She winds down the granite canyon, and she bends across the lea,
Like a prancing dancing stallion down her seaway to the sea;
Cast your eyes upon the biggest thing yet built by human hands,
On the King Columbia River, it's the big Grand Coulee Dam.©

The Mystique of Grand Coulee Dam *and the reality of the Columbia Basin Project*

COLUMBIA RIVER HISTORY

By Paul C. Pitzer

The Grand Coulee Dam is one of the major tourist attractions in Washington. Every year thousands of people travel to eastern Washington to visit the huge structure. Most have heard about the dam's extraordinary size and the power it produces, yet many do not realize that the green fields and productive farms they pass on the trip are a by-product of the great dam. There is a significant contrast between the mystique of Grand Coulee Dam and the reality of the Columbia Basin irrigation project.

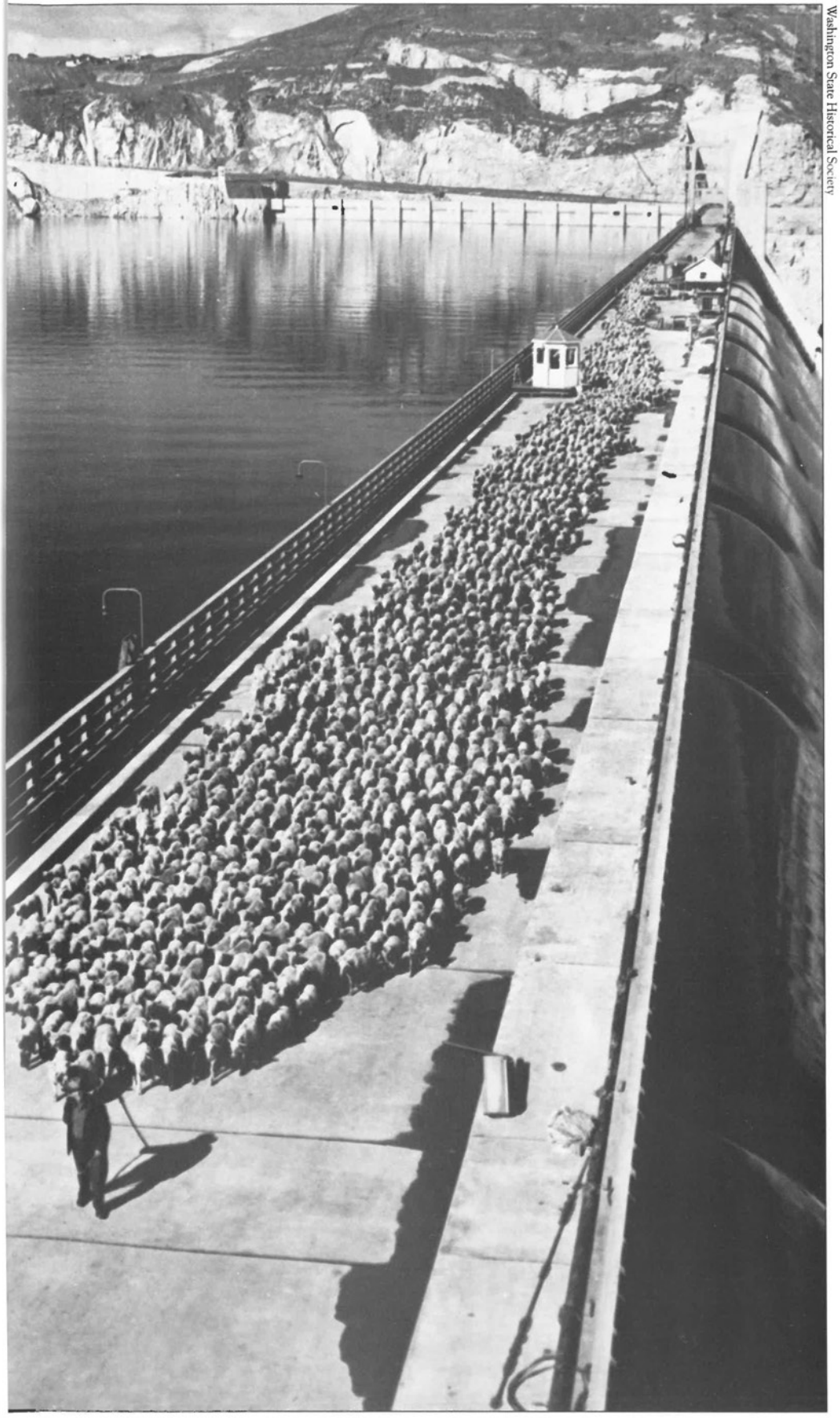
In 1933, the newly elected Roosevelt administration began to finance and construct Grand Coulee Dam and the Columbia Basin Project. The venture was controversial, especially in the East where some disapproved of public power and others objected to expensive Western reclamation efforts. A few questioned the wisdom of putting such a large and costly undertaking seemingly in the middle of nowhere, far from any market for its electricity.

To counter criticism, backers of the dam and its builder, the Bureau of Reclamation, conducted a public relations campaign that lasted over a decade; the outpouring of Grand Coulee publicity was prodigious. "It has been estimated," wrote popular historian Stewart Holbrook, "that a definitive shelf of Grand Coulee books, pamphlets, magazine articles and newspaper stories would run to more lineal feet, or greater poundage, or would...far exceed all other writings which...have been devoted to...the Columbia and all of its tributaries from source to mouth." The result was an image of Grand Coulee Dam that took on a larger-than-life mystique. Freelance journalist Richard L. Neuberger underscored the success of the effort when he wrote in 1942, "Everyone in America has heard of Grand Coulee."

Neuberger, more than anyone else, helped build Grand Coulee's image. A liberal Democrat, he strongly endorsed construction of dams by the federal government and he readily joined the ranks of Grand Coulee boosters. "Man's Greatest Structure," he called it in 1936, and a year later he labeled it "The Biggest Thing on Earth." He went on to write about it in *Harper's*, *The New York Times Magazine*, *The Christian Science Monitor*, *Nation*, *The New Republic*, *American Magazine* and *Survey Graphic*, not to mention his 1938 book, *Our Promised Land*. Neuberger often repeated the claim that the United States was building the biggest man-made thing on the face of the Earth. Other publications picked up the phrase, and in its many variations it became Grand Coulee Dam's standard metaphor.

Neuberger was not the only source of Grand Coulee propaganda. An article in *Barron's* in December 1933 began, "Out on the Pacific Coast the New Deal has started a power project that ultimately will make Muscle Shoals and Boulder Dam look like adventures with building blocks." Six months later *Newsweek* called Grand Coulee the "greatest power, reclamation, and flood control project ever conceived," although the accompanying map placed Grand Coulee at about the location of Wenatchee, indicating that some in the

For a number of years through the 1940s and early 1950s, farmers like Joe Hodgin moved their sheep across the top of Grand Coulee Dam to their summer range in the Okanogan Highlands near Republic on the north side of the Columbia River. The sight of the sheep on the road above the spillway crest, flowing with water, made a spectacular picture, and photographers were generally on hand to capture it.



Washington State Historical Society

East were a little hazy about the location of the great dam. *Newsweek* had also overlooked Robert Bradford Marshall's 1919 plan for a California water development which was ten times larger than the Columbia Basin Project.

The *Seattle Times*, among others, called Grand Coulee "The Eighth Wonder of the World." That inflated sobriquet caught on and became part of the dam's legend even before the first bucket of concrete was poured. "The World's Greatest Dam," will create an electrified paradise, promised *Popular Science Monthly* in 1936. They compared it to five of the great pyramids of Egypt.[1]

In 1935, while Congress debated authorization and funding for Grand Coulee, Rufus Woods put out a special eight-page edition of his *Wenatchee Daily World*. Its headline declared that at Grand Coulee Dam reclamation engineers were harnessing "Two Million Wild Horses!" Woods sent copies to every legislator in Washington, D.C. It would be wrong, he wrote, for the country not to complete "the World's Greatest Project."

The story of the United States building the "biggest thing on Earth" was dramatically played by project backers as a positive accomplishment which they contrasted against the gloom of the Great Depression. Government promoters used every avenue to tout their achievements at Grand Coulee. In 1941, as part of its publicity campaign, the Bonneville Power Administration hired Woody Guthrie to write songs about the Northwest and its hydroelectric development. Guthrie wrote, "from the rising of the river to the setting of the sun, the Coulee is the biggest thing that man has ever done."

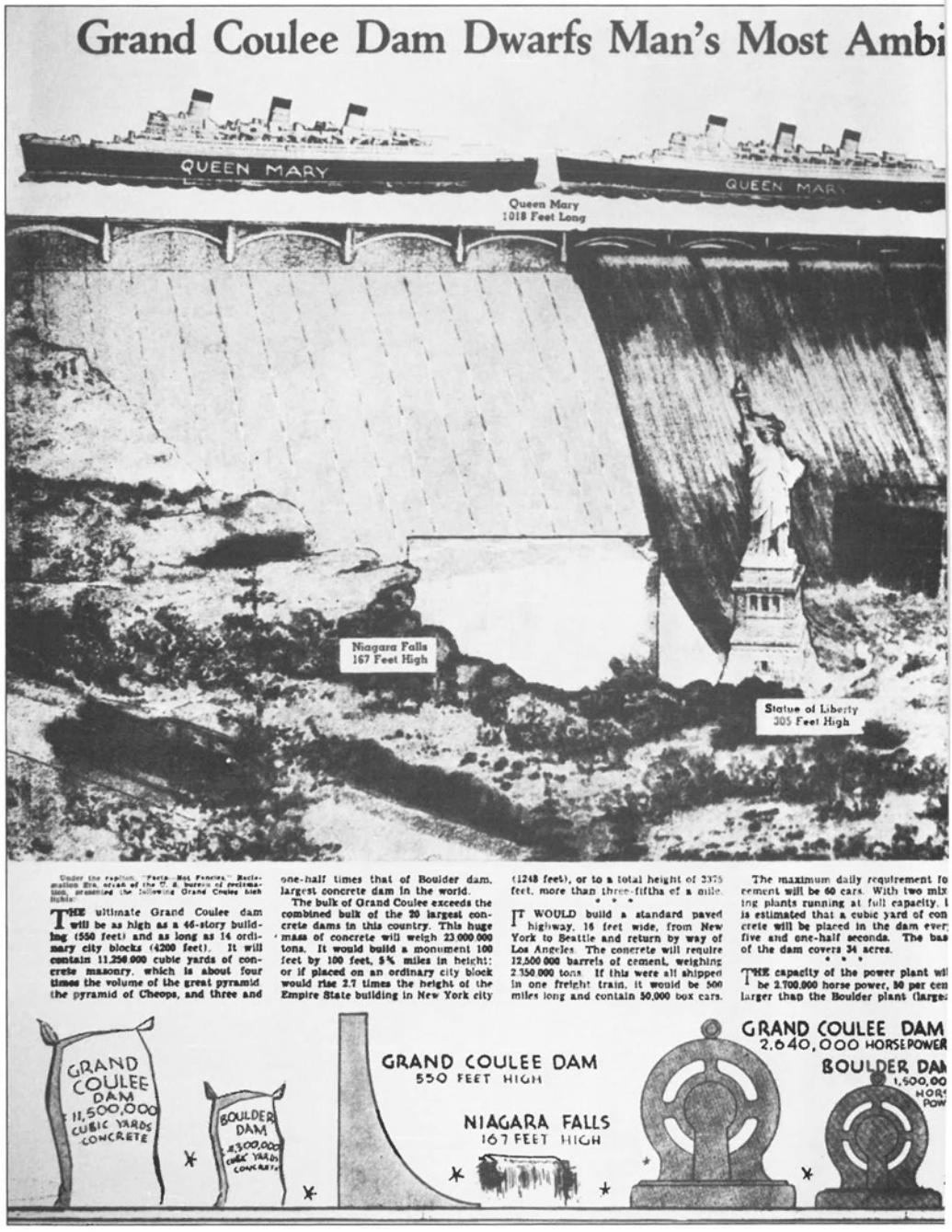
No one doubted that Grand Coulee Dam was big. But as early as 1933, when Representative Knute Hill had claimed that the dam would be the largest of man's structures, the Portland *Oregonian* suggested that the congressman had overlooked the Great Wall of China. The reality, as historian Murray Morgan correctly wrote, is that Grand Coulee Dam was "the largest concrete structure

in the world, one of the biggest things built since the Great Wall of China." But the backers of Grand Coulee were successful in making it seem to be the biggest, and their influence was worldwide. In 1939 the *China Weekly Review* reprinted an article written in Shanghai which said, "From the standpoint of general interest, the Grand Coulee Dam is the largest monument ever made by man on this earth."

In the 1930s Grand Coulee was the most massive dam in the world. But soon many earth-filled structures greatly exceeded its volume.[2] Recently, Itaipu Dam on the Brazil-Paraguay border in South America has captured the record as the world's largest concrete dam. When Grand Coulee's first two powerhouses were completed in 1951, it was the world's largest power generating station. That honor was lost to the Krasnoyarsk station in Siberia during the 1960s, but regained in the late 1970s when Coulee's third powerhouse was built. Coulee retains a tenuous hold on the title; however, projects now under construction in the Soviet Union and South America will be larger when they are completed.

In 1938, Neuberger had called the dam the "World's Greatest Engineering Wonder." Indeed, the engineering and construction accomplishments at Grand Coulee were formidable and in no way should they be underestimated. This was reaffirmed in 1955 when the American Society of Civil Engineers listed Grand Coulee Dam and the Columbia Basin Project as one of the seven civil engineering wonders of the United States. However, as D. C. Riddle, chief engineer for one of the two conglomerates that built the dam, wrote for *Civil Engineering* in 1936, "In working out the construction problems presented on such a vast scale at Grand Coulee Dam, no startling novelties have been attempted. On the contrary, the selection of tools

In the misty crystal glitter of the wild and windward spray,
Men have fought the pounding waters, and met a watr'y grave,
Well she tore their boats to splinters and she gave men dreams to dream,
Of the day the Coulee Dam would cross that wild and wasted stream.©



Spokane artist George H. T. Brinkerhoff made the original of this drawing, and it hangs today in that city's Civic Building. It is typical of the promotions done nationally through the 1930s by backers of Grand Coulee construction. The purpose was to convince Americans that they were building man's largest structure and to secure their support for its completion. Considering the number of people who have heard of Grand Coulee Dam, it is reasonable to conclude that the effort was moderately successful.

I climb the rocky canyon where the Columbia River rolls,
Seen the salmon leaping the rapids and the falls;
The big Grand Coulee Dam in the state of Washington
Is just about the biggest thing that man has ever done.©

and methods was based on proven experience." An editorial a year later in *Pacific Builder and Engineer* added, "Reclamation engineers are fond of saying that 'Boulder [Dam] was just a laboratory we built in order to find out how to build Coulee.' "

While management of the Columbia River and construction of the dam was a Herculean accomplishment, the project was largely a novelty of size and, while remarkable, it was not as exceptional as the contemporary articles in the press indicated. But the mystique created in the 1930s is today perpetuated. In a 1983 article the *Wenatchee World* stated, "Grand Coulee Dam stands as one of the paramount construction projects of the 20th Century.... It was a task that tested to the limit man's knowledge of engineering in the 1930s."

Courtesy of *The Star Newspaper*, Grand Coulee, Washington

Commenting in 1934 on one of the problems relating to construction of Grand Coulee, an article in *Public Utilities Fortnightly* stated that the anticipated surplus of Grand Coulee power would be utilized only if some miracle happened. "There might be a war which would crowd the Pacific Northwest with eager workers and their Saturday nights with wassail." A generation later Stewart Holbrook reflected that most people had heard "that Grand Coulee was the greatest powerhouse in the world; that it 'won World War II' because it supplied the energy that made the aluminum for 60 percent of American planes; and that because of it, too, the government atomic plant was established at Hanford...." Holbrook's comment was typical of publicity about the dam during and immediately after the war.

And in fact, in October 1940 the government had declared the dam a national defense project. A few days later a sizable quantity of electricity from the as yet unfinished generators was sold, in advance, by the Bonneville Power Administration to the Aluminum Company of America. It was earmarked for defense purposes. Interior Secretary Harold L. Ickes urged faster completion of the Grand Coulee generators. Work on the second and third generators was speeded up while the fourth through sixth were granted high priority by the War Production Board. The Bureau of Reclamation and the press throughout the Northwest and the nation heralded each new generator and boasted of the enormous contribution made to the war effort by every increase in power output.

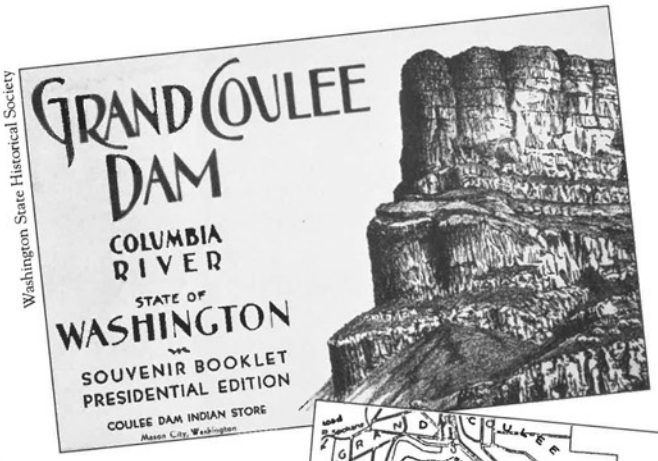
In February 1944 the sixth large Grand Coulee unit turned for the first

time. But after the sixth, no more of the anticipated eighteen generators were installed during the war. By October 27, 1942, the War Production Board had suspended the priority for Grand Coulee Dam and stopped work on the second powerhouse entirely. The decisive battles of the war were over before the last two generators began production, and even earlier it was clear that further capacity at Grand Coulee would have no effect on the outcome of the fighting. In all, about one-third of the planes built in the United States during the World War II used aluminum produced from power generated at Grand Coulee Dam.

Grand Coulee power went not only to aluminum production, but also to what was then a "mystery project" at Hanford. As the *Wenatchee Daily World* reflected in 1948, "It was this hydroelectric power which made possible the development of the atomic bomb at Hanford—development which shortened the war and saved the lives of thousands of American boys and billions of dollars." It was the contribution to the atomic bomb as much as the aluminum that led writers to extoll Coulee's contribution to the Allied victory. Whether or not the atomic bomb was necessary, or if it appreciably shortened the war, is today the subject of an ongoing debate among historians.

There's a building in New York that you call the Empire State,
I rode the rods to 'Frisco to walk the Golden Gate;
I've seen every foot of film that Hollywood has run,
But Coulee is the biggest thing that man has ever done.©

In either case, the Bureau of Reclamation and others pointed to the power that created aluminum which made planes which won battles, or to the electricity that yielded the material crucial for an atomic bomb which they felt had shortened and ended the war. A contraction of the steps led promoters of the dam to a conclusion that credited Grand Coulee directly with the victory. It stretches the point to write about Grand Coulee, as journalist Marc Reisner did in 1986, that "It probably won the Second World War."



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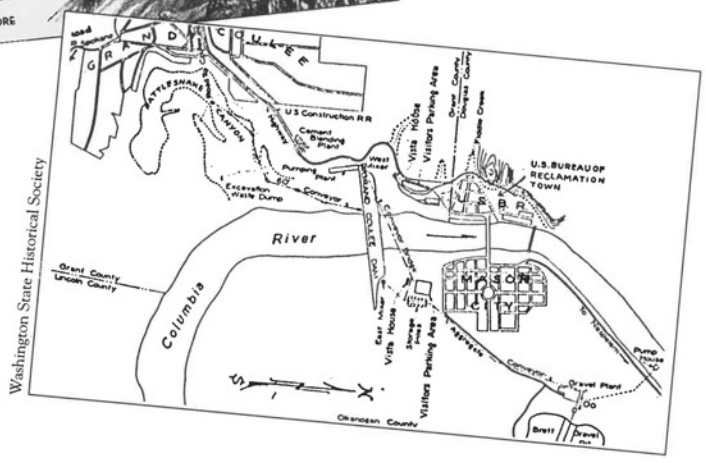
LEFT: This cover of a souvenir booklet is typical of the materials tourists bought when they visited Grand Coulee during the construction years of 1933-1941. This particular printing commemorated President Franklin Roosevelt's visit to the site in 1937.



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A map of the dam construction site shows Mason City for construction workers on the east side of the river, the Bureau of Reclamation settlement called Engineer's Town on the west side, and the town of Grand Coulee high above in the ancient Grand Coulee above Rattlesnake Canyon. The town of Grand Coulee was infamous for its B Street and the entertainments that workers found there. Note that the dam is located about where Grant, Douglas, Lincoln and Okanogan counties meet.

While Coulee may not have won the war, the war clearly won Grand Coulee. The sudden need for large blocks of power ended claims by detractors like Republican Representative Francis D. Culkin of New York, that nobody would ever buy the electricity, and that it would have to be sold to "Jack Robinson Rabbit." If nothing else, World War II made Grand Coulee Dam an unquestioned economic success. It was this sudden and overwhelming success that solidified the mystique of Grand Coulee Dam.

Although power production turned out better than anticipated, there was an environmental loss. The annual run of salmon above Grand Coulee ended, and the new reservoir covered the historic Indian fishing grounds at Kettle Falls. But the Bureau of Reclamation made heroic efforts to transplant the runs into streams below the dam and to compensate with fish hatcheries. The effort has been somewhat successful.

Grand Coulee was one of the early multiple use dams, and for many, the loss of fish was offset by greater gains. In addition to power and irrigation, for example, as far back as the 1920s, proponents argued that Grand Coulee Dam would contribute to downstream flood

control. And when Congress authorized it in 1935, one of the stated purposes of the project, written prominently into the legislation, was flood control.

All was well until the spring of 1948.[3] By June 12 the Columbia River at Grand Coulee had swelled to a startling flow of 585,000 cubic feet per second. This caused considerable damage downstream and carried away Vanport, north of Portland, then one of the larger cities in Oregon.

In the wake of the flood, the river management program of the Army Corps of Engineers and the Bureau of Reclamation received understandably harsh criticism. The Bureau of Reclamation had all along been quietly straightforward about the degree to which Grand Coulee Dam could affect downstream flooding. Of the estimated $487 million cost for the Columbia Basin Project forecast in 1943, only one million dollars was written off to navigation and flood control. The Bureau of Reclamation asserted that Grand Coulee Dam had never been built with flood control as a major factor, and indeed, the 1948 flood was of such magnitude that it would hardly have affected the outcome downriver in any event.

Nevertheless, the Bureau undertook a study of the problem. The Army Corps of Engineers suggested that one million acre feet of the reservoir's nearly ten million acre feet be vacated each spring as a flood control measure. A Bureau of Reclamation inter-office letter commented, "Regardless of the actual benefit that can be achieved, a concerted effort on our part might, at least, have considerable psychological value."

In 1961, in a letter to Senator Henry M. Jackson, Commissioner of Reclamation Floyd Dominy elaborated on the problem faced by the Bureau, and on its solution. "Grand Coulee Dam was not designed specifically for flood control operation. The disastrous flood of 1948, however, showed conclusively that control of large floods could not be achieved by levees alone and would require, in addition, reservoir storage. Since that time Grand Coulee Dam has

(Continued on page 36)

Curtis photo, courtesy of Washington State Historical Society

Taken in 1920, this picture shows an abandoned farmhouse next to an orchard desiccated by drought. The dry years in the Columbia Basin drove away many who had come earlier, and convinced those who remained that only irrigation could make the rich lands bloom.

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On October 2, 1937, President Franklin D. Roosevelt's special train arrived in Ephrata. From there the President was driven to Grand Coulee Dam where he inspected construction work for a second time (he had first visited the site in the summer of 1934), and spoke to over 10,000 people in Mason City. Next to Roosevelt in the picture is Frank Arthur Banks, the engineer who represented the Bureau of Reclamation and oversaw construction of the dam. On the right is Senator Lewis Baxter Schwellenbach, a staunch supporter of Grand Coulee construction who, before his election in 1934, had been a U.S. District Court Judge and later became Secretary of Labor in the administration of Harry S. Truman.

(Continued from page 33)

been operated to achieve significant reduction of lower Columbia river floods and is an important element in the plans of the Corps of Engineers to provide comprehensive flood control for the Columbia River."

Actually, the construction of Hungry Horse Dam in Montana, started in April 1948, helped more than the effort at Grand Coulee. The construction of Libby Dam in Montana and three dams in British Columbia have added over 20 million acre feet of additional storage upstream from Grand Coulee.[4] These are part of a system of over 75 reservoirs throughout the Columbia watershed which today do control the flow of the river.

The human cost of Grand Coulee has also been exaggerated. Craig Sprankle, Information Officer for the Bureau of Reclamation at Grand Coulee Dam, notes that tourists continue to ask if any workmen were entombed in the dam when it was built. Grand Coulee publicity in the 1930s frequently centered on the speed at which contractors poured the concrete. Nearly 80 men did die during construction, but no one was buried in the process. What Joseph Stevens wrote about Hoover Dam would be equally true of Grand Coulee: "The idea of workers forever entombed in the great structure they had helped build was so irresistibly poetic, so deliciously macabre, that it became the basis for the most enduring legend of Hoover Dam...."

Grand Coulee Dam was, then, the biggest masonry dam ever constructed, but it was not the biggest manmade thing on Earth. It was a notable engineering accomplishment, but it was not the greatest engineering wonder as was claimed by its champions. It was not designed with any measure of downstream flood control in mind. The power it generated facilitated the Allied victory in World War II, but Grand Coulee hardly did the job single-handedly. And finally, there are no bodies buried in the concrete. Whether or not these are myths (in the true sense of the word), or only exaggerations, is a matter of definition. Indisputable is the bigger-than-life mystique created by Grand Coulee Dam advocates which persists today.

Three times the size of Boulder or the highest pyramid,
Makes the Tower of Babel a plaything for a kid;
From the rising of the river to the setting of the sun,
The Coulee is the biggest thing that man has ever done.©

That pervasive mystique masks the reality that Grand Coulee Dam is but one element of the larger Columbia Basin Project. For at Grand Coulee, reclamation and power generation are inextricably linked. The huge dam creates a lake from which irrigation water is drawn. Power from the generators turns the pumps that raise the water about 270 feet into an equalizing reservoir. The sale of the rest of the electricity pays all the costs of power generation and subsidizes most of the reclamation bill.

The Bureau of Reclamation stands at the center. Its dam creates the electricity and it governs the flow of scarce water. But unlike the commanding position that historian Donald Worster attributed to the Bureau in the arid Southwest, in central Washington the politics of irrigation are jealously guarded by local farmers and even more by urban entrepreneurs.

The symbiotic relationship between power and irrigation was the vision of newspaper editor Rufus Woods, of lawyer Billy Clapp, who is credited with first suggesting construction of the dam in 1918, and of James O'Sullivan, another lawyer. They were typical of the professionals and businessmen in eastern Washington who saw irrigation of the one-million-acre-plus project as a way to build an agricultural-industrial empire in the Columbia Basin. That empire would provide farms with cheap, abundant water and farmers, in turn, would provide a market for a growing industrial complex.

In the 1930s, the New Deal added the aspect of planning to the vision. New Deal historian Richard Lowitt called it the goal of the "Planned Promised Land." The idea was to create small irrigated farms and self-sufficient communities where the economy was controlled, soil fertility assured, and productivity guaranteed. The rich reclaimed land would replace submarginal land in other locations. The project would benefit perhaps 80,000 families, including many dust bowl refugees.

In 1937 the Columbia River Basin Anti-Speculation Act formalized the goals by limiting irrigated farms to 40 and 80 acres. Owners of larger tracts would be required to sell their excess land. Under the new law, landowners formed three irrigation districts and signed contracts with the government for delivery of water.

In keeping with the idea of planning, the Bureau of Reclamation hired Dr. Harlan H. Barrows of the University of Chicago to undertake what came to be called the Columbia Basin Joint Investigations. This series of 28 studies involving over 40 government and private agencies, attempted to solve problems before they were encountered. Early on, Barrows realized that the Anti-Speculation Act was myopic and he recommended altering the law. The studies and Barrows' recommendations resulted in the Columbia Basin Project Act of 1943 which allowed the size of farms on the project to range from 10 to 160 acres, depending on the quality of the land.

World War II delayed reclamation construction for about ten years. Finally, in 1952, the first water from behind Grand Coulee Dam arrived on the land. But with the water, unforeseen problems developed. Unwilling to accept the land limitations, many wheat farmers, mostly on the east side of the project, withdrew over 300,000 acres. Post-war inflation raised construction costs beyond anything anticipated. And drainage of surplus irrigation water

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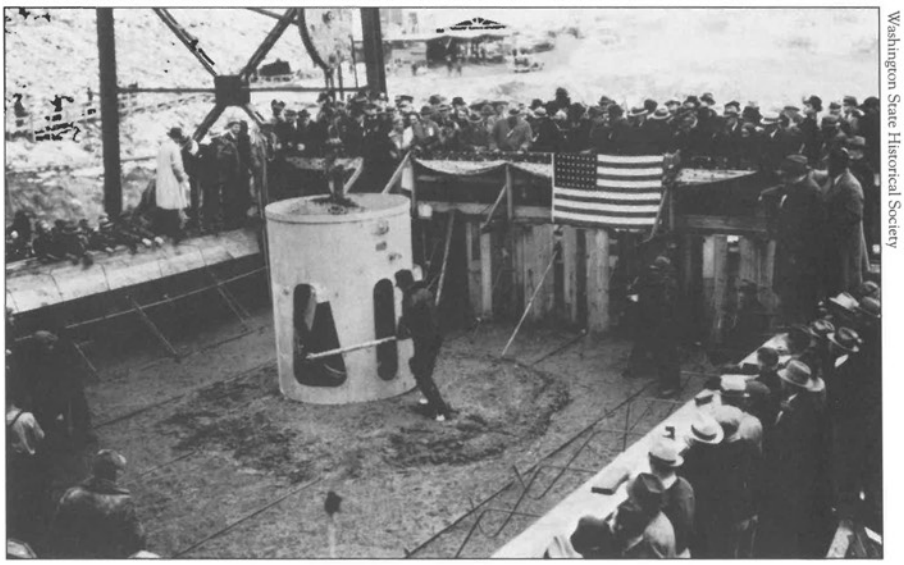
On December 6, 1935, Governor Clarence Daniel Martin dressed as a worker, enrolled as a member of the labor force, and prepared to pour the "first" bucket of concrete onto the foundation for Grand Coulee Dam.

This dramatic photograph made during construction of the foundation of Grand Coulee Dam gives evidence of the fact that large dams are not single blocks of concrete. Rather, they are a series of columns which successive pourings of concrete, lowered in buckets from the cranes seen here, raised at the rate of about five feet every few days. Later, additional concrete called grout welded the columns together forming the solid structure seen today.

quickly became an unexpected headache. Only $8 million had been allocated to pay for drainage facilities, and many times that amount was needed. Furthermore, farmers, then caught between higher costs, the need to mechanize, and declining farm prices, chafed under the landownership limitations.

The Bureau of Reclamation attempted to negotiate a new contract with higher repayments in order to cover the rising costs. But the farmers argued that power revenues should pay the bills, as had been promised in the past. The bitter controversy continued from 1954 until 1962 when both sides finally agreed on revised repayment contracts. They raised the average cost of water delivery for each acre of land from $85 to $163.50. The repayment period, however, was extended from 40 to 50 years so that the cost per year was actually reduced in the initial years of the contract.

In 1957, after intense lobbying by project supporters, Congress amended the anti-speculation limitations of the Columbia Basin Project Act. Despite objections from the Bureau of Reclamation, the new law allowed any individual to own up to 160 acres, while a husband and wife might own 320 acres. The law also liberalized leasing restrictions and allowed farmers to rent land and receive water as long as they did not



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Here, at 2:06 p.m., Governor Martin pulls down the large handle and releases four cubic yards, or about eleven tons, of concrete (the first of the eleven million cubic yards that ultimately formed Grand Coulee Dam). The grey mass dropped into the center of Block 16-G, and into it Martin also deposited a metal box full of documents as a cornerstone. The governor got into the rhythm of the work and placed eight more loads, guiding the large drop bucket and jockeying the concrete into position with an electric vibrator. A representative of the contractor, the MWAK Company, then handed the governor a check for a few cents as a token payment for the time he had "worked."

I better quit my talking 'cause I told you all I know,
But please remember, pardner, wherever you may go,
I been from here to yonder, I been from sun to sun,
But Coulee Dam's the biggest thing that man has ever done.©

own property in excess of the limits.

Although resolution of these problems provided increased money for drainage work and lessened tensions between farmers and the Bureau of Reclamation, the episode had repercussions. After 1960, and especially after 1965, enlargement of the project slowed appreciably. Only about 40,000 acres have been added since 1968. Today, just over 550,000 acres, about half of the contemplated project, are under the ditch.

On October 12, 1982, President Ronald Reagan signed the Reclamation Reform Act of that year, updating the Reclamation (or Newlands) Act of 1902. The new law raised landownership limits on all government irrigation projects to 960 acres and allowed farmers to pay the full cost of water delivery on anything over the 960 acre limit. It was a far distance from the New Deal vision of self-sufficient farms of 40 and 80 acres planned almost 50 years earlier. In 1973 there were 2,290 farms operating on the Columbia Basin Project, an average of 240 acres each, supporting something fewer than the 80,000 families predicted by earlier visionaries. Twenty-four farms exceed 900 acres, and four are 2,000 acres or larger. This does not account for farmers who may be renting additional project land and hence actually operating larger tracts.

Changing conditions, changing economics, and the understandable desire of farmers to live better than on a self-sufficient subsistence level altered the visions for the planned promised land. Transmission lines carried the power away from the Columbia Basin, and that, combined with shipping costs to distant markets, prevented realization of the agricultural-industrial empire that Rufus Woods anticipated.[5] The reality of the Columbia Basin Project today is significantly different from that for which the visionaries or the planners had hoped.

Yet, since the middle 1960s, a new organization, composed largely of professionals and businessmen, has lobbied the government to complete the Columbia Basin Project. Called the Columbia Basin Development League, they argue, as did their predecessors, that increased irrigation will enrich eastern Washington and benefit the state and the Pacific Northwest.

But there are unanswered questions. Who will pay the cost of such a construction, now estimated at well over two billion dollars? Is there enough water both to generate needed power and irrigate more land?[6] Is more reclaimed land really needed? Will farmers on newly irrigated land pay more or the same as farmers in older adjacent areas? How much should power rate payers subsidize irrigation?

In 1992 the completed Grand Coulee will be 50 years old. The mystique of the giant dam continues undiminished. In the shadow of that mystique, the reclamation issue continues to raise questions. Although everyone in America may have heard of Grand Coulee Dam, few outside the immediate area can identify the Columbia Basin irrigation project. The vision of the agricultural-industrial empire of north central Washington and the New Deal's goal of the "Planned Promised Land" for that region have not materialized. On the positive side, the project has not generated a huge self-perpetuating bureaucracy and it is doubtful that the Bureau of Reclamation is the "power to reckon with" that Donald Worster found in California. But it does have politically powerful advocates who persistently push for its completion. The next few years may determine whether or not that will happen.

NOTES:

[1] This was clearly an exaggeration. The great pyramid of Egypt contains something over 3 million cubic yards of material and Grand Coulee Dam has approximately 12 million cubic yards of concrete.

[2] Grand Coulee Dam contains around 12 million cubic yards of concrete. The Fort Peck Dam in Montana, built at about the same time as Grand Coulee, contains 125 million cubic yards; however, it is an earth-filled rather than a concrete structure. Nevertheless, it is notable that Grand Coulee received the publicity because of its size, while Fort Peck was hardly mentioned, at least in terms of size. Today, Grand Coulee does not even appear among the largest 35 dams in the world when they are listed by volume.

[3] In 1941, the Federal Writers' Program guide, *Washington: A Guide to the Evergreen State*, included the statement, "The dam is designed to halt the full flood of the mighty Columbia...." Writers' Program and Washington State Historical Society (Works Projects Administration). *Washington: A Guide to the Evergreen State*. (Portland, Oregon: Binfords & Mort, 1941), p. 332.

[4] The total storage capacity of Franklin D. Roosevelt Lake is 9.4 million acre feet, but only 5.2 million acre feet of that total is usable to generate power or for flood control. While the average flow of the Colorado River at Hoover Dam is only 20 percent of the flow of the Columbia at Grand Coulee, Lake Mead contains over 28 million acre feet of storage. The comparison shows that while the Grand Coulee reservoir is large, in relation to the size of the river it is small.

[5] Aluminum uses 25 percent of the region's power and employs 0.5 percent of its work force. See: Energy Research and Development Administration. *Choosing an Electrical Energy Future for the Pacific Northwest - An Alternate Scenario*. (Washington, D.C.: U.S. Government Printing Office, January 31, 1977), p. 79.

[6] At present, the irrigation aspect of the Columbia Basin Project uses about 5 percent of the flow of the Columbia River at Grand Coulee Dam. To double the project would raise that to 10 percent. Power to pump that water up onto the land would be lost from the power pool. The water pumped would not generate power either at Grand Coulee or any of the downstream dams. With increased upstream storage, no surplus water is now spilled at Grand Coulee, and the Bureau of Reclamation last summer installed a laser light show for tourists in order to eliminate much of the minimal spill which it had written off to public relations. The savings in lost power potential amounts to roughly $500,000 yearly. There is good reason to speculate that the future will see difficult struggles over who will get increasingly scarce Columbia River water.

EDITOR'S NOTE

The song lyrics accompanying this article are from "The Grand Coulee Dam" (TRO © 1958 (renewed) and 1976 Ludlow Music, Inc., New York, N.Y.), and "Biggest Thing that Man has Ever Done (The Great Historical Bum)" (TRO © 1961 (renewed) and 1963 and 1976 Ludlow Music, Inc., New York, N.Y.), written by Woody Guthrie and printed with permission from The Richmond Organization.

Paul C. Pitzer is a teacher of American History at Aloha High School in Beaverton, Oregon. He recently completed his Ph.D. at the University of Oregon, writing his dissertation on the Columbia Basin Project, and is working on a history of Grand Coulee Dam.

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