The situation was so bad that, "by the end of 1931, the best estimates indicated that half of those normally employed in the mills and forests of Washington and Oregon were out of work" (Ficken 1987: 188). As a result of that economic catastrophe, for example, Washington's total lumber production fell in 1932 to 2.6 billion board feet from a high of 7.3 billion board feet in 1926; Oregon's lumber production fell to 1.6 billion board feet from 4.45 billion board feet for the same period. Railroad freight car shipments of logs and lumber for Washington, Oregon and Northern Idaho declined to 217,000 in 1932 from 804,000 in 1928 (Dembo 1985: 51-53). It was the largest slump to hit the lumber industry in a history, that has watched boom and bust cycles several times during the last century. The most recent occurred when a "great rash of mill closures" during the 1970s and early 1980 took place when "high interest rates caused the home-building industry to go into a prolonged slump" and environmental pressures began cutting off ^{supplies (period)} (cheap supplies of federal timber previously available to sawmill owners (Robbins 1986: 13; Mitchell 1991: 86).



Fig. 3.1: A young Ralph Hull with dog Jack and a cat whose name is unknown. The photo was taken about 1939 on the front porch of the Hull home in Dawson. Courtesy of Ralph Hull, Dawson.

3.2 Hull's Upbringing Provides Rudder

Hull was born April 13, 1912 to William Monroe Hull, and Ethel M. Tompkins on a "stump ranch" about four miles northwest of Bellfountain in an area known as Hell's Canyon (Fig. 3.2). His mother's parents homesteaded land in the vicinity of Green Peak, which is visible from Hull's sawmill. Hull's father and mother married in 1911, and built a home in the Hell's Canyon area off Reese Creek Road just west of Bellfountain off Dawson Road, an area occupied by about 20 other families. The home was built with lumber cut in a water-powered sawmill on nearby Flat Mountain, which was then owned by Tom Coon and on a ridge about three miles from the building site. There was no electricity, no inside toilet. Hull's family brought the wood to the building site by horse and wagon. The family lived in a tent during their first winter and while the house was under construction. Hull was reared in Hell's Canyon and around Bellfountain, where his family moved in 1919.

Hull has a brother and four sisters. They grew up in a hard-working sheep, cattle and goat-ranching family. As Hull put it: "Well, my father believed in people working. He was a very hard worker himself. One of the hardest working persons I ever saw." Consequently, the children were taught early to work and not play. He recalled that, at the age of 6 "My main diversion, my main occupation, was helping my father". As he described his work:

Well, we had to take care of sheep and cattle. And down below the house was a barn where we kept the cattle and horses, the milk cows I should say. Before you got to the barn, there was a chicken house off to the right and also a hog house in that area. You done chores, you fed the chickens or the pigs or whatever. I did a lot of work. My father always taught me that work was one of the first things he believed in. I done a lot of work while I was growing up . . . [but] at 6 or 7 you don't work long hours.

He enrolled at Bellfountain School in 1919, a small building with about 40 students from grades one through 12. Bellfountain was a hub of farm and ranch activity early in the twentieth century, providing steady work and a settled life for those who wanted it (Fig. 3.3). As Hull recalled:

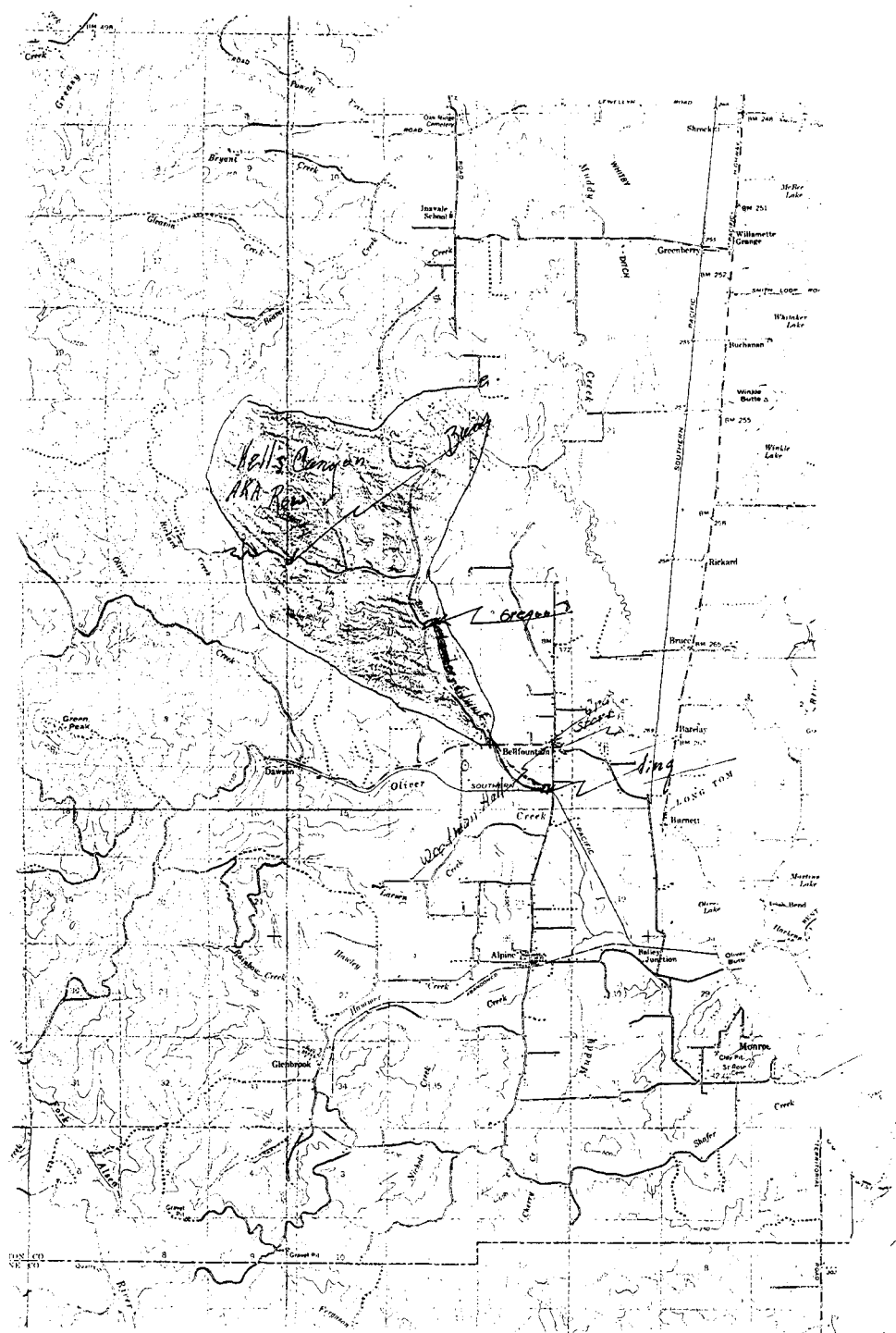


Fig. 3.2: This map was annotated by Ralph Hull, and shows the approximate locations of a school, sawmill, and other buildings that existed in about 1920 in and around Hell's Canyon and Belfountain. Courtesy of Ralph Hull.



Fig.3.3: Downtown Belfountain sometime in the late 1920s or early 1930s. Woodman Hall is in background. It is where a service station sits today. A postal slot to the left of the window in the W.A. Christiance Store was used by the Post Office between 1895 and 1902 when the town was named Dusty. Courtesy of Ralph Hull, Dawson.

Well, there was a church and schoolhouse. . . and a blacksmith's shop and a store. . . Bellfountain started as a farming community. I was always told the farmers were the wealthy people in the community. It took a lot more labor to run a farm than it does now, so farmers were hiring people to work for them.

Then, the Corvallis Logging Company that had a logging camp up Oliver Creek. And then there was a sawmill in Dawson. Then, there was the OACO Orchards. They were big around here. There was lots of labor hiring for the spring thinning of apples, and later picking of apples. There also was a packing plant in Monroe. I even worked thinning apples for awhile. The orchards ran west from Monroe all the way to the west of Alpine. Then, there was a prune ranch west of Bellfountain and a prune ranch west of Glenbrook. All these places hired a lot of labor, and those people just settled around here.

As Hull grew, so did the range of his responsibilities and chores.

I learned from my father to do everything early. My father got the flu in 1919 or 1920, so I started milking cows when I was seven years old. My fingers were so weak I had to use my little finger in order to squeeze the teats to get the milk out. . . He [Hull's father] had a team of horses that we traveled with. They hauled the wagon, that sort of thing. We also had a saddle horse. One of the work horses doubled as a saddle horse too. It was my job when I got a little older to take the saddle horse and ride it to Bellfountain, four miles north to my grandfather's place and look after the sheep, maybe bring them salt or hay. Then we traveled up through about three-fourths of a mile of timber to what we call the Starr place. There was about 80 acres up there. We had cattle there and we checked that stock. Then, we would go on down to the place where I was raised or born. That was a 430-acre place. . . once a week that was usually my job, quite often in the winter time.

Community life focused around visiting neighbors and attending Bellfountain Church or attending school events.

My father didn't believe in spending money to go to Corvallis or to the movies. We didn't have the money. You have to remember that it was hard for people [nowadays] to appreciate and remember how hard-up people were back in those days. My father and mother would buy a barrel of flour, for example . . . that's 196 pounds . . . we bought sugar by the 100-pound sack and did a lot of canning at home. We didn't have the money to go to a lot of social things. My mother made homemade bread because we couldn't afford the five cents it took to buy a loaf of bread at the store.

Thrift was encouraged. By the time Hull was a teen-ager, it was an ingrained habit, and he didn't fritter away what he considered to be a meager allowance for the chores he did. As he puts it:

[The allowance] was very little. And if I did have some [left over] I didn't spend it. I remember very well my father hired a boy to work to put the hay in. I forget what he paid him, \$15 or \$20 for a few days work, not one

day but several days. At the Pioneer Picnic in Brownsville, this boy spent all that money that he earned in a week on nothing, gimmicks. I wasn't raised that way.

My father paid us 10 cents if we caught a pocket gopher out in the field. Also he gave us a bummer lamb, a lamb whose mother died, and we would feed it a bottle and nipple full of milk. During the summer or fall that we sold it, I got to keep the money. Also, when I first moved down here to Bellfountain [from Hell's Canyon] we began picking prunes at the prune ranch out there. [He picked plums, which were then made into prunes]. I got 10 cents a box for that. Of course when you are seven or eight years old you don't pick many prunes. But gradually we picked more. I worked in that prune orchard, picking prunes and we shook prunes and we hauled prunes with a team and wagon into the dryer. We dipped prunes and threw prunes and everything, for about nine or 10 years. I put it [his earnings from work] in the bank and it earned 4 percent interest in a savings account. I spent money for clothes and school books . . . I guess our family background, religious or Christian-type thing, emphasized working and not looking for a handout or welfare . . . So that was my background, that was my bringing up; and be generous with what you had.

3.3 Lumber Interest Rises

Along the way, Hull gained some interest in logging, primarily through cutting timber and clearing land on his own property and selling firewood around the area. Although he used his savings and bought a ranch of his own while still in high school, Hull went against his father's desires to see him become a rancher and decided to pursue sawmilling as a career.

My father wanted me to stay on the farm, he even picked out a place or two for me to buy. My uncle Wes Miller had this mill up here [in Dawson]. He was always kind of intriguing to me and urged me to go into the lumber business. It was a much faster business than farming. You were making lumber and selling it. You didn't have to wait a year for the crop to come in. That was an attraction to me. I was only 22 years old. Prior to that, we had been very, very active in working on the farm, working in the community and cutting wood, taking wood to school and selling it. We had a good foundation. Good background for starting in the lumber business.

As Hull matured, his world opened into the Great Depression, a time of poverty beyond what he already had known. Travel in south Benton County remained largely a horse-and-buggy affair and emphasis was on the basics of everyday living.

People today just can't relate to it very well. Today, people think they need electricity and maybe electric heat or oil heat, radios, television, video cassette recorders, an extra car or two, a boat, air conditioning and some money to just buy expensive foods in small quantities, even school buses to ride to school. These were things nobody could afford then, particularly

later on in 1934 during the Great Depression. In 1934, for example, we could afford a warm breakfast after doing some chores, a good healthy lunch if we were going to school, paying our property taxes, paying doctor bills, supporting community activities and saving some money for retirement. That was about all we could afford. Many people couldn't even afford that . . . I was wanting to get into the wood business and we were soliciting orders for wood from people in Corvallis. That was in the 1930s, at the bottom of The Depression. The Depression was very severe and several people would tell me they didn't need any wood, they couldn't afford it .

But, armed with youthful enthusiasm, a desire to "cut some lumber," and a belief that things would get better, Hull jumped at an opportunity to operate a sawmill (Fig. 3.4).

As he put it:

It all started in the fall of 1934. At a social function in the Bellfountain [school] gymnasium, I made a deal with Merle Gragg, who had a sawmill three miles north of Bellfountain. It was a steam sawmill. I agreed to lease his mill, which had been idle because of market conditions related to the Depression. I agreed to pay him 50 cents a thousand for use of the mill and \$1.50 a thousand for the second-growth Douglas-fir timber which was nearby. The agreement was written on the back of a \$5 check. The agreement was for about six months. With winter staring us in the face, we built a skid road from the log pond out to the timber across the county road. We put one skid right on the county road, took about three or four inches of the county road. We bought a team of horses, built a sled with oak runners on it and hauled the logs to the mill pond [Figure 3.5]. That's the way we logged the first winter. Wages at the time were 30-cents to 35-cents an hour, and some employees even took lumber in exchange for labor. We had worker compensation rates to pay about the same as we do now. But there was no Social Security taxes, no unemployment taxes, no federal income tax withholding and no state income tax withholding. Our understanding parents permitted us to install a \$15 oak roll-top desk in the living room at our home. It was our office for several years. We still use the desk in the company office . . . In the fall of 1934 when we started business, we received many commendations from the general public for our efforts to create a few jobs. In 1934 many people still had their roots in the soil, which gave them all or part of their living as well as practical knowledge of what life is all about. There was very little public welfare as such and people generally took pride in taking care of their own family problems [Hull 1992].

Hull's first order for lumber came on Feb. 15, 1935, "a final settlement of 30,236 board feet to Trio Lumber Co. in Eugene. It contained one-half car of 2 x 12s and a half car of 10 x 10s. the price was \$8.50 a thousand board feet, loaded on the car, less 50 cents for commission." Orders were slim, but his timing was good as conditions began improving somewhat, partly due to labor problems in large sawmills along the Columbia

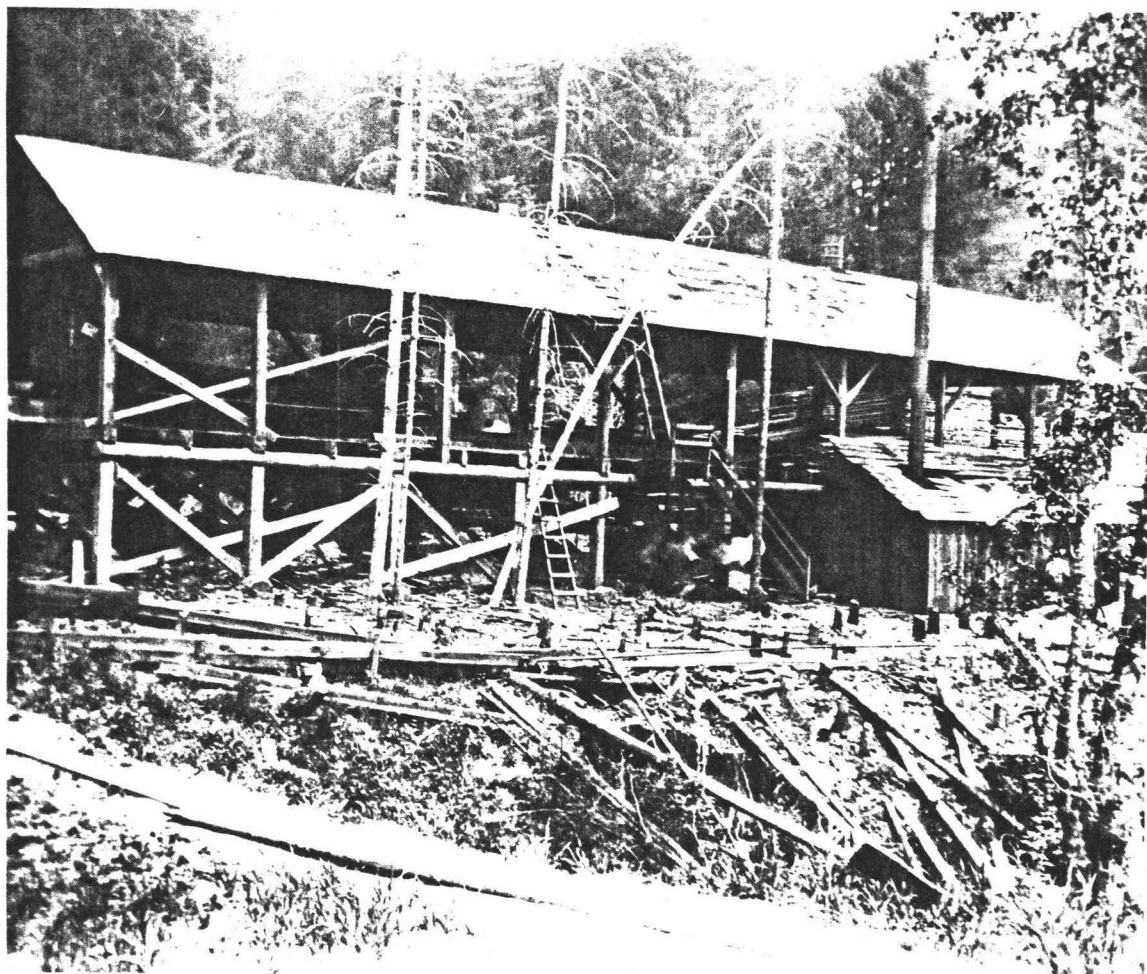


Fig. 3.4: This is a 1935 shot of G.M. (Merle) Gragg's steam-powered sawmill, about three miles north of Belfountain. Ralph Hull operated the sawmill for a time. Courtesy of Ralph Hull, Dawson.



Fig.3.5: Paul Bloom on a sled load of logs at the end of a skid road at the Merle Gragg mill pond. The photograph was taken in 1934, illustrating the way Ralph Hull hauled his first logs to his first sawmill. Courtesy of Ralph Hull, Dawson.

River near Portland. "The Northwest Council of Sawmill and Timber Workers called for an industry wide strike in May of 1935 to secure a thirty-hour workweek, a seventy-five-cent hourly minimum wage and union recognition" (Ficken 1987: 210). Within days of the proposed May 6 walkout, "most of the sawmills in Portland and on Puget Sound and Grays Harbor were closed by employers hoping to avoid violence . . . by the middle of May, 90 percent of the Northwest industry's capacity was shut down and 30,000 workers walked the picket lines" (Ficken 1987: 210-211).

As Hull, whose economic strategy at the time was beat-the-bush and jump when an opportunity opens, put it: "It was tough . . . But we had a little bit of a good market because they had a strike on the Columbia River. All the big mills were shut down up there and we had a good market for cheap plank."

When his six-month lease with Gragg ended, Hull immediately leased an "all electric" sawmill on a Southern Pacific Railroad spur leading to a brickyard in nearby Monroe. Meanwhile, the federal "New Deal" government of Franklin Roosevelt was gathering speed and providing jobs for people through Civilian Conservation Corps projects. Hull was quick to take advantage of the situation, which produced a demand for lumber to build camps to house Civilian Conservation Corps workers that were then being put to work in the Pacific Northwest on a variety construction and reforestation projects that greatly boosted a sagging lumber industry (Schwantes 1989: 302-309; Robbins 1990: 85-87; Dembo 1985: 53-55). As he recalled:

I remember one of our best orders at the time was for about 70, 000 feet of surfaced 2 x 4s that we trucked to a Civilian Conservation Corps Camp that the 'New Deal' government was building several miles west of Cheshire on the Long Tom River.

Lumber for his new venture was coming, in part, from federal timber supplies that included Oregon and California timber lands. Hull also got some from land that his uncle, Wes Miller, had owned and sold to Hull to cut at \$1 a thousand board feet. The so-called O & C [Oregon and California] timber was part of 1916 deal in which the federal

government acquired timberland owned by the Southern Pacific Railroad and the Coos Bay Wagon Road on the basis that they had not complied with provisions of an 1866 land grant. The land was to be administered by the Bureau of Public Lands [the Bureau of Land Management beginning in 1946] and sold for logging and lumber.

His leased electric-powered sawmill in Monroe was unique for its time, Hull said, and produced the largest electric bill the Junction City office of Pacific Power & Light Co. had yet seen (Hull 1992). Hull operated the mill for about four months when a fire from sawmill refuse overpowered a Sunday watchman and burned the mill down. The planer wasn't lost in the fire, and Hull enlisted the technical expertise of area resident and "steam man" Hubert K. McBee to help him build his own sawmill four miles north of Bellfountain. Half of the sawmill was on his uncle's land, Hull said, and half was on federal land. Hull recalled he was not exactly flush with cash, but that he got the project done cheaply:

You didn't worry about finances then. You just went ahead and did it. We did it very economically. We found a man named Paul Bloom to do the logging for us. We bought a team of horses and sold them to Bloom. He brought in the mud sills for the foundation on which the sawmill was built. He just went out in the woods and brought down maybe half a dozen logs and laid them out where we wanted them on the ground.

It was on an incline and the logs would be on a 20 percent grade . . . the core was the saw husk, I think, and a good carriage and a 11x11 single-cylinder Case steam engine. [A husk is the term used for the framework on which certain machinery was attached. It becomes the pivot point for the power system, the machinery where the saw arbor shaft and drive pulley, saw and other machinery are mounted]. . . Originally, it was a traction engine [from a steam-powered farm tractor]. . . We converted it to sawmill use, made a stationary engine out of it. The way we done that was to take the fire box out and build a Dutch oven under it so you have a lot more fire power, heat coming in there increases your steam capacity a good deal. Generally, the Dutch oven would remain in place if we moved the engine, but we might salvage fire brick out of it . . . The top of it usually had an arch on it and it has a set of fire grates for the fuel to burn on and you had some draft grates to control the wind that comes into it. It was quite a large installation. I forget how big it was. But it worked pretty good.

There was a spring there that provided the water for the steam engine. We just piped the water to the site and used a water tank to store it.

3.4 Marketing a Product/Lumber-Pile Banking

Selling lumber did not present Hull with any major problems, even during the Depression. Hull said, "You can always sell lumber if you want to sell it cheap enough." There were markets available, but he had to look hard for them, a diligent process that kept him hustling. That led to some sales of so-called "Jew plank," a contemporary reference to odd-dimensioned, undersized and rough-surfaced, planks. Hull said they were called "Jew plank" because "They sold them to the Jews [Jewish merchants] on the docks of New York." Essentially, the planks were 1/4 inch less than standard sizes, such as 3 x 12 planks.

Hull operated his sawmill north of Bellfountain all through 1936 and 1937, until it, too, burned to the ground in May, 1938 from a fire that got started in slab wood while the sawmill was running. Fires were a common occupational hazard in sawmills in those days, particularly in steam-powered mills where fire was always going under the boilers (Cox et al. 1985: 68). "Lots of mills burned," Hull said, and continued to burn through the 1950s. This fire idled his crew of about 15 men.

Beset by unexpected fires, equipment failures, and the ever-present cycle of business slumps, Hull quickly adopted the general strategy of cutting a lot of lumber and stacking it as inventory that he could use as a bank of money to draw on during slack periods or to finance new ventures. Some sawmill operators couldn't afford to do that; others didn't think to do it and their mills stayed closed when the unexpected occurred. He borrowed money to get his early ventures going, Hull said, but inventory sales helped bail him out thereafter. When the Bellfountain sawmill burned, he relied on money to pay off the bank that loaned him seed money. As he put it:

When it burned, we had quite an inventory. You talk about where we got the money to build this mill. Well, back in 1935 and 1936 we were getting money from shipping the lumber out of inventory from the Monroe mill and they furnished us the money to build the mill up north of Bellfountain. So when the mill at Bellfountain burned we had an even larger lumber inventory [usable to bankroll another venture].

That venture was already on the drawing boards. A sawmill in Dawson owned by his uncle, Wes Miller, burned to the ground in 1936, destroying everything except the mill's steam plant and the planer (Fig. 3.6). The fire had started from the explosion of an acetylene torch while a welder was working under the sawmill. It put 90 men out of work, according to the June 11, 1936 *Corvallis Gazette-Times*. Miller had operated that sawmill since he built it at the end of the Southern Pacific Railroad spur line in 1922, according to Benton County property records. Prior to that, the records show that in 1920 Miller had leased a smaller sawmill on the same site that had been owned and operated by Fred Malcolm since 1914.

Immediately after Wes Miller's sawmill burned, his brother, Clarence, built the I.P. Miller Lumber Co. at the west end of a mill pond that Wes had previously used. I.P. Miller specialized in producing railroad ties and other timbers for railroad construction, employing 75 men and producing an average of 75,000 board feet for one eight-hour shift in his band mill, according to the June 10, 1959 *Corvallis Gazette-Times*.

Wes Miller's plans had been to rebuild the mill to cut large timber, leaving the smaller timber for his brother's plant to process. But Wes decided not to rebuild, Hull said. He just repaired the boiler room and upgraded the planer operation to plane lumber for I.P. Miller. He decided in 1938 to get out of the business entirely because of sagging markets, agreeing to sell the site to Hull.

Meanwhile, the mill Hull first leased from Merle Gragg had burned down and was rebuilt, but sat idled by the sagging economy. Hull leased that sawmill and operated it for a month or two to cut up their log inventory for lumber to build his new sawmill on the Wes Miller site in Dawson. He got most of the 50,000 board feet of lumber he needed for the Dawson project by cutting timber with the leased Gragg sawmill. Some of the more critical lumber, carriage timbers that had to be as smooth as possible to allow the carriage to run on them smoothly, I.P. Miller cut for him. Any cash he needed came from sale of lumber that he had kept in the bank, on inventory.



Fig. 3.6: A 1934 view of the W.J. Miller sawmill in Dawson. The sawmill burned to the ground in 1936, with all but the boiler house in foreground and the planer building being destroyed. Ralph Hull rebuilt the sawmill on approximately the same footprint as the Miller mill. Note the small houses or employe "shacks" on the left side of the photo adjacent to the forest. Smoke from their woodstoves is particularly visible. Courtesy of the Benton County Historical Society.

They began building the new sawmill during the winter of 1938-39 and opened in June of 1939. For a timber supply, Hull bought eleven 40-acre tracts, or about 440 acres, on Green Peak immediately west of the mill site. He later bought another 160 acres and "we bought timber whenever we could from the federal government." Having timber so close was a distinct advantage, a factor that cut his costs considerably, and one he enhanced by buying tax-delinquent timber in the immediate area at depressed prices. Hull explained the economic strategy he pursued, a strategy followed by other successful Benton County timber barons such as T.J. Starker (Fisher 1991: 45):

It's hard for people . . . to understand that timber was not a prime commodity back then [in the early days]. There was timber everywhere around here, almost everywhere. Relatively, it didn't have much value as second growth timber in the 1900s, 1910, 1920, around in there. The timber very slowly acquired some value. I might say just for the record that since 1900 there has been several, what we might call timber booms. Back about 1900, all the people thought that all at once this timber was going to be very valuable here. The people would take homesteads with the idea of hanging onto the timber. A lot of people gambled that way. They were about 20 or 30 years ahead of the times. So somewhere in 1910 or 1912, the county assessors came out and cruised this timber and put it on the tax roll. Of course those people who bought the timber had no income, they were speculating on it. So later on then came World War I and there was some activity in timber then, a timber market in 1918 and 1919. Seemed like in 1920 there was a slump and then in 1921 it picked up again. The decade from 1921 to 1929 when the Depression came, the lumber business was sitting relatively good. It always has its ups and downs market wise. So, the thinking was that timber was always going to be valuable in the '20s and of course with the Depression came the timber that had been worth something became almost worthless. Money people, the mortgage people, had loaned money on these timberlands.

Some took out second mortgages. The Green Peak people who took second mortgages lost all of their money and the first mortgage losers took a big beating on it too. We got it for \$1.35 a thousand. They may have had \$3 or \$4 a thousand invested in it . . . you just can't tax year after year for a profit when it takes 65 years to 100 years to grow. Compound interest and carrying charges will eat you up . . . Anyway, getting timber close to the mill was an economic advantage, and we used to think we had an advantage by saving transportation costs. Well, it wasn't until the early war years that we began hauling long distances and log trucks began passing each other on the highways [and operation costs jumped considerably]. . . We started [cutting on Green Peak] in 1938 and 1939 and there's still timber stands in there. A lot of it has naturally reseeded itself. Our situation was not particularly unusual. Why, everywhere you looked in these canyons there was timber and sawmills.

4. HULL'S SAWMILL: A CURRENT VIEW

Today, the Hull-Oakes Company's sawmill complex consists of: the main sawmill building; a lumber planing shed; a building housing two boilers fired by under-the-floor brick Dutch ovens supplied by wood-chip and sawdust fuel from the lumber-cutting process; a shed for debarking logs; and an idle wigwam-style burner previously used for disposing of unused sawmill wastes. It also includes: a mill pond; business office housed in a former rental home on the site; lumber storage sheds; former office; truck and large equipment maintenance shed; county access road and railroad siding; several small outbuildings; and two water-storage reservoirs holding a total of about 250,000 gallons (Figs. 4.1 and 4.2). The complex operates as a large system, with logs and lumber progressing from one work-station to another in a pre-determined manner that can be modified to suit work-order changes. The buildings are primarily of wood frame and some non-combustible construction, one and two stories in height, with iron-clad skeletons, iron-clad frame and wood-and-metal-covered roofs. Walls are part open sided, skeleton iron-clad, crib and wood frame. Floors are part concrete, wood-joisted, earth and steel. The following is a description of each building and principal structure:

4.1 Buildings and Structures

Main sawmill: Although irregular in shape, the main sawmill is roughly 250 feet long and 100 feet wide. The two-story building is built atop a concrete and steel foundation and a variety of concrete pads to which various items of machinery are tied (Figs. 4.3 and 4.4). For the most part, it is of a standard crib barn-type construction with V-shaped, and lateral carrying trusses for an upper framing above a barn-board plank floor. The building is 40 feet tall at its highest point. Its 45-degree pitch gable roof has overhanging eaves; the wood-frame building and roof are clad with corrugated sheet metal. Where wood siding is left visible, it is vertical boards and battens. Because much of the mill is open-sided, there are few windows in it. However, there are two twin-panel, six-pane,

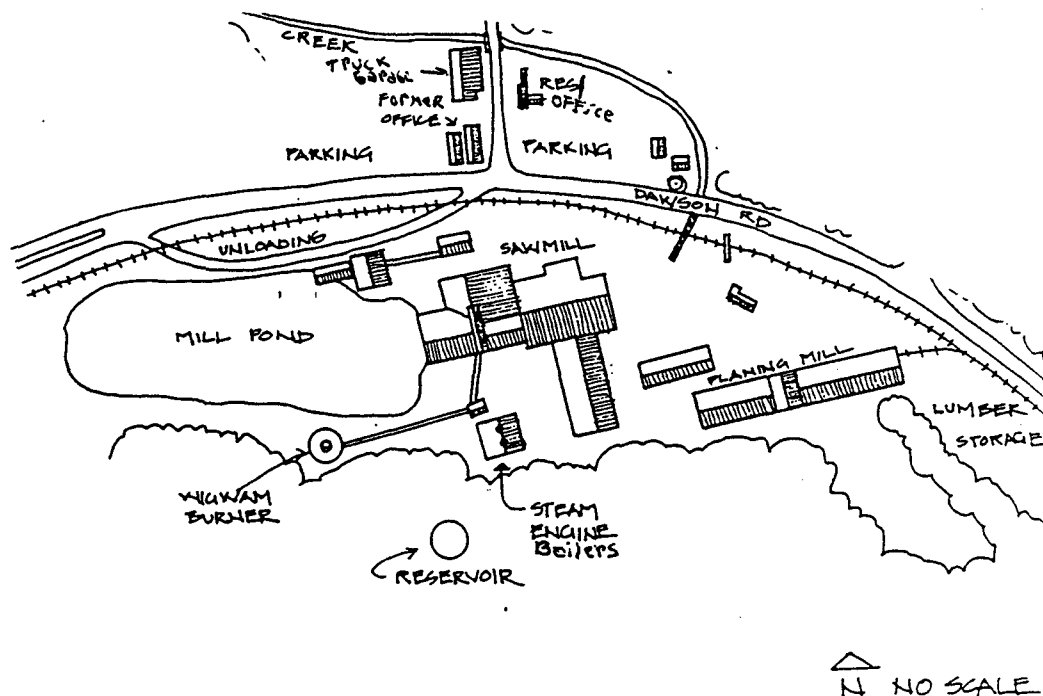


Fig. 4.1: This sketch map of the Hull-Oakes Lumber Co., Inc. sawmill and related buildings and structures is a hand-corrected version of an incorrectly-drawn sketch map included in the 1984-85 Benton County Historical Survey. It provides a general orientation to existing structures at the Hull-Oakes sawmill. The original map is on file in the Benton County Historical Society, Philomath, Ore., #474B. Map modified by George Wisner, 1994. Courtesy of the Benton County Historical Society.

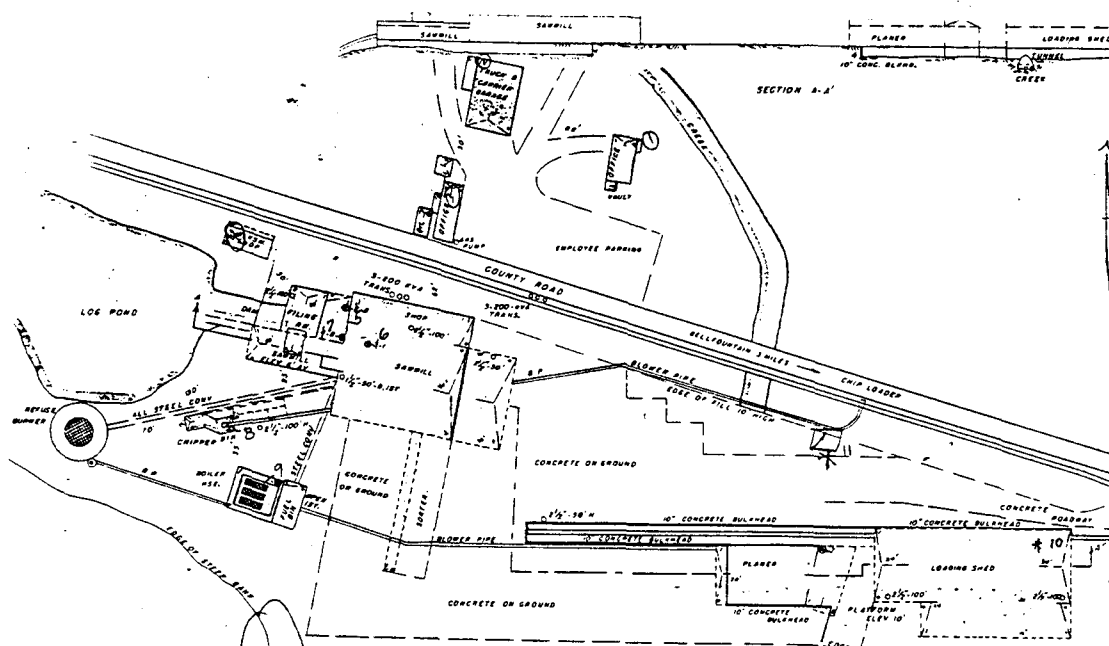


Fig. 4.2: This sketch map of the Hull-Oakes Lumber Co., Inc. sawmill shows overview of the contributing sawmill buildings, and their elevations. This map was done by the Oregon Insurance Rating Bureau, Portland, Ore., and drafted by W.S. Pearson. Courtesy of Ralph Hull.

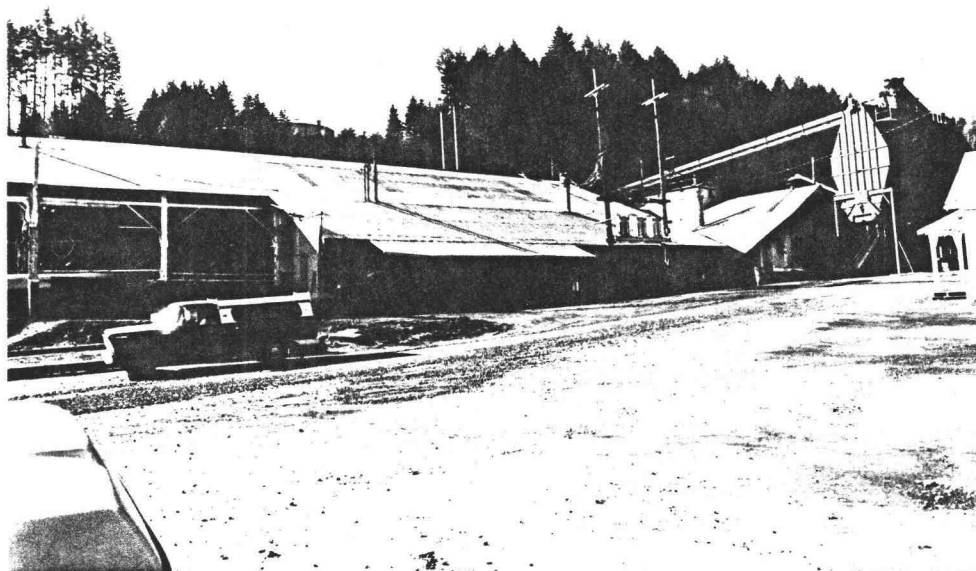


Fig. 4.3: Looking at the north elevation of the main Hull sawmill in 1993. Note metal wood-chip storage bin on right. (Unless othersize stated, all other photographs of Hull-Oakes buildings and machinery were taken in 1993 and 1994). George Wisner photo.

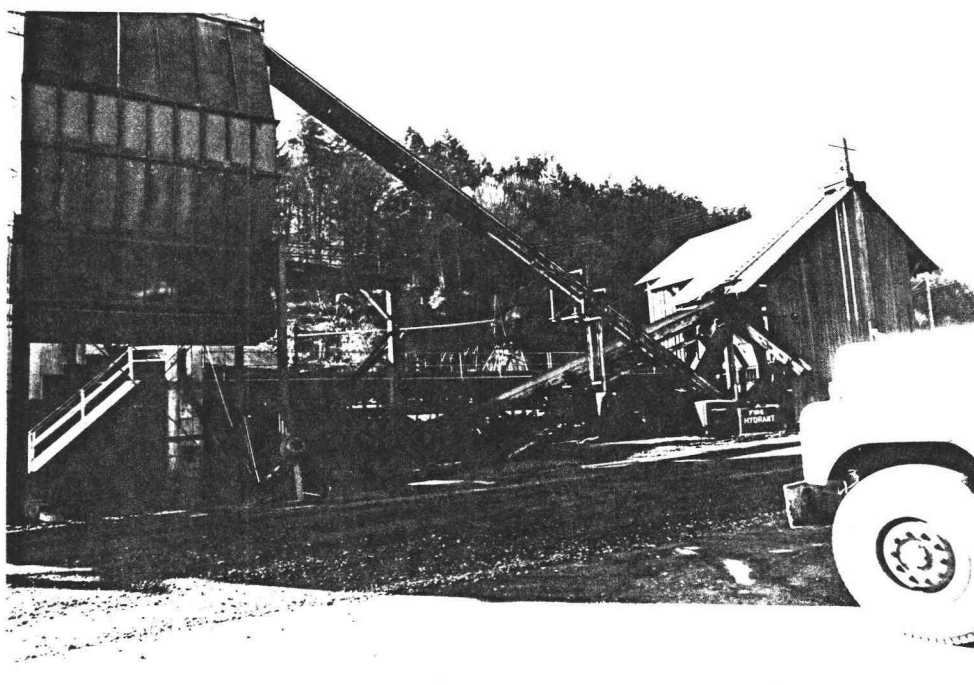


Fig. 4.4: Northwest elevation of the main sawmill as seen from the north. Note debarker building on right. George Wisner photo.

casement windows providing natural light to a saw-filing room on the building's northwest side. The main mill construction is typical of the period, according to Hull, and is of vernacular construction without benefit of formal plans and contains about 50,000 board feet of construction lumber. The mill's main steam engine, carriage-drive steam engine and steam-powered auxiliary equipment, assorted shafts, gears, some conveyors, pulleys that include one three-foot diameter wooden pulley pre-dating Hull's sawmill, and other running-gear, occupy what amounts to a basement area under the main sawmill building. Much of that under-the-floor maze is surrounded by concrete footings and channels. As Hull put it:

There weren't many alternatives at that time. We poured concrete footings, put up 12 x 12 posts and 12 x 12 caps on top of the posts with a 12-inch joist on top of those. That was the mill floor. And we had to build the concrete base for the steam engine that ran the mill. That is about 12 feet above ground level. The platform for the engine is beneath the center of the mill. No, we didn't have any elaborate plans to build the mill, we just built it . . . had a good sawmill person named Hubert K. McBee . . . sawmill men just go ahead and build 'em. They know what's needed and what corners to cut, and that's how we did it. Probably used a couple of [railroad] car loads of lumber. In those days a car load was about 25,000 board feet.

The mill's saw-filing room is directly north of the main lumber-cutting saw, or head-rig (Fig. 4.5). The positioning, just west of the north/south axis of the main sawmill, was necessary to give quick access to band saw blades for sharpening.

Placement of saw-filing rooms within sawmills varies from mill-to-mill, but are generally placed on the main sawmill floor opposite the head-rig saw (Brown 1947: 82). There also are five panels of six window panes each mounted in a row near the top of a sliding barn door that's an equipment entry to the saw shop's north entrance. A similar door is on the south side, but does not contain windows. This part of the mill was built in 1938 but was reconstructed and remodeled in the early 1950s to accommodate new equipment. A lumber-sorting chain-type steel conveyor extends about 125 feet to the south from the south-east end of the main mill. The sorter is about 30 feet wide and covered by a post-and-beam-supported, metal-clad and gabled roof with overhanging

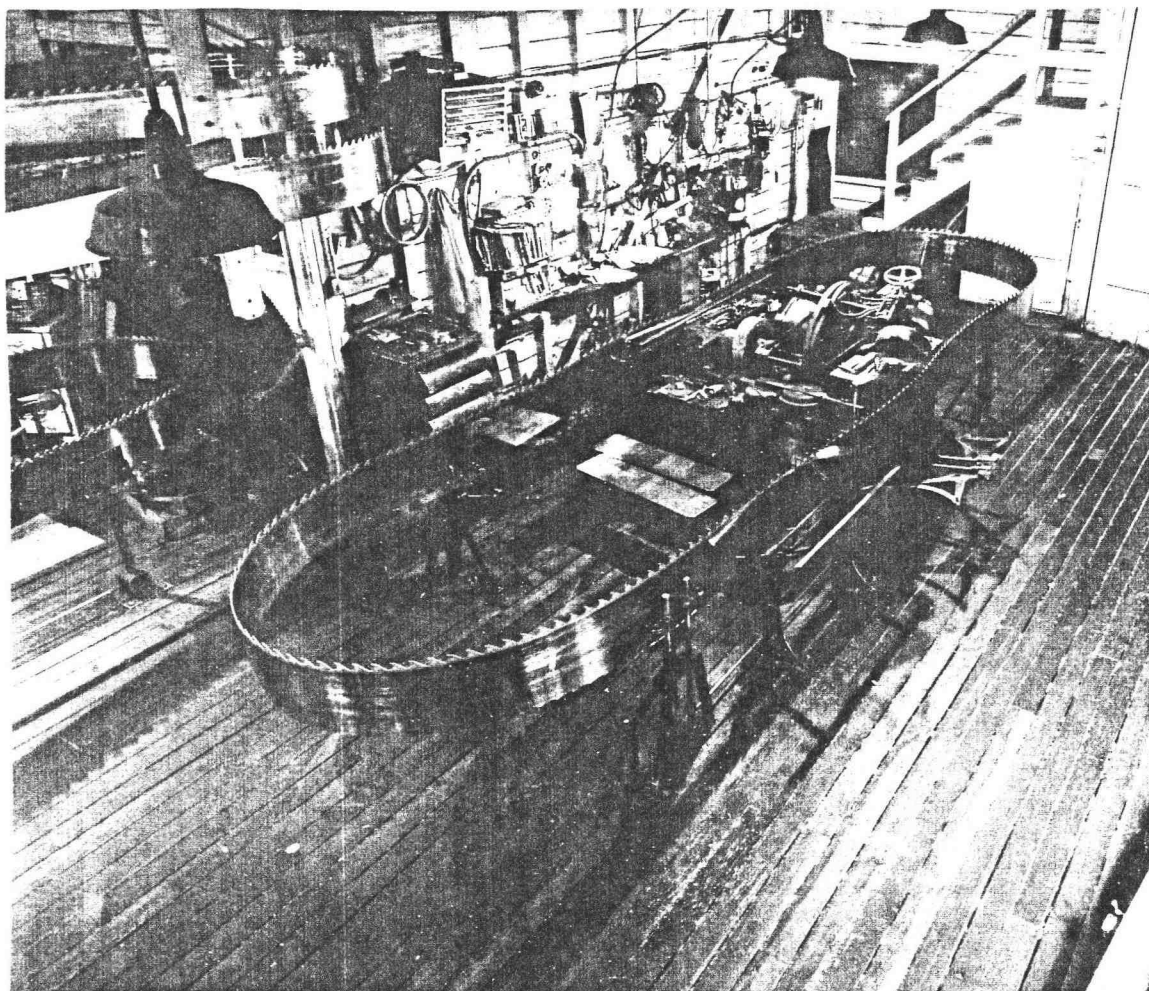


Fig. 4.5: A view of the saw-filing room at the Hull-Oakes Lumber Co. sawmill in Dawson. A head-rig band saw is shown on the company's Armstrong brand, electrically-operated band-filing machine. Band saws are changed and sharpened every two hours. The sharpening process takes about two hours; the company has six of the Swedish-steel saws on hand, with each one costing about \$1,700. The company wears out about two of the bandsaws a year. The filing room is directly north of the sawmill's headrig. Courtesy of Gary Tarleton.

eaves. Besides the main head-rig saw, the main sawmill also contains an edger or resaw to create boards with parallel sides and divide boards into acceptable widths and grades; a trim saw to cut the ends of boards square; a large-timber saw; and the green-chain shed for sorting fresh-cut lumber.

Boiler and wood-chip fuel storage house: A two-story boiler house and fuel bin sits about 70 feet south of the main sawmill, connected by a steel conveyor mounted on concrete pads (Figs. 4.6 and 4.7). The most prominent features of the structure are two 120 foot tall metal smokestacks with fuel arrestor screens that carry away the smoke produced by the combustion of sawdust and wood chips in the boiler fireboxes below. Ventilator fans and other machinery protrude from the top of the building's roof. The fuel storage bin is constructed of laminated 2 x 6 boards for its lower two thirds; the upper third is built of laminated 2 x 8 boards. The sides of the bin are reinforced with bolted beams. The attached boiler house is 60 feet long and 35 feet wide, and about 40 feet high. The building is a hodge-podge of vernacular construction, including concrete, brick and barn beam foundation, barn beam framing and corrugated sheet metal siding and a roof partially tied together with baling wire. There are no windows in this building. This structure was part of a previous mill on the site, and was built in about 1920 to house boilers used to provide steam power for that earlier sawmill operated by W.J. Miller. The inside is a maze of piping, baling wire and brick used to construct two under-the-building Dutch ovens to fire the PSMD-brand boilers.

The boilers themselves are wrapped in brick. One boiler dates to 1911, and was installed in the W.J. Miller sawmill in 1920; the second boiler came from the Ferris sawmill near Mill City, Ore. It dates to about 1915, and was installed at the Hull-Oakes sawmill Circa 1980. A third boiler remains in the boiler house for water storage, and dates to about 1909. All of the boilers are of riveted construction in 285C pressure-vessel-quality steel plate; the two actively-used boilers are wood fired. They are called "72 x 18" boilers, which means that they are 6 feet in diameter with heating tubes inside

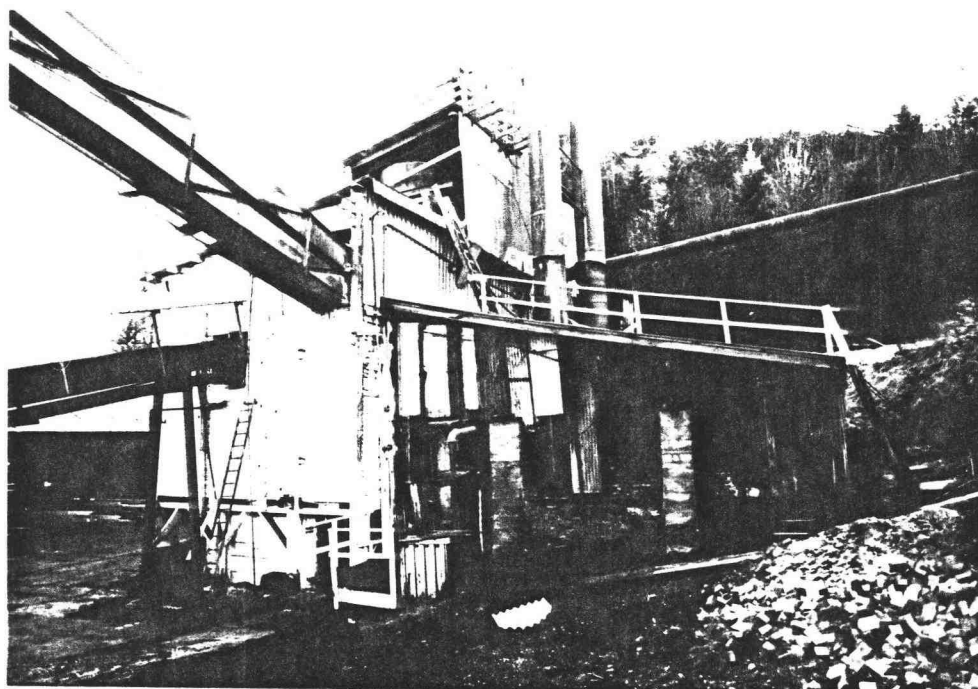


Fig. 4.6: North elevation of the Hull sawmill's fuel-storage bin and attached boiler house. Boiler house is in foreground. George Wisner photo.

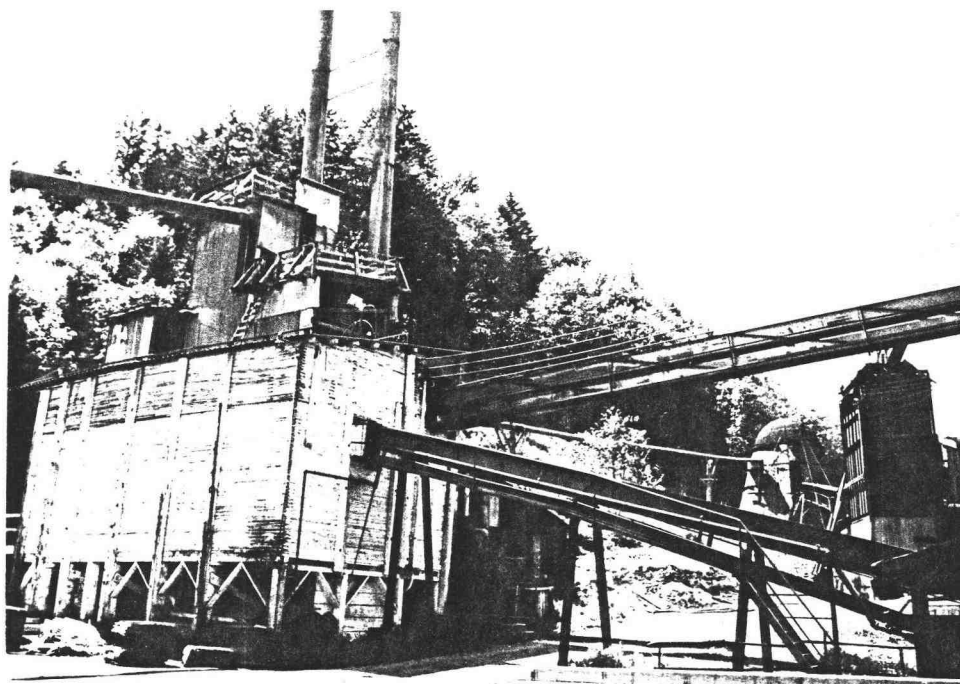


Fig. 4.7: South elevation of the Hull sawmill fuel-storage bin and attached boiler house. Note "hog" chipper machine building and combination sawdust and wood-chip storage bin on right. George Wisner photo.

that are 18 feet long (Figs. 4.8, 4.9, 4.10 and 4.11). They are known as two-step horizontal, return tube boilers. The boilers, partially suspended from ceiling rods, consist of cylindrical shells with flat-ended enclosures into which the .125-inch thick metal heating tubes are inserted. Fire from the double Dutch oven-styled arched fireboxes that heat the belly of the boilers also returns through the metal tubes to further heat the water in the boilers, providing a two-step heating process (Hull 1992; Olson 1994). As Hull explained it:

They were what you would call an HRT, Horizontal Return Tube, and in this case the fire went underneath the belly of the boilers to a rear firebox and came back inside the tubes, fire came inside the tubes. All the heat came back through the inside tubes. Now today most boilers would be called water tube boilers, which means the fire would go around the tubes. But these heated the water when it went underneath the belly of the boiler and also when it came back through the tubes. The water is contained in the boiler just like in a tea kettle. Water boils in a tea kettle. These are just large tea kettles, really.

Water for the boilers comes from the Oliver Creek system over which the main sawmill is built.

The creek always ran under the mill. Eventually we diverted it through a big concrete tunnel. Originally it ran down the middle. It was the Green Peak tributary of Oliver Creek. It comes off Green Peak and runs into Oliver Creek here underneath the docks of the mill . . . Oliver Creek flows into Muddy Creek, Muddy Creek flows into the Marys River, the Marys River flows into the Willamette River.

The boiler arrangement provides the 150-pounds per square inch of steam pressure normally used to operate the sawmill's steam engine. "That's about standard for this type of operation," Hull said of the steam pressure developed. "There's no other place to get steam except from politicians. They are full of it; but they aren't always effective." The actual history of the boilers at the Hull-Oakes sawmill is not clear. But firetube boilers, such as those at Hull-Oakes' sawmill, have been an industry standard for years because of their comparatively low cost of installation, large water capacity and ability to absorb sudden demand fluctuations common to sawmills change throughout each working day (Shields 1961: 11, 18 and 19).

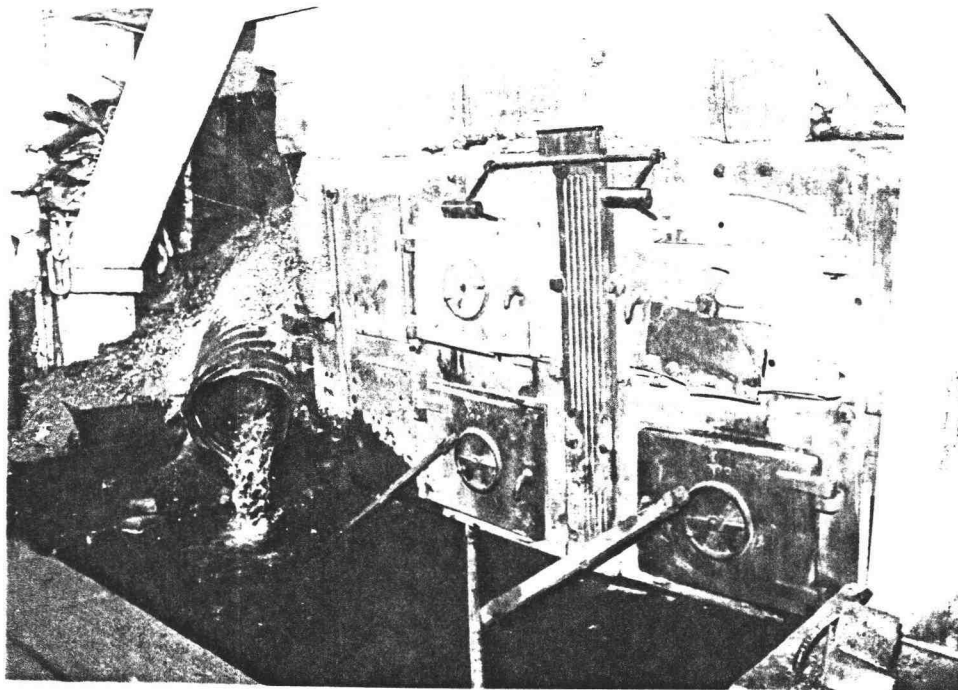


Fig. 4.8: Cast-iron doors to the east-facing double Dutch ovens that fire the sawmill boilers. Courtesy of Wren Photographer John Bragg.

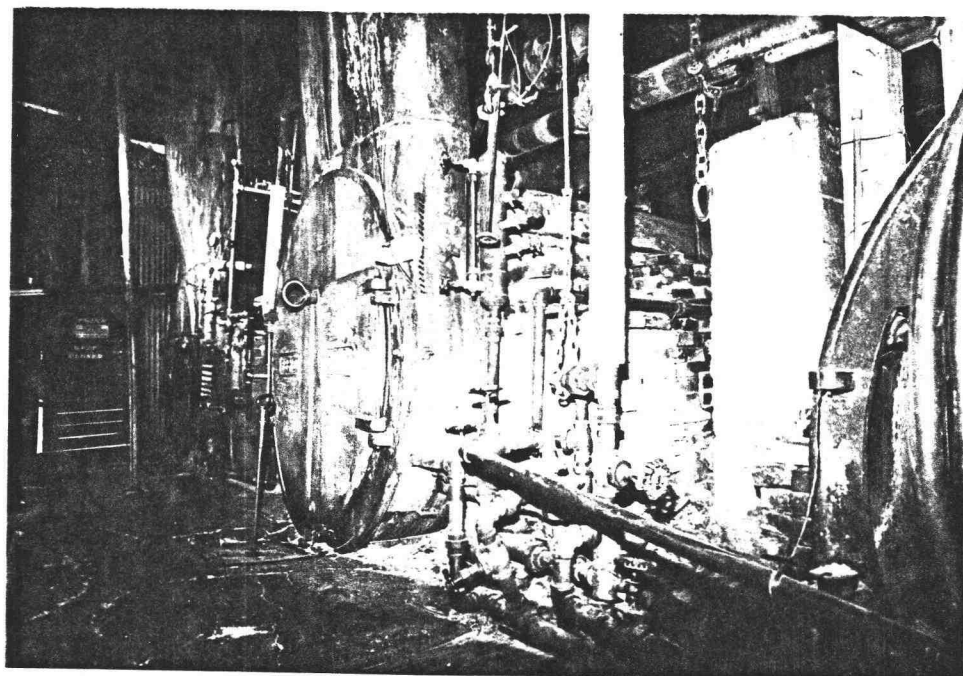


Fig. 4.9: This shot shows two of three east-facing boilers in the boiler house at the Hull sawmill in Dawson. Courtesy of Wren Photographer John Bragg.

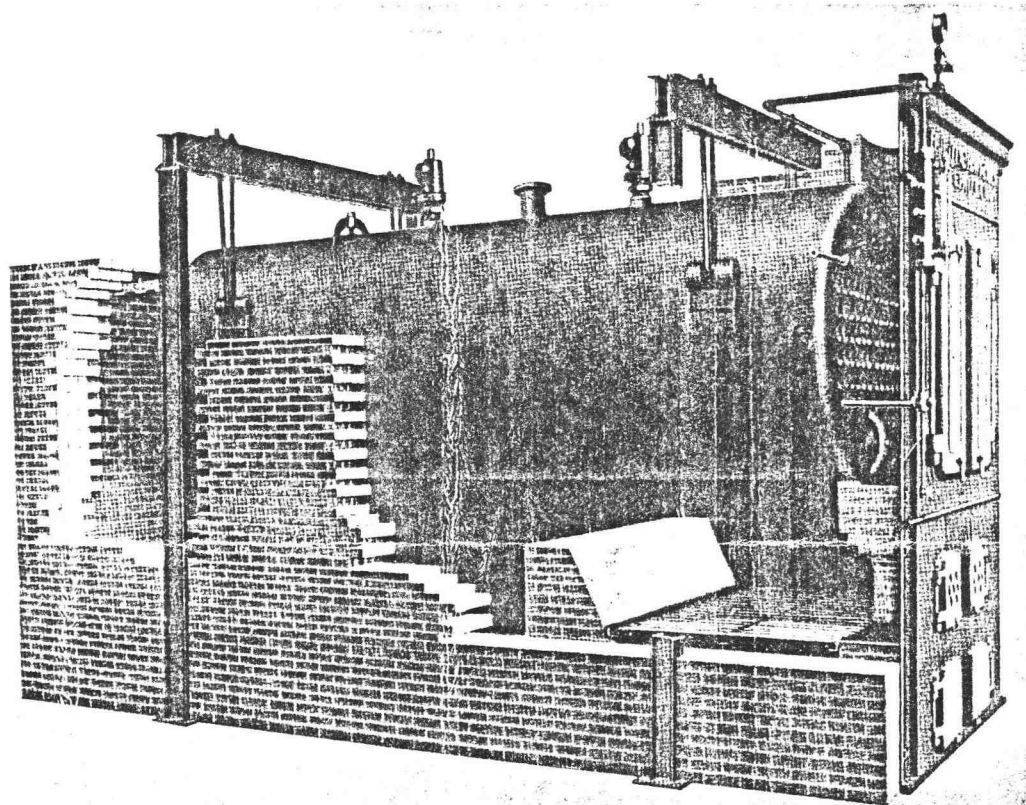


Fig. 4.10: This sketch shows the installation configuration of a Horizontal Return Tube boiler. The installation is nearly identical to that used to install boilers at the Hull-Oakes Lumber Co. sawmill in Dawson. Note the suspension rods, lugs, buckstays, and refractory setting (Courtesy of McGraw-Hill, F.W. Dodge Division).

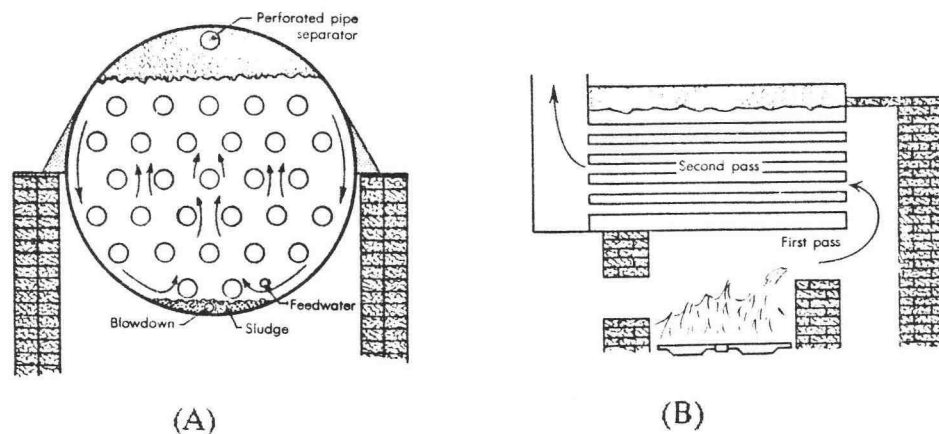


Fig. 4.11: Sketch (A) shows the water circulation in a standard Horizontal Return Tube boiler. Sketch (B) shows the hot gas flow in a standard HRT-type boiler (Courtesy of McGraw-Hill, F.W. Dodge Division).

Wigwam burner: An all-metal wigwam-style refuse burner sits about 200 feet south of the main sawmill, and directly adjacent to the south side of the mill pond (Figs. 4.12 and 4.13). This wire-mesh-capped metal-clad conical structure was built during the early 1950s to meet the then new Oregon Department of Environmental Quality air quality standards for refuse burning at sawmills, and to lessen the chance of sawmill fires by containing refuse burning. The state outlawed such structures in 1970 as air quality control standards became more strict. The structure is 75 feet tall, and about 50 feet in diameter at its base. Prior to construction of the refuse burner, sawmill waste was burned in the open on the same site, and without any enclosure. Wigwam burners weren't always part of sawmill sites in Oregon, and Hull's grumbling about them is typical of old-timer comments in the industry concerning politics and what was generally regarded as government interference into their affairs. As Hull explained:

My uncle Wes' mill didn't have one here, and mills didn't have wigwam burners generally up until the 1950s. Well, sawmills had waste from the mill. Before the time of hogs [hog fuel chippers] and the market for hog fuel, sawdust and planer shavings, mill operators always had problems getting rid of their waste material. That stuff consisted of edgings and the slabs, and many times the mill trims from the boards. They just ran all this material out with a long conveyor on the side of the mill someplace and burned it. Sometimes you put up some kind of a shield of corrugated steel to keep the heat from burning down the conveyor. There was legislation that required us to build a wigwam burner, which was supposed to be an improvement on open fires . . . and more efficient where smoke was concerned. I think they were probably less likely to get a fire started from them than from an open fire. They made us put one in and they made us take it out. That's typical politics for you.

Log pond: The log pond is due west of the sawmill. It is about 250 feet long and 150 feet wide (Fig. 4.12). It is about 15 feet deep at its deepest point. The generally-earthen structure is partially surrounded by concrete and provides working storage for incoming logs. It existed on the site before the Hull-Oakes sawmill began operation in 1939. The history of its construction is unclear. But the pond also served as a log-storage area for now defunct and dismantled I.P. Miller sawmill. That sawmill was directly west of the pond. It operated from 1936 to 1981 when the company ceased operation and

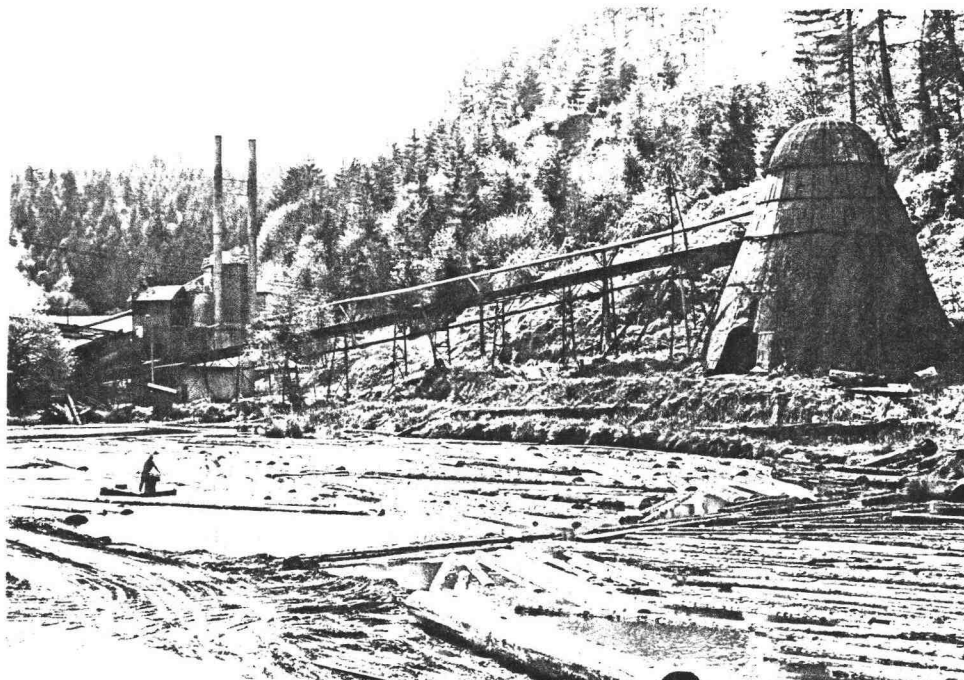


Fig. 4.12: View of Hull-Oakes Lumber Co. sawmill log pond in May, 1993. Former wigwam-style refuse burner is in the right background. This shot taken from west end of the mill pond, looking east. Sawmill boiler shed is in left background. Note "pond monkey" moving logs in center of pond. Courtesy of Wren Photographer John Bragg.



Fig. 4.13: Close-up of the north elevation of wigwam-style refuse burner at the Hull-Oakes sawmill. Courtesy of Wren Photographer John Bragg.

dismantled the mill, Hull said. Hull-Oakes later bought the company's land. All that remains of the I.P. Miller sawmill are scattered remnants of buildings and foundations.

Wood chip storage bin: A two-story wood-chip bin of wood-frame construction and clad in corrugated metal siding, was built in 1960 about 33 feet north of the boiler house (Fig. 4.7). It sits on wooden posts atop concrete and wood pads. The bin provides storage for wood chips used as fuel for the furnaces that heat water in the boilers. It also holds the hog-fuel-chipping machine.

Planer building: A one-story, wood-frame planer building sits about 200 feet southeast of the main sawmill (Fig. 4.14; see Appendix A). It is 100 feet long, 50 feet wide, and 24 feet high; it is typical of sawmill construction and crib-type barn framing. Its 45-degree roofline has overhanging eaves. It has a corrugated metal roof. The building pre-dates the Hull-Oakes sawmill, and was built Circa 1920 to accommodate the W.J. Miller sawmill operations.

Wood-storage building: An open-sided wood-frame wood-storage shed sits 10 feet east of the planing shed (Fig. 4.15; see Appendix A). It measures about 150 feet long by 80 feet wide. It is 34 feet high, and has cross-shaped lateral carrying trusses, with hip jacks. The building's 45-degree roofline has overhanging eaves. It has a corrugated metal roof. The building, also built in the 1920s, sits on barn posts atop concrete and wood-block piers, and partially on a concrete foundation. Lumber also is stored on large expanses of concrete and gravel lots around this building.

Oil storage sheds and former office: Two small wood-frame outbuildings, and the former company office sit about 60 feet north of the main sawmill (Figs. 4.16 and 4.17; see Appendix A). The former office is a one-story ship-lap-sided structure, with vertical wainscoting, and a small front porch. It pre-dates Hull-Oakes occupation of the site, and was built in the 1920s. Its 45-degree pitch roof has overhanging eaves. There is a small concrete pad on the north end of the building but the rest of the former office has no foundation. It has a corrugated metal roof. There are three 1-over-1 double hung

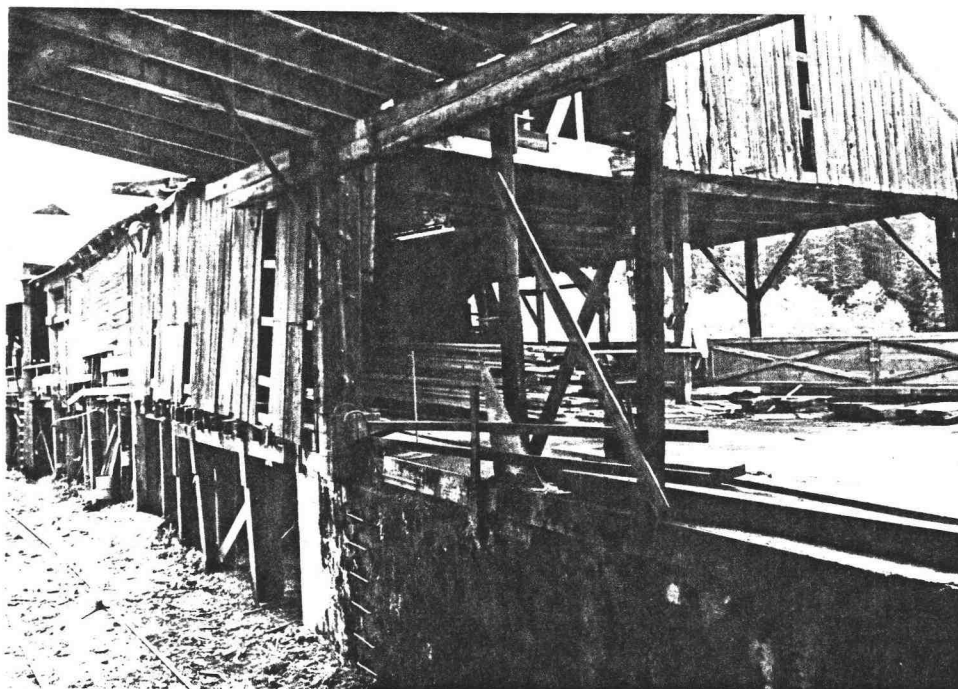


Fig. 4.14: Planer shed, west elevation, showing a concrete lane for spur railroad line used for loading box cars. Courtesy of Wren Photographer John Bragg.

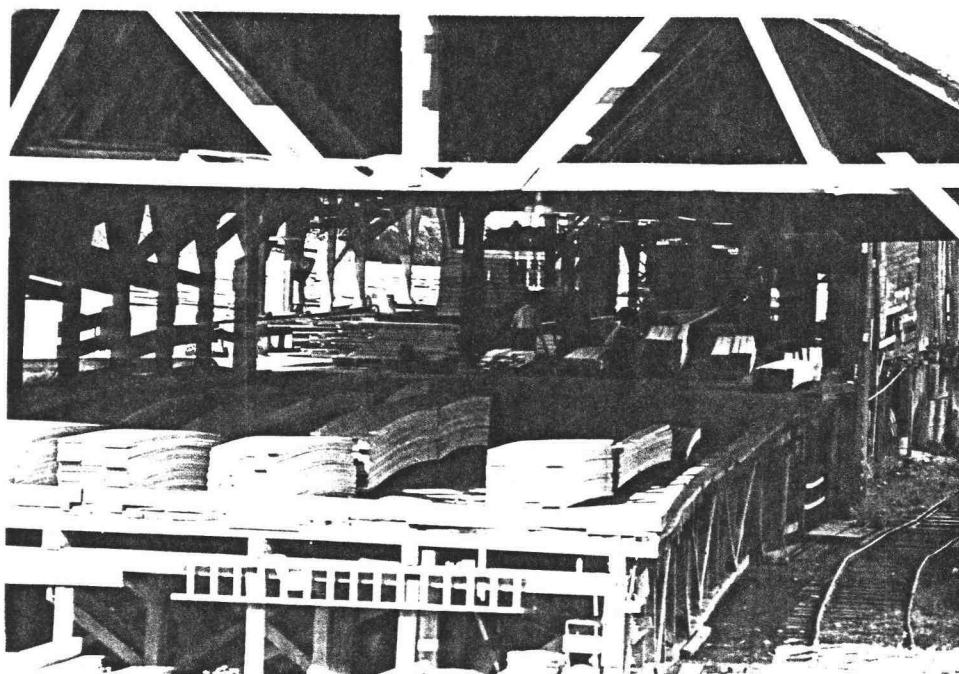


Fig. 4.15: East elevation of lumber storage shed on east end of sawmill site. Courtesy of Wren Photographer John Bragg.



Fig. 4.16: South elevation (front) view of former office building. Oil storage building is on left; gasoline storage on right. Building is on north side of Dawson Road. Courtesy of Wren Photographer John Bragg.



Fig. 4.17: South elevation of the Hull sawmill former office (right) and associated oil-storage building. George Wisner photo.

sash windows on the east side of the building. They measure approximately 50 inches by 27 inches. A gasoline-storage tank adjacent to the east side of the building is an above-ground steel tank on a concrete pad surrounded by three concrete walls. It is topped by a steel and barn beam roof covered with corrugated metal. There are two 1-over-1 double hung sash windows on the south end of the former office. They also measure 50 inches by 27 inches. There's one 1-over-1 double hung sash window on the building's west side, measuring 50 inches by 27 inches. Four feet west of the former office is an all-metal-clad, beam-framed oil storage shed. It rests on barge beams and concrete piers.

Truck maintenance garage: A 30 foot tall truck and lumber carrier maintenance garage sits about 150 feet north of the main sawmill, and to the north of Dawson Road (Figs. 4.18 and 4.19; see Appendix A). It was built in the 1940s. The 45-degree roofline of this barn-built crib building has overhanging eaves and a corrugated metal roof. Its sides are vertical boards and battens. The garage has no foundation. It sits on wood blocks. There is a brick chimney on the east end of the building about 12 feet from the south end of the garage. There are two pairs of six-pane casement windows on the east side of the building, and two pairs of six-pane casement windows on the north end. The building has a dirt floor, and a flared corrugated metal roof extension on the west side. It also contains a blacksmith's shop, which would offer archaeological potential for recovering blacksmithing tools or bits and pieces of machinery related to blacksmithing activities.

Company office: The company's present office is a former one-story rental house built in the 1930s. It is about 119 feet northeast of the corner marker for sections 9, 10, 16 & 15 and on the north side of Dawson Road (Figs. 4.20 and 4.21; see Appendices A and B). It is built in a bungalow, wood-frame style. It was modified with an addition constructed on the east side of the building sometime during the 1950s to further accommodate the use of the building as an office. It sits on a concrete foundation. The ship-lap-sided office itself measures about 35 feet by 20 feet. It has a concrete and steel

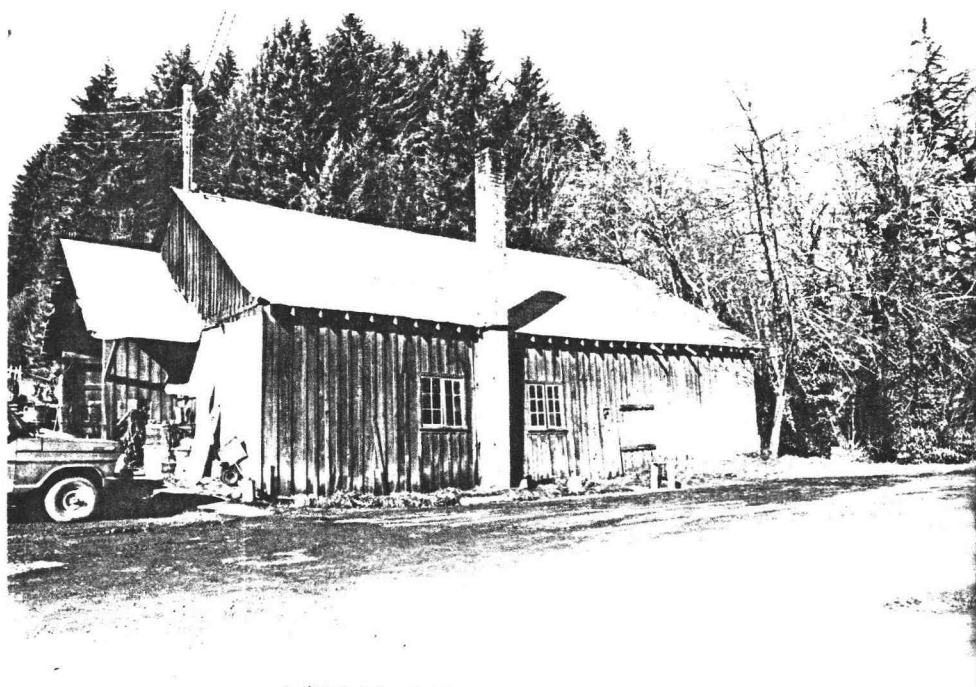


Fig. 4.18: East elevation of the Hull truck maintenance barn. Note board and batten siding. George Wisner photo.



Fig. 4.19: South elevation of the Hull Lumber Co. truck maintenance barn. George Wisner photo.



Fig. 4.20: West elevation of the company's office building, showing the carport and front porch. George Wisner photo.



Fig. 4.21: Southwest elevation view of the company's office building, showing west elevation of vault. George Wisner photo.

vault on its south end. The vault measures about 13 feet by 10 feet and is about eight feet high. The main office structure measures about 35 feet by 20 feet. Its 45-degree roofline has overhanging eaves. It has a wood-shingled roof, and is typical of the vernacular tradition house of the period. About 12 similar homes were built at Dawson during the 1920s and 1930s. Because the homes were built by individuals, some trading lumber for wages, the collection of buildings was not considered in the strictest sense to be a "company town" in the manner of one built by the Phelps Dodge Corporation at Morenci, Arizona and conforming to a classic definition of a "company town":

Owned outright by Phelps Dodge are all homes, business buildings, and public utilities, and a company store dominates the business life of the town. Private businesses exist, but their premises are leased from the company, which allows only those firms it considers necessary to the community [Allen 1966: 4].

Similar company towns matching the above definition were built in the Pacific Northwest lumber industry, one of the earliest by Pope and Talbot on Puget Sound (Allen 1966: 15). Other such company lumber towns that are now defunct included Starkey, owned by the Mt. Emily Lumber company; Valsetz, originally owned by the Cobbs-Mitchell Lumber Company, and later by the Valsetz Lumber Company, a division of the Boise Cascade Corporation; Wendling, owned by Booth-Kelly Lumber Company; and Brookings, originally owned by the California-Oregon Lumber Company. But in the case of Dawson, all buildings were owned by individuals. Although there was a cookhouse run by a private individuals for a time, there was no company store, and most of the company's employees lived away from Dawson proper. As Hull put it:

No. I wouldn't call Dawson a company town, not the way we generally think of company towns . . . They [employees] generally owned their own stuff and took care of their own stuff . . . I don't think Wes [Miller] charged anybody rent, but he may have for a couple of them.

Anyway, everyone who lived in those buildings worked at Dawson-area sawmills or in the woods around them. The office and former office, are the surviving remnants of those former homes. On the south side of the company office, there is one 6-over-1

double-hung sash window, measuring 16 inches by 28 inches; and one 6-over-1 double-hung sash window measuring 34 inches by 50 inches. There also is one 6-over-1 double-hung sash window on the east side of the building; and one single-pane fixed window measuring 72 inches by 40 inches. There is a concrete deck on the north end of the house, which forms a pad for a two-vehicle carport adjacent to Oliver Creek. The carport is attached to the office. Steel beams and posts support the carport roof. There is one 6-over-1 double hung sash window on the west side of the building. It measures 35 inches by 52 inches. There also is a 12-pane fixed window on the same side. The panes are connected with standard muntins. The windows also are surrounded by plain trim. A small front porch on the west side of the building covers the front entry way and plain entry door.

Water reservoirs: An approximate 500,000-gallon circular concrete and metal-roofed water reservoir sits about 400 feet south of the main sawmill, on a bench atop a steep slope facing the mill. A second concrete and metal-roofed reservoir, holding about 120,000 gallons of water, sits about 50 yards down a timber-filled slope to the north and west of the larger reservoir. The reservoirs supply water for the boilers that supply steam to the mill's main engine and auxiliary steam-driven equipment; they also are available for fire suppression. An underground piping system connects the reservoirs to the sawmill (Fig. 4.31).

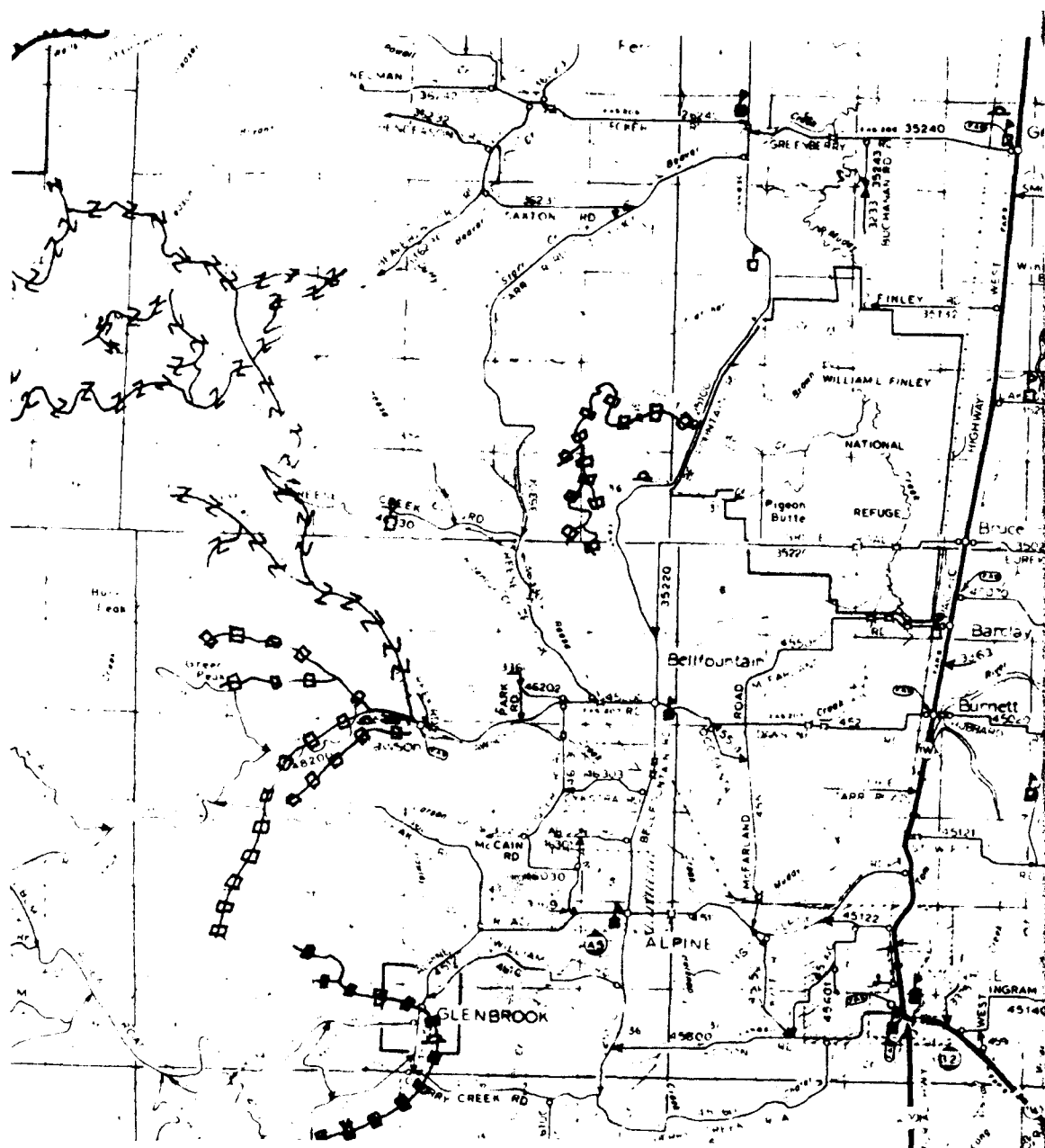
Railroad tracks: The Southern Pacific Railroad tracks run east and west, about 25 feet north of the main sawmill (Fig. 4.1). This rail line, leased since February, 1993 by the Willamette and Pacific Railroad in Albany, parallels Dawson Road adjacent to the sawmill complex, and has four spurs serving the mill. One spur sits at the bottom of a 10-foot deep concrete-lined trench adjacent to lumber storage sheds and the planing mill. Boxcars once were backed into this siding for loading. But the siding is no longer used. The Hull-Oakes company owns two of the spurs.

The railroad to the site was built in 1909-10 by the Corvallis and Alsea River Railway. The Portland, Eugene and Eastern Railway bought it in 1911; the Southern Pacific Railroad bought the line in 1915 (Austin and Dill 1987: 181). The line was originally built to serve a growing logging and sawmill enterprise at Dawson Station, as it was known. Several logging railroads had already been built in that area (Fig. 4.22). Dawson Road, just north of the main rail line, was built in the early 1900s. But it was the railroad that enabled the mill to quickly haul large amounts of lumber from the area, a railroad installed early in the century as part of a larger scheme to provide transportation from the Willamette Valley to the Oregon Coast.

Construction of a rail line south from Corvallis to Eugene was proposed as early as 1886. But nothing was developed until 1907 when the Corvallis and Alsea River Railway was incorporated. The promoter, Stephen Carver, proposed to build from Corvallis to the Pacific Ocean via Alsea. The rail line was completed to Alpine Junction on June 5, 1908; and to Glenbrook via Bailey Junction by mid-1909. Carver couldn't get enough money to finish his line, but the railroad was extended from Alpine Junction to Monroe and from Bailey Junction to Dawson, also known as McCreedy, during 1910 to serve the lumber industry in that area [Austin and Dill 1987: 181].

Lumber wasn't all that traveled on the rail line during its first four decades of operation, according to Hull. The railroad also hauled raw logs from the Corvallis Logging Company back to Corvallis to the Corvallis Lumber Co. sawmill at the confluence of the Willamette and Marys Rivers, according to Hull. And railroad cars also hauled goods from area farms, he said.

It was a time before real roads and trucks. And there were a lot of goods shipped on the railroad. It's hard to realize unless you have lived through it to see the transition from horse and buggy days to the truck days, highway trucks. . . Well in 1919 and 1920 when we lived south of the [Bellfountain] Park, here was this railroad that had one passenger car on it. It came out from Albany. They stopped at every crossroads and picked up a can of cream if there was something there. Or they would pick up a car load of wood, just ordinary four-foot cord wood, pulp wood. They also would load piling at different places and people here would ship out wool, or ship lambs in the cars. Grain, too, of course. They did all this before trucks were important.



--- Corvallis Logging Co. R.R. to Dawson, thence by Southern Pacific Railroad to Corvallis.

--- Wade Howell - W.J. Miller railroad system from Dawson around Green Peak.

--- This railroad near Glenbrook was first operated by Jamestown Lumber Co., later Pope & Talbot.

Fig. 4.22: This is a logging railroad map compiled by T.J. Starker, former professor of forestry at Oregon State University. The date Starker drew the map is unknown. But the map is listed in the Benton County Surveyor's office in Corvallis as being revised in June, 1975. The following is the legend:

Barking shed and conveyor: A two-story debarking machine house sits at the extreme northwest end of the main sawmill building (Figs. 4.23 and 4.24; see Appendix A). It rests on posts and concrete foundation or concrete piers. The 72-inch Salem Brunette log debarker was installed in 1970. An all-steel conveyor leads from this board and batten building east toward the main sawmill. It is built on a concrete foundation. Its supports are primarily steel beams on concrete pads or piers.

Tunnel: One underground structure at the mill deserves mention: A concrete tunnel that goes along the northern edge side of the sawmill and under the planing mill to divert and enclose Oliver Creek away from the main sawmill supports was built in 1954 (Fig. 4.25; see Appendix A). That tunnel is about 6 feet high and 5 feet wide. It is several hundred feet long. Hull described the construction process:

When we first got here in 1938 the only kind of footings under the docks were of wood. Sometime later, we started doing away with the wooden docks, filling in the ground and surfacing it with gravel or concrete. Somewhere around, I'm guessing now, somewhere around 1955 or so, I think we decided to divert the outflow from the log pond into this concrete tunnel to keep the water away from underneath the dock for quite a ways. I was told we could fill in that area, fill in over the creek with fill material and build the dock. Basically, where the creek ran is all filled over with five or 10 feet of fill.

4.2 A History of Changes

It must be stressed that the present configuration of sawmill buildings and machinery today is not entirely the same as it was when Hull built the sawmill in 1938. But seeing the mill in its present-day configuration makes it easier to understand how and why it was modified. Exterior physical changes are noticeable on aerial photographs. However, many of the changes are within existing structures and are not visible on aerial photographs. Specific dates for when some of the changes were made are not entirely clear, as the work often was done during the course of routine operation and employees can't remember for certain when it was done. Many of the former houses that were on the W.J. Miller site at Dawson Station were torn down entirely. Much of the land

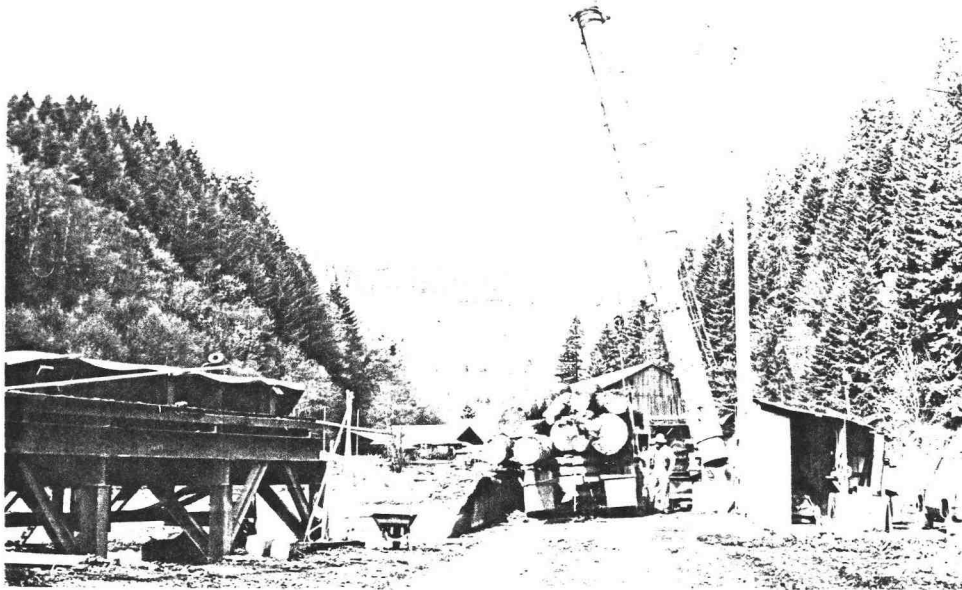


Fig. 4.23: "A" frame for off-loading logs to log pond. View looking west at west-end of sawmill building. Note conveyor to de-barker on left. Courtesy of Wren Photographer John Bragg.

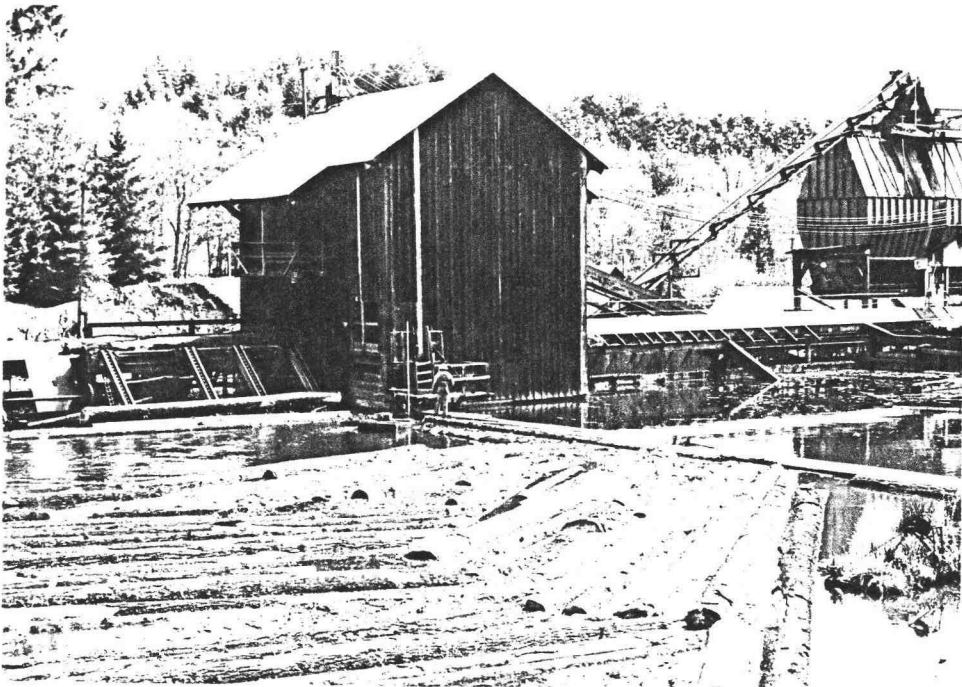


Fig. 4.24: South elevation of debarker house and machine. View looking north across log pond. Note in-coming and out-going conveyor's from de-barking house. Also note metal wood-chip storage bin on right. Courtesy of Wren Photographer John Bragg.



Fig. 4.25: Concrete tunnel diverting Oliver Creek away from Hull sawmill supports under construction in 1954. Courtesy of Ralph Hull, Dawson.

surrounding them has been bulldozed and covered by concrete or gravel, leaving no trace of the former buildings. Major changes in the main sawmill and surrounding structures are visible on aerial photographs taken in 1949, 1951, 1955, 1957, 1980, and 1990 (Figs. 4.26, 4.27, 4.28, 4.29, 4.30, and 4.31). The following discussion of those aerals was compiled from personal communications during 1992, 1993 and 1994 with Hull, and retired millwright Ralph Kundert.

The 1949 photo shows the sawmill from east to west, capturing the I.P. Miller sawmill west of Hull's mill pond; the other four aerals show the mill from west to east, and the 1990 aerial shows the mill from directly overhead and looking north to south.

The 1951 aerial clearly shows the open-pit refuse-burning area in the southwest, or lower right, of the photo; the "wigwam"-style refuse burner first appears in the 1955 photo, indicating it was built sometime between 1951 and 1955. The 1951 photo also clearly shows the sawmill's blacksmith's shop on an island between two roads in the foreground; the blacksmith's shop was believed to have been removed sometime in the late 1960s, just before the existing road was realigned and a log-debarker system was installed in 1970. The 1980 aerial shows the de-barker conveyor and debarking shed in the lower left quarter of the photo, the last major modification of the sawmill. The 1980 aerial also shows a roof built over a channeled railroad spur passing the planing mill to the east of the main sawmill. The 1980 photo also shows a roof over the sawmill's green chain that extends to the south, a structure that was shown as uncovered in 1957. That roof was believed to have been built in the late 1960s or early 1970s.

The 1949 and 1951 aerals show the sawmill in essentially the same configuration as when Hull rebuilt the main mill in 1938; the planer and wood-storage buildings to the east, and the boiler house that's detectable by rising steam in those photos pre-dated Hull's 1938 occupation. A pond-saw building also is shown to the west of the main sawmill on the mill pond in the 1951 aerial; the building housed a steam engine that drove a drag saw to cut logs into desired lengths for specific lumber orders. The pond-saw

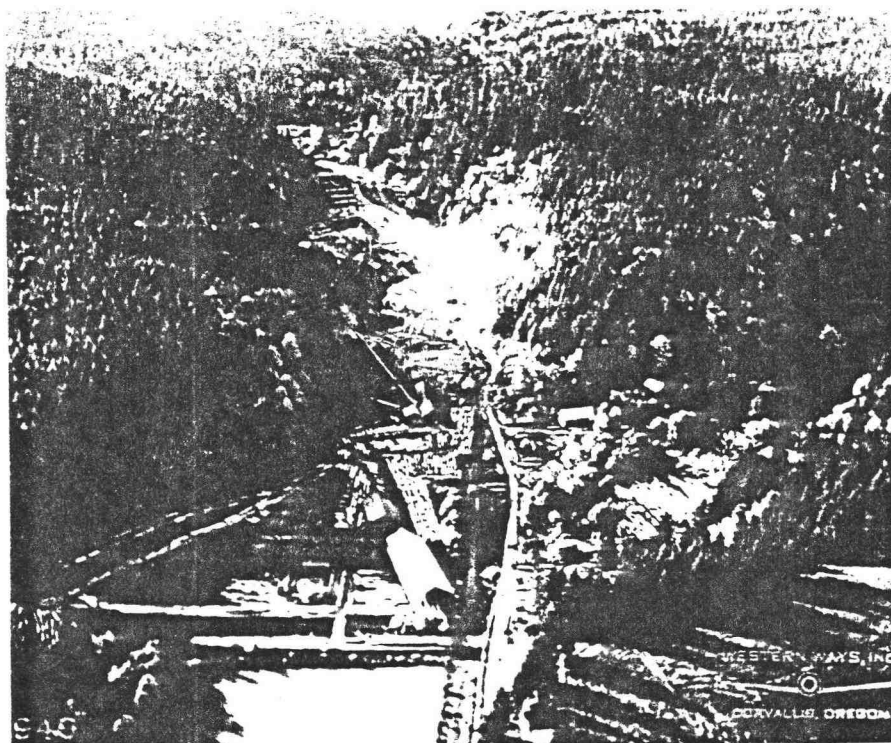


Fig. 4.26: Aerial view of the Ralph Hull Lumber Co. in 1949. Photographers, Western Ways, Inc. Courtesy of Ralph Hull, Dawson.

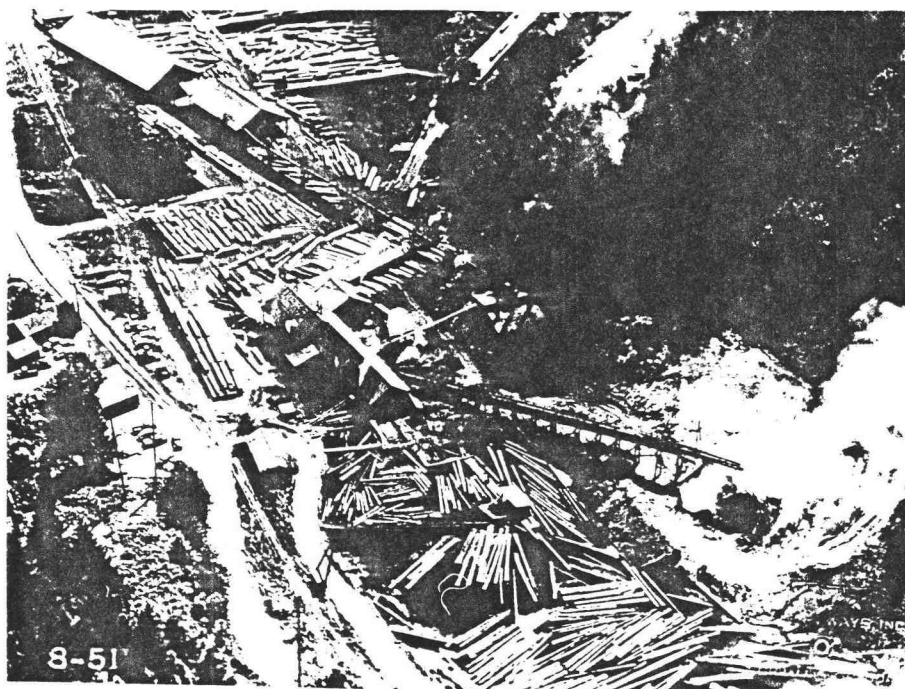


Fig. 4.27: Aerial view of Ralph Hull Lumber Co. in August, 1951. Photographers, Western Ways, Inc. Courtesy of Ralph Hull, Dawson.



Fig. 4.28: Aerial view of Ralph Hull Lumber Co. in August, 1955. Photographers, Western Ways, Inc. Courtesy of Ralph Hull, Dawson.



Fig. 4.29: Aerial view of Ralph Hull Lumber Co. in May, 1957. Photographers, Western Ways, Inc. Courtesy of Ralph Hull, Dawson.

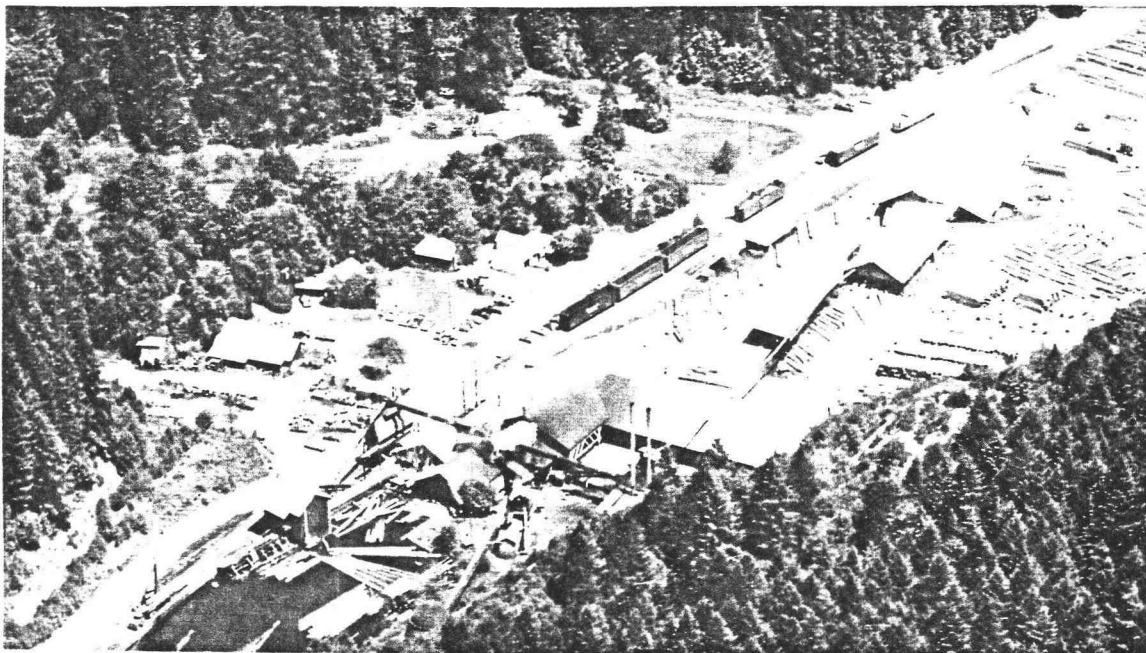


Fig. 4.30: Aerial view of Ralph Hull Lumber Co. in June, 1980. Note the addition of the barker and chip bins just east of the log pond that were added to the mill in the early 1970s. Photographers, Air Graphics, Inc., Milwaukie, Ore. Courtesy of Ralph Hull.

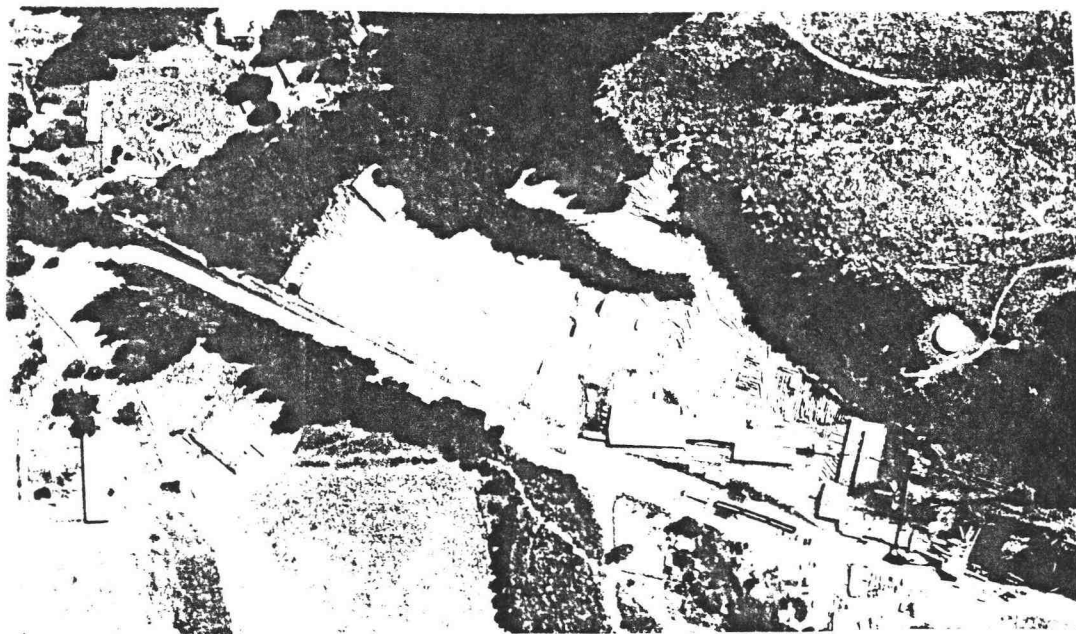


Fig. 4.31: Aerial view of Ralph Hull Lumber Co. in June, 1990. Note the concrete and metal-roofed water reservoir on a hill above, and to the south of the main sawmill. Another metal-roofed concrete reservoir is hidden in the trees about 50 yards down the slope to the northwest. Together, the reservoirs provide about 620,000 gallons of water to the mill to supply the boilers and for fire suppression. Photographers, W.A. C. Corp., Eugene. Photo is on file at the Benton County Surveyor's office in Corvallis under T. 14S., R. 6W., Sec. 16. Courtesy of Benton County Surveyor's office.

building was removed when the new debarking system was installed in 1970, the last major modification to the main sawmill. The pond-saw building does not appear in the 1980 aerial. The new debarking system, included a large chain saw to cut logs to desired length.

The 1955 aerial shows a building addition extending north from the main sawmill, a building that wasn't there in the 1951 aerial. The building was added to accommodate a new saw-filing shop and band saw, a saw that required more room for storage and filing than did the mill's previous circular saws. Further modifications to the building are shown in the 1957 aerial. The roof line was extended to accommodate installation of the mill's present steam engine as well as a small machine shop.

The 1990 aerial shows little change in the plant from 1980. However, this aerial does show the large water-storage reservoir atop a hill to the south of the main sawmill building. The second, and smaller, reservoir is buried in the tree-filled slope to the south of the main sawmill and is not visible in the aerials. This aerial came from the Benton County Surveyor's office in Corvallis. That office also has aerials of the sawmill for 1982 and 1983. They are filed under T. 14S., R. 6W., Sec. 16.

5. SAWMILLING PROCESS AT HULL-OAKES

The lumber-cutting process at Hull-Oakes has not changed much over the years, primarily undergoing refinements where Hull thought practical (Fig. 5.1). The process is similar to that of other sawmills of its generation and, because it is steam powered, that mechanical phase of the operation is now antiquated. Today's sawmills tend to rely more on electricity, computers and lasers to complete that process.

5.1 Stoking the Fires

At Hull-Oakes, the process begins at midnight each workday when a fireman, or firemen, start fires in the two Dutch ovens underneath the company's boiler house. Getting the fire started is a hand process; sawdust, wood chips and bark are tossed by shovel into maw of the mill's ovens, eventually raising the firebox temperature to about 2,000 degrees Fahrenheit; once the fire's rolling, an automated conveyor feeds sawmill wastes to the fires. Getting the fire going is an interesting exercise, with employee individuality and experience playing a key role.

"No two people build a fire the same way," according to fireman Jerry King, who has been fireman at Hull-Oakes for 18 years. "The trick is to keep the pressure climbing to 145 pounds. Then I give it a kick in the backsides" (King 1985). By that he meant he throws open the firebox doors shortly before the sawmill's crews get on their jobs at 7 a.m., forcing air into the system and sending a blast of steam up the smokestacks. The combination kicks the heat up rapidly, quickly raising steam pressure to the 150 pounds necessary to operate the mill's steam engine (King 1985; King, personal communication 1994). Heat also builds up rapidly in the boiler room and around the furnaces; it's a job that King and other firemen look forward to during cold and wet winter months; one they sweat through during summer heat. By the time workers begin showing up at the plant at 7 a.m., steam pressure is more than sufficient to give an ear-piercing blast on the call-to-work steam whistle that echoes through the canyon; the whistle blows again at lunch time,

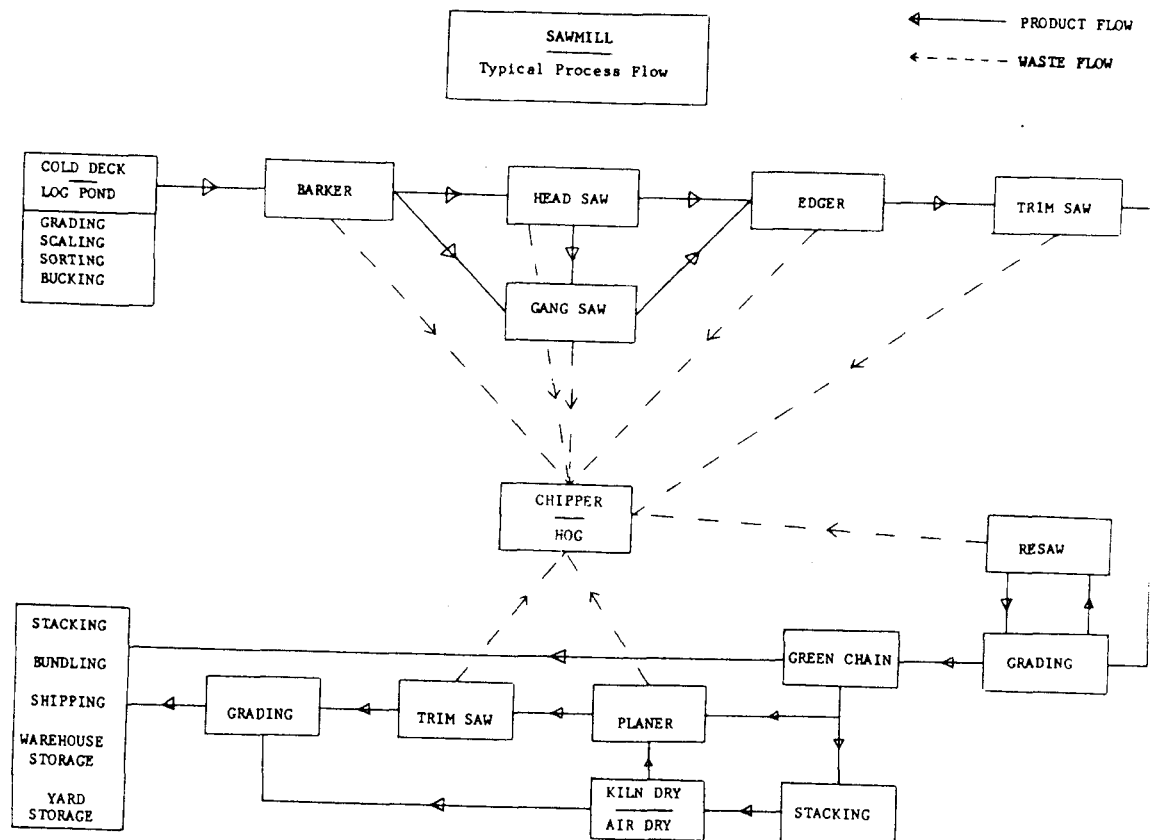


Fig. 5.1: This hand-drawn sketch is a flow chart of a typical sawmill process flow. It is substantially the same as that followed at Hull-Oakes Lumber Co. in Dawson, although it does not depict the precise way that logs flow through the plant.

and at 3:30 p.m. when workers call it quits for a day that's part of a five-day work week. The scream of steam-driven sawmill whistles commands the attention; and its once-common sound has all but vanished throughout the Pacific Northwest's forests and sawmills.

5.2 Log Trucks Roll and Saws Whirl

When log trucks arrive, drivers dump their logs into the log pond for storage in preparation to begin the assembly line lumber-cutting process (Fig. 4.23). A person called a "pond monkey" uses a motorized boat called a "log bronc" to push or herd logs around the pond, sorting them by size to be picked up by a "side lift." The "side lift" is an endless chain that grabs the logs with rotating hooks and slides the logs up a metal beam incline and drops them into a metal conveyor (Fig. 5.2). The conveyor feeds them into a high-speed electric-powered "ring barker" that uses flint-edged knives and air pressure to strip bark from the logs (Fig. 5.3). Prior to installing that machine in 1970, employees used less efficient machinery, or stripped the bark from the logs with hand tools such as metal bars, saws and wedges (Billings 1993).

A large machine-operated chain saw then cuts, or "bucks", the logs into desired lengths (Fig. 5.4). These lengths generally range from 24 feet long up to 44 feet and 46 feet long; Hull's sawmill can cut lumber from logs 85- to 100-feet long in one pass. A large chain conveyor in a metal trough moves the "bucked" logs toward the main sawmill deck (Fig. 5.5). Meanwhile, bark peeled from the logs goes into another conveyor to the "hog" machine. This chipping machine breaks the bark into small pieces that are sold as "hog fuel" to paper mills to fuel their operations. In the past, Hull said, this "hog fuel" was sold for use in landscaping and to burn in residential and commercial furnaces throughout the region, including furnaces at Oregon Agricultural College, now called Oregon State University."

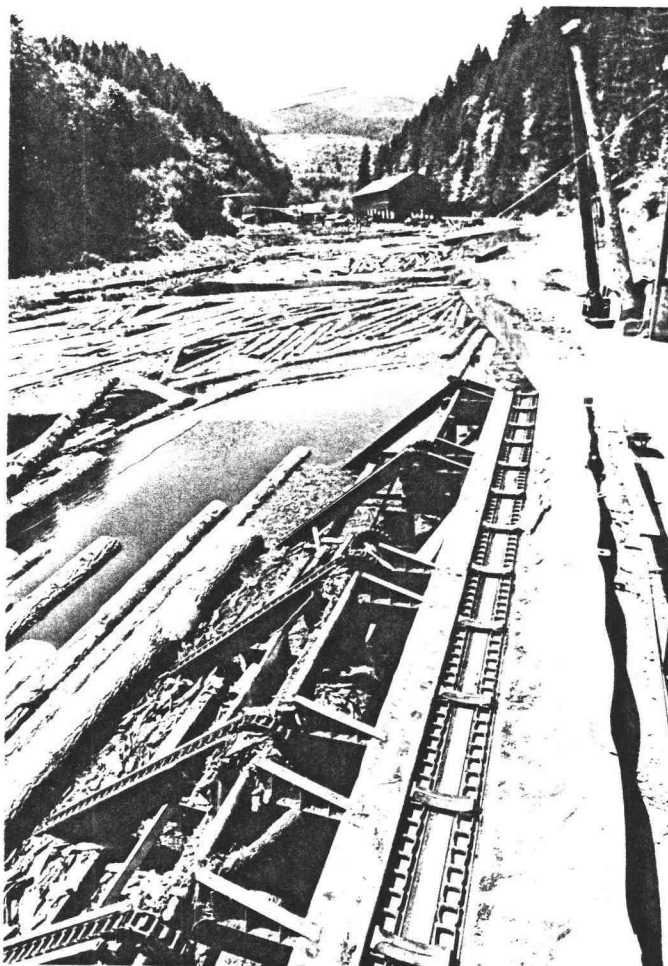


Fig. 5.2: In-feed conveyor to debarking machine. This shot is looking west from west end of sawmill. Courtesy of Wren Photographer John Bragg.

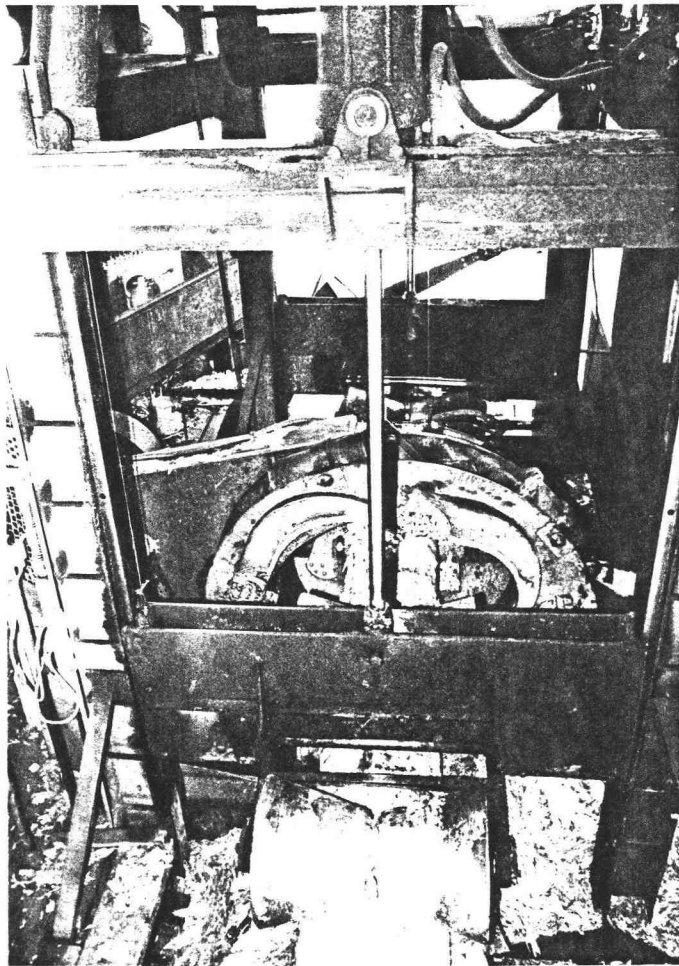


Fig. 5.3: Ring debarker showing ring and jaws that hold and strip bark from logs.
Courtesy of Wren Photographer John Bragg.

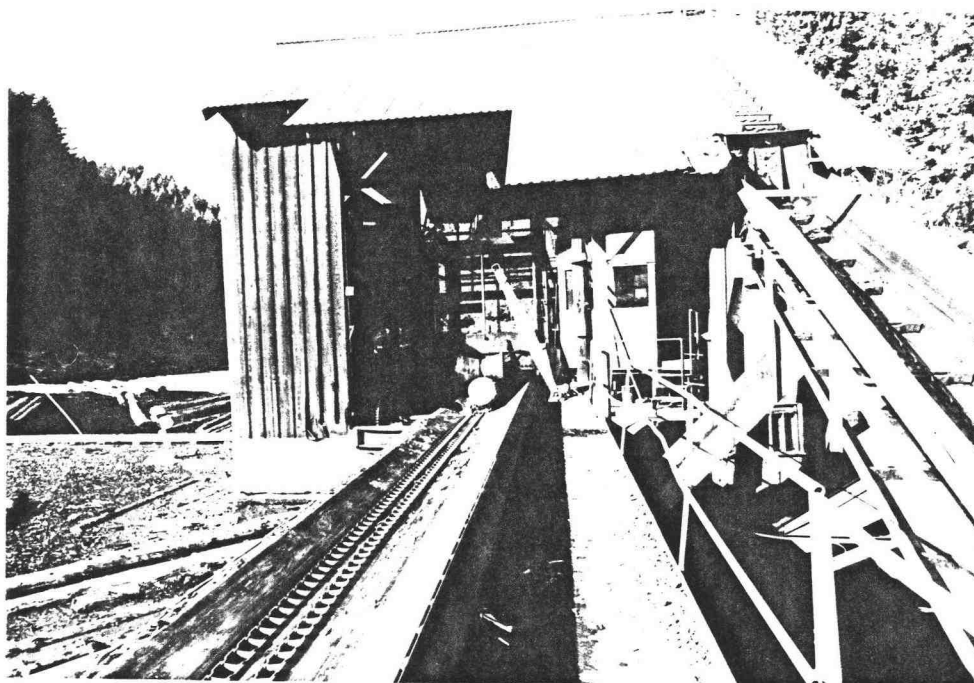


Fig. 5.4: Looking into the outflow end (east end) of the Hull sawmill debarking machine. A large log-bucking chain saw is just to right of the debarker rollers. George Wisner photo.

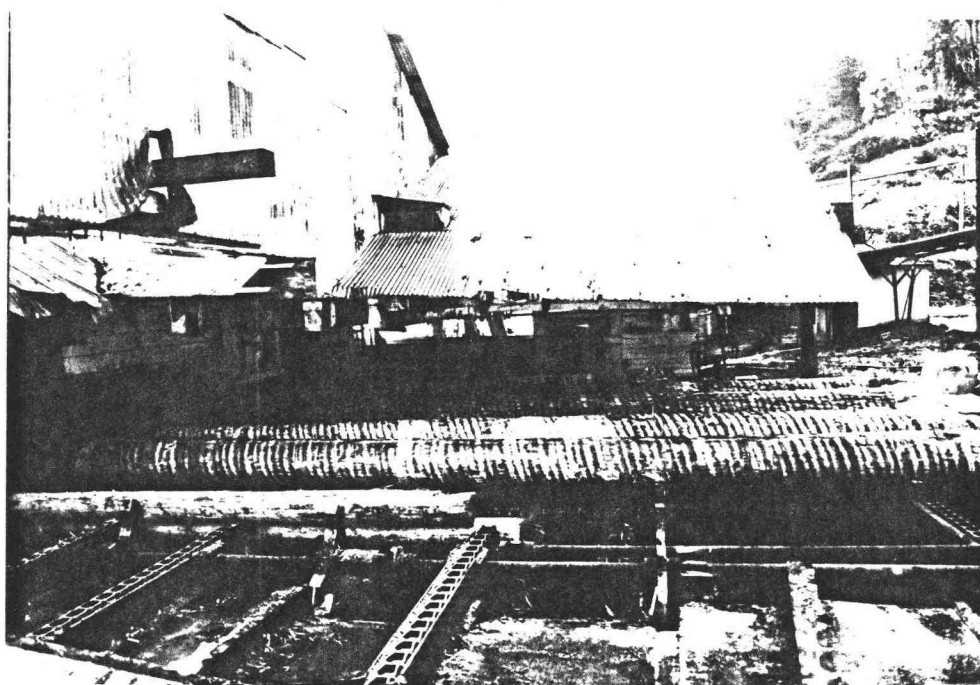


Fig. 5.5: South and west elevations of the Hull main sawmill looking across the log deck toward the carriage from the debarking conveyor. George Wisner photo.

Logs that have been "barked" and "bucked" to desired lengths are shuttled by an endless-chain conveyor "infeed" to the sawmill's main lumber cutting saw, or "head rig." Head rigs, as was mentioned earlier, can be of varying types. When Ralph Hull first opened his sawmill, he operated a head rig with twin 56 inch diameter, inserted tooth, circular saws with a chipper ahead of them to help process the larger logs (Fig. 2.3). The saws were mounted slightly offset one above the other, with the top saw activated only when a log too large for the lower saw to accommodate came toward it (Hull 1992; Hull, personal communication 1994). Those saws cut lumber for the company until 1955, when Hull installed a band saw that remains in operation. The band saw is a right-hand, 9-foot-long column, single-side-cutting bandsaw with upper and lower arbors, or axles, containing Timken roller bearings (Fig. 5.6). Hull said the Filer and Stowell Co., Milwaukee, Wis., built the machine. It was installed at a cost of \$26,883.

After leaving the conveyor following debarking and bucking, logs fall onto a "stop-end-loader." It is a metal crater where the "sawyer" responsible for cutting the logs sends them by a machine consisting of metal pushing arms and a mechanical log turner onto the sawmill "carriage." The carriage at Hull-Oakes is a partially steam-powered steel-track-mounted shuttling device that carries the log through the band saw head rig (Figs. 5.7 and 5.8; see Appendix A). A "ratchet setter" rides the carriage, "dogging" or locking into place the logs as they are turned for cutting. Because sawmill noise is so loud the sawyer communicates with the "ratchet setter" through a series of elaborate hand signals; the ratchet setter sets the desired cuts for the logs with a "Trout set works" (Fig. 5.9; see Appendix A). The set works is a brass dial on the carriage connected by mechanical linkage and calibrated to lock the logs into place for specific cuts. In more modern sawmills, this process is aided by computers and lasers; at Hull-Oakes it remains manual, assisted with air pressure and electricity. The company's carriage came from a sawmill in Scio, Ore. and has been rebuilt and modified several times to improve its

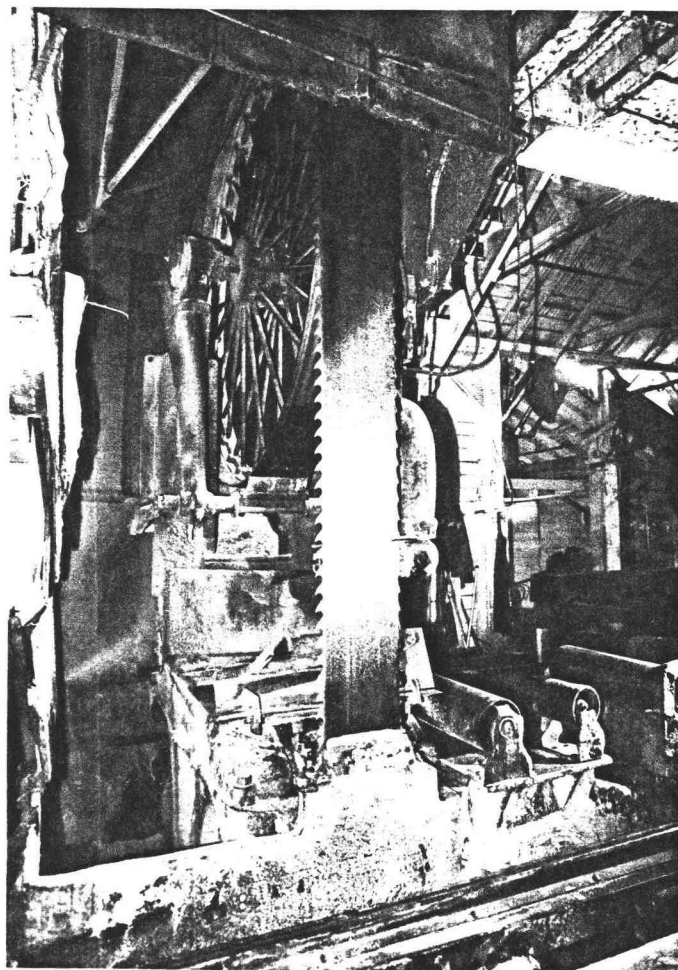


Fig. 5.6: "Head-rig" bandsaw showing upper wheel and saw. Courtesy of Wren Photographer John Bragg.

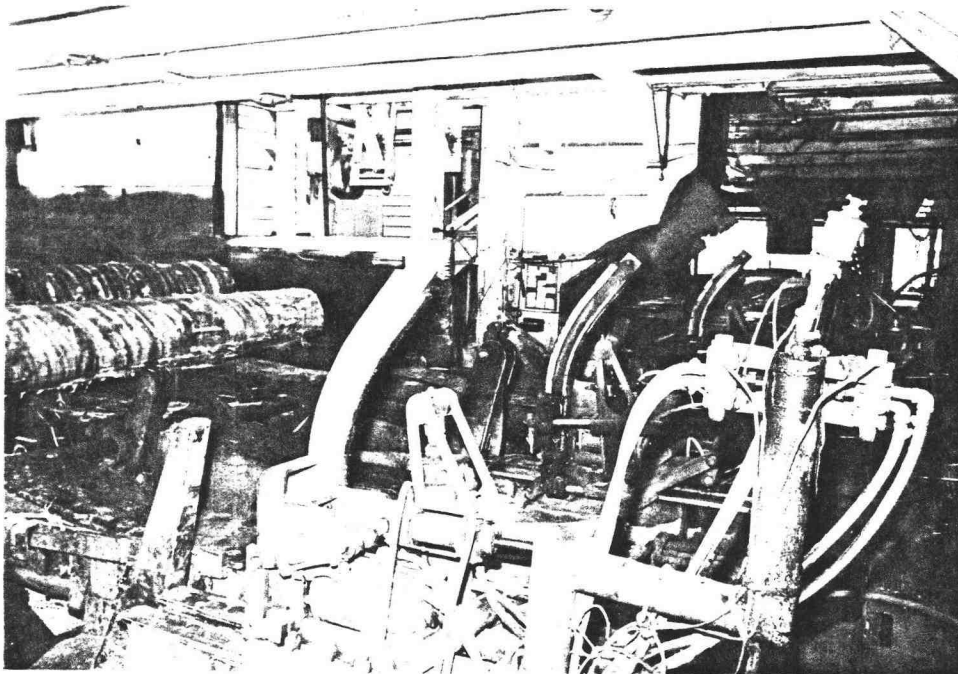


Fig. 5.7: View showing log carriage "dogs" and other controls for carriage. Courtesy of Wren Photographer John Bragg.

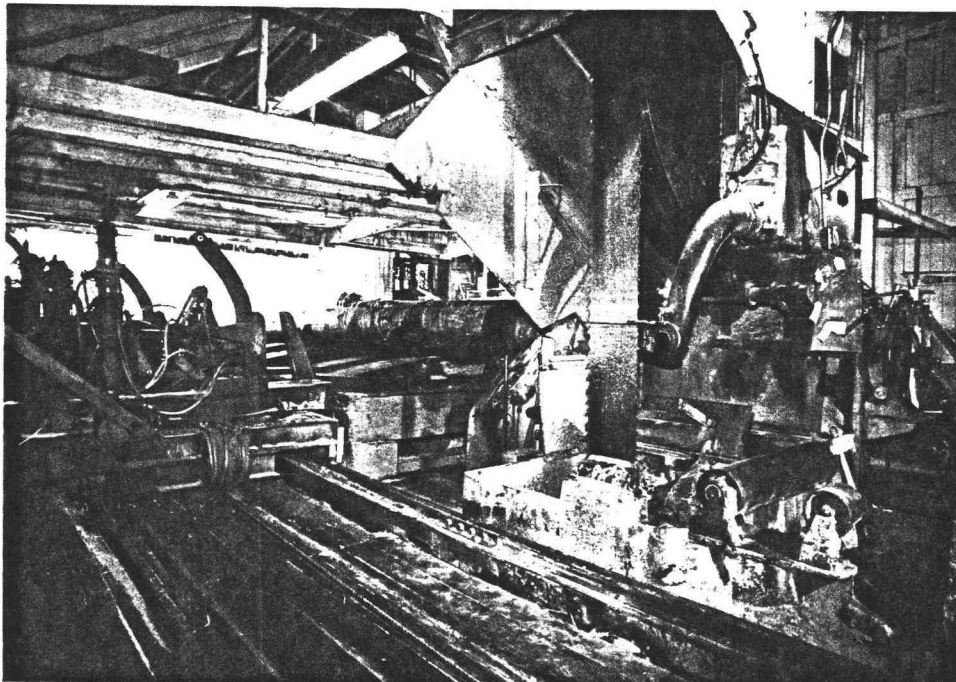


Fig. 5.8: Log carriage "head-rig" band saw and log-hauling mechanism. This view is looking west. Courtesy of Wren Photographer John Bragg.

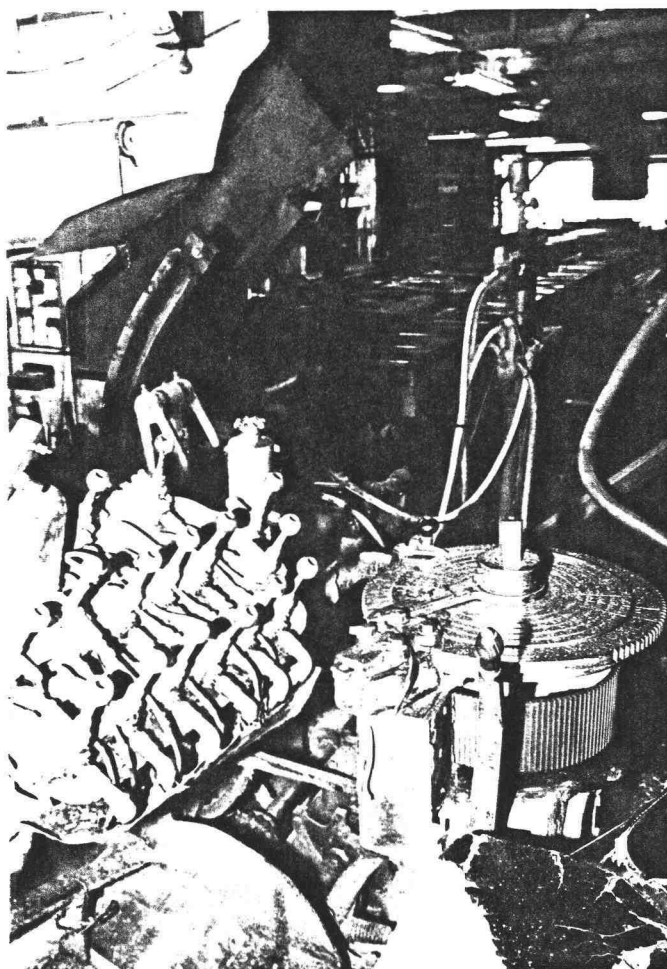


Fig. 5.9: Air and steam-operated log carriage at the Hull-Oakes sawmill. This photo is a detail of the "dogs" and controls. Courtesy of Wren Photographer John Bragg.

performance since Hull installed it in 1938. As Hull describes the modifications, typical of many sawmill machinery modifications:

The carriage frame consisted of two Douglas-fir timbers 1-10 x 15 and 1-10 x 20, both 45 feet long, and furnished by our neighbor sawmill, I.P. Miller Lumber Co. located on the [west] end of the same log pond. The carriage track was of selected straight ordinary railroad rails and the carriage tracks had flat babbitt bearings with the bottom bearing half there of carrying waste materials for lubrication. The wheels were single flange cast chilled, 'hard iron'. There were four 72-inch screw type heavy head blocks equipped with replaceable face plates. The setter on the carriage set his own dogs. The carriage set works were first powered with about 1.5-inch diameter manilla hemp rope that ran in grooved pulleys, needing a highly skilled worker to splice it. Originally a man from the Brownsville Woolen Mills spliced the rope. In a few years the rope and grooved pulleys were discarded and replaced with 4-inch flat transmission belt and pulleys. The flat belts and pulleys on the carriage set works were later replaced with a 'shot gun'-type [fast moving] air cylinder and 85 foot-long piston that provided a constant supply of air to run an air-powered motor which activated the carriage set works. In June, 1967, an offset carriage with pantograph was bought from Lulay Brothers, a sawmill at Scio, Oregon. It was installed in 1968. This carriage had a vee rail, together with axles and bearings that provided a 3/8-inch off-set on the carriage on its return travel, protecting the bandsaw from dragging on the log or remaining lumber cant [following a lumber cut] [Hull, personal communication 1994].

Endless chains and a system of powered "live rolls" take the newly-cut lumber to the "edger" saws. They are a belt-driven bank of five movable circular saws on an arm, which give parallel edges to the planks and turn them into dimension lumber (Fig. 5.10). Hull calls it a "conventional edger" for the industry. Some edgers can have up to 10 circular saws on them, each independent of the other in its horizontal movement (Holmes 1920: 16). Lumber leaving the edger goes by another set of endless chains and rollers to the "trim saws." These gang-type saws further refine the dimension lumber orders that include standard dimensions such as boards 2 inches wide, 4 inches wide or 6 inches wide. One man operates the machine. The gang trimmer is a refinement over a prior process at the mill, and one aimed at better efficiency and cutting labor overhead. As Hull explained:

We did not have a gang trimmer to start with. We had two trim saws. One was for the larger lumber and one for the smaller lumber. Each one of those saws required a man, of course. The small one [saw] was 36" in diameter and the larger one would be five-or six-feet in diameter.

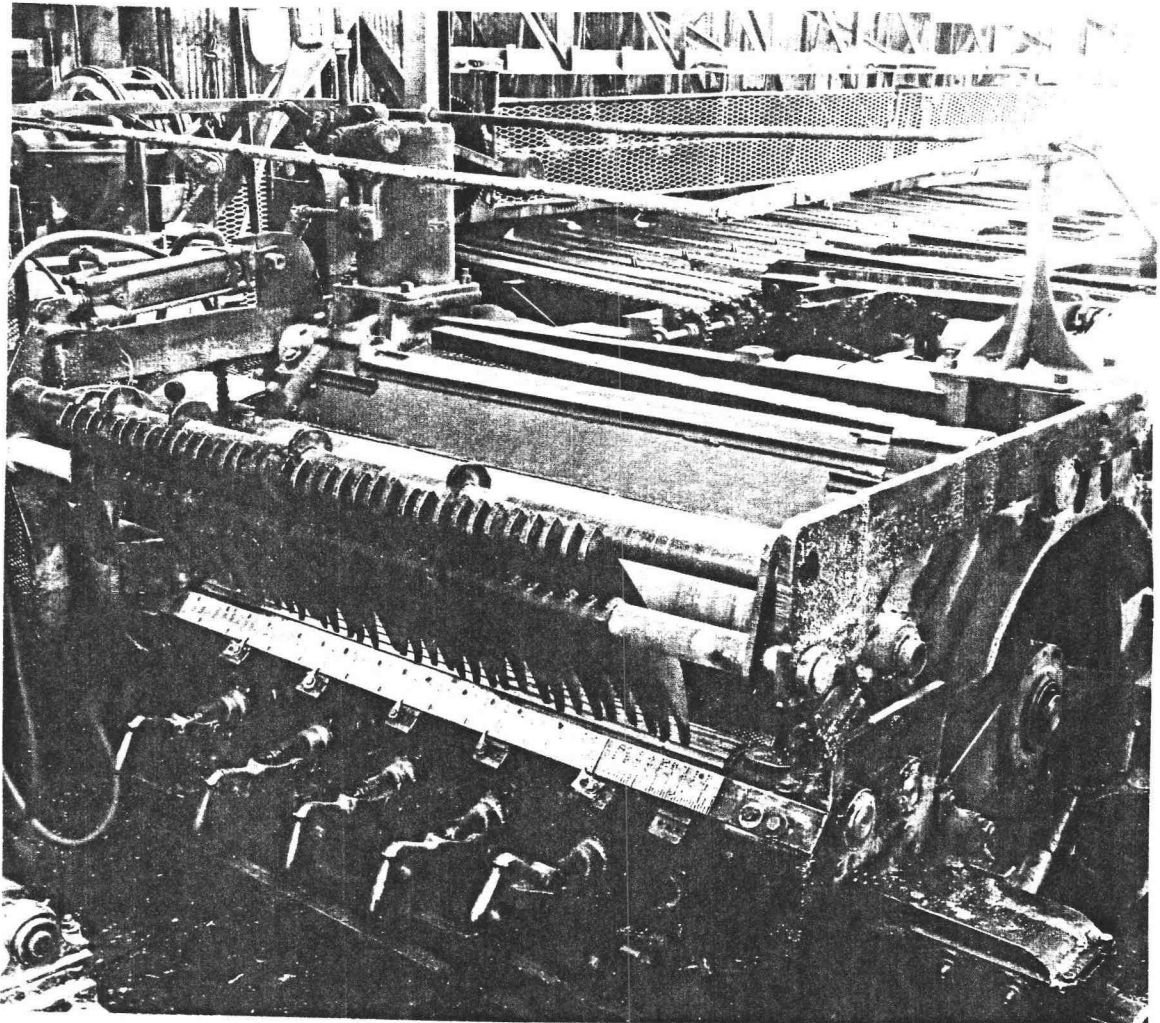


Fig. 5.10: This is the edger machine used at the Hull-Oakes Lumber Co. sawmill. The five handles at the front of the machine control the distance between five circular saws within the machine itself, and which are used to cut straight edges on dimension lumber. The edger was installed in the 1960s. Courtesy of Gary Tarleton.

At the Hull-Oakes mill, lumber also can go to another endless chain called a "camel back" containing a "hump" where some dimension lumber is sorted and redirected toward a "resaw" machine that produces a finer-grade of dimension lumber (Fig. 5.11). Once completely cut, dimension lumber goes to a "green chain", or large table with endless chains inserted in it length-ways to carry lumber to various stations for sorting. Graded and sorted lumber moves by "straddle carrier" truck to a nearby yard for storage. The "straddle carrier" truck sits on long stilt-like legs. Hydraulic gripping arms hold the lumber stacks between its legs as the truck moves around the yard like a large spider to deposit its loads on various piles to dry and be made ready for shipment.

5.3 Lumber Rides the 'Cadillac' of Planers

Orders for finished lumber go to a special knife-blade planer with knife blades fitted into special heads for specific cutting jobs, for precise finishing and storage in finished-lumber piles. Finished lumber leaves the plant by truck or rail. The planer, and the building in which it is housed, predate the Hull-Oakes mill. They were part of the W.J. Miller mill. That mill was on the same spot as the Hull-Oakes mill from 1922 until it burned in the spring of 1936. The planer, planing shed and boiler shed and boilers were the only equipment and building survivors of that fire. The planer was made by the Stetson-Ross Machine Works in Seattle, Wash. (Figs. 5.12, 5.13 and 5.14). It carries a shop #246 as an identification number. The Kimwood Corp. of Cottage Grove, Ore. bought the machine company in 1982 and maintains a partial record of products produced by the machine works, which began operation in 1907 at Seattle, Wash. The company's records show this so-called "Cadillac of planers" first shaved boards in 1914 for the Hoquiam Sash and Door Co. in Hoquiam, Wash. Miller had the machine in his plant prior to the 1930s. It was one of 8,000 planers and machines made by the company. Hull described the planer:

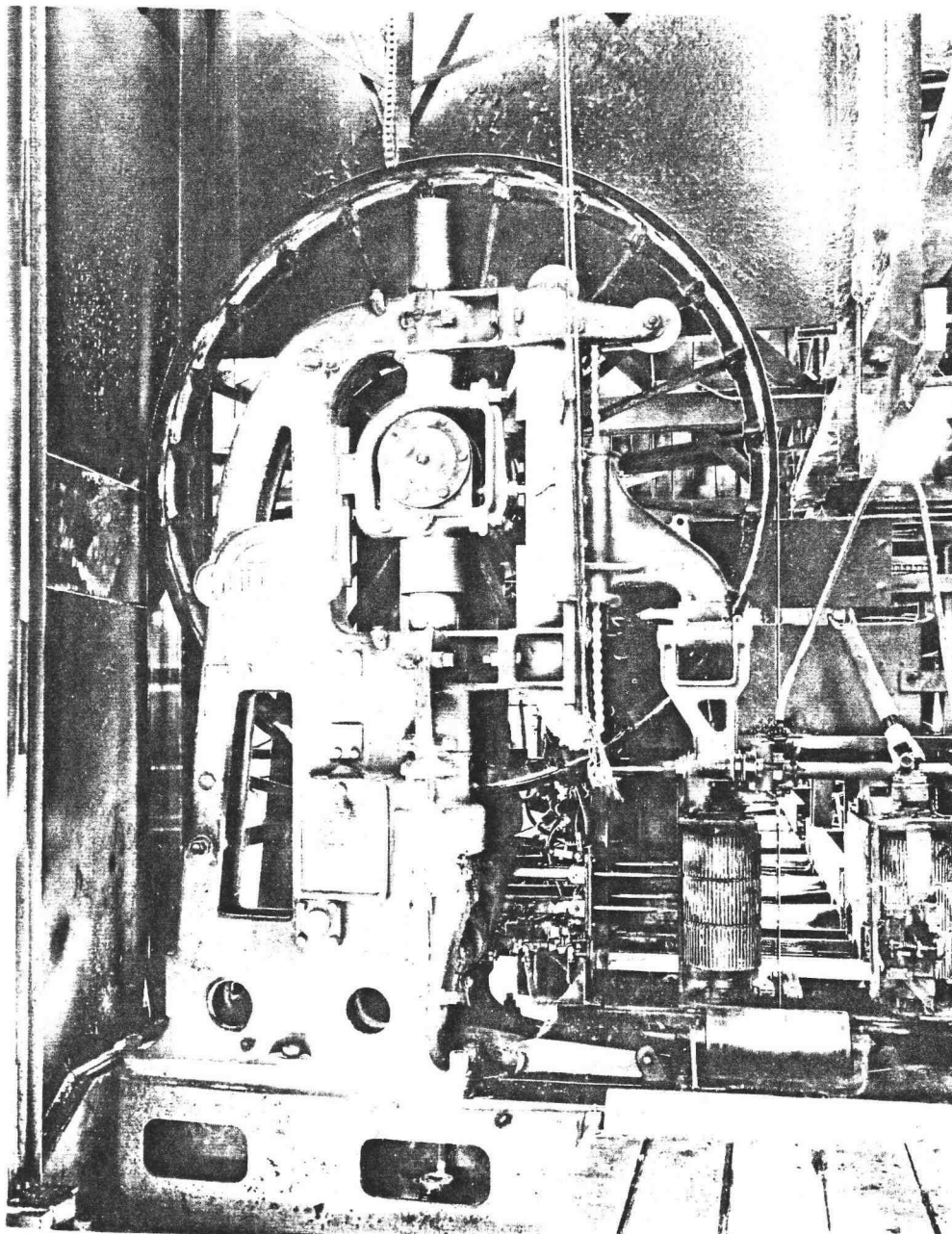


Fig. 5.11: This photograph depicts the Sumner Iron Works 7' long bandsaw used as a resaw at the Hull-Oakes Lumber Co. in Dawson. The bandsaw was purchased in 1974 from the Clemens Forest Products sawmill operated by Rex Clemens of Philomath. The machine was converted from left hand to right hand feed for use at Hull-Oakes. Courtesy of Gary Tarleton.

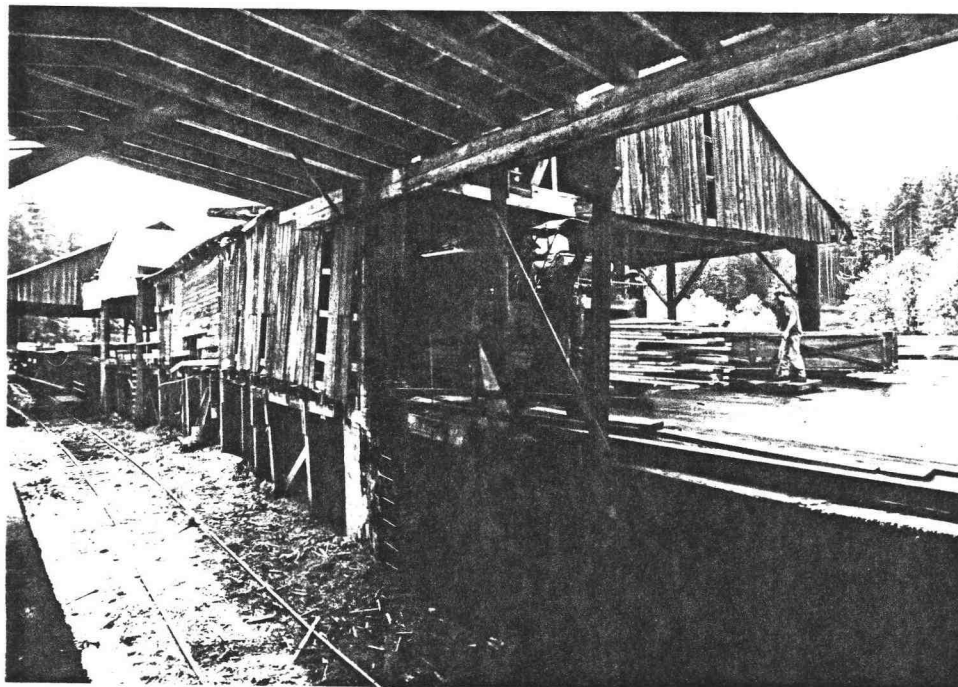


Fig. 5.12: Northwest elevation of planer shed, looking southeast. Courtesy of Wren Photographer John Bragg.

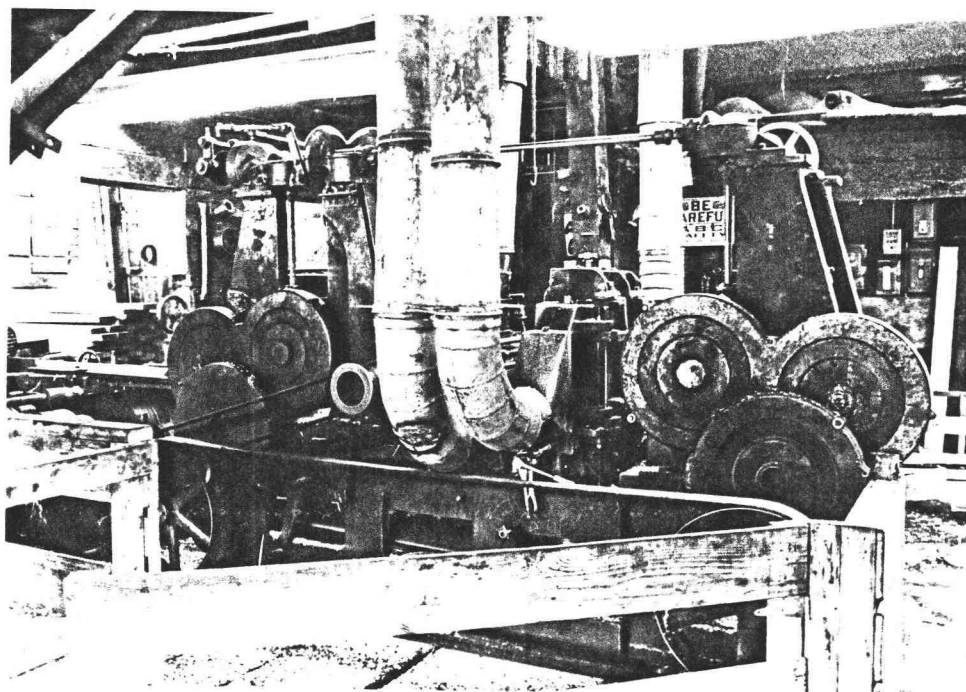


Fig. 5.13: South-side view of planer showing drive gear covers and sawdust removal stacks. Courtesy of Wren Photographer John Bragg.

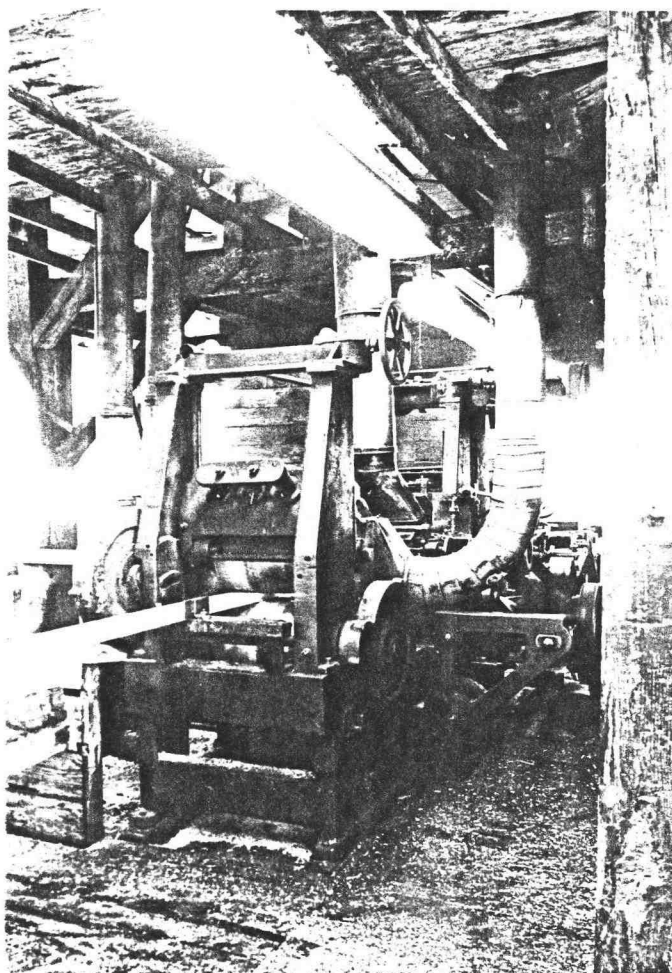


Fig. 5.14: This is an east-end view of the sawmill planer. Courtesy of Wren Photographer John Bragg.

It is a round-headed planer. The side heads, you buy those and they come on and off depending upon what you are planing. When you had the side heads, you could make tongue and groove lumber or you had a ziplock edge where you made shiplap for siding . . . Well, we didn't actually do any custom planing. This is a slow planer. It is a 16 x 18 timber sizer actually, which means you could plane up to a 16 x 18-inch timber, which is large timber.

5.4 Large-Timber Specialty

Cutting large-dimension timber, primarily from large old-growth Douglas-fir, has been a Hull-Oakes trademark since the mill opened in 1939 after being designed to handle long logs and large-diameter logs that were then common in the region. It is a specialty that has been a unique survival strategy for Hull when dimension-lumber markets are flat, he experiences short-term lumber-price fluctuations or when the company loses money selling dimension lumber at less than the costs it paid for the raw timber. Company records provide an example of that volatility: In 1993, Hull was paying \$600 per 1,000 board feet for raw timber. At the same time, random length lumber, such as 2 x 4s, 2 x 6s and 2 x 12s were selling for \$445 a thousand at the start of 1993; by March, they were posted at \$530 a thousand. Records indicated that 8 x 8 timbers were selling for \$675 a thousand board feet on Sept. 30, 1993; they sold for \$8 a thousand in 1934.

If large-dimension timbers are ordered, rough-cut timbers from the head-rig saw go to a special timber saw rather than to the dimension lumber saws such as the "edger," "trimmer" and "resaw" (Fig. 5.15). It is a large, 60-inch diameter single-arbor circular saw that cuts timbers to specific lengths that range from 6 x 6s to 24 x 24, sometimes larger (Figs. 5.16 and 5.17). Lumbermen frequently called them "Jap squares" in the pre-World War II days. That is because they were commonly cut in the 1920s and 1930s by west-coast sawmills for markets in the Orient, with timbers up to 30 inches square a frequent commodity (Andrews 1994: 160). A photograph in Hull's office shows his sawmill crew standing on a single timber, 110 feet long and 30 inches on a side, that was shipped to Tennessee in 1964. Over the years, industry-wide modernization has resulted in sawmills scaling back on the cutting of large timbers, largely to accommodate more

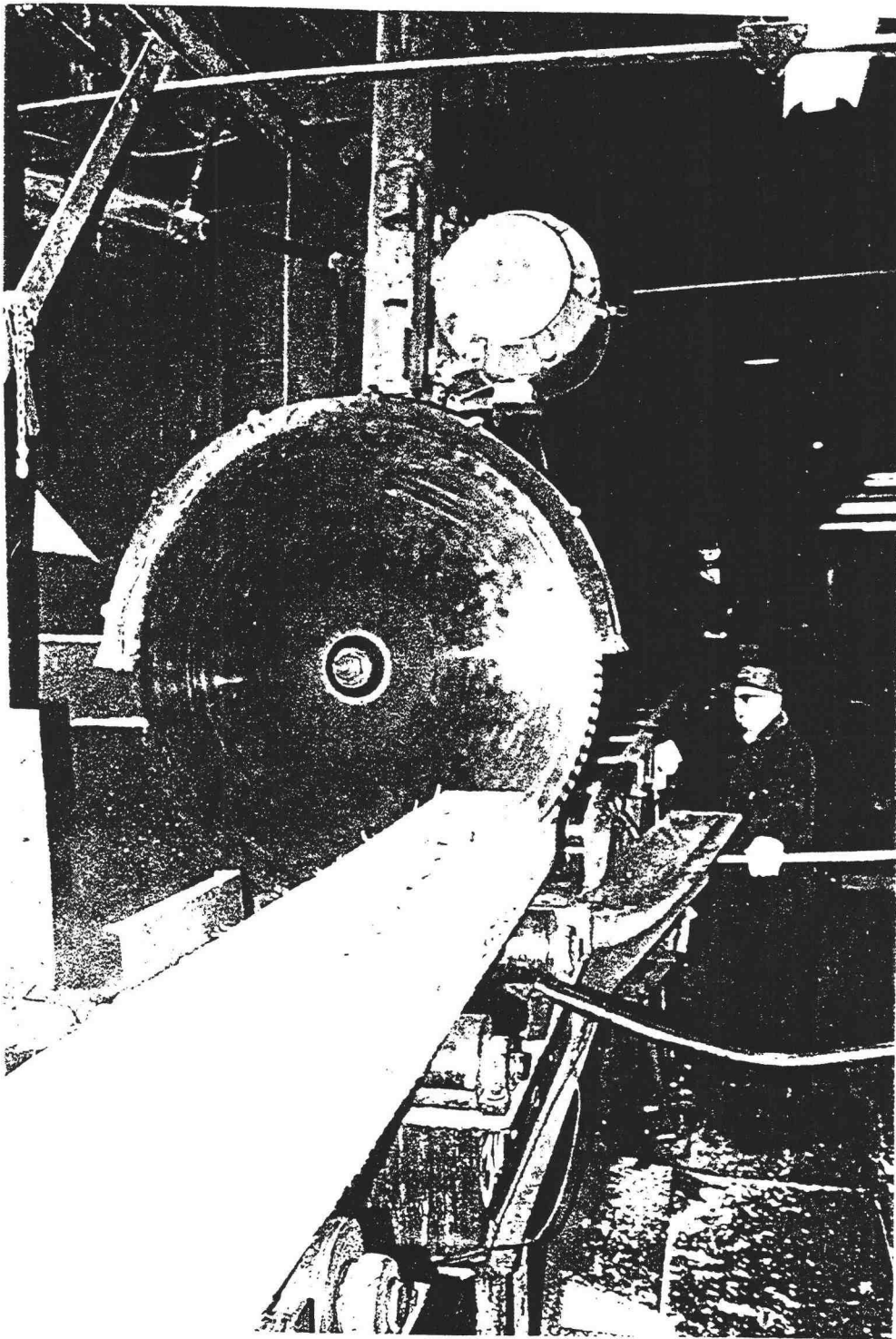


Fig. 5.15: Bill Oakes operates this large-timber saw at the Hull-Oakes Lumber Co. in Dawson. When large-sized timbers are ordered, they are moved by chain-conveyor to the large-timber saw where they are cut by the single-arbor saw and moved to drying stacks by an electric hoist. Courtesy of Wren Photographer John Bragg.

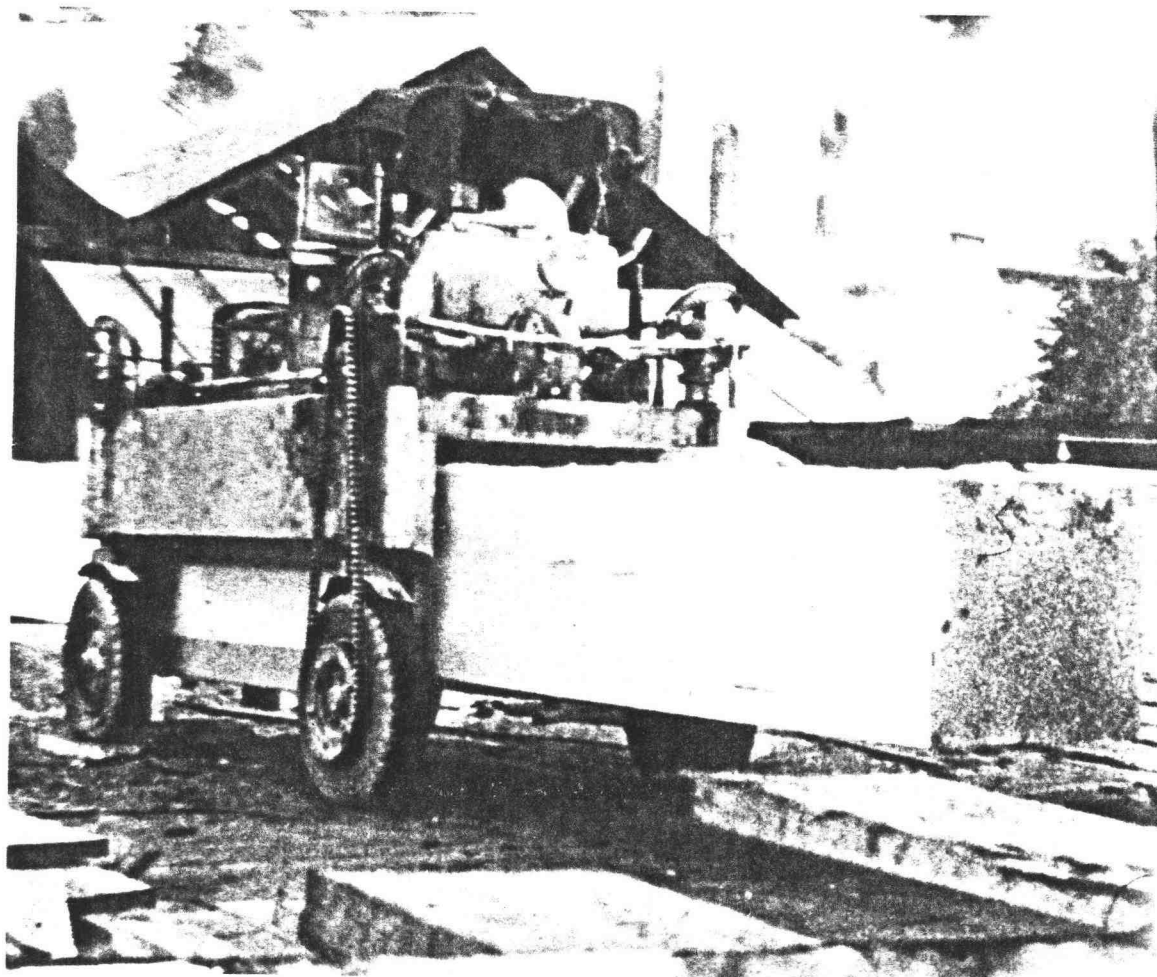


Fig. 5.16: Largest timbers being pulled in 1948 by straddle carrier from the Hull-Oakes sawmill to storage and loading docks. The one shown is part of a load that included two 34-inch by 36-inch timbers and three 30-inch by 32-inch timbers. The timbers were all 56 feet long. The load made a carload totaling 24,864 board feet. Hull continues cutting large-dimension timbers as part of his specialized production and marketing strategy. Courtesy of Ralph Hull, Dawson.

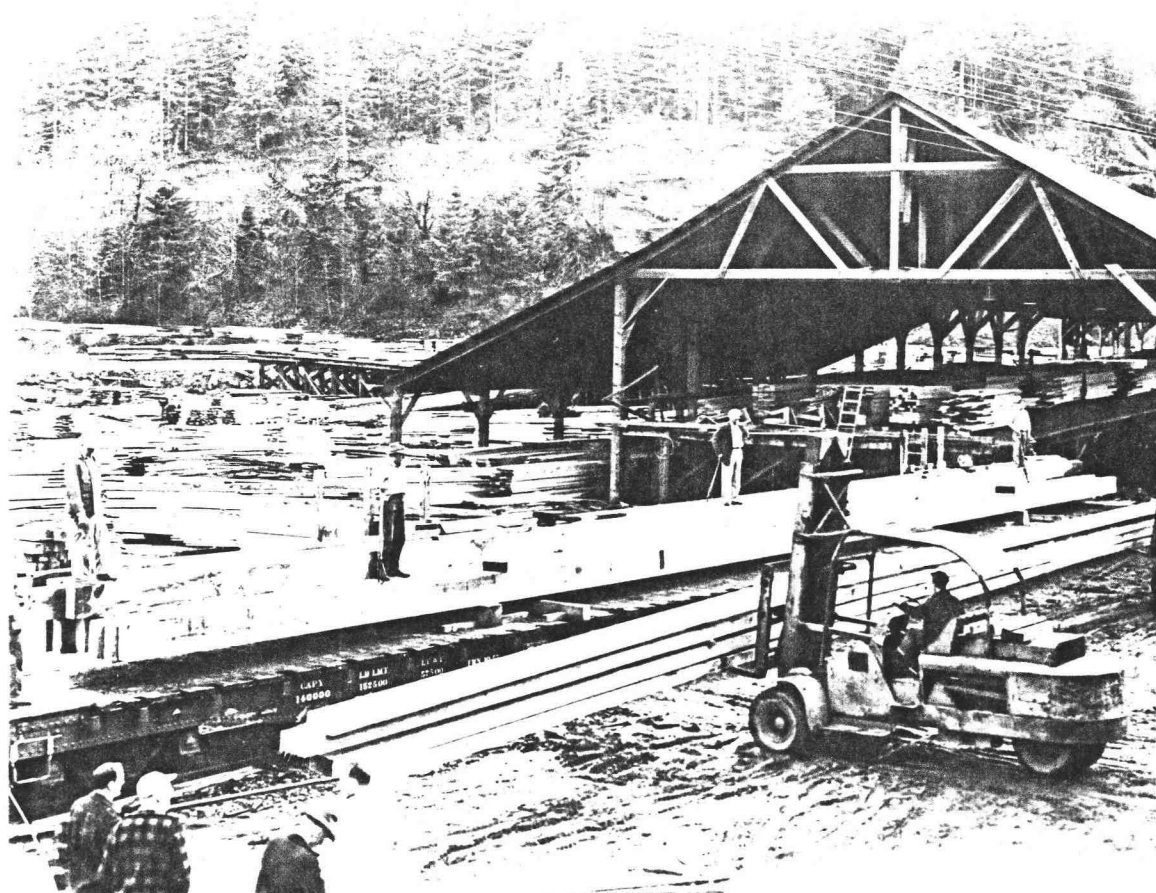


Fig. 5.17: Two forklifts carry a stack of the longest timbers cut at Hull-Oakes sawmill in Dawson. Today's modern mills are not equipped to handle such long or large timbers. Courtesy of Ralph Hull, Dawson.

compact and electronically-controlled machinery and foreign and domestic dimension-lumber markets, and a shrinking demand for such timbers as metal beams and laminated wood construction began entering the markets in the 1950s. Hull-Oakes is the only mill left that can cut such large timbers, but then the market for them isn't what it once was.

Hull explained:

In the time that we built the mill there was quite a premium for long length timbers. A lot of mills couldn't cut over 40 feet in length. . . that was before the time of laminated beams and laminated timbers, so we had a steady market. . . When laminated timbers came in around 1951, that cut down on our long-timber business.

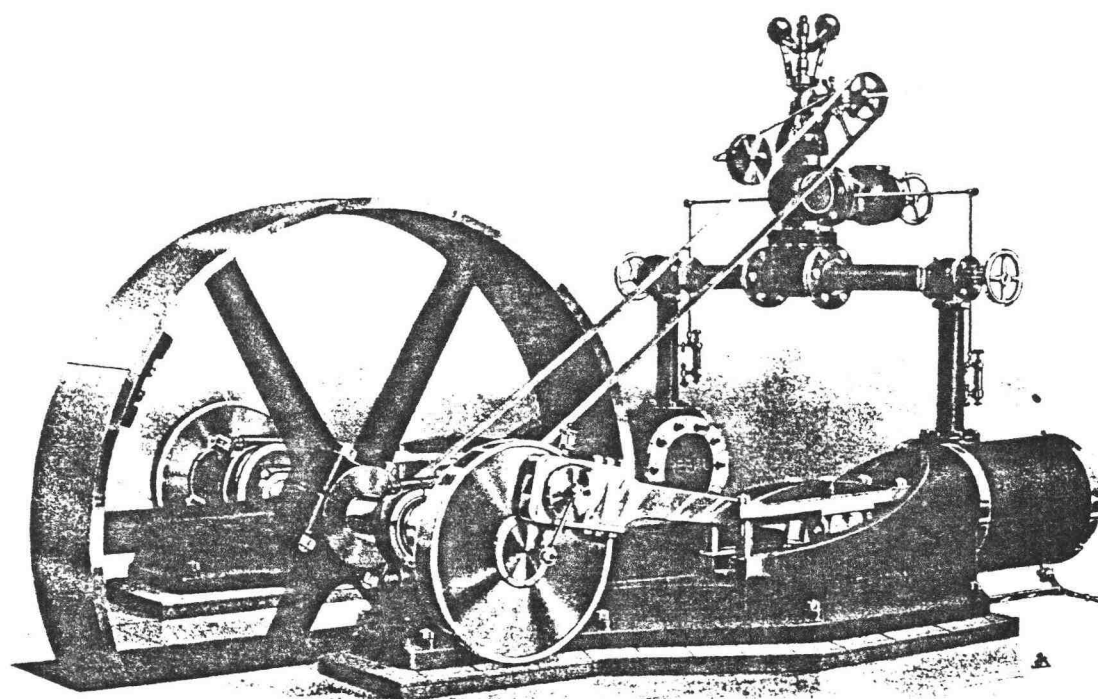
But it did not eliminate the business. Hull believed there always would be a demand for a limited number of long timbers for specific purposes: His gamble has paid off. Besides the giant timber to Tennessee for "the world's longest loveseat," its large timbers have gone around the continent: bridge stringers to Nova Scotia, Canada; beams for gold dredges in Alaska; pier supports in Tacoma and Seattle; dredging materials to the U.S. Army Corps of Engineers after Washington's Mount St. Helens erupted in 1980. The mill also cut special 5 inch x 12 inch x 40 foot long deck-support planks for a 1994 restoration of America's most famous historic fighting ship, the U.S.S. Constitution, "Old Ironsides" (Hull 1992; Hull 1994). Each of the 40 beams for that historic ship were valued at \$1,000.

6. STEAM POWER GIVES THE MUSCLE

Steam power is what makes the Hull-Oakes sawmill of particular historical significance. Steam engines have provided power for the sawmill's operation since it began. The machines provide a sense of place and time for the sawmill; today, they operate about half of the mill machinery (Fig. 6.1; see Appendix A). As engines go, steam engines are regarded as efficient, relatively inexpensive because they make use of sawmill wastes and eliminate the need to go outside to purchase fuel such as gasoline, diesel fuel or electricity. Basically, they are regarded as external combustion engines where combustion is external to the piston and the mechanical action. In this case, sawdust and wood chips are burned to heat water in boilers, creating steam that turns the steam engine and is converted to mechanical power. Fossil fuel internal combustion engines, such as automobile engines, rely on repeated explosions of fuel and air mixtures within the piston and mechanical action of the engine itself (Pyle 1974: 52). The following is a description of the main steam engine at the Hull-Oakes sawmill, an engine that helped cut boards at a sawmill in Lorane, Ore., for about 40 years before Hull bought it. The engine, which has been continually used in sawmills for more than 80 years, powers about half the machinery at the sawmill including the head-rig saw and edger saws; electricity powers another 50 percent of the mill's equipment.

6.1 Hull's Steam Engine

The main power plant at Hull-Oakes is a horizontal, twin-cylinder "Regal" model steam engine made in 1906 by the Ames Iron Works, Oswego, N.Y. (Figs. 6.2 and 6.3; see Appendix A). The company began in 1840 as Talcott & Underhill Co., manufacturing winches for the Great Lakes shipping trade. In 1854, Henry M. Ames purchased the company and called it the Ames Iron Works; he incorporated under that name in 1901, "manufacturing a wide variety of portable, traction and stationary steam engines" (Exhibit label on an Ames Iron Works steam engine at the Henry Ford Museum



Regal Twin Engine — Throttling Type

See page 15 for description and dimensions.

Fig. 6.1: An Ames Iron Works "Regal" steam engine powers the Hull-Oakes Lumber Co. sawmill in Dawson. This is a catalog drawing of a steam engine similar to the one in the sawmill. It is included in the 1904 Illustrated Catalog of Ames Iron Works engines and boilers. The company was headquartered in Oswego, N.Y.

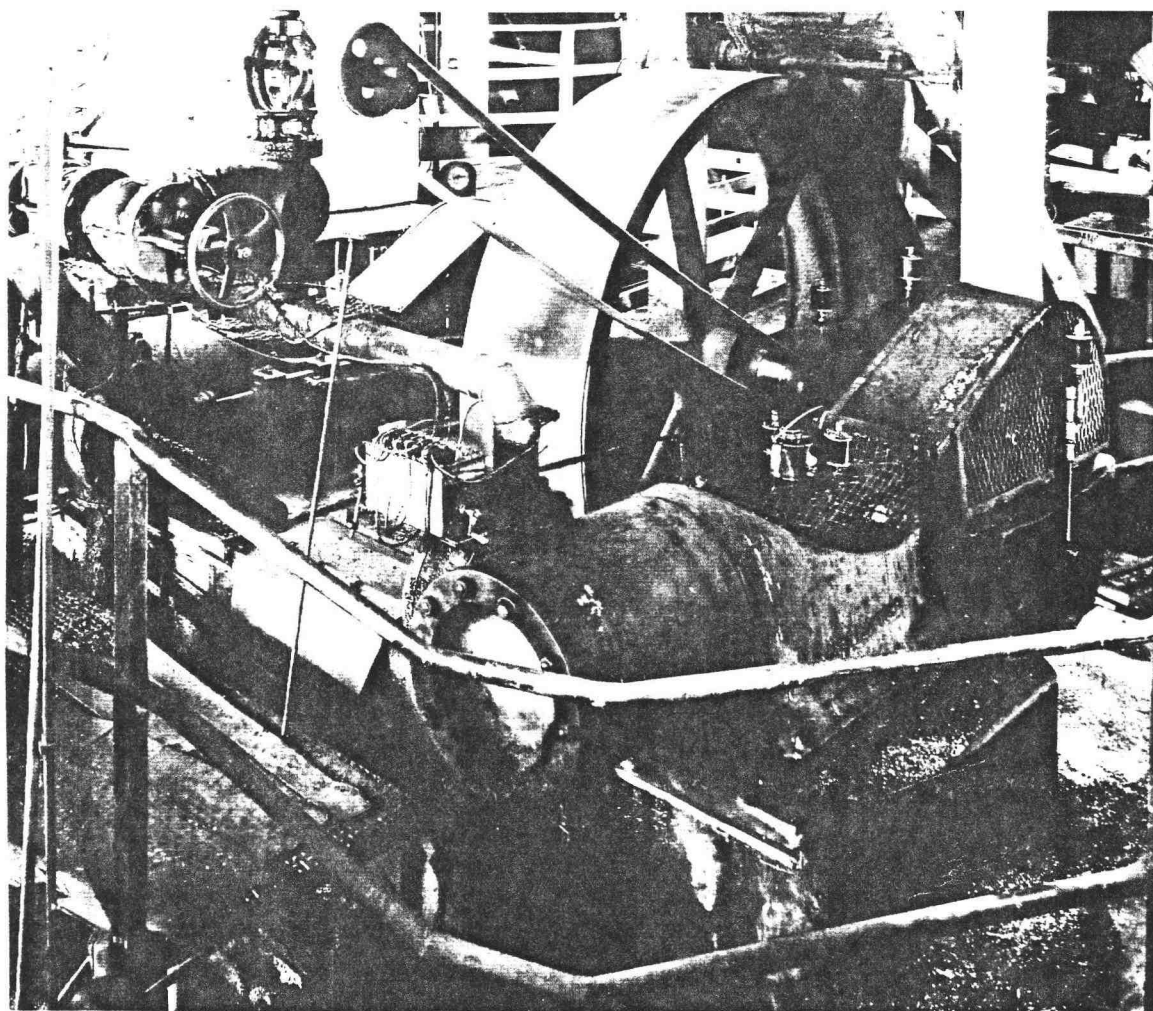


Fig. 6.2: The above photograph shows a close-up of the 1906 Ames Iron Works "Regal" twin-cylinder steam engine as it is installed in the Hull-Oakes Lumber Co. sawmill in Dawson. Courtesy of Corvallis photographers Gary Tarleton and Dan O'Brian.

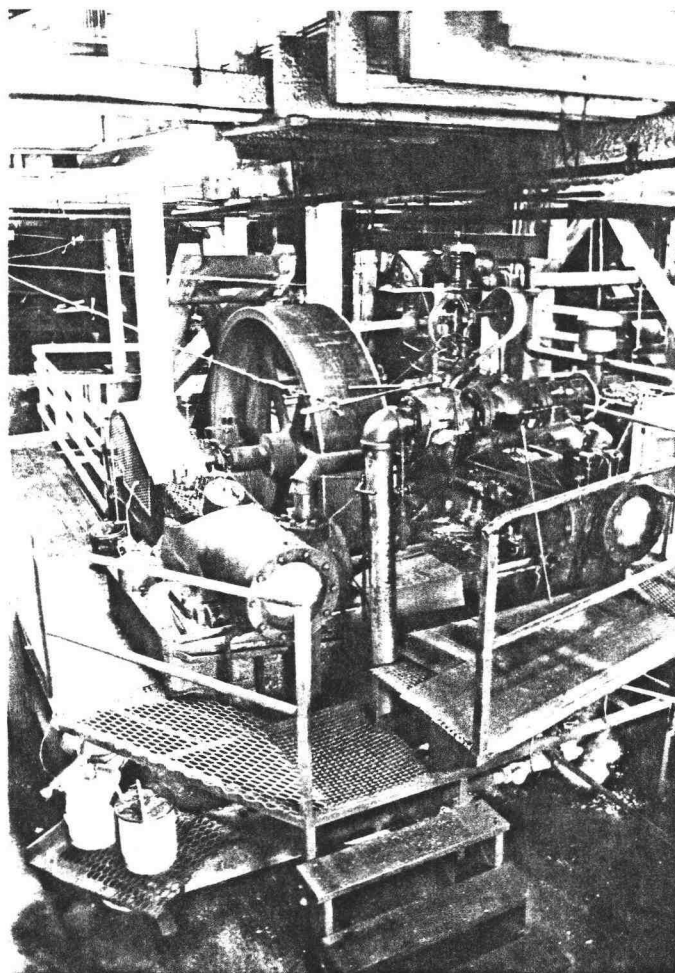


Fig. 6.3: View of the Ames "Regal" steam engine and its setting at the Hull sawmill. Courtesy of Wren Photographer John Bragg.

and Greenfield Village Research Center, Dearborn, Michigan). Leonard Ames, A.L. Merriam, Leonard Ames, Jr., and F.W. Merriam, also were listed as proprietors. The company was sold in 1919 to the Pierce-Butler Radiator Co., and continued to operate as the Ames Iron Works until 1962 when its buildings were dismantled and engine and boiler fabrication business discontinued. The company posted sales of \$40 million during the 1940s (Terry Prior, director/curator of the Oswego County Historical Society, personal communication 1994). An Ames Iron Works existed in Oswego, N.Y. in December, 1994, but its relationship to the historic company of the same name was unclear. However, in 1979 it was listed as a division of Pomeroy, Inc., according to the Henry Ford Museum exhibit label.

A 1906 Ames Iron Works catalog [Courtesy of the Henry Ford Museum] gives the following specifications for a steam engine similar to the one used at the Hull-Oakes sawmill: 16-inch diameter pistons; 18-inch stroke; 220 hp per piston at 160 revolutions per minute; 96-inch diameter pulley or so-called "bull wheel"; 26-inch diameter pulley face [across which stretches a solid belt made from 200 cow hides to drive mill machinery]; the engine is 12 feet, 11.5 inches long, 10 feet, 5 inches wide, weighing 15,750 pounds. The engine at Hull-Oakes frequently operates at 180 revolutions per minute to produce about 450hp (Millwright Ron King, personal communication 1994). It has an 8-inch diameter main shaft, with a 13-inch long main bearing. The catalog also describes the engine as being a balanced slide-valve type, consisting of a flat casting working between seat and pressure plate, locomotive guides, forged-steel connecting-rod fitted with cast-iron crank pin boxes lined with genuine babbitt. Babbitt is an alloy for lining bearings and consisting of tin, copper and antimony. It was named after American inventor Isaac Babbitt (Merriam-Webster 1973: 80). The engine also includes a spring-loaded pendulum-type governor to automatically shut down the engine if its speed increases beyond a certain pre-determined point. It includes oil cups, a centrifugal oiler for each crank shaft pin, sight feed lubricator, and cylinder drip cocks operated by a

single lever for each cylinder. Foundation mounting bolts are 6 feet to 7 feet long, and mounted in concrete. This engine was installed at Hull-Oakes in 1953. It had operated for about 40 years in the J.H. Chambers Mill in Lorane, Ore. before Hull moved it to Dawson. History of the engine while it was at the Chambers Mill is unclear.

6.2 Historic 'One-lunger' Engine Hull-Oakes' First

When Hull started this sawmill in 1939, it also was operated by steam. But it had a different main steam engine then, and one purchased with Hull's usual eye to bargain hunting. As Hull described it:

The core of the mill [in 1939] came from another old mill . . . When you start the way we did, you don't buy new machinery, I can tell you that. You buy second hand machinery and you buy that for a fraction of what the new machinery would cost. As far as that goes, our main engine was a single cylinder engine with a large bore. . . around 20 inches, which is quite large and it had a really heavy flywheel. It came out of a mill over toward Triangle Lake, at the Horton Lumber Company. . . that mill burned . . . and when it burned, the engine was in their steam sawmill. It seemed that flywheel was 12 or 15 feet in diameter and I guess when that mill burned the fire got hot enough to kind of flatten the cast iron in that wheel, it kind of had a flat spot on it, but it never bothered us.

It was an H S & G engine, Houston, Stanwood and Gamble. It wasn't the best engine in the world . . . not steam efficient . . . We put it on a logging truck, and I remember the crankshaft stuck in the air, it was over width and probably over weight [to legally haul on existing roads], but we did it anyway.

Although Hull couldn't recall any problems with their bargain engine, his sawmill partner, Donald Oakes, saw it differently. He recalled that the engine was a continuing problem in later years that required some tricky and possibly dangerous maneuvers to keep it running:

That one lunger steam engine would stop on dead center frequently because of its flat spot and we had to jump on top of that flywheel, the 'bull wheel' to get it moving again. That was a huge flywheel and if we couldn't get it started by jumping on the wheel, we would take a 2 x 4 and use it as a lever, prying against the frame and one of the spokes on the flywheel to get it moving. When we got the two-cylinder engine, that took care of all of that [Oakes, personal communication 1993].

6.3 Steam Engines Galore

Although the main engine is frequently the most talked-about steam engine at steam-powered sawmills, several engines or steam-powered pistons often operated simultaneously to run various pieces of equipment scattered around the mill yards. Hull-Oakes sawmill was no exception: millworkers once did their jobs amid the howl and vibration of five steam engines. In addition to the mill's main steam engine, a smaller "steam engine" consisting of two under-the-floor, diagonally-mounted steam-powered cylinders provides a "fast-acting" throw for movement of the sawmill's carriage back and forth on its east/west movement line (Hull 1992). The system once was common for mills handling larger logs, with the steam cylinders for sawmill carriage drives generally ranging from eight inches in diameter to 16 inches in diameter (Brown 1947: 67). Additional steam-powered cylinders called "pots" operate the carriage's log-turning mechanisms. The company's steam plant provides the steam for all the steam-powered equipment.

The company's inventory of steam-power equipment also includes a horizontal one-cylinder "Vim" model steam engine. It also is made by the Ames Iron Works, and is a smaller version of the larger main engine. That engine, which once drove two conveyors, sits adjacent to the main mill building. Although connected to steam pipes, the engine no longer is used. The mill's other engines have been scrapped or sold to other mills, a typical fate of mill machinery. As Hull described it:

The whole sawmill ran on steam engines. There was the one steam engine that ran most of the mill. It ran the head rig and a lot of other things. The smaller steam engine ran a couple of conveyors. We had another steam engine that ran the planer. There was another steam engine that unloaded logs at the log dump. And then the pond saw [to buck large logs] ran with a steam at one point.

Hull recalled another engine at his plant, one that, as many did, required some tinkering and modifications to make it suit their application:

We got it on the east side of the Willamette Valley in the Cascades some where south of Brownsville and north of Springfield . . . the core was the saw husk, I think, and a good carriage and a 11x11 single-cylinder

Case steam engine . . . originally, it was a traction engine [from a steam - powered tractor] but we converted it for stationary use. The way we done that was to take the fire box out and build a Dutch oven under it so you could have a lot more fire power, heat coming in there, increases your steam capacity a good deal. Generally, the Dutch oven would remain in place if we moved the engine. But we might salvage the fire brick out of it . . . The top of it usually had an arch on it and it has a set of fire grates for the fuel to burn on and you had some draft grates to control the wind that comes into it. It was quite a large installation, I forget how big it was. But anyway, it worked pretty good.

A "husk" is the term used for the framework on which certain machinery is attached. It becomes the pivot point for the power system. It is the point of attachment for saws and arbors associated with the shafts and drive pulley, saws and other machinery are for a head-saw rig.

6.4 Steam Operation Tricky/Dangerous

Keeping a steam engine running also can be difficult. It's not something learned overnight or out of a book, according to Hull, who said he was fortunate to have "a real good steam man . . . Hubert K. McBee . . . who frequently worked with our steam engines." As Hull explained:

You have to know something about steam, though. We didn't ordinarily make parts for steam engines if one broke down. We would have a machine shop do it. Today, you speak of technology changes. Well, I wouldn't call steam a technology. I always looked at it as engineering, steam engineering. Technology, in my way of thinking, is reserved for electrical things. Most of the real good steam men learned about it on the job. McBee had the practical experience necessary to get the job done in a way that would work best in a given situation. They know what works to best advantage. That's compared with the academics and architects who rely on figures and theories on how a mill should be built. But they don't generally have that practical experience that's necessary. McBee had that practical experience.

Hull added that working on the engines is "a disappearing craft. . . But we can still get parts made at machine shops if we need to, and the younger men are getting trained as they go. We get along all right."

Ron King, 33, is the company's present millwright. He has worked there 15 years, "ever since I got out of high school" (King, personal communication 1994). The mill, he

said, has provided him with stability necessary to support his family. He started out working on the mill's "green chain" sorting fresh-cut lumber, and worked his way into the job of a millwright. As he explained:

I heard they wanted a guy to do millwrightin'. Out of desperation, I went for it. I guess it was because I could weld that they hired me. First welding I did was to a support on an edger table. Everybody asked me why I was doing such a good job on the project, when it only was going to break again anyway. I said I didn't want it to break right away. That weld lasted for 12 years. I guess that sealed my fate to become a millwright . . . my grandfather worked here as a millwright, too. I guess it was foreordained that I become a millwright. . . Keeping this steam machinery running takes more common sense than engineering skill. You can just look at it and see how it works. It's pretty basic [King, personal communication 1994].

A good steam man, for example, listens closely to the steam engine, like a doctor listens to the human heart to see if it is functioning correctly. Slight changes in sounds through steam escaping from leaking pipes, unusual metallic knocks or clogging of speed-regulating governor mechanisms in the engine, can signal problems that need to be corrected (Hull, personal communication 1994). And some sounds also tell a worker when the engine is running well, or when some special tinkering is needed. As former millworker Chesley Rainey explained:

Oh, you should hear it when it's pulling a heavy load. It'll talk to you . . . 'pow', 'pow', 'pow'. . . just as fast as it could go. It wasn't running away or anything. It was pulling, and pulling hard . . . sometimes a millwright would even pour hot water on the engine to make it run better. . . it cools the steam down or something. Yeah. That Hubert McBee was super all right. He was a jack of all trades. He could run anything, fix anything [Rainey, personal communication 1994].

Problems, dangerous problems, around steam-powered sawmills are legendary among lumbermen: engines running away and exploding like bombs and punching holes in sawmill crews; men getting body parts ripped off by sawmill belts and whirling shafts; and falls from ever-greasy and slippery floor into mill machinery that's so noisy it's difficult to hear a cry for help. One academic studying early steam-powered sawmills and logging for his doctoral thesis titled "More Deadly Than War" proclaimed that

"Civilization never before saw the like of West Coast steam logging: Only war compares to it" (Prouty 1982: 190). In that thesis Father Andrew Mason Prouty cited Washington State Safety Board statistics showing that 4,200 people were killed or injured in the timber and sawmill industry from May 1 to Aug. 31, 1920. That compared with 4,286 people killed, injured or who died from disease during the Spanish-American War over the period of April 21 to Oct. 21, 1898 (Prouty 1982: 190).

In his 1973 master's thesis, Prouty also described the steam-powered sawmill as "An organized chaos, a screeching bedlam of pounding machinery on a vibrating deck, where saws turned like streaks of circular lightning: the mill was an exciting place to work, an easy place to get killed" (Prouty 1973: 149-150). Yes, it is noisy, and dangerous, according to Hull, but not as severe as the Dante's Inferno portrait painted by Prouty. "Oh, a few people have been hurt. And the steam engines have run away a few times, but they were shut down before anything too serious happened."

Ralph Kundert, 68, a retired Hull-Oakes millwright, recalled one hair-raising episode. Wood chips had clogged the steam engine governor, a device that regulates the engine's speed and is supposed to shut it down if something is amiss (Fig. 6.4). The governor didn't work this day. The engine built up speed until a large flywheel on it "just blew apart" like a bomb. "Nobody got hurt, but it sure was exciting," recalled Kundert, a tall, thin man of Scandinavian descent from South Dakota, who came to Oregon with his ranching family during the Great Depression. He has worked off-and-on at the Hull-Oakes sawmill for more than 30 years since he started work there in 1943. Most of his time at the mill has been as a millwright. He is one of three generations of his family to work at the Hull-Oakes sawmill (Kundert, personal communication 1989 and 1994). Working with steam engines was more of an on-the-job intuitive learning experience than formal training for Kundert. Working side-by-side with a mechanic who frequently came to Hull-Oakes sawmill to weld and perform other mechanical chores, he learned the eccentricities of steam engines, of which there are many. Working with steam engines "is

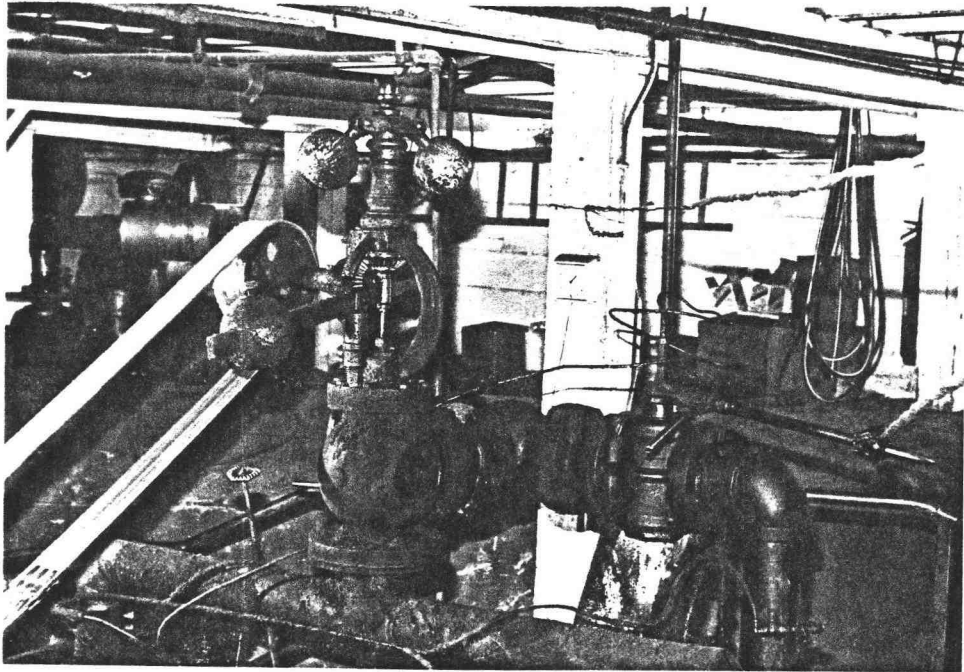


Fig. 6.4: Centrifugal governor atop "Regal" steam engine in the Hull-Oakes sawmill. As engine speed increases, governor balls extend outward from central shaft until desired speed is reached. Courtesy of Wren Photographer John Bragg.

real time consuming" and a lot of it mainly involves "just listening" and being in tune with the running engine, he claimed. "About 90 percent of it involves your ears. Just by listening, you could tell if you had to readjust this, or readjust that" (Kundert 1994).

Every time he would walk by the company's steam engines, which was frequently during a day's work, he would put a hand on the moving piston rod, let it slide through his hand. "You can feel what the engine is doing, whether there's a rod loose, or a bearing wearing, whether there's grating [inside an engine or its parts] or whether something is loose . . . It's just something you had to be used to . . . it's just experience" (Kundert 1994). The steam engines are usually shut down at the end of each day, and at lunchtime. An elaborate procedure is required to restart them. "It's not like flipping a switch" on an electric motor and getting instantaneous results, Kundert said. Automatic oiling mechanisms, turned off when the engines are shut down, must be reset by hand to get the proper distribution of steam cylinder oil to lubricate engine bearings. The oil is extremely thick when cold. "I wouldn't say you can cut it, but it's thick" (Kundert 1994). Consequently, a can of it sits next to the running engine to keep warm and viscous. And when the engine cools, so does the oil. Lubrication mechanisms must be readjusted as the engine warms up and metal and oil change shape or viscosity due to heat or cold; steam valve settings frequently must be readjusted so the right amount of steam is applied to the pistons at the right time to get the most benefit out of the steam pressure available. "Experience tells you when enough is enough . . . and the engines make a real 'crack' [cracking or popping noise] when steam hits the end of the piston" prior to another stroke (Kundert 1994). But experience, years of doing it over and over, told him when adjustments were correct. "You just had to work on 'em" (Kundert 1994).

And they were dangerous. All the time, Kundert as well as the other employees had to keep away from rapidly rotating engine parts, belts and shafts. Steam engines also have a habit of gaining speed to infinity and shaking themselves apart unless the increasing speed

is checked by a governor mechanism to shut them down or keep them to a desired speed. Sometimes, the mechanism doesn't work right, and the engines start to run out of control. "It doesn't happen everyday, but quite regularly" (Kundert 1994). Several emergency pull cords are scattered at select stations around the mill. If anyone hears the steam engine picking up speed beyond its normal operating tone, he yanks the cord, shutting the steam pressure off to the engine. "But you don't have too long before they will blow up" (Kundert 1994).

He recalled one small steam engine attached to the mill's resaw mechanism that got out of control one day, exploding and sending chunks of flywheel metal sailing through walls and floors. Nobody was hurt, but could have been. Usually, one person is sent down to the engine to shut it off at the source, Kundert said. While one person risks his life, everybody else scatters (Kundert 1994).

Steam plants are very noisy, too, Kundert said, more so today with reliance on metal conveyors, chains and other equipment. They were quieter when everything was built of wood. "In the old days everything was wood. Metal was expensive, timber was cheap. . .and in the old days there was very little noise except for that produced by the engine and saws" (Kundert 1994).

Steam engines aren't as efficient as electronic technology, Kundert conceded. But there's something about them that can't be denied, something special to be appreciated and accommodated, he added.

There is just something that is part of the past that should not be completely forgotten. There's a [special] knack to it. And I know Ralph [Hull] sticks with it because he loves it. When he comes out to the mill the first thing he does, he'll go down there and listen to that [steam engine]. I go down and I listen to that thing 'wheeze' and 'whop', too. It gets in your blood [Kundert 1994].

Kundert wasn't the only person with steam engine memories. Chesley Rainey, 69, and a retired millworker, also remembered that now and then Hull's steam engine would run out of control:

The governor would foul up. The engine would sound like it was going to jump out of the mill. . . you could hear them when they were getting started. . . just begin gaining speed. Oh, you had to watch what you were doing around there, all right. We had quite a few accidents [he lost three fingers on his left hand when he got it smashed by moving lumber]. . . You don't go out there and go to sleep. . . you can get hurt real easy [Rainey 1994].

Having the company's boiler room isolated from the steam engine itself eliminates one potential hazard mentioned by Prouty, the firing like cannon shells of boiler insulating material dropped on it by natural wear and tear on the boilers over time.

Flywheels could throw material with the force resembling that of projectiles shot from a cannon. Lagging, a mortar of fireclay, was used to insulate the outside of boilers. It was plastered on the boiler at the factory and covered with a tin jacket. The tin would corrode and a chunk of lagging would fall down. The lagging had the consistency of cement and it would hit the fast moving connecting rods of the spinning flywheel [Prouty 1973: 160].

He detailed the case of "Alexander M. McKinnon, chief engineer of the Taylor mill at Seattle" who was "instantly killed" when hit by a piece of flying lagging (Prouty 1973: 160). Belts that transfer power from the engine's flywheel to other machinery, often are as "dangerous as the saws" because they could easily grab a worker and wrap him around a whirling shaft or a pulley before help could be summoned (Prouty 1973: 163). Hull-Oakes' drive belt, a solid belt of cowhide glued together in three layers and costing about \$4,000 to replace every 10 years or so, has given few problems over the years (Hull, personal communication 1994). But shafts have been responsible for at least one fatality at the Hull-Oakes sawmill. Although his memory of the exact date has faded, it was an accident that Virgil Hall, 83, who helped Hull set up his mill and worked there for 45 years, will never forget.

Well, one man got killed one day. I'll always remember that. Well, he got his pants leg in a shaft, I think, and got wrapped up in it. He was trying to get it loose, and then he got his arm in there. I was in the cage, trimming. I looked down and there was a man's arm wrapped around the shaft. He [The rest of him] was lying down in the conveyor. He fell down in there. That was the only big injury around the mill. Some men were killed in the woods. And we had minor injuries once in a while. A few missed fingers and such, but no other major injuries [Hall 1994].

Hull is the first person to concede that his mill is outdated when compared to today's computerized and technologically-refined sawmills. But he likes the feel of steam power,

its a personal experience that people must work on to appreciate and understand [Figure 6.5]. "We have an old- fashioned sawmill and an old-fashioned operator. Because we cut large logs, our operation doesn't lend itself to computerization. I don't like them. They are too impersonal" (Hull, personal communication 1990). The mill is definitely inefficient, he concedes. "It takes us more man hours per thousand board feet produced [than it does for modern mills built within the past decade]. We just have to get more money ." Still, he is saving money by sticking with steam power generated by mill wastes. The company installed electrical equipment in the early 1980s, with the goal of eventually replacing steam power. An AC/DC industrial electric motor and related equipment are installed and ready to be hooked up under the sawmill (Fig. 6.6). They have never been used. A surge in electrical rates during the 1980s convinced Hull to stay with steam. "It's more profitable than if we electrified. We saw our electric bill go from \$2,000 to \$10,000 a month for what we do use" (Hull 1984). Hull had no choice but to operate entirely with steam when he built his present mill in 1938, because electrification had not yet arrived in isolated rural areas such as Dawson. Household electricity didn't arrive there until the early 1940s. The Mountain States Electric Co. first installed an industrial-strength electric line there in 1949, according to the company's records that are now maintained by Pacific Power and Electric Co. in Portland. Pacific Power acquired the Mountain States company. Industrial-strength electricity is three-phase electricity that provides about three times the normal household power for industrial and commercial use. The increased power often is used to turn large motors, such as those driving machinery in sawmills. Hull-Oakes uses 277-volt and 480-volt electricity to power its three-phase motors, which are common to the industry. Hull began using electric power gradually after 1949, staying with steam when he determined it wouldn't be cost-effective for him to operate the whole sawmill with electricity. Besides, he admits to having an affinity for the old-fashioned nature of steam (Hull, personal communication 1994).

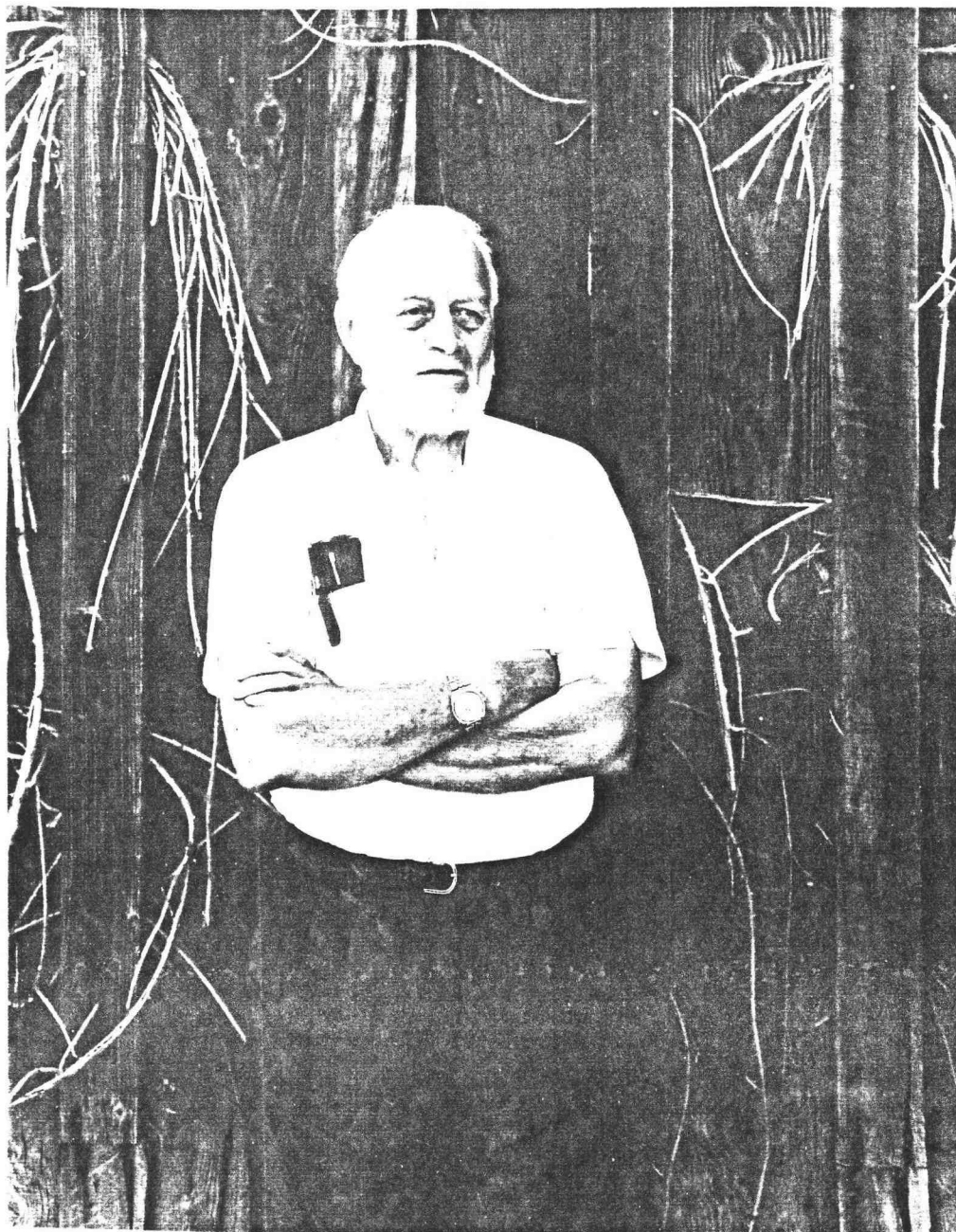


Fig. 6.5: Ralph Hull stands outside one of his sawmill buildings in 1993 at the Hull-Oakes Lumber Co. in Dawson. Hull has operated the sawmill since 1939, after starting in the business in 1934. Courtesy of Gary Tarleton.

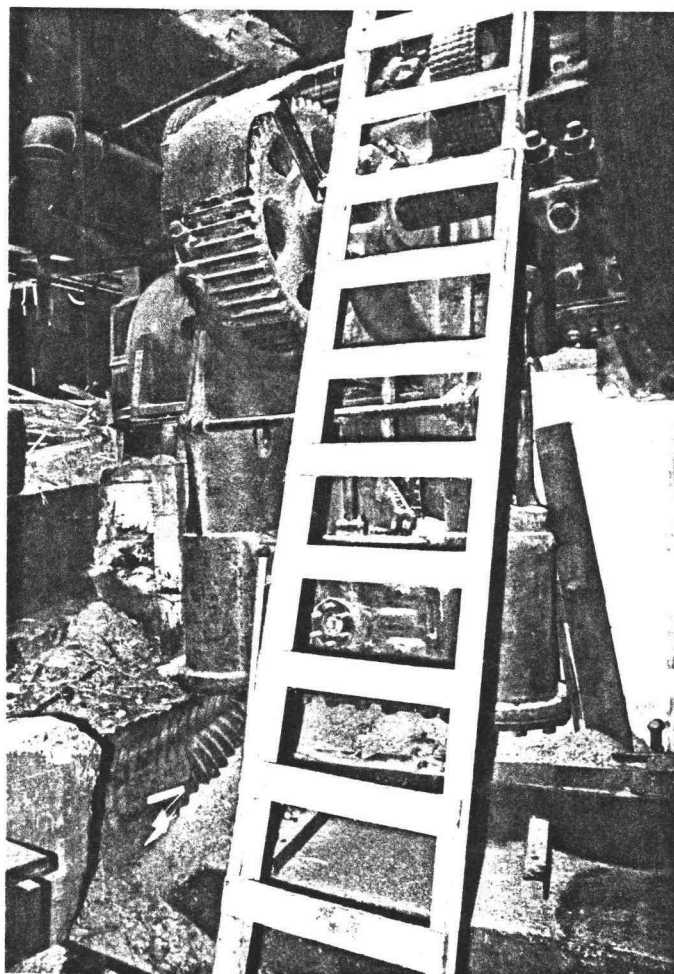


Fig. 6.6: View of the AC/DC electric drive motor beneath the deck of the Hull sawmill. The machinery is in place, but was never used because Hull decided not to convert the sawmill to total electric power. Courtesy of Wren Photographer John Bragg.

Hull's sawmill's have always been labor intensive operations, as required by steam-driven mills. There were 85 people employed by Hull-Oakes in 1994 and early 1995: Forty of them work directly in the sawmill; the rest in the office, or logging in the woods.

The following is a job-title breakdown of the 40 people working in the company's sawmill during 1994:

- 1 sawmill supervisor
- 1 millwright
- 1 millwright's helper
- 1 relief-man, a person who works at large on any job necessary around the mill
- 1 "pond monkey" who shuttles logs around the log pond
- 1 barker operator who operates the log-debarking machinery
- 1 sawyer to determine how each log is to be cut
- 1 ratchet setter to work the log carriage machinery
- 1 off-bearer who removes initial lumber cuts for more processing
- 1 edgerman who operates lumber-edging machinery
- 1 trimmerman who is concerned with lumber lengths
- 1 spotter to put lumber on the trimming table
- 1 jump roll man who helps direct lumber for resawing
- 1 "rough grader" who also directs lumber for resawing
- 1 resaw man to operate resaw machinery
- 5 green chain workers to sort and grade lumber
- 1 timbersaw man
- 2 chippermen to handle sawmill wastes
- 2 straddle-carrier drivers
- 2 firemen to operate the boilers
- 1 planerman to set up and operate the planer
- 1 planer feeder man to feed lumber into the planer

- 1 lumber grader to work with planer crews
- 2 planer off-bearers to remove lumber from the planer
- 2 lumber-car loaders
- 3 lumber sorters
- 2 yard graders to grade the lumber in the storage yard
- 1 storage yard superintendent

7. DAWSON: THE WAY IT WAS

Hull had gotten married just before he agreed to buy the Dawson mill site. "At that age and losing a sawmill by fire and trying to build a sawmill, we didn't have any money," Hull said, so he and his new wife agreed to rent a house at Dawson from one of his relatives. Dawson wasn't a company town, in the sense that a specific company such as Bohemia Lumber or Pope & Talbot built its houses specifically for rentals to company employees. Rather, it was a town-like cluster of houses built by individuals that happened to grow up around that area's lumber and logging operations. Hull had been trying to save money while he was dipping into his inventory, "shipping a car load of lumber out of inventory a month to help pay for building the new mill." Because of a family spat, the rental house at the upper end of the Dawson mill pond did not work out, and Hull began building a new home at Dawson with some of his inventory. He still lives in that house, which is on the north side of Oliver Creek about 500 feet from the present company office. Dawson was not really a town at the time, Hull said, although there were "12 to 15 houses" there. The company's present office is one of those houses. Most of the houses were built gradually sometime before 1938, according to Hull, and he only built two houses there.

Emergence of better roads and the automobile was changing the area's settlement patterns. "About that time [1939] the employees didn't want to live out here. They wanted to move to Monroe or Junction City or Corvallis or Eugene." Most of the former houses were torn down to accommodate expansion of Hull's sawmill over time. No traces of them are left, and most of the land they were on has been dug up and paved over.

7.1 Cookhouse Stokes Workers

But there was a cook house at the sawmill. It was not comparable to some legendary turn-of-the-century sawmill cookhouses that had huge dining rooms, large staffs and

were capable of serving 120 men such as the one at the C.R. Johnson sawmill in Mendocino County, Calif. Men who ate there got everything from "mush to mulligan" three times a day, for \$15 a month (Andrews 1994: 126). But the one at Dawson served good food, Hull recalled. As he explained:

Well, Alta & Earl Miller operated it. Actually Alta was the workhorse and the cook. She ran the cook house. There were other operators before her I am sure. But I don't remember who they were. It had a large dining room. You could walk in the front door and they would serve meals at meal time. I think we had a noon meal and an evening meal, of course. They were staggered hours, they were staggered shifts. Summertime they had to work, get up early because of the weather, so that presented some problems, I know, for the cook. I can't exactly tell you how all that was handled. We never took over the cook house. It kind of operated on its own.

The cookhouse continued operation until it was torn down in about 1942 (Hall 1994).

7.2 'Mill Shack' Living

Orin B. Nye, 80, of Junction City, said his father, a Pennsylvania Dutchman, worked for Wes Miller before 1930 as a "donkey puncher," or steam-donkey engineer. His family lived in one of the houses (Fig. 7.1). He described the housing as "standard mill shacks" of uninsulated and built of unfinished lumber with shake roofs. His house had "A kitchen, front room and a bedroom. There was a wood stove and a 'two-holer' outhouse about 40 yards west of the house (Nye 1993). He recalled few get-togethers with people in Dawson, but remembered something about the family's lifeways:

We did lots of hunting for meat . . . there was no electricity, so we used oil and kerosene lamps for light. We didn't have a refrigerator, and relied on a lot of canned [home canned] goods. We paid about \$5 a month rent, with wages running around 75 cents an hour or about \$6 a day — and we saved money on it . . . We didn't associate much [with people at Dawson]. We would sometimes go out to eat, go to ballgames in Bellfountain and shop in Bellfountain and Monroe. We bought a refrigerator in 1940 . . . there was electricity there then and we had electric lights . . . We didn't really feel isolated because we were busy working six days a week and we didn't have a lot of time to visit . . . There was one dump along the logging road [see Fig. 7.1]. It would be just southwest of the mill, where they were dumping garbage, household garbage only. About three fourths of a mile from the mill, just threw it over the banks of the road. At one time it was [Wes] Miller's old railroad grade [Nye 1993].

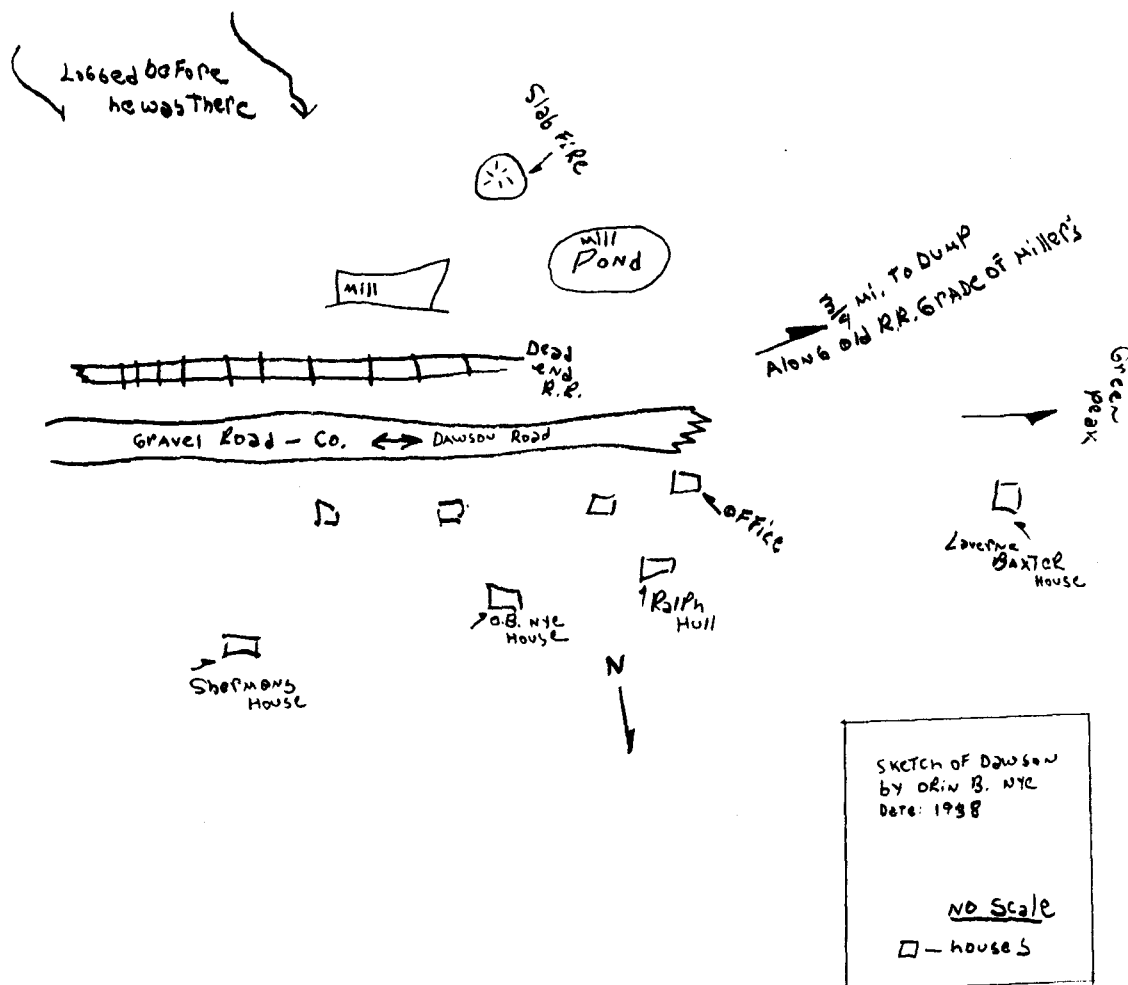


Fig. 7.1 : This sketch by Orin B. Nye was drawn March 12, 1993, and depicts the layout of Dawson as he remembered it existing in 1938. The sketch is not to scale, and provides an approximate location of the Hull-Oakes sawmill, mill pond, houses and other structures or features related to the mill. The dump, primarily for household refuse, was generally alongside the road and railroad grade as it climbed out of the canyon about .75 mile west of the sawmill.

Sawmill payroll records show there were 30 people employed at Hull's sawmill in 1938. That compares to 85 employees in 1993. Payroll records also show that employees worked for a maximum of \$3 a day [a 9 or 10-hour day being common] in 1938, were up to \$6 a day in 1941, and were paid about \$1 an hour by 1944; in 1993 they made \$63.20 a day for an eight-hour day (Fig. 7.2). Ten of the company's employees are related. In 1938 hiring was done with a handshake; 14 separate forms are required now, according to Hull.

Other workers also recall Dawson and their experience living there. Harry Wallace, 74, was born on Ingraham Island southeast of Monroe and moved to Dawson when he was six years old (Fig. 7.3). His father, Kess Wallace, "worked on the pond" there as a "pond monkey" choosing the logs for specific orders and sending them to the saws to be cut (Wallace 1993). Wallace, who worked for I.P. Miller beginning in 1937, gave the following account:

It was quite a little burg when we was there . . . houses were built out of unfinished, unplanned, lumber, mill shacks they were. They were square houses, a little longer than they were wide. One we lived in had three bedrooms, living room, kitchen. We had an outside pump for water, and an outhouse. We used kerosene lights. For refrigeration, a 'cooler' . . . a screened-in box so air would go through that we put by the creek on stilt legs . . . I think the rest of the people did it that way too. . . We didn't keep stuff long in those days. Meat was packed in brine. We did a lot of home canning, always had chickens, a cow for milk, a calf for beef, and a home garden .

People were family oriented. . . they had houses scattered along the road from Bellfountain to Dawson. Roads weren't paved, just gravel, and we usually had a flat tire or two on every trip . . . We always had some of the family around for get-togethers over the weekends — school things, barn dances. At one time we lived in a house right under the planer, only the planer wasn't there then [Wallace 1993].

Alva Hinton, 75, also grew up in Dawson, where his father worked in the woods for Wes Miller. His father Ivan, built the family's house with lumber supplied by Miller. "We didn't have enough money to rent anything" (Hinton 1993). But things were not all that bad, he said, and poverty was a matter of personal perception.

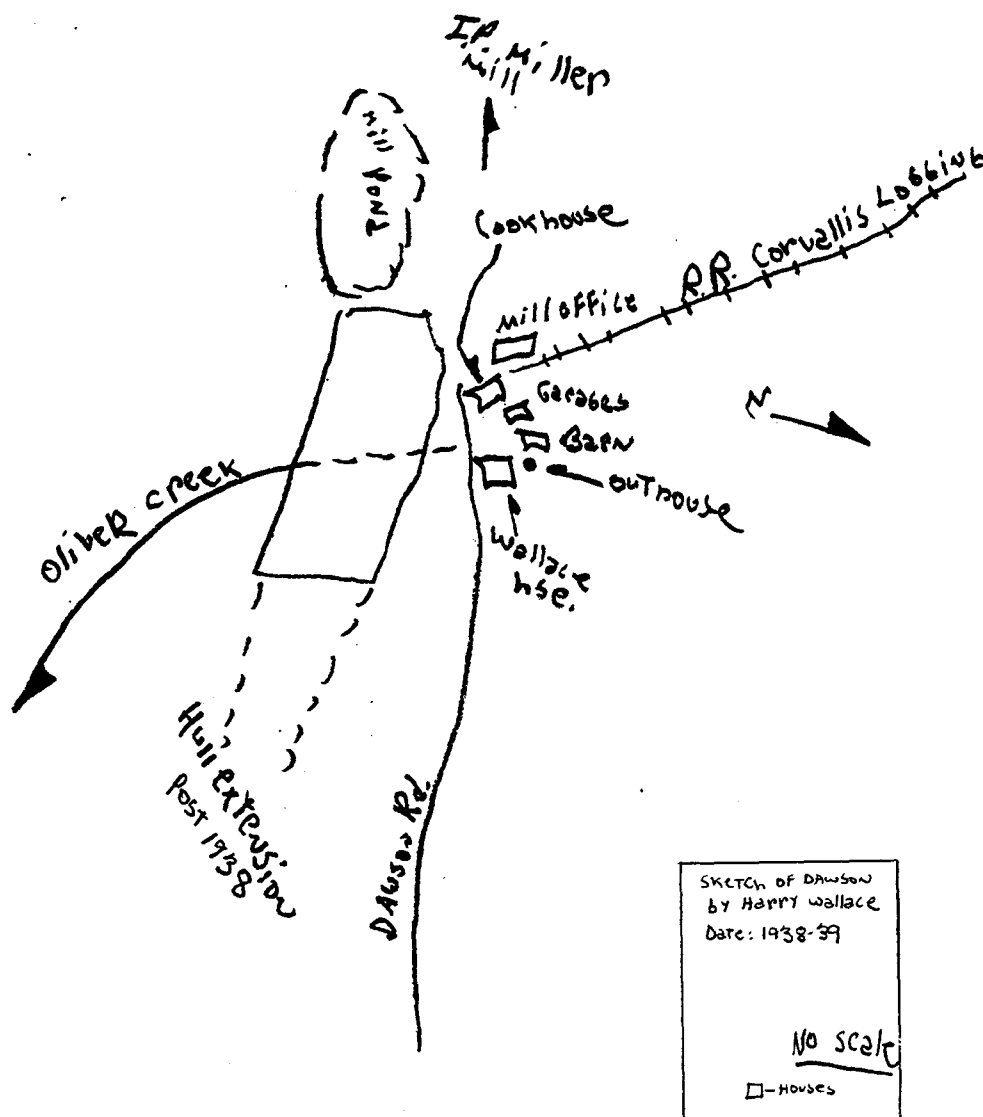


Fig. 7.3: Former sawmill worker Harry Wallace drew this sketch on March 12, 1993 of Dawson as he recalled it appearing in about 1938-39. The sketch is not to scale. Besides showing the approximate location of the W.J. Miller sawmill and its relationship to an extension to the remains of it that was built by Ralph Hull, the sketch also shows the approximate location of Oliver Creek, the I.P. Miller sawmill just west of the Hull-Oakes mill, a logging railroad in the area, the cookhouse, and his own house and outhouse.

Looking back, he said that the "Depression years weren't that bad for most people around the mill. We really didn't know we was poor. We ate a lot of hamburger and got by like that" (Hinton 1993).

8. DISCUSSION/CONCLUSION

The vanishing of steam-powered sawmills throughout the United States in general, and the Pacific Northwest in particular leaves a gap in our understanding of this industry. The case of Hull-Oakes Lumber Co., Inc., and its reliance on steam power to cut lumber, captures in a concrete way a glimpse of that industry before it and its practitioners vanish entirely. Using information gleaned from informants, as well as the existing written and photographic record of the sawmill industry in general and the Hull-Oakes sawmill in particular, this study fleshes out a pattern of mechanical modification and selectivity within the industry that can only increase our understanding of such an industry and the role mills played in the social and economic fabric of their surrounding regions. Putting the mill on record also contributes to the preservation of a vital part of the cultural and industrial heritage of Benton County, Oregon and the Pacific Northwest. As such, it provides a valuable teaching aid for a range of studies in schools, colleges and universities. Equally as important, it gives archaeologists a broader database to interpret the remains of similar industrial sawmill sites they may encounter elsewhere. Comments from retired millwright Ralph Kundert, for example, provide an insight to day-to-day steam engine operation, skills and practices that aren't readily available elsewhere and will disappear when Kundert dies; interviews with other retired sawmill employees provides a picture of sawmill life from those who lived it; and details provided by Ralph Hull serve to expand knowledge of how early sawmills were operated, and the pitfalls operators faced on a daily basis. His comments also show how one operator and his business survived the technological, mechanical, political and financial turbulence of a rapidly-changing industry that for years defined the image of the Pacific Northwest. His hard-work ethic, reliance on second-hand machinery to operate his mill, and reluctance to part with an antiquated technology because he liked it and didn't find new technology to be particularly cost-effective to him, illustrate a system of values prevalent among people at the time. Photographs, maps and narrative descriptions of Hull-Oakes' sawmill

machinery and buildings capture specific architecture, process configuration, setting and use of those buildings and machinery before the only thing left to interpret are bits of metal, brick and wood as is common at most former sawmill sites. Construction techniques at Hull-Oakes, for example, demonstrate craftsmanship and adaptability for utility's sake during a particular historical period encompassing the Great Depression and its aftermath. Such methods were common at steam-powered sawmills that are now all but extinct. The bones of most of those mills lie rotting and buried by vegetation common to the forested areas where they once operated. Photographs of intact machinery creates a visual aid for archaeologists left with only bits and pieces of mill machinery as is common at many former sawmill sites.

By studying an operating steam-powered sawmill and the lives of the practitioners of its arts and lifeways, we can see more clearly the complexity, adaptive strategies and way of life shaping an industry that carries with it a liberal supply of myth and romanticism: an image symbolic with the free-wheeling Pacific Northwest and its tall tales of big timber and bigger-than-life loggers and lumbermen. Looking at Hull-Oakes while it's operating, provides a more realistic picture of the industry as a whole by illustrating the workings of one sawmill that has survived with old methods in an industry frequently rocked by change that followed the Great Depression. It also illustrates that technological innovation often is far more complex than might at first be thought; that individual initiative, inventiveness, unwillingness to accept technological change wholesale, business acumen and perseverance can sometimes steer an industry toward success rather than failure that has plagued a good many sawmills in recent times. Through such personal comments, Hull and his sawmill seem to embody those qualities in a more realistic way than Hank Stamper and his fictional logging family did in their family-against-the-world, fisticuff-laden, macho battle to stay afloat in the turbulent and competitive logging industry as portrayed in *Sometimes a Great Notion*, a novel that well embodies the mythology of the Pacific Northwest logging industry (Kesey 1965).

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APPENDICES

APPENDIX A



Fig. 4.a: Looking at the east elevation of the main Hull sawmill. George Wisner photo.

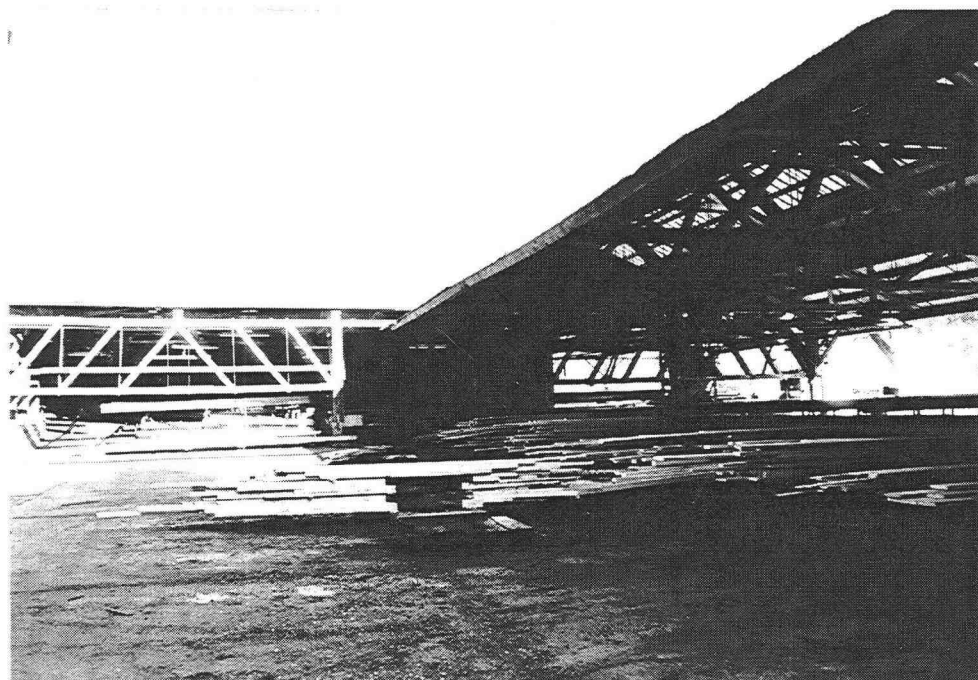


Fig. 4.b: Looking northeast at the southwest elevation of the "green chain" of the Hull sawmill. George Wisner photo.



Fig. 4.c: East elevation of Hull sawmill sawdust fuel-storage bin and attached boiler house. George Wisner photo.

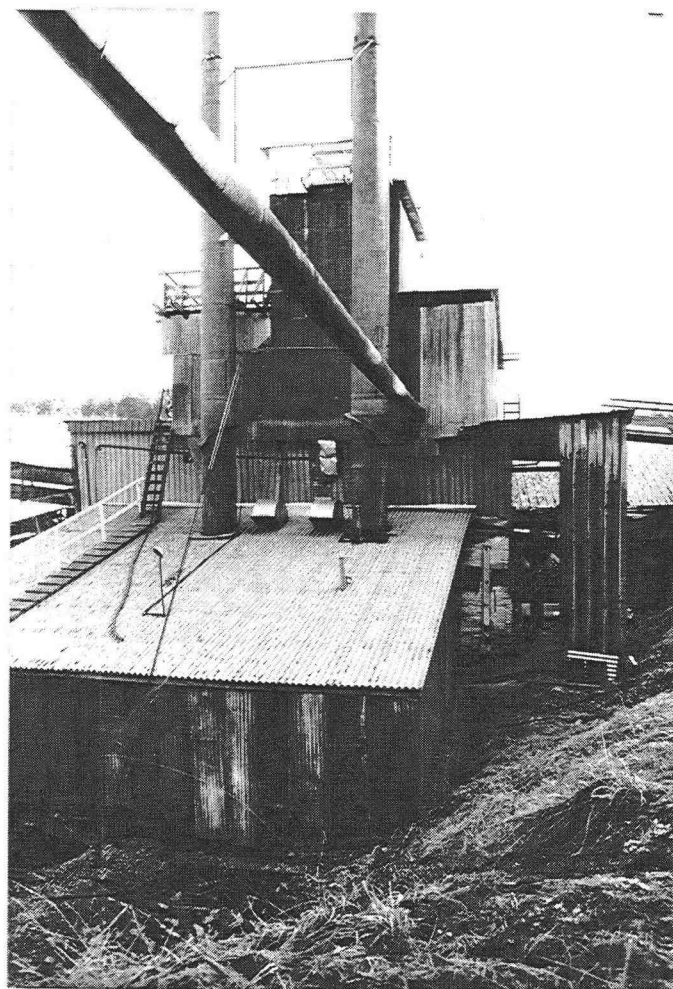


Fig. 4.d: West elevation of fuel-storage bin. Stacks are 120 feet tall. Courtesy of Wren Photographer John Bragg.

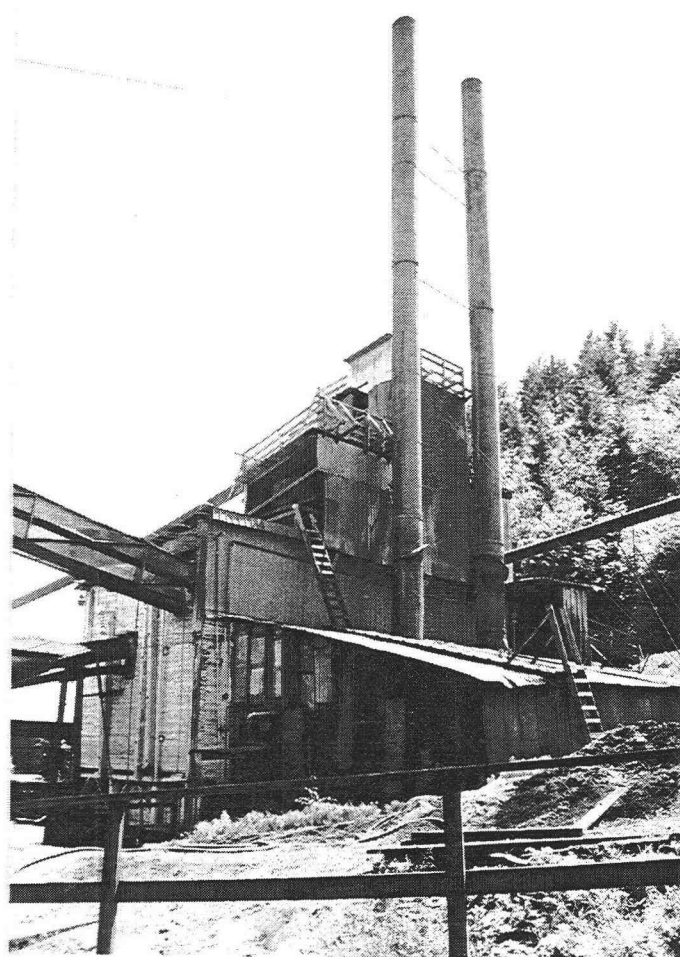


Fig. 4.e: Northwest elevation of the company's fuel-storage bin and attached boiler house. George Wisner photo.

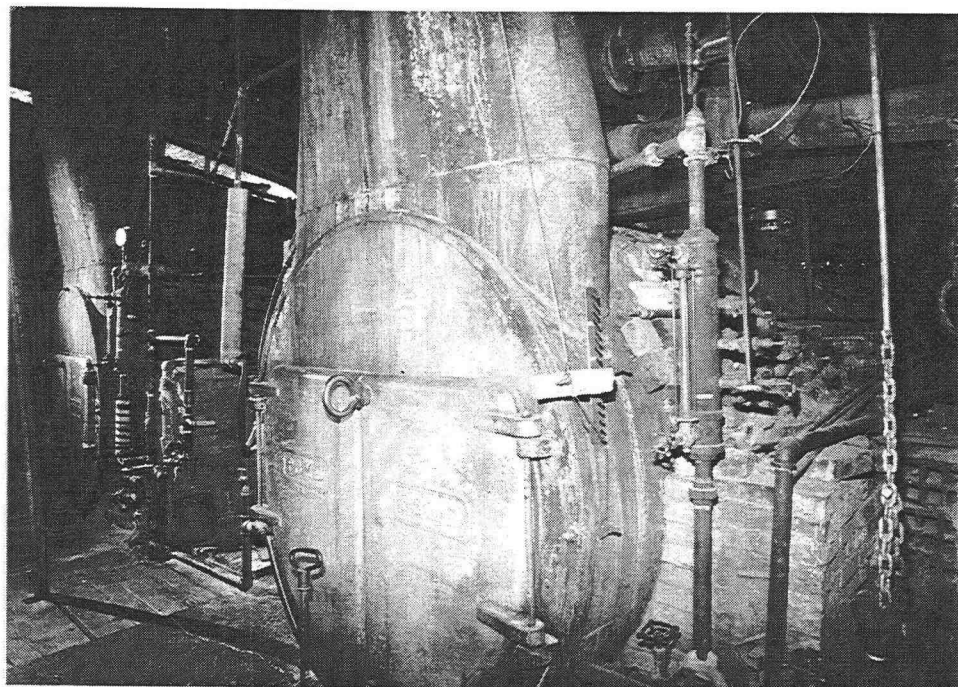


Fig. 4.f: Face of one of three east-facing boilers in the sawmill at Dawson. Courtesy of Wren Photographer John Bragg.

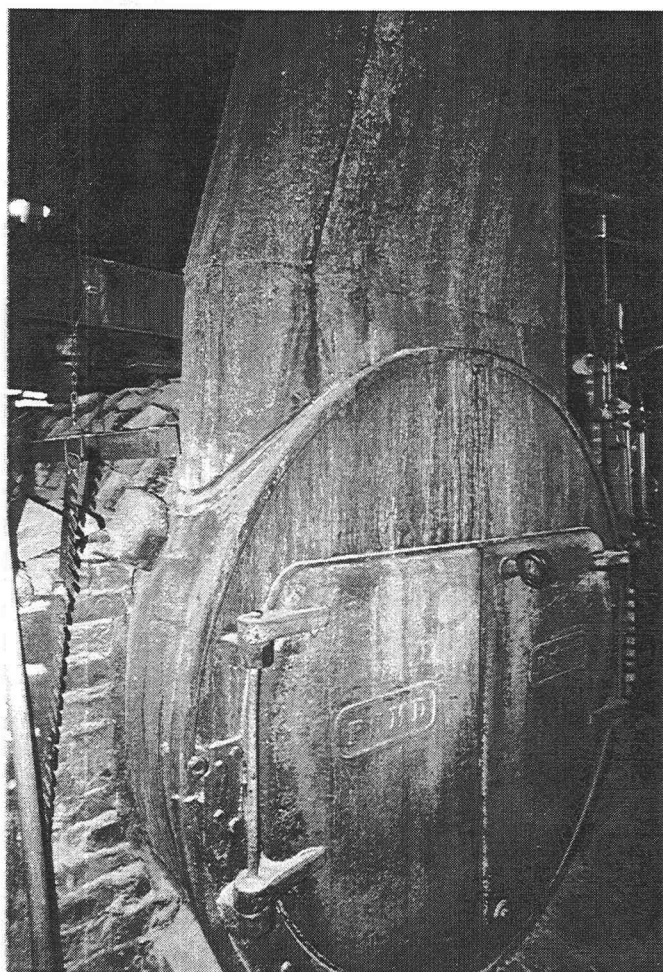


Fig. 4.g: Face of east-facing boiler at Hull sawmill in Dawson. Courtesy of Wren Photographer John Bragg.

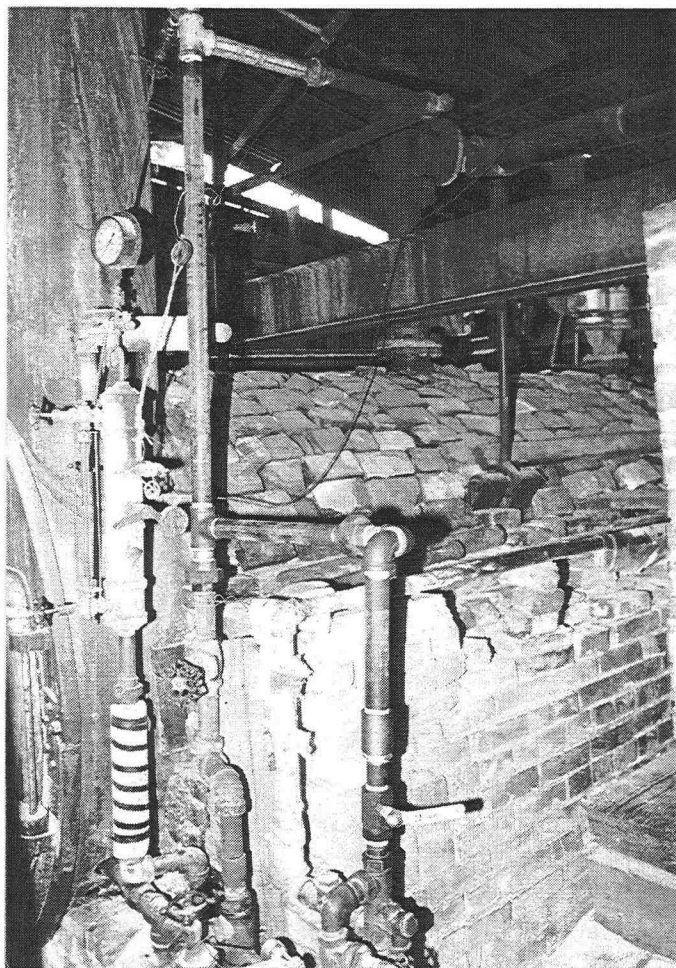


Fig. 4.h: View of the brick work around boilers at sawmill, showing steam-pressure valve in foreground. Courtesy of Wren Photographer John Bragg.

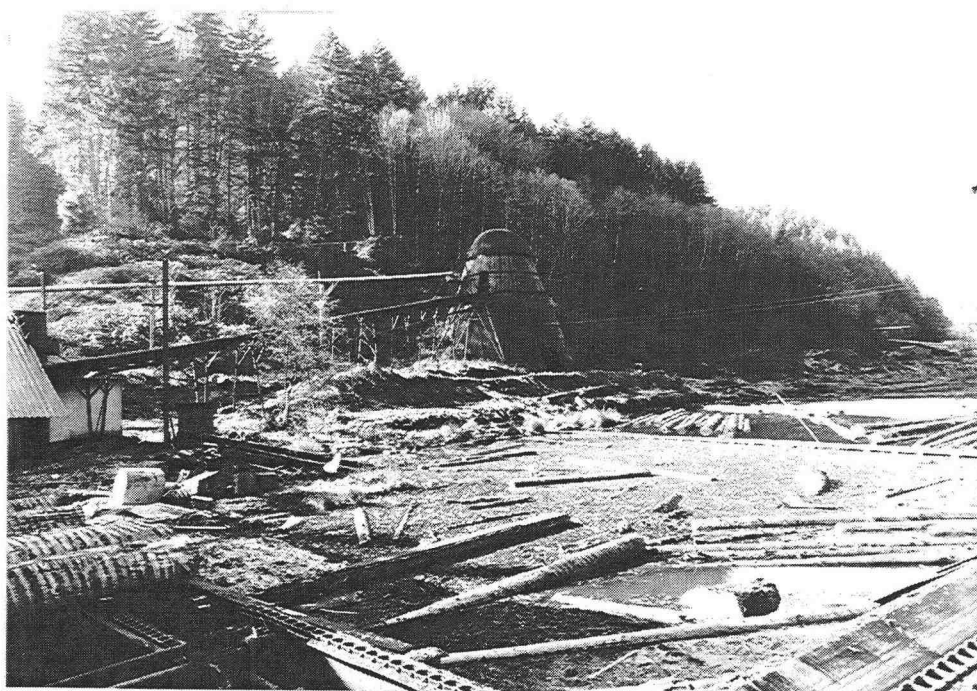


Fig. 4.i: View looking southwest from the Hull sawmill log carriage toward the defunct wigwam-style refuse burner. George Wisner photo.

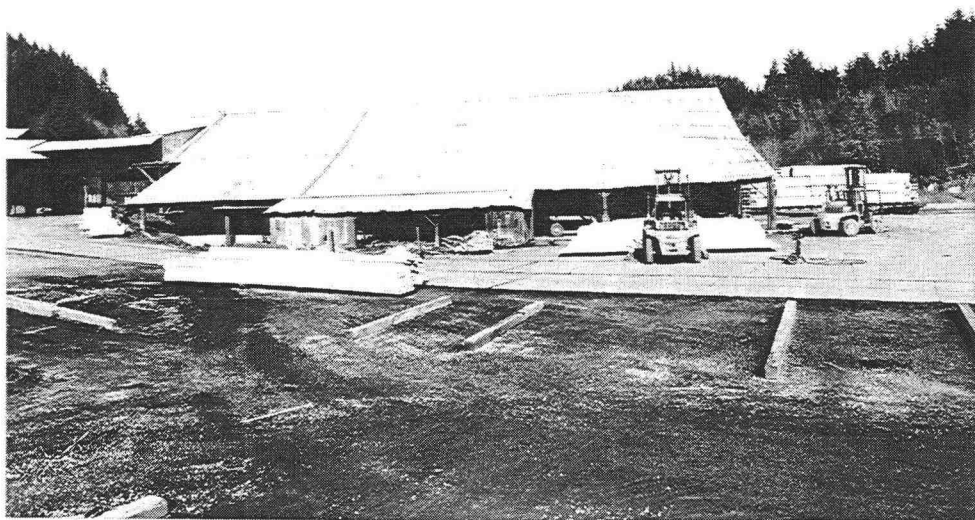


Fig. 4.j: South elevation of the Hull sawmill planer building and attached lumber storage building. George Wisner photo.

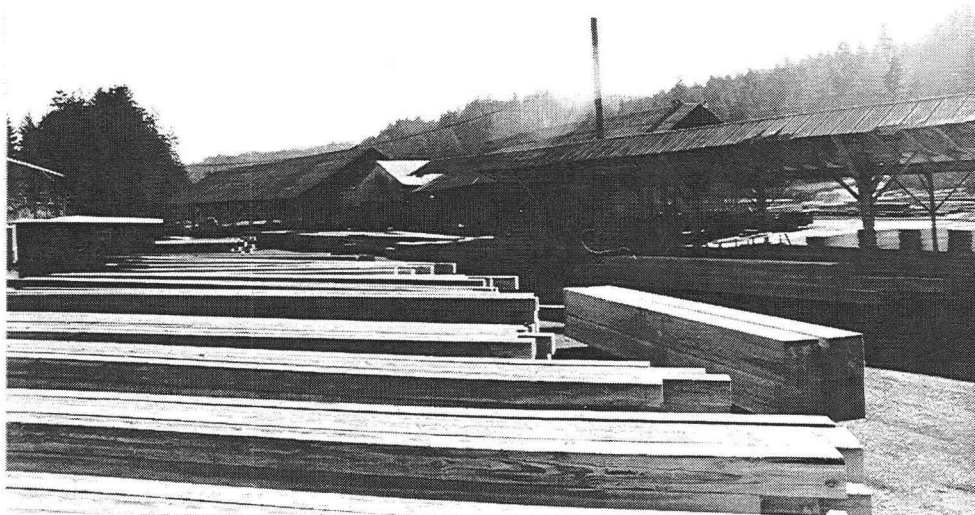


Fig. 4.k: Looking southeast from a lumber storage area at the north and west elevations of the company's planer building and lumber-storage sheds. George Wisner photo.

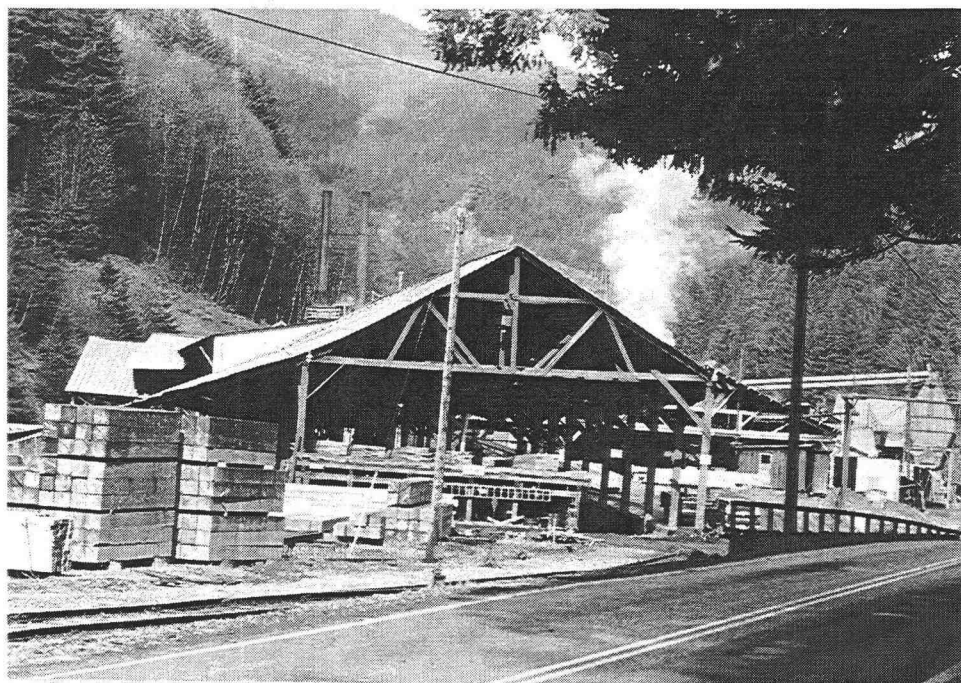


Fig. 4.1: General setting for Hull's sawmill, looking from east to west. Southern Pacific Railroad tracks are in foreground. Railroad was installed in about 1909 to support a growing logging and lumbering industry. George Wisner photo.



Fig. 4.m: South elevation of the Hull sawmill planer building on the east end of the sawmill complex. George Wisner photo.

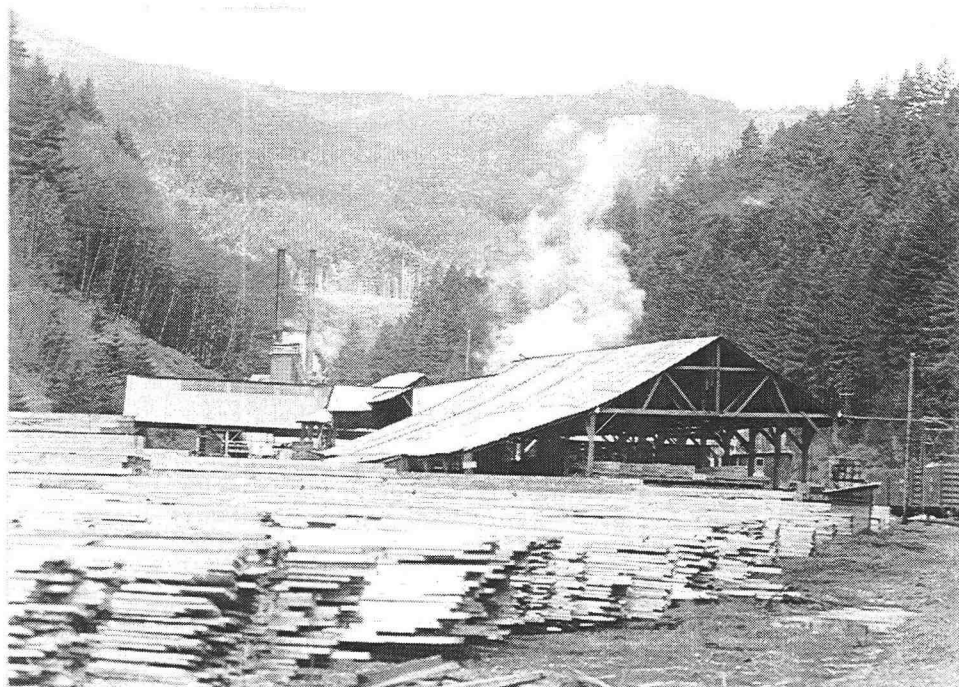


Fig. 4.n: View of Hull's lumber company from east to west showing general setting. Courtesy of Wren Photographer John Bragg.

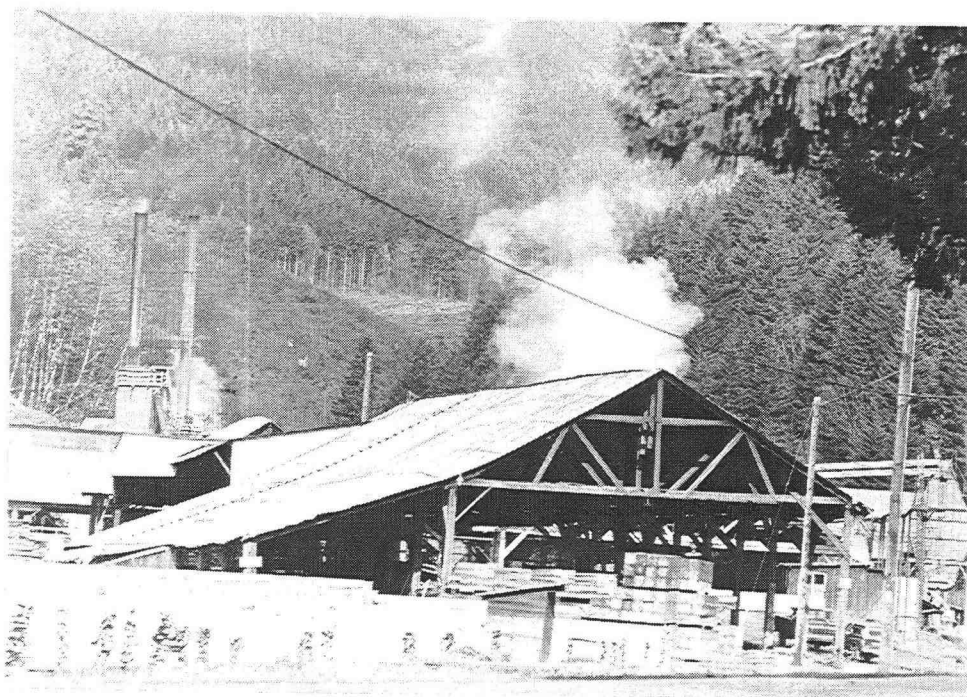


Fig. 4.o: View of the Hull sawmill looking from east to west. The east-end lumber storage shed is in the foreground. Courtesy of Wren Photographer John Bragg.



Fig. 4.p: View of Hull sawmill looking north from the sawmill's main lumber storage pad, showing the company office, former office, truck-maintenance shed and associated buildings not directly connected to lumber-production process. Main sawmill is on the south side of Dawson Road. George Wisner photo.



Fig. 4.q: Southeast elevations of the Hull sawmill former office building showing oil storage (left) and gasoline storage areas. George Wisner photo.

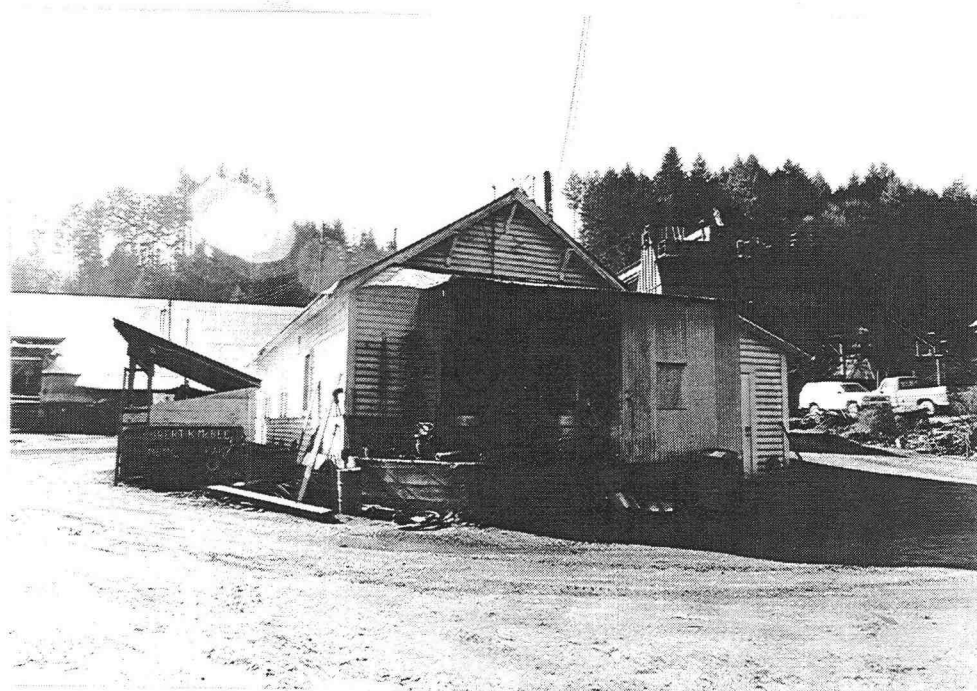


Fig. 4.r: North elevation of the company's former office building and adjacent gasoline-storage area. George Wisner photo.



Fig. 4.s: Northwest elevation of the Hull sawmill former office building and adjacent oil-storage building. George Wisner photo.

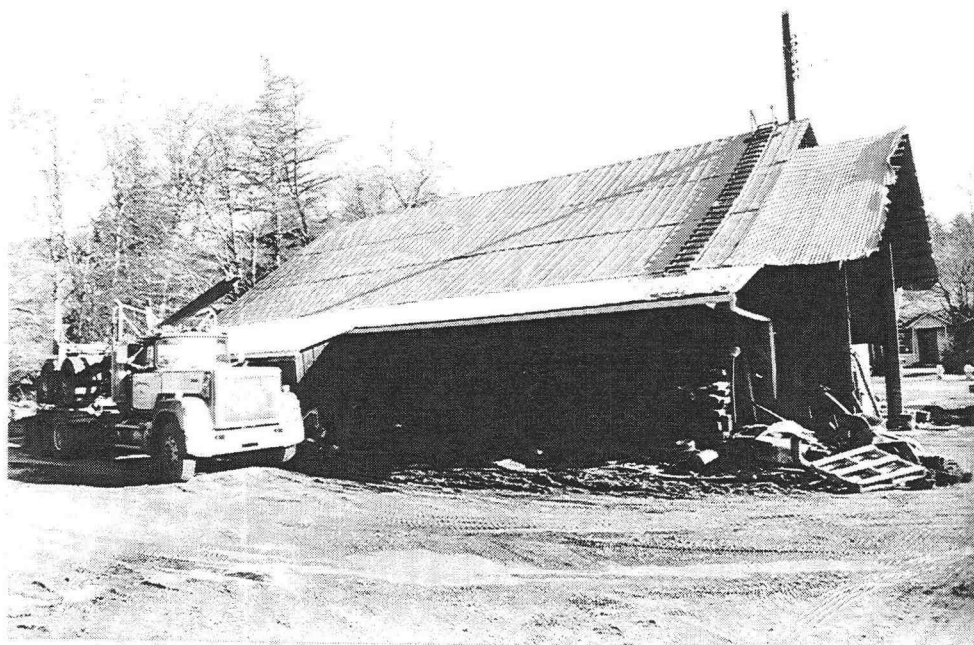


Fig. 4.t: West elevation of the Hull Lumber Co. truck maintenance barn. George Wisner photo.

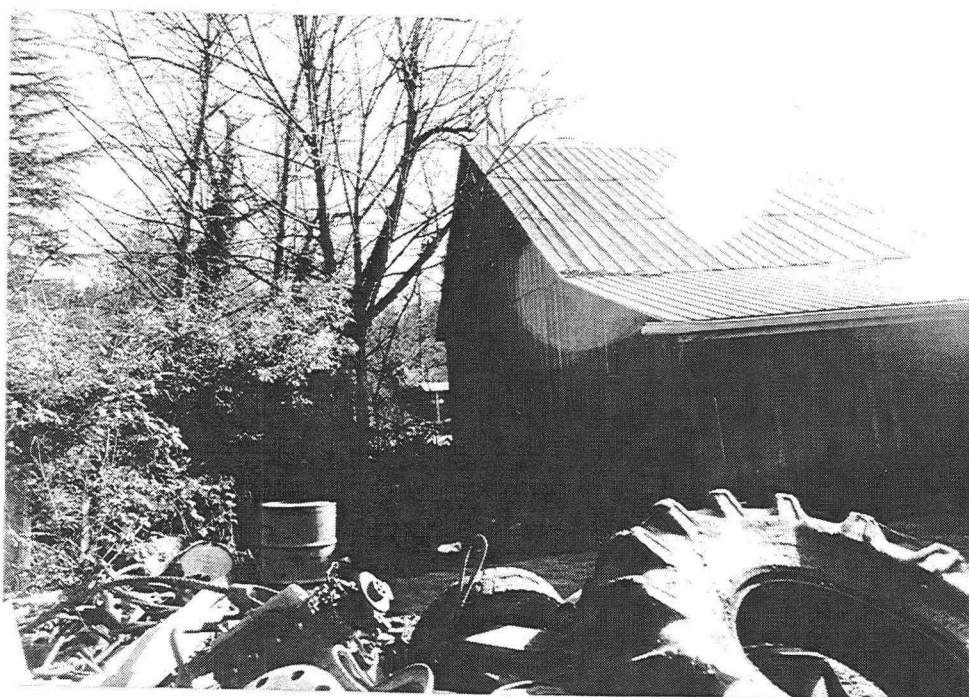


Fig. 4.u: North and west elevations of the company's truck maintenance barn. George Wisner photo.



Fig. 4. v: East elevation view of the company's business office, showing the east end of the built-on addition, and a concrete deck and carport adjacent to Oliver Creek. George Wisner photo.



Fig. 4. w: North elevation of the company's business office, showing Oliver Creek in foreground. George Wisner photo.



Fig. 4.x: South elevation of the Hull sawmill business office. Ladder goes to top of concrete block vault built into office. George Wisner photo.

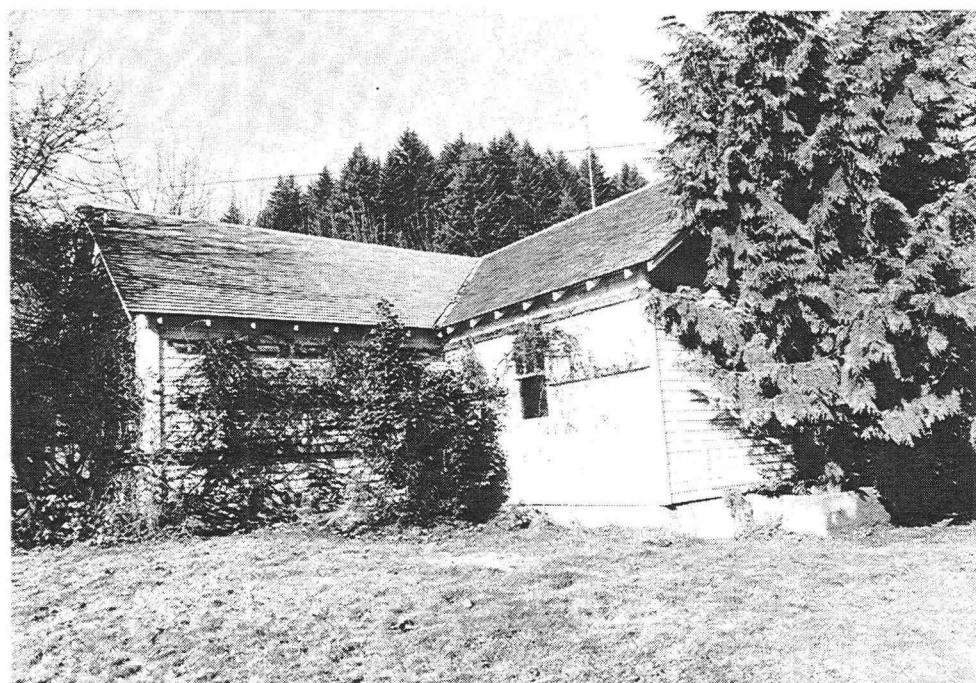


Fig. 4.y: A southeast elevation view of the company business office, showing an office addition and concrete foundation. George Wisner photo.

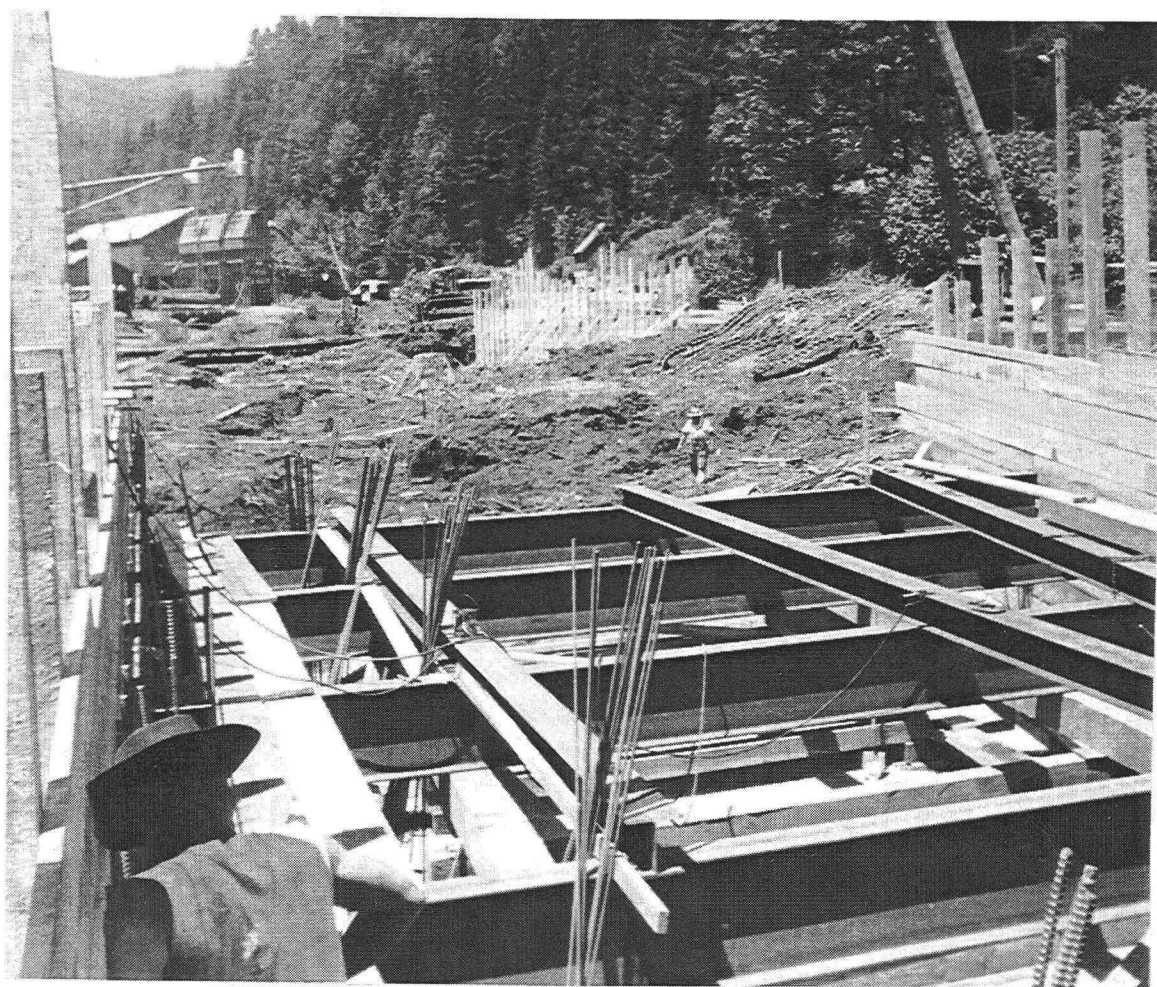


Fig. 4.z: Frame for log debarker under construction in 1970 at west end of the Hull-Oakes sawmill. Courtesy of Ralph Hull, Dawson.

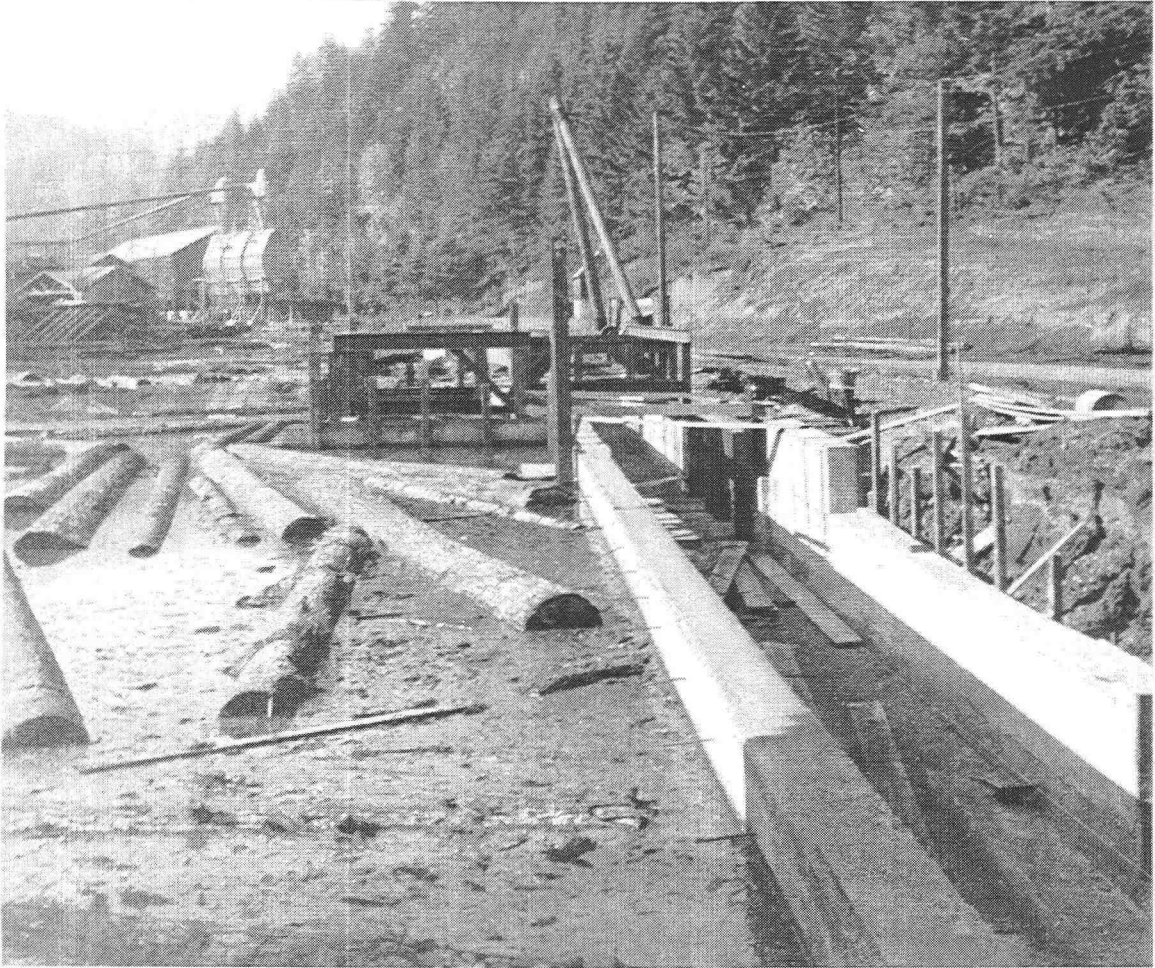


Fig. 4.aa: Frame for log debarker under construction at west end of Hull sawmill.
Courtesy of Ralph Hull, Dawson.



Fig. 4.bb: Frame for log debarker under construction in 1970 on west end of Hull sawmill. Courtesy of Ralph Hull, Dawson.



Fig. 4.cc: Log debarker frame under construction on west end of Hull sawmill. Courtesy of Ralph Hull, Dawson.

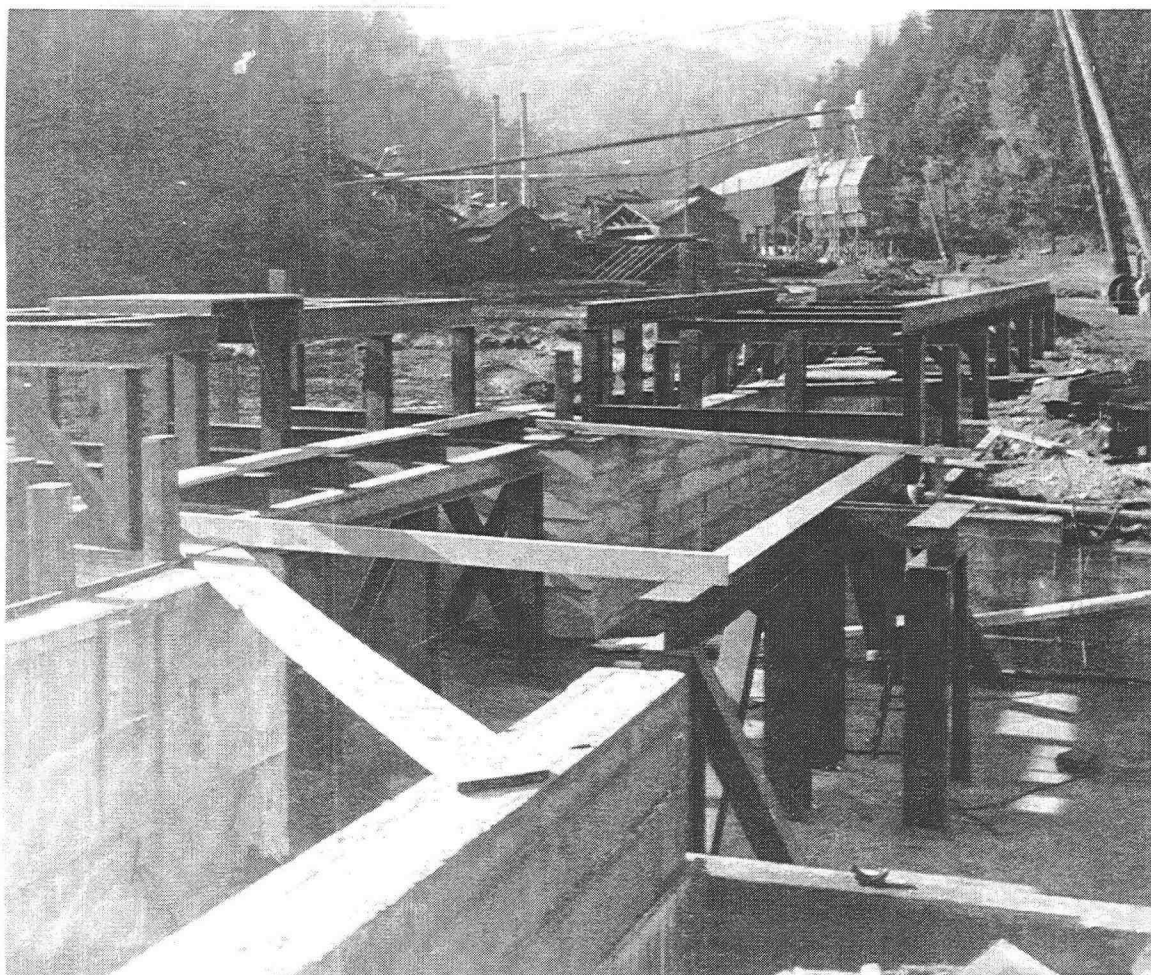


Fig. 4.dd: Log debarker frame under construction on the west end of Hull sawmill.
Courtesy of Ralph Hull, Dawson.

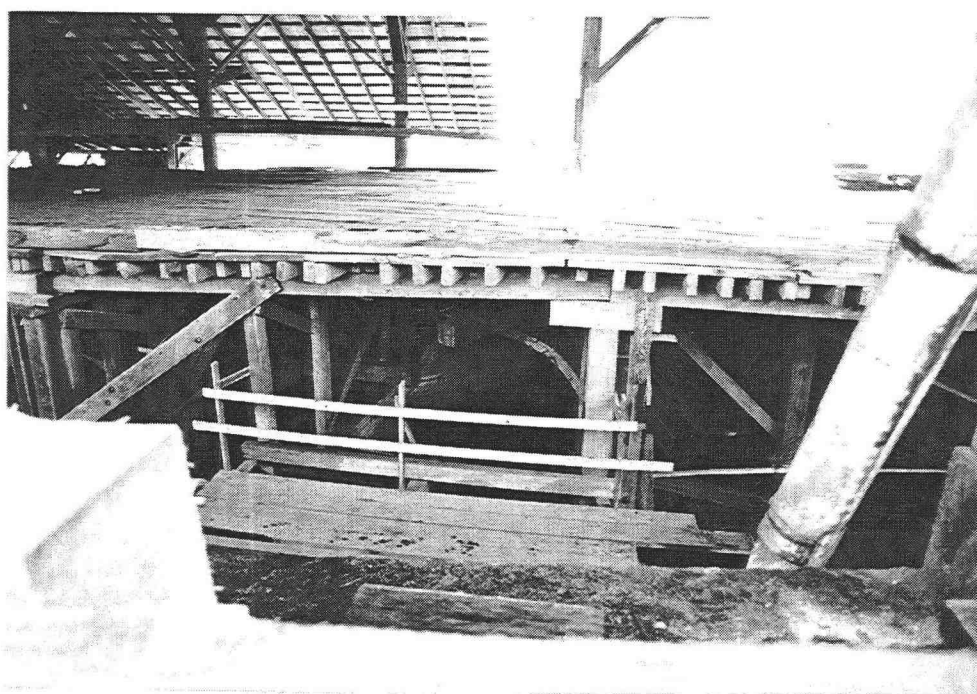


Fig. 4.ee: Concrete tunnel diverting Oliver Creek under the planer building at the Hull sawmill. This is from the north side of the tunnel looking south. George Wisner photo.

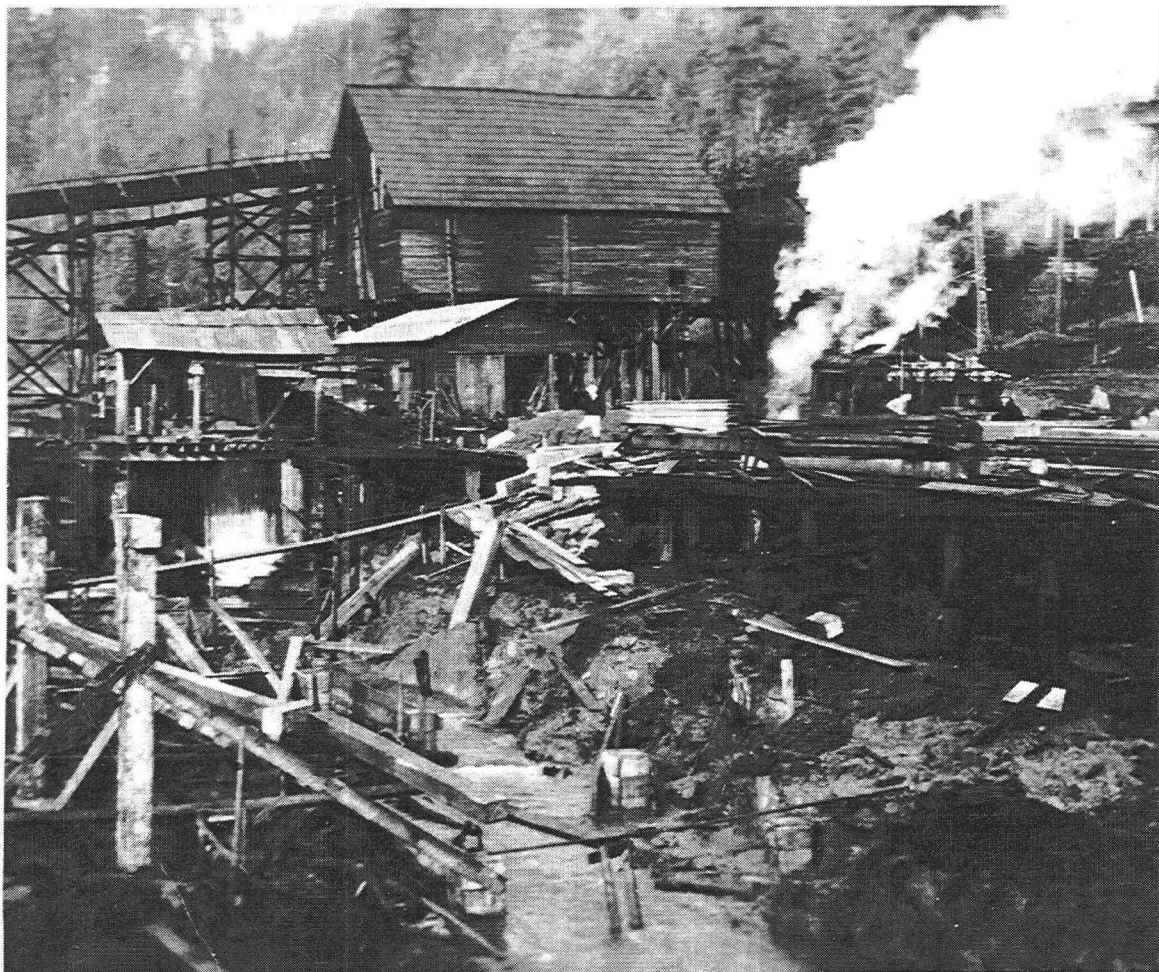


Fig. 4. ff: Starting construction of the Hull sawmill after a 1936 fire destroyed the W.J. Miller sawmill on the same site. Buildings shown in photo are no longer at the sawmill. Large building was used to store hog fuel. Courtesy of Ralph Hull, Dawson.

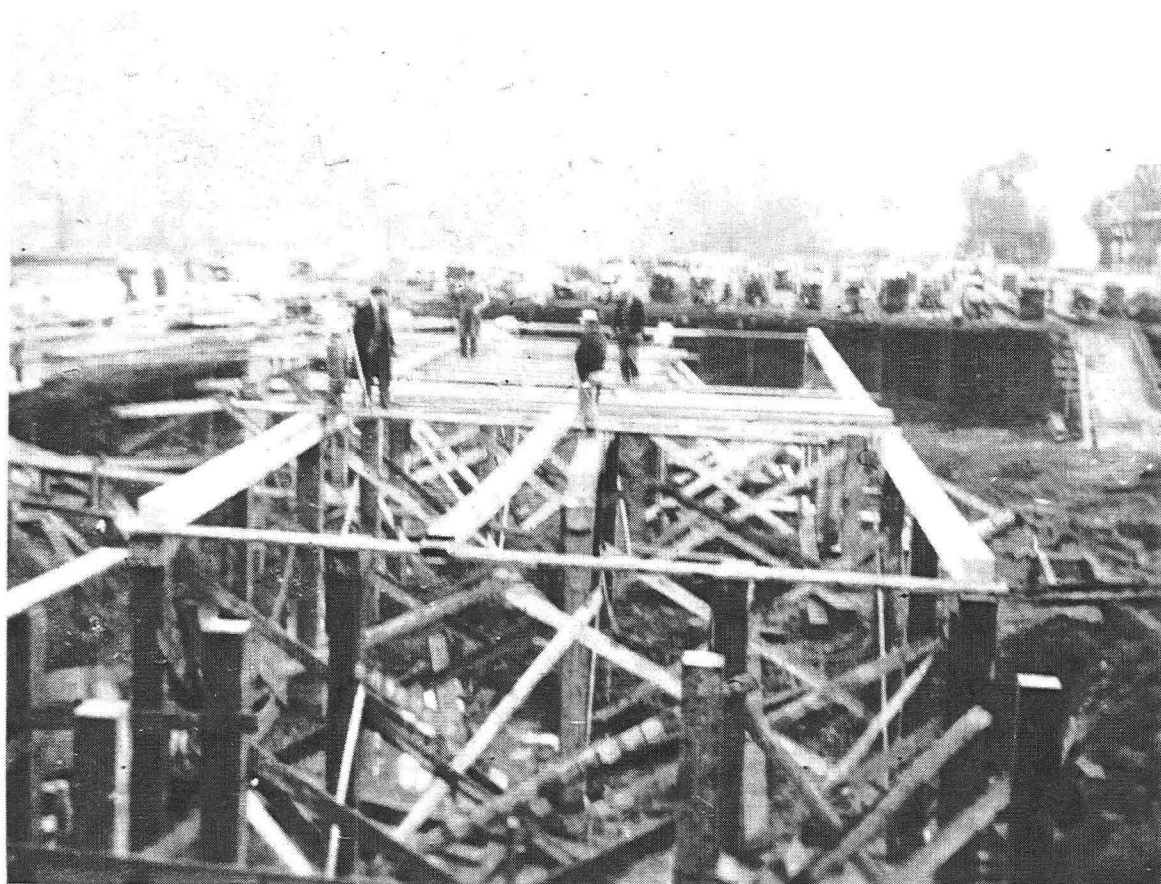


Fig. 4. gg: Construction of the main floor and supports for the Hull sawmill in 1938.
Courtesy of Ralph Hull, Dawson.

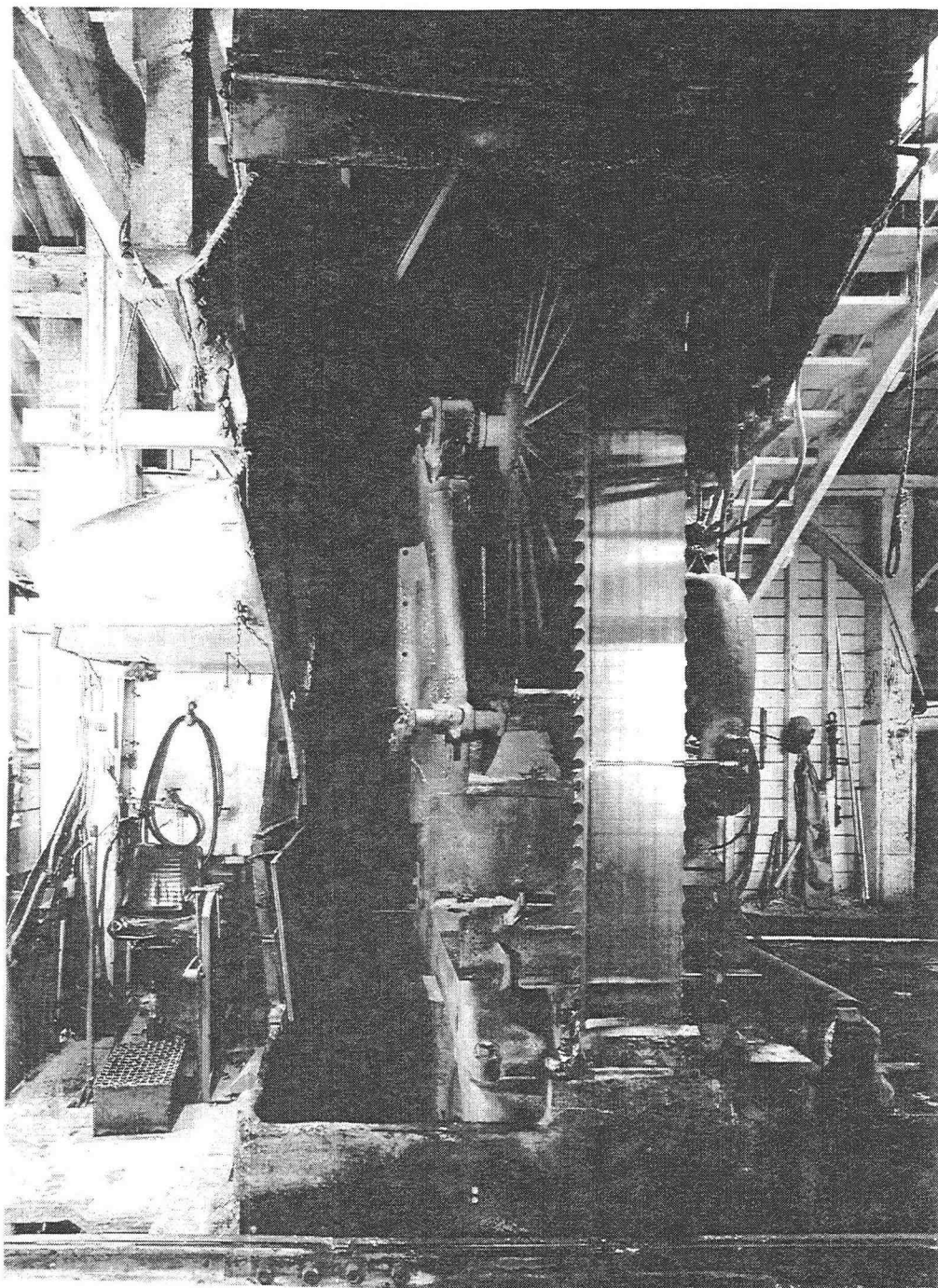


Fig. 5. a: This photograph shows a close-up view of the Hull-Oakes Lumber Co. "head-rig" saw and upper wheel. To the left of the saw is where the sawyer sits. Courtesy of Corvallis photographers Gary Tarleton and Dan O'Brien.

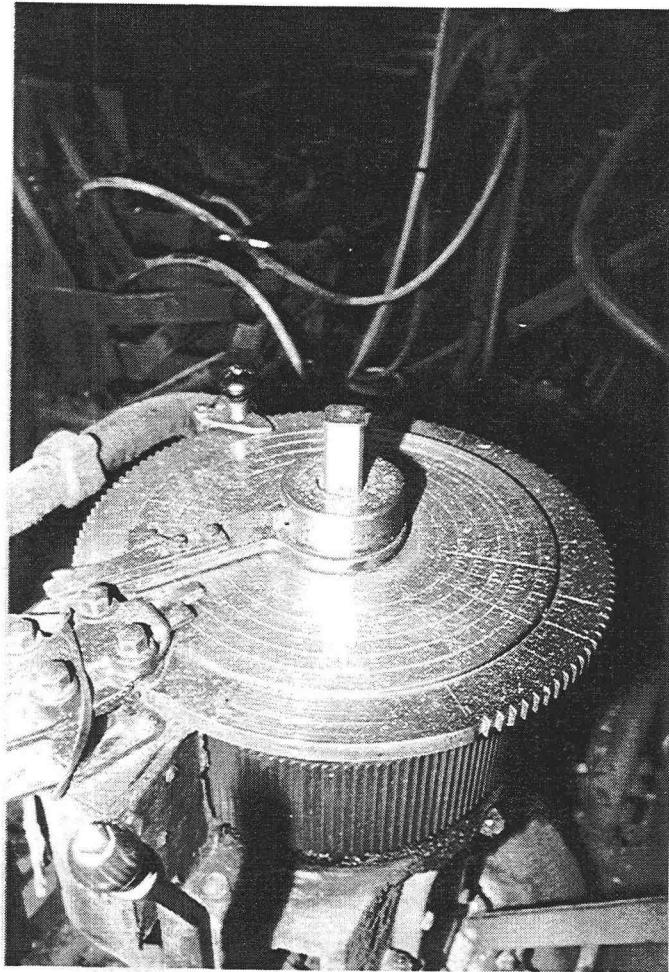


Fig. 5.b: View of "the dial" on log carriage. The all-brass dial is used to set the size of each piece of lumber to be cut from a log — jobs now done in modern mills by computers and lasers. Courtesy of Wren Photographer John Bragg.

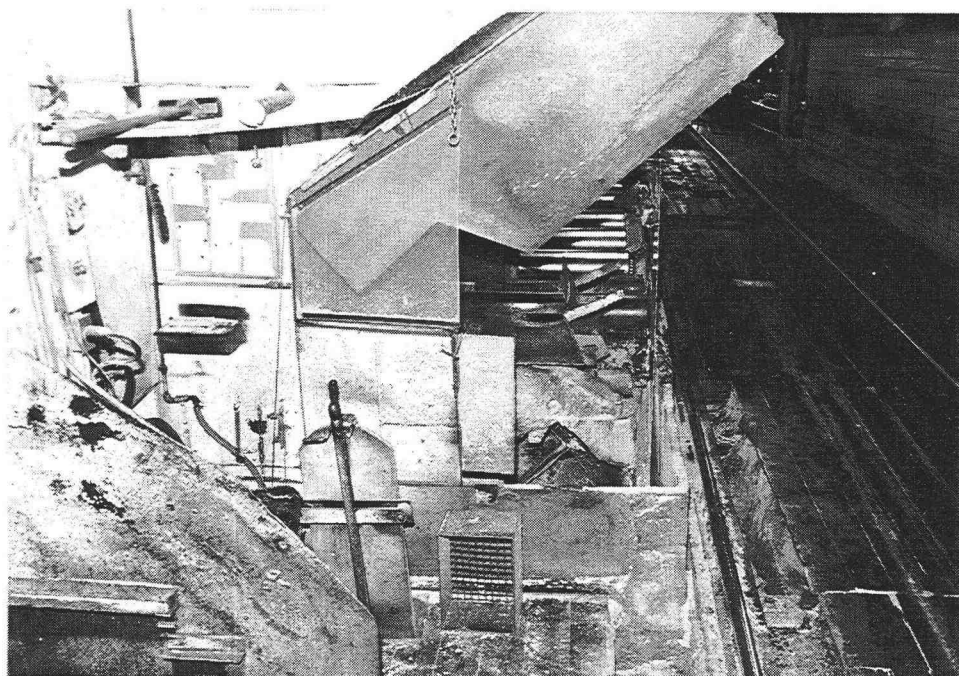


Fig. 5.c: View from saw cage where sawyer sits to direct the primary lumber-cutting operation at the Hull-Oakes sawmill. Courtesy of Wren Photographer John Bragg.

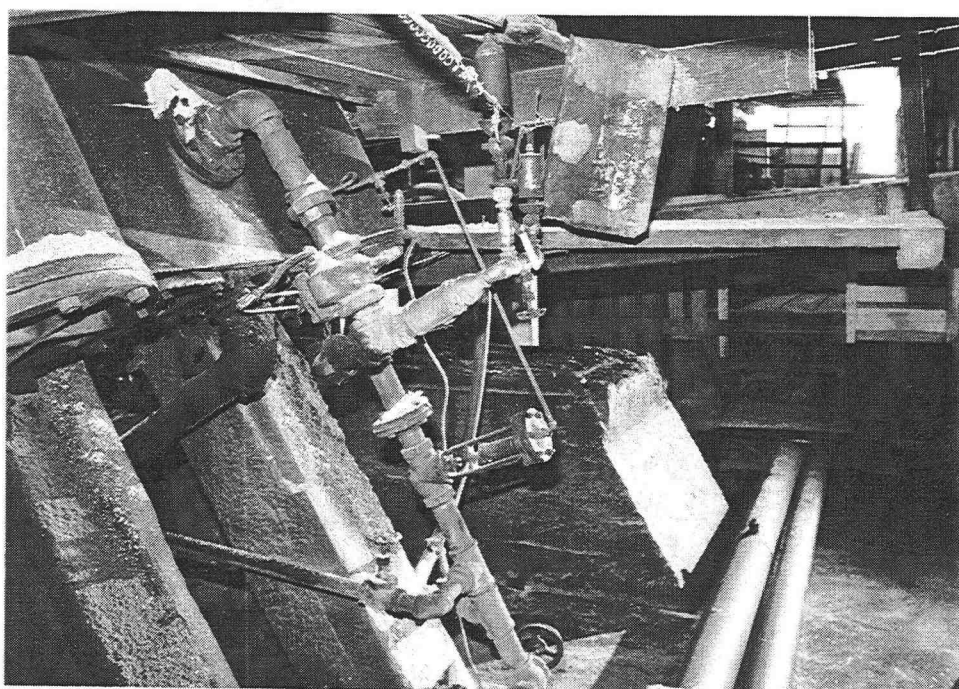


Fig. 5.d: This photo shows a vertically-mounted small twin-cylinder steam engine that is used to move the sawmill's carriage back and forth in an east/west direction. The engine, consisting of twin pistons connected to the carriage overhead, receives steam from the sawmill's main steam plant. Smaller, bucket-type steam-activated pistons operate mechanisms to turn the logs on the carriage. Courtesy of Wren Photographer John Bragg.

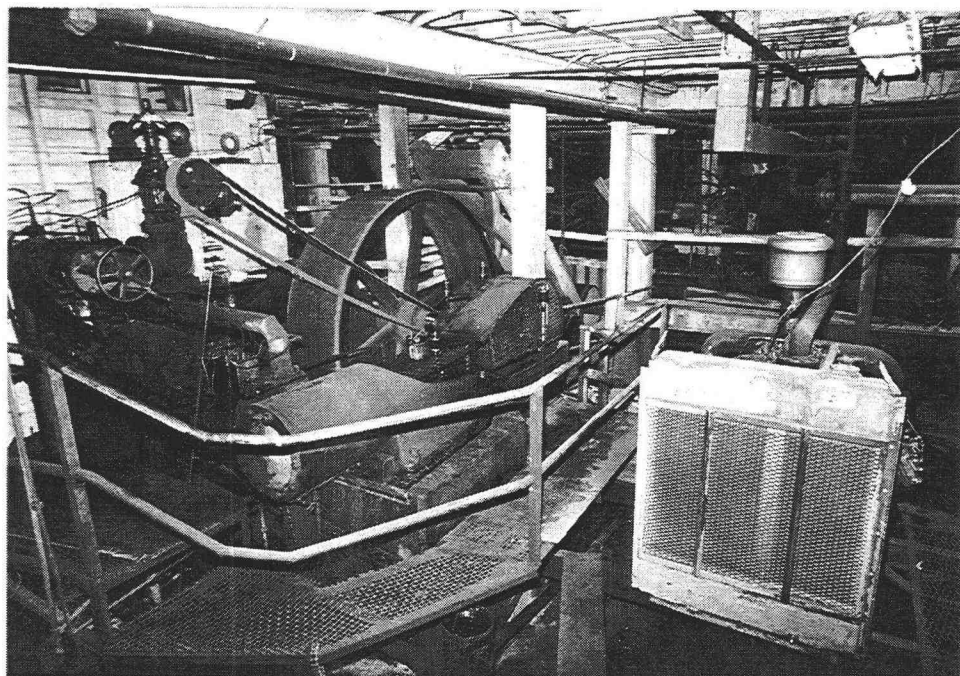


Fig. 6.a: "Regal" steam engine and adjacent air compressor. Courtesy of Wren Photographer John Bragg.

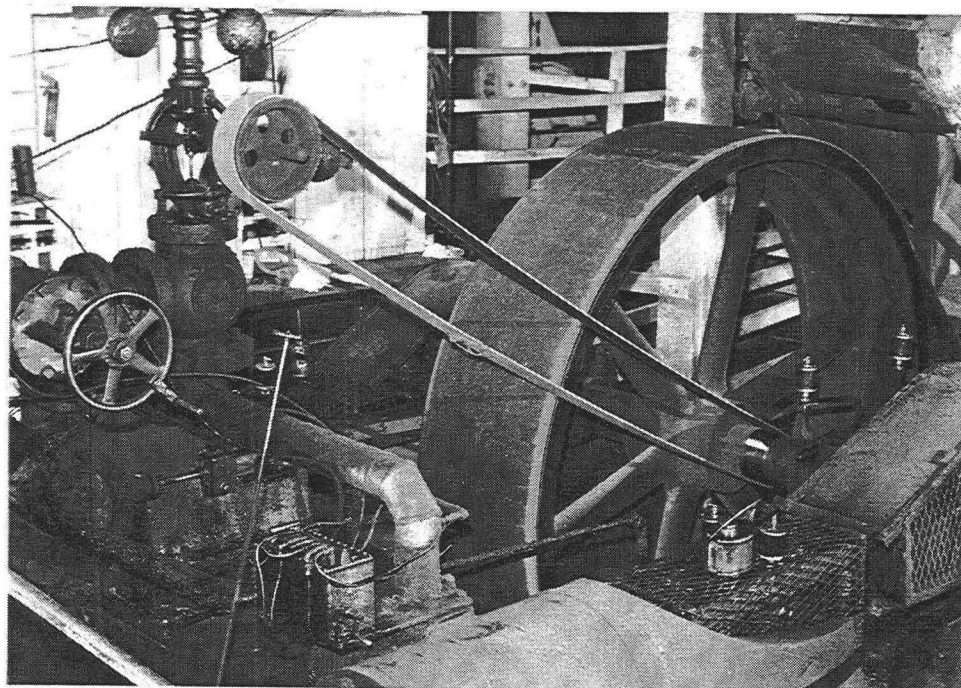


Fig. 6.b: View of "Regal" steam engine showing drive wheel and drive belts to wheel and to the centrifugal governor. Courtesy of Wren Photographer John Bragg.

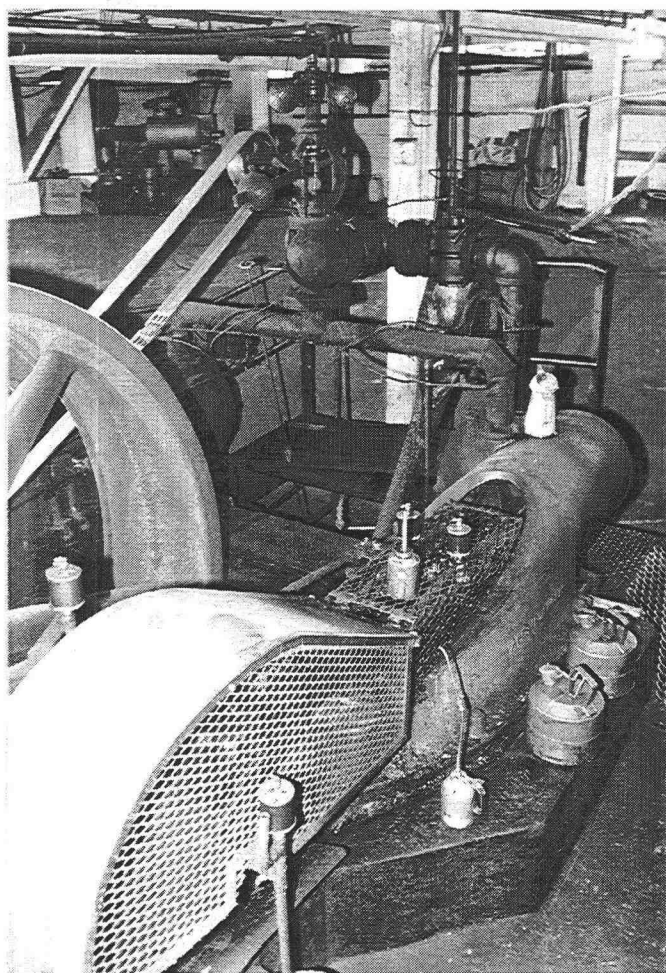


Fig. 6. c: View of "Regal" steam engine showing right (east-side) piston and oiling mechanisms. Courtesy of Wren Photographer John Bragg.

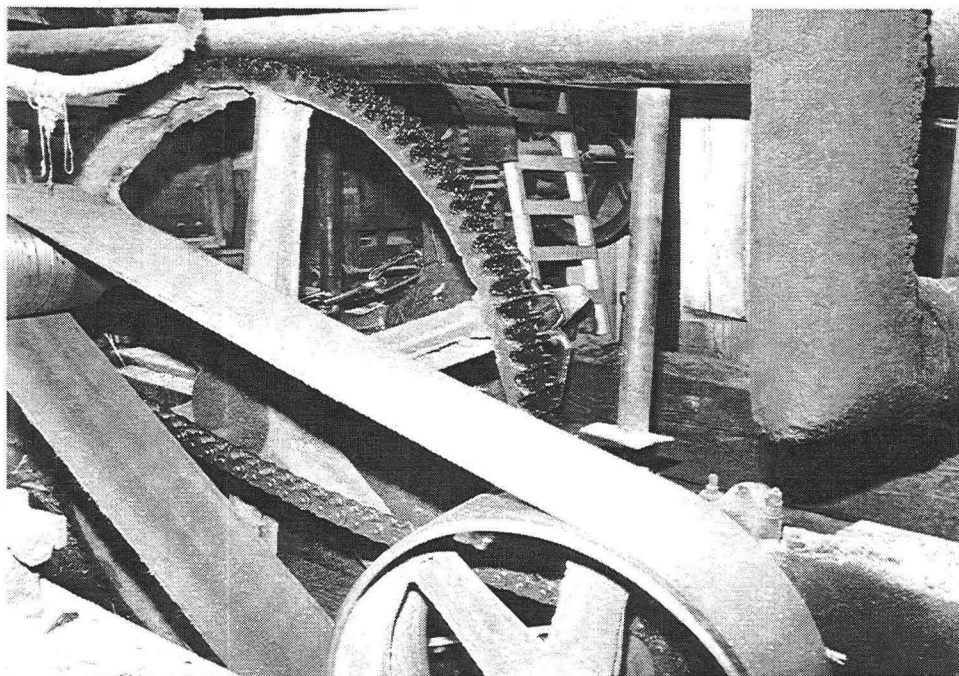


Fig. 6.d: Close-up of gearing for the main conveyor at the sawmill. Courtesy of Wren Photographer John Bragg.

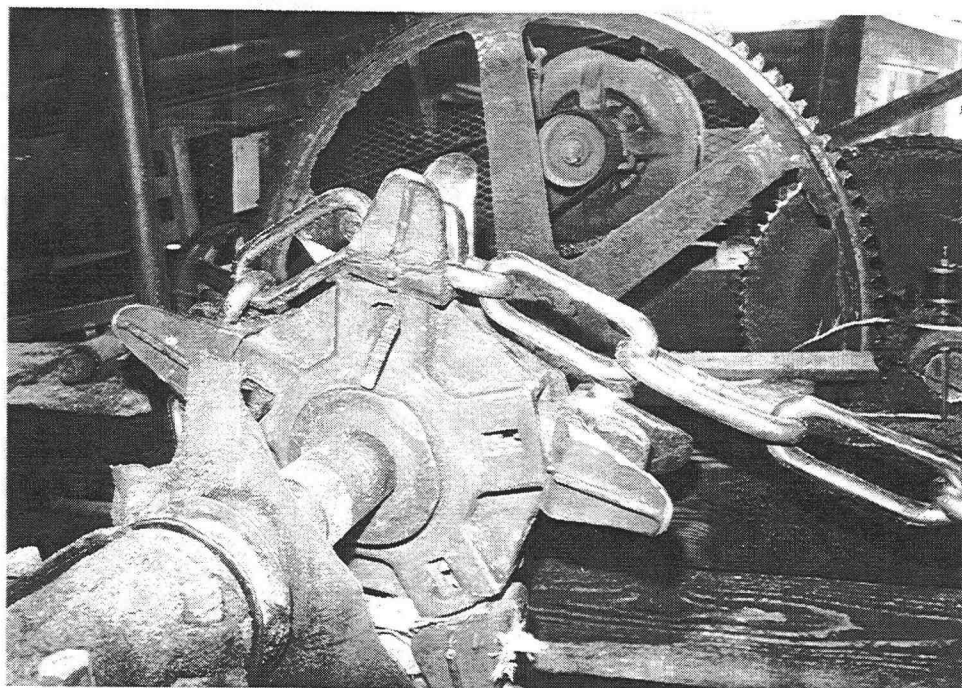


Fig. 6.e: View of gearing and endless chain arrangement at the Hull sawmill. Courtesy of Wren Photographer John Bragg.

APPENDIX B

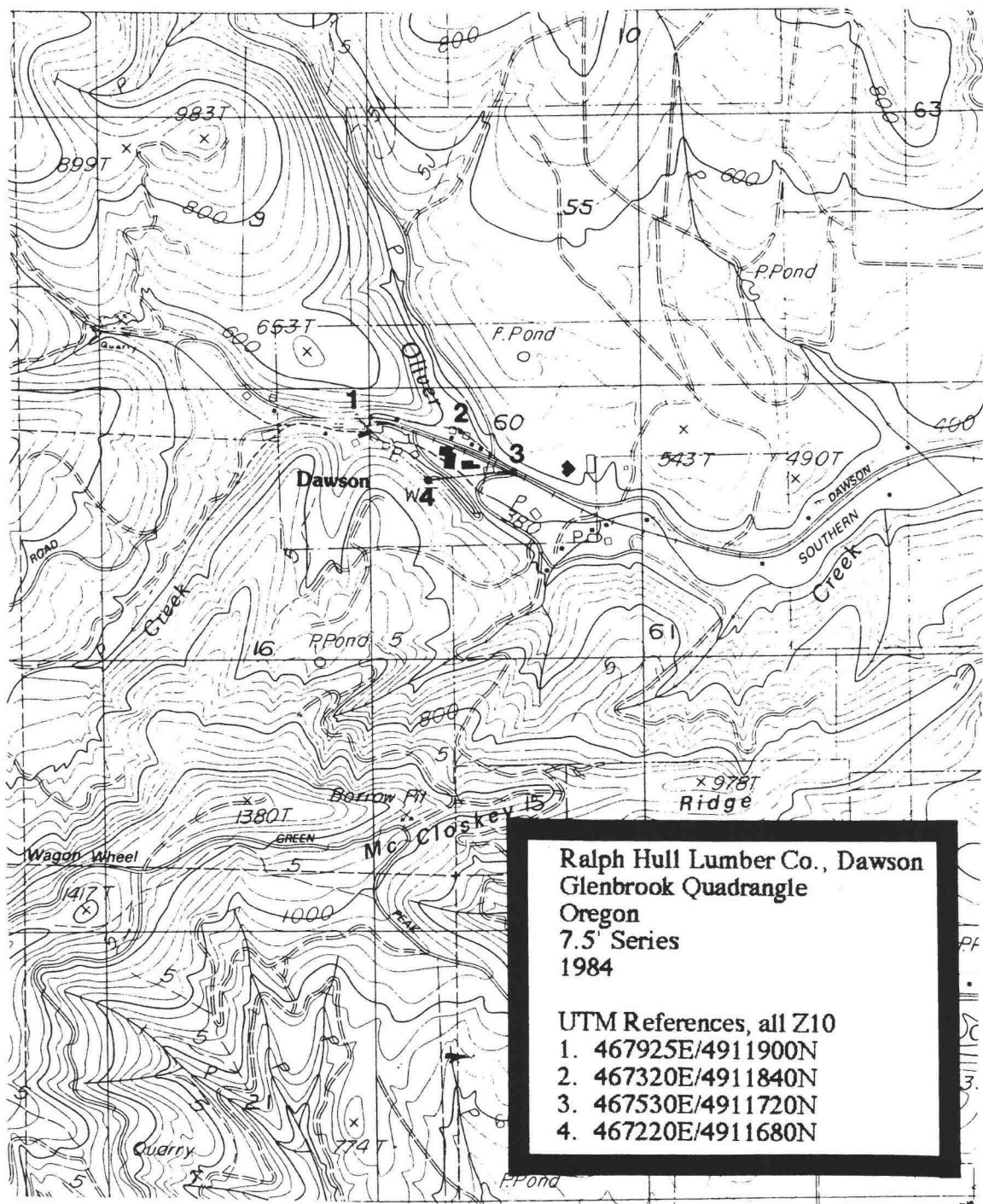


Fig. 2. a: This 7.5 minute map shows the relationship of Dawson to the surrounding countryside, and references the Hull-Oakes sawmill by its UTM coordinates.

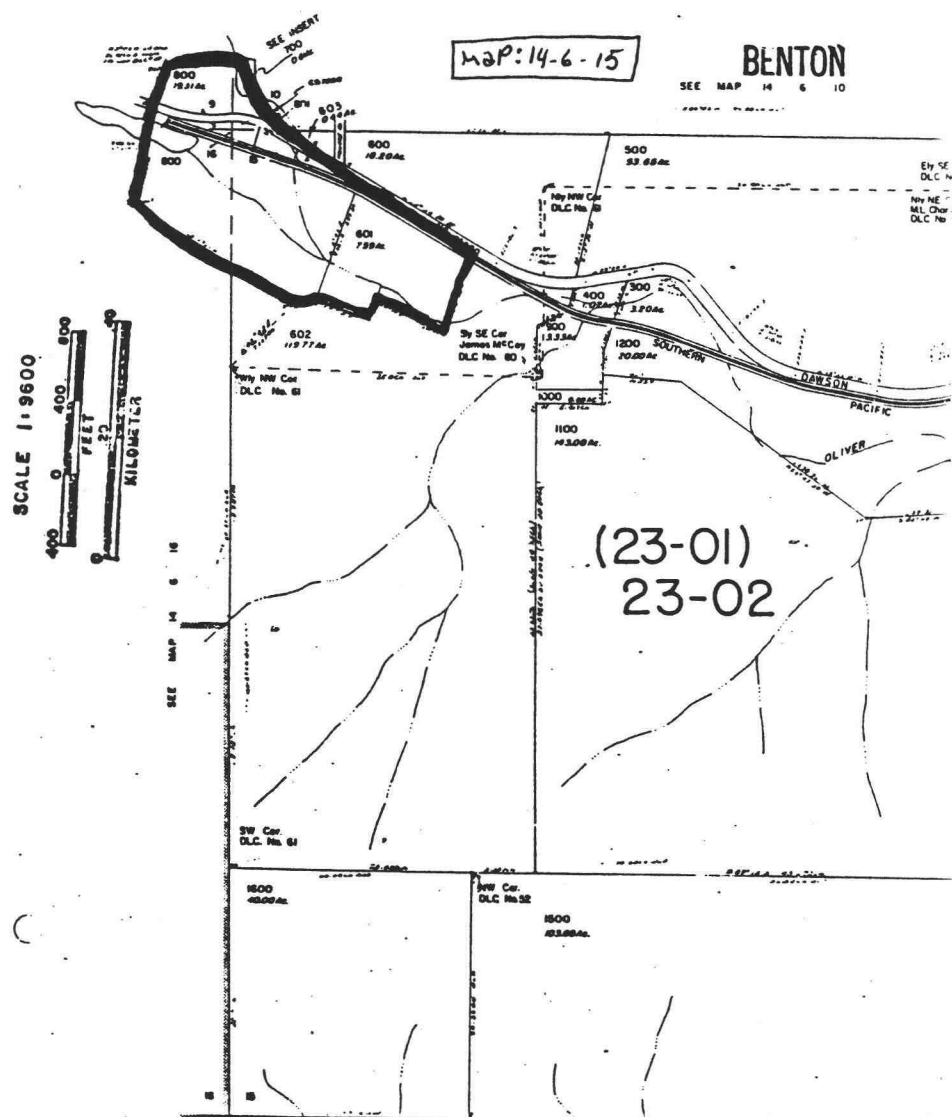


Fig. 2.c: Benton County Assessor's Office Tax Lot Map 14-6-15 for the Hull-Oakes Lumber Co., Inc. sawmill. Courtesy Benton County Tax Assessor's Office, 121 N. W. 4th St., Corvallis, Ore.

SCALE 2 IN. = 1 MILE.
DATED MARCH 1929

BENTON COUNTY ORE.

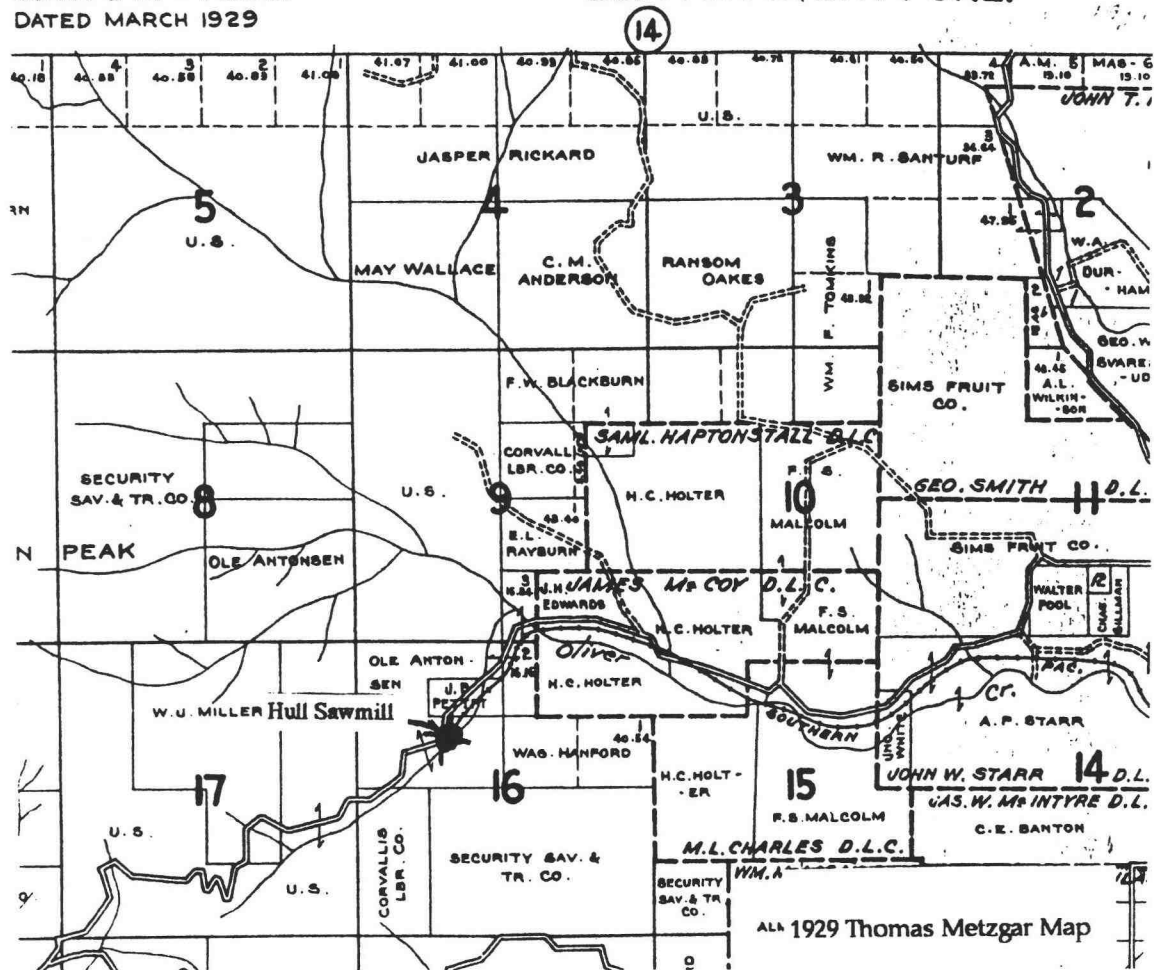


Fig. 2.d: Thomas Metzgar Map showing original land ownership in 1929 on the site of the future Hull-Oakes Lumber Co., Inc. Courtesy of Oregon State University, Kerr Library Map Room

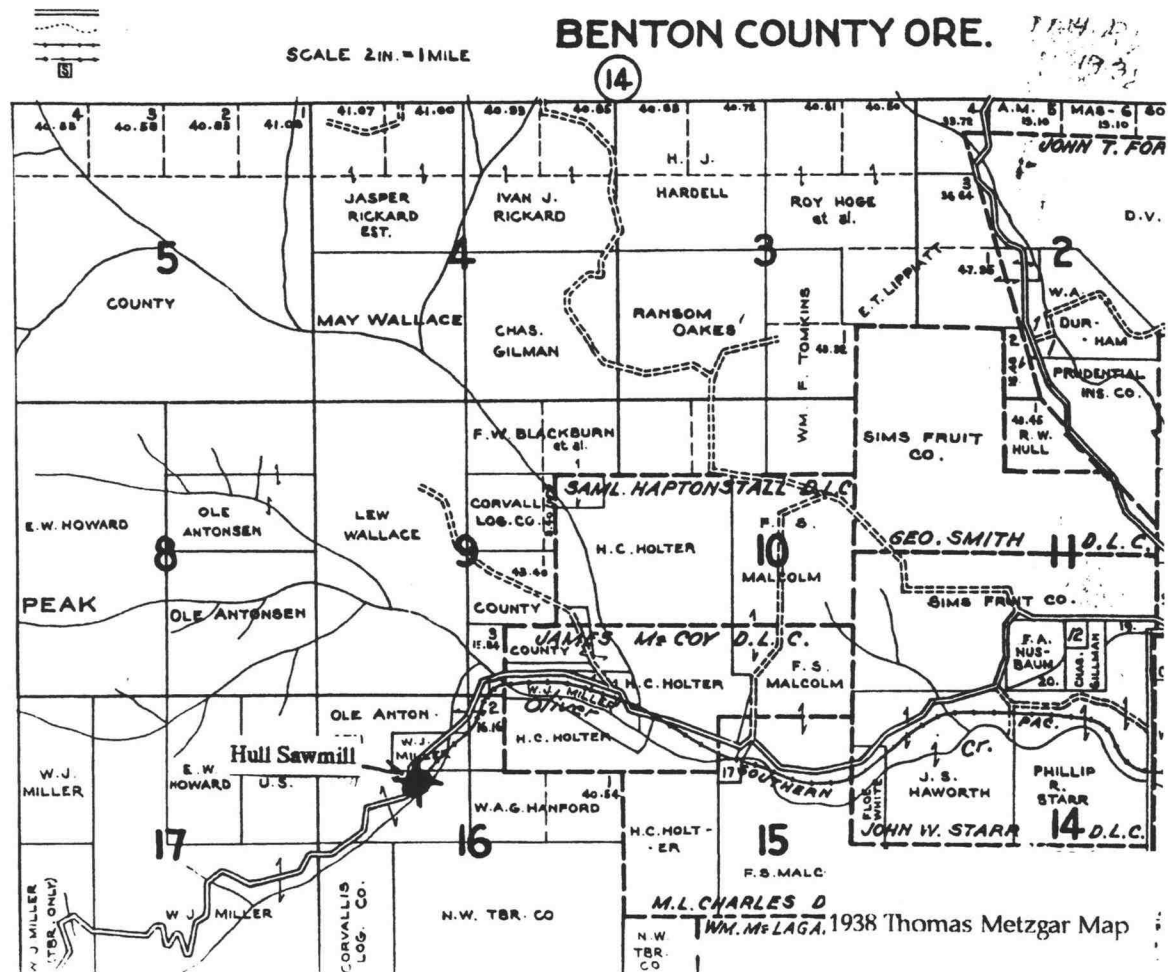


Fig. 2.e: Thomas Metzgar Map showing original land ownership for Hull-Oakes Lumber Co., Inc. in 1938. Courtesy Oregon State University, Kerr Library Map Room.

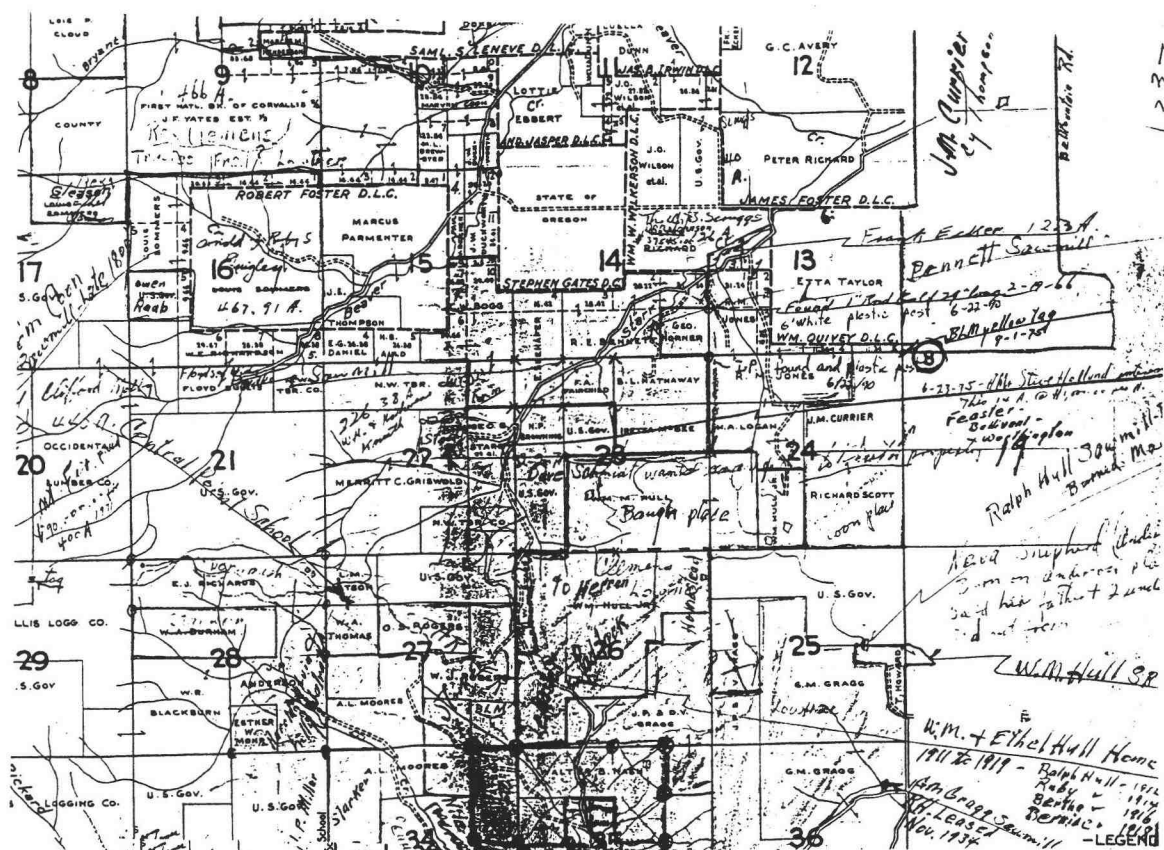


Fig. 2.f: This 1938 Metzgar road map of Benton County was annotated by Ralph Hull and shows buildings, sawmills and other structures in the Bellfountain and Dawson areas during the 1930s. Courtesy of Ralph Hull.

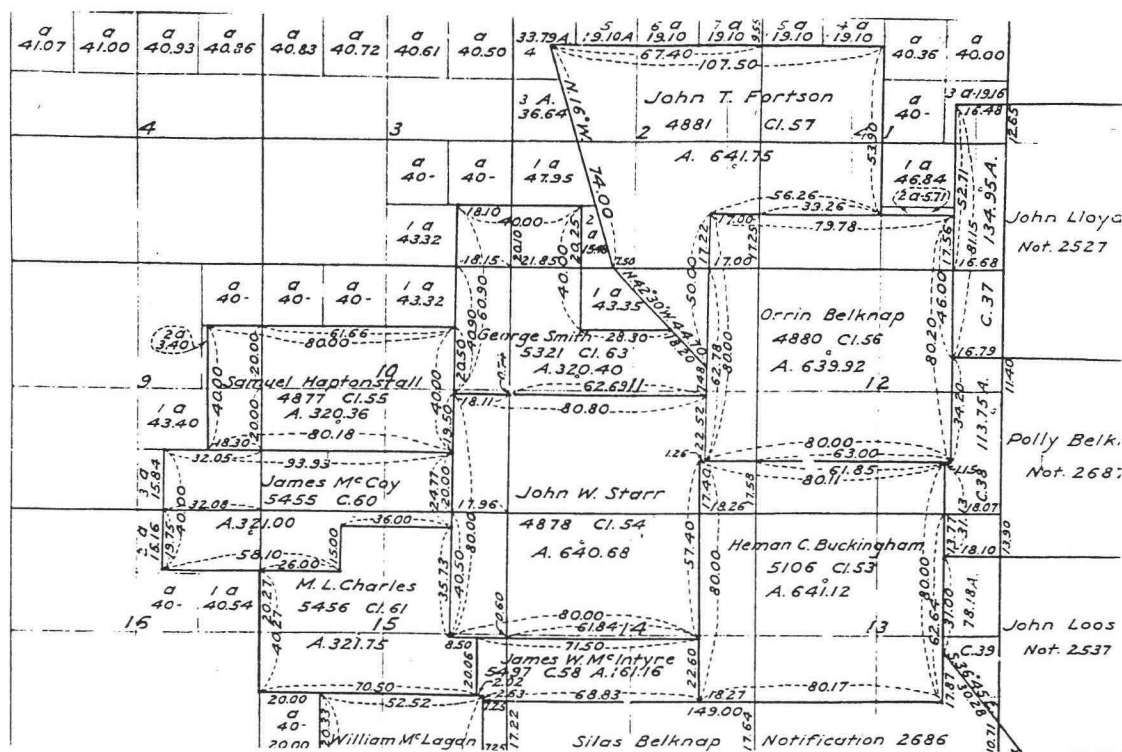


Fig. 2.g: The above map shows the Survey of Claims in Township No. 14 South, Range No. 6 West of the Willamette Meridian Territory of Oregon as recorded in Salem, Ore., on Dec. 11, 1857. It was signed by John S. Zieber, surveyor general of Oregon and is available at the Benton County Surveyor's office in Corvallis. The Hull-Oakes Lumber Co. sawmill property is shown on sections 9, 10, 15 & 16 of this map.

Record of Survey for **HULL LUMBER COMPANY**
 in the SE 1/4 of Section 9, James McCoy
 D.L.C. No. 60 and Samuel Haptenstall D.L.C.
 No. 55, T.14 S., R. 6 W., W.M.,
 Benton County, Oregon
 April 13, 1989 Scale: 1 inch = 500 feet

**Benton County
 Surveyor's Office**

FILE NO. **8263**
 FILE DATE **4-24-1989**
 FILE SIZE **8 1/2" x 14"**

NARRATIVE:

THE PURPOSE OF THIS SURVEY WAS TO MONUMENT THE PROPERTY CORNERS AS SHOWN HEREON. BASIS OF BEARINGS IS FROM SOLAR OBSERVATION. THE SURVEY WAS PERFORMED WITH A 10-SECOND READING MANUAL TOTAL STATION. POINT 'A' WAS DETERMINED BY USING RECORD DEED DISTANCE (742.50 FEET) SOUTHERLY ALONG THE WEST LINE OF D.L.C. NO. 60, FROM THE NORTH WEST CORNER THEREOF, AND THEN RECORD DEED DISTANCE (1647.50 FEET) AT RIGHT ANGLES EASTERLY FROM SAID WEST LINE OF D.L.C. NO. 60. POINT 'B' WAS DETERMINED BY RECORD DEED POSITION OF NORTH 20 RODS (330 FEET) AND EAST 30 RODS (495 FEET) FROM THE SOUTHWEST CORNER OF D.L.C. NO. 55. POINT 'C' IS AT THE INTERSECTION OF A LINE RUNNING WEST FROM POINT 'B' AND THE WEST LINE OF D.L.C. NO. 55.

LEGEND

- FOUND MONUMENT AS NOTED, FROM HARDCOPY 14-6-00005
- SET 5/8" X 30" IRON ROD WITH YELLOW PLASTIC CAP MARKED "LS 1102"
- () DATA OF RECORD FROM HARDCOPY 14-6-00005



SPRINGER SURVEYING
 37056 MOSS ROCK DR.
 CORVALLIS, OREGON 97330
 PHONE: 745-5798

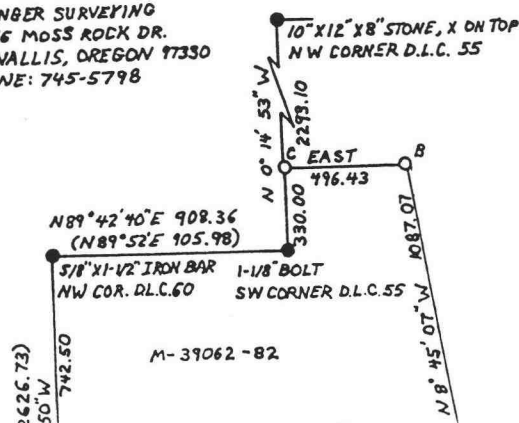


Fig. 2.h: The above map is a 1989 survey providing monuments for the listed corners. Courtesy of the Benton County Surveyor's office in Corvallis.

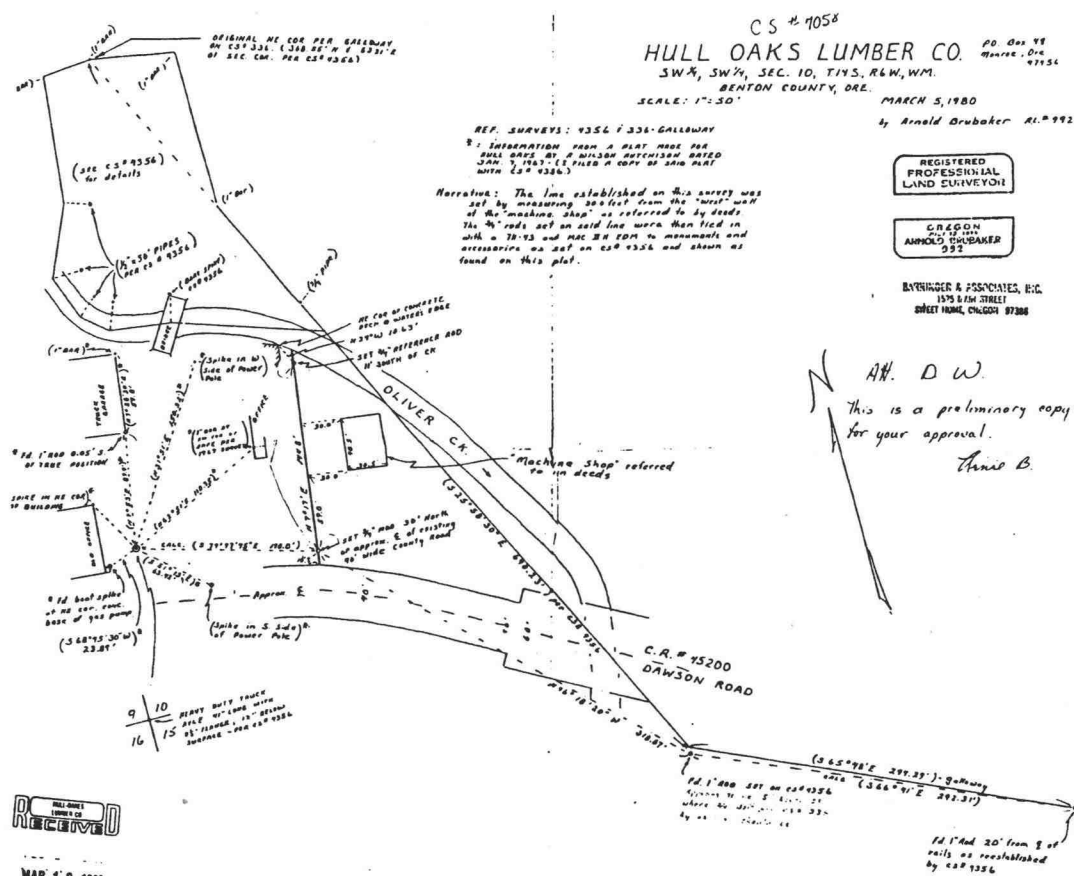


Fig. 2.i: The above map provides a 1980 survey of the Hull-Oaks Lumber Co. property, focusing on establishing the SW 1/4 of the SW 1/4, Sec. 10, T.14S., R. 6W. It can provide a starting point for future archaeologists searching for the remains of the Area's industry. Courtesy of the Benton County Surveyor's office in Corvallis.

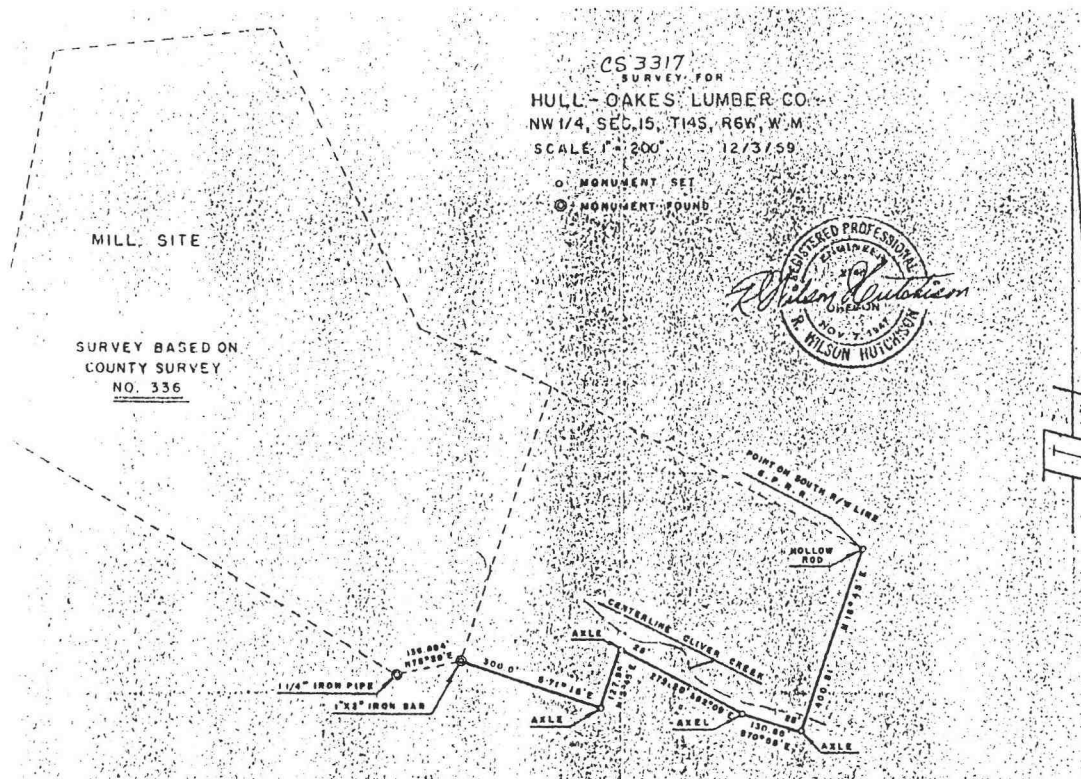


Fig. 2.j: The above map is a 1959 survey of the Hull-Oakes Lumber Co. sawmill site, which may be helpful to future archaeologists studying the site. Courtesy of the Benton County Surveyor's office in Corvallis.

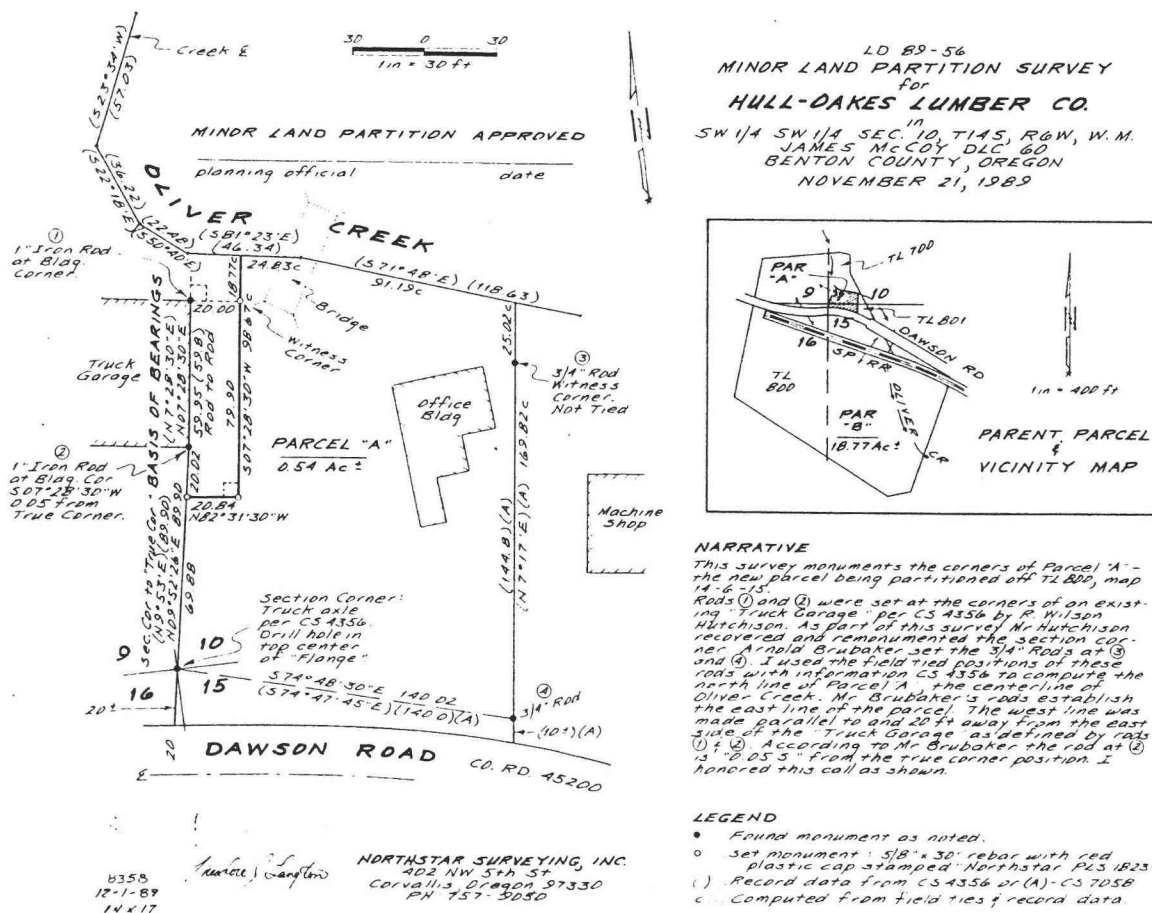


Fig. 2.k: The above map is a 1989 survey of the Hull-Oakes Lumber Co. showing a minor land partition performed at that time. Courtesy of the Benton County Surveyor's office.

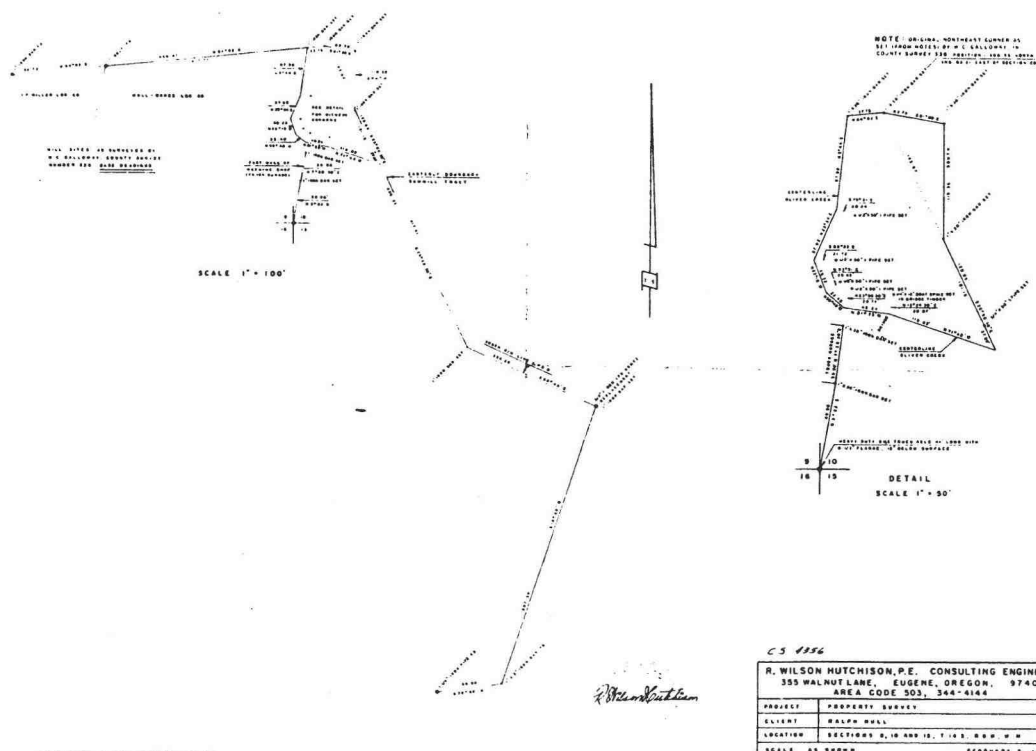


Fig. 2.1: The above map is a survey of the Hull-Oakes Lumber Co. done in 1967. As such, it shows overall dimensions of the sawmill site as recorded at that time. Courtesy of Benton County Assessor's office in Corvallis.

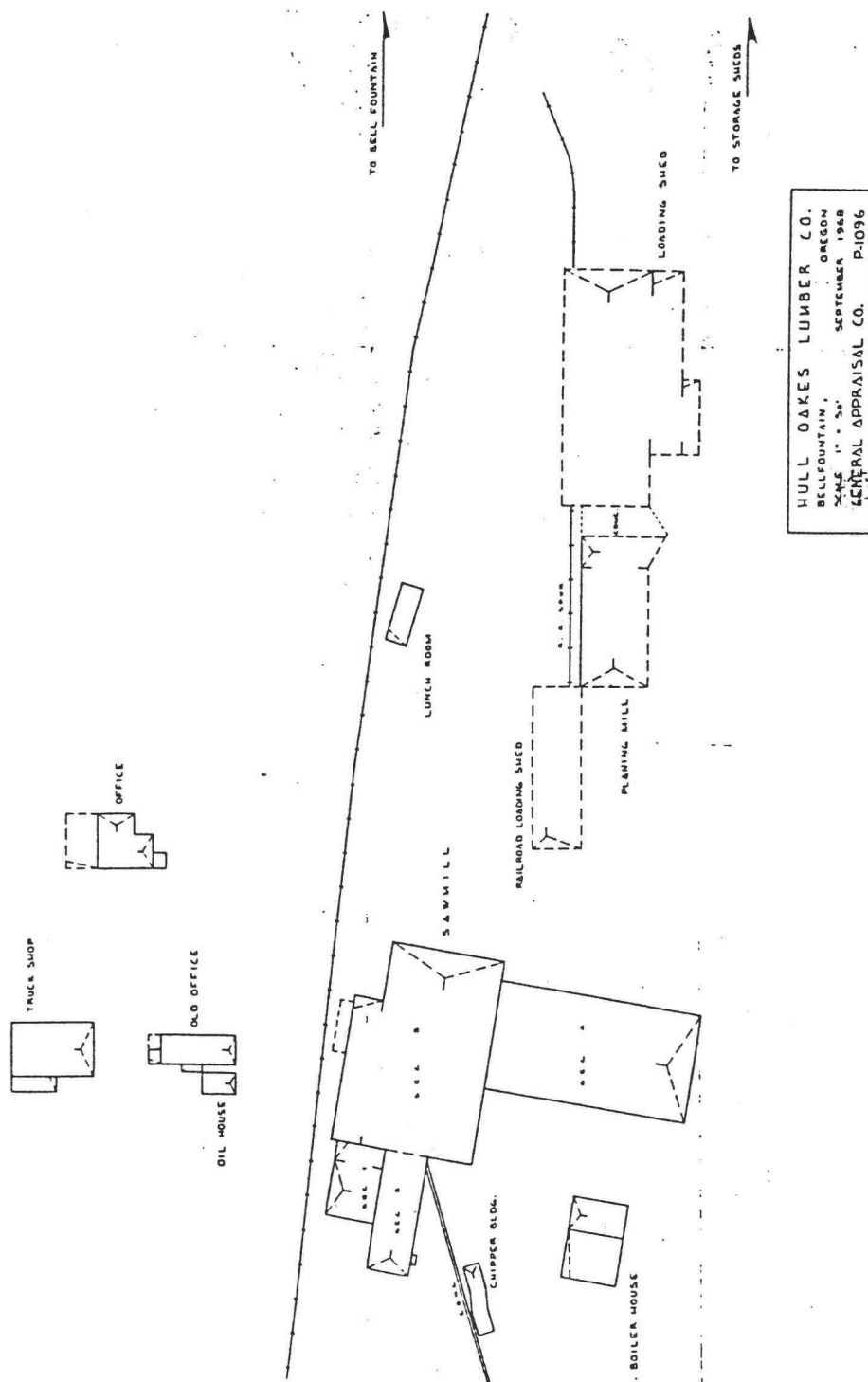
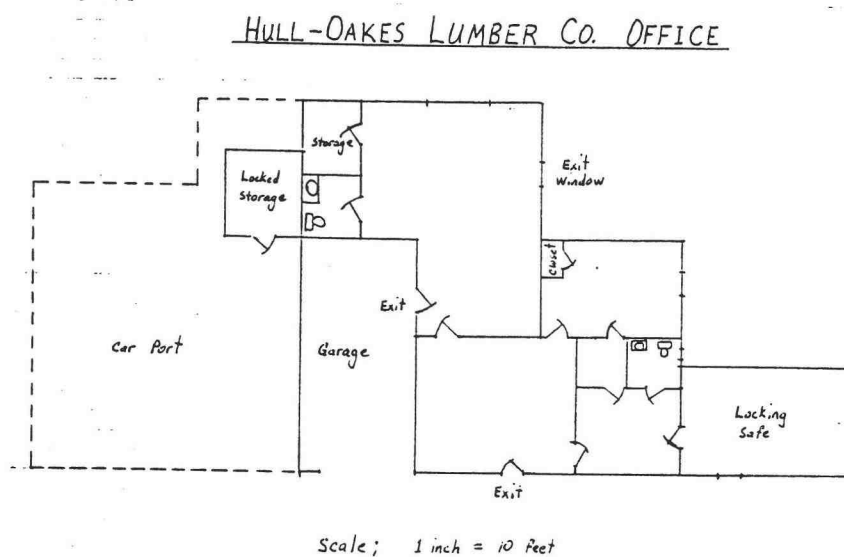


Fig. 4. a: The above map, created by the General Appraisal Co. in 1968, shows a scale location of buildings at the Hull-Oakes Lumber Co. in Dawson. The map is on file at the Benton County Surveyor's office in Corvallis.



EMERGENCY FIRE EXITS

Fig. 4.c: This sketch of the Hull-Oakes Lumber Co. office showing its emergency fire exits provides a scaled floor plan of the office. The office was formerly one of several employee houses built adjacent to sawmills at Dawson. Courtesy of Ralph Hull.