Man with cabbage at B.E. Smith Ranch near Rupert (HAER No. ID-16-114)

Historic American Engineering Record

M I N I D O K A

Minidoka Dam, Powerplant, and South Side Pump Division ■ HAER No. ID-16 ■ Minidoka and Cassia Counties, Idaho

submitted to:
U.S. Bureau of Reclamation
Pacific Northwest Regional Office
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September 2002

HISTORIC AMERICAN ENGINEERING RECORD

Minidoka Dam, Powerplant and South Side Pump Division — HAER No. ID-16

Location: West side of Lake Walcott (Minidoka Dam and Powerplant)
Minidoka vicinity; Minidoka and Cassia counties; Idaho

Construction date:
1904-1906 (Minidoka Dam)
1905-1907 (North Side and South Side gravity canals)
1907-1911 (Powerplant and Lift Stations)
1908-1910 (South Side canals)

Builder:
Bates and Rogers Company, Chicago IL (Minidoka Dam)
Allis-Chalmers Company, Milwaukee WI (Powerplant turbines)
Orman and Crook, Pueblo CO (Main North Side and South Side Canals)
Hubbard and Carlson, Boise ID, and Monarch and Porter, Des Moines ID (North Side branch canals)
South Side Minidoka Water Users' Association (South Side canals and sublaterals)

Present owner: U.S. Bureau of Reclamation
Burley Irrigation District

Present use: storage dam for irrigation and hydropower generation, with associated structures and irrigation canals

Present condition: fair - good

Significance: The Minidoka Project was established in the early years of the twentieth century by the United States Department of the Interior's newly established Reclamation Service (later renamed the Bureau of Reclamation). Located on the Snake River in southern Idaho, the original Project included a dam, the related reservoir (Lake Walcott), a hydroelectric power plant, and two irrigation delivery units, one primarily served by gravity flow and the other aided by three lift stations. By providing water to irrigate the region, the Project transformed the landscape from a sagebrush desert into lush farm fields. It also stimulated Reclamation's interest in hydroelectric generation. Reclamation initially intended to produce power to operate the lift stations and, incidentally, to sell any excess for commercial and residential use. As the twentieth century progressed, however, the demand for electricity turned hydroelectricity production into a significant priority for the Minidoka Project and for Reclamation.

Project Statement: The Minidoka Dam, Powerplant, and South Side Pump Division were documented for the Historic American Engineering Record by Fraserdesign of Loveland, Colorado, and Hess Roise of Minneapolis, Minnesota, under contract with the U.S. Bureau of Reclamation. Recordation was carried out under supervision of Lynne MacDonald, Regional Archeologist for the Pacific Northwest Regional Office of Reclamation.

Report Produced by: Jeffrey A. Hess, Demian Hess, Charlene K. Roise, Abigail Christman
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Fraserdesign, Loveland CO

September 2002

1 DESCRIPTION

Minidoka Dam and Powerplant

Minidoka Dam is the heart of the Minidoka Project, as originally defined, and was the first structure completed by Reclamation for the Minidoka Project. The dam raises the level of the Snake River to reach the headworks for two gravity-operated canals that supply the two irrigation units the Minidoka Project originally served. It also provides irrigation water storage and creates a power head to generate hydroelectricity for the pumping stations on the canals. Built in 1905-1906, the dam stands at the head of Lake Walcott, in the middle of Section 1, Township 9 South, Range 25 East, near the intersection of the Minidoka, Cassia, and Blaine county lines [see *Figure 1*].[1] The structural height of the dam is 86 feet; its hydraulic height is 75 feet [see *Figure 2*]. The 4,475-foot-long crest stands 4,250 feet above sea level. The dam tapers from a top width of 25 feet to a maximum base width of 412 feet [see *Figure 3*]. The reservoir side is earth- and gravel-fill angled at a slope of three to one. The face's upper half is protected by rock paving. The downstream side is rockfill and sloped at a rate of one-and-one-half to one. A concrete corewall extended along the upstream toe of the rockfill, and concrete cutoff walls ran from the abutments into the dam.[1]

The Powerplant lies immediately north of the dam's north abutment. The Main North Side Side Canal headgates [see *Figure 4*] are located just north of the powerhouse, while the Main South Side Canal's headgates [see *Figure 5*] lie to the south of the dam, at the end of a 3,000-foot-long spillway beginning at the dam's south abutment [see *Figure 6*].[2] When originally built, the spillway was a simple overflow ogee-type weir. In order to increase the capacity of Lake Walcott, Reclamation placed reinforced concrete piers fitted with 5-foot flashboards along the top of the spillway during the winter of 1909/10. A walkway running along the top of the piers allowed workers to remove the flashboards by hand, thus controlling the height of the reservoir [see *Figure 7*]. In 1913, Reclamation removed several piers at the center of the spillway and installed four 10-by-12 foot, motor-operated radial gates to better control the discharge [see *Figure 8*].[2] In 1989, these devices were replaced by three 20-by-15 foot radial gates. The remaining sections of spillway (298 piers and bays) still feature hand-operated stoplog boards.

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[1]For photos of Minidoka Dam and its separate components, see HAER No. ID-16-1 through 16.

[2]For photos of this radial gate section, see HAER No. ID-16-A.

The hydroelectric powerplant built at the north end of the dam supplies electricity to run the Project pumping plants. Power generated in excess of Project needs was marketed originally to local residents by Reclamation. Today, it is marketed by Bonneville Power Administration for sale throughout the region. Built during the winter of 1909-1910, the powerplant is a plain, rectangular, utilitarian, reinforced concrete structure with a low-pitched gable roof [see *Figure 9*].[c] Water enters from a forebay on the plant's east side and drops through penstocks to turbines mounted on the building's lowest floor [see *Figure 10*].

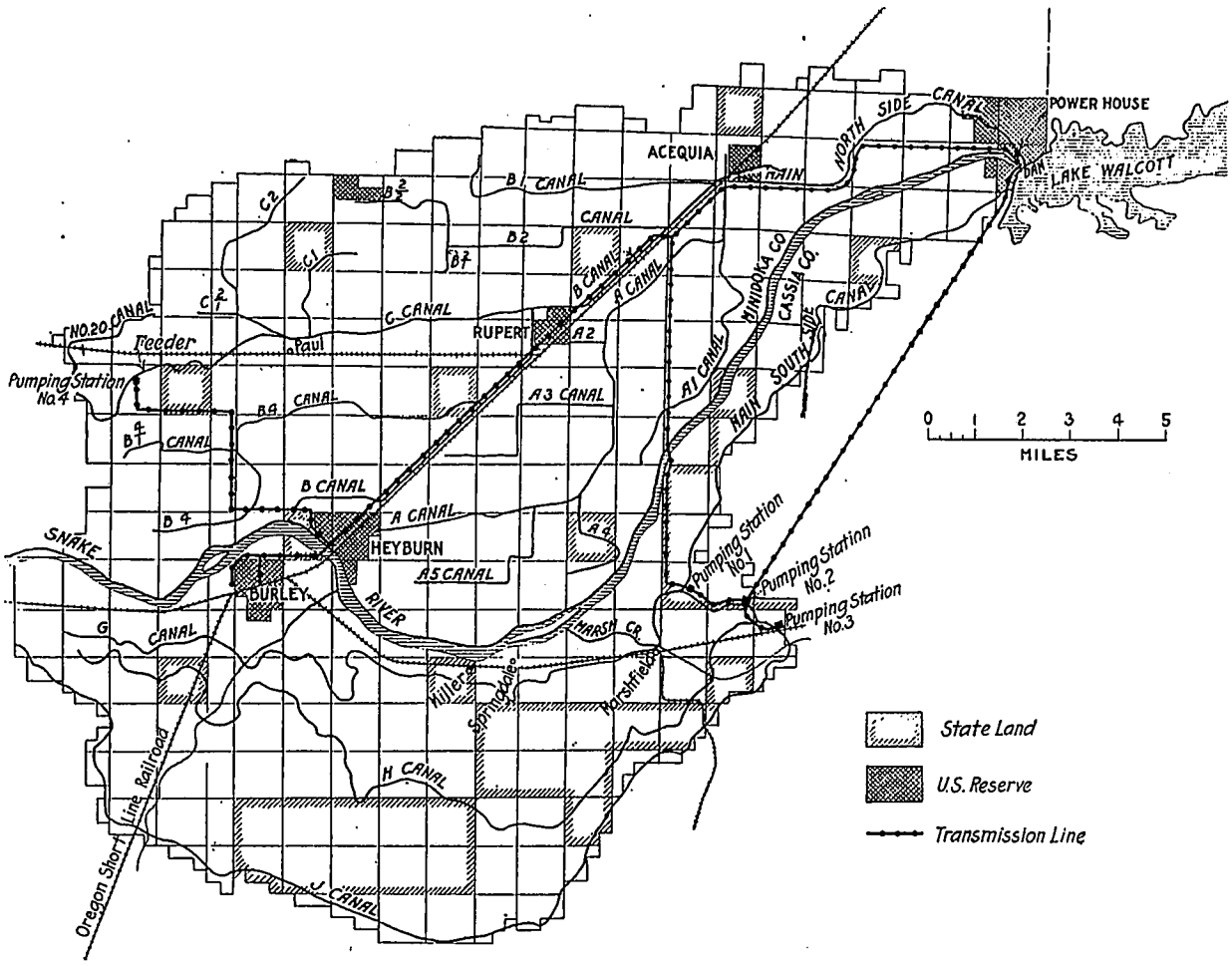

Figure 1. Minidoka Project, from Power, 30 March 1915.

[c]For photos of Minidoka Powerplant, see HAER No. ID-16-17 through 60.

The discharge then exits into the Snake River through draft tubes set between piers supporting the plant over the tailrace.

As originally constructed, the powerplant contained five 1,200 kilowatt, vertical power units generating alternating current at 2,300 volts, a total of 7.5 megawatts. As Reclamation engineers expanded the pumping system in the 1910s and 1920s, they quickly found that they needed to increase power production to meet Project needs and keep abreast of a growing market for power in nearby towns. In 1926, therefore, Reclamation installed a sixth power unit in the north end of the plant capable of generating 3 megawatts of power, and in 1942 constructed a seventh unit, housing it in a plain, utilitarian, boxy addition built

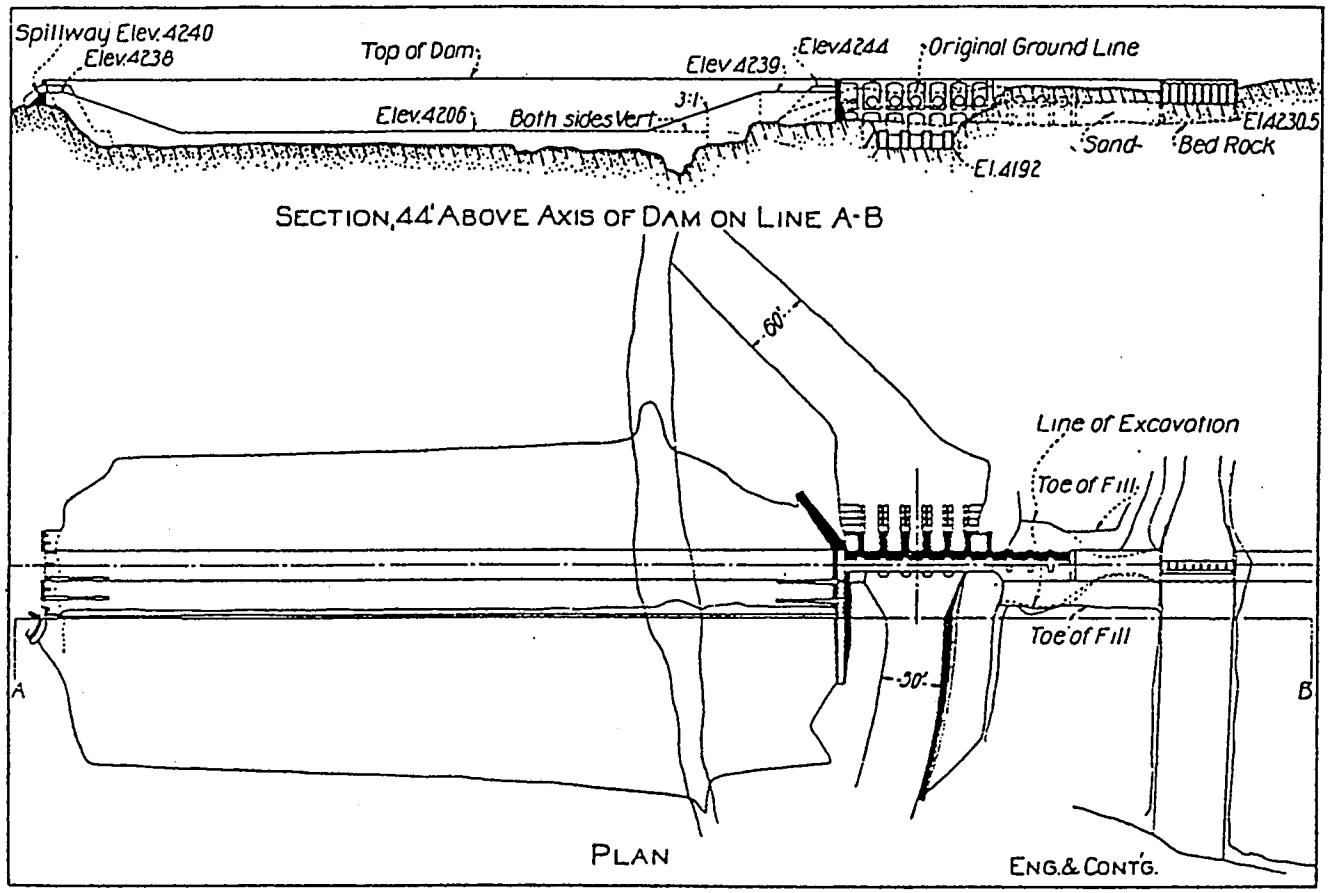

Figure 2. Plan and elevation of Minidoka Dam, from Engineering and Contracting, 9 April 1913.

on the north bank of the tail race, adjoining the west side of the original plant.[d] With this new unit, the plant's total generating capacity was 15.5 megawatts. Significant alterations in the 1990s, including the decommissioning of the original five generator units and the construction of a new powerplant, raised the facility's capacity to 27.7 megawatts.

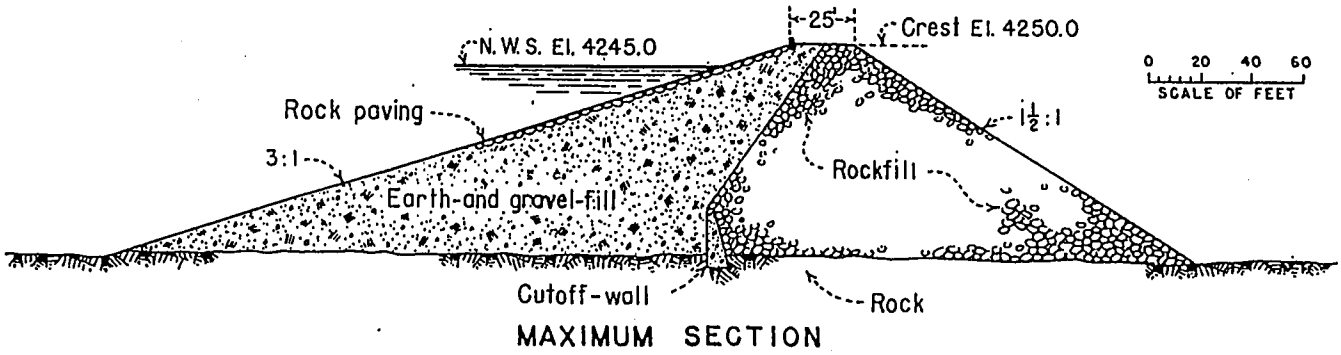

Figure 3. Maximum section of Minidoka Dam, from U.S. Bureau of Reclamation Minidoka Project Data Sheet, 1981.

Reclamation initially installed a bank of transformers inside the powerhouse, on a gallery overlooking the generator floor. The transformers stepped current up to 33,000 volts for transmission to the pumping plants and Project towns. In 1926, Reclamation established an outdoor switching yard on a point of land between the powerhouse forebay and the Main North Side Canal to contain the substation equipment for the newly added sixth power unit. Later, Reclamation transferred the substation equipment for all of its power units to the outdoor switching yard. By 1933, all of the indoor transformers had been removed. In the late 1920s, Reclamation negotiated a contract with a regional power utility to secure additional power to meet peak demands on the Minidoka Project in exchange for the excess electricity generated at the Minidoka Plant during non-peak periods. To exchange power between the two systems, Reclamation built a 132,000-33,000 volt substation on the north bank of the Main North Side Canal in 1930, opposite the yard established in 1926. With the modifications undertaken at the facility in the 1990s, both of these yards were removed and replaced with a single new transformer yard in the same location.[e]

[d]For photos of the Powerplant addition, see HAER No. ID-16-21 through 23 and ID-16-58 through 60.

[e]For photos of the Transformer Station, see HAER No. ID-16-H-1 through 6.

Gravity Unit

As originally planned, the Minidoka Project was composed of two irrigation delivery units: the Gravity Unit and the Pumping Unit. The division of lands into these two units was based upon whether water could be delivered through the system primarily using the force of gravity, or whether mechanical pumping was required to raise the water in the canals up to higher terraces. Initial development focused on the Gravity Unit. Officially opened in 1907, the Gravity Unit consists of 60,000 acres on the north side of the Snake River in Minidoka County and 10,000 acres on the south side of the river in Cassia County. The south side gravity lands lie between the river and the Main South Side Canal, which supplies water to the tract through gravity sublaterals. On the north side of the river, the Gravity Unit is watered by the Main North Side Canal. The canal extends for about eight miles in a westerly direction before splitting into four main branches near Acequia. The "A" Canal turns south and the "E" Canal north, both at 90-degree angles. The "E" Canal soon ends. The "A" Canal continues southwest and west, terminating less than a mile east of Heyburn. The "B" and "C" Canals run together to the southwest and west for about five miles until they are northwest of Rupert. There, the "C" Canal heads west, while the "B" Canal extends south, southwest, and west, finally ending not far from the Snake River north of Burley. A spiderweb of laterals extend from these main branches. While most rely on gravity flow, several isolated high areas in the west and northwest—less than 3,000 acres—are watered by small electric pumping plants. All in all, the north-side system comprises some 20 miles of main canals and 260 miles of laterals [see *Figure 11*].[3]

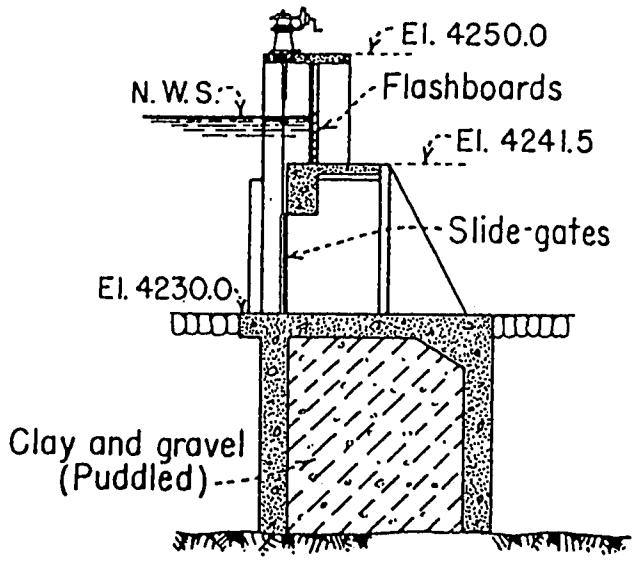

Figure 4. Section through Main North Side Canal headgate, from BOR Data Sheet.

Pumping Unit

The Pumping Unit did not officially open until November 1915, although Reclamation delivered water to some areas of the division as early as 1909. The unit lies on the south side of the Snake River and contains approximately 50,000 acres. The ground on this side of the Snake rises steadily to the south, and as a result the Pumping Unit lands rely on three electric pumping plants, or "lift stations," to raise water from the Main South Side Canal

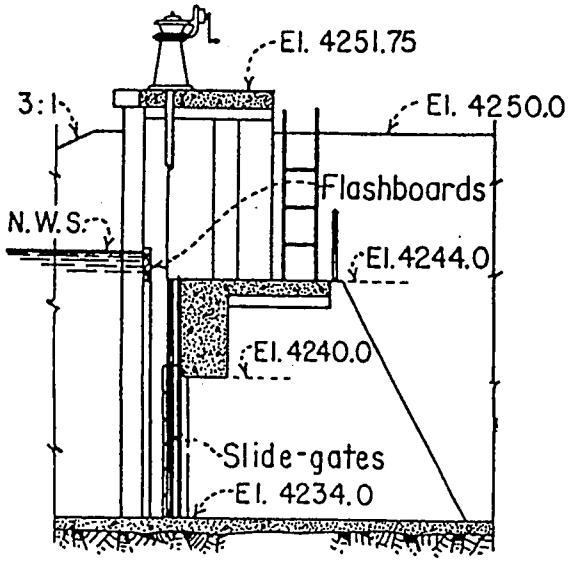

Figure 5. Section through Main South Side Canal headgate, from BOR Data Sheet.

[see *Figure 12*]. Each plant pumps water a height of thirty feet to reach a gravity canal that runs westward across the Pumping Unit farmlands. Through sub-laterals, each canal then distributes water to the lands to the north (or downhill) of that canal. The Main South Side Canal brings water from headgates at the southern end of Minidoka Dam about fifteen miles south-southwest to Lift Station #1. Some of the water raised by the first pumping station is diverted to the "G" Canal, which extends west about eighteen miles, while the remaining water travels about one and one-half miles east to Lift Station #2. Further elevated, some water flows into the "H" Canal, which swings to the southwest, west, and then northwest, stretching a total of some twenty-six and one-half miles. The rest of the water is directed approximately three-quarters of a mile southeast to Lift Station #3, where it is raised a final time to an elevation ninety feet higher than when it entered Lift Station #1. The water is then distributed by the twenty-five-mile-long "J" Canal, which echoes the curve of the "H" Canal to the north. In addition to the canals served by the pumping stations, a small gravity canal ("B" Canal) branches off from the Main South Side Canal about three miles north of Lift Station #1. The "F" Waste Canal discharges water from the Main South Side Canal into the Snake River.[1] Together, these canals create a system extending about eighty-eight miles that feeds over two hundred miles of laterals [see *Figure 13*].

Reclamation began building the lift stations during the winter of 1909-1910, completing the pump buildings by the fall of 1910. For all the plants, Reclamation selected vertical, double-suction, submerged centrifugal pumps direct-connected to synchronous electric motors. They initially installed four 125 second-foot pumping units in Lift Station Number 1, three in Lift Station Number 2, and one in Lift Station Number 3 supplemented by a 75-second-foot pumping unit. These installations were completed by the summer of 1911.

Reclamation quickly discovered that its pumping plants could not supply enough water to meet demand during peak summer months. As more land came under cultivation, therefore, Reclamation periodically enlarged the pumping capacity. The first expansion occurred during the winter of 1911-1912, when Reclamation added extra pumping units to

[1]For photos of the South Side canals and associated structures, see HAER No. ID-16-L-1 through 60.

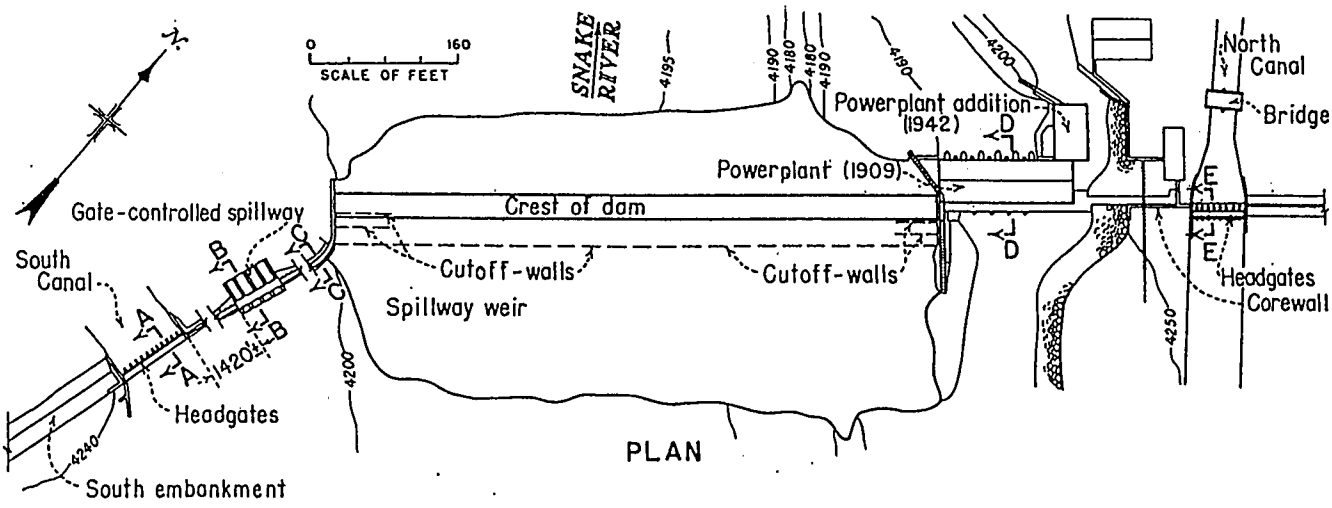

Figure 6. Plan of Minidoka Dam and Powerplant, showing headgates for Main North Side and Main South Side Canals, from BOR Minidoka Project Data Sheet, 1981.

all of the stations. In 1913, the agency enlarged the system again by installing new pump runners that substantially increased the amount of water each pump could lift. In 1926, the water users requested that Reclamation further increase the capacity of the system by 25 percent to meet water delivery shortages. Reclamation completed this expansion in 1933, replacing pumps in the Lift Station#3, and increasing the number of units in Lift Station #1 and Lift Station #2. Additional improvements occurred after World War II, including the installation of another pumping unit at the second lift station in 1954. Both the first and second lift stations now contain six pumping units, the former with a total capacity of 1,037 second-feet, and the latter with a total capacity of 894 second-feet. The third lift station has three pumping units and a total capacity of 525 second-feet.

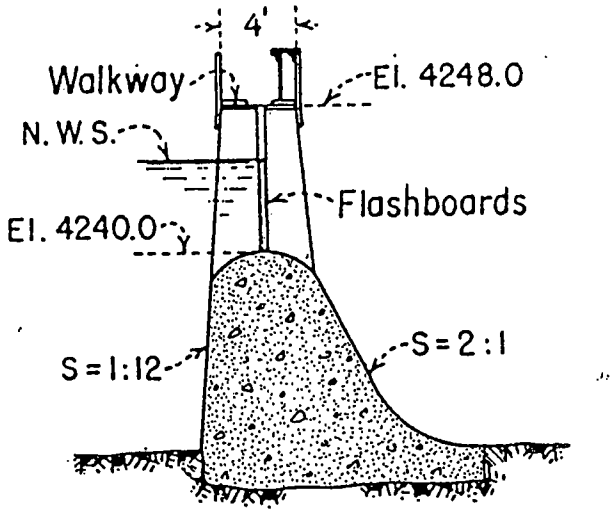

Figure 7. Section through ogee portion on Minidoka Dam, rom BOR Data Sheet.

The Larger System[4]

Over the years, the Minidoka Project has been expanded in a number of ways. In 1908, Reclamation constructed a dam at Jackson Lake, nearly 500 miles upstream in Jackson Hole, Wyoming. The Jackson Lake reservoir provides water to supplement the natural flow of the Snake River and the storage provided by Lake Walcott. In 1927, Reclamation completed

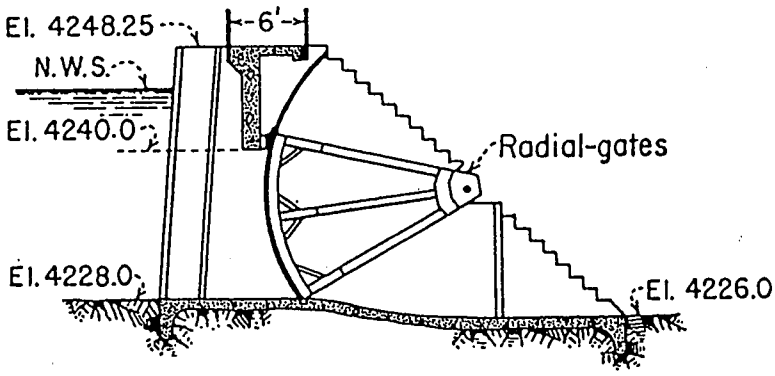

Figure 8. Section through radial gate portion of Minidoka Dam, from BOR Data Sheet.

American Falls Dam, which created a reservoir containing over 800,000 acre-feet for use by the Minidoka Project and other irrigation interests in the Snake River Valley. Other expansions to the Minidoka Project included the Gooding Division, which was added in 1927; the Upper Snake River Project, completed in 1939 to supply water to various irrigation interests in Fremont and Madison Counties; the North Side Pumping Unit, added in 1950 to supply pumped water to land just north of the Gravity Unit; the Michaud Flats Project, authorized in 1954 to reclaim land through pumping around American Falls; and the Palisades Dam and Powerplant, a multiple-purpose project transferred to the Minidoka Project in 1958 [see Figure *14*].

Endnotes

[1] U.S. Department of the Interior, Bureau of Reclamation, Pacific Northwest Region, "Minidoka Project," from Project Data Book, Region Revision September 1983, pp. 8, 15.

[2]Over time, various names have been applied to the components of the Minidoka Project. The primary canal serving the South Side Pump Division, for example, has been known as the Main South Side Canal, the Main Southside Canal, and the South Side Main Canal. Likewise, one of the lift stations is known as the Lift Station #2, Second Lift Station, and Pumping Station Number 2 . The following narrative uses consistent nomenclature throughout, regardless of whatever designation was most popular during a given era or most frequently used by a certain group.

[3]The authors of this study visited the Minidoka Project several times during the early 1990s and the South Side Pump Division in 2000. This description of the facilities' "current" appearance is as they existed in 1993. A detailed map of the Gravity Unit is included in Mark Fiege, *Irrigated Eden: The Making of an Agricultural Landscape in the American West* (Seattle and London: University of Washington Press, 1999), 32-33.

[4]Other elements of the Minidoka Project are documented in two reports: Abigail Christman and Clayton B. Fraser, "Minidoka Dam, South Side Pumping Division Lift Station #2 Operator's Housing Complex" (HABS No. ID-124), prepared by Hess, Roise and Company and Fraserdesign, 2002; and Clayton B. Fraser, Demian J. Hess, and Jeffrey A. Hess, "Walcott Park" (HABS No. ID-103), prepared by Fraserdesign and Hess, Roise and Company, 1994. These reports provide expanded discussions of some associated aspects, particularly housing for employees who operated the powerplant and lift stations.

2 BIRTH OF THE MINIDOKA PROJECT

Emergence of Federal Reclamation

The arid region of the United States, broadly defined, lies between the 100th Meridian, which bisects the Dakotas and Nebraska, and the eastern slope of the Cascade and Sierra Nevada mountain ranges, which extend through Washington, Oregon, and California. This area generally receives less than twenty inches of rainfall each year, making traditional agriculture impossible to practice. Although initially dismissed as a "Great American Desert," the arid lands attracted interest after the Civil War as the frontiers of settlement pushed eastward from California and Oregon and westward from the Mississippi Valley.[1]

Responding to public demand, Congress in the 1870s began to fund irrigation surveys and issue publications on the reclamation of desert lands by irrigation. Of particular importance was a series of investigations conducted during 1888-1893 by the Division of Hydrography of the U.S. Geological Survey (USGS). In addition to identifying irrigable tracts and potential reservoir sites, the surveys served as a training ground for a generation of irrigation engineers who would go on to administer the Federal reclamation program.[2]

By the 1890s, Western settlers, politicians, publishers, scientists, and businessmen had joined forces to demand more Federal aid to develop the arid West. This "irrigation movement" was given form and direction by the "Irrigation Congress," a national organization that began holding annual meetings in 1891. Although many in the movement were solely interested in promoting economic development, others were driven by the idealistic spirit of Jeffersonian agrarianism. The creation of self-sufficient farmsteads in the West through Federal aid and scientific water management seemed intrinsically good, and an antidote to the nation's rising tide of urbanization and industrialization.[3]

Direct Federal funding and control of irrigation projects proved too controversial for universal acceptance in the 1890s, however. Instead, the Irrigation Congress championed the cause of Federal land grants to the Western states for private development. This campaign culminated in the passage of the Carey Act in 1894. The law specified that each Western state could receive up to one million acres of public land. The states were then to contract with private companies to construct irrigation works. Once the initial irrigation infrastructure was in place, the states would sell the land to homesteaders, who would purchase water from the irrigation companies.[4]

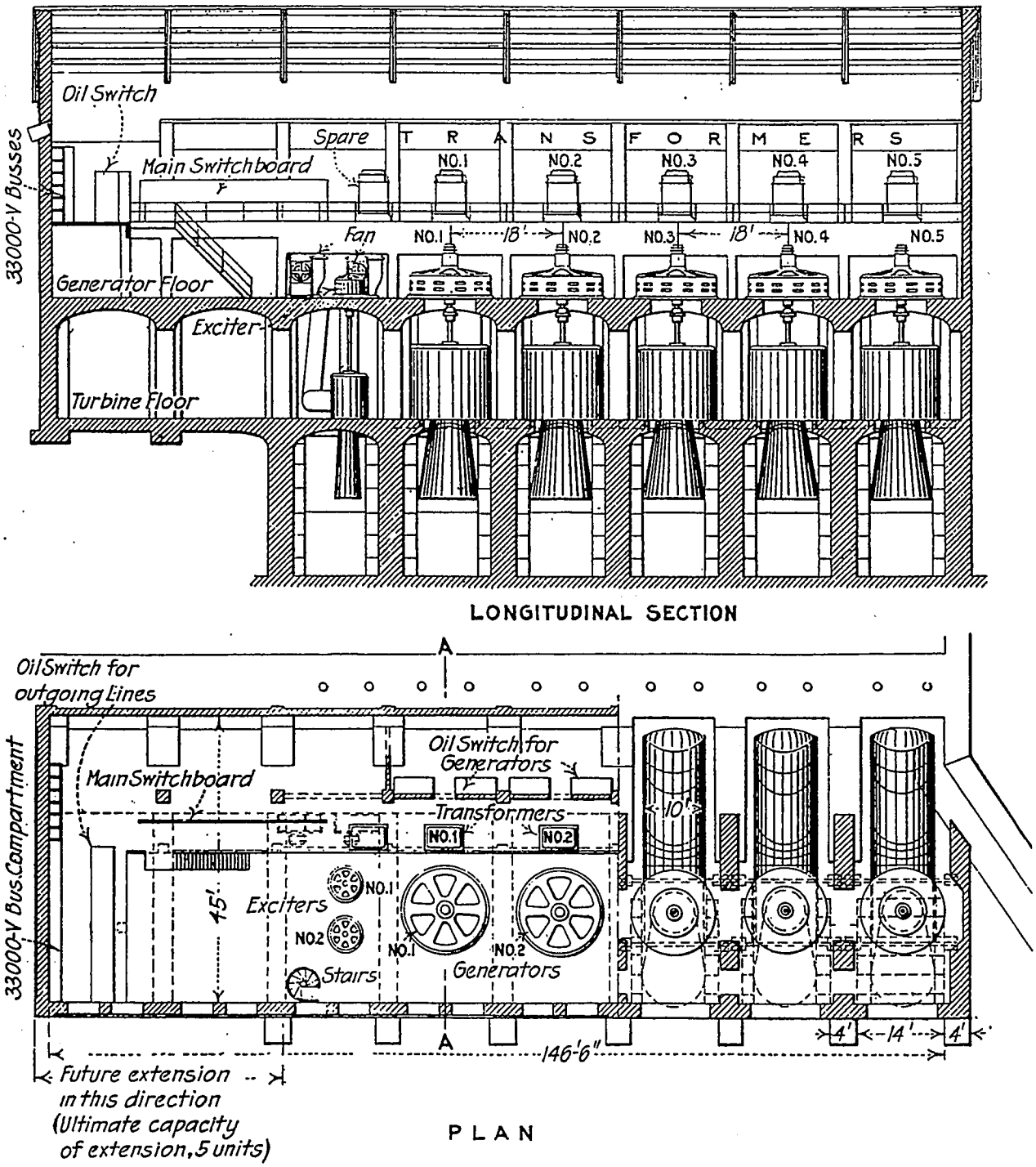

Figure 9. Plan and longitudinal section of Minidoka Dam Powerplant, from Power, 30 March 1915.

Although the Carey Act was a major step forward, many in the irrigation movement believed that more direct Federal involvement was required. These forces eventually triumphed with passage of the Reclamation Act of 1902. Under this legislation, the Secretary of the Interior administered the Reclamation Fund, a special fund to construct irrigation works in the West. Money for the Reclamation Fund was initially generated by public land sales. The land reclaimed by Federal irrigation works was open to settlement under the Homestead Act. To preclude speculation, homesteaders were not allowed to hold more than 160 acres. Settlers receiving water were to repay the Federal Government for the cost of the irrigation works in ten annual installments. The money thus collected reverted to the Reclamation Fund, making it a self-perpetuating account. After all installment payments had been completed for the majority of irrigated lands within a project, the water users were to relieve Reclamation of project administration and henceforth maintain and operate the irrigation system at their own expense.

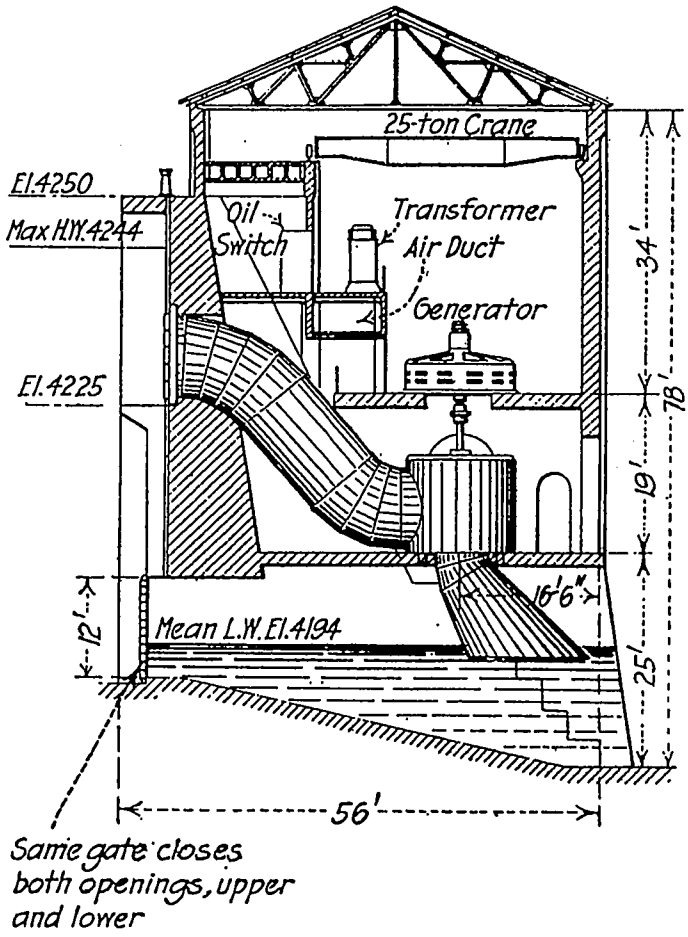

Figure 10. Cross section of Minidoka Dam Powerplant, from Power, 30 March 1915.

Since the USGS had been conducting hydrographic studies of the West for many years, it was reasonable for the Secretary of the Interior to appoint the agency as overseer of the new law. To carry out this work, USGS established an internal unit—designated the Reclamation Service (Reclamation)—which was staffed by Engineers who had served with the Division of Hydrography. Frederick Hayes Newell, head of the Hydrographic Division, became Chief Engineer of the new organization. In 1906, Reclamation became an independent agency, with Newell as its Director reporting to the Secretary of the Interior. In 1923, the agency was reorganized as the Bureau of Reclamation, still under the aegis of the Department of the Interior.[5]

Federal Reclamation in Idaho

In November 1902, the Secretary of the Interior announced that over three million acres of public land in Idaho were to be withdrawn from public entry for investigation by Reclamation. To examine the land and determine which areas could be developed, Reclamation appointed D.W. Ross, formerly Idaho State Engineer, as the agency's District Engineer for the state.[6] By the end of the year, Ross submitted a report outlining the general characteristics of the state's arid region and identifying probable sites for reclamation. In the spring of 1903, Ross dispatched survey crews to run trial canal lines and map potential reservoir sites in the most promising areas.[7]

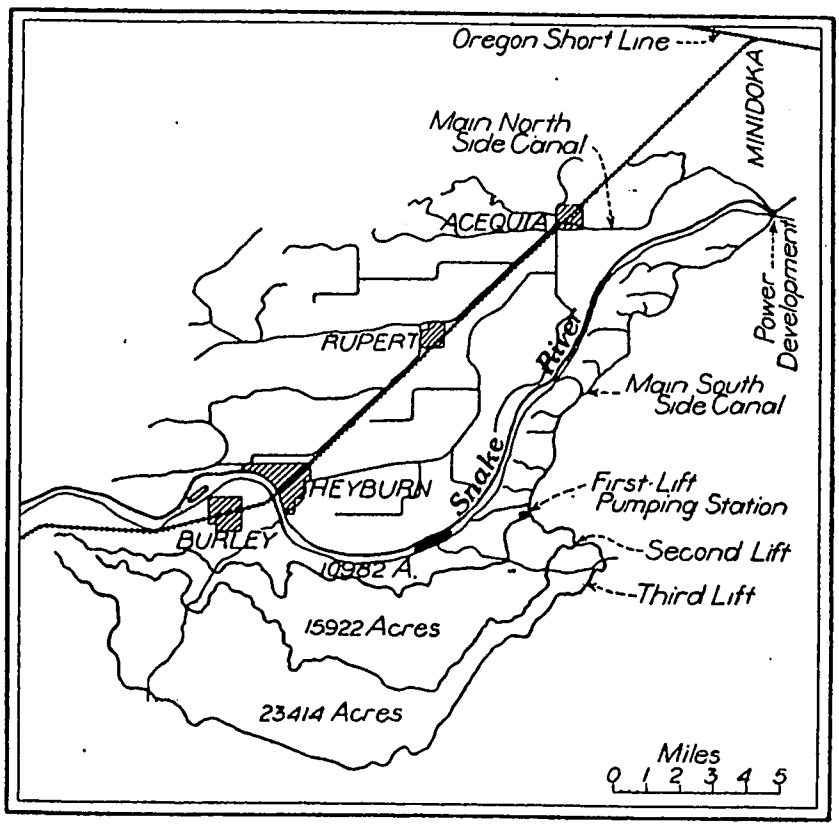

Figure 11 Minidoka Project, from Engineering Record, 19 February 1910.

As Ross reported to Newell at the end of 1902, "The opportunities for the reclamation of arid lands are confined mainly to the southern part of the State, since... the valley lands of the northern end are relatively limited and humid."[8] Although the driest section of the state—receiving on the average less than ten inches of precipitation a year—the southern half is also the site of Idaho's largest watercourse: the Snake River. Arising in western Wyoming, the Snake entered southeastern Idaho in the vicinity of Idaho Falls. At its confluence with Henry's Fork, its first major tributary in the state, the Snake veered southwest and entered the Great Snake River Plains, a broad plateau lying between the mountains of Idaho's northern panhandle and the foothills to the south. The plains were crisscrossed by lava flows and blanketed by a thick layer of broken volcanic rock, ash, and loess. The area was arid and desolate, but seemingly very fertile.

The Snake River traversed the plains on an arcing east-west path. Beginning at Henry's Fork, the river ran southwestward toward present-day Burley and Twin Falls. It then

flowed northwest, eventually joining the Boise and Payette Rivers at the state's western border. American Falls, lying about 90 miles below Henry's Fork, marked the traditional division of the "Upper" and "Lower" Snake River Valley. In the Upper Valley, the Snake ran at nearly the same elevation as the surrounding flood plain. Below American Falls, the river slowly descended into a deep canyon, dropping nearly 800 feet below the surface of the plain by the time it reached the central portion of the state.

European fur traders and missionaries began practicing irrigation in Idaho as early as 1836, but these initial attempts were short-lived. Permanent irrigated settlements appeared in the southeastern area of the state near the border with Utah in the 1860s, as the Mormon Church sent out colonies from the Great Salt Lake basin. Irrigated farms also appeared in the Boise and Payette valleys following the discovery of gold in the region in 1862. These farms proved to be highly profitable, and by the 1880s the Boise River Valley had become the main agricultural center of the state.[9]

Settlement and irrigation spread to the Upper Snake River Valley in the 1880s, following construction of a narrow-gauge railroad through the region in 1879, and completion of the Oregon Shortline through the Snake River Plains in 1884. The low-lying lands of the Upper Valley were easy to irrigate, and settlers, many Mormon, quickly formed water users' associations and canal companies to construct diversion dams and irrigation canals. By the time Reclamation began its investigations in Idaho, Ross reported that nearly all of the irrigable Upper Valley lands had already been developed.[10]

In the Lower Valley, several ranches appeared during the 1870s and 1880s, particularly around Clear Creek, Raft River, and the few other tributaries that joined the Snake in the east/central portion of the state. These ranchers maintained pastures and hay meadows along the river. One such innovative rancher was Henry Schodde, who irrigated bottom land near present-day Minidoka by means of water wheels built on the Snake River.[a] Other than these developments, irrigation did not develop in the Lower Valley to the extent that it had in the Upper Valley. The reason was largely due to the region's geography. Below American Falls, the Snake dropped steadily and the surrounding plains were too high to be watered by simple diversion canals. High dams or pumping systems to lift water above the canyon's rim were needed to water large areas, and their construction was beyond the means of most water users' associations and canal companies.[11]

A major exception to the lack of development in the Lower Valley was the Twin Falls South Side Project, located approximately 60 miles below American Falls. Begun under the Carey Act with the backing of Eastern investors, the Twin Falls Project entailed construction of a dam at present-day Milner and a distribution system to water approximately 60,000 acres on the south side of the Snake River. Construction of the Twin Falls

[a]For views of early Snake River waterwheels, see HAER photos No. ID-16-61 and ID-16-62.

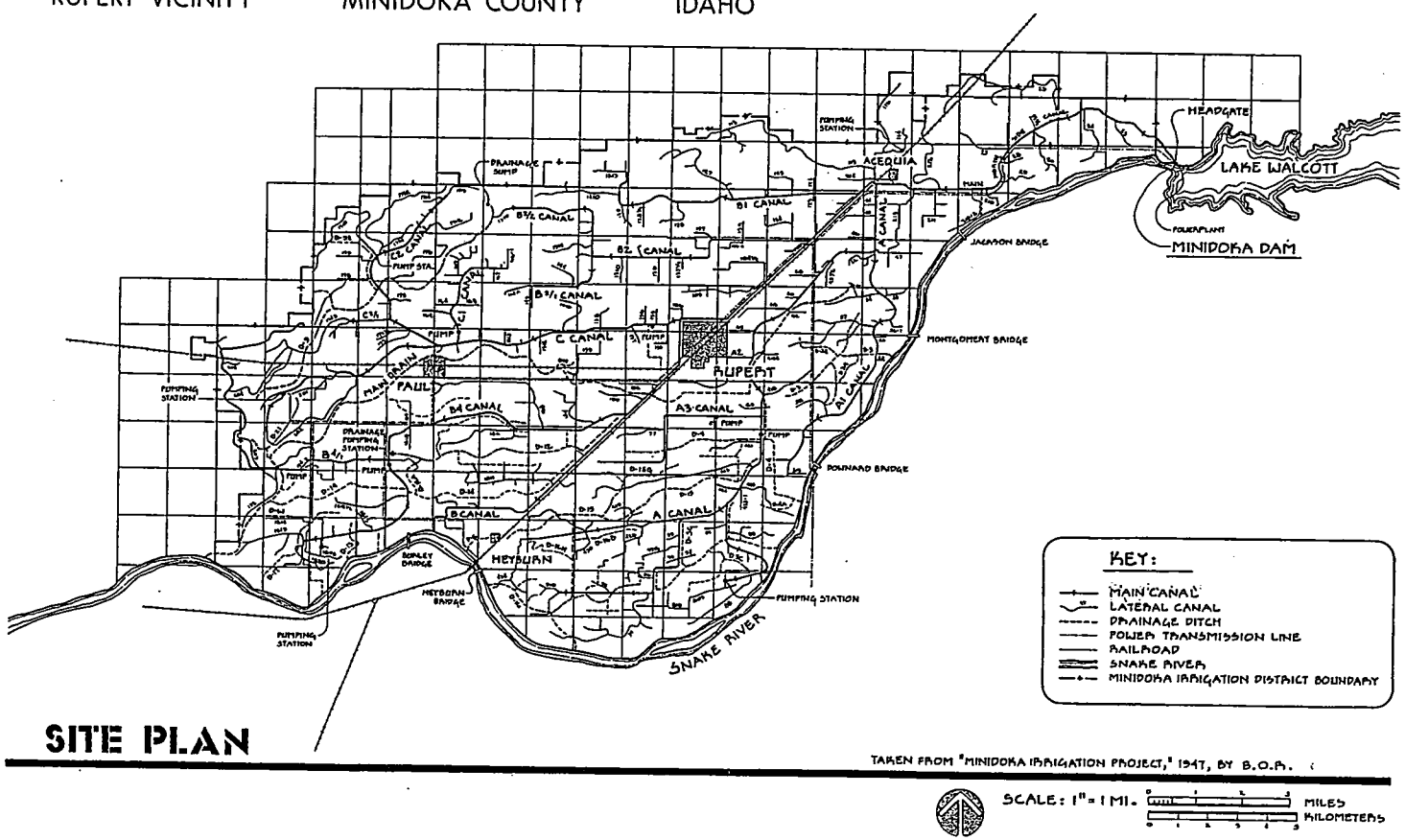

Figure 12. North Side Gravity Division of Minidoka Project, by Clayton Fraser, 2002.

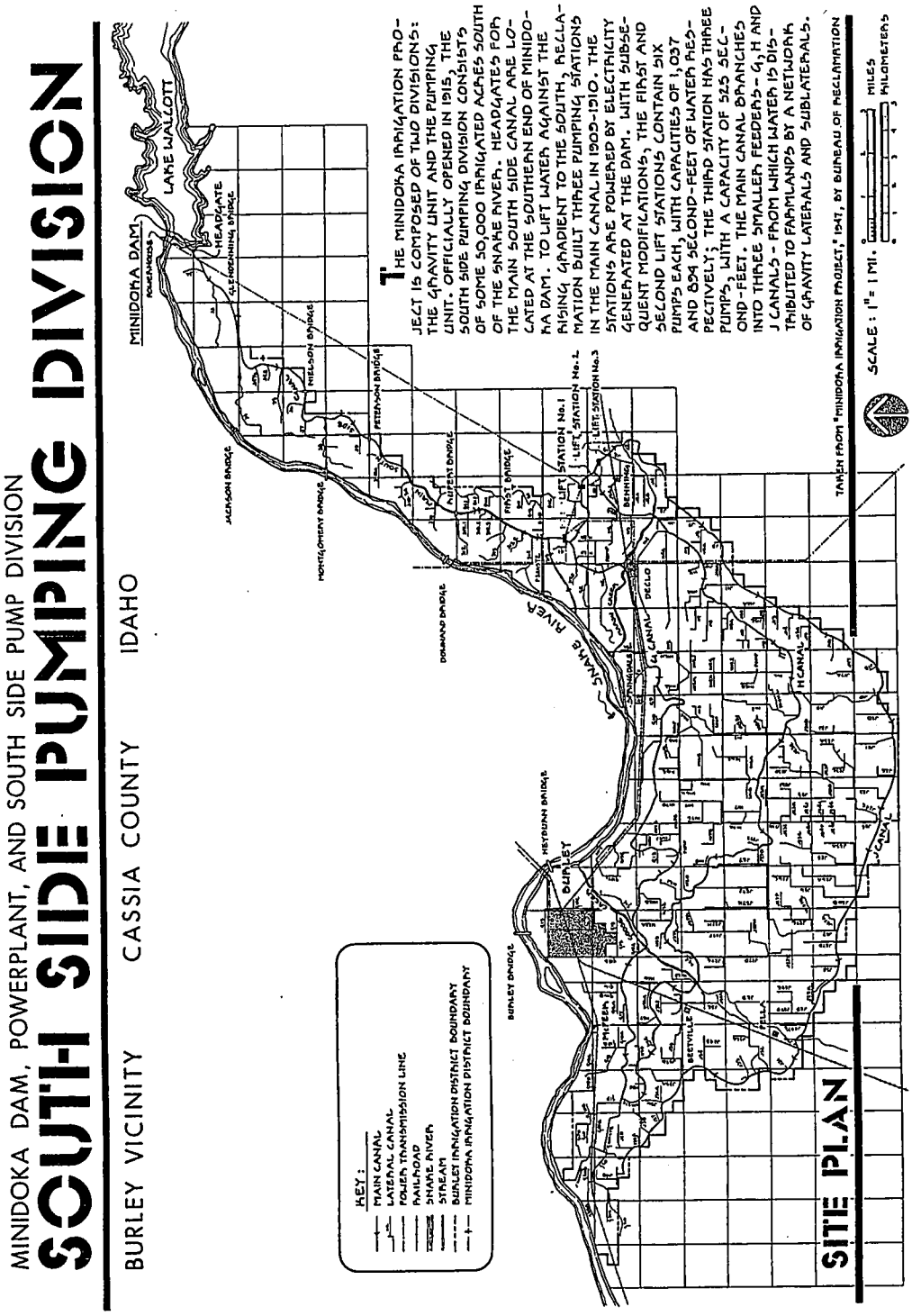

Figure 13. South Side Pumping Division of Minidoka Project, by Clayton Fraser, 2001.

irrigation works began even as Ross started his surveys in 1903, and water was first delivered in 1905. The Twin Falls Project was to be an immediate success, spurring development of numerous other Carey Act projects in the vicinity of Twin Falls.[12]

Another promising site for development lay just above the Twin Falls Project, approximately 40 miles below American Falls.[a] Located near the Minidoka Rapids, the site had been considered by private developers since at least 1888. The USGS had also surveyed the area in 1890, followed by the State in 1895. Based on these earlier studies, Ross declared this "one of the finest tracts of irrigable land in the West," and he dispatched a survey party here in the spring of 1903.[13]

Investigations at Minidoka

Reclamation surveys in the spring and summer of 1903, directed by T.J. Burke, confirmed that there was an excellent damsite at the head of Minidoka Rapids, where the river breached a 37-foot-high lava ridge. A long, narrow bench of irrigable land extended 25 miles downstream on the north side of the river, measuring 12 miles across at its widest point. Containing approximately 60,000 acres, the top of the bench stood 15 to 30 feet above the level of the river. A second bench of land rose steeply north of the lower bench, reaching a height of 60 to 80 feet above the river. On the south side of the Snake, the land was not divided into such clearly defined tiers, but rose steadily toward a range of foothills at the southern edge of the Snake River Plains.[14]

In October 1903, Ross submitted three preliminary plans to develop the Minidoka tract. The first plan called for a dam approximately the same height as the existing lava ridge, thus raising the river level by about 37 feet. This structure would allow Reclamation to water the entire low bench on the north side of the river by simple gravity canals. On the south side, the same method would irrigate only a narrow 6,000-acre strip adjacent to the river. Ross pointed out, however, that a hydroelectric plant could be built at the dam. The power generated could then be used to pump water to higher ground on either the north or south sides. Considering the high quality of the south-side land, Ross recommended building pumping plants to reclaim this area rather than the north side. Given the height of the dam, he estimated that at least 6,240 horsepower could be generated for pumping purposes, raising enough water to irrigate approximately 53,000 acres of south-side land.

The second plan was almost identical to the first, except that the dam was to be eight feet higher. The primary purpose of raising the dam was to increase the amount of power that

[a]For views of Minidoka Falls before construction of Minidoka Dam, see HAER photos ID-16-63 through ID-16-67.

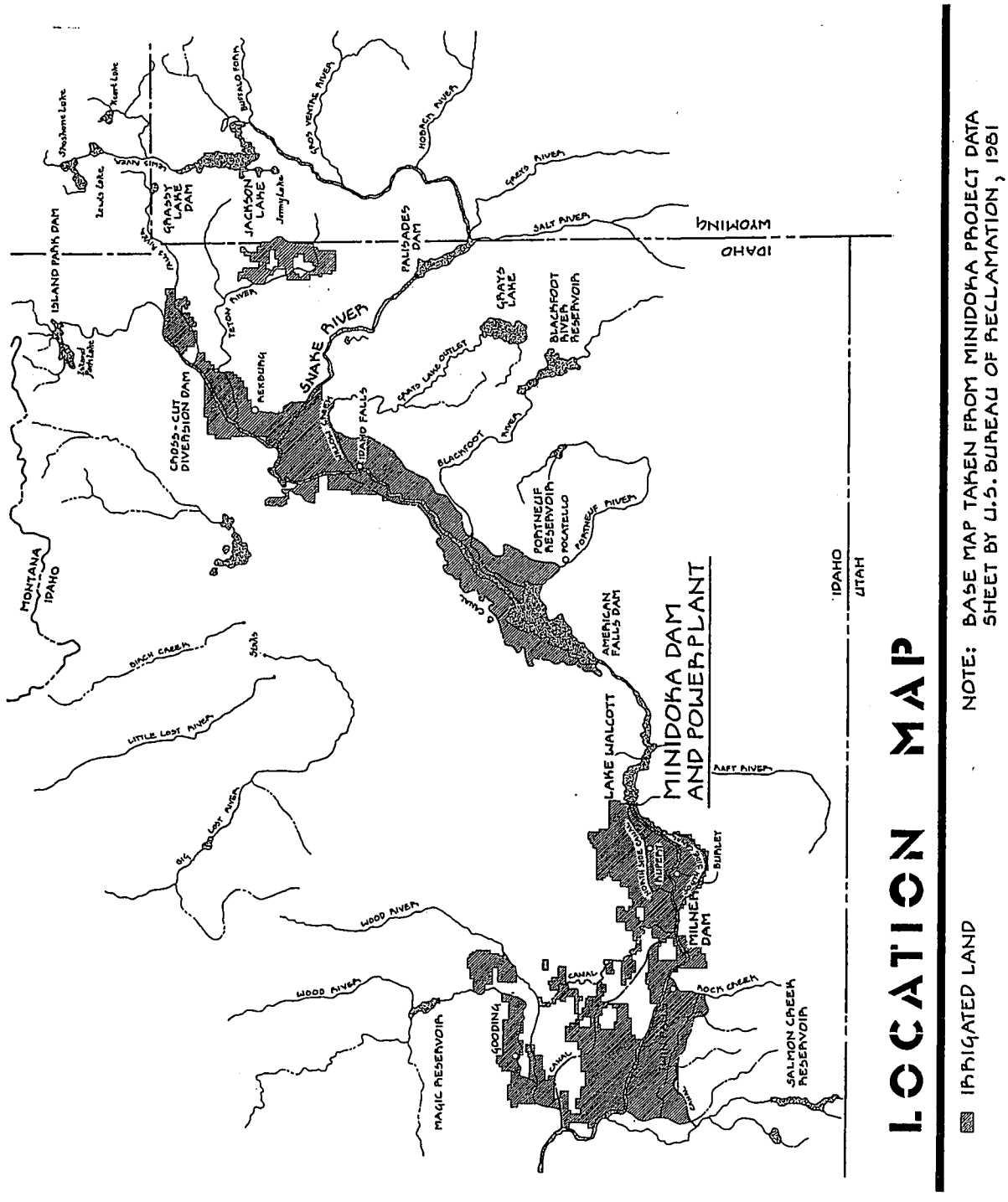

Figure 14. Minidoka Project, by Clayton Fraser, 2001.

could be generated for pumping operations. Ross estimated that the increased head would yield another 2,000 horsepower, enough to reclaim an additional 7,000 to 10,000 acres of south-side land. The final plan called for an even higher dam, raising the river by at least 80 feet. Although the high bench lands on the north side would still be above the reservoir level, at least 35,500 acres of south-side land could be irrigated by gravity. The high dam also would create an enormous power potential capable of generating sufficient electricity to pump irrigate at least 35,000 acres on the high north-side bench and 41,700 acres on the south side.

Although the third scheme promised to develop the most land, Ross doubted its practicality. Building such a high dam would be expensive, requiring a structure measuring at least two-and-one-half miles in length. Instead, Ross recommended the second scheme as the most feasible. This plan would allow all the north-side lands on the first bench to be reclaimed by gravity, in addition to 6,000 acres on the south side. Another 60,000 acres of south-side lands could be developed through pumping, raising the total reclaimed area to about 126,000 acres.

Development of Pump Irrigation

In addition to the Minidoka Project, Reclamation was considering installing pumping systems on the proposed Salt River Project in Arizona and on the Missouri River in western North Dakota. On the Salt River Project, a hydroelectric plant was to power the pumping stations. In North Dakota, Reclamation contemplated building steam power pumping stations fueled by locally available lignite.[15]

Irrigation pumping was not new and had been used extensively in other sections of the United States for at least a decade. On the Great Plains, farmers in Kansas and Nebraska had developed pumping during the early 1890s, supplementing natural rainfall with well water. A wide range of pumping plants were initially used, including steam- and gasoline-driven pumps. By the late 1890s, wind-powered, reciprocating pumps had emerged as the preferred type. Pumping also had developed during the 1890s in the Gulf States of Louisiana and Texas. In these areas, rice growers introduced the technique in order to reclaim lands too high for flood irrigation.[16]

Pumping had also been used extensively in the West by the time Reclamation began its investigations at Minidoka. Arizona farmers began using pumping plants during the early 1890s, particularly along the Yuma River, and in Utah pumps were reportedly in use by the early 1900s.[17] The earliest pumping plants, though, were located in California. A thriving citrus-growing industry had developed in the Sacramento and San Joaquin valleys of that state by the 1880s, relying on water drawn by gravity from the area's streams and lakes. To bring more land into cultivation, farmers became interested in tapping the

aquifer beneath most of the state's central and southern regions. Irrigators began to drill artesian wells by the 1870s, and pumping plants were reported in use by the early 1880s, primarily in the area around San Francisco. By 1890, pumping plants were scattered throughout the central counties of California, supplementing artesian wells and gravity systems. As steam-powered operations, most of these early facilities were hampered by high prices for wood and coal. The economics of pumping improved after oil was discovered in California in the 1890s, and by 1900 pumping plants—the majority fueled by oil—were irrigating nearly 160,000 acres in the state.[18]

During the 1890s, hydroelectricity emerged as another viable source of power for pumping operations. California had a large number of waterpower sites, primarily in the Sierra Nevada along the eastern edge of the state. In 1891, California investors built their first hydroelectric plant near Pomona. By 1900, twenty hydroelectric stations were reportedly in operation.[19] These early hydro installations principally sold power to the large coastal cities for lighting and industrial purposes, transmitting electricity over long, high-voltage transmission lines. Some companies, however, also began selling power to farmers to operate irrigation pumping plants. Many of these early electric pumping plants were located in Tulare County, in the central section of the state. Electric pumping quickly proved to be an excellent commercial load, for its demand was nearly constant throughout the growing season. Electric pumping plants were also more compact and easier to operate and maintain than steam-driven units due to their smaller number of moving parts.[20]

The number of electric pumping projects increased substantially after 1900, due largely to promotional efforts of power companies. One of the largest and most publicized of the electric pumping developments was started by the Kern Land Company in 1901. Drawing power from a hydroelectric plant built by "interests friendly to the land company," the project developed 3,000 acres near Bakersfield by pumping from wells. The undertaking was joined by many others in the southern and central counties. By 1910, pumping, much of it powered by hydroelectricity, supplied water to over 270,000 acres in California.[21]

Although California irrigators established the feasibility of hydroelectric pumping systems, no one had ever attempted to build a pumping project on the scale proposed for the Minidoka Project. Most pumping plants watered only a few hundred acres, and the largest operating projects mentioned in the contemporary engineering press did not exceed 3,000 acres.[22] By contrast, Ross proposed pump irrigating at least 60,000 acres. To supply water to such a large area required pumping plants of an unprecedented size. In 1902, a trade journal reported that "one of the largest pumping plants in the world, and probably the largest using electricity as a motive power" had just been built on Utah Lake, near Salt Lake City. The plant contained four 100-second-foot-capacity pumps.[23] The Minidoka pumping system, according to initial estimates, was to consist of three pumping stations, each with a capacity of over 500 second-feet.[24] Despite its scale, the Minidoka pumping system did not call for any major technological breakthroughs. Rather, it seemed to require the prudent application of established engineering practices.

Decision to Proceed with the Minidoka Project

Although Ross in his 1902 report had referred to the Minidoka Project as one of the most promising irrigation developments in Idaho, if not the entire West, he soon transferred his allegiance to another potential undertaking known as the Payette-Boise Project. This scheme contemplated developing a large tract of land in both the Payette and Boise valleys in the western section of the state. Even while Reclamation was conducting its investigations at Minidoka Rapids in 1903, Ross had another team surveying the western Idaho river valleys. At the end of 1903, Ross reported that the Payette-Boise Project could develop more than 300,000 acres—over twice the area of the Minidoka Project. The Reclamation Fund could not support both undertakings, and Ross made it clear in his report for 1903 that he now preferred the Payette-Boise Project over the Minidoka Project.[25]

Unfortunately, it was not clear whether the Payette-Boise Project could be developed. Most of the land was privately owned, and negotiations with landowners were expected to take considerable time, with no assurance of success. Reclamation, meanwhile, could not afford the luxury of simply suspending work on the Minidoka Project pending the outcome of its negotiations. In January 1904, Ross urgently reported to Newell that the Utah Light and Power Company was considering acquiring and developing a power site at Shoshone Falls, near the Twin Falls Carey Act Project. Speculators had filed on this site in 1901, giving their claims priority over the Government's rights at Minidoka Rapids, which had been filed by Ross in 1903. The flow of the Snake River dropped considerably during the summer months, and if the power company developed its rights at Shoshone Falls, the Minidoka Project would not be able to store enough water for irrigation.[26]

Ross recommended that Reclamation immediately go to court to condemn the power company's rights. Idaho law gave preference to irrigation over power generation, so it seemed likely that Reclamation would prevail. Ross also recommended that the Government immediately build a dam at Minidoka Rapids and construct the main gravity canals. The Shoshone Falls powerplant had not yet been built, and if Reclamation irrigated the Minidoka gravity lands, it could claim first beneficial use of the water and perhaps bolster its argument for condemnation.

As far as Ross was concerned, proceeding with the Minidoka Project did not necessarily preclude developing the Payette-Boise Project. Indeed, Ross recommended continuing negotiations with the Payette-Boise landowners. If the negotiations proved fruitful, then Reclamation could suspend its plans for the Minidoka pumping system, using this money to start the Payette-Boise Project. If negotiations failed, then the pumping system could proceed as planned. Anxious to get the jump on power developers, Ross presented his preliminary estimates and recommendations for the Minidoka Project to Reclamation in March 1904.[27]

Endnotes

[1]On the growing interest in the arid region during the mid-nineteenth century, see Michael C. Robinson, *Water for the West: The Bureau of Reclamation, 1902-1977* (Chicago: Public Works Historical Society, 1979), 3-18; Lawrence B. Lee, "100 Years of Reclamation Historiography," *Pacific Historical Review* 47 (November 1978): 511-519; Ellis L. Armstrong and others, *History of Public Works in the United States, 1776-1976* (Chicago: American Public Works Association, 1978), 303-339.

[2]The USGS surveys are discussed in Lee, "100 Years of Reclamation Historiography," 511-514; U.S. Department of the Interior, U.S. Geological Survey, *First Annual Report of the Reclamation Service, 1902* (Washington, D.C.: Government Printing Office, 1903), 33-37, 48-50.

[3]For an outline of the irrigation movement, see Robinson, *Water for the West*, 13-16; Lee, "100 Years of Reclamation Historiography," 510-519; *First Annual Report of the Reclamation Service, 1902*, 38-40. For discussion of the conservation ideals of the engineers and scientists closely connected with the Federal reclamation program, see Grant McConnell, "The Conservation Movement—Past and Present," *Western Political Quarterly* 7 (1954): 463-478; Timothy O'Riordan, "The Third American Conservation Movement," *Journal of American Conservation* 5 (1971): 155-171; John R. Ross, "Man Over Nature: Origins of the Conservation Movement," *American Studies* 16 (Spring, 1975): 49-62.

[4]For a discussion of the Carey Act in Idaho, see Hugh T. Lovin, "The Carey Act in Idaho, 1895-1925," *Pacific Northwest Quarterly* 78 (October 1987): 122-133.

[5]Beginning in 1902, Reclamation published annual summaries of its activities. Titles varied from year to year, and institutional authorship reflected Reclamation's official name at the time: U.S. Department of the Interior, U.S. Geological Survey (1902-1906); U.S. Department of the Interior, U.S. Reclamation Service (1907-1921/1922); U.S. Department of the Interior, Bureau of Reclamation (1922/1923-present). Henceforth, these various works will be cited as *Annual Report*, year, page.

[6]For a biographical sketch of Douglas William Ross, see *Proceedings of First Conference of Engineers of the Reclamation Service*, ed. F.H. Newell (Washington, D.C.: Government Printing Office, 1904), 340-341. The *Proceedings* (pp. 29-32) also explain Reclamation's basic three-tiered hierarchy of "district," "supervising" and "consulting" engineers:

> In each of the thirteen States and Three Territories named in the reclamation law, there are one or more district engineers, the district being the basis of the organization and embracing an important river basin. The district, for convenience, is designated by the name of the State rather than by that of the river, provided there is only one district recognized in a State. The district engineer has charge of all of the work in his district, and matters are referred to him for report. He corresponds directly with the chief engineer [Newell], prepares quarterly estimates of expenditures, approves all accounts, and is responsible for all Government property. . . .
>
> The supervising engineers are in effect deputies of the chief engineer and possess all requisite authority to execute the work which may be delegated to them. As it is impracticable for any one man to supervise all of the operations of planning and construction, the territory of the

supervising engineers is designated in general terms... The supervising engineers are men of experience in engineering affairs and in executive work....

The consulting engineers are men employed continuously to give advice and suggestions concerning various details of the engineering work. They have few, if any, executive functions, but upon them is placed the responsibility of determining engineering details and policies. They are not limited geographically in their operations, but their sphere of activity is rather in specialization of operations. The consulting engineers are generally organized into boards, as the problems presented in any one locality may fall into various departments of engineering. They travel widely, and meet according to prearranged programme, bringing together such of the men as are believed to be best qualified to pass upon the broad problems met in each project. The supervising and district engineers are usually called in consultation whenever practicable, but the main features are left to the decision of the engineers employed in a consulting capacity.

[7]*Annual Report*, 1902, 160-195; *Annual Report*, 1902-1903, 253.

[8]*Annual Report*, 1902, 162.

[9]For the development of irrigation (and, hence, settlement) in southern Idaho, see Leonard J. Arrington, "Irrigation in the Snake River Valley: An Historical Overview," *Idaho Yesterdays* 30 (Spring/Summer 1986): 3-11; William Darrell Gertsch, "The Upper Snake River Project: A Historical Study of Reclamation and Regional Development, 1890-1930" (Ph.D. diss., University of Washington, 1974), 24-42; Mary Gunnell Lewis, "History of Irrigation Development in Idaho" (M.A. thesis, University of Idaho, 1924).

[10]The impact of railroad construction is noted in Gertsch, 49. Ross discusses the extensive development of the Upper Valley lands in *Annual Report*, 1902, 160-170.

[11]For development in the Lower Valley, see Lewis, "History of Irrigation Development in Idaho"; Gertsch, "The Upper Snake River Project."

[12]Lovin, "The Carey Act in Idaho"; Gertsch, "The Upper Snake River Project," 43-106.

[13]D.W. Ross to F.H. Newell, 29 October 1902, Record Group 115, Entry 3, Box 646, File Number 250, National Archives, Washington, D.C. (henceforth referred to as RG 115, with appropriate entry, box, and file numbers, NA-Washington).

[14]See *Annual Report*, 1902-1903, 251-277, for both a description of the Minidoka lands and Ross's initial irrigation plans.

[15]*Annual Report*, 1902-1903, 51-55, 63-64. For a description of the Salt River system, as built, see M.O. Leighton, "Engineering Construction by the United States Reclamation Service," *New England Water Works Association* 20 (June 1906): 130-137; O.H. Ensign and James M. Gaylord, "Transmission Applied to Irrigation," *American Institute of Electrical Engineers—Proceedings* 30 (25 April 1911): 709-722. On the pumping projects in North Dakota, see C.J. Blanchard, "The Call of the West," *National Geographic Magazine* 20 (May 1909): 433.

[16]A good discussion of irrigation pumping practices throughout the country is provided in U.S. Department of the Interior, U.S. Geological Survey, *Pumping Water for Irrigation*, by Herbert M. Wilson (Washington, D.C.: Government Printing Office, 1896). For specific locales, see the following: H.V. Hinckley, "Pumping Irrigation on the Great Plains," *Engineering Magazine* 11 (April 1896): 16-33; Philip Eastman, "Windmill Irrigation in Kansas," *Review of Reviews* 29 (February 1904): 183-187; U.S. Department of Agriculture, Office of Experiment Stations, *Mechanical Tests of Pumps and Pumping Plants Used for Irrigation and Drainage in Louisiana in 1905 and 1906*, by W.B. Gregory, Bulletin 183 (Washington, D.C.: Government Printing Office, 1907).

[17]"Pumping Water for Irrigation in Arizona," *Engineering News* 31 (31 May 1894): 456; C.W. Arthur, "Irrigation Electric Power Pumping Plant in Utah," *Electrical World and Engineer* 40 (25 October 1902): 659.

[18]For information on pumping in California, see John Richards, "Irrigating Machinery on the Pacific Coast," *Scientific American Supplement* 24 (17 December, 24 December, 1887): 9960-9961, 9975-9977. Also see the 1890 report on the state by the Census Bureau in Congress, House, *Miscellaneous Documents*, 52nd Cong., 1st sess., 1892, Vol. 50, Part 10, 34-70. For the widespread use of oil-fueled plants, and the acreage irrigated by pumping, refer to U.S. Census Office, *Twelfth Census of the United States, Taken in the Year 1900*, vol. 6, part 2, *Agriculture: Crops and Irrigation*, 829-831.

[19]For the development of the power industry in California, see Terry S. Reynolds and Charles Scott, "The Battle Creek Hydroelectric System and the Northern California Power Company, 1900-1919," HAER No. CA-2, 7-20.

[20]See A.G. Wishon, "Irrigation with the Use of Electrical Pumping Plants," typescript of an article published in *Little Farms Magazine*, n.d., in RG 115, Entry 3, Box 188, File Number 433, NA-Washington. The appeal of pumping as a commercial load is touched on in the following articles: "Irrigation Pumping in California," *Electrical World and Engineer* 37 (6 April 1901): 540; Lewis A. Hicks, "Possibilities and Limitations of Electric Pumping," *Journal of Electricity, Power and Gas* 11 (September 1901): 216-219, 222-223; Idem, "A Proposed Transmission for Pumping Purposes," *Journal of Electricity, Power and Gas* 13 (June 1903): 237-243; W.W. Wheeler, "On the Cost of Irrigation by Electrically Driven Pumps from Transmission Services," *Journal of Electricity, Power and Gas* 15 (September 1905): 411-413. On the advantages of electricity for pumping over either gas or steam, see the following: A.T. Maltby, "Electric Pumping," *American Electrician* 9 (May 1897): 159-162; S.H. Bunnell, "The Application of Electric Power to Pumping Machinery," *Engineering Magazine* 16 (December 1898): 429-440; A.J. Bowie, "Electric Pumping for Irrigation," *Electrical World and Engineer* 40 (9 August 1902): 208-211; Idem, "Economic Operation of Electric Irrigation Pumps," *Electrical World and Engineer* 40 (27 December 1902): 1039-1041.

[21]"Electric Power for Irrigation at Bakersfield, California," *Electrical World and Engineer* 37 (6 April 1901): 543-546.

[22]The technical literature occasionally noted that very large pumping projects were in the planning stages, such as a 40,000-acre undertaking by the Summit Lake Water Company in California during the 1890s (Wilson, *Pumping Water for Irrigation*, 51). These mammoth projects apparently were not completed.

[23]Arthur, "Irrigation Electric Power Pumping Plant in Utah," 659.

[24]D.W. Ross, "General Outline of Minidoka Project with Es t i mates of Cost," March 1904, in Minidoka Project Records, U.S. Department of the Interior, Bureau of Reclamation, Burley, Idaho (this collection will henceforth be referred to as BR-Burley).

[25]Ross's recommendations were published in the *Annual Report*, 1902-1903, 251-325. In regard to the Payette-Boise Project, Ross wrote: "I would suggest that this undertaking is worthy of first place in the consideration of feasible irrigation projects in this State" (p. 325). For a further discussion of this issue, see Jeffrey A. Hess, "Deadwood Dam," Historic American Engineering Record (HAER) Report No. ID-18, prepared by Fraserdesign and Hess Roise and Company, 1991, and Fredric L. Quivik and Amy Slaton, "Boise Project, Deer Flat Embankments," Historic American Engineering Record (HAER) Report No. ID-17-B, prepared by Renewable Technologies, 1990; both reports are available at the Library of Congress.

[26]D.W. Ross, "Plans for Power Development on Snake River and Their Relation to Irrigation," January 1904, Minidoka Project Records, U.S. Department of the Interior, Bureau of Reclamation, Minidoka Dam, vicinity of Rupert, Minidoka County, Idaho (collection hereafter referred to as "BR-Minidoka Dam Office").

[27]Ross, "General Outline of Minidoka Project with Estimates of Cost": "I would also recommend that the construction of the power and pumping plants be deferred, pending progress of the work of organization of the land owners of the Payette and Boise Valleys."

3 PLANNING AND CONSTRUCTION OF MINIDOKA DAM

Approval of the Minidoka Project

Early in March 1904, Reclamation's District Engineer for Idaho, D.W. Ross, asked the agency's Chief Engineer, F.H. Newell, to assemble a board of consulting engineers to examine plans for the Minidoka Project. Anxious to begin work, Ross was hoping for speedy approval of his program. But Newell regretfully informed him that no engineers were available to study his estimates. To push the project along, Newell suggested preparing a synopsis of recommendations for cursory review, leaving a more detailed analysis for later.[1]

Ross submitted a "brief outline of the essential features" of the Minidoka Project on 21 March 1904. The report was referred to a hastily assembled review board, composed of A.P. Davis, George Y. Wisner, and H.N. Savage. Demonstrating enviable speed, the board approved Ross's proposal on the same day received. The Secretary of the Interior, E.A. Hitchcock, authorized the Minidoka Project on 23 April 1904, making it the first Federal irrigation project approved in Idaho.[2]

Dam Design

Ross recommended adopting the second plan he had proposed in 1903: building a dam of moderate height and constructing a hydroelectric powerplant to irrigate the high southside lands. To impound and divert the waters of the Snake River, Ross proposed building a rockfill and earthfill dam. This type of structure was a logical choice, for the raw materials were readily available on site. Rockfill dams had first been used extensively in California during the mid-nineteenth century, often in connection with mining operations. The type had gained popularity because it was simple to build, being little more than a uncompacted pile of rocks. One drawback, however, was that the rockfill leaked like a sieve. To make a watertight structure, some type of facing was required. Timber planking backed by hand-laid stone was the most common choice, although concrete, iron sheets, and earth-and-gravel embankments were also used.[3]

Plans for the Minidoka Dam were prepared by a young assistant engineer named John Lucian Savage, who twenty years later would become Reclamation's chief designing engineer for all civil, mechanical, and electrical work.[4] Savage's design was simple and straightforward, requiring no innovations or special feats of engineering. In contrast to

the technological marvels later built by Reclamation, the Minidoka Dam was a fairly modest structure. As eventually built, the dam measured 736 feet between abutments and rose approximately 60 feet above the original level of the river bed. Due to a deep channel near the north shore, the dam had a maximum height above bedrock of 86 feet. In width, the top of the dam measured approximately 25 feet, while the base averaged 300 feet.

The main body of the dam was comprised of loose rockfill for stability, sealed on its upstream face by an earth-and-gravel embankment [see *Figure 15*]. The rockfill had an upstream slope of 1:1 and a downstream slope of 1.5:1. The earth-and-gravel facing had an upstream slope of 3:1, covered by riprap from crest to water line to prevent erosion by waves. To control seepage, Reclamation built pairs of concrete cutoff walls extending into the dam from the abutments. The agency also built a concrete corewall at the upstream toe of the rock fill, running the full length of the dam and rising eight feet above the low water line. This would prevent seepage through the rockfill that could undermine the dam[5]

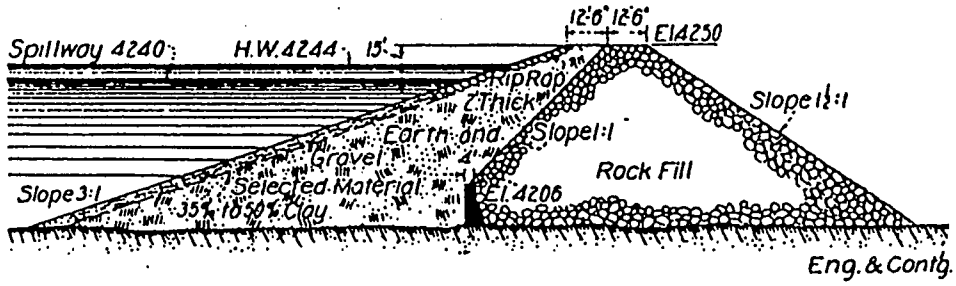

Figure 15. Section through Minidoka Dam, from Engineering and Contracting, 9 April 1913.

Insufficient spillway capacity was a primary cause of dam failures, particularly for erosion-prone earth and rockfill structures. Aware of this, Reclamation carefully designed a large spillway for the Minidoka Dam. The site was ideal in this regard, for a long, low lava ridge to the south provided an excellent foundation for an extremely long spillway. Starting at the south abutment of the dam, a concrete overflow spillway of the ogee weir type was to run southward for approximately 3,000 feet. The headgates for the Main South Side Canal were to be located at the south end of the structure. To divert the flow of the river during construction, Ross proposed excavating a channel around the dam's north abutment. This so-called "diversion channel" was to be controlled by a concrete control structure equipped with sluice gates. Another channel was to be excavated north of the diversion channel for the Main North Side Canal.

Powerplant Location

In a report prepared in 1903, Ross had proposed locating the hydroelectric plant in the diversion channel. This seemed the best site, for the diversion channel was to discharge immediately below the dam into a depression in the river bed that ran straight through the

rapids. Although the level of water in the depression was only slightly higher than the level of the river below the rapids, Ross believed that a large head could still be developed.[6] The only other alternative was to build the powerplant below the rapids. While this would allow full use of the available head, it also required the construction of a half-mile-long forebay canal through solid rock.[7]

In December 1903, Ross discussed his plans for the power site with Reclamation Consulting Engineer J.H. Quinton, who had considerable experience in the construction of power canals.[8] Quinton argued that the powerplant should be located below the rapids, so that the full head could be developed. Pumping operations, after all, would require a large amount of power, and Reclamation needed every foot of fall available. Ross accepted Quinton's advice, and his proposal to the engineering board in March 1904 specified building the powerplant below the rapids. Under this plan, the first several thousand feet of the Main North Side Canal would carry water to the powerhouse, becoming, in effect, a "forebay canal."[9]

On 2 July 1904, an engineering board met in Boise to open bids for construction of the dam, spillway, diversion works, and forebay canal. Neils J. Blagen of Portland, Oregon, was the low bidder at $390,203. A controversy quickly arose, however, over how much rock was to be placed in the dam. The problem stemmed from ambiguous wording in the specifications prepared by Ross.[10] After reviewing the bid documents, Newell himself admitted confusion: "I must confess that after several hours of reading the specifications and letters concerning them. . . , I can not be clear as to what is the actual meaning of these specifications on these points. It will probably take the decision of a court to construe what is the actual meaning."[11]

Although Reclamation admitted the specifications were misleading, it refused to allow the contractor to withdraw his bid without penalty—a privilege that the other bidders probably would have demanded as well. Negotiations with Blagen stretched unsuccessfully through July, hopelessly delaying the project. The protracted contract proceedings, however, had an unintended benefit. During the hiatus, Reclamation engineers were able to look more closely at the proposed siting of the powerplant. In the spring of 1904, Reclamation had appointed electrical engineer H.A. Storrs to develop detailed plans for the plant. After examining topographical maps of the area, Storrs concluded that Quinton's scheme for a downstream powerhouse was less practical than building the structure in the diversion channel as recommended by Ross. Such an arrangement would eliminate the need to excavate both a forebay and tailrace. Because construction specifications using Quinton's powerhouse site had already been advertised, Storrs did not immediately advance his alternative. But with contract negotiations at an impasse in August 1904, Storrs wrote Newell suggesting that Reclamation capitalize on the situation by revising the plans.[12]

Ross examined Storrs' proposal in October. While applauding its simplicity, he pointed out that building a powerplant directly in the river would be extremely difficult, dangerous,

and expensive. However, the proposal encouraged Ross to reexamine his original plan for the plant. On 19 November 1904, he informed A.P. Davis, Newell's second-in-command, that he had decided the powerhouse should be moved, and that he would explain the issue to an engineering board scheduled to meet in late November.[13]

Composed of A.J. Wiley, H.N. Savage, and Storrs, the board met in Boise on 30 November 1904. As he had first suggested in 1903, Ross recommended building the powerplant in the diversion channel so that the diversion control structure would form the powerplant's upstream wall, with the diversion gates serving as penstock openings. The channel below the plant would then function as a tailrace, discharging into the deep section of the river. Ross recommended deepening and widening the channel slightly, to get the fullest fall available through the rapids. He stated that a private irrigation dam, soon to be completed for the Twin Falls Irrigation Project about 20 miles downstream at Milner, would probably submerge the lower section of Minidoka Rapids during periods of high water. Since backwater from Milner Dam would inhibit the development of full head at the Minidoka powerplant if it were built below the rapids, the downstream site no longer had any advantage over the diversion channel location. The board accepted Ross's proposal on 5 December 1904. The new location required a redesign of the diversion control structure, enlarging it to accommodate more gates for use as penstock openings.[14]

Final plans for the diversion channel control works called for a massive, 70-foot-high, reinforced concrete structure, extending from the north end of the dam's concrete corewall to the Main North Side Canal headgates, a distance of approximately 125 feet. The section of the concrete structure within the diversion channel was to be divided into five 10-foot-wide bays, each bay with an 8-by-12-foot sluice gate. Above each sluice gate would be a ten-foot-diameter penstock opening. A five-foot-wide pier separated each bay, braced on the downstream face by a concrete buttress. The five bays located within the diversion channel were flanked by an additional bay to the south, and five bays to the north. The south bay contained openings for two waterwheel-driven exciters. The bays to the north were designed to accommodate additional penstock openings.[15]

Bates and Rogers Company

By the time the new power site had been chosen, Reclamation had withdrawn the old specifications and awarded a new contract for construction of the dam and headworks. Unable to come to an agreement with Blagen, the Government selected the second-lowest bidder, the Bates and Rogers Company. This firm signed a contract on 17 September 1904, agreeing to begin construction within 90 days, and to complete the project within fifteen months, by December 1905.[16] Based in Chicago, the company had been founded by Onward Bates and Walter Alexander Rogers in 1901. Both men were well-respected in engineering circles, and had extensive experience in railroad and concrete construc-

tion. Bates was particularly active in national engineering societies, eventually serving as president of the American Society of Civil Engineers.[17]

The contractors were slow to assemble their construction plant. Equipment did not begin to arrive on site until the second week in November 1904, and the plant was not completed until at least January 1905, a month behind schedule.[18] This delay was partially due to inexperience, for neither Bates nor Rogers had ever been involved in dam construction, and neither appears to have supervised such a large project before. Bates freely admitted this fact when he visited the damsite in October 1904. Instead of being alarmed by the contractor's lack of experience, Ross was impressed by Bates' honesty, which served to reassure him that the project would be done correctly. As the Project Engineer reported to his superiors:

> It is not Mr. Bates' intention to rush into the job with a big outfit, as he very willingly admits there are features in connection with the construction of the dam with which he has had but little experience. It is his plan to begin with a small force, increasing it just as rapidly as he can, or as he plans it safe to do so. It is my opinion that he will not have an outfit on the ground and work underway strictly in accordance with the contract, but I am satisfied that he will make his plans with a view of avoiding any bad breaks and that the plans he adopts will be about the best ones that can be figured out for the purpose.[19]

Construction was also hindered by the area's isolation. All supplies had to be shipped in by railroad, and the nearest depot, Minidoka Station, was over six miles away. The only way to reach the damsite from the station was by a primitive road, reportedly very sandy in places. To compound the contractors' problems, construction materials were also extremely scarce due to a Western building boom.[20]

The plan of construction called for the erection of a cofferdam preparatory to work on the concrete corewall. The cofferdam would divert the river into the diversion channel, and would ultimately be incorporated into the finished dam embankment. The cofferdam consisted of two parallel embankments, the one upstream being formed of earth and gravel, and the lower embankment being rockfill. The earthfill came from a large borrow pit located on the south bank of the Snake River, downstream of the damsite. The fill was loaded into dinky cars, run over the river on a temporary wooden railroad trestle, and dumped. The rockfill for the lower embankment came from excavated materials from the diversion channel, which was built simultaneously with the cofferdam. The rock was dropped into place by two cableways spanning the river.[21]

Ross hoped that the cofferdam would be completed and the river diverted by the end of the summer of 1905.[22] But the work proceeded very slowly; the last gap in the cofferdam was not closed until April 1906.[a] The delay was partially due to accidents and unavoidable

[a]For photos of early construction of the dam, see HAER No. ID-16-68 through 97.

engineering problems. One setback occurred when Bates and Rogers discovered that a twelve-foot-thick sand stratum underlay the lava rock on the north side of the river. The contractors were forced to build retaining walls in the excavations for the diversion channel and the Main North Side Canal to prevent the sand and overlying rock from collapsing into the cuts. Also, a cofferdam built across the mouth of the diversion channel collapsed, destroying a large amount of equipment.[23] The greatest problem, however, proved to be the contractor's construction plant. During the summer of 1905, Bates and Rogers lost valuable time by not quickly replacing an inadequate dredge used in excavating earthfill for the cofferdam. An insufficient number of concrete mixers also delayed work on sections of the corewall built during the winter of 1905-1906.[24]

The slow progress became critical in the spring of 1906. Unless the contractors completed the corewall and raised the dam fill above the river, the annual floods were certain to wash away most of the structure. Early in April 1906, Ross urged Bates and Rogers to increase the tempo of their work and the size of their construction plant:

> The rock fill which has been placed now stands unprotected from high water and nothing but the most vigorous crowding of your work during the next thirty days will in my judgement save it from destruction. . . . Several months ago, as before stated, your attention was called to the serious consequences which might result should you be overtaken by the flood which is now rapidly approaching, and I am fully convinced that the time has now arrived when you will have to sacrifice a small amount in prosecuting this work in order to save yourselves and others from what may be a very serious loss.[25]

Bates and Rogers responded by instituting round-the-clock construction, completing the corewall and rapidly raising the dam's rockfill section. Fortunately, cold weather in the mountains delayed the onset of flooding, giving the contractors more time. By the time the river crested in June 1906, they had raised the rockfill to its ultimate height. Rockfill for the dam was provided by the continued enlargement of the diversion channel, as well as construction of the first 2,000 feet of the Main North Side Canal, also included in Bates and Rogers' contract. Placement of the earth-and-gravel facing continued through the remainder of the summer. Initially, fill was dumped from the wooden trestle upstream of the rock embankment. The water then sluiced the earth into the rockfill, filling the voids and creating a watertight structure. When the level of the fill reached the height of the trestle, tracks were laid directly on top of the rockfill.[26]

The contractors completed work on the diversion structure, the dam, the initial segment of the Main North Side Canal, and the spillway by October 1906, ten months behind initial expectations. Reclamation closed the diversion channel gates on 2 November to begin filling the reservoir behind the dam. By 12 November, the level of the reservoir had risen to within nine feet of the crest of the spillway, and Ross reported that "the rockfill dam is behaving beautifully."[27] Engineers discovered some leakage around the diversion control structure and Main North Side Canal headgates, probably due to the underlying sand

stratum and resulting unstable rock conditions. Reclamation reduced the leakage by extending the North Side cutoff walls and driving a line of sheet piling near the control structure. The Government completed final tests on the dam in February 1907, and the reservoir filled without further incident.[28]

Additional Water Storage

Unallocated natural flow in the Snake River was not sufficient to supply all the water needs of the Minidoka Project. In his initial report of 1903, Ross made it clear that after mid-July practically the entire natural flow of the Snake River would be used by irrigation projects above American Falls. The flow that was left would almost certainly be needed to satisfy the water rights of the Twin Falls South Side Project further downstream. The only solution was to build a storage reservoir further up the Snake River, which would impound water during the winter months and which could be released slowly for Project use during the summer.

Extensive investigations in 1903 located a suitable reservoir site at Jackson Lake in Wyoming, high on the headwaters of the Snake River. Ross estimated that a dam at the mouth of the lake could impound between 198,940 and 684,034 acre-feet of water. Reclamation forces began construction of a temporary dam at Jackson Lake in 1906, and the reservoir started to fill in July 1908. Capable of holding 350,000 acre-feet, the reservoir was not only intended to serve the Minidoka Project, but other irrigation interests along the Snake River as well. In 1907, Reclamation entered into contracts to sell Jackson Lake water to the Twin Falls North Side Project, and the following year it arranged sales to the American Falls Canal and Power Company. A dam failure caused by rotting timbers in the temporary structure forced Reclamation to build a permanent facility at Jackson Lake in 1911.[29]

Estimates and Costs

In his proposal to the consulting board in March 1904, Ross had estimated the total cost of building Minidoka Dam and its associated spillway and diversion control structure to be $429,000. Later, when the consulting board agreed to build the powerhouse on the diversion channel, thereby eliminating the forebay canal, Ross lowered his estimate to approximately $367,000. Despite the anticipated savings, the total cost of construction actually exceeded the original estimate, amounting to about $505,000.[30]

There seem to have been two major reasons for the cost overrun. First, Ross underestimated the amount of work required. In the dam's construction, for example, he had allowed for 70,000 cubic yards of rock, 101,000 cubic yards of earth and gravel, and 1,800

cubic yards of concrete, whereas the actual cubic yardages proved to be about 75,000, 139,000, and 2,700, respectively. Similar deficiencies marred his projections for excavating the diversion channel and constructing the diversion control structure. Based on the unit prices used in estimating each type of work, these miscalculations were responsible for a cost overrun of at least $63,000. The second problem was that Reclamation seems not to have budgeted realistically for its own expenses charged to the project. These costs totaled about $61,000, with 70 percent going for materials and the balance for staff engineering salaries. The bottom line was that the total cost of the Minidoka Dam outstripped the initial estimate by $76,000, and the revised estimate by $138,000.[31]

These higher costs did not seem to concern Reclamation officials at the time of the dam's completion, or at least the engineers made no reference to it in their public reports. Cost overruns were to be repeated on other sections of the project, however, and engineering oversights and miscalculations were to continue. Although Reclamation did not recognize it at the time, the difficulties encountered in the dam construction were not isolated problems, but harbingers of the future.

Endnotes

[1]D.W. Ross to F.H. Newell, 2 March 1904, 10 March 1904; Newell to Ross, 4 March 1904, RG 115, Entry 3, Box 646, File Number 250, NA-Washington. On the role of Reclamation's "consulting engineers," see Chapter 1, fn. 6 of this report.

[2]D.W. Ross to A.P. Davis, George Y. Wisner, and H.N. Savage, 21 March 1904, RG 115, Entry 3, Box 646, File Number 250, NA-Washington; Davis, Wisner, and Savage to F.H. Newell, 21 March 1904, BR-Burley.

[3]J. Barry Cooke and Arthur G. Strassburger, "Rockfill Dams," in *Development of Dam Engineering in the United States*, eds. Eric B. Kollgaard and Wallace L. Chadwick (New York: Pergamon Press, 1988), 887-889; Alfred R. Golze, ed., *Handbook of Dam Engineering* (New York: Van Nostrand Reinhold Company, 1977), 338-339; Edward Wegmann, *The Design and Construction of Dams*, 5th ed. (New York: John Wiley and Sons; London: Chapman and Hall, Limited, 1908), 266-279.

[4]On Savage's career, see Edgar C. McMechen, "The Billion Dollar Engineer," *Reclamation Era* 27 (April 1937): 83-83; *Who Was Who in America*, vol. 4 (Chicago: Marquis-Who's Who, Inc., 1968), 829-830.

[5]C.J. Blanchard, "The Minidoka Irrigation Project, U.S. Reclamation Service," *Engineering Record* 55 (2 March 1907): 244-246; U.S. Department of Agriculture, Office of Experiment Stations, *Timber Dams and Rock-fill Dams*, by Samuel Fortier and F.L. Bixby. Bulletin 249, Part 2 (Washington, D.C.: Government Printing Office, 1912), 57-64; P.M. Fogg, "A History of the Minidoka Project, Idaho, to 1912 Inclusive," typescript, August 1915, 13, in BR-Burley.

After the completion of Minidoka Dam, Reclamation appears to have built only three other earth-faced, rockfilled dams: Avalon Dam, Carlsbad Project, New Mexico, 1907; Clear Lake Dam, Klamath Project, California, 1910; and Elephant Butte Dike, Rio Grande Project, New Mexico, 1916.

(See U.S. Department of the Interior, Bureau of Reclamation, "Statistical Compilation of Storage Dams and Reservoirs on Bureau of Reclamation Projects," 30 June 1969; Idem, "Statistical Compilation of Diversion Dams on Bureau of Reclamation Projects," 30 June 1974; copies of the above reports are located in the Water Resources Center Archives, University of California, Berkeley.)

Though the agency continued to build rockfilled structures, it generally chose to face them with concrete, rather than earth. The high cost of transporting earthfill was one reason for the switch, but Reclamation engineers were also increasingly concerned over seepage through earth facings. Despite concrete corewalls and cutoffs, engineers discovered that water continued to percolate through most dams of this type, creating a serious erosion threat. Reclamation did not return to earth-faced, rockfill construction until after 1940, when a better understanding of soil mechanics and new soils testing procedures enabled engineers to build more watertight dams. Termed "earth core" and "sloping earth core" dams, these structures differed significantly from those built earlier. The earth facings of these later dams were generally much thinner in comparison to the rockfill, and the soil was deposited in carefully "zoned" layers. Whereas the soil for early earth-faced dams was often simply sluiced into placed, in later earth core dams it was generally rolled and compacted. For information on the problems of earth-faced, rockfill dams, and the development of sloping earth core dams, see U.S. Department of the Interior, Bureau of Reclamation, *Development of Earth Dam Design in the Bureau of Reclamation*, by F.C. Walker (n.p.: n.d.), 3-4; Cook and Strassburger, 888-889, 893-897; Golze, 339-354.

[6]Measured in vertical distance of fall, static head is the water pressure generated by the difference in elevation of water above and below the generators.

[7]D.W. Ross, "Progress Report on the Minidoka Irrigation Project," 24 October 1903, BR-Burley.

[8]For a biographical sketch of Quinton, see *Proceedings of First Conference of Reclamation Engineers*, 339.

[9]D.W. Ross to F.H. Newell, 6 October 1904, RG 115, Entry 3, Box 634, File Number 158, NA-Washington; Ross to A.J. Wiley, H.N. Savage, and H.A. Storrs, 30 November 1904, BR-Minidoka Dam Office.

[10]In one section, the specifications stated that "all rock, earth and gravel placed in the dam will be measured in excavation," that is, before it had been removed from the ground. The specifications then went on to stipulate that 110,000 cubic yards of rock would be placed in the dam. Reading this, Blagen had assumed that the amount of rock specified was the volume as measured in the ground, and had prepared his bid accordingly. In actuality, Ross had meant to state that the rockfill would have a volume of 110,000 cubic yards as measured in the dam; the actual volume of the rock in its solid form would be considerably less. The difference was crucial to Blagen, for he had planned to cover a large part of the cost of his plant by the amount of rock excavated. A lower amount of rock meant a significant reduction in his profits, already a thin margin. Ross admitted that the specifications could have been clearer, but he argued that the terms had been carefully explained to all of the contractors in person, including Blagen. See the following documents in RG 115, Entry 3, Box 669, File Number 607B, NA-Washington: Niels J. Blagen to D.W. Ross, 6 July 1904; Ross to F.H. Newell, 22 July 1904; Blagen to Secretary of the Interior, 22 July 1904; Acting Director to Secretary of the Interior, 26 July 1904.

[11]F.H. Newell to D.W. Ross, 22 July 1904, RG 115, Entry 3, Box 669, File Number 607B, NA-Washington.

[12]H.A. Storrs to F.H. Newell, 11 August 1904, RG 115, Entry 3, Box 634, File Number 158, NA-Washington.

[13]D.W. Ross to F.H. Newell, 6 October 1904, RG 115, Entry 3, Box 634, File Number 158, NA-Washington; Ross to A.P. Davis, 19 November 1904, RG 115, Entry 3, Box 646, File Number 250, NA-Washington.

[14]D.W. Ross to A.J. Wiley, H.N. Savage, and H.A. Storrs, 30 November 1904, BR-Minidoka Dam; W.H. Sanders, Savage, Wiley, Ross, and Storrs to Newell, 5 December 1904, RG 115, Entry 3, Box 646, File Number 250, NA-Washington; Ross to Newell, 7 December 1904, RG 115, Entry 3, Box 646, File Number 250, NA-Washington; Storrs to H.N. Savage, 12 December 1904, BR-Minidoka Dam; Ross to H.N. Savage, 16 December 1904, BR-Minidoka Dam; Ross to Storrs, 17 December 1904, BR-Minidoka Dam.

[15]Fortier and Bixby, "Minidoka Dam," 57-64; "The Contractor's Plant and Methods Used on the Minidoka Project," *Engineering Record* 55 (22 June 1907): 733-735. Blanchard, "The Minidoka Irrigation Project, U.S. Reclamation Service," 244-245; Fogg, 13-15, 19; U.S. Reclamation Service, "Final Plans, Concrete Dam in Diversion Channel," January 1907, plans contained in F.C. Horn, "Conditions and General Distribution of Cost," [May 1908?], BR-Minidoka Dam.

[16]F.H. Newell to Secretary of the Interior, 5 August 1904, RG 115, Entry 3, Box 669, File Number 607B, NA-Washington; Fogg, 12; D.W. Ross to F.H. Newell, 7 February 1905, RG 115, Entry 3, Box 669, File Number 607B, NA-Washington; see "To Start the Minidoka Work," *Idaho Daily Statesman*, 18 October 1904, attached to Ross to Newell, 19 October 1904, RG 115, Entry 3, Box 669, File Number 607B, NA-Washington.

[17]T.L. Condron, W.A. Rogers, and Edgar S. Nethercut, "Memoir: Onward Bates," *Journal of the Western Society of Engineers* 41 (December 1936): 372; John W. Leonard, ed., *The Book of Chicagoans* (Chicago: A.N. Marquis & Co., 1905), 495; Idem, *Who's Who in Chicago and Vicinity, 1941* (Chicago: A.N. Marquis, 1941), 64; Obituary for Lester Cushing Rogers, *Chicago Tribune*, 16 February 1972; "Onward Bates, Noted Engineer, Is Dead at 86," *Chicago Tribune*, 5 April 1936.

[18]Refer to the following documents in RG 115, Entry 3, Box 669, File Number 607B, NA-Washington: D.W. Ross to F.H. Newell, 19 October 1904 and 10 November 1904; D.G. Martin, Resident Engineer, to D.W. Ross, 31 January 1905.

[19]D.W. Ross to F.H. Newell, 19 October 1904, RG 115, Entry 3, Box 669, File Number 607B, NA-Washington.

[20]The difficulties in securing and transporting materials are discussed in the following: D.W. Ross to F.H. Newell, 7 February 1905, RG 115, Entry 3, Box 669, File Number 607B, NA-Washington; "The Contractor's Plant and Methods Used on the Minidoka Project," *Engineering Record* 55 (22 June 1907): 733.

[21]Fortier and Bixby, "Timber and Rock-Fill Dams," 57-64; "The Contractor's Plant and Methods Used," *Engineering Record*; Blanchard, "The Minidoka Irrigation Project, U.S. Reclamation Service."

[22]Ross expected to have the river diverted before the end of August 1905. He makes this timeframe clear in a letter to Newell, 26 March 1905, RG 115, Entry 3, Box 669, File Number 607B, NA-Washington. In this communication, Ross discusses a controversy regarding the sluice gates

for the diversion dam. These gates were being manufactured by the Coffin Valve Company of Boston. Earlier in March, a similar set of gates manufactured by the Coffin Valve Company had failed at Milner Dam, just downstream of Minidoka Dam. Reclamation had immediately ordered the contractors to stop building the Minidoka sluice gates until an investigation of the design could be completed. Ross objected, arguing that the Minidoka gates were actually standard designs, and that the failure at Milner had been due to the poor design of the pedestal stems. If the work on the gates were delayed, Ross warned that Bates and Rogers would have to postpone work on the diversion dam. Even with this setback, Ross believed that the river could be diverted by August 1905. Newell approved the decision not to suspend work on the sluice gates; see Ross to Newell, 31 March 1905, RG 115, Entry 3, Box 669, File Number 607B, NA-Washington.

[23]Blanchard, "The Minidoka Irrigation Project, U.S. Reclamation Service"; "The Contractor's Plant and Methods Used," *Engineering Record*; Fortier and Bixby, "Timber Dams and Rock-Fill Dams," 57-64; Fogg, 16-19.

[24]Refer to the following correspondence, contained in RG 115, Entry 3, Box 669, File Number 607B, NA-Washington: F.C. Horn to E.P. Lenahan, 14 April 1905; D.W. Ross to F.H. Newell, 18 and 19 April 1905; Ross to Bates and Rogers Construction Company, 3 April 1906.

[25]D.W. Ross to Bates and Rogers Construction Company, 3 April 1906, RG 115, Entry 3, Box 669, File Number 607B, NA-Washington.

[26]Blanchard, "The Minidoka Irrigation Project, U.S. Reclamation Service"; "The Contractor's Plant and Methods Used," *Engineering Record*; Fortier and Bixby, "Timber Dams and Rock-Fill Dams," 57-64; Fogg, 16-19.

[27]D.W. Ross to A.P. Davis, 12 November 1906, RG 115, Entry 3, Box 646, File Number 250, NA-Washington.

[28]Fogg, 19.

[29]For early planning and construction details of the Jackson Lake Dam, refer to the following: D.W. Ross, "Progress Report on the Minidoka Irrigation Project," 24 October 1903, 36-46, BR-Burley; P.M. Fogg, "History," 40-42. Although the Jackson Lake Reservoir played an important role in the operation of the Minidoka Project, its history is beyond the scope of this study, belonging more properly to an examination of the hydrology and irrigation of the entire Snake River Basin.

[30]D.W. Ross to A.P. Davis, George Y. Wisner, and H.N. Savage, 21 March 1904, BR-Burley; Ross to A.J. Wiley, Savage, and Storrs, 30 November 1904, BR-Minidoka Dam; Ross to F.H. Newell, 28 January 1907, RG 115, Entry 3, Box 646, File Number 250; [Horn], "Conditions and General Distribution of Cost."

[31]Compare the estimates prepared by D.W. Ross in his report to A.J. Wiley, H.N. Savage, and H.A. Storrs (30 November 1904, BR-Minidoka Dam) with the actual amount listed by Fogg's "History" (p. 20). The full financial impact of these miscalculations is difficult to gauge because Reclamation apparently used different accounting systems for estimating the costs and for paying Bates and Rogers for their work. The former was based on unit prices, while the latter involved a type of cost-plus arrangement; see Horn, "Conditions and General Distribution of Cost."

4 CONSTRUCTION OF THE GRAVITY SYSTEM

Postponement of the Pumping System

In his report to the engineering board in 1904, D.W. Ross had recommended delaying construction of the Minidoka powerhouse and pumping system so that money could be diverted to the other main Federal irrigation venture in Idaho—the Payette-Boise Project. If Reclamation chose not to proceed with the Payette-Boise Project, then Ross advocated developing the Minidoka gravity and pumping divisions simultaneously.[1] When Reclamation's engineering board approved the Minidoka Project, it did not specifically address whether or not to delay the pumping division. The issue appears to have been overlooked in the rush to get the project under construction. The Secretary of the Interior's authorization in May 1904 did not offer any further clarification, being little more than a reiteration of the engineering board's recommendation.

Although no official approval had been given to the pumping division, the general impression in Idaho was that it would be built at the same time as the gravity division. This belief was bolstered by the fact that Reclamation in June 1904 submitted plat maps covering both divisions of the project to the General Land Office in Hailey, Idaho. Public notices issued in October and November 1904 also made no distinction between the pumping and gravity divisions, further suggesting that the two were to be opened at the same time. Even Ross acted as if Reclamation had decided to develop the full Minidoka Project. Indeed, evidence suggests that he went so far as to encourage prospective settlers to file on the high south-side lands, declaring them to be the best on the project.[2] The *Burley Bulletin*, a vocal critic of Reclamation, later claimed:

> During the summer of 1904 one might talk with any of the engineers on the project, or any of the reclamation officials in Idaho from the chief on down and invariably he would be told that the project was all right, that the pumping system was as safe and sure as the gravity system, that the lands under the pumping system were very much the better lands.[3]

Certainly, the public's behavior indicated a great deal of faith in Reclamation's good intentions. Hundreds of settlers rushed to file on the Minidoka lands after the project was announced. By the end of 1904, most of the irrigable land on both sides of the river had been claimed.[4]

In October 1904, Ross drew up plans for a residence to house the power system superintendent at the damsite. Arthur P. Davis reviewed and approved the plans in November.[5] In passing, Davis observed that it might not be practical to rely on electricity for lighting and heating because the "power house would not be built for several years."[6] This news came as a bombshell to Ross. "In your letter you state that the power house will not be built for several years," he replied hastily. "I do not understand it this way. It is my understanding that this development will be undertaken right away. I hope there is no misunderstanding in relation to this, but if there is, I think it should be straightened out without delay."[7]

Davis, in turn, was surprised by Ross's confusion. "I did not know that my conception was at variance with yours," he wrote back to Ross. "It has been generally talked among the Consulting Engineers and those acquainted with the conditions of the various projects, and of the funds... that the gravity system should first be put in operation, and the pumping adjunct come somewhat later...." The delay was necessary because the Department of the Interior had authorized over $40 million worth of projects, but the Reclamation Fund contained only $23 million. "The result," wrote Davis, "is that either some of the projects which are ready for construction must be abandoned or they must be cut down to what I have called their lowest terms. . . . In the Minidoka project I have regarded this as the gravity system, leaving the pumping portion until such time as the return of money from irrigated lands will furnish funds for its construction."[8]

The news from Davis was devastating, made all the more so because of recent changes concerning the Payette-Boise Project. Landowners on this project had proved receptive to Reclamation development, but Ross had recently learned that Reclamation was considering suspending work on this undertaking as well. In a letter to Newell, Ross complained that the loss of the Payette-Boise Project and the Minidoka pumping system "would leave Idaho with <u>half</u> a project," meaning only the Minidoka gravity system.[9]

On 30 November 1904, Ross spoke with W.H. Sanders, H.N. Savage, A.J. Wiley, and H.A. Storrs, who had gathered in Boise to discuss project engineering issues. Pointing out that most of the land under the pumping division had been filed upon, Ross warned: "It will readily be seen then that the expectations of the general public, and especially settlers now on the ground, are well in advance of the plans originally made by us."[10]

Although clearly aware of the impending human tragedy, Ross no longer advocated building the Pumping Unit immediately. Instead, he lobbied to begin construction on Payette-Boise. To fund this project, Ross recommended diverting some of the money from the Minidoka Project, specifically the allocation for the pumping system. Only in the event that the Payette-Boise Project were not to be developed did Ross support the idea of beginning construction of the pumping system. He defended this stand by arguing that technical problems would probably delay the Pumping Unit for several years anyway, while only a small amount of money would be needed to start work on the Payette-Boise Pro-

ject. Furthermore, Ross claimed that Payette-Boise was "of greater important to the State than the Minidoka Project." By expending a small amount of money on the Payette-Boise Project now, Ross argued that Reclamation could eventually develop both projects:

> I greatly favor the idea which has been entertained all along in connection with these two projects; that is, that we should take steps as will insure the construction of both systems. A start can be made on the Payette-Boise project which will not involve a very large outlay, but which will subserve the interests of the people and satisfy them for several years, convince them at least that it is not the intention of the Department to drop them coldly. This could be done without greatly interfering with the Minidoka plans, as there are certain features of the Minidoka work which, in the interests of economy and efficiency, should not be pushed without the most careful study. I refer to the pumping system.[11]

The engineering board did not know what to do with such a politically charged issue. Reclamation lacked the money for either project, yet there was strong public sentiment for both. The board's report, issued on 5 December 1904, failed to take a strong stand on the matter. In regard to the Payette-Boise Project, the board simply recommended that Reclamation give the project further study and announce a decision "at the earliest possible date." No concrete recommendation was made regarding the Minidoka power and pumping system either. The board members did agree, however, that "we are of the opinion that the gravity portion of the Minidoka Project should be pushed to completion." Although vague, the report still represented a victory for Ross. It authorized him to continue negotiations over the Payette-Boise Project and definitely established that only the Minidoka Gravity Division was to be built at that time. The board's failure to make any reference to the pumping division served as a *de facto* decision to delay its construction.[12]

Ross immediately set out to secure an official announcement that the Pumping Unit would be suspended in preference to the Payette-Boise Project. In a letter to Newell, he warned that the current plan of delaying the pumping system and dropping the Payette-Boise Project was hazardous, as "a public sentiment will be created which will not be helpful to the Reclamation Service." Instead, Ross recommended that Reclamation convene a review board that would include the Governor and other "leading citizens" to discuss "the policy to be pursued in this state." Ross implied that the board could then announce the pumping system's delay, and the diversion of Minidoka funding to start the Payette-Boise Project. Ross made no reference to the probable outcry from the Minidoka settlers over this news, apparently assuming that public support for the Payette-Boise Project, coupled with the Governor's backing, would mute the criticism.[13]

But Newell objected to Ross's proposals. Starting work on either the pumping system or the Payette-Boise Project was simply not feasible, he said, for the money was not available. He also questioned the idea of including state officials and lay persons on an engineering board: "The project boards . . . are mainly of an engineering character, and it hardly seems feasible to consult with the Governor and leading citizens on such subjects."[14]

Newell's opposition did not deter Ross. On 14 January 1905, he informed Davis that a board of engineers should be assembled in Boise to review plans for the construction of the Minidoka gravity canal system. "In view of the fact that preliminary plans and estimates of the Payette-Boise project will be ready by the date stated," Ross continued, "I would suggest that the same board be instructed to consider said plans and estimates together with the report which I shall prepare of this project with a view of making such recommendations to the Chief Engineer as may be deemed best." Through deft scheduling, Ross thus managed to have a single board appointed with the power to review the Minidoka and Payette-Boise projects together. Even more surprisingly, Ross informed Davis that Charles D. Walcott, Director of the Geological Survey—Reclamation's own oversight agency—had personally invited the Governor and State Engineer to attend the board meeting.[15]

The special review board, composed of Governor F.R. Gooding, State Engineer James Stevenson, Jr., H.N. Savage, Wiley, and Storrs, assembled in Boise on 13 February 1905. Although the meeting went smoothly, controversies quickly developed over the final reports. No doubt irritated that state officials had been included on the board against his wishes, Newell took steps to preserve his authority as Reclamation's Chief Engineer. As Ross later complained to Newell:

> I wish to call your attention to what appears to be a slight misunderstanding, I think, on the part of Mr. Savage in the matter of the Governor and State Engineer's relation to other members of the Board, it being Mr. Savage's idea, quoting the Chief Engineer as his authority, that the Governor and State Engineer were not expected to sign the report; in fact, he stated this to the Governor, who seemed somewhat hurt at the suggestion, remarking to me later on, that he could hardly see the advantage in taking part in the deliberations and voting on the same as was suggested to him in the letter from the Director, if he was not expected to sign the recommendations. I was obliged to take issue with Mr. Savage on this point, and it was finally decided . . . to have the report signed by the Governor and the State Engineer.[16]

Ross did not receive final copies of all the reports until the end of the month. At that time, he was horrified to discover that separate sets had been prepared for the signatures of the engineers and state officials, a tactic, Ross declared, that was "bound to make a farce of the arrangements which I have been to so much pains to bring about."[17] Even more serious, however, was a major change in the text of the report on the Minidoka distribution system. Ross had proposed constructing gravity canals on both the north and south sides of the river. Under his proposal, the south-side canal was only to have a capacity to water the low-lying gravity lands, totaling about 8,000 acres. Original plans had contemplated building a much larger canal, which would supply water to all of the high lands when the pumping plants were built. Ross had argued, however, that construction of a full-size canal, and the rest of the pumping system, should be "contingent upon the decision reached in the Payette-Boise Project."[18]

Although Ross thought he had extracted the board's approval of his proposal, the final report made no mention of the south-side canal at all. The omission was significant. The pumping system delay was still not publicly known, and Ross was fully aware that, once released, the news would trigger a storm of protest. To offset this criticism, Ross had secured the backing of the Governor and State Engineer. Governor Gooding, however, had made it clear that he would only support Ross if a south-side canal were built, thus avoiding the appearance that the south-side settlers had been wholly abandoned. Ross explained the arrangement in a letter to Newell:

> It was this feature of the enterprise [construction of the south-side canal] in which Governor Gooding was particularly interested. The entry-men on the southside lands will, of course, censure the Reclamation Service severely if the pumping plans are not carried out promptly; so to leave out at this time all mention of plans for reclaiming the gravity lands on that side would not be a wise policy; and this was what the Governor had in mind, and what it was understood had been agreed upon.[19]

Ross redrafted the report to include the gravity portion of the south-side canal and submitted it to the other board members for approval. Wiley and Savage signed, but Storrs refused. "I am willing to have the pumping features of the Minidoka project buried temporarily for the good of the other project," he wrote to Ross, "[but] I object to having a tombstone, in the shape of a small gravity system on the south side, erected to mark the place and time of burial." As far as Storrs was concerned, the south-side settlers already on the land deserved to have the pumping system built as quickly as possible. Barring that, they at least deserved to know the truth:

> As regards the settlers on the south side, only one in eight acres under the project on that side can be reached by gravity, and the settlers on the seven-eighths not so covered should be informed whenever any plan of operations for the south side is adopted, whether the building of the pumping system on which they must depend is indefinitely postponed, as would be indicated by building a canal of small section, or is only temporarily postponed, as would be indicated by building the canal of sufficient capacity to supply the pumping system. . . .
>
> The injustice to these settlers will, it seems to me, be still greater and more difficult to explain, if the money returned by settlers on the north side in annual payments . . . is taken from the Minidoka project and applied elsewhere, instead of being used to complete that project. Of course, I understand the settlers have no legal right to demand that the original plans be carried out, but since you give weight in your letter to the feelings that would probably be held and expressed by those people, I have presented my idea of what is due them.[20]

Reclamation accepted the revised report despite Storrs' objections.[21] In March 1905, Ross and the Governor publicly announced that only a gravity system was to be built on the south side of the Minidoka Project, while $1.3 million was to be appropriated for the Payette-Boise Project. Although not explicitly stated, it was generally understood that the money for the new project was being taken from the original Minidoka allotment.[22]

True to Ross's prediction, the announcement provoked considerable outcry from the Minidoka Project settlers. Entrymen claimed that Reclamation had mislead them into settling on the south-side lands and questioned the propriety of using Minidoka funds for another project. As a group of settlers declared in a petition to the Secretary of the Interior:

> We submit that we have settled on our lands in good faith, on the assumption that the Government plans would be carried out, and that we would have water for irrigation within a reasonable time. . . . If the proposed Minidoka plan is abandoned or postponed, it will result in . . . a large majority of cases of the abandonment of our entries, as we will have to make our living elsewhere, thereby causing the loss of our time and expenditure.[23]

Fred R. Reed, editor of the *Burley Bulletin*, was particularly vocal in his charges against Reclamation. Reed had come to the area as a sales agent for the Burley Townsite Company, which owned lots on the south side of the Minidoka Project. The decision to delay the pumping system literally left the Town of Burley high and dry. Angered by this turn of events, Reed charged that the pumping plans had been derailed by a high-level conspiracy between State and Reclamation officials to develop the Payette-Boise lands. Referring to the engineering board that had just met in Boise, Reed claimed:

> There is an 'inner circle' to this so-called board of consulting engineers. This 'inner circle' did not make its conclusions known to the rest of the board until this meeting which closed in Boise February 17, 1905. We will wager a small fortune that before that time no living man ever heard of there being any distinction as between the north and south sides of the Minidoka project. Since then the Excuse Division of the reclamation service has been working overtime to side step from the blame connected with the transfer of this money from the Minidoka to the Boise-Payette project, which left 500 settlers living on arid homesteads on the south side of the Minidoka project for an indefinite period.[24]

Reclamation denied the charges, of course, arguing that it had never officially promised to develop the Minidoka pumping system. This claim was technically true. According to the Reclamation Act, the agency was only authorized to make preliminary studies, while the Secretary of the Interior decided which projects were to be constructed. Although Reclamation had widely publicized its plans to build the pumping system, the Secretary of the Interior had never issued a public notice specifically stating that the pumping lands were to be developed. All of the public notices simply referred vaguely to the Minidoka Project area but did not exactly specify which sections were to be reclaimed. "The Reclamation Service did not change its plans as regards the pumping simply because it had no plans to change," Newell explained, "but on the contrary prepared facts and estimates to be laid before higher authorities for their determination."[25]

Reclamation officials also denied that the pumping system had been suspended because of the Payette-Boise Project. Instead, they claimed that engineering problems related to the design of the pumping plants were the primary reason for the delay. Walcott explained to the Secretary of the Interior: "This [outcry] is evidently the result of a misappre-

hension by the people interested in the Minidoka project. The plans for the pumping devices to irrigate lands above the gravity ditches have not yet been fully matured and the engineers are not yet prepared to recommend the beginning of this portion of the work."[26] Because the pumping division could not be built immediately, Reclamation had decided to use some of the Minidoka appropriation for another project.[27] The real problem, according to Walcott, was not that the Government had changed its plans, but rather that speculators and settlers had unwisely occupied project lands before the area was ready:

> The entire difficulty in this matter arises from the fact that despite the warnings issued by the Department at various times, people have rushed in to settle upon lands long before any water could possibly be furnished. These people now feel disposed to criticize anything which might appear to them as interfering with the furnishing of water to the lands they have taken, regardless of the many considerations affecting the proper development of the project from an engineering and financial standpoint.[28]

Despite Reclamation's claims to the contrary, project correspondence reveals that funding shortages and Ross's desire to proceed with the Payette-Boise Project were the primary factors behind the decision to delay the Minidoka pumping system. In a letter to Newell in February 1905, Storrs made it clear that engineering problems were not a major obstacle in designing the Minidoka pumping system. "I have not yet prepared final plans and estimates," Storrs wrote in regard to the power and pumping system, "owing to the pressure of other work, and more especially to the fact that the construction of power and pumping plants has seemed likely to be deferred indefinitely. . . . I can, however, complete my designs and estimates in a comparatively short time, whenever it is decided to proceed with construction work."[29]

The Secretary of the Interior eventually appointed a special investigator to examine the charges against Reclamation, but the issue was never resolved to the satisfaction of the south-side settlers.[30] No matter who was to blame for the delay, the high south-side lands were destined to remain without water for several years. However, the same engineering board that had authorized the diversion of funds to the Payette-Boise Project also approved the final plans and specifications for the gravity distribution system. Settlers on the low-lying project land, at least, could hope for water within a short period of time.

The Gravity System

Reclamation opened bids to build the gravity system on 15 June 1905. Contracts for the main canals on both the north and south sides were awarded to Orman and Crook of Pueblo, Colorado. The Main North Side Canal measured seven miles in length, while the Main South Side Canal was thirteen miles long. Orman and Crook also contracted to build all of the principal structures for the distribution system, including headworks, drops, turnouts, and bridges. Contracts for the main branch canals on the north side, aggre-

gating over 102 miles in length, were awarded to Hubbard and Carlson of Boise, and to Monarch and Porter of Des Moines, Iowa. All of the contracts were approved by the Secretary of the Interior in July 1905, with work scheduled for completion by June 1906.[31]

Ross hoped that water could be turned into the system to test the canals by late 1906, and that full operations could begin by April 1907, the legal start of the irrigation season. Not only would the early delivery of water regain the goodwill of area settlers, but it would allow the Government to begin collecting payments by the end of the year. Returns were desperately needed, for the Reclamation Fund was nearly exhausted. Due to extremely cold weather during the winter, Reclamation agreed to extend the canal contract deadlines to July 1906. Orman and Crook and Hubbard and Carlson made good progress, the latter fulfilling all their obligations and the former their Main Canal requirements by the end of July. Monarch and Porter, however, experienced repeated delays due to mismanagement. In March 1906, Ross reported that the contractors had completed only 16 percent of their work and were being forced into receivership. Monarch and Porter's bondsmen completed the contract by the end of November 1906.[32]

Despite this delay, Ross was confident that water could still be delivered by the spring of 1907. In November 1906, he informed Newell that the reservoir behind Minidoka Dam, known as Lake Walcott, had been filled, and water was being run through parts of the gravity system. "I am in hopes," he wrote, "that we will be able to prime all of the main canals and branches this fall." He went so far as to declare that "it would be a good idea to have a formal opening early in the spring making it quite an event." Based on Ross's recommendations, the Secretary of the Interior on 9 March 1907 formally announced that water would be delivered by the start of the 1907 growing season.[33]

Unfortunately, Ross began planning his celebrations too soon. Although Orman and Crook had completed its canal work on time, the firm proved much less successful in fulfilling its contract for associated hydraulic structures. The contractors did not even begin work on this phase of the project until the end of May 1906, and by the fall most of the structures were still incomplete. Without the headgates, drops, and turnouts in place, Ross found it impossible to test all of the canals. With disaster looming, Reclamation assembled its own construction crews to build the needed structures. Despite these efforts, the 1907 irrigation season opened with much of the system incomplete.[34]

Ross's superiors were at a loss to understand how work on the distribution system could have fallen so far behind schedule. To determine the extent of the damage, Arthur P. Davis toured the Minidoka Project in April 1907. He was shocked to discover that over 300 structures still needed to be built on the sublaterals. A "serious error has been made," Davis informed Newell, adding, "unless it rains large numbers of people will be left dry, with losses."[35]

The failure to deliver water on time was a major blow to both Project settlers and Reclamation. In a confidential report, Davis declared that it was "a serious blunder, one of the worst I think, yet made by the Reclamation Service. It seems to me utterly inexcusable." The failure to deliver water further undermined the settlers' trust in the Government and all but ruined the prospect of making any collections to replenish the Reclamation Fund that year. Davis summarized the situation by writing:

> This crowning blunder has well-nigh demoralized the project. The service is discredited which suggests and lends plausibility to all the criticisms which faultfinders can invent. It jeopardizes the collections for the current year, by involving a breach of faith on our part, and by depriving most of the settlers of the ability to pay, owing to lack of crops.[36]

Davis placed the blame for the late delivery of water squarely on Ross and his assistants. He particularly criticized Project Engineer G.H. Matthes, who continually had "neglected and ignored" Ross's orders and showed "the grossest incompetence." Matthes had been replaced by James G. Camp in the spring, but before he left, "he apparently took pains to sow dissension among the engineers." Davis reserved his harshest criticisms for Ross, who "has not been in very close touch with the situation on this project, and for a long time no other competent person has been responsible for guiding and pushing the work."[37]

As if the late delivery of water were not trouble enough, Davis found many other problems on the project. At least 10,000 acres of north-side land were too high to be watered by gravity.[38] Settlers were also disgruntled over the Government's decision not to build the sublateral system, which carried water from the main canals to individual farm units. Ross had initially planned to build all of the sublaterals at Government expense, hiring the settlers to do the construction. In September 1906, however, he concluded that there was not enough money to cover the work. Although Reclamation agreed to build some of the more difficult grades, settlers were required to construct their sublaterals at their own expense. Many failed to complete their laterals by spring, compounding the difficulties in delivering water.[39]

All of these controversies marked an inauspicious start to what Ross had once termed the most promising reclamation project in the West. Although Reclamation did finally deliver water to the gravity lands by the 1908 irrigation season, past mistakes clouded its relationship with the settlers. Even the rebirth of plans for the pumping system did little to regain popular support, for its construction, too, was to be marred by more mistakes and misunderstandings.

Endnotes

[1]"I would also recommend that the construction of the power and pumping plants be deferred, pending progress of the work of organization of the land owners of the Payette and Boise Valleys"; Ross to A.P. Davis, George Y. Wisner, and H.N. Savage, 21 March 1904, BR-Burley.

[2]For references to the plats and public notices, see Fogg, 85-88. Ross strenuously denied that he ever told anyone to file on the south-side lands: "In fact I have refused to furnish general information to intending homesteaders; but have referred their letters either to the Hailey land office or to other settlers on the Project"; see Ross to Newell, 3 March 1906, RG 115, Entry 3, Box 634, File Number 158, NA-Washington. Despite this claim, at least nine settlers submitted sworn statements to the Secretary of the Interior that they had spoken with Ross or his assistants about the Minidoka Project and had been assured that the pumping system would be built. B.H. Burgess, for example, wrote: "Before filing upon said farm I sought and had an interview with Mr. D.W. Ross . . . and questioned him concerning the advisability of location under said pump system. Mr. Ross assured me that the land under the pump system would be supplied with water at the same time that the land under the gravity system of the north side of Snake river . . . would receive water. . . . He considered the land under the pump system to be superior to the lands of the other parts of said project. . . ." All of the affidavits are located in Record Group 48, Lands and Railroads Division, Reclamation Projects—Minidoka, Box 30, File Number 5157-1903, NA-Washington.

[3]"Department of the Interior," *Burley Bulletin*, 6 April 1906.

[4]D.W. Ross to A.J. Wiley, H.N. Savage, and H.A. Storrs, 30 November 1904, BR-Minidoka Dam.

[5]See the following correspondence in RG 115, Entry 3, Box 671, File Number 609, NA-Washington: D.W. Ross to F.H. Newell, 22 September 1904, 1 October 1904, 3, 7 November 1904; Newell to Secretary of the Interior, 1 October 1904; Acting Secretary of the Interior to Director of the Geological Survey, 7 October 1904.

[6]A.P. Davis to D.W. Ross, 10 November 1904, RG 115, Entry 3, Box 671, File Number 609, NA-Washington.

[7]D.W. Ross to A.P. Davis, 19 November 1904, RG 115, Entry 3, Box 671, File Number 609, NA-Washington.

[8]A.P. Davis to D.W. Ross, 25 November 1904, RG 115, Entry 3, Box 671, File Number 609, NA-Washington.

[9]This quote is from D.W. Ross to F.H. Newell, 7 December 1904, RG 115, Entry 3, Box 646, File Number 250, NA-Washington. In this letter and the reply, Ross and Newell openly discuss the decision to delay the Payette-Boise Project. For example, Ross states: "If I may judge from a letter recently received from Mr. Davis, the Payette-Boise project will be shelved for an indefinite period of time." Newell then affirms this observation, writing: "The people of Idaho will have no just cause of complaint at the necessary delay in taking up the Boise project" (F.H. Newell to D.W. Ross, 14 December 1904, RG 115, Entry 3, Box 646, File Number 250, NA-Washington).

The fact that Reclamation considered delaying the Payette-Boise Project was apparently never revealed to the public, and later Reclamation accounts make no reference to it. The annual report for 1904 (published in 1905), for example, conveys the impression that Reclamation

remained fully committed to the project, noting with approval the formation of a water users' association and predicting that "formal contracts covering practically all the lands held in private ownership will be entered into with the association before the end of December" (*Annual Report*, 1903-1904, 239). The difference between the public's perception of what Reclamation was planning and what its own officials desired is perplexing, and deserves to be investigated more fully, both in terms of the Payette-Boise Project and the Minidoka pumping division.

[10]D.W. Ross to A.J. Wiley, H.N. Savage, and H.A. Storrs, 30 November 1904, RG 115, Entry 3, Box 646, File Number 250, NA-Washington.

[11]Ibid.

[12]W.H. Sanders, H.N. Savage, A.J. Wiley, D.W. Ross, H.A. Storrs to F.H. Newell, 5 December 1904, RG 115, Entry 3, Box 646, File Number 250, NA-Washington.

[13]D.W. Ross to F.H. Newell, 7 December 1904, RG 115, Entry 3, Box 646, File Number 250, NA-Washington.

[14]F.H. Newell to D.W. Ross, 14 December 1904, RG 115, Entry 3, Box 646, File Number 250, NA-Washington.

[15]D.W. Ross to A.P. Davis, 14 January 1905, RG 115, Entry 3, Box 646, File Number 250, NA-Washington. Ross's ability to stage this coup merits further study; presumably he worked political connections that he had established while serving as Idaho State Engineer.

[16]D.W. Ross to F.H. Newell, 16 February 1905, RG 115, Entry 3, Box 646, File Number 250, NA-Washington.

[17]D.W. Ross to H.A. Storrs, 27 February 1905, RG 115, Entry 3, Box 646, File Number 250, NA-Washington.

[18]In his report to the board ("Estimates and Report on North and South Side Main Canal, and North Side Distribution System, Minidoka Project," 13 February 1905), Ross first calls for the construction of a full-size south-side canal: "The plans proposed herein contemplate the construction of a canal on the south side of the river which will have a capacity of about 800 second-feet. . . . While it will not be feasible to begin the installation of the power and pumping system under this project until the dam and gravity system of canals are completed, and though the full capacity of this canal may not be needed for sometime, owing to the fact that the pumps are not likely to be installed all at one time, but gradually, still it is thought that it will be more economical to construct this canal of full capacity in the beginning" (p. 5). At the end of the report, however, Ross suggests that the pumping and power system not be built, thus freeing "more than $1,000,000, which might be used for the construction of works in some other part of this state." If the pumping system were to be delayed, Ross then recommended building only a small canal for the south side (pp. 7-8). Report is contained in RG 115, Entry 3, Box 646, File Number 250, NA-Washington.

[19]The quote is from D.W. Ross to F.H. Newell, 28 February 1905. Ross received the board's report on either February 26th or 27th, 1905. He immediately wrote H.A. Storrs: "I shall protest against the recommendations made owing to the difference between the draft prepared in my presence and the perfunctory statements contained in the draft signed." The problem was that the south-side canal was "not mentioned at all in the brief suggestions which were finally prepared." See Ross to Storrs, 27 February 1905, RG 115, Entry 3, Box 646, File Number 250, NA-Washington.

Ross refers to the Governor's interest in the south-side canal in two other letters. Writing Storrs on 27 February 1905, Ross declared: "The implication to be drawn from this [the final report] is that we have no intention of reclaiming any lands in Cassia County at the present time, either by means of gravity or by pumping. The Governor asked me particularly about this feature of our plans when I called on him to have him sign the recommendations for the Payette-Boise project, and it was with the understanding that a recommendation had been made to construct a canal large enough to irrigate the lands on the south side of the river that could be watered by gravity, that he gave his support to the plan of diverting some of the Minidoka funds to the Payette-Boise project."

In a second letter to Storrs on 28 February 1905, Ross again referred to his agreement with the Governor: "Our intention in relation to these lands was inquired into by Governor Gooding, as he fully appreciated the storm which would be raised by the settlers on that side of the river as soon as they learned that the plans for the pumping project were deferred. Unless the gravity system is extended on that side there will not be an acre of land reclaimed south of the river, although a large percentage of it has been entered."

Correspondence contained in RG 115, Entry 3, Box 646, File Number 250, NA-Washington.

[20]Storrs makes his position clear in a letter to D.W. Ross, 4 March 1905, RG 115, Entry 3, Box 646, File Number 250, NA-Washington.

[21]The revised final report is postdated 16 February 1905, and signed by H.N. Savage, A.J. Wiley, and D.W. Ross, is located in RG 115, Entry 3, Box 646, File Number 250, NA-Washington.

[22]As F.H. Newell later explained to the Secretary of the Interior: "On March 27, 1905 the sum of $1,300,000 was set aside for the Payette-Boise project in Idaho. It was not stated at that time whether this latter allotment would be deducted from the amount provisionally set aside for the Minidoka project, but in the estimates prepared from time to time it has been tacitly assumed that the $2,600,000 above mentioned included the entire sum for both of the above named projects." 30 June 1906, RG 115, Entry 3, Box 97, File Number 38-b, NA-Washington; also see Fogg, 43. The matter was not fully resolved until 8 January 1906, when the Secretary officially reduced the Minidoka allotment by $1,300,000; see *Annual Report*, 1906, 44.

[23]Petition to the Secretary of the Interior, 3 March 1905, RG 48, Lands and Railroads Division, Box 30, File Number 5157-1903, NA-Washington.

[24]"Department of the Interior," *Burley Bulletin*, 6 April 1906. For background of Fred R. Reed, see S.F. O'Fallon to Secretary of the Interior, 16 March 1906, RG 48, Lands and Railroads Division, Reclamation Projects—Minidoka, Box 30, File Number 5157-1903, NA-Washington.

[25]F.H. Newell to D.W. Ross, 12 March 1906. Newell and Ross discussed, on several occasions, how the Reclamation Act itself seemed to set the stage for public disappointment with Government irrigation planning. On 12 April 1906, Newell wrote Ross: "The Reclamation Act is perhaps defective in that no authority is conferred for making definite statements as to the future. The Reclamation Service, of course, can not do more than make recommendations to the Secretary, and the Secretary is limited by the terms of the Act, which states explicitly that the public notice can not be given until after contracts have been let for the construction of the work." All correspondence is in RG 115, Entry 3, Box 634, File Number 158, NA-Washington.

[26]C.D. Walcott to Secretary of the Interior, 26 April 1905, RG 48, Lands and Railroads Division, Box 30, File Number 5157-1903, NA-Washington.

[27]This chain of logic is also sketched out in A.P. Davis to Burton French, 21 June 1905, RG 115, Entry 3, Box 634, File Number 158, NA-Washington.

[28]C.D. Walcott to Secretary of the Interior, 26 April 1905, RG 48, Lands and Railroads Division, Box 30, File Number 5157-1903, NA-Washington.

[29]H.A. Storrs to F.H. Newell, 11 February 1905, RG 115, Entry 3, Box 634, File Number 158, NA-Washington.

[30]For the report of the special investigator, see S.F. O'Fallon to Secretary of the Interior, 16 March 1906, RG 48, Lands and Railroads Division, Box 30, File Number 5157-1903, NA-Washington.

[31]Fogg, 28-30.

[32]For extension and completion of contracts, see Fogg, 29. For problems with Monarch and Porter, see D.W. Ross to F.H. Newell, 7 March 1906, RG 115, Entry 3, Box 646, File Number 250, NA-Washington.

[33]D.W. Ross to F.H. Newell, 12 November 1906, RG 115, Entry 3, Box 646, File Number 250, NA-Washington. For text of the 9 March 1907 Public Notice, see Fogg, 91-92.

[34]For problems in the completion of the distribution system, see Fogg, 30-32. D.W. Ross also discussed the matter in his letter to F.H. Newell, 12 November 1906, RG 115, Entry 3, Box 646, File Number 250, NA-Washington.

[35]Davis to Newell, 23 April 1907, RG 115, Entry 3, Box 646, File Number 250, NA-Washington.

[36]This quote is from a "personal and confidential" report by A.P. Davis to F.H. Newell, 4 May 1907, RG 115, Entry 3, Box 646, File Number 250, NA-Washington. The report contains a point-by-point discussion of the settlers' grievances on the Minidoka Project. Davis analyzes the late delivery of water and concludes that it was largely the fault of D.W. Ross. He also notes that Ross' character and temperament were responsible for much of the settlers' hostility toward Reclamation. According to Davis, the settlers found Ross to be "discourteous and unwilling to give civil hearing to requests and questions." Davis concluded that based on his own experiences with Ross, the allegations against his character were probably true: "I made no inquiries regarding Mr. Ross' attitude and manner toward the settlers, but the complaints of insolence and discourtesy were numerous and very bitter. From my own observation and experience I am convinced that in the main they are so well-founded as to seriously impair his usefulness in contact with settlers, contractors and the public generally. He is unreasonably sensitive to criticism, and has a quick temper and imperious disposition, which frequently antagonizes his best friends, and leaves them no alternative but to entirely agree with him or to fight him."

[37]Ibid.

[38]The high land is discussed in A.P. Davis and D.W. Ross to F.H. Newell, 1 May 1907, RG 115, Entry 3, Box 646, File Number 250, NA-Washington.

[39]Ross to A.P. Davis, 29 January 1906, 12 February, 15 September 1906, in RG 115, Entry 3, Box 646, File Number 250, NA-Washington.

5 CONSTRUCTION OF THE POWERPLANT AND PUMPING PLANTS

Rebirth of the Power and Pumping System

With the opening of the Gravity Unit, Reclamation discovered that several isolated tracts of north-side land, totaling about 10,000 acres, were too high for gravity irrigation. This had financial implications for the Federal Reclamation Fund. If the lands could not be irrigated, then the portion of Project construction costs prorated to these areas could not be collected. To keep the repayment base intact, D.W. Ross and A.P. Davis in May 1907 suggested that Reclamation construct several small pumping plants on the north side powered by a temporary hydroelectric unit. If the engineers were aware of the irony of building a pumping system for the north-side gravity division while the south-side pumping lands languished in limbo, they made no reference to it.[1]

At the time the Reclamation Act cleared Congress in 1902, no one had carefully considered the economic role of hydroelectric power on irrigation projects. But with the rapid growth of the electric industry in the early 1900s, Reclamation realized that power sales could be a significant source of revenue. In 1906, therefore, Congress authorized the Secretary of the Interior to enter into power contracts on reclamation projects. Leases were not to exceed 10 years, with preference given for municipal uses. In urging approval of the north-side pumping system and temporary power unit, Ross and Davis indicated their awareness of the economic issues involving electric power. Indeed, their argument dwelled less on irrigation imperatives than on the immediate need to initiate power sales in order to establish a client base for the future powerhouse:

> If this small installation cannot be provided, the date at which it will be feasible to make collections from the high lands will be postponed and probably some private corporation will secure franchises for lighting the towns of Rupert, Heyburn, and Burley and for pumping water for domestic use. This will complicate the situation when the day arrives for the sale of power developments from the Minidoka dam and will result in the loss of considerable revenue to the reclamation fund and the Minidoka project.[2]

F.H. Newell, recently promoted from Chief Engineer to Director of Reclamation, agreed with Davis and Ross, and authorized the design of the north-side pumping plants and temporary power unit in the spring of 1907.[3] Within a few months, however, attention shifted rapidly from this undertaking back to the south-side pumping lands, for Ross had overlooked an important consideration. According to Idaho law, water appropriations had to be developed within five years of the date of initial filing. Ross had filed on water rights for

the south-side lands in June 1903, meaning that the rights had to be developed by the summer of 1908. Ross apparently did not focus on this vital point until the fall of 1907. In response, Reclamation suddenly shelved its plans for the north-side pumping plants and announced that—at long last—it would begin the immediate construction of the south-side plants and distribution system.[4]

Reclamation began building the distribution system for the south-side pump division in the spring of 1908. Since a hydroelectric powerplant had not yet been built at Minidoka Dam, a gasoline engine and 16-inch centrifugal pump raised water at the site of Lift Station #1. Although this could only irrigate a few hundred acres of south-side pumping unit land, Reclamation believed that this was sufficient to "prove up" its claim to its water rights. Work began on the temporary plant in March, and the installation delivered its first water on 22 June 1908—one day before the legal deadline, but a year later than any of the south-side settlers had expected. At the end of the irrigation season, Reclamation dismantled the temporary installation and construction finally began on the permanent pumping plants and hydroelectric powerhouse.[5]

Design of the Powerplant

In his report to the engineering board in March 1904, Ross had included a tentative description of the power and pumping system that he had prepared in consultation with engineer J.H. Quinton. This plan called for the construction of three lift stations to irrigate a total of 60,512 acres. At Lift Station #1, a battery of pumps was to raise 540 second-feet of water 24 feet, while a second set of pumps was to lift 158 second-feet of water 25½ feet. Pumps at Lift Station #2 were to raise 522 second-feet of water 28 feet, and Lift Station #3 was to pump 302 second-feet of water 29½ feet. To furnish the operating power, Ross recommended installing three hydroelectric units at Minidoka Dam, each unit to consist of a pair of 48-inch cylinder turbines direct-connected to a 2,500-kilowatt generator.[6]

O.H. Ensign, Reclamation's chief electrical engineer, refined Ross's preliminary plan in July 1904. Concerning the lift stations, Ensign recommended that vertical pumping units attached to either 250- or 500-horsepower motors be used. Vertical units, Ensign observed, required fewer bearings than horizontal units, which made them easier to install and maintain. Vertical arrangements also required less space, permitting the construction of a smaller and less expensive pumping plant. Further, the vertical design ensured that the motors could be set well above the level of the pump pits, safeguarding the equipment in the event of accidental flooding.[7]

Based on Ross's estimates for volume and lift, Ensign estimated that 7,050 horsepower, or approximately 5,400 kilowatts, were required to operate the pumping motors. Assuming

a 10 percent transmission loss from the power generating site to the pumping stations, Ensign reported that the powerplant needed to produce at least 6,000 kilowatts. As the power site had still not been selected in 1904, Ensign could only offer tentative plans for powerplant arrangement. For this facility, he suggested installing four power units, each consisting of a 1,500-kilowatt generator connected to a pair of 3,000-horsepower turbines. Ensign further recommended allowing space for two additional power units to accommodate future expansion of the pumping system. He estimated that a plant measuring 45 by 150 feet could house all six power units, as well as the necessary exciters, governors, and switching equipment.

Plans for the powerplant remained at this stage until the spring of 1907, when Ross instructed Ensign to begin designing the temporary power unit and the north-side pumping plants. Ross initially suggested only 200 kilowatts of capacity to serve the temporary need only, but by late summer Davis encouraged Ensign to plan for the installation of a larger unit that could be incorporated into the permanent powerplant, thus saving the expense of replacement when the full plant was built.[8] These instructions were soon followed by the announcement that construction of the permanent powerplant and south-side pumping plants was to proceed apace.

In designing the permanent power system, Ensign first focused on selecting the best possible arrangement for the power units, as the plant was literally to be built around them. But he also had to design around the constraints of the diversion channel and its control works, built in 1905-1906. In 1905, Reclamation had decided to locate the powerplant on the diversion channel, and had fitted the channel control works with penstock openings. The 10-foot penstock openings were located on 15-foot centers, creating a cramped space. In November 1907, Ensign informed Davis that given the size of the penstock openings and the head available at the site, a 1,000-kilowatt unit would typically be installed. Due to space limitations, however, Ensign doubted whether anything larger than a 750-kilowatt unit could be used. To generate the 6,000 kilowatts required for pumping, at least eight power units would therefore have to be installed. Because only five penstock openings were located over the diversion channel, at least three power units would have to be built on the north bank of the tail race, and the forebay would have to be widened considerably. This plan was highly unattractive because the forebay was located in solid rock, and the additional excavation would be prohibitively expensive.[9]

Ensign, however, had been using standard horizontal power units for his calculations. In January 1908, he shifted his attention to a vertical arrangement for turbine and generator, which required much less room. By the end of the month, he concluded that five 1,200-kilowatt, direct-connected, vertical units could be installed in the space available, although the plant would be "exceedingly crowded."[10] At the time Ensign made his recommendation, direct-connected vertical power units had not yet gained general acceptance. Although direct-connected vertical units had many advantages over horizontal ones, particularly in terms of space savings, their use had been delayed due to technical problems

in supporting the tremendous combined weight of both the turbine and generator. If supported from below, the bearing tended to interfere with the turbine's discharge into the tailrace. The submerged location also made the bearing difficult to inspect and maintain.

The best solution was to support the unit from above, and various top-mounted systems were being developed, usually in the form of roller, cone, or ball thrust bearings, which tended to wear out quickly. Oil films, where the bearing surfaces were separated by a thin film of pressurized oil, seemed promising, but required expensive pressurizing equipment that was difficult to maintain. A solution appeared in 1898, when Albert Kingsbury invented a non-pressurized oil-film bearing, utilizing segmented, moveable bearing plates submerged in a simple oil bath. The rotation of the bearing plates drew an oil film between the surfaces. The thickness of the film varied according to the oil's viscosity, which was controlled by cooling apparatus in the oil reservoir. Drawing on Kingsbury's innovation, engineers soon designed other non-pressurized, oil-film thrust bearings.[11]

With the development of a viable bearing in the early 1900s, vertically arranged, direct-connected power units gradually gained acceptance. The first hydroelectric plant to use this type of arrangement was reportedly put into operation at Sault Ste. Marie, Michigan, in 1905. By 1915, direct-connected, vertical units were considered the "best practice" for hydroelectric facilities. The Minidoka powerplant was thus among the first in the country to use direct-connected, vertically arranged equipment, and its successful operation served to demonstrate the viability of the technology.[12]

In the spring of 1908, Ensign completed specifications for the powerplant equipment and drafted tentative plans for the powerplant building [see *Figure 16*]. According to these general designs, the plant was to incorporate the eight bays at the south end of the diversion control structure. Five of the bays were to be occupied by power units, giving the plant a total capacity of 6,000 kilowatts. Two bays were to be held in reserve for the future installation of two more power units. The remaining bay was to be used for the water-driven exciters, which were required to start the generators [see *Figure 17*]. Although Ensign believed that work could begin immediately on the foundations, he noted that the remainder of the plant could not be finalized until contracts had been awarded for the power units and other equipment. "Immediately upon award of contract for the apparatus," he informed Newell, "we will be able to obtain definite outline drawings from the contractor on the apparatus which he expects to furnish, enabling us to make final layout."[13]

Ensign also turned his attention to the south-side pumping plants. "The problem in a system of this kind," he later recalled in an article co-authored with assistant James M. Gaylord, "is to supply at as high an efficiency as practicable, taking into consideration operating conditions, first cost and maintenance, water in variable quantities with the least liability of shut-down and the least possible operating expense." Ensign recommended installing vertical, double-suction, high-speed, submerged centrifugal pumps.[14]

Ensign's plans embodied the most approved methods of the day. Irrigation pumping had been used extensively in California since the 1890s, and by the 1900s a general consensus had emerged that the arrangement specified by Ensign was the most compact, efficient, and reliable. Some engineers may have questioned the decision to use vertical units because of the complexity of designing a suitable bearing. Most engineers agreed, however, that vertical pumping units were preferable due to their smaller size and the desirability of keeping the motor above the level of the incoming water to preclude flooding. Conventional wisdom also dictated that centrifugal pumps operated most efficiently when fully submerged, a condition that virtually dictated a vertical unit. Submerging the runner of a horizontal pump required a sealed pump chamber equipped with suction tubes and valves that generally proved expensive, inefficient, and space-consuming.[15] To overcome the problem of supporting a vertical pump, Ensign recommended using a modified oil-film bearing at the top of the unit. "This bearing," he explained in a letter to Davis, "may be of such a character that it is entirely supported on a disk or film of oil, but should oil pressure fail, for any cause, it will drop a very infinitesimal amount and come in contact with hardened steel rollers."[16]

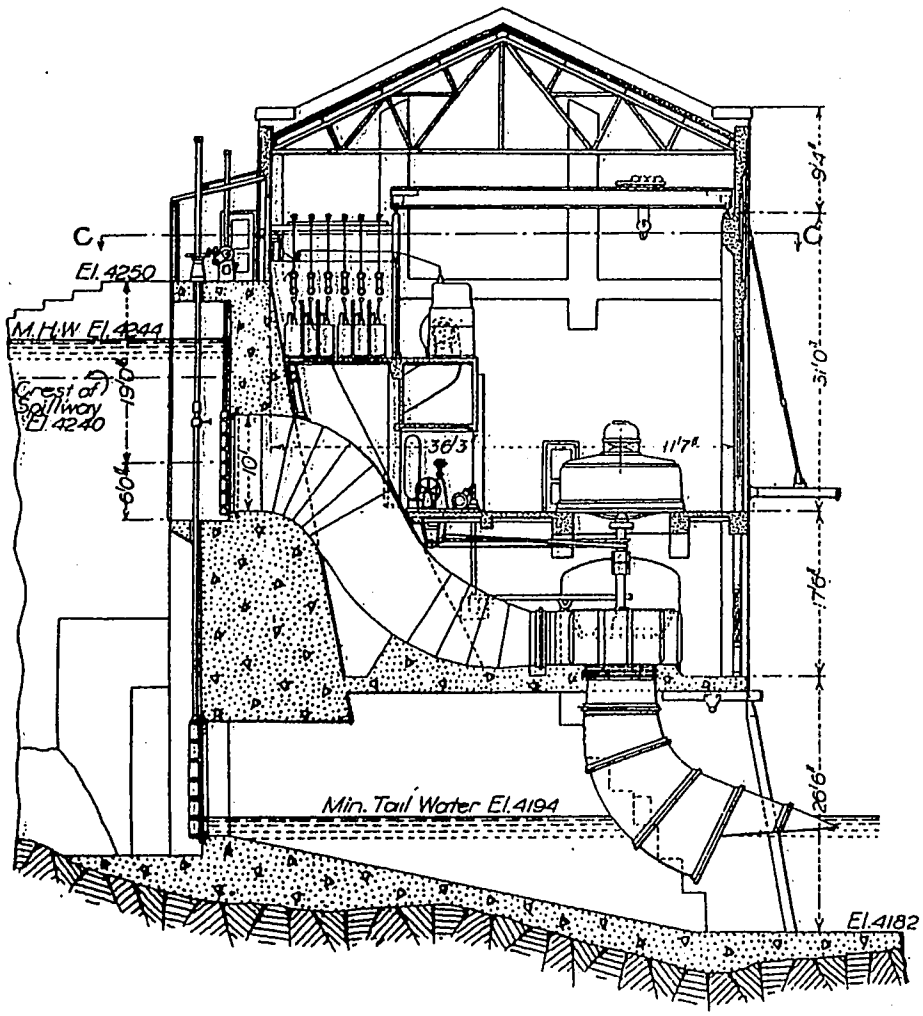

Figure 16. Cross section of Minidoka Powerplant, from U.S. Reclamation Service, 1909.

Most centrifugal pumps employed gate valves, which operated like wicket gates on a ydraulic turbine, to control their rate of discharge. Standard practice also called for the nstallation of check valves in the discharge line to prevent water from reentering the ump in the event of a power failure. Ensign disapproved of the operation of both items. Gate

valves were expensive, difficult to maintain, and frequently interfered with pump discharge even in the open position, reducing efficiency. Furthermore, they decreased ump efficiency by creating friction in the discharge tube. In closing, check valves also tended to create a severe water ram, which could damage the concrete tubes planned for the Minidoka pumping plants.

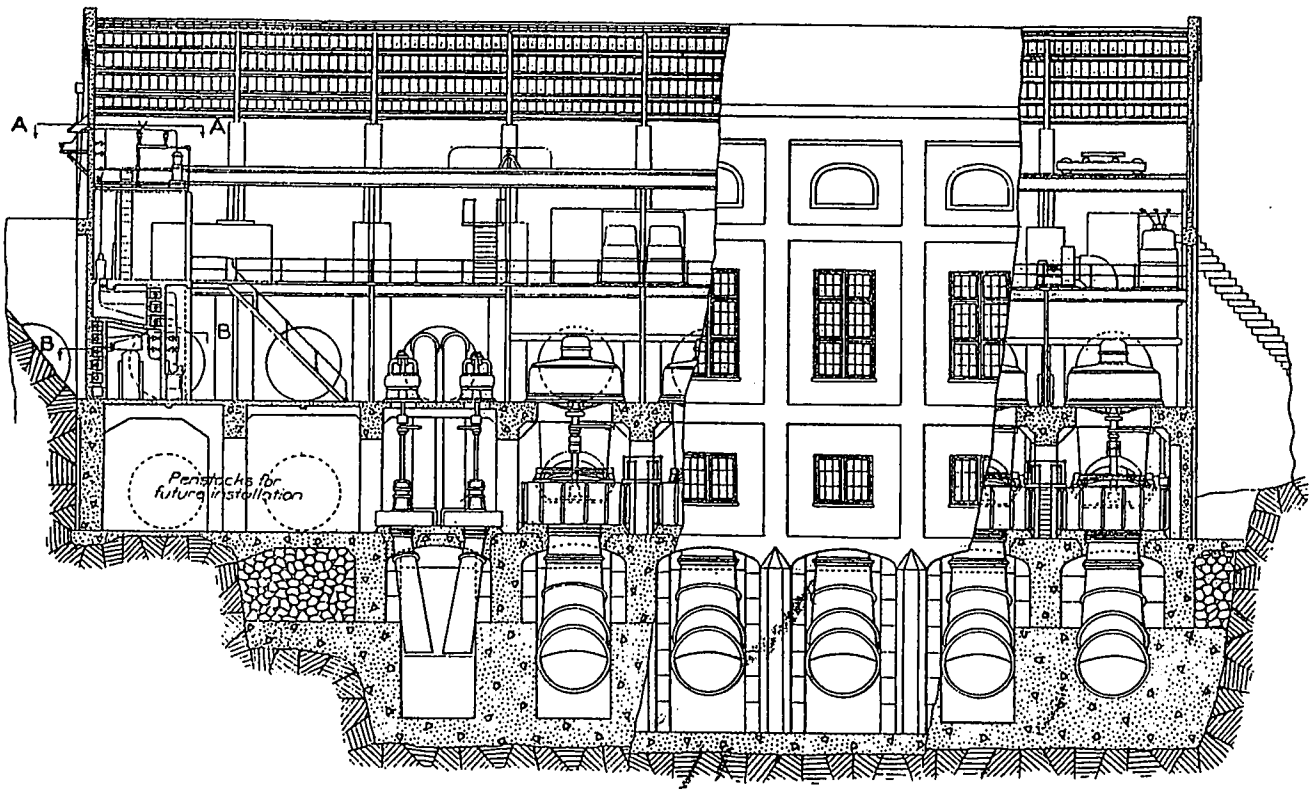

Figure 17. Longitudinal section of Minidoka Powerplant, from U.S. Reclamation Service, 1909.

Ensign proposed replacing both items with a simple cylinder gate. This gate essentially consisted of a metal ring fitted around the periphery of the runner. By raising or lowering the ring, the operator could limit the discharge into the volute, controlling the pump's output. In addition to being much simpler than a gate valve, the cylinder gate in its raised position did not reduce pump efficiency, for it could not interfere with the water leaving the runner. Ensign proposed attaching the gate to a float so that it could also operate as a check valve. In the event of a power failure, water in the discharge tube would run back through the pump into the pump pit. The sudden rise in surface elevation would lift the

float, closing the cylinder gate and preventing more water from running back through the discharge tube and pump. By means of this ingenious combination of standard hydraulic engineering equipment, Ensign believed that he could avoid both the expense and inefficiency of gate and check valves. "In the design submitted," he declared, "we have endeavored to create as near as possible a fool-proof device, and one which offers the simplest possible control and the highest possible efficiency, with a minimum first cost."

Reclamation submitted specifications for the powerhouse and pumping plant equipment to a select group of manufacturers in May 1908.[17] The Government began examining proposals in June and announced its awards in July. The Allis-Chalmers Company of Milwaukee received the contracts to supply the power-unit turbines, thrust bearings, and governors; the exciter turbines; and the pumps for the lift stations. The Westinghouse Electrical Manufacturing Company of Pittsburgh would furnish the majority of electrical equipment, including the power-unit generators and the pumping-unit motors and thrust bearings. Several firms also received minor contracts, including the General Electric Company of Schenectady, New York, for the powerplant exciters; the S. Morgan Smith Company of York, Pennsylvania, for the penstock gates; the Fulton Engine Works of Los Angeles, for the powerplant gate hoists and controls; and the Niles Bement Pond Company of Philadelphia, for the overhead crane in the powerplant. Due to funding shortages, Reclamation could not afford to purchase all of the power and pumping units at once. The contracts, therefore, specified that only one power unit was to be installed in the powerplant, while each lift station was to receive only one pumping unit. The remainder of the equipment was to be purchased and installed as "options" when funds became available.[18]

With contracts awarded, Ensign's division quickly completed final plans for the powerplant and pumping stations. As eventually constructed, the powerhouse was a reinforced-concrete, gable-roofed structure standing 94 feet in height and measuring 50 feet in width, east-to-west, and 150 feet in length, north-to-south. The plant's exterior had few architectural embellishments, save for a grid of pilasters and horizontal bands created by the exposed concrete frame. Other features included industrial sash windows between the pilasters and simple moldings beneath the cornice.[19]

Constructed against the downstream face of the diversion control structure, the powerhouse rested on foundation walls centered on the structure's stepped buttresses. The walls rose 26½ feet above the floor of the tailrace and were joined at the top by segmental arches. Set above the arches, the turbines discharged into draft tubes suspended between the foundation walls. Partition walls centered on the foundation walls rose 17½ feet above the level of the turbines and carried the floor for the generators. The exterior walls of the plant rose above the generator floor, forming a single open space up to the underside of the roof. A gallery sixteen feet above the generator floor ran along the north and east walls of the plant and carried the electrical switching equipment. A second gallery lay a short distance above the first gallery on the north wall and carried the lightening arrester apparatus.

Each penstock opening was screened by a vertical trash rack, with the opening controlled by a 10-foot, 10,000-pound, cast-iron gate manufactured by the S. Morgan Smith Company. Two bronze stems connected each gate to a 6-horsepower electric motor mounted directly overhead on the crest of the diversion control structure. To equalize pressure during opening, each gate was equipped with two small filler gates. The openings to the two exciter turbines were controlled by 1,000-pound cast-iron gates mounted on single stems. All of the penstocks, turbine cases, and draft tubes were manufactured of heavy plate steel.

Between 1909 and 1911, generating units were installed in the five southernmost bays of the powerplant. The units were centered approximately 36 feet from the upstream wall and 11½ feet from the downstream wall of the plant. Each unit was equipped with a 200 r.p.m., vertical, inward flow, axial discharge, single runner, Francis-type turbine built by Allis-Chalmers. Operating under an effective head of 46 feet, the turbines had a rated maximum capacity of 2,000 horsepower. Under its contract, Allis-Chalmers guaranteed that the turbines could operate at an efficiency of 81½ percent at full gate. From half to full gate, the manufacturer promised an average efficiency of 77 percent. Separate oil-pressure governors installed by Allis-Chalmers controlled the speed of each turbine. A vertical shaft direct-connected each turbine to a Westinghouse alternating-current, three-phase, 60-cycle, 2,300-volt, 1,200-kilowatt generator. Westinghouse guaranteed that the generators could operate at an efficiency of 95½ percent. A thrust bearing mounted on top of the generator carried the entire weight of the power unit, amounting to 44,500 pounds. Supplied by Allis-Chalmers, the bearing consisted of two cast-iron plates running in an oil bath. Each plate was incised with channels that drew oil outward across the bearing to form a thin film.

The generators were activated by two exciters located in the sixth bay of the powerplant. For its own power, each exciter unit relied on an Allis-Chalmers turbine of a type identical to those of the larger generating units. General Electric supplied the 125-volt, direct-current, 120-kilowatt exciter generators. During construction, General Electric refused to allow Allis-Chalmers to mount the thrust bearing on top of the exciter generators, as had been done on the power units. Instead, the exciter bearings were placed between the generator and turbine.

Allis-Chalmers air-blast transformers, mounted on the first gallery above the generator floor, stepped up the 2,300-volt current produced by the generators to 33,000 volts for transmission. The transformers were cooled by two motor-driven blowers. The main switchboard for the electrical equipment, supplied by Westinghouse, was located at the north end of the gallery, allowing the operator to overlook the entire generator floor.

Design of the Pumping Unit

As originally planned by Ross, the powerhouse supplied electricity to three lift stations serving the Pumping Unit (or South Side Pump Division). The Main South Side Canal, which extended a total of about thirteen miles, was lined with concrete. The bottom width of a typical maximum section was 57 feet, with the walls rising at a slope of 1.25 to 1. Designed to hold a depth of 7.5 feet of water, the canal's capacity was 1,325 feet a cubic second. Lift Station #1 stood at the end of the Main South Side Canal, approximately twelve miles southwest of Minidoka Dam. It raised water 30.13 feet to a gravity canal that split into two branches a short distance from its head. The secondary branch (the "G" Canal) extended westward for eighteen miles to supply water to approximately 11,000 acres. The main branch ran to Lift Station #2, located 9,000 feet to the southeast. Pumps at this station lifted water 31.95 feet to another gravity canal which also split into two branches. The secondary branch (the "H" Canal) ran westward about twenty-six and one-half miles and supplied water to an additional 16,000 acres, while the main branch ran 4,000 feet southward to Lift Station #3. This facility raised water 30.09 feet to a twenty-five-mile-long gravity canal (the "J" Canal) that irrigated over 23,000 acres. Electricity generated at Minidoka Dam traveled to Lift Station #1 and Lift Station #2 over a single transmission line. Substations at the lift stations then stepped the current down to 2,200 volts for use by the pumps. Lift Station #3 had no transformers, but drew 2,200-volt power directly from the second lift station over a short transmission line.[20]

A long, narrow, gable-roofed, reinforced-concrete building housed the pumping apparatus at the Lift Station #1 [see *Figures 18, 19 and 20*]. Oriented on an east-west axis, the plant was divided into two sections. The eastern section housed the pumping units and measured 18 x 92 feet. The western section housed the electrical apparatus and measured 30½ x 50¼ feet. On the exterior, the plant was ornamented by a simple molding beneath the cornice, and by pilaster strips that marked the divisions of the bays containing the pumping units and transformer banks. Industrial sash windows were once located in the exterior walls, spaced between the pilasters. The sashes have since been removed and the openings blocked flush with the exterior wall.

As originally designed, the pump room contained four 125-second-foot capacity pumping units arranged in a row down the center of the plant. The motors of the pumping units were mounted on the floor of the plant, while the pumps were suspended in separate pumping pits located beneath the floor [see *Figure 21*]. Water entered each pit through two sluice gates set in the north wall of the plant. Each pair of gates was operated by an electric motor mounted on the headgate works. A fifth pit, designed to accommodate a 75-second-foot capacity pumping unit, stood at the far east end of the building. This extra pit was for the eventual reclamation of a so-called "fourth lift," which lay above Lift Station #3's bench lands.

As specified by Ensign, all of the pumping units utilized vertical, double-suction, centrifugal pumps built by Allis-Chalmers. Under its contract, the manufacturer guaranteed that at full capacity, the pumps would operate at an efficiency of 73 percent. The pump runners were fitted with the cylinder gates designed by Ensign, and were controlled by levers set in the floor near each unit. The pumps were direct-connected to 3-phase, 600-horsepower, vertical, Westinghouse synchronous motors operating at a speed of 300 r.p.m. The combined weight of the motor and pump amounted to 16,500 pounds, all of which was carried by a thrust bearing mounted on top of the motor casing. Although Ensign had specified a combination oil-film and roller-bearing unit, Westinghouse initially supplied a ball-bearing thrust bearing. Each pump discharged into a 2-foot, 9-inch diameter, reinforced-concrete pipe. The discharge pipes ran from the south side of the plant uphill to the canal. The upper ends of the discharge pipes held flap valves designed to prevent return flow when the pumps were not operating.

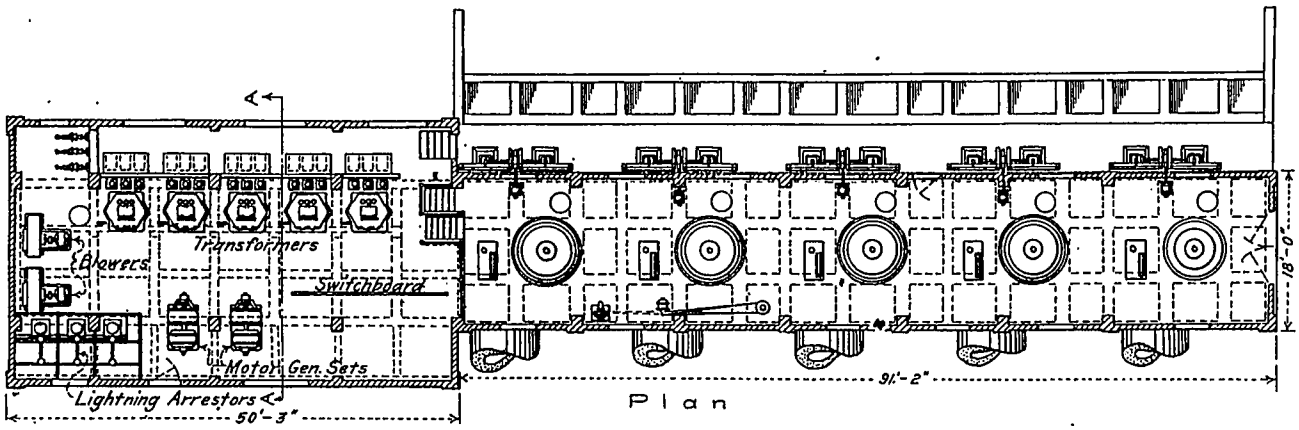

Figure 18. Plan of Lift Station #1, from Engineering-Record, 19 February 1910.

A drainage pipe connected all of the pump pits to a central sump equipped with a 6-inch centrifugal pump capable of draining each pit in 20 to 30 minutes. This procedure allowed the pump-unit motor to be started without load. Once the unit reached full speed and synchronization, operators opened the sluice gates to allow water gradually back into the pit. Reclamation eventually concluded that this start-up was too slow. Each pump therefore received a by-pass valve allowing it to empty its own pumping pit back into the forebay while running off the compensator. By this arrangement, each pump could be started within two minutes.

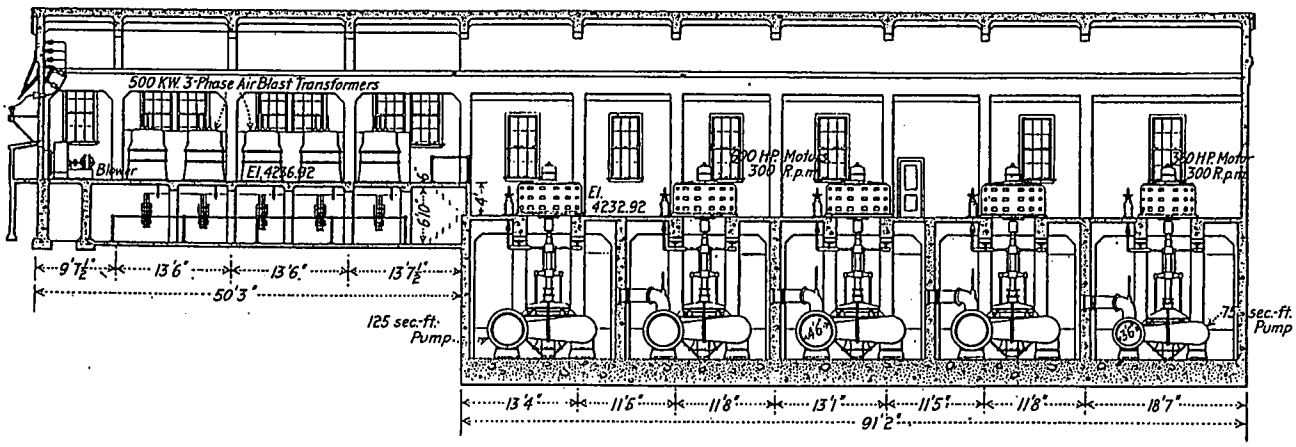

Figure 19. Longitudinal section of Lift Station #1, from Engineering-Record, 19 February 1910.

The western end of the plant housing the electrical equipment was open to the pumping section. All of the electrical apparatus was mounted on a four-foot-high platform, creating a split level. The plant contained five three-phase, 500-kw, air-blast transformers that stepped down incoming current from 33,000 to 2,200 volts. The system also included a sixth transformer for decreasing the 2,200-volt current to 220 volts, for use by an auxiliary pump and lighting circuits. Two Sturtevant blowers installed against the western wall provided air for cooling purposes.

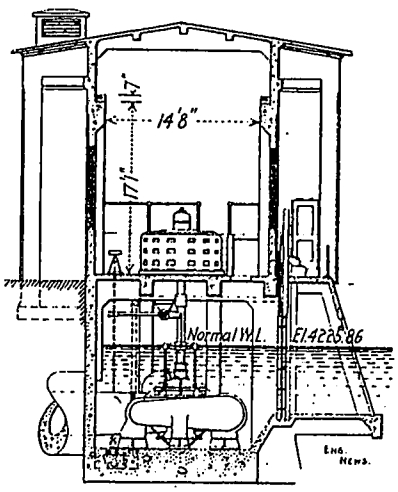

Figure 20 Cross section of Lift Station #1, from Engineering-Record, 19 February 1910.

Lift Station #2 was originally almost identical to Lift Station #1. Sited on an east-west axis, the eastern pumping section measured 18 by 73 feet, while the western electrical section measured 30½ by 55 feet. The pump room contained three 125-second-foot capacity units, with an extra pit for a 75-second-foot pump. To step down current for its own pumps and those at the Third Lift Station, the electrical sectio contained six 500-kw, three-phase transformers.

Lift Station #3 consisted of an 18-by-75½-foot, reinforced-concrete building of the same general appearance and design found at the first two lifts. It was equipped with a 125-second-foot and a 75-second-foot pumping unit, as well as an additional pit for an extra 125-second-foot pump.

Construction of the Powerplant and Pumping Plants

Ensign held overall responsibility for construction of the pumping plants and powerplant.[a] He was assisted on the former by Project Engineer James G. Camp and on the latter by R.B. Keese. Excavation of the powerplant foundations and the enlargement of the tailrace began in July 1908 and was completed by the fall. Over the following winter, Ensign pushed the government crews to complete the powerplant building to the level of the generator floor and the pumping plants to the level of the motor floor. "It is our plan," Ensign explained to Newell, "to only do just that amount of concrete work necessary to support water wheels and generators at the power station, and furnish a foundation for them, and to support pump and motor at pump plants, including all that portion of the work which is below the surface of the ground, and will be submerged by water and the necessary gates to control entrance of water to pump pits."[21]

Long spells of sub-zero temperatures complicated construction, forcing crews to light brush fires to keep the curing concrete warm. Work was also hindered by the manufacturers, who continually requested extensions on nearly all of the contracted items. S. Morgan Smith and Company proved particularly tardy in its contract for the penstock gates due to problems in fabricating the bronze control stems. When the company finally delivered the first two gates in the spring of 1909, Ensign reported that both had cracked during shipment because of misloading. One gate was repaired and installed, while the company eventually replaced the other. Delays also plagued work on the pumping plants. Although Ensign had completed plans for these buildings in October 1908, Camp failed to organize his crews until nearly a month later. Work on the Second Lift Station was especially difficult, for the building site was solid rock, re-

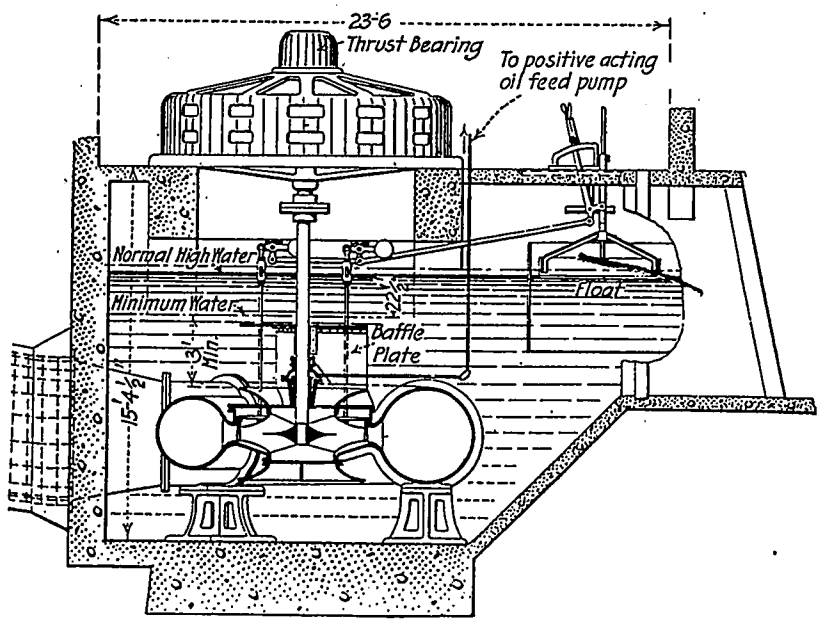

Figure 21 Typical lift pump on Minidoka Project, from Power, 30 March 1915.

[a]For photos of Powerplant under construction, see HAER No. ID-16-99 through 113.

quiring extensive blasting. Through deft scheduling and acerbic harangues, Ensign nevertheless succeeded in hurrying all of the work to completion on schedule. By May 1909, the first power unit had been installed in the powerplant, and the initial pumping units had been placed in each of the lift stations. "We will undoubtedly be ready to furnish Mr. Camp with water," Ensign informed Newell, "wherever his canals and pressure pipes are ready to receive it, on May 1st, the date set by him, on which water will be needed."[22]

Reclamation began to operate Lift Station #1on 9 May 1909, delivering water on a rental basis to approximately 3,600 acres of the south-side pumping lands. The charge for water was set at $1 per acre-foot. Continuing construction even while the plants were in operation, Reclamation completed the powerhouse building in June, the Third Lift Station in August, the Second Lift in October, and the First Lift in November.[23]

Construction continued through the winter of 1909-1910, when Reclamation exercised its options to purchase more pumping and power units. By the spring, the Government had installed the second and third power units at the dam, as well as four more 125-second-foot pumping units. Crews placed two of these pumps in Lift Station #1 and installed additional units in Lift Station #2 and Lift Station #3. The new equipment permitted delivery of water on a rental basis to 11,000 acres during the 1910 irrigation season. Reclamation completed its planned installations at the powerhouse and pumping stations during the winter of 1910-1911. During the 1911 irrigation season, approximately 20,000 acres received water on the south-side pumping system.[24]

Although Reclamation was generally satisfied with the operation of the pumping equipment, it discovered several minor problems during the first three seasons. "I have just returned from Minidoka where everything seems to be running very nicely," Ensign reported to Newell in July 1910. "The only thing to really find fault with is the manner in which the cylinder gates on the pumps operate."[25] The gates were controlled by a hand lever which, Ensign admitted, could only be operated by two men or "one stout man . . . if he is very careful."[26] The lever did not provide sufficient control, creating wild oscillations in the gate if it were moved too rapidly. To correct the problem, Reclamation replaced the lever with a more manageable screw-mounted hand wheel. The thrust bearings provided by Westinghouse for the pumping units also did not operate satisfactorily, for the ball bearings created too much friction. After 1911, Westinghouse replaced all the ball bearings in the 125-second-foot pumps with roller bearings. The 75-second-foot pumps continued to operate with ball-bearing units until 1919, when Reclamation installed General Electric spring-type thrust bearings. In 1923, Reclamation began to replace all of the roller bearings in the large units with a simpler type of oil-film bearing.[27]

The most serious problem proved to be the capacity and efficiency of the power-unit turbines. Partial tests conducted on the first unit in 1909 indicated that the turbine had a lower output at full gate than at 77-percent gate. Reclamation could not conduct further tests to determine the cause of the problem, however, because it had to lower the reservoir

at the end of the summer to work on the dam spillway. When ice build-up made it impossible to conduct tests the following winter, the second and third units were built without any clear information on the cause of the problems in the first unit. Further tests in 1910 showed that turbulence in the turbine cases of all three units was lowering capacity and efficiency. In September 1910, Allis-Chalmers submitted new runner and turbine-case designs, which Reclamation ordered for the fourth and fifth power units. Rather than replace the first three units completely, Reclamation allowed the manufacturer to install new runners in the existing cases. "This," Ensign explained to Newell, "will result in there being two units in our plant which will be slightly different from the others but not in the parts which are likely to be frequently renewed."[28]

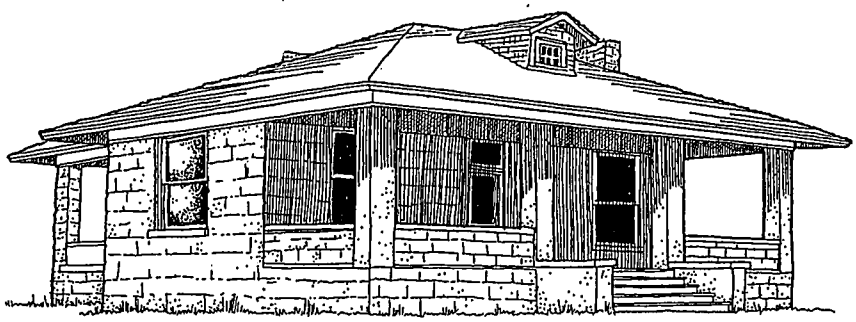

Figure 22 Sketch of Superintendent's House, by Clayton Fraser, 1994.

Reclamation ran tests on the new equipment in 1911, and Ensign happily reported that "the Allis-Chalmers Company have certainly redeemed themselves on this job."[29] The engineers concluded that the first three units had capacities of 2,049 horsepower at an efficiency of 81½ percent. The fourth and fifth units, installed in new turbine cases, performed slightly better, with capacities of 2,070 horsepower at 82 percent efficiency. The improvements to the units gave the plant an overall capacity of more than 10,000 horsepower, or approximately 7,000 kilowatts at the normal head of 46 feet.[30] Capacity was actually even higher, for during the winter of 1909-1910, Reclamation had raised the dam spillway by constructing piers fitted with stop logs. Although the raising was primarily done to increase the capacity of Lake Walcott for use as an equalizing reservoir, it also increased the power head by four to five feet. Due to the higher head, the plant could potentially produce up to 8,000 kilowatts, although fluctuations in the lake elevation made it practical to produce only 7,800 kilowatts.[31]

Ancillary Facilities

For operation and maintenance, the power and pumping works required a variety of support facilities. The largest number were at the damsite, where Reclamation built a housing and shop complex to serve the powerhouse and irrigation control works. The staff housing camp dated from 1908, when Reclamation provided living quarters for the

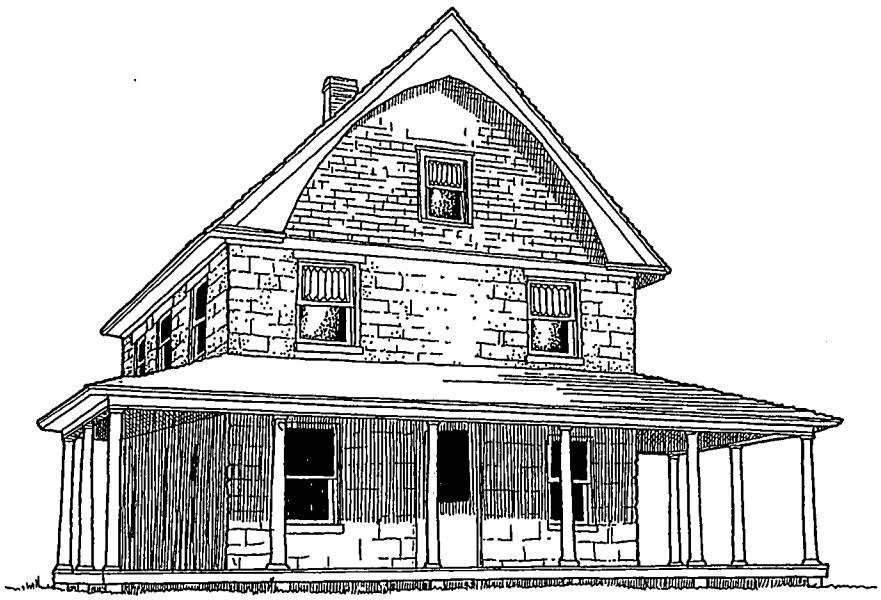

Figure 23 Sketch of Operator's House / Mess House, by Clayton Fraser, 1994.

head-gate operator of the Main North Side Canal. Located several hundred feet northeast of the powerplant site, this building was a one-story, hipped-roof, lava-rock bungalow [see *Figure 22*]. Following completion of the powerhouse in 1909, Reclamation added another lava-rock bungalow for the Power Superintendent and a dormitory/mess hall for powerhouse operators [see *Figure 23*]. By 1913, the housing camp contained nine residences, as well as several storage sheds and outbuildings [see *Figure 24*].[32]

The shop complex at the dam was built just northeast of the powerplant, separated from the housing camp by the Main North Side Canal. The first permanent structure, completed at a cost of $9,023 in 1913, was a combined Office, Shop, and Storehouse.[b] Designed by the Reclamation engineering staff, the two-story, flat-roofed, reinforced-concrete structure measured approximately 30 by 72 feet. In 1915, Reclamation expanded its maintenance facilities by erecting a one-story, gable-roofed Blacksmith Shop and Garage, measuring 40 by 55 feet.[c] Unlike the earlier building, this structure was designed by a private architect, Ernest H. Gates of Twin Falls. Although its plastered exterior resembled concrete construction, the new building sported a structural steel frame with walls of metal lath. It was completed for a cost of $5,604.[33] Over time, a number of other ancillary structures were built below the principal structures. They were primarily used for equipment and material storage and maintenance shops. By 1999, all had been removed.

Housing and shop compounds were common on Reclamation projects because of the generally remote location of the irrigation works. If this was true for the Minidoka Powerplant, it was even more so for the pumping stations, which were about ten miles from the

[b]For photos, see HAER No. ID-16-B-1 through 9.

[c]For photos, see HAER No. ID-16-C-1 through 9.

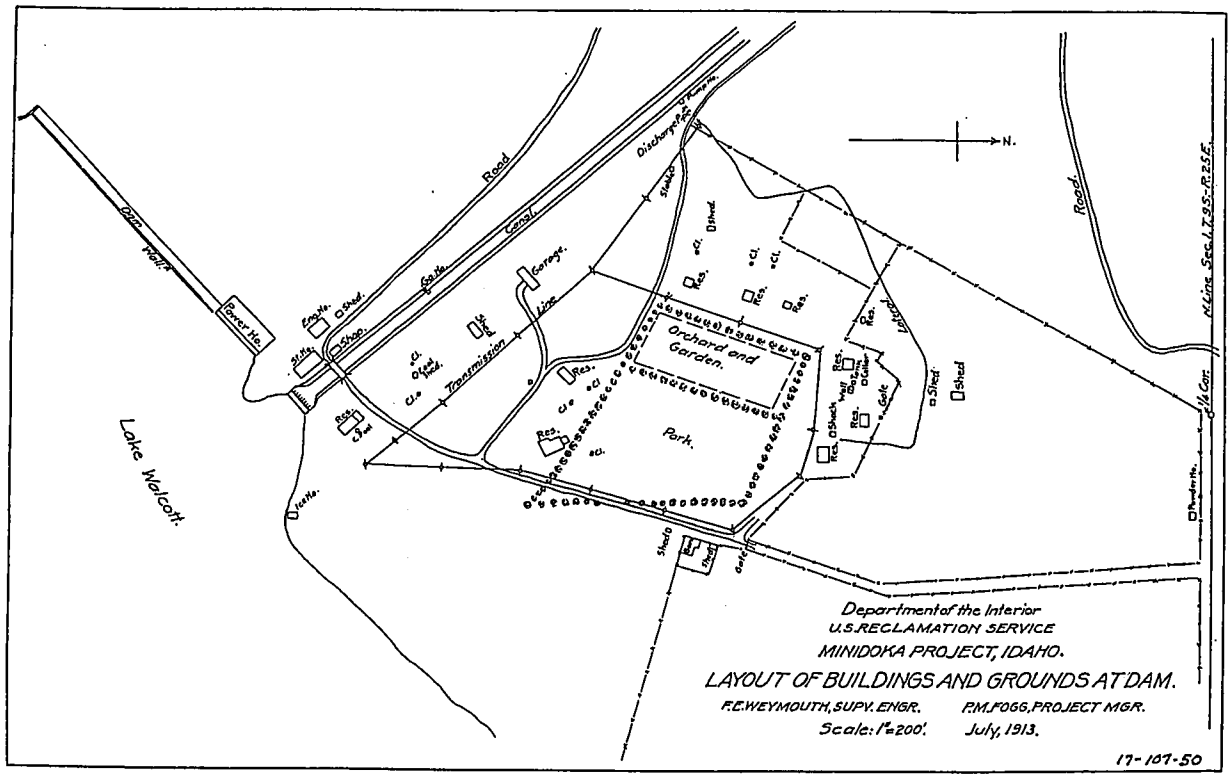

Figure 24. Layout of buildings and grounds at Minidoka Dam, by U.S. Reclamation Service, July 1913.

nearest settlement. As part of the original construction of the pumping system in 1908, Reclamation established a "headquarters camp" for the pumping system at Lift Station #2. After construction of the pumping system was completed, the camp buildings housed lift station operators. In 1913, the camp consisted of "a boarding-house, an operators' bunk-house, Foreman's Cottage, operator's cottage, stable, storeroom, oilhouse, and other small buildings [see *Figure 25*]."[34]

Most of the structures at Lift Station #2 were originally temporary wooden shacks, later remodeled into permanent worker housing. One notable exception was the Foreman's Cottage, a single-story bungalow designed by the Reclamation engineering staff. According to a contemporary account, it was "a well-built frame building, consisting of four rooms, bath, front and back porches, and cellar." An identical Foreman's Cottage stood at Lift Station #1, which also contained a small storehouse. Lift Station #3 originally had no outside buildings. In 1915, Reclamation added, at a cost of $9,448, a one-story, gable-roofed, reinforced-concrete Shop, Storehouse, and Garage at Lift Station #2, measuring 50 by 55 feet. Like the shop facility built at the damsite at the same time, this building also was designed by Twin Falls architect Ernest H. Gates.[35]

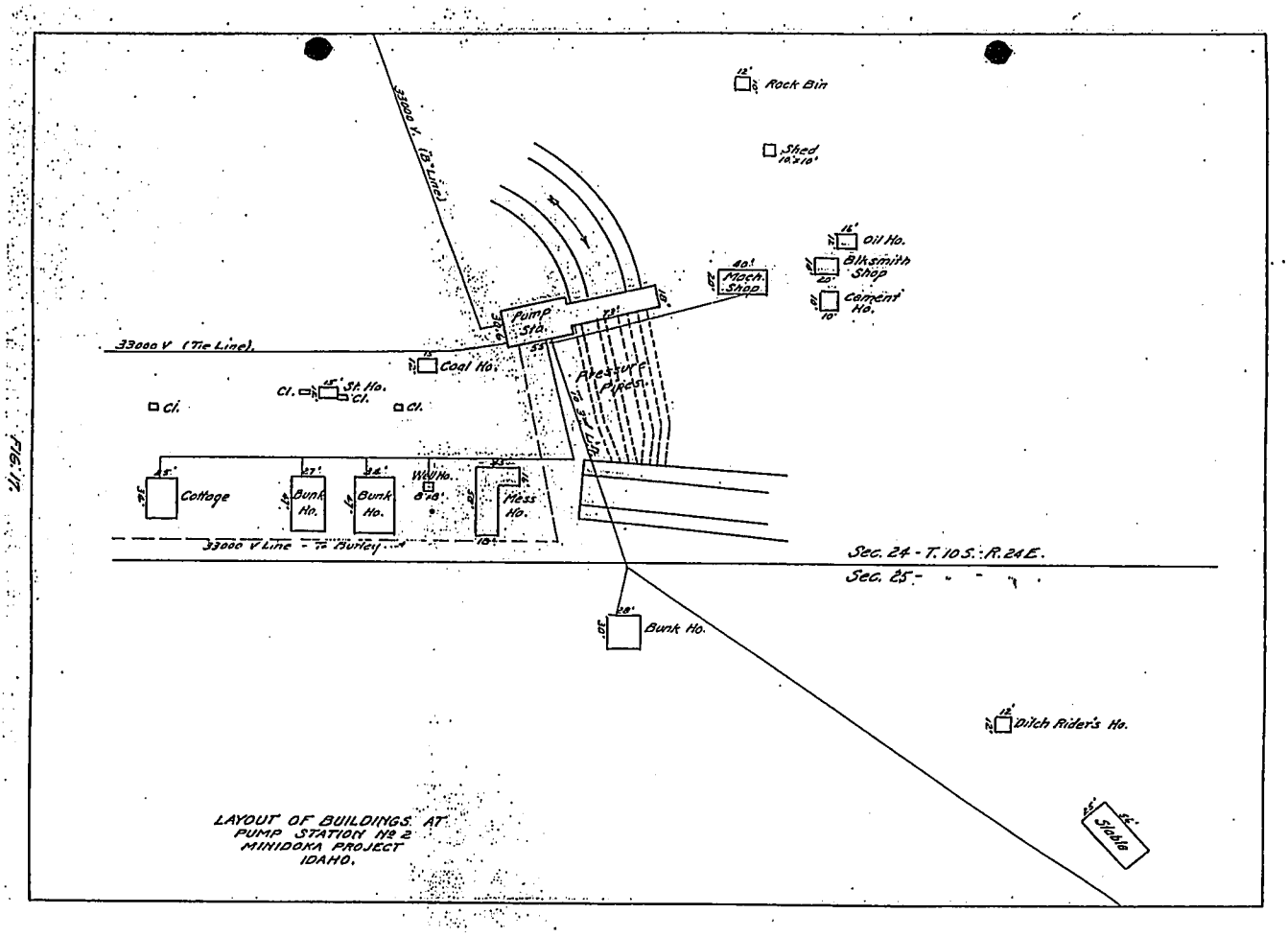

Figure 25. Layout of buildings at Lift Station #2, by U.S. Reclamation Service, 20 December 1913.

Significance of the Minidoka Pumping System

When Ross first proposed reclaiming the high south-side lands of the Minidoka Project in 1903, electrical irrigation pumping was well established in California, but virtually unknown in Idaho. This situation was to change dramatically within a few years. By 1912, electric pumping systems were in operation in Idaho not only on the Minidoka Project, but on the High-Line Project near Twin Falls, the Twin Falls North Side Pumping Project between Jerome and Milner, and the Indian Cove Pumping Project near Mountain Home. "To-day," one writer boasted, "a greater acreage of land is watered by electrically operated pumping plants in the State of Idaho than in any other State of the Union, or possibly in any other part of the world."[36]

Given the unprecedented size of the Minidoka system, it is tempting to conclude that it was the seminal undertaking that conclusively established the efficacy of hydroelectric pump irrigation and led to its widespread application in the state. However, such a claim does not withstand close scrutiny. In large measure, the use of pump irrigation was a natural evolution in irrigation practice. The success of the Twin Falls South Side Carey Act Project in 1905 inspired investors to undertake more irrigation projects in the Lower Snake Valley. Due to the region's geography, pump irrigation was the only way to reach the high lands bordering the river. While later developers may have looked to the Minidoka Project for confirmation that pumping was feasible, many projects were started while the Minidoka south-side system was still under construction. The developers of these projects, like Ross, were undoubtedly inspired by the success of pump irrigation in California. While the Minidoka Project was certainly the largest of the early pumping developments, it was only one of several projects that demonstrated the value of pump irrigation in Idaho.[37]

Perhaps more significant than Reclamation in promoting electric pumping were the private power companies located along the Snake River. Non-federal hydroelectric interests had begun filing on Snake River power sites in 1900, gambling that the area's enormous power potential could be profitably developed. The first hydroelectric plants appeared at Swan Falls in 1901, American Falls in 1902, Shoshone Falls in 1907, and Lower Salmon Falls in 1910. These facilities initially served the scattered industries and settlements of the Lower Valley, particularly the developments around Twin Falls. To expand their markets, the utilities appear to have started promoting irrigation pumping around 1908. Irrigation pumping was an ideal load, for in addition to consuming large blocks of power, it created secondary domestic and industrial markets as settlements developed around the reclaimed areas. The Great Shoshone and Twin Falls Water and Power Company of Twin Falls, incorporated in 1907, was especially active in selling power for pumping operations. By 1912, it had constructed an extensive transmission system throughout the Lower Snake River Valley, linking its powerplants at Shoshone and Lower Salmon Falls with at least a dozen private pump-lift stations.[38]

Though not solely responsible for the spread of irrigation pumping, the Minidoka Project was nevertheless a triumph and a showcase for Federal reclamation. Embodying the best technical practices of its day, the Minidoka pumping system was unparalleled for its sheer size. Compared to the tortuous progress of the north-side gravity system a few years earlier, the erection of the Minidoka powerhouse and lift stations was a marvel of ease and efficiency. Unfortunately, these legitimate achievements were to be shrouded by a host of problems arising from the construction of the pumping distribution system under Project Engineer James G. Camp.

Endnotes

[1]D.W. Ross and A.P. Davis to F.H. Newell, 1 May 1907, RG 115, Entry 3, Box 646, File Number 250, NA-Washington.

[2]For the legislation enabling Reclamation to sell power generated on its projects, see Act of April 16, 1906, Ch. 1631, 34 Stat. 116, printed in *Federal Reclamation Laws Annotated* (Washington, D.C.: United States Government Printing Office, 1943), 94-97. Also see E.C. Finney, "Hydroelectric Power Development on Public Lands in Relation to Irrigation," *Reclamation Record* 5 (October 1914): 364-366.

[3]F.H. Newell to D.W. Ross, 29 May 1907; Ross to O.H. Ensign, 23 May 1907, in RG 115, Entry 3, Box 634, File Number 158, NA-Washington.

[4]The correspondence record is unclear as to exactly when Reclamation decided to proceed with the construction of the permanent powerhouse and the south-side pumping system. At the end of September 1907, A.P. Davis and O.H. Ensign, Reclamation's chief electrical engineer, were still discussing what size the temporary north-side power unit should be; and Ensign, as late as October 1907, was still preparing plans for the north-side pumping units, as if these were the only pumping facilities to be built; see Davis to Ensign, 30 September 1907; Ensign to F.H. Newell, 26 October 1907. In December 1907, however, Ensign was suddenly preparing plans for the full powerplant, and no further mention was made of the north-side pumping plants until after the south-side system was completed; see W. Van den Heuvel for O.H. Ensign to F.H. Newell, 9 January 1908. In his "History of the Minidoka Project," Fogg (pp. 43-44) links the onset of construction for the south-side pumping unit with the five-year limitation for undeveloped water rights: "It was essential to preserve . . . the priority of right for the lands on the pumping unit, owing to the irrigation developments lower in the valley, to which such priority would pass unless held for this project. Accordingly, it became necessary that the works for the pumping unit be developed without further delay [by June 23, 1908]." Given the fact that Reclamation was contemplating construction of only a temporary power unit and the north-side pumping plants as late as October 1907, it would appear that the pending expiration date of the water rights was simply overlooked by Ross until November 1907. All of the above-cited correspondence is in RG 115, Entry 3, Box 646, File Number 250, NA-Washington.

[5]For a discussion of the temporary pumping plant, see Fogg, 58-59, 148. Also refer to O.H. Ensign to A.P. Davis, 20 March 1908, RG 115, Entry 3, Box 646, File Number 250, NA-Washington.

[6]D.W. Ross, "General Outline of Minidoka Project with Estimates of Cost," 21 March 1904, BR-Burley.

[7]For the information here and in the next paragraph, refer to O.H. Ensign to F.H. Newell, 2 July 1904, BR-Minidoka Dam.

[8]D.W. Ross to O.H. Ensign, 23 May 1907; A.P. Davis to Ensign, 30 September 1907, in RG 115, Entry 3, Box 646, File Number 250, NA-Washington.

[9]Discussion of the proper size and arrangement of the power units, particularly due to the limited space available, dominates all of Ensign's correspondence on the powerplant during the fall and winter of 1907 to early 1908. See the following correspondence, all contained in RG 115, Entry 3, Box 646, File Number 250, NA-Washington: Ensign to Newell, 16 September, 16 November, 18 November, 1907, 9 January, 16 January, 17 January, 23 January 1908. H.B. M cDermid also addresses some of the same design issues in "Hydro-Electric Irrigation Project," *Power* 35 (12 March 1912): 300-302.

[10]See the following correspondence in RG 115, Entry 3, Box 646, File Number 250, NA-Washington: O.H. Ensign to J.G. Camp, 16 January 1908; Ensign to F.H. Newell, 17, 20, 23 January 1908. Quote is from Ensign to Newell, 23 January 1908.

[11]For a discussion on bearing design for vertical units, including a history of the Kingsbury thrust bearing, see Duncan Hay, "Hydroelectric Development in the United States, 1880-1940," unpublished report prepared for the Edison Electric Institute, Washington, D.C., 1987, 83-88. Also see A.C. Clogher, "Hydroelectric Practice in the United States," *American Society of Mechanical Engineers—Transactions* 59 (1 February 1937): 65-77.

[12]Lamar Lyndon, *Hydro-Electric Power* (New York: McGraw-Hill Book Company, Inc., 1916), vol. 2, *Electrical Equipment and Transmission*, 123.

[13]O.H. Ensign to F.H. Newell, 9 January 1908; Ensign to Newell, 8 May 1908; A.P. Davis to Ensign, 20 May 1908; all in RG 115 Entry 3, Box 646, File Number 250, NA-Washington.

[14]O.H. Ensign and James M. Gaylord, "Transmission Applied to Irrigation," *American Institute of Electrical Engineers—Proceedings* 30 (25 April 1911): 691-722. Ensign submitted plans for the pumping units on 19 March 1908; see letter to A.P. Davis in RG 115, Entry 3, Box 646, File Number 250, NA-Washington.

[15]For discussions of the most approved pumping methods of the day, refer to the following articles: A.T. Maltry, "Electric Pumping," *American Electrician* 9 (May 1897): 159-162; S.H. Bunnell, "The Application of Electric Power to Pumping Machinery," *Engineering Magazine* 16 (December 1898): 429-440; "Tests of Centrifugal Pumps Under High Heads," *Engineering News* 64 (9 August 1900): 98-100; "The Development of Centrifugal Pumping Machinery," *Electrical World and Engineer* 37 (5 January 1901): 58-59; Lewis A. Hicks, "Possibilities and Limitations of Electric Pumping," *Journal of Electricity, Power and Gas* 11 (September 1901): 216-223; A.J. Bowie, "Electric Pumping for Irrigation," *Electrical World and Engineer* 11 (9 August 1902): 208-211; Idem, "Economic Operation of Electrical Irrigation Pumps," *Electrical World and Engineer* 40 (27 December 1902): 1039-1041; W.W. Wheeler, "On the Cost of Irrigation by Electrically Driven Pumps from Transmission Services," *Journal of Electricity, Power and Gas* 12 (September 1905): 411-413; O.H. Ensign, "Power Engineering Applied to Irrigation Problems," contained in U.S. Department of the Interior, U.S. Geological Survey, *Proceedings of Second Conference of Engineers of the Reclamation Service* (Washington, D.C.: Government Printing Office, 1905), 58th Congress, 3d Session, House Document 463, 37-42.

[16]This quote and the following discussion of gate and check valves are in O.H. Ensign to A.P. Davis, 19 March 1908, RG 115, Entry 3, Box 646, File Number 250, NA-Washington.

[17]O.H. Ensign to F.H. Newell, 6 May 1908, RG 115, Entry 3, Box 655, File Number 481-B, NA-Washington.

[18]The contract awards are discussed in the following correspondence, all contained in RG 115, Entry 3, Box 655, File Number 481-B, NA-Washington: O.H. Ensign to F.H. Newell, 27 June, 20, 22 July 1908; C.H. Fitch to Secretary of the Interior, 15 July 1908; Ensign to A.P. Davis, 20 July 1908; Fitch to Ensign, 28 July 1908. Also see Fogg, "History," 53-54.

[19]The description of the powerplant is taken from the following sources: O.H. Ensign, F.E. W eymouth, and William Van Dan Heuvel, "Power Plant at Minidoka Dam," 29 January 1909, RG 115, Entry 3, Box 646, File Number 250, NA-Washington; James M. Gaylord, "Power and Pumping System of the Minidoka Project, Idaho," 20 December 1913, 16-27; "Hydroelectric Development the Minidoka Project," *Engineering Record* 61 (8 January 1910): 45-48; O.H. Ensign and James M. Gaylord, "Electric Power for Irrigation," *Engineering News* 66 (6 July 1911): 4-9; James M. Gaylord, "An Irrigation Pumping System, the Minidoka Hydroelectric Project," *Electrical Review* 59 (9 September 1911): 503-506; H.B. McDermid, "Hydro-Electric Irrigation Project," *Power* 35 (12 March 1912): 360-362; A.P. Connor, "Federal Project at Minidoka, Idaho," *Power* 41 (30 March 1915): 422-425.

[20]This description of the pumping plants is drawn from the following plans held in Minidoka Project Records, U.S. Department of the Interior, Bureau of Reclamation, Denver: O. H. Ensign, "Pumping Station No. 1, General Arrangement," [1909]; Ensign, "Pumping Station No. 2, General Arrangement," [1909]; Ensign, "General Arrangement of Pumping Station No. 3," 30 April 1908; Ensign, "Pumping Station #3, General Arrangement," [1909]. Also refer to the following articles and reports: Gaylord, "Power and Pumping System," 35-77; "Pumping Stations of the Minidoka Irrigation Project," *Engineering Record* 61 (19 February 1910): 204-206; Ensign and Gaylord, "Transmission Applied to Irrigation"; U.S. Department of the Interior, Bureau of Reclamation, Pacific Northwest Region, "Minidoka Project," from Project Data Book, Region Revision September 1983.

[21]O.H. Ensign to F.H. Newell, 31 December 1908, RG 115, Entry 3, Box 646, File Number 250, NA-Washington.

[22]General notes on construction are provided in Gaylord, "Power and Pumping System," 11-12, 29-31, 35, 43-45, 46, 48-49, 51, 53. For extension requests by Westinghouse, General Electric, and Allis-C halmers, see the following correspondence contained in RG 115, Entry 3, NA-Washington: O.H. Ensign to General Electric Company, 5 December 1908, Box 654, File Number 480-D; D.W. Niven, Power and Mining Department, General Electric Company to A.P. Davis, 12 December 1908, Box 654, File Number 480-D; Will J. Sando, Manager, Pumping Engine and Hydraulic Turbine Department, Allis-Chalmers to A.P. Davis, 12 December 1908, Box 655, File Number 481 C; Ensign to Niven, 19 December 1908, Box 654, File Number 480-D; Ensign to F.H. Newell, 19 December 1908, 4 January 1909, Box 654, File Number 480-D; 22 December 1908, 20 January 1909, Box 655, File Number 481-C; E.M. Sischoff, Westinghouse Electrical and Manufacturing Company, 19 January 1909, Box 654, File Number 480-C; Secretary of the Interior to the Auditor for the Interior Department, 4 February 1909, Box 655, File Number 481-C; 6 February 1909, Box 654, File Number 480-C. The S. Morgan Smith Company's delinquency, and the damage to the penstock gates, is set forth in the following correspondence contained in RG 115, Entry 3, Box 656, File Number 481-D, NA-Washington: Ensign to Newell, 7 September, 1, 24 December 1908, 19 January, 21 May 1909; C. Elmer Smith, President, S. Morgan Smith Company to Department of the Interior, 10 December 1908; Davis to Ensign, 13 January 1909; Secretary of the Interior to S. Morgan Smith Company, 5 February 1909; Ensign to S. Morgan Smith Company, 2 April, 21 May, 8 October 1909; S. Morgan Smith Company to Davis, 7, 13 June 1909; Newell to S. Morgan Smith Company, 24 June 1909; Newell to Ensign, 1 July 1909; S. Elmer Smith to Newell, 8 September 1909; F.E. Weymouth to Newell, 4 December 1909; S. Morgan Smith Company to U.S. Reclamation Service, 13 December 1909. Delays in the construction of the pumping plants are discussed in the

following correspondence contained in RG 115, Entry 3, Box 646, File Number 250, NA-Washington: Ensign to J.G. Camp, 25 November 1908; Acting Supervising Engineer to Camp, 28 November 1908. For the quote at the end of the paragraph, see Ensign to Newell, 12 April 1909, RG 115, Entry 3, Box 646, File Number 250, NA-Washington.

[23]For the operation of the pumping system in 1909, see *Annual Report*, 1909-1910, 127.

[24]Gaylord, "Power and Pumping System," 29-31, 43-45, 48-49, 53; *Annual Report*, 1910-1911, 105; *Annual Report*, 1911-1912, 83.

[25]O.H. Ensign to F.H. Newell, 2 July 1910, RG 115, Entry 3, Box 655, File Number 481-C, NA-Washington.

[26]O.H. Ensign to F.H. Newell, 8 October 1910, RG 115, Entry 3, Box 655, File Number 481, NA-Washington.

[27]Problems with the bearings are discussed in Barry Dibble to Chief Engineer, 2 January 1923, in Burley Irrigation District Office, Burley, Idaho (henceforth cited as BID).

[28]Problems with the efficiency and capacity of the turbines are fully detailed in the following correspondence contained in RG 115, Entry 3, NA-Washington: O.H. Ensign to F.H. Newell, 18 May 1909, Box 646, File Number 250; 8 June 1909, 2 August, 10, 27 September 1910, Box 655, File Number 481-C; Charles O. Tappan, Allis-Chalmers Company to Ensign, 7 June 1909, 12 September 1910, Box 655, File Number 481-C; Ensign to Allis-Chalmers Company, 8 June, 15 November 1909, Box 655, File Number 481-C; H. Woodland, Vice President and Treasurer, Allis-C halmers Company to Morris Bien, Acting Director, U.S. Reclamation Service, 18 August 1910, Box 655, File Number 481-C; Ensign to Tappan, 12 September 1910, Box 655, File Number 481.

[29]O.H. Ensign to A.P. Davis, 3 March 1911, RG 115, Entry 3, Box 647, File Number 250, NA-Washington.

[30]"Final Report on Efficiency and Capacity Tests, Generator Turbine Furnished by the Allis-Chalmers Company Under U.S.R.S. Specification No. 153, Tested at Minidoka, Idaho," April 1911; James M. Gaylord to O.H. Ensign, 23 August 1911; Ensign to F.H. Newell, 25 August 1911. All of the above-cited material is in RG 115, Entry 3, Box 655, File Number 481-C, NA-Washington.

[31]The raising of the spillway is discussed in the following correspondence: A.P. Davis to F.E. Weymouth, 25 March 1909, RG 115, Entry 3, Box 646, File Number 250, NA-Washington; Project Engineer to F.H. Newell, 4 February 1910, BOR-Minidoka Dam. Also see F.E. Weymouth to Director, 12 April 1917, RG 115, Entry 3, Box 634, File Number 158, NA-Washington for a discussion of the power head created by the remodeled spillway.

[32]For a detailed discussion of the development of the housing camp, see Demian J. Hess and Jeffrey A. Hess, "Walcott Park," HABS No. ID-103, 1994, 22-28, 33-38.

[33]For an as-built photograph and floor plan of the Office, Shop, and Storehouse, see "Annual Project Report," 1913, 172-174. For similar documentation of the Blacksmith Shop and Garage, see "Annual Project Report," 1914, 83; 1915, 87-88. Both buildings still survive at the site. The earlier facility has been completely converted into office space, while the later building has been converted to storage and office space.

[34]Gaylord, "Power and Pumping System," 49.

[35]An account of Lift Station #2 is provided in "Minidoka Dam South Side Pumping Division Lift Station #2 Operators' Housing Complex," HABS No. ID-124, prepared by Abigail Christman, Hess Roise and Company, 2002. See also Gaylord, "Power and Pumping System: 49-50; "Annual Project Report," 1915, 90-91.

[36]Quote is from E.A. Wilcox, "Application of Hydroelectric Energy to Irrigation Pumping in Southern Idaho," *Electrical World* 60 (5 October 1912): 705-710. On irrigation pumping in Idaho, also see: Wilcox, "Irrigation Pumping in Southern Idaho," *Electrical Review and Western Electrician* 62 (25 January 1913): 179-184; E.V. Berg, "Pumping Water for Irrigation Compared with Gravity System; the High Line Pumping Co.'s Irrigation System, Idaho," *Engineering and Contracting* 36 (16 August 1911): 192-195; G.T. Ingersoll, "An Irrigation Pumping Plant with Three Lifts for the Snow-Moody Development Co., Payette, Idaho," *Engineering and Contracting* 38 (2 October 1912): 385-389. According to the information provided by Wilcox, these pumping systems were developed concurrently with the Minidoka pumping system.

[37]The tremendous interest in irrigation development in the Lower Snake River Valley after the opening of the Twin Falls Project is discussed by Gertsch, "The Upper Snake River Project," 64-106. The boom in irrigation developments in the early 1900s is also described by Hugh Lovin, "The Carey Act in Idaho, 1895-1925," *Pacific Northwest Quarterly* 78 (October 1987): 122-133.

[38]D.W. Ross reported with distress the rapid speculation in power sites on the Snake River in "Plans for Power Development on Snake River and Their Relation to Irrigation," 6 January 1904, BR-Minidoka Dam. The construction of powerplants is outlined in George C. Young and Frederic J. Cochrane, *Hydro Era: The Story of Idaho Power Company* (n.p.: Idaho Power Company, 1978), 20-21, 29-33. Wilcox, "Application of Hydroelectric Energy to Irrigation Pumping in Southern Idaho," sketches out the extent of the Great Shoshone and Twin Falls Water Power Company in the Snake River Valley.

6 CONSTRUCTION OF SOUTH SIDE DISTRIBUTION SYSTEM

South Side Pump Distribution System

When work began on the Minidoka Powerplant and pumping plants in the fall of 1907, Reclamation lacked sufficient funds to build the south-side pump division distribution system. In November 1907, D.W. Ross came up with a possible solution. He proposed a cooperative scheme to construct the water-carriage works, not only on the Minidoka Project, but on all the Federal reclamation projects in Idaho. "This plan suggested itself to me as a result of a meeting of settlers on the Minidoka project," Ross wrote Reclamation's Director, F.H. Newell. According to Ross's idea, the settlers were to form a corporation that would contract with Reclamation to build the canals and sublaterals. The corporation would hire settlers to do the work, paying them in warrants or certificates. Reclamation would then redeem the certificates at face value and deduct the corresponding amount from the bearer's annual repayment obligation to the Federal Government for project construction costs, which, according to the Reclamation Act, were to be fully retired by the water users over a period of ten years.[1]

This cooperative arrangement promised to be of equal benefit to Reclamation and the settlers. Both parties wanted the irrigation system in operation as quickly as possible, but neither had the hard cash to cover all their obligations in the matter. Even before Reclamation had officially approved the scheme, a group of settlers on the pumping division began organizing themselves to implement it. In January 1908, they filed papers incorporating the South Side Minidoka Water Users' Association (SSWUA), with Frank Riblett as president and C.A. Johnson as secretary. The SSWUA immediately wired F.H. Newell asking for permission to issue certificates to purchase construction supplies. The settlers' initiative surprised Reclamation, and A.P. Davis, the Chief Engineer, wrote back explaining that the cooperative plan was still under consideration. On 21 February 1908, Secretary of the Interior James R. Garfield officially gave the plan his blessing for use on all Reclamation projects. A month later, Reclamation contracted with the SSWUA to build the south-side pump division's distribution system.[2]

The settlers did their work quickly and efficiently. By June 1908, the SSWUA had completed the G, H, and J canals that carried water from the lift stations. Widening of the Main South Side Canal began in March 1908 and continued until 1910. The SSWUA started on the farm sublaterals in the fall of 1908 and completed them in 1910 as well. In all, the settlers moved about 2 million cubic yards of material for about $203,000.[3]

South Side Gravity Sublateral System

In November 1908, Reclamation's field supervisor—or Project Engineer—for the Minidoka Project, James G. Camp, suggested that a similar cooperative scheme be instituted to complete the Gravity Unit sublateral system, which was still unfinished. The 1907 and 1908 growing seasons had been dismal failures for the Gravity Unit, and farmers desperately needed money to meet their construction payments due to the Government, which fell due in December, as well as their operation and maintenance payments due the following April. "It is going to be a hard rustle [for the settlers] to make the payments . . . ," Camp wrote Davis. "If they could be assured that they would receive . . . repayment for their sublateral work it would put a different aspect on the situation and do much to reassure them that the [Reclamation] Service was doing everything possible to assist them."[4]

Camp realized that it would probably take several months to organize a Gravity Unit water users' association to issue certificates. To meet payments due in the interim, he proposed issuing temporary certificates to Gravity Unit settlers. Although these certificates could not be accepted by Reclamation as payment for construction, settlers would be able to trade them to those on the Pumping Unit for SSWUA certificates. Those holding temporary certificates would eventually receive Gravity Unit certificates when such were issued.[5]

Reclamation agreed that Gravity Unit settlers should be reimbursed for their construction, but questioned whether certificates were the proper form of payment. The use of certificates had proved to be exceedingly controversial, for critics charged that Reclamation was attempting to issue its own currency—a violation of Federal law.[6] There was no denying that the certificates were being widely used on the Minidoka Project as a form of scrip. Banks took certificates as collateral and merchants accepted them as payment, although at discounts ranging from 10 to 20 percent.[7] Even James G. Camp, the Project Engineer, viewed certificates as a convenient form of currency. Reflecting his failure to grasp the distinction between certificates and actual money, Camp requested permission at the very outset of the cooperative work to purchase a large amount of lumber with the warrants. Newell quickly advised against the purchase, warning: "This whole matter of the issue of certificates must be very carefully guarded and extraordinary discretion used, as there is a danger that the whole thing will be upset by any mistake at the outset."[8]

By the end of 1908, Reclamation had concluded that the use of certificates was too politically explosive to continue. In a letter to F.E. Weymouth, who had replaced Ross as Reclamation's Supervising Engineer for Idaho, Newell asserted that "there is probably no one matter so full of danger to the entire Service as this matter of certificates. Some of our strongest friends in the Senate have advised us to avoid it as we would a rattlesnake, because 'we never know when it will make an attack.' A single false step may precipitate

us in endless trouble."[9] In January 1909, therefore, Davis informed Camp that Reclamation had decided not to issue certificates for the Gravity Unit sublaterals, offering instead non-transferable book credits on each water user's account.[10]

Unfortunately, Camp had already taken the perilous step that threatened disaster. Misunderstanding a communication from Davis in November 1908, he had assumed that certificates would be issued. At that time, therefore, he drew up approximately $2,500 worth of temporary certificates and arranged for settlers to trade them for SSWUA certificates. In January 1909, Camp informed his superiors that some type of transferrable credit would have to be issued to retire the temporary certificates he had released.[11]

Camp's actions placed the Department of the Interior in an untenable position. According to Reclamation's District Counsel B.E. Stoutemyer, releasing more certificates to replace the temporary ones would be a clear violation of the law against issuing negotiable paper. But if certificates were not issued, Reclamation would be forced to repudiate Camp's warrants. In this event, Stoutemyer warned, "There will be a great many charges of bad faith and some very definite and undisputable evidence of broken promises on our part."[12]

To make matters even worse, Camp also had promised the Gravity Unit settlers that they would receive credit for all of their work on the sublateral system, when in fact Reclamation was only prepared to award credits for a percentage of the construction. "When the settlers learn that they are not to receive these credits," Weymouth wrote Newell, "they will, of course, immediately wish to be advised as to why they are not to receive them. This will make it necessary to repudiate the promises made them by Mr. Camp, and I believe at the present time that Mr. Camp is about the only man connected with the Reclamation Service in whom some of the settlers have any confidence. An immediate and great outcry will be made, and the entire matter will probably be taken to the Secretary of the Interior in some form or other." The controversy threatened to drag the certificate issue back into the political spotlight, igniting a major scandal. "The entire situation is so grave," Weymouth concluded, "that I hardly see how it could be possible for the Reclamation Service to have a more serious situation anywhere."[13]

Reclamation eventually concluded that the only solution was to purchase the entire sublateral system from the Gravity Unit, issuing book credits for all of the work. The entire certificate policy finally collapsed in June 1909, when the U.S. Attorney General, at the behest of the Secretary of the Interior, determined that the cooperative plan was illegal. In September 1909, the Secretary ordered Reclamation to redeem all of its outstanding certificates for cash, the money being provided by a special Congressional appropriation.[14]

Political Repercussions

The controversy over the misuse of Minidoka certificates led directly to the ouster of James Camp as Project Engineer. Weymouth had long harbored doubts about Camp's abilities, and the mishandling of the certificates convinced him that Camp had to be removed immediately. "I find that it is not safe to leave him alone a single moment," Weymouth complained to Newell. In desperation, he assigned an engineer from the Boise office to the Minidoka Project in order to "hold Mr. Camp down until the end of the present irrigation season, by which time it should be possible for us to relieve him."[15] Camp left the project at the end of October 1909, his post being occupied by C.H. Paul, who remained until the end of 1910.

Although eventually repudiated, the cooperative policy enabled Reclamation to complete the pumping distribution system at a time when it lacked the money to construct it otherwise. The cooperative plan also laid the foundation for the organization of settlers on the Project. From the outset, Reclamation believed that a single group would eventually represent all Project settlers, whether on the Pumping Unit or on the Gravity Unit. When the Pumping Unit settlers organized a water users' association to issue certificates, Government officials assumed that the SSWUA was only a temporary organization and would disband after completing work on the sublaterals.[16]

Camp upset these expectations in November 1908, when he encouraged Gravity Unit settlers to form another water users' association in the mistaken belief that Reclamation was about to issue more cooperative certificates. Called the Minidoka Water Users' Association (MWUA), this body included settlers on all of the land north of the river, as well as those on gravity lands to the south.[17] Camp's actions proved premature, for his superiors had not decided whether to expand the cooperative scheme to include the Gravity Unit. Faced with a *fait accompli*, Davis reluctantly approved the formation of the MWUA, taking consolation in the fact that it might prove useful if a cooperative scheme were eventually carried out. He warned Camp, however, that the project should not be divided permanently into two organizational units:

> The objections to two permanent associations are that constant friction and difficulty must necessarily arise when both are dependent for their water upon the same dam and power plant. There will be serious trouble whenever it is impracticable to furnish the north- and south-side canals with full water supply. Other matters will doubtless arise when the interests on the north and south side may be at variance. . . . If there is one association the matter will be fought out among themselves and some definite stand will be taken by the association.[18]

Camp did not see eye-to-eye with Davis on this. Rather than fearing the permanent division of the project into two parts, Camp viewed this development as inevitable. The Pro-

ject Engineer argued that two political associations were necessary precisely because the two Project divisions had different interests. Writing Davis, Camp declared:

> I believe it is essential to the successful management of this project that there be an organization on each side of the river for administrative purposes. The conditions are different. The North side has to deal with sub-irrigation and its consequent drainage, irrigation of numerous high spots, management of sublateral systems and Government Townsites. The South Side has none of these but others equally important. To have the Board of a single organization to deal with both would mean men from portions of the project widely separated and knowing but little of the local problems on the other part.[19]

Regardless of the merits of having two organizations or one, Camp pointed out that there was now little anyone could do to alter the situation. "The movement is started and would be hard to stop," he reported to Davis. "To try to stop them from organizing would be useless and give force to the oft repeated assertion that the Service did not want the Gravity people to have an organization so that they could present their troubles." Reclamation decided not to interfere, and for a while it appeared that the problem of two associations would resolve itself. Although the MWUA incorporated, it failed to attract members. By the end of 1909, it had been abandoned due to lack of interest.[20] Nevertheless, the fact that two water users' groups had formed set a precedent that was never forgotten by the settlers. Despite Reclamation's desire to have only one settlers' group, the Gravity and Pumping Units refused to unite under a single organization. The division of the project into two organizational bodies was to have a major impact on the project's history, particularly in terms of the development and administration of the power system.

Endnotes

[1]See D.W. Ross to F.H. Newell, 20 November 1907, RG 115, Entry 3, Box 127, File Number 237, NA-Washington; Fogg, 44.

[2]For news of the formation of the South Side Minidoka Water Users' Association, see Camp to A.P. Davis, 14 January 1908, RG 115, Entry 3, Box 673, File Number 865, NA-Washington. For the SSWUA's request to start work, and Reclamation's response, see Davis to Frank Riblett, 18 January 1908, RG 115, Entry 3, Box 673, File Number 865, NA-Washington.

[3]Fogg, 45-52. The cost of the work is based on the value of the certificates eventually canceled, which amounted to $202,522.45.

[4]James G. Camp to A.P. Davis, 4 November 1908, RG 115, Entry 3, Box 630, NA-Washington.

[5]Camp described this loan plan as follows: "If Mr. A has 100 dollars due him in certificates on January 1st, 1909 in re-payment of sub-lateral work, he can borrow that amount from a holder of the present certificates, make his payment before Dec. 1st, then after January 1st, re-pay in

certificates. This might save many a settler who has been able to earn only part of his present payment, from losing his place, and we certainly would not wish this to occur under these circumstances"; Camp to Davis, 4 November 1908, RG 115, Entry 3, Box 630, NA-Washington.

[6]Newell refers to Congressional criticism in the following correspondence, all contained in RG 115, Entry 3, Box 657, File Number 521: F.H. Newell to J.G. Camp, 16, 19, 26, 27 May 1908. In his letter of 27 May 1908, Newell explained: "Certain Eastern Senators have seen fit to make it appear that these certificates are evidences of indebtedness of the Government and are issued without due authority of law. I have tried to explain the matter fully and I hope that the explanation will be satisfactory. There has been an intimation, however, that a resolution might be introduced in the Senate to prevent the issuance of these certificates." Also see Senate Document No. 507, 60th Congress, 1st session.

[7]Speculators also became involved in the purchase of certificates, offering to buy certificates from farmers at a discount in the hopes of reselling them at a profit. In need of cash, farmers were eager to sell the scrip. Others were willing to purchase from the speculators because the certificates sold for less than face value—thus allowing the purchaser to repay construction charges at a lower price. Camp described the common practice of trading certificates, writing "Each merchant on the old part of the project has a certain number of Gravity settlers as customers. He knows their need of certificates. He furnishes groceries and feed to contractors, takes certificates in payment and turns them over to the settlers who do not care to work at grading. Some stores take the certificates at par being satisfied with the profit on their goods, others charge 5 to 10% discount for handling" (Camp to Newell, 23 May 1908, RG 115, Entry 3, Box 657, File Number 521, NA-Washington). In a letter to the Secretary of the Interior, L.H. Sweetser, a Minidoka settler and Lt. Governor of Idaho, gave another description of the use of certificates, calling attention to the enormous speculative market which existed:

> From the standpoint of a settler who holds South Side Minidoka Water Users' Association scrip I desire to call your attention to certain facts and ask whether relief may be expected. I am not a speculator in scrip. In order to do my share in hurrying completion of the South Side canals, I did work thrown up by other contractors.... I paid out over $1800.00 in cash in carrying out this work, and received credit for $4311.00 in scrip. As the summer advanced, poor settlers found themselves unable to get oats for their horses on the canal work, except for cash, of which they had none, and I went security for them to the extent of $3000.00 at a bank, they putting up scrip as collateral.... I now need money, and the $3,000.00 in notes are payable tomorrow. Many others here..., especially the merchants, are in the same situation in which I find myself. Nearly every settler here is, and has been, practically without funds. The merchants, therefore, believing that script would be retired by the North Side payments, ... have been advancing these settlers credit. Scrip is now selling at less than 80% of its face value, and is very slow sale. I cannot afford to accept 80 cents for what scrip I have, and could not sell it even if it were on the market, as it is very slow moving. I put $500.00 worth on the market ten days ago and $400.00 worth of it had been sold on the 28th at 21% discount. All who have scrip presumed it would move readily by this time and that it would suffer a comparatively small discount. They now find themselves with scrip on their hands and no market for it except for a smaller amount at a ruinous discount.

L.H. Sweetser to Secretary of the Interior, 30 November 1908, RG 115, Entry 3, Box 657, File Number 521, NA-Washington. Reclamation was fully aware that the certificates were being traded, and even attempted to limit the number of certificates issued to maintain a high market value. See the

following contained in RG 115, Entry 3, Box 657, File Number 521, NA-Washington: A.P. Davis to Camp, 30 December 1908, 16 January 1909; Camp to Davis, 6, 21 January 1909.

[8]For this quote and the details concerning Camp's interest in purchasing lumber with certificates, see Newell to Ross, 16 May 1908, RG 115, Entry 3, Box 657, File Number 521, NA-Washington.

[9]F.H. Newell to F.E. Weymouth, 11 February 1909, RG 115, Entry 3, Box 630, NA-Washington.

[10]Even when Camp first suggested awarding credits for the Gravity Unit sublaterals, Reclamation expressed reservations over issuing more certificates. On 23 November 1908, for example, Davis informed Camp that a public notice, rather than a certificate, might be a better alternative (see RG 115, Entry 3, Box 673, File Number 865, NA-Washington). On 16 January 1909, Davis then wrote Camp declaring: "I have written you repeatedly that it will not be necessary to issue certificates, but that credit will be given on each man's water right charge as it becomes due. . . . This has the effect of not being transferable and makes all the sublateral work valuable in preventing cancellation of homestead entries" (RG 115, Entry 3, Box 657, File Number 521, NA-Washington). Despite Davis' assertion that he had written "repeatedly" on the subject, this letter appears to have been the first definite statement that only book credits would be issued. Until this time, the matter had been an open question.

[11]Camp proposed his plan for reimbursing the Gravity Unit settlers on 4 November 1908, and on 10 November Davis wired back: "Your recommendation to repay gravity unit settlers for work on sublaterals is approved by the Secretary." In a letter written on 9 November, just before the telegram was sent, Davis explained that Camp was only to prepare written accounts of how much credit was due each settler. These accounts would then be used to "enable them to borrow certificates and make their payments in this way." Camp, however, did not confine himself simply to making accounts. Assuming he had full authority, Camp proceeded to issue temporary certificates. Davis did not realize that Camp had taken this step until 6 January 1909, when Camp informed him: "On the other hand we agreed to repay the Gravity settlers for work done on gravity sublaterals in time to use it on their Maintenance and Operation payment which must be made April 1, 1909 and further issued to them during the month of December 1908, transferable orders which entitled the holder to the issuance of the certificates between Jan. 1st, and April 1st, 1909. On these orders considerable 1908 certificates were borrowed and used to help make the payments due Dec. 1, 1908." The evolution of the controversy can be traced in the following correspondence, all contained in NA-Washington: Davis to Camp, 9 November 1908, RG 115, Entry 3, Box 630; Davis to Camp, 16 January 1909, RG 115, Entry 3, Box 657, File Number 521; Camp to Davis, 13 November 1908, RG 115, Entry 3, Box 673, File Number 865; Camp to Davis, 6, 21 January 1909, RG 115, Entry 3, Box 657, File Number 521; F.E. Weymouth to F.H. Newell, 4 February 1909, RG 115, Entry 3, Box 630; Camp to Weymouth, 2 February 1909, RG 115, Entry 3, Box 630.

[12]Stoutemyer to Weymouth, 19 February 1909, RG 115, Entry 3, Box 630, NA-Washington.

[13]F.E. Weymouth to F.H. Newell, 13 March 1909, RG 115, Entry 3, Box 630, NA-Washington.

[14]The acquisition of the sublaterals and the disposal of Camp's certificates is dealt with in the following correspondence, all in RG 115, Entry 3, Box 630, NA-Washington: F.E. Weymouth, James G. Camp, Chas. H. Paul, B.E. Stoutemyer to F.H. Newell, 20 February 1909; Newell to

Weymouth, 27 February 1909; Newell to Secretary of the Interior, 27 February 1909; Newell to Weymouth, 5, 18 March 1909; Weymouth to Newell, 16, 17 March 1909; N.E. Webster, Jr. to F.H. Newell, 16 March 1909. Also see Fogg, 35-36, 45.

[15]F.E. Weymouth to F.H. Newell, 13 March 1909, RG 115, Entry 3, Box 630, NA-Washington. See also Weymouth's letter to Newell of 5 March 1909, in which he criticizes Camp for past errors in the preparation of estimates and blunders in the construction of the pumping plants and government housing camp: "I am of the opinion that he is not fitted for independent charge of work and that we can never tell what he may do next." Camp, for his part, apologized for the certificate controversy, but defended his actions, citing the 10 November 1908 telegram from Davis authorizing his proposal; see Camp to A.P. Davis, 20 March 1909, RG 115, Entry 3, Box 630, NA-Washington.

[16]The Reclamation Act specified that all projects were eventually to be turned over to a settlers' organization (see *Annual Report*, 1902, 62). Reclamation, however, did not believe that the Minidoka settlers needed a representative government, such as a water users' association, during the Project's early years. Ross, for example, feared that a water users' association would simply provide a platform for "men holding radical political views." Water users' associations were also only considered necessary on projects containing large amounts of private land. In these cases, the group was needed to sign a contract with the Government, guaranteeing repayment. In situations where there was mostly public land, as on the Minidoka Project, the Government held the patent, and thus could safeguard its investment by threatening to cancel entry. Instead of a water users' organization, Ross recommended that Reclamation merely assemble a committee of "five thrifty settlers" on the M inidoka Project to serve as an intermediary between the water users and the government (see Ross to Newell, 30 November 1907, RG 115, Entry 3, Box 673, File Number 865, NA-Washington). In later correspondence, Davis also made it clear to Camp that when a permanent water users' association was formed, it should represent the entire project (see Davis to Camp, 23 November 1908, RG 115, Entry 3, Box 673, File Number 865, NA-Washington).

[17]Camp notified his superiors of the formation of the Minidoka Water Users' Association on 13 November 1908, and implied that it was to be a permanent form of administration for the gravity unit: "I have felt the necessity of a Water Users Association ever since I have had charge here. The Board of Directors could be of great value to me in Administration. The settlers have very frequently requested me to help them organize and many have claimed we were not giving them an opportunity to have a proper method of dealing with the Service. They have felt that we favored the South Siders and have cited the fact that other projects have such organizations" (see J.G. Camp to A.P. Davis, 13 November 1908, RG 115, Entry 3, Box 673, File Number 865, NA-Washington).

[18]A.P. Davis to Camp, 19 November 1908, RG 115, Entry 3, Box 673, File Number 865, NA-Washington. In this same letter, Davis approves the formation of the MWUA, with the understanding that it is to be a temporary organization to issue cooperative certificates only.

[19]J.G. Camp to A.P. Davis, 16 November 1908, RG 115, Entry 3, Box 673, File Number 865, NA-Washington.

[20]J.G. Camp to A.P. Davis, 16 December 1908; F.E. Weymouth to A.P. Davis, 18 December 1908; P.M. Fogg to Director, 14 September 1911. All correspondence is in RG 115, Entry 3, Box 673, File Number 865, NA-Washington.

7 OPERATION AND EXPANSION OF THE POWER AND PUMPING SYSTEM

Commercial Power Division

Although the Minidoka powerplant generated electricity primarily for irrigation pumping, it also produced power for commercial purposes. Congress in 1906 had authorized the Secretary of the Interior to lease power generated on Reclamation projects, stipulating that "such leases shall be covered into the reclamation fund and be placed to the credit of the project from which such power is derived." Reclamation immediately began to explore the possibility of producing commercial power on several projects, particularly the Salt River Project in Arizona.[1]

Commercial power schemes figured prominently in plans for the Minidoka Project as well. Reclamation realized that the entire output of the plant could be sold during the winter, defraying some of the expense of construction and operation. Power sales were considered so important that in 1907 Ross and Davis recommended installing a temporary power unit at Minidoka Dam for this purpose, even though work on the Pumping Unit had been suspended.[2] Project settlers also were highly interested in commercial power, hoping that it would stimulate local development, as well as dispel the gloom and drudgery of rural life. As the Rupert Commercial Club claimed in 1908:

> Power will be sold at such a low rate as to induce the location of beet sugar plants, flouring mills and manufacturing industries of all kinds, thus materially aiding in the development of this section. It is promised that electricity will be furnished so cheaply that it can be used for heating purposes in place of coal, and it can be supplied to the farmers for lighting their homes, operating feed mills and other machinery at a very low rate.[3]

In the fall of 1909, with work on the Minidoka Powerhouse underway, Reclamation began negotiating power sales with the towns of Heyburn, Rupert, and Burley, the principal trade centers of the Minidoka Project area [*see Figure 26*]. In March, Heyburn and Rupert signed power contracts with Reclamation. The town of Burley chose to act as its own distributor, signing a contract directly with Reclamation in April. All of the contracts were to run for ten years, and initially guaranteed each town 1,500 kilowatts of power during the winter and 300 kilowatts during the summer. To safeguard the interests of the farmers on the Minidoka Pumping Unit, the contracts specified that power could be limited below the amounts contracted if required during the summer for irrigation. Reclamation was responsible for building the transmission lines to the towns and erecting substations to convert the current to a voltage suitable for distribution. The towns were to build the distribution circuits and arrange sales to the individual consumers.[4]

With the contracts signed, Reclamation appointed A.P. Davis, F.E. Weymouth, and C.H. Paul as a special engineering board to consider the question of how to handle the cost of building the commercial power features. Constructing transmission lines and substations to the towns required the immediate expenditure of at least $27,000. The engineers also predicted that additional transformers and transmission lines would have to be built as power demands increased. Within ten years, the board estimated, the total capital investment in the commercial power system would amount to at least $51,000.[5]

According to Federal reclamation law, the cost of the commercial system had to be charged against one of the project's administrative units. Rather than levy the expense against either the Gravity or the Pumping Divisions, the board recommended creating a special "Commercial Power Division." The cost of the lines and substations could then be repaid by commercial revenues, at no additional cost to the irrigation water users. The board also recommended that 13 percent of the cost of the powerplant, or about $57,850, be deducted from the amount charged against the Pumping Unit and instead be charged

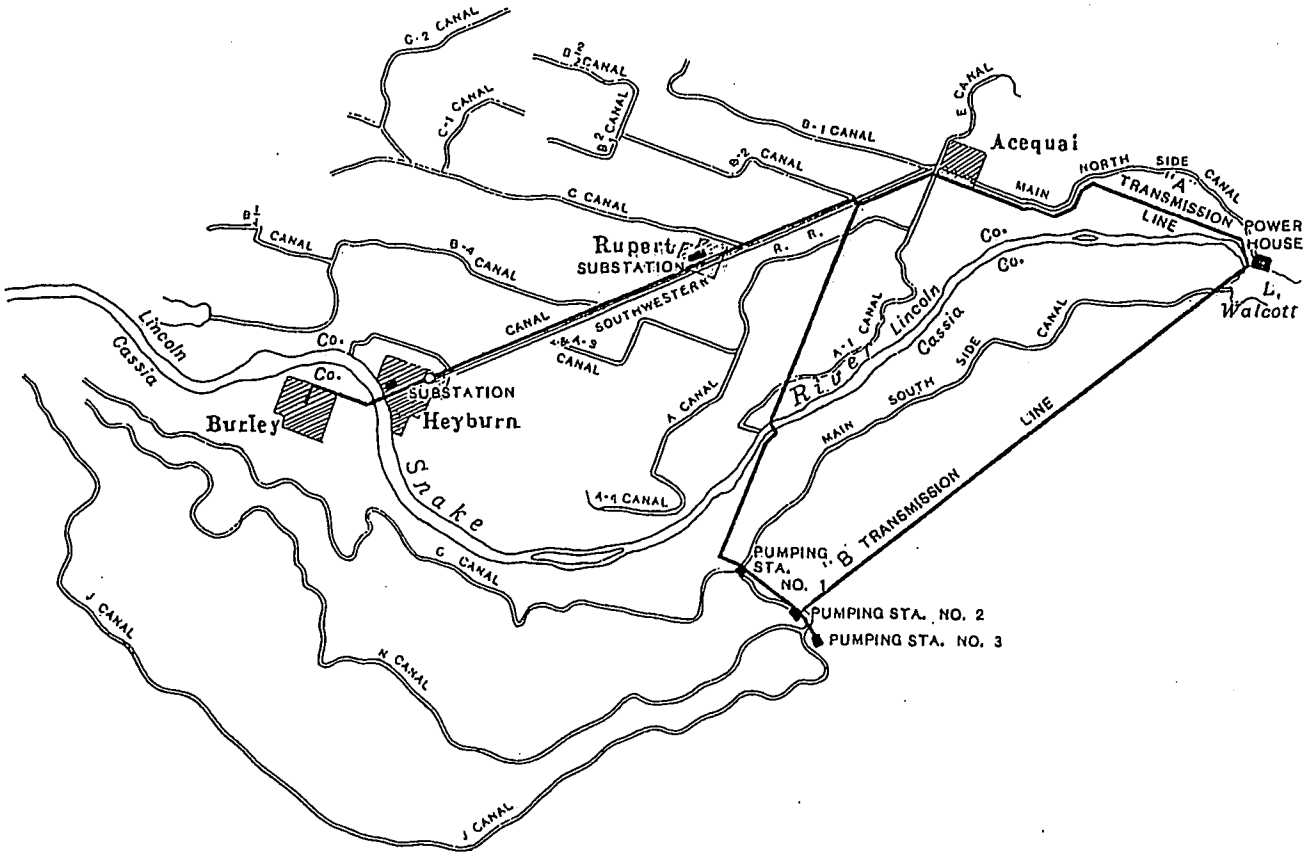

Figure 26. Minidoka Powerplant main transmission lines, from Electrical World, 30 December 1911.

to commercial power. The percentage was based on the fact that the pumping plants were only expected to require 87 percent of the powerplant's capacity, allowing at least 13 percent of the power to be sold commercially during the irrigation season. Charging 13 percent of the cost of the plant to commercial power seemed equitable and further reduced the costs to the Pumping Unit settlers.[6]

Reclamation began delivering power to the towns in the fall of 1910. Rates, which were set by the Government, were initially low to encourage use. Reclamation also was extremely conscious of outside competition in setting its prices. Private utilities had already built a number of powerplants on the Snake River, including two at American Falls and another at Shoshone Falls. While it was unlikely that these companies would string lines to the Minidoka Project to compete directly against Reclamation's commercial power system, they did threaten to draw businesses to their respective market areas and away from the Government project. "It is important that we locate industries and secure markets as near as possible to this project," Davis noted in 1908. "This is so important that I think the farmers who are paying for this project might afford to furnish power free, or at least way below cost, to secure industries in this vicinity."[7]

For lights and appliances, consumers purchased electricity on a kilowatt-hour basis, with the rate set at 5 cents per kilowatt-hour for the first 100 units. The cost then dropped steadily for each additional block of power. The unit price for the next 100 kilowatt-hours was only 4 cents, and 3 cents for the next 300 kilowatt-hours. At the far end of the scale, consumers using more than 100,000 kilowatt-hours per month were assessed a unit price of only 0.55 cents. To discourage power use during the pumping season, all prices rose 25 percent in June, July, and August.[8]

Although Reclamation officials believed that power use would increase and prove profitable, they initially doubted that demand would rise rapidly. As the project's power superintendent, Barry Dibble, wrote in 1914: "In these small sage brush towns, which even now have a combined population of less than 3000, it appeared highly improbable that the use of electricity in the ordinary ways would ever amount to enough to warrant the operation of the power system throughout the non-irrigation season." To guard against insufficient power sales, Reclamation targeted a new market: electric heating. Not only was indoor heating a vital requirement in the Idaho climate, but the demand for it occurred during the non-irrigation season. "This electric heating load," Dibble observed, "appeared to be the only one that could be secured that would satisfy the conditions of the Minidoka system. These permitted of carrying a heavy load in the winter but required that the demand be reduced to practically nothing in the summer."[9]

At the time, marketing electricity for heating was almost unheard of, for it was generally acknowledged that coal was a much cheaper fuel. Although Reclamation engineers agreed that Minidoka electric heating rates would have to be set artificially low to be competitive, they believed the scheme was practical because of the special conditions under

which the Minidoka powerplant operated.[10] Reclamation claimed that the cost of production was almost negligible, and pointed out that rates did not need to return any of the cost of the powerplant because it was already being paid for by the water users. Even the cost of installing lines and substations was not a factor, for this cost was being returned by the more profitable lighting and appliance load. According to one Reclamation engineer, all of the revenue from electric heating, no matter how small, represented "that much gain."[11] Dibble summarized the situation when he wrote:

> It was apparent that electric heating would have to be supplied at a price very much lower than the customary rates for electricity in order that it might supplant coal, in fact the rate must be below the average cost of supply. However, in supplying electricity for heating, use was made of a power station that was already installed and operated for other purposes, and a transmission line which was needed to supply the ordinary requirements of the towns.[12]

Power sales began modestly in all of the towns, with a total connected load of only 300 kilowatts at the end of 1910 and 706 kilowatts at the end of 1911, the first full year of operation. To increase power consumption, Dibble delivered public lectures, "illustrated with lantern slides," on the uses of electricity, and prepared articles for the local and national press describing the commercial system. Weymouth noted approvingly in 1912 that Dibble was spending "a great deal of his time in educating the people as to what can be accomplished by purchasing cheap power."[13]

Perhaps Dibble's greatest public relations coup came when the towns of Rupert and Burley decided to install electrical systems in their new public high schools, erected in 1914 and 1916, respectively. Dibble published detailed accounts of the buildings, describing their lighting and heating facilities, as well as their "domestic science rooms," fully equipped with electric hot plates, ranges, and other appliances. In addition to their normal curriculum of reading, writing and arithmetic, the high schools educated the settlers in the uses of electricity for lighting, heating, and cooking. To highlight Dibble's efforts, Reclamation concurrently dubbed Minidoka the "Electric Project" in its popular publications.[14]

With favorable rates and extensive publicity, commercial sales increased rapidly. By the end of 1912, the total connected load of the towns had risen to 1,300 kilowatts—an increase of nearly 100 percent over the year before. With predictions of continued growth, Reclamation began to increase the capacity of its substations at Burley and Rupert during the summer of 1913, completing the work by 1915. The expansion proved necessary, for during the following winter the electrical load of both towns nearly reached the 1,500-kilowatt limit allowed under their contracts. Heyburn, with a smaller population and fewer businesses, experienced almost negligible growth, its commercial load remaining below 200 kilowatts.[15] To accommodate continued growth in Rupert and Burley, Reclamation increased the contract limits for the 1914-1915 commercial season, Burley being allowed a maximum load of 1,800 kilowatts, and Rupert 1,750 kilowatts. For the winter of 1917-1918, Reclamation again increased the contract limits to 3,000 kilowatts for Burley and 2,000

kilowatts for Rupert. By the time the contracts expired in 1920, Burley alone had a peak commercial demand of 3,260 kilowatts.[16]

In addition to its contracts with Burley, Rupert and Heyburn, Reclamation arranged power sales to manufacturing concerns, beginning in 1912 with an agreement to deliver up to 170 kilowatts to the Amalgamated Sugar Company plant at Burley. The agency also sold power to a number of small villages, including Albion, approximately 15 miles south of Minidoka Dam, and Paul, 10 miles west.[17]

Despite Reclamation's readiness to negotiate with area towns and industries, the Government was slow to arrange power sales to project farmers. Although Reclamation in 1913 did contract with a few farmers located adjacent to Minidoka power lines, the total number was never high. By 1920, no more than 40 farms received power directly from Reclamation.[18] Most settlers had expected the Government to build transmission lines and substations to convey power to the farmsteads, just as it had done for the towns. Reclamation, however, argued that the cost was prohibitive and instead urged farmers to form cooperatives to construct the lines themselves and buy power in bulk. As Dibble reported in 1914:

> Usually, when the matter first comes up the farmers are dumbfounded at the cost of installing lines and transformers. If they are in earnest and reasonably well located, they soon begin to realize that the economies and comforts they can enjoy with electricity are sufficient to warrant the expenses. The idea that they will get the government to build lines to supply them is gradually disappearing.[19]

The first electric cooperative contracted with Reclamation in 1913. Called the Minidoka Northside Power Company, the group tapped a substation built to serve a pumping plant on the Gravity Unit. A second cooperative, the Farmers' Electric Company, formed in 1914, and a third, the Schodde Electric Company, emerged in 1915. The number of cooperatives increased substantially after 1915, due largely to an upswing in the agricultural economy during World War I. In 1918, Dibble observed that "the prosperity of the farmers is also a large factor in the development in rural districts.... With their increased prosperity has come an increasing desire to have all the modern conveniences possible and with the network of distribution lines covering the project as they do, almost any group of farmers can have electric service if they so desire."[20]

By 1920, at least 1,100—or 46 percent—of the Project's 2,400 farms received electricity. Considering that only about three percent of the nation's farms were electrified, Minidoka truly seemed to have earned its nickname of the Electric Project. But with the collapse of the Idaho farm economy in the 1920s, the period of rapid rural electrification ended. From 1920 until 1930 the number of electrified farms on the Minidoka Project remained about the same. Although Reclamation continued to tout Minidoka as a leader in rural electrification, other projects actually moved into the vanguard, most notably, the Salt River Project in Arizona, which achieved one hundred percent electrification of its 7,000 farms by 1929.[21]

The leveling-off of rural electrification on the Minidoka Project was at least partly the result of an increasingly limited power supply, which ultimately made electricity more expensive for the consumer. When commercial sales began in 1910, the peak demand for commercial power had amounted to no more than 300 kilowatts. But peak demand increased substantially winter by winter, reaching 700 kilowatts in 1911-1912, 1,690 kilowatts in 1912-1913, and 2,760 kilowatts in 1913-1914. Examining this upward trend, Dibble predicted in 1914 that the winter peak would equal the full capacity of the plant sometime before 1920. His estimate proved accurate, the commercial peak reaching 7,500 kilowatts during the winter of 1918-1919.[22]

Only a small portion of the commercial power load served "traditional" uses, such as lighting and small appliances. Most power went to heating, which in 1917 consumed 84 percent of the Minidoka hydroelectric plant's output. Reclamation was optimistic, however, that the more profitable non-heating load was increasing. In 1919, Dibble reported that the connected load for lighting and appliances had increased 50 percent in Burley and 42 percent in Rupert, reflecting the growing popularity of electric ranges, washing machines, and water heaters, as well as a more general use of smaller devices, such as irons, toasters, and vacuum cleaners.[23]

Increased power sales, of course, led to increased commercial revenues. Gross returns rose every year, growing from only $680 in 1910 to $63,177 in 1918. Profits were modest at best. Before 1913, Reclamation charged the project's Commercial Power Division with 13 percent of the operating expenses of the powerhouse, in accordance with the recommendations of the 1910 engineering board. By 1913, however, the amount of power consumed by the Commercial Division nearly equaled that used for irrigation pumping. Reclamation, therefore, decided it would be more equitable to divide the operating costs in proportion to the number of kilowatt-hours used by each project unit. Because much of the commercial load came from electric heating, which had very low rates, the profit margin was quite small. Unlike private utilities, however, the Minidoka Project's Commercial Power Division did not incur expenses for interest, insurance, and taxes. These dispensations apparently allowed the Government system to run in the black after the first few years. As a Federal board of review explained in 1920:

> Based on operation and maintenance charges alone there were losses in 1910 and 1911, with profits increasing from $1,889 in 1912 to $42,428 in 1918, making a total profit for the whole period from 1910 to 1918 inclusively of $113,817. By including depreciation also in the charges losses occur for 1910 to 1913 with small profits for the remaining years ending with $10,430 in 1918 and totaling $24,448 for the whole period of operation. If interest on investment [computed at an annual rate of simple 6 percent] is also charged, there is a deficit for each year . . . ranging from $4,505 in 1910 to $22,836 in 1918 making a total deficit of $135,432 for the whole period. By including taxes and insurance [computed at an annual rate of 3 percent] the deficits are still further increased to $215,401 for the nine year period.[24]

In 1920, the original ten-year power contracts expired, and the towns entered new leases with Reclamation. A major change under the new contracts was a substantially higher heating rate. The cost to the consumer rose from $1.00 per kilowatt to $2.25 per kilowatt. "The new rate," Weymouth informed Davis, "was specified only after careful consideration and the increase is necessary in order to cover a proper share of the cost of production." Although the new rates made electric heating more profitable, they also encouraged many consumers to switch to coal. During the winter of 1920-1921, for example, Reclamation reported that the connected heating load had dropped 23 percent. This decline, however, was more than made up for by the steady growth in electric sales for lighting and appliances. The net result was a steady rise in profits. By 1925, Reclamation estimated that net profits for the year would amount to at least $60,000.[25]

Expansion of the North Side and South Side Pumping Systems

Reclamation had originally estimated that it could sell 1,000 kilowatts, or about 13 percent of the capacity of the Minidoka plant, during the pumping season. After the spillway had been raised in 1910, it appeared that the Government could sell even more power. By raising the reservoir surface four feet, the new spillway enabled the powerplant to generate an additional 800 kilowatts. Two developments in 1913, however, negated any gains from the higher spillway, and, in fact, severely curtailed the amount of commercial power available during the summer.

The first development was the emergence of electric pumping on the Gravity Unit. Reclamation had recommended building north-side pumping plants in 1907, after discovering that the gravity system could not water several tracts of high land. The first pumping station opened in 1913, followed by additional plants in 1914, 1915, and 1918. Seven pumping plants eventually opened on the north side, serving both irrigation and drainage purposes. Most of these stations were modestly scaled, having capacities of only 4 to 20 second-feet and operating under lifts of five feet or less. But two plants were sizable. One, known as the Boersch Lake Station, was equipped with two 26-second-foot-capacity centrifugal pumps operating under lifts of nearly 20 feet. The other, known as the West End Station, contained two 20-second-foot-capacity centrifugal pumps, with lifts of over 21 feet [*see Figure 27*]. All told, the north-side plants required 330 kilowatts to operate.[26]

The second, and more serious, development was a plan to increase the capacity of the south-side pumping plants by 20 to 25 percent to remedy chronic water shortages. Since this expansion would substantially increase the amount of power required by the Pumping Unit, it posed a significant threat to commercial power plans.

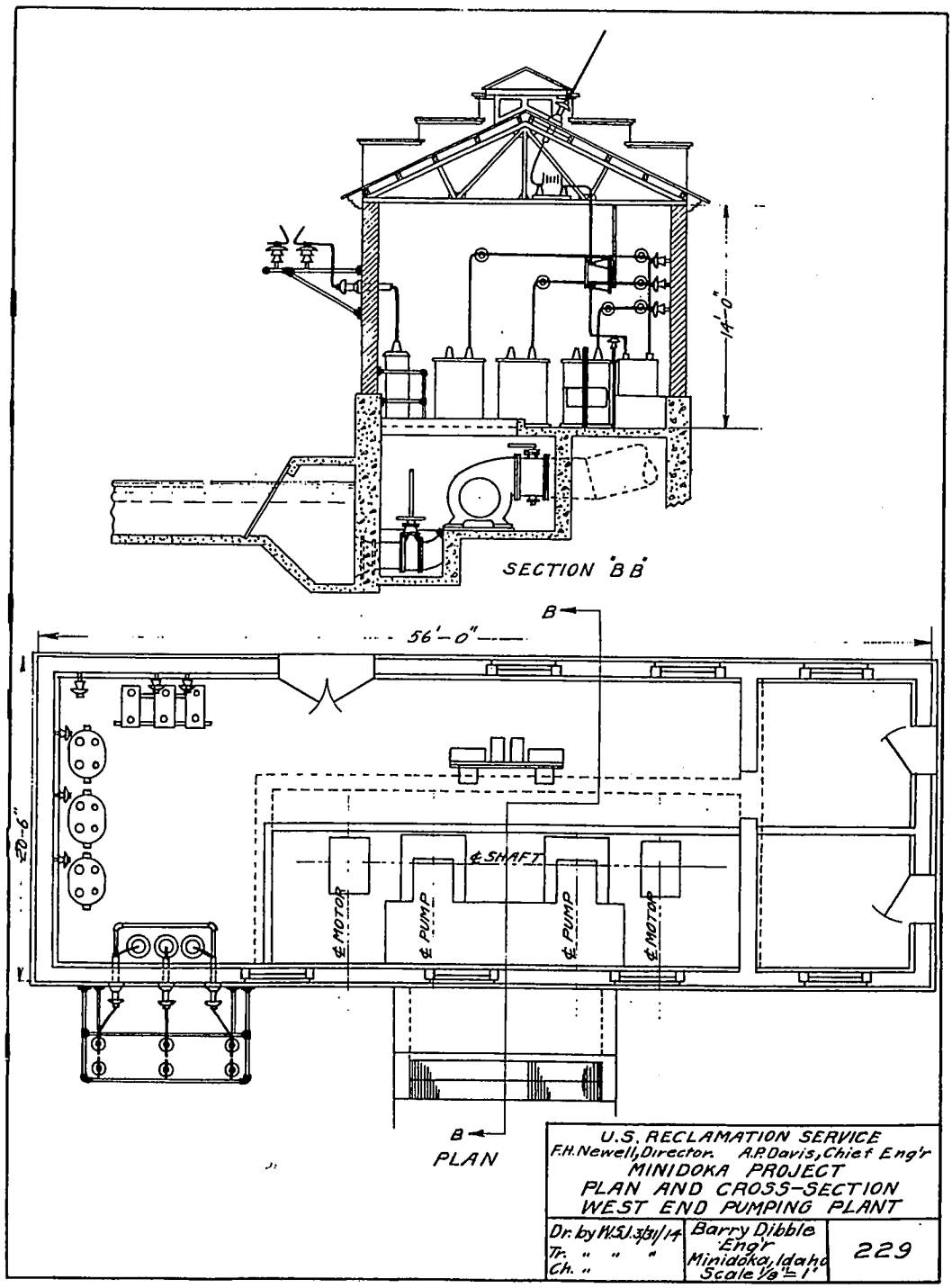

Figure 27. Section and plan of West End Pumping Plant, by U.S. Reclamation Service, 31 March 1914.

The proper capacity of the pumping system had been a point of contention since the earliest days of the project. At the advent of the reclamation movement, there was little agreement as to how much water was actually required to irrigate a given acre of land. Invariably, private irrigators believed that more water was needed than did Government irrigation engineers, maintaining that crops could not grow without large amounts of water. Many insisted, however, on low water duties in order to maintain title to excessive water appropriations, which could then be sold or developed at their leisure. Appalled by this practice, conservationists in Idaho tried repeatedly in the early 1900s to set legislative limits on the amount of water per acre which could be claimed for irrigation.[27]

Writing in 1905, Ross admitted that "there is not much reliable information which would enable one to decide what the exact duty of water should be. . . ." In the Upper Snake River Valley, he reported, a flow of one second-foot was generally sufficient to irrigate 25 to 30 acres of land. In the Boise Valley, however, the amount of land irrigated by a one-second-foot flow ranged from as little as 25 acres to as high as 60 acres. But Ross dismissed these findings. Reflecting the common conservationist belief that irrigators were generally wasteful, he declared: "I feel satisfied . . . that altogether too much water is used in the older districts, especially by irrigators having early rights and an abundant supply of water."[28]

Perhaps in hope of bolstering the case for legislative limits on water claims, Ross seemed determined to impose a high duty of water on the Minidoka Project. Although past irrigation experience in Idaho suggested that 60 acres to one second-foot was the highest water duty possible, Ross predicted that one second-foot could irrigate 80 or even 100 acres on the Minidoka Pumping Division. Writing Newell in February 1905, he claimed: "The capacity for the main canal on the south side of the river I had decided on at the rate of 1 second-foot for each 80 acres of land, hoping that as the pumping system is developed that the duty of water can be increased so that this capacity can be extended to 1 second-foot to each 100 acres, or perhaps more."[29]

When the final plans for pumping plants were prepared during the winter of 1908-1909, they specified a duty even higher than 80 acres to the second-foot. Lift Station #1, which was to supply water to 48,700 acres, had a capacity of only 500 second-feet—a ratio of one second-foot to every 97.4 acres irrigated. The other pumping stations were designed with similarly low capacities.[30]

When the Government completed its pump installation in 1911, it quickly discovered that the system could not supply enough water during certain periods of the growing season. The pumping shortages occurred despite the fact that only 20,865 acres were under irrigation—far below the acreage the pumps were expected to supply. Loath to admit that water duties might be lower than expected, Reclamation initially blamed the farmers for the shortages, claiming that they had delayed applying for water until too late in the season. "This was in spite of warnings and efforts on the part of the operation force to secure

early irrigation," Project Engineer P.M. Fogg reported. "The result was a very heavy demand for water almost simultaneously on the part of the majority of the irrigators, and . . . the plant was taxed to its full capacity for a few days in the middle of July." Consequently, Fogg concluded, "A few small areas of crop were burned, but these were inconsiderable, [and] were due largely to negligence on the part of the settlers."[31]

To remedy the problem, Reclamation urged the farmers to adopt a system of water rotation. By carefully scheduling water use, the period of maximum demand could be spread over a longer period of time, thus reducing the volume of water demanded. However, the Government recognized that this was only a partial solution, and at the end of the year it reluctantly decided to install additional pumps at each lift station. The expansion could be accomplished with little difficulty, for an extra pump pit had been provided at each station during construction. These pits had originally been planned to supply water to a "fourth lift." The expansion during the winter of 1911-1912, however, ended any possibility of the additional lift being developed. Reclamation increased the capacity of Lift Station #1 to 575 second-feet, Lift Station #2 to 500 second-feet, and Lift Station #3 to 325 second-feet. After these modifications, the pumping system finally was able to supply one second-foot to every 80 acres—the capacity initially specified by Ross.[32]

Despite the new pumps, Reclamation was still hard pressed to meet the demand for water during the peak months in 1912 and 1913. At the end of 1913, the agency reported that it had been forced to overload the pump motors at Lift Station #1 by 9 percent, and at Lift Station #2 by 4 percent. Only Lift Station #3, where the least land was under cultivation, could accommodate the settlers' needs. Given the fact that only 32,100 acres were currently being irrigated, south-side settlers were understandably concerned that the canals and pumping plants would not be able to supply the full 60,000 acres originally contemplated for pump irrigation.[33]

At the end of the 1913 season, Reclamation appointed an engineering board to study the water shortage problem. The board's report, submitted in October 1913, once again recommended implementation of a stricter water rotation schedule, as well as a program of canal improvements to reduce the water lost through seepage. The board also recommended substantially enlarging the pumping system by 20 to 25 percent, thereby increasing capacities of the first, second, and third Lifts to 750 second-feet, 620 second-feet and 350 second-feet, respectively. The engineers estimated that the cost of this expansion would total at least $51,000.

To increase capacity, Reclamation planned to install higher efficiency pump runners that would be able to lift more water for a given amount of power. This remedy avoided the expense and complication of adding extra pump pits to the lift stations. The higher efficiency of the pumps did not, however, mean that the expansion could be completed without increasing power consumption. The engineering board estimated that during periods of peak demand, the south-side pumping load could rise to 5,880 kilowatts. Although the

powerplant could generate 7,800 kilowatts, only 6,240 kilowatts were available for use at the pumping stations due to transmission losses. The south-side pumping plants would therefore consume over 90 percent of the available power during peak periods.

The combined load of the north-side plants and the enlarged south-side plants virtually guaranteed that no power would be available for summertime commercial purposes. "This brings up the question," Weymouth observed in a letter to Davis in November 1913, "as to how the construction cost of the power plant should be distributed to the various features on the Minidoka Project."[34]

In 1910, Reclamation had decided to charge 13 percent of the powerhouse cost to commercial power, assuming that at least this much of the plant's capacity would always be available for sale. A recalculation of costs did not occur until 1914, when Congress requested the appointment of a special board to review Reclamation's repayment contracts. Because so little power could be sold during the summer, the review board "recommended that no part of the powerplant costs should be charged to the Commercial Power Unit, but that the entire cost of the plant should be divided between the Gravity Unit and the South Side Pumping Unit in the proportion of their maximum demand for power." Analyzing the current power consumption of each unit, the board fixed the division at 4.4 percent to the Gravity Unit and 95.6 percent to the Pumping Unit. The board's report eventually served as the basis for the announcement of costs when the Pumping Unit officially opened late in 1915.[35]

As the first phase of the pumping expansion, Reclamation planned to install new runners in Lift Station #1 and Lift Station #2, increasing their capacities to 650 second-feet and 525 second-feet, respectively. The Byron-Jackson Iron Works of San Francisco designed the new pump runners, submitting final plans in December 1913. Reclamation awarded the contract to build the runners to the United Iron Works of Oakland, California, which agreed to supply them for a total cost of $1,252.[36]

Dibble and Ensign hoped that the experimental pump runners would have a capacity of at least 150 second-feet at an efficiency of at least 75 percent. Reclamation installed the first new runner in March 1914. To their satisfaction, the pump proved to have a capacity of 186 second-feet at an efficiency of 76.3 percent. While both the efficiency and the capacity were better than expected, running the pump at full volume required loading the motors to 856 horsepower—far in excess of its rated capacity of only 600 horsepower. To reduce the strain on the motors, Reclamation engineers reduced the runners' capacity to approximately 150 second-feet by filing down the vanes. At this lower volume, the load on the motors was an acceptable 730 horsepower. For reasons not clearly understood, reducing the capacity had the added benefit of increasing the efficiency of the pump, raising it to approximately 80 percent. All of the new runners were eventually modified in this manner. During the 1914 season, Reclamation replaced the original 125-second-foot runners in the First, Second and Third Units of Lift Station #1, and the Third and Fourth Units of Lift Station

#2. Because the pump motors were operating at higher horsepowers, Reclamation installed new windows at both lift stations to improve ventilation for cooling purposes.[37]

The new pump runners performed well during the 1914 irrigation season, prompting Reclamation to plan for the replacement of all the original runners. The remaining 125-second-foot runners were to be replaced by the new 150-second-foot runners, while the 75-second-foot pumps located at the first and third lifts were to receive new 115-second-foot runners. Reclamation opened bids for the new runners in November 1914, awarding the contract to the Seattle Construction and Dry Dock Company. The company agreed to build the large runners for $181 a piece, and the small runners for $203.50. The total cost of the alteration was approximately $18,000. Installation of the new runners occurred during the winter of 1914-1915, raising the capacities of the first, second, and third lifts to 760 second-feet, 660 second-feet and 430 second-feet, respectively.[38]

Despite the significant increase in capacity, water shortages continued to plague the project during periods of peak demand. In 1917, the South Side Water Users' Association appointed its own committee to investigate the water situation. In its report in November, the committee strongly recommended that Reclamation increase the capacity of the pumps, canals, and sublaterals to allow a larger flow. Although Reclamation considered making a minor expansion to the system in 1920, the work was not carried out at that time.[39]

Power Shortages and Powerplant Expansion

With the expansion of the south-side pumping plants in 1913, the summertime peak demand for power considerably exceeded the Minidoka powerplant's original 7,000-kilowatt capacity. Reclamation made up the deficit by holding the level of Lake Walcott to the crest of the spillway, thus enabling the powerplant to produce approximately 7,800 kilowatts. But demand soon overwhelmed the system again. By 1915, the pumping stations were absorbing the plant's full capacity during the summer, and the commercial system was taking nearly its full output during the winter, leaving no excess capacity to accommodate breakdowns or commercial expansion.[40]

The obvious solution was to increase the generating capacity of the Minidoka Powerplant. Not only could Reclamation then produce more power for pumping and commercial uses, but it could lower the elevation of Lake Walcott. Reclamation had installed the higher spillway to allow the reservoir to absorb releases from Jackson Lake Reservoir, located nearly 500 miles upstream. This supplemental water was intended for irrigation during the long, dry summer months. But with the reservoir raised to the crest of the spillway for power purposes, the discharges from Jackson Lake simply overflowed the spillway and wasted downstream.

Reclamation had long anticipated that the Minidoka powerplant would need to be enlarged. Indeed, extra penstock openings had been included in the diversion control structure and powerhouse when these features were originally built. In 1908, Ensign also had prepared plans for a 5,000-kilowatt addition. In Ensign's plan, an ell housing five power units would be built on the north bank of the tailrace, adjoining the west side of the plant. This expansion was never implemented.[41]

In 1915 the Government began preparing for expansion. Reclamation built a new road to the powerplant to facilitate construction. Replacing the original route over the desert to Minidoka station, the new road ran along the Snake River to Acequia, located five miles west of the dam. In 1916, the Government also built a concrete bridge over the Main North Side Canal near the powerplant, declaring that the old bridge "had become unsafe and the new bridge was constructed strong enough for hauling heavy machinery for the proposed extension of the power plant." In 1918, the Government even went so far as to erect new housing for the construction workers in the camp adjacent to the plant.[42]

James M. Gaylord, working out of Reclamation's Denver Office, supervised the preparation of plans for the powerhouse expansion. Gaylord intended to build an addition to the powerplant on the site chosen by Ensign. Rather than five power units at 1,000 kilowatts each, the addition promised to deliver twice the power in the form of two 5,000-kilowatt units.[43] A phased installation would minimize immediate outlays. Although Reclamation would excavate for both turbines and build the entire addition, it would install only one power unit for the time being for a cost of $550,000. Dibble hastened to predict, however, that "I am confident . . . it will be economical to install the 7th unit at a not distant date" to meet the growing demand for commercial power.[44]

Despite these extensive preparations, plans for the powerplant expansion ended abruptly. Funding problems were partly to blame, bringing the project to a temporary halt in 1918. But a more important factor was the sudden possibility of securing power from an entirely different source. During the funding crisis, Dibble had approached the Idaho Power Company to see whether he could purchase power to meet peak demands while Reclamation decided the fate of the new powerplant units.[45] Founded by the Electric Bond and Share Company of New York, Idaho Power was a merger of five small Idaho utilities located in the Snake River Valley. It served a large area throughout southern Idaho and eastern Oregon and operated several Snake River power stations, including three plants at American Falls above the Minidoka Project.[46] Dibble's negotiations led to more than he had bargained for. As he later recalled:

> The discussion with the Power Company immediately led to a reconsideration of the possibilities for water storage as well as for power at American Falls. Since 1910 the Reclamation Service has been studying the inter-relation of the use of water for power and irrigation on Snake River, and has determined that the Idaho Power Company's rights at American Falls are the key to all future development on Snake River.[47]

Through its earlier studies, Reclamation had determined that a large dam at built American Falls could store enough water during the winter to improve the water supply of the entire Lower Valley and irrigate an additional 400,000 acres. A hydroelectric plant at the dam, furthermore, could use the water released for irrigation to generate an enormous amount of power for pumping and commercial purposes. With state opinion-makers behind the American Falls Dam, public pressure mounted for its construction in 1918 and 1919. Reclamation, however, had not announced any definite plans for the project, apparently due to a lack of funding.[48]

During his discussions with Idaho Power, Dibble was horrified to discover that the company was considering increasing its own power production at American Falls. Executing this plan would give the company claim to a large amount of the river's winter flow, making it impossible for Reclamation to develop a storage facility at American Falls. To forestall this, Reclamation immediately began to explore the possibility of acquiring Idaho Power's holdings at the falls, either through purchase or condemnation. Anticipating that development of American Falls would meet all of its power needs, Reclamation suspended work on the Minidoka powerplant expansion while negotiations got underway.[49]

The power situation on the Minidoka Project remained acute while negotiations dragged on. In August 1920, Dibble warned that "unless something can be done to obtain sufficient power to relieve the situation here next summer, we are going to be placed in a very embarrassing position."[50] Dibble later estimated that the Minidoka Project required at least another 500 kilowatts to carry the growing summertime commercial and pumping loads. Water shortages caused by cyclical periods of drought in the late 1910s and early 1920s also made it increasingly important to use Lake Walcott as an equalizing reservoir—an impossibility while the reservoir was held to the crest of the spillway to generate power. In order to lower the reservoir, Dibble reported, the Project needed at least another 900 kilowatts from an outside source.[51]

As a temporary solution, Reclamation negotiated a power exchange with Idaho Power in the spring of 1921. Under this contract, Idaho Power supplied approximately 500 kilowatts to the Minidoka Project in exchange for an equal amount of power from Reclamation's powerplant on the Boise Project. Early in 1921, Reclamation strung a twelve-mile transmission line from Burley to Idaho Power's system at Milner. Construction of the line marked the first interconnection of the Minidoka Project with another power system.[52] Reclamation and Idaho Power finally came to an understanding on American Falls in the fall of 1921. At that time, Idaho Power agreed to a complex contract awarding Reclamation its water and power rights at the falls, in addition to two of its powerplants. In return, Reclamation agreed to pay the company $1 million in four installments and guaranteed certain water and storage rights for power production at the company's remaining American Falls plant and other hydroelectric facilities further downstream. The utility signed the contract in October 1921, and it was forwarded to Washington for the approval of Secretary of the Interior Albert B. Fall.[53]

In addition to supplying power to the Minidoka Project, the American Falls Dam was expected to serve at least 31 private irrigation companies in the Snake River Valley, as well as several new Reclamation projects, including the Minidoka North Side Extension. This latter undertaking was to reclaim land in Minidoka, Power, and Lincoln counties adjacent to the existing Minidoka Project and had been contemplated by Reclamation as early as 1908. Although many of the private irrigation companies had entered into individual contracts to pay for part of the new American Falls Dam in 1919, a downturn in the farm economy in 1921 forced many to default on their payments. Bills were also pending in Congress at that time to impose a blanket moratorium on repayments by water users on Reclamation projects.

These facts convinced Fall that the cost of the American Falls project would never be repaid, and he initially refused to sign the Idaho Power contract. After extensive lobbying by Idaho interests, particularly by Senator William E. Borah, Fall agreed to approve the contract if the irrigation companies receiving water could offer a more substantial repayment guarantee. The irrigation companies in the Snake River Valley eventually did so by forming the so-called "Big Irrigation District" in July 1923. Fall signed the Idaho Power contract later that year.[54]

With the contract's approval, Reclamation acquired two of the Idaho Power Company's American Falls plants, both built in 1902. Known as the Island and West Side plants, these hydroelectric stations had a combined capacity of about 1,800 kilowatts.[55] Early in 1924, Reclamation built a transmission line to American Falls from the Minidoka Dam to tap the Idaho Power plants. By this time, unfortunately, the power requirements of the Minidoka Project had grown to such an extent that even these additional facilities were insufficient. In 1924, E.B. Darlington, who had replaced Dibble as the Project Superintendent, reported:

> The power requirements of the South Side pumping stations will in 1925 and 1926 absorb practically the entire output of the Minidoka power house during the peak of the irrigation season. The average summer load on the project, for commercial purposes, is about 800 kilowatts. It is therefore seen that the margin over actual necessities is very narrow, and no reserve power is available to take care of expansion and natural growth in the use of electrical energy on the farms and in the towns of the project.[56]

In 1925, Reclamation increased power production at the Minidoka Plant by about 150 kilowatts by replacing the runner in the fifth power unit with a more efficient model.[57] The improvement was hardly sufficient to meet all power needs, and in 1926 Reclamation's Denver Office urgently recommended that funds be procured to begin work on the long-awaited American Falls powerplant. If funds could not be secured, the Denver Office wrote, "It is believed that the development of additional power at Minidoka Dam should be undertaken immediately."[58]

But funding was not forthcoming, and the American Falls plant was not built. In 1926, therefore, Reclamation revived its plans to expand the Minidoka Powerplant. The agency had secured an appropriation to pay for the expansion in 1918, but it had since expended the funds as part of the American Falls acquisition.[59] As a result, Reclamation officials decided to fund the expansion solely from the accrued profits of the Minidoka Project's Commercial Power Division, which amounted to approximately $340,000. This amount, however, was insufficient to cover the cost of building an addition to house two new power units, as originally planned. "The estimated cost of such an installation," the Denver Office reported, "is $402,000 and therefore this development cannot be undertaken unless additional funds can be made available." Instead, Reclamation decided to install a single 2,400-kilowatt unit inside the existing powerhouse, in a bay occupied by two water-driven exciters. This option was estimated to cost $200,000, including the expense of an outdoor transformer yard and two new motor-driven exciters, which were to be located at the north end of the powerhouse generating floor.[60]

Reclamation opened bids for the new unit in September 1926. Allis-Chalmers received the contract for the generator and switch board, while the Newport News Shipbuilding and Drydock Company was to furnish the turbine. Construction by Government forces began in October 1926 and continued through the following spring. To place the new turbine and generator, Reclamation cut a doorway into the north end of the powerplant and installed a guy derrick. Simultaneously with this, the Government built a new switch yard on a point of land to the east of the plant. The yard housed the transformers for the sixth unit, as well as, eventually, a transformer for the fifth unit. Reclamation completed the installation of the sixth unit on 16 June 1927.[61]

Installation of a sixth unit was, in many ways, simply another stop-gap measure to correct the Minidoka Project's chronic power shortages. As the Chief Engineer of the Denver Office, R.F. Walter, explained: "When the sixth unit is completed . . there will be sufficient capacity to handle the present power requirements of the Minidoka Project with a small margin to care for an increase in commercial load. There will be insufficient reserve capacity, however, to provide for one of the units' being out of service except the two old plants at American Falls which are now obsolete."[62] It was understood that additional changes in the power system would soon have to be made.

Even as the new power unit was being installed, other developments were taking place that would have a profound effect on future power plans. While Reclamation struggled with the power and pumping expansions of the 1910s and early 1920s, project settlers struggled with their own problems of low crop prices and high construction costs. The settlers' search for solutions culminated in the passage by Congress in 1924 of the so-called "Fact Finders Act," which, with later Federal legislation, substantially revamped the Reclamation program [see next chapter]. It has been generally recognized that the Act was significant for allowing Reclamation to be more responsive to the needs of the water users. This was achieved, principally, by liberalizing the method by which repayment and opera-

ation and maintenance costs were charged. Rather than requiring repayment within a set number of years, as had been defined in 1902 by the Reclamation Act, the Fact Finders Act geared payment to the productivity of each farm unit. Annual operation and maintenance charges, furthermore, were levied as a percentage of per-acre income.[63]

The Act also had a substantial impact on the production and sale of commercial power. The question had long been simmering on the Minidoka Project of what should be done with power revenues. The construction of a new power unit had largely consumed most of the accrued profits, but the commercial system had grown to such an extent that substantial revenues were being returned each year. The Fact Finders Act specified that the money had to be distributed to the project water users, a provision in keeping with the Act's intended goal of "humanizing" Reclamation and giving more power to the settlers.[64] One problem, though, was that the Minidoka Project was divided into two administrative units—the Gravity and the Pumping Units—and it was unclear how to apportion power revenues between them. Sixteen years earlier, Reclamation's Chief Engineer A.P. Davis had warned that the creation of separate water user's associations for the Gravity and Pumping Units would inevitably lead to "friction and difficulty" because "matters will doubtless arise when the interests of the north and south side may be at variance." The power profit issue would make these words prophetic.

There was another fundamental problem with the Fact Finders Act that overshadowed intra-project rivalries. The Act's underlying philosophy of increasing local control was at fundamental odds with Reclamation's growing recognition of the long-term value of system-wide coordination of its water and power resources. Reclamation had always emphasized the importance of scientific and rational management of water resources to provide for the greatest public good. The Fact Finders Act did not ostensibly challenge this philosophy, for it also stressed the importance of managing projects scientifically. But the framers of the legislation did not see that scientific management could be in conflict with the well-being of individual water users. The inherent difficulty of managing a system-wide resource while respecting local interests was to be clearly revealed in the coming years as Reclamation attempted to administer the Minidoka power system and divide power profits under the terms of the Fact Finders Act.[65]

Endnotes

[1]Congress authorized the lease of power in an act of 16 April 1906. Text is printed in U.S. Department of the Interior, Bureau of Reclamation, *Federal Reclamation Laws, Annotated* (Washington: Government Printing Office, 1943), 94-97. In addition to Minidoka, power developments were planned, or being considered, on Salt River Project, Arizona; U n c ompahgre Valley Project, Colorado; Garden City Project, Kansas; Boise Project, Idaho; Williston Project, North Dakota; Klamath Project, Oregon and California; Strawberry Valley Project, Utah; Sunnyside, Tieton, and Wapato Units of the Yakima Project, Washington; Truckee-Carson Project, Nevada;

Shoshone Project, Wyoming; and Rio Grande Project, New Mexico. Reclamation arranged power sales on every project that contained a generating plant. The two largest commercial power producers in the 1910s proved to be the Minidoka Project and the Salt River Project. At Salt River, Reclamation built a 45,000 volt transmission line to sell power to the City of Phoenix, 75 miles away. In 1917, the Federal Government divested itself of the Salt River powerplant as part of turning over the project's irrigation infrastructure to the local water users' group. See "Irrigation and Electric Energy," *Electrical World* 56 (7 July 1910): 19-22; F.H. Newell, "Electrical Features of the U.S. Reclamation Service," *American Institute of Electrical Engineers, Proceedings* 33 (12 October 1914): 1583-1598; Karen L. Smith, *The Magnificent Experiment: Building the Salt River Reclamation Project, 1890-1917* (Tucson: The University of Arizona Press, 1986), 143-144.

[2]D.W. Ross and A.P. Davis to F.H. Newell, 1 May 1907, RG 115, Entry 3, Box 646, File Number 250, NA-Washington. In his "History of the Minidoka Project," Fogg writes that commercial power "had always been carried in mind as being a desirable development for the use of excess capacity. Especially during the winter months when the irrigation requirements of the pumping lands were not active, it was recognized that upon completion of the installation, there would be a large amount of power available for which a market should, if possible, be found" (p. 61).

[3]*Minidoka Project: A Brief Description of the Second Project to Be Irrigated by the U.S. Reclamation Service* (Rupert Commercial Club, 1908).

[4]In the fall of 1909 and spring of 1910, Reclamation advertised for bids from those interested in serving as power distribution agents to the Project towns. These agents were to purchase power from the Government at "wholesale rates" and build the lines to distribute the current to customers. Reclamation initially placed caps on the rates that the distribution companies could charge, allowing a margin for profit. Bids were received from the Town of Burley, which proposed to act as its own distributor; from F.N. Victor, to serve as agent for the Town of Rupert; and from E.B. Skinner, for the Town of Heyburn. All of the bidders received their respective contracts. See Fogg, "History," 61-62. Some details of the power contracts are discussed in F.E. Weymouth to Supervising Engineer, Helena, Montana, 27 December 1912, RG 115, Entry 3, Box 643, File Number 223, NA-Washington. Contract limits are given in *Annual Report*, 1914-1915, 30.

[5]For the estimated cost of the commercial power system and the distribution of costs to the Commercial Power Division, refer to A.P. Davis, F.E. Weymouth, and C. H. Paul to F.H. Newell, 17 December 1910, RG 115, Entry 3, Box 647, File Number 250, NA-Washington.

[6]After the long delay in opening the Pumping Unit, Reclamation was anxious to win back the goodwill of the settlers. Construction prices had been much higher than expected, however, and this fact was unlikely to engender support. Reclamation was thus eager to reduce costs as much as possible. The board alluded to this concern in an earlier report, when it wrote: "It is very desirable... to keep the cost of the pumping unit as low as possible" (see Davis, Weymouth, and Paul to Newell, 7 December 1910, RG 115, Entry 3, Box 647, File Number 250, NA-Washington).

[7]A.P. Davis to O.H. Ensign, 16 March 1908, RG 115, Entry 3, Box 643, File Number 223, NA-Washington. In his letter, Davis reports that the American Falls Power Company is "offering free power for one year to any industry employing ten or more that will locate at American Falls." Davis went on to observe: "As American Falls is only twenty-five miles from the Minidoka Dam they are in good shape to enter into competition either in locating industries near them or supplying power to our customers." Davis also notes the rates being offered by the utility at Shoshone Falls, called the Twin Falls Power Company. Reclamation's power sales began in October 1910;

see Barry Dibble, "Operation of Minidoka Reclamation Project," *Journal of Electricity, Power and Gas* 33 (11 July 1914): 29. For information on earlier powerplants within the Snake River region, see George C. Young and Frederic J. Cochrane, *Hydro Era: The Story of Idaho Power Company* (n.p.: Idaho Power Company, 1978), 19-33.

[8]*Annual Report*, 1913-1914, 36-37. Slightly lower rates are listed in Dibble, "Operation of Minidoka Reclamation Project," 30. Discrepancies probably reflect the fact that the rates for light, appliances, and power changed several times during the early years of the project.

[9]Dibble, "Operation of Minidoka Reclamation Project," 29. Similar sentiments are expressed by A.P. Davis to C.H. Paul, 14 October 1910, RG 115, Entry 3, Box 643, File Number 223, NA-Washington. For further discussion, see Dibble, "Electric Heating as a Profitable Load," *Journal of Electricity* 42 (1 February 1919): 102.

[10]The problems of offering competitive heating rates are discussed in the following letters from the Vice President and General Manager of the Idaho Power Company: to R.B. King, Division Manager, Idaho Power Company, 16 August 1917; to Public Utilities Commission, 20 February 1918; to Addison T. Smith, 10 June 1918; all contained in RG 115, Entry 3, Box 645, File Number 223C. According to these letters, the Great Shoshone and Twin Falls Water Power Company attempted to sell electricity for heating in 1909 and 1910. The company assumed that it could market the electricity below cost because the power was "surplus," and could be transmitted on lines built for other purposes. It miscalculated operating expenses, however, and went bankrupt. In "Electric Heating as a Profitable Load," Barry Dibble also notes this electric heating venture by the Great Shoshone and Twin Falls Water Power Company, and indicates that Reclamation looked to it as a model for its own activities.

[11]C.H. Paul to A.P. Davis, 19 October 1910, RG 115, Entry 3, Box 643, File Number 223, NA-Washington.

[12]Dibble, "Electric Heating as a Profitable Load," 102.

[13]F.E. Weymouth to A.P. Davis, 14 September 1912, RG 115, Entry 3, Box 643, File Number 223, NA-Washington. For internal reference, Reclamation each year compiled an annual review of Minidoka Project activities. Authorship and title varies slightly from year to year. Henceforth, these summaries will be cited as "Annual Project History," year, page. Copies are found at BR-Minidoka Dam and BR-Burley. References to Dibble's promotional activities can be found in "Annual Project History," 1914, 138-139; "Annual Project History," 1915, 130. Electrical-load statistics are listed in "Annual Project History," 1911," n.p.

[14]The following articles were written to describe the new high schools and promote the Minidoka commercial power system: "The Electrically Heated High School at Rupert, Idaho," *Electrical Review and Western Electrician* 64 (9 May 1914): 940; Dibble, "An Electrically E quipped High School," *Journal of Electricity, Power and Gas* 32 (11 April 1914): 309; Dibble, "Electric Heating, Minidoka Project," *Reclamation Record* 7 (January 1916): 31-32; Dibble, "Burley School is Electrically Heated," *Electrical Review and Western Electrician* 68 (15 January 1916): 98. Reclamation's official publication, the *Reclamation Record*, also was continually running short notices and articles espousing the benefits of electricity and its growing use on the "electric project," as the Minidoka Project came to be called. See the *Record* for: "Current Comments from the Projects," 5 (February 1914): 48-49; "Electricity on the Farm," 5 (May 1914): 163; C.J. Blanchard, "The Minidoka Project, South Side Unit," 8 (January 1917): 22-24; "Electricity and Home Building; the Minidoka Electric Project a Shining Example," 11 (April 1920): 183.

[15]See "Annual Project History," 1913, 184-189; "Annual Project History," 1914, 100, 142-143; "Annual Project History," 1915, 94, 122-126.

[16]For the increases in the power contract limits, see *Annual Report*, 1915-1916, 26; 1916-1917, 25-26; 1917-1918, 28. The substations at Burley and Rupert were enlarged again in 1917, see "Annual Project History," 1917, 55, 186. For size of load at Burley, see "Annual Project History," 1919, 273.

[17]On the Amalgamated Sugar contract, see the following correspondence in RG 115, Entry 3, Box 634, File Number 223, NA-Washington: A.P. Davis to F.E. Weymouth, 2 January 1912; Weymouth to Davis, 9, 10, 14 September 1912; Barry Dibble to Weymouth, 13 September 1912. Eventually other contracts were negotiated with local feed mills, brick yards, and mines; see Dibble, "Operation of Minidoka Reclamation Project," 30.

[18]Howard H. Douglas, "Use of Electricity in Rural Communities on the Minidoka Project," *Reclamation Record* (November 1920): 499. Reclamation arranged small power contracts (½-kilowatt limit) with two farmers in 1913; see *Annual Report*, 1916-1917, 26. In that same year the Project Manager declared in his annual report: "There has been much interest on the part of the farmer in obtaining power and discussions with them have resulted in considerable progress being made and some small contracts have been closed" (see "Annual Project History," 1913, 205). Most of these farmers were located near existing substations, as was noted by T.W. Halliday, "Rural Service in Southern Idaho," *Electrical World* 78 (16 July 1921): 107.

[19]"Annual Project History," 1914," 138-139. Except for special cases where farms were located immediately near substations, Reclamation adopted the policy of not selling to individual farmers due to the complexity of handling hundreds of small contracts. The Project Manager noted in 1913: "It is planned as far as possible to wholesale power to small communities of farmers organized as corporations, they to build their lines and install their small transformers and in general to conduct the distribution. This frees the Government from the details of distribution and from collections which would be very expensive" ("Annual Project History," 1913, 205). Also see Dibble, "Operation of Minidoka Reclamation Project," 30, for further discussion of this policy.

[20]For Dibble's quote, see "Annual Project History," 1918, 229. The rapid spread of electrical cooperatives can be gauged in *Annual Report*, 1919-1920, 34-36; M.R. Lewis, *Progress Report of the Idaho Committee on the Relation of Electricity to Agriculture*, (n.p., 1926), 10-14. For a brief history of one of the largest cooperatives on the project, see Barrow Lyons, "In Unity There is Power," *Reclamation Era* 33 (April 1947): 78-80.

[21]For the lack of growth in rural electrification on the Minidoka Project during the 1920s, see statistics in Howard H. Douglas, "Use of Electricity in Rural Communities on the Minidoka Project," *Reclamation Record* (November 1920): 499; "Cheap Electricity Serves Minidoka Water Users," *New Reclamation Era* (December 1924): 190; University of Idaho, Agriculture Experiment Station, *Rural Electrification Development in Idaho*, by Hobart Beresford, Bulletin No. 180 (Moscow, ID: University of Idaho, 1931), 15. National statistics are found in "Ten Years of Rural Electrification," *National Electric Light Association Bulletin* 19 (September 1932): 525. The Idaho electrical industry believed that the main stumbling block to increased rural growth was the farmers' perception that electricity was too costly. Idaho Power Company seems to have partly answered this objection through an aggressive marketing campaign, which, during the last half of the 1920s, allowed it to more than double its rural base to about 10,700 customers. At that time, approximately 31 percent of the state's 41,678 farms were electrified. See Beresford, 14, 17; M.L. Hibbard, "Rural Service—Its

Organization and Work," *Electrical West* 65 (1 December 1930): 304-307. On the Salt River Project, see "Rural Electrification Progress on the Salt River Project, Arizona," *New Reclamation Era* (October 1929): 151.

[22]See "Annual Project History," 1911, n.p.; "Annual Project History," 1912, 11; "Annual Project History," 1913, 198. Also see *Annual Report*, 1919-1920, 155; 1920-1921, 39-40. Dibble made his prediction in "Irrigation Service as an Electric-Power Load," *Engineering News* 71 (4 June 1914), 1241.

[23]Dibble, "Electric Heating as a Profitable Load," 103; "Annual Project History," 1919, 273-274. An analysis of power use is given in Douglas, "Use of Electricity in Rural Communities on the Minidoka Project," 501.

[24]J.H. Dockweiler and F.W. Hanna, "Report on Investigation of Heating Rates for the Cities of Rupert and Burley, and the Village of Heyburn," 9 August 1919, 36, BR-Minidoka Dam. When called to account for the deficits, Barry Dibble argued that profit was not the primary purpose of the Commercial Power Division: "[When] the Commercial power development first took definite form and was actively begun, several reasons were advanced as making advisable the additional installation and expense that was necessary. Among them were the benefits that would accrue to the towns and through them to the project from having a cheap and ample supply of electricity available for power, lights and other purposes; the advantage of keeping together throughout the year a skilled organization for operating the power house and the lessened depreciation and liability of accidents in the power house that would result from continuous operation. In addition there was the expectation of sufficient revenue to return the additional investment to the Reclamation Service, within a reasonable time." And Dibble concluded: "I think considering the newness of the country we are serving and the sparse population that . . . our results can be regarded as reasonably good. . . . It is impossible to estimate the benefit that cheap power has been, both in advertising the project and in bringing in new industries, thus widening the market for farm products. Many of the farms now have electricity available. In both town and country this development is doing a good work in improving living conditions and attracting the best class of citizens." See Dibble to F.E. Weymouth, 13 April 1916, RG 115, Entry 3, Box 645, File Number 223C, NA-Washington.

[25]F.E. Weymouth to A.P. Davis, 11 June 1919, RG 115, Entry 3, Box 645, File Number 223C, NA-Washington. The new heating rates proved controversial; see "Project Towns Place No Bids on Electricity," *Burley Bulletin*, 6 June 1919; Dockweiller and Hanna, "Report on Investigation of Heating Rates," 1-6. For the decline in heating load and the rise in profits, see *Annual Report*, 1920-1921, 158; Barry Dibble, draft of letter to F.E. Weymouth, 13 March 1923, BR-Burley; E.B. Darlington and B.E. Stoutemyer to D.W. Davis, 19 October 1925, 9; in RG 115, Entry 7, Box 730, File Number 301.32, NA-Washington.

[26]The following pumping plants were built on the Gravity Unit in these years: West End Pumping Station, 1913; A-4 Scoop Wheel, 1913-1914; 1812 Station, 1914; 1817 Scoop Wheel, 1915; Boersch Lake Pumping Station, 1915; C-2 Scoop Wheel, 1918; a construction date for the 114 Pumping Station has not been located. For a summary description of the north-side pumping stations, see an inventory dated 17 May 1917, which was prepared by Minidoka Irrigation District for Reclamation when the water users assumed control of the Gravity Unit; the inventory is in the Minidoka Project Papers, Minidoka Irrigation District Office, Rupert, Idaho (henceforth identified as MID). Also see Barry Dibble to F.E. Weymouth, 30 August 1921, MID, and "Annual Project History," 1913, 106-107, 176-183; 1914, 92-93; 1915, 91-115.

[27]Hugh Lovin, "'Duty of Water' in Idaho: A 'New West' Irrigation Controversy, 1890-1920," *Arizona and the West* 23 (Spring 1981): 5-28. Duty of water is expressed as the amount of water required on a tract of land in a given year to grow a given crop. For example, if the total amount of water used on one acre of land during a growing season amounts to 5 acre-feet, then the duty of water is defined as 5 feet. When an irrigator successfully produces crops with relatively little water, his land is said to have a "high" duty of water. Conversely, a "low" duty of water signifies that a comparatively large amount of water is in use.

[28]D.W. Ross to John H. Lewis, State Engineer, Salem, Oregon, 11 August 1905, RG 115, Entry 3, Box 630, File Number 140, NA-Washington.

[29]D.W. Ross to F.H. Newell, 28 February 1905, RG 115, Entry 3, Box 646, File Number 250, NA-Washington.

[30]Fogg, "History," 59-60.

[31]"Annual Project History," 1911, 5-6.

[32]See Fogg, "History," 60-61; "Annual Project History," 1911, 5-6; James M. Gaylord, "Power and Pumping System of the Minidoka Project, Idaho," 20 December 1913, 76; in RG 115, Entry 3, Box 634, file 158, NA-Washington.

[33]For the information provided here and in the following paragraph, refer to Board of Engineers to F.H. Newell, 24 October 1913, RG 115, Entry 3, Box 647, File Number 250, NA-Washington.

[34]F.E. Weymouth to A.P. Davis, 29 November 1913, RG 115, Entry 3, Box 647, File Number 250, NA-Washington.

[35]Board of Engineers to Reclamation Commission, 10 July 1914, RG 115, Entry 3, Box 647, File Number 250, NA-Washington. For the opening of the Pumping Unit, see Public Notice dated 3 November 1915, copy printed in *Annual Report*, 1915-1916, 168-170.

[36]See the following correspondence in RG 115, Entry 3, Box 647, File Number 250, NA-Washington: Board of Engineers to F.H. Newell, 24 October 1913; James M. Gaylord to F.E. Weymouth, 27 December 1913; D.C. Henny to F.E. Weymouth, 23 December 1913, RG 115, Entry 3, Box 647, File Number 250, NA-Washington.

[37]See the following correspondence in RG 115, Entry 3, Box 647, File Number 250, NA-Washington: O.H. Ensign to F.E. Weymouth, 27 December 1913, 29 January 1914; Ensign to D.C. Henny, 30 March 1914. Also see Barry Dibble to A.P. Davis, 27 January 1915, RG 115, Entry 3, Box 634, File Number 158, NA-Washington; "Annual Project History," 1914, 87-90.

[38]Refer to the following: "Annual Project History," 1914, 90; Barry Dibble to A.P. Davis, 27 January 1915, RG 115, Entry 3, Box 634, File Number 158, NA-Washington; E.B. Darlington and G.H. Hogue, "The Cost of Enlarging the South Side Pumping System—Minidoka Project, Idaho," August 1928, 17, in R.G. 115, Box 782, National Archives, Denver.

[39]For information on the water users' report, see transcript of testimony given by Barry Dibble for the Fact Finders Committee, September 1923, 21-23; contained in RG 115, Entry 7, Box 677, File Number 105.21, NA-Washington.

[40]The power shortage is alluded to in the following correspondence contained in RG 115, Entry 3, Box 645, File Number 223C, NA-Washington: O.H. Ensign to A.P. Davis, 11 February 1915; F.E. Weymouth to O.H. Ensign, 10 June 1915. Also see Barry Dibble to James M. Gaylord, 2 May 1917, RG 115, Entry 3, Box 647, File Number 250, NA-Washington.

[41]U.S. Reclamation Service, "Minidoka Project, Location of Power House Including Future Extension, Ultimate Capacity 12,000 k.w.," 9 September 1908, in Minidoka Project Records, Bureau of Reclamation, Denver (henceforth this collection will be referred to as BR-Denver).

[42]See the following: "Annual Project History," 1915, 88; "Annual Project History," 1916, 145; "Annual Project History," 1917, 96. For information on the housing, refer to the following correspondence on file at BR-Burley: Acting Chief of Construction to Barry Dibble, 11 May 1918; Barry Dibble to Chief of Construction, 28 June 1918, 17 July 1918; Barry Dibble to Charles Farmer, 25 July 1918; Charles Farmer to Barry Dibble, 28 July 1918. Also see "Annual Project History," 1918, 7-8, 54-55, 59-59a.

[43]U.S. Reclamation Service, "Minidoka Power Plant Extension, Proposed Floor Plan," 25 July 1918; "U.S. Reclamation Service, "Minidoka Power Plant Extension, Proposed General Arrangement," 2 August 1918, in BR-Denver.

[44]Barry Dibble to F.E. Weymouth, 6 August 1918, RG 115, Entry 3, Box 634, File Number 158, NA-Washington. On the estimated cost, see F.E. Weymouth to A.P. Davis, 20 December 1921, BR-Burley.

[45]F.E. Weymouth to Barry Dibble, 17 September 1918; A.P. Davis to F.E. Weymouth, 26 September 1918; in RG 115, Entry 3, Box 634, File Number 158, NA-Washington.

[46]For a history of the company, and a description of its territory and holdings, see: George C. Young and Frederic J. Cochrane, *Hydro Era: The Story of Idaho Power Company* (n.p.: Idaho Power Company, 1978); *Idaho Power Company: Description and Views of Properties and Territory Served* (n.p., March 1920), pamphlet held at Idaho State University Library, Pocatello, Idaho.

[47]Barry Dibble to Chief Engineer, 19 December 1921, BR-Burley.

[48]The benefits of the dam are sketched out in the following: A.P. Davis to Idaho Power Company, 2 November 1920, BR-Burley; "Compilation of Information Concerning the American Falls Reservoir," 23 June 1923, BR-Burley. Public interest in American Falls is discussed in William Darrell Gertsch, "The Upper Snake River Project: A Historical Study of Reclamation and Regional Development, 1890-1930," Ph.D. Dissertation, University of Washington, 1974, 176-203. For further information on the Government's interest in the project, refer to Irvin E. Rockwell, *The Saga of American Falls Dam* (New York: The Hobson Book Press, 1947).

[49]Reclamation's and Idaho Power's conflicting plans are discussed in the following documents: F.E. Weymouth to D.F. McGee, Vice President, Idaho Power, 10 December 1918; "Memorandum: Proposed Contract between the United States and Idaho Power Company for the Transfer of American Falls Power Site," 11 April 1919; B.E. Stoutemyer to A.J. Wiley, 12 June 1919; B.E. Stoutemyer to F.E. Weymouth, 18 June 1919. Concerning Reclamation's designs on Idaho Power's hydroelectric plants and the resulting impact on the Minidoka Project, see F.E. Weymouth to Idaho Power, 19 August 1919; Dibble to Weymouth, 19 December 1921. All of the material cited above is located in BR-Burley.

[50]Barry Dibble to James M. Gaylord, 7 August 1920, BR-Burley.

[51]Barry Dibble to F.E. Weymouth, 19 December 1921, BR-Burley.

[52]See "Annual Project History," 1920, 225; Barry Dibble to Chief Engineer, 19 December 1921, BR-Burley; "A Year's Electrical Construction Work," *Journal of Electricity and Western Industry* 46 (15 June 1921): 625.

[53]Draft contract, 28 April 1921, BOR-Burley; A.P. Davis to Secretary of the Interior, 31 October 1921, BR-Burley.

[54]For information on the Minidoka North Side Extension, see *Annual Report*, 1920-1921, 409. For information on Fall's concerns over repayment and refusal to sign the power contract, see the following: Gertsch, "The Upper Snake River Project: A Historical Study of Reclamation and Regional Development, 1890-1930," 208-218; Rockwell, *The Saga of American Falls Dam.*

[55]A description of the plants is in B.E. Stoutemyer to Burley Irrigation District and Minidoka Irrigation District, 30 April 1924, BR-Burley.

[56]"Annual Project History," 1924, 33.

[57]See "Annual Project History," 1925, 45.

[58]Acting Chief Engineer to Commissioner, 19 May 1926, RG 115, Entry 7, Box 734, File Number 320, NA-Washington.

[59]Barry Dibble to F.E. Weymouth, 19 November 1921, BR-Burley.

[60]Acting Chief Engineer to Commissioner, 19 May 1926, RG 115, Entry 7, Box 734, File Number 320, NA-Washington.

[61]For awarding of contracts, see Chief Engineer to Commissioner, 11 September 1926, RG 115, Entry 7, Box 734, File Number 320, NA-Washington. For construction information, refer to "Monthly Reports," filed in RG 115, Entry 7, Box 678, File Number 105.3, NA-Washington.

[62]R.F. Walter to Commissioner, 5 August 1926, RG 115, Entry 7, Box 734, File Number 320, NA-Washington.

[63]Robinson, 44-46.

[64]Second Deficiency Act, Section 4, Subsection I, 5 December 1924, reprinted in U.S. Department of the Interior, *Federal Reclamation Laws, Annotated*, 277.

[65]The conflict between water users' local interests and the central authority of Reclamation was a longstanding problem which predated the Fact Finders Act. Karen Smith discusses this in *The Magnificent Experiment*, 155-159. Although the Fact Finders Act was intended to resolve this conflict by requiring Reclamation to respect local interests, the continuing disputes of administering the Minidoka power system demonstrates that the Act was not a success in this regard, and that, in fact, it had exacerbated the problem.

8 SETTLERS' PROBLEMS AND THE SEARCH FOR SOLUTIONS

Early Problems and Legislative Responses

The formative years of the Minidoka Project were trying times for settlers on both sides of the Snake River. Inspired by official reports and glowing accounts in the press, homesteaders had rushed in to claim most of the land by the end of 1904. Reclamation, however, did not deliver water to the Gravity Unit until 1907, and it could not supply any significant portion of the Pumping Unit with water until 1909. Six more years elapsed before "construction work on this Project was practically completed" and the Pumping Unit was officially opened to settlement.[1]

The settlers suffered during the long wait, often using up whatever savings they had rather than abandon their claims. Life did not necessarily become easier when Reclamation finally delivered water, for farming proved to be extremely difficult and unprofitable in the first years on the Project. The raw desert soil was sandy in many places and deficient in nitrogen, making it difficult to raise crops. Wind storms, jack rabbits, and grasshoppers also seemed to conspire to destroy anything the settlers did manage to plant.[2] Although exact crop statistics were not kept, contemporary observers painted a bleak picture of early agricultural efforts:

> The spring of 1908 was accompanied by high winds, which were disastrous to the crops, and carried away the seed from the sandy soils as fast as it could be planted. The weather was dry and cold until the latter part of May and this retarded the growth of such crops as were successfully started. In a large number of cases too, the land had not been properly leveled, and the farm laterals were poorly built. Many of the settlers cleared so large an area of their sandy land from its protection of sage brush that the wind had full opportunity to drift the top soils, covering the crop and cutting it off there.[3]

Despite these hardships, water users managed to produce crops for sale and bring more acreage into cultivation each year. In 1910, the first year for which accurate records are available, settlers cultivated 36,179 acres, mostly in grains, alfalfa, and potatoes, and produced $386,300 worth of farm goods: an average return of $10.68 per acre. Most of this income, however, was claimed by expenses. System construction charges repayable to Reclamation amounted to $2.20 per acre for the Gravity Unit, and operation and maintenance charges totaled 75 cents per acre in 1910. On this section of the project, therefore, Government charges could claim up to one-third of a farm's earnings. Much of the remainder went to pay for seed, equipment, and labor. Considering that most settlers had

spent between $2,000 and $5,000 preparing their land and building homes, this meager return was disappointing.[4]

With such slim profits, many settlers were either unable or unwilling to repay Reclamation. The agency required that operation and maintenance fees be paid by the start of each season, and construction repayment charges by the end of each year. According to the terms of the Reclamation Act, settlers who were more than one year in default on construction payments could lose their lands. One year after the 1907 payment fell due, more than 25 percent of the Gravity Unit settlers still had not paid. Each year, at least 10 to 20 percent of the settlers continued to be delinquent on their construction payments.[5]

The Minidoka water users were not alone in their plight. Settlers on other Reclamation projects faced similar problems, and a sizable number of water users were delinquent throughout the West. Fearing they would lose their land after investing so much, settlers demanded payment extensions.[6] Many lashed out at Reclamation, blaming the Government's policies for their problems. On the Minidoka Project, settlers had good reason to be critical, given the long delay in the construction of the Pumping Unit, the late delivery of water in 1907, conflicts over sublateral construction, and the confusion concerning cooperative certificates. When F.H. Newell headed a Reclamation board of inquiry in 1911, he encountered a good deal of settler hostility. As one representative of the Gravity Unit informed him: "I want you to feel, Mr. Newell, that the people here are dissatisfied; grievously dissatisfied; disappointed; dissatisfied with you; dissatisfied with your rulings; with your associates; with those who administer the law."[7]

Elected officials took heed of the water users' demands. In 1910, Congress authorized a $20 million loan and liberalized use of the Reclamation Fund to allow Reclamation to complete construction of delayed projects. The same legislation created more stringent entry rules to prevent future homesteaders from filing on project lands before Reclamation was ready to deliver water. Then, in 1911, Congress passed the Curtis Act, which authorized Reclamation to negotiate new repayment contracts with financially strapped water users. Instead of requiring a flat rate each year, payments were to be graduated, allowing settlers to pay less in the first years of a project, when they lacked capital. One drawback, at least from the settlers' perspective, was that the new law allowed Reclamation to increase the total construction charges. Nearly two-thirds of the Minidoka Gravity Unit water users eventually acquired new contracts under the terms of this legislation. In addition, Congress in 1914 passed the Reclamation Extension Act, which extended the repayment period to twenty years, established more direct Congressional control over Reclamation expenditures, and reorganized the administration of the agency.[8]

Formation of Minidoka and Burley Irrigation Districts, 1910-1918

While Congress attempted legislative cures, Minidoka Project settlers sought their own remedies. In order to represent the interests of the Gravity Unit, a group of settlers formed the Minidoka Water Users' Association (MWUA) late in 1910. Although state law required water users' associations to capitalize at an amount equal to the value of project irrigation works, the MWUA did not incorporate and instead served as an informal "mutual benefit society," with E.L. Rigg as president and J.D. Hunsinger as secretary. The association took an active role in Project affairs, holding public meetings with Reclamation officials in 1910 and 1911 and agitating for action on issues ranging from repayment policies to land ownership restrictions. Looking back on the MWUA's accomplishments in its first two years, Rigg insisted that "there is probably not a settler on the project who will say that the Minidoka W. U. A. has not been of great benefit."[9]

Reclamation did not dispute the MWUA's influence, but questioned whether the organization had the authority to speak for settlers' interests, since its membership included only about 300 of the 1,000 farmsteads on the Gravity Unit.[10] Rigg acknowledged that the association "should be more representative," but he argued that the settlers did support its views. He explained in a letter to Newell why he believed so few water users had joined: "The objection that we most often meet with now from non-members is, that they would join if we could make everybody join."[11]

On some irrigation projects, the Secretary of the Interior required water users to join an association before they could apply for water rights to serve project lands. In June 1912, Rigg proposed reorganizing the MWUA as a standard water users' association so that the Secretary of the Interior could require membership. "We feel," Rigg asserted in a letter to Newell, "that if an organization of this character were formed on this side [i.e., the Gravity Unit], we could probably overcome a great deal of the dissatisfaction that now exists among the settlers with the [Reclamation] Service, as then all settlers would hold membership in the organization which we believe would act as a buffer as it were."[12]

Rigg's proposal placed Newell in a quandary. "I have acknowledged receipt of this," he confided to Weymouth, "but am a little doubtful what to advise."[13] Given the level of discontent on the Minidoka Project, Reclamation was anxious to demonstrate its concern for the settlers' well-being to win back public support. Organizing a more powerful water users' association might help the settlers, but the membership requirement might also be extremely unpopular. In the past, Reclamation had used universal membership as a means of enforcing the repayment clause on projects that contained large numbers of settlers who had purchased their land from private parties rather than from the Federal Government. On these projects, the water users' association was required to secure a lien against the private lands, thus safeguarding the Government's interests. But most of the

Gravity Unit lands had come directly from the public domain, which meant that the Government already held a lien on the property.[14] In the summer of 1912, Newell informed Rigg that the Secretary of the Interior had decided that Reclamation could not compel the Gravity Unit settlers to join a water users' association:

> Such a step has been criticized as unfair and the assertion made that the Secretary of the Interior has no moral right to try to force landowners into the association unless it is essential to the main purpose of the Reclamation Act. You can readily see that the minority who do not wish to become members have ground for complaint at being forced to contribute to the association of which they may not approve and regard any action as arbitrary and tyrannical which forces them without what in their opinion is an adequate reason.[15]

Rigg, however, insisted that the Gravity Unit settlers would support compulsory membership. After extensive discussions, Newell finally announced in July 1913 that the Secretary was "inclined to the view that if a decided majority of the water users clearly express the desire that he use his power to coerce the minority into joining he will at least consider the matter."[16]

By calling for a formal vote, Reclamation ultimately set the stage for the creation of a entirely different entity known as an "irrigation district." First developed in Utah during the 1860s and perfected in California during the 1890s, an irrigation district was a quasi-municipal corporation formed under state law to supply irrigation water to a defined geographical area. Like a school district, an irrigation district was empowered to levy taxes on land within its boundaries and issue bonds to fund construction. In Idaho, the establishment of an irrigation district required approval by two-thirds of the electorate residing within the proposed district. Faced with an election to determine its survival, the MWUA decided to seize the moment and gain even greater recognition by reorganizing as a full-fledged irrigation district.[17]

On 22 July 1913, settlers on the Gravity Unit voted the creation of the Minidoka Irrigation District [MID]. For the first board of directors, they selected R.L. Cheney from the village of Acequia, E.L. Rigg from Rupert, and E.T. Hollenbeck from Heyburn.[18] The new district encompassed all of the gravity lands on both the north and south sides of the Snake River. In October, the MID formally requested that the Secretary of the Interior "agree to cancel entries for non-payment of the district's assessment." In assenting, the Secretary confirmed the new organization's authority on the Minidoka Project.[19]

At the same time MID also petitioned to take over from the Federal Government the operation and maintenance of the Gravity Unit, which had been a goal of many settlers for years. In 1906, D.W. Ross had estimated that the total cost of building the system and operating it for ten years would amount to $26 per acre. Based on this report, the Secretary of the Interior issued a public notice the following year stating that the construction repayment charge would total $22 per acre, payable in ten annual installments of $2.20. The

Secretary also announced an additional annual charge of 40 cents per acre to cover operation and maintenance costs. Although the notice did not preclude the possibility of increasing the operation and maintenance charge, settlers generally assumed that this fee would remain the same, thus resulting in a total cost of $26 per acre as Ross had estimated.

Ross's figures, however, proved inaccurate, the actual costs being much higher than anticipated. While the construction charge could not be changed, Reclamation steadily increased the operation and maintenance [O&M] fee. The O&M cost rose to 60 cents per acre in 1909, 75 cents in 1910, and $1.75 in 1911. Already hard pressed to meet their construction payments, the settlers bitterly denounced the increases. An MWUA officer complained that "settlers have no assurance to what limit this maintenance charge can go. They do not know what the money is going for; they have no voice in making contracts, and they are called upon each year to pay for it." In 1911, the MWUA began advocating taking over the operation and maintenance of the unit to give the water users more control over its expenses.[20]

Reclamation officials were inclined to support the water users' bid to take over the Gravity Unit. "In my mind," Project Manager Fogg declared in 1911, "the sooner that the project can be turned over to the settlers here to be operated under their control . . . the better it will be for all concerned."[21] The transfer would relieve Reclamation of a considerable administrative burden, and seemed likely to improve the Government's relationship with the water users. As Reclamation's District Counsel B.E. Stoutemyer observed: "The settlers now think that they could [operate the Gravity Unit] a great deal better than the Government has done it and there is no way in which they can be so quickly convinced of the good service and low charges of the Government as to allow them to try it themselves."[22]

Despite Reclamation's support, talks with the MWUA failed to yield concrete results. The organization of an irrigation district in 1913, however, apparently renewed the settlers' interest in taking over operation and maintenance. In November 1913, the First Assistant Secretary of the Department of the Interior dispatched a letter to MID declaring: "I am heartily in sympathy with this movement and will do everything within my power to provide for the operation and maintenance of the project by the Minidoka Irrigation District."[23] At the end of November, Reclamation appointed Stoutemyer to prepare a draft contract turning control of the unit over to MID. Stoutemyer completed the contract by the end of December, but revisions continued until 1916.[24]

A number of technical legal issues frustrated a swift settlement. In particular, Section 6 of the Reclamation Act specified that the Secretary could only turn over control of a project to the water users after a majority of the construction costs had been repaid. On the Minidoka Project, construction repayment was not yet to that point, and many water users were, in fact, delinquent. The Secretary initially attempted to skirt this issue by maintaining that the Department was not actually "turning over the management and operation of the project in the manner contemplated by Sec. 6 of the Reclamation Act." Instead, the

Government was merely drawing up a contract for the project's operation and maintenance. Uncertainty on the legality of this point, however, convinced the Department of the Interior to forestall approving a contract until after Congress enacted the Reclamation Extension Act of 1914. This act specifically provided for the negotiation of operation and maintenance contracts with water users' groups.[25]

Even with passage of the Extension Act, the Secretary and Reclamation continued to delay approval of the contract with MID. Newell explained that the matter could not be rushed, for it was "the first case presented where we are about to transfer the responsibility of the control of the project to the local people."[26] The Department of the Interior was well aware that the MID contract would set an important precedent, and it was leery of hurrying the process along before it had carefully evolved a set of procedures that would guide all future transfers. By February 1916, the necessary protocols were in place, and Reclamation quickly redrafted the MID contract to conform to the new regulations. The document was approved by the Secretary of the Interior in the spring of 1916.[27]

The contract with MID was straightforward, specifying which properties where O&M was to be transferred, how costs were to be determined and divided, and the duties of each party. Although Reclamation retained title, for purposes of O&M they entrusted MID with "possession of the Main North Side Canal of the Minidoka Project and all laterals and sublaterals in connection therewith, the lateral system of the Gravity section of the Minidoka Project on the South Side of the Snake River, and the drainage system of the gravity section of the Minidoka Project."[28] The pumping plants built on the north side of the river were also transferred to MID's control, in addition to associated buildings, telephone lines, and transmission lines. On 1 August 1916, MID submitted the contract to its members, who ratified it by a vote of 527 to 137. The contract set the date for the transfer at 1 January 1917.[29]

While MID concluded negotiations to take over P&M of the Gravity Unit in 1916, water users on the Pumping Unit were taking steps to create their own irrigation district. A governing body already existed in the guise of the SSWUA, which had been established in 1908 to issue cooperative certificates. The SSWUA initially had a broad base of support, for Reclamation required membership to receive water on a rental basis. This method of distributing water had been in effect because the project had not yet officially "opened," and water users had therefore not yet signed repayment contracts with Reclamation. After the formal opening of the Pumping Unit in 1915, however, settlers were entitled to receive water by virtue of their contracts and without belonging to the SSWUA. Membership in the organization had thus dropped rapidly. In September 1916, the SSWUA board determined that "some other form should be entered into, before the South Side Water Users' Association died because of lack of funds." With the success of MID, the SSWUA board also decided to reorganize as an irrigation district so that it could collect O&M assessments.[30]

The SSWUA held a general election to form an irrigation district on the Pumping Unit on 5 March 1918. As the *Burley Bulletin* reported, "Only 105 votes were cast, but the fact that all were in favor of the proposition indicates a favorable sentiment throughout the district."[31] Called the Burley Irrigation District [BID], the new political body was divided into five districts, each represented by a director. The first directors were Archie McLean, first division; Charles Chadwick, second division; W.R. Robinson, third division; George Hanna, fourth division; N.C. Nelson, fifth division. Unlike the MID board, the BID directors did not show any interest in taking over the operation and maintenance of the Pumping Unit. Following approval of the MID repayment contract, Reclamation announced that all future contracts required approval by voters representing at least three-fourths of the project acreage. Given the low turnout in the earlier ballot, the BID directors may have doubted whether they would be able to secure enough votes to conform to this provision.

Improvement and Collapse

As Minidoka settlers became more experienced in irrigation and continued to improve their land through cultivation and fertilization, farmsteads became more productive. Per-acre returns for the entire project rose steadily, reaching $11.51 in 1911, $13.93 in 1912, and $17 in 1913.[32] The project was poised to benefit from the dramatic increase in farm prices ushered in by World War I. "It is generally conceded," the Project Manager exulted at the end of the 1915 season, "that the year . . . was the most prosperous one that the farmers of the project have ever experienced. Nearly all crops yielded a bountiful harvest and the prices have been good and often high."[33] Unusually high prices continued throughout the war and the immediate postwar period. As a consequence, the average return per acre rose steadily from $22.41 in 1915, to $59.95 in 1919.[34]

Like most American farmers of the period, Minidoka settlers reveled in unprecedented prosperity. At the end of the 1915 season, Reclamation boasted that the "banks of the Project were overloaded with money, the deposits at the end of the year amounting to considerably more than $1,000,000."[35] Many settlers used their new-found wealth to increase their acreage and purchase new farm equipment. Homesteaders also improved their standard of living. One man who grew up on the project recalled that "up until 1916, life . . . was mostly a matter of survival. Only necessities were purchased. Living was on the austere side."[36] During the war, though, families rebuilt homes, secured electrical service, and purchased consumer goods ranging from toasters to automobiles.

But the good times proved short-lived. After the war, European farms resumed production, while American farmers continued to cultivate the extra acreage acquired during the war. Prices remained high throughout 1919 but dropped substantially in 1920 as the result of farm surpluses. On the Minidoka Project, Reclamation reported that "during the harvesting period a most discouraging situation developed" when "the market for practically

all farm products except sugar beets collapsed."[37] The average crop value per acre fell steadily throughout the 1920s, dropping to $41 in 1920 and reaching $29 in 1924.[38]

With the fall in agricultural prices, the economy of the Minidoka Project crumbled. During the flush years, ten banks had operated on the project. In January 1921, the Bank of Commerce in Burley failed, followed by three more before year's end. By 1924, at least nine of the original banks had closed.[39] Due to the financial crisis, a majority of water users had failed to meet their Government payments for 1920. Reclamation collected less than half of its 1920 construction repayments by the December deadline, and operation and maintenance collections lagged even further behind.[40]

The majority of the delinquencies were on the Pumping Unit, where Government charges were higher because of the pumping plants. In 1915, a Board of Review had established the construction repayment cost per acre for the Pumping Unit that included the expense of the dam, power house, pumping plants, Jackson Lake Reservoir, and the features used for commercial power. Announced by public notice on 3 November 1915, the construction charge per acre on this division was $56.50 every ten years (or $5.65 per year) for public lands and $57.50 every ten years for state lands.[41]

The Gravity Unit costs were substantially lower by comparison, amounting to no more than $3 per acre per year. In April 1921, BID submitted a petition to the Secretary of the Interior warning that "utter ruin awaited" the Pumping Unit unless the Federal Government declared a five-year moratorium on construction and maintenance charges. From the settlers' point of view, a major cause of their plight was the limited capacity of the pumping plant. "From the first," declared the BID, "the irrigation system has been too small to supply the farmers here with a sufficient amount of water for the proper irrigation of their lands, and they have yearly watched their crops suffer."[42] In a companion petition, the Burley Commercial Club asserted that "farmers on the South Side Minidoka Project will require concessions on payments and an adequate supply of water" in order to survive.

Reclamation denied that the water supply was inadequate. Instead, the agency urged settlers to apply a more rigorous system of water rotation. Project Manager Dibble was particularly reluctant to grant the settlers' request for a moratorium on payments. "The local bankers agree," he informed Weymouth, "that there is still a great deal of extravagance on the part of the communities and that people generally have not reached the point where they are willing to deny themselves luxuries in order to pay their accumulated debts." He continued:

> I think I have mentioned that the Ford Agency in Burley is averaging a sale of one car per day. A Burley merchant told us that on one day this week he sold four Edison phonographs. Mr. Olson, President of the Directors of the Burley Irrigation District in the meeting of November 1st made the remark that he did not feel a postponement of charges would help the farmers a great deal as many of them would use the money to buy automobiles or some other luxuries.[43]

Although Dibble sincerely believed that a moratorium was not warranted, his position was also influenced by Reclamation's financial condition. The Reclamation Fund was in serious financial straits, for receipts from public land sales had dwindled, and additional revenue sources approved in the 1910s—such as profits from public land oil leases—were also declining. If a general moratorium were declared, Reclamation would lose yet another source of income and be forced to suspend its development of new projects and improvement of existing works. As a matter of policy, Reclamation officials thus strongly opposed any repayment extensions.[44]

Despite this opposition, Congress passed, and the Secretary of the Interior approved, a series of relief measures beginning in May 1921. By most accounts, these so-called "leniency acts" were stopgap measures that did not solve the financial problems faced by water users. The opportunity for lasting reform came unexpectedly in 1923, when the Interior Department was shaken by the Teapot Dome Scandal and the resignation of Secretary Albert B. Fall. Hubert Work replaced Fall as Secretary, and the change in leadership breathed new life into Reclamation. Determined to end the agency's continuing problems, Work announced that he would introduce major reforms.[45]

The Fact Finders

As one of his first steps, Work reorganized Reclamation with the goal of increasing efficiency and reducing expenses. The Reclamation Service thus became the Bureau of Reclamation, and Work appointed D.W. Davis, former Governor of Idaho, to serve as Commissioner of Reclamation. In 1924, Work replaced Davis with Elwood Mead, a noted agriculturalist and irrigator who had served with the Department of Agriculture. Symbolizing the broad administrative changes, Reclamation announced that the *Reclamation Record*, its official publication, was to be renamed the *New Reclamation Era*.

In September 1923, Work appointed a seven-man "fact-finding commission to make an intensive study of the policy, application, and operation of Government methods of reclaiming arid lands by irrigation."[46] In April 1924, the Fact Finders submitted a report that offered a point-by-point program to amend current Reclamation legislation and presented specific recommendations to improve conditions on each project. For the Minidoka Project, the committee advised, among other things, expanding the pumping system and turning over operation and maintenance of the Pumping Unit to BID.

Congress enacted most of the Fact Finders' legislative suggestions in the so-called "Second Deficiency Act" of December 1924, also known as the "Fact Finders Act." The new act was intended to correct a perceived imbalance in the current reclamation program, placing less emphasis on engineering and finances and more on agricultural issues and the well-being of the water users. Among the major provisions of the law, repayments to

the Government were to be based on productivity of the land and not a rigid time schedule. Reclamation also was required to turn over the operation and maintenance of each project to a legally organized water users' organization once two-thirds of the land was covered by water-rights agreements. The Government would retain title to the facilities.

After a water users' organization took over a project, Reclamation was to begin distributing profits resulting from the lease or sale of commercial power, land, and water. Subsection I of Section 4 of the act specified: "The net profits from such sources may be used by the water users to be credited annually, first, on account of project construction charge, second, on account of project operation and maintenance charge, and third, as the water users may direct."[47] The terms of the Fact Finders Act were to be embodied in a contract between Reclamation and the duly authorized water users' group.

Implementation of the Fact Finders Act

Since Reclamation had already turned over the operation and maintenance of the Gravity Unit to MID, its main concern on the Minidoka Project was to prepare a contract with BID that would divest the Government of O&M of the Pumping Unit, divide power profits between BID and MID, and arrange for expansion of the pumping system. BID voters ratified the contract on 26 February 1926. Although the document technically terminated Federal operational control of the Pumping Unit on 1 April 1926, Reclamation agreed to continue operating the system until 1 March 1927, to give BID time to hire suitable managers.[48]

As part of its contract with BID, Reclamation also committed itself to expanding the power and pumping system to supply more water. To pay for this construction, both MID and BID agreed that Reclamation could use the $300,000 in commercial power profits that had accrued to March 1926. To fund the rest of the expansion, namely the enlargement of the south-side pumping plants and Pumping Unit canals, BID authorized Reclamation to use the District's share of future commercial power profits. Determining BID's share in the power profits proved to be a complex issue, however, and work on the pumping plants was delayed for several years until the matter was resolved.

The Burley Irrigation District believed that it was entitled to 95.6 percent of all power profits, having been charged this percentage of the cost of the powerplant. The Minidoka Irrigation District disagreed, arguing that "in arriving at a proper and equitable division of these revenues, the cost of the powerhouse alone must not be used; but that the total cost of the powerhouse and dam, combined, must constitute the basis for such a division."[49] MID's point was privately conceded by many Reclamation engineers, including Dibble, who believed that the Minidoka Dam was an integral part of the power system since it created the power potential. MID had been charged 59.2 percent of the dam's construction cost, and

including this item in the expense of the power system raised the District's proportionate contribution to 37.5 percent.[50]

In preliminary drafts of its contract with BID, Reclamation suggested appointing an arbitration board to "review the available data and recommend to the Secretary of the Interior what proportionate part or percentage of each of the several classes of accumulated net profits... should be allowed to each of the two above named Districts." BID and MID were each to appoint one member to the board, while a third member would be selected by mutual consent. In this way, Reclamation hoped that the matter could be resolved between the two Project divisions, thus avoiding the bitter recriminations that would result if the Secretary imposed his ruling from outside.[51]

To Reclamation's surprise, BID objected to the arbitration clause. In March 1925, MID and BID had submitted various claims, including those concerning commercial power, to a Board of Survey and Adjustments. The board had been appointed by the Secretary of the Interior in January 1925, primarily to consider the question of determining construction costs, but also to hear any other "matters now in dispute or that need adjustment." Stoutemyer confided to the Commissioner that BID appeared to be "under the erroneous impression that they have won their case [on power profits] before the Board of Survey and Adjustments." As a result, BID was not inclined to let the matter come before an arbitration board as proposed in the contract. "At any rate," Stoutemyer concluded, "they wish to preserve the right to criticize the decision of the Secretary in case it is not the kind of decision that they desire on this point, which they could not well do if they adopted the arbitration provision and took part in the selecting of the arbitrators." As a result, the final form of BID's contract was vague as to exactly how profits were to be divided. It simply stated that the Secretary would determine what "proportionate part or percentage of the accu[m]ulated net profits . . . should be credited to the lands in the Burley Irrigation District, . . . and what proportionate part to the lands in the Minidoka Irrigation District," without specifying on what basis the division was to be made.[52]

In the end, BID did not, in fact, win its case with the Board of Survey and Adjustments. In March, the Board reported in favor of MID, recommending that profits be "divided between the two divisions in the ratio of 37.5% for the North Side and 62.5% for the South Side."[53] But the Board's findings were not considered binding, so the question remained largely unresolved. Stoutemyer and E.B. Darlington, the new Minidoka Project Manager, were inclined to support the view that MID deserved more of the profits than BID wished to allow. "In our opinion," they informed the Commissioner in a joint report in March 1926, "there is considerable merit to the contention of the Minidoka Irrigation District that it has an interest in the power privilege created by the dam." No one in Reclamation, however, was willing to agree on an exact distribution, and so the matter was left in the hands of the Secretary of the Interior as specified in BID's contract.[54]

To resolve the matter conclusively, Secretary Work scheduled a hearing on 12 March 1927. After listening to the claims of MID and BID, Work announced two weeks later that profits would be divided in the same manner as the costs of the powerhouse, 95.6 percent going to BID, and 4.4 percent going to MID. Dismissing the subtleties that had plagued Stoutemyer and Darlington, Work wrote:

> To state it simply, the Burley District owns 95.6 per cent of the power plant, and the Minidoka District the remainder, or 4.4 per cent. To declare that, because the operation of the power plant has proven profitable, the Minidoka District should be entitled to more than 4.4 per cent of the profits, would be arbitrary, and could only be sustained by holding that the recommendation of the (1915) Board of Review was erroneously approved. That I am not prepared to do, at this late day, many years after contracts had been entered into with the two districts on the basis thereof.[55]

With the profit question apparently settled, Reclamation finally proceeded with plans to expand the pumping system. During the fall of 1924, in response to the Fact Finders' recommendations, the agency had already taken steps to increase the capacity of the First and Second Pumping Lift stations. Reclamation accomplished the expansion in the same way it had increased capacities in 1913, by re-engineering the pump runners. The modification raised the load on the pumping unit motors to 800 horsepower, which had previously been considered too high. After analyzing operating data since the 1913 expansion, however, Reclamation engineers concluded that the increase was within the operating limits of the units. By this method, they increased the capacity of the First Lift by 65 second-feet, and the Second Lift by 66 second-feet.[56] This small improvement, however, was not sufficient. In its 1926 contract with BID, therefore, Reclamation agreed to prepare cost estimates for increasing the capacity of the system by either twelve or 25 percent.

Reclamation submitted its estimates for enlarging the pumping system to BID in 1928. According to Reclamation's figures, expanding the system by 12 percent would cost $452,160, while a 25 percent expansion would cost $828,960. In a vote late in 1928, the BID water users approved the plan to expand the system by 25 percent. The cost of the expansion was to be covered by commercial power profits, with repayment spread over a ten- to twelve-year period.[57]

Reclamation began its expansion program during the winter of 1930-1931. At that time, Government forces removed the 110-second-foot pump from the First Lift station and replaced it with a 200-second-foot pump manufactured by the Pelton Water Wheel Company. The crews then moved the salvaged 110-second-foot pump to the Second Lift, housing it in a reinforced concrete extension that connected the station to a nearby machine shop. During the winter of 1933-1934, Reclamation moved another 110-second-foot pump from the Third Lift Station to the First Lift. The pump was housed in an extension added to the east end of the plant. To replace the pump removed from the Third Lift, Reclamation installed a 180-second-foot pump purchased from the United Iron Works of Oakland,

California. To complete the expansion, Reclamation had originally planned to replace the 110-second-foot pumps at the First and Second Lift stations with 180-second-foot pumps. By this date, however, there was increasing evidence, in the form of rising water tables and resulting field-drainage problems, that Pumping Unit farmers were over-irrigating their lands. The Government, therefore, canceled plans to continue the expansion, leaving the First, Second, and Third Lift stations with capacities of 1,037 second-feet, 821 second-feet, and 553 second-feet, respectively.[58]

The implementation of the Fact Finders' suggestions did not, as many hoped, clear away all the problems on the Minidoka Project. By giving more control to the irrigation districts, particularly by awarding them rights to commercial power profits, the Fact Finders Act set the stage for significant new controversies which would overshadow the management of the Project and the Government's relationship with the water districts for years to come.

Endnotes

[1]"Annual Project History," 1915, 3-4.

[2]For accounts of early living conditions and the difficulties faced by many settlers both on and adjacent to the Minidoka Project, see Alvin C. Holmes, *Swedish Homesteaders in Idaho on the Minidoka Irrigation Project* (Twin Falls, Idaho: Ace Printing, 1976); Gerhard Riedesel, *Arid Acres: A History of the Kimama-Minidoka Homesteaders, 1912 to 1932* (Pullman, Washington: The Copy Machine, 1980).

[3]Fogg, "History," 133.

[4]For 1910 production figures, see *Annual Report*, 1912-1913, 54. The high cost of farming the Minidoka tract, and the poor returns received, is discussed in "Presentation of Grievances of Minidoka Water Users' Association," transcript of meeting held at Rupert, Idaho, 5 September 1911, in RG 115, Entry 3, Box 632, File Number 157, NA-Washington.

[5]Fogg, "History," 139, 142, 144.

[6]Robinson, *Water for the West*, 37-42.

[7]"Presentation of Grievances of Minidoka Water Users' Association," RG 115, Entry 3, Box 632, File Number 157, NA-Washington.

[8]Robinson, *Water for the West*, 42-44. For a discussion of the Curtis Act, see Fogg, "History," 114-122.

[9]The organization of the MWUA is discussed in F.H. Newell to Project Engineer, 7 February 1911. On MWUA activities, see transcript of meeting held between MWUA and A.P. Davis, 16 December 1910, RG 115, Entry 3, Box 647, File Number 250, NA-Washington; P.M. Fogg to J.D. Hunsinger, Secretary, MWUA, 27 March 1911, RG 115, Entry 3, File Number 865, NA-Washington;

"Minutes of Meeting of the Minidoka Water Users' Association and Messrs. Bien and Wells," 23 May 1911, RG 115, Entry 3, Box 632, File Number 157, NA-Washington. Quote is from E.L. Rigg to F.H. Newell, 19 July 1912, RG 115, Entry 3, Box 673, File Number 865, NA-Washington.

[10]E.B. Johnson to Secretary of the Interior, 21 June 1913, RG 115, Entry 3, Box 673, File Number 865, NA-Washington. Reclamation officials frequently expressed reservations about water users' associations. As Newell once explained: "Our experience with water users associations has been such that I doubt whether they are worth what they cost. The reason is largely that the great body of the water users do not take sufficient interest to elect men who can give enough time to the business to transact it properly"; Newell to F.E. Weymouth, 20 June 1912, MID Office. See also P.M. Fogg to Weymouth, 9 July 1912, RG 115, Entry 3, File Number 865, NA-Washington.

[11]Quotes are from E.L. Rigg to F.H. Newell, 19 July 1912, RG 115, Entry 3, Box 673, File Number 865, NA-Washington.

[12]E.B. Johnson to F.H. Newell, 22 June 1912, RG 115, Entry 3, Box 673, File Number 865, NA-Washington. Also see: P.M. Fogg to F.E. Weymouth, 8 May 1912, MID office; Johnson to Fogg, 9 July 1912, MID Office.

[13]F.H. Newell to F.E. Weymouth, 29 June 1912, RG 115, Entry 3, Box 673, File Number 865, NA-Washington.

[14]B.E. Stoutemyer to P.M. Fogg, 14 May 1912; Morris Bien to F.H. Newell, 1 August 1912; Newell to E.B. Johnson, 12 August 1912; all in MID Office.

[15]F.H. Newell to E.L. Rigg, 1 August 1912, RG 115, Entry 3, Box 673, File Number 865, NA-Washington.

[16]For Rigg's assurances, see the following correspondence: F.H. Newell to F.E. Weymouth, 26 September 1912, RG 115, Entry 3, Box 673, File Number 865, NA-Washington; P.M. Fogg to Weymouth, 12 October 1912, MID Office. Newell discusses the Secretary's decision in a letter to E.B. Johnson, 2 July 1913, RG 115, Entry 3, Box 673, File Number 865, NA-Washington.

[17]For information on irrigation districts, refer to U.S. Department of Agriculture, *Irrigation Districts, Their Organization, Operation and Financing*, by Wells A. Hutchins, Technical Bulletin No. 254 (Washington, D.C.: Government Printing Office, 1933). On the MWUA's reassessment of its status, see Fogg to Newell, 1 May 1911; Weymouth to Newell, 26 February 1912, MID Office; Newell to Weymouth, 4 March 1912, MID Office; E.B. Johnson to Newell, 22 June 1912; Fogg to Weymouth, 8 May, 9 July 1912, MID Office; Weymouth to Newell, 15 July 1912; Weymouth to Newell, 9 October 1912, MID Office; Fogg to Weymouth, 12 October 1912, MID Office; Weymouth to Fogg, 14 October 1912, MID Office; Johnson to Secretary of the Interior, 21 June 1913. Unless otherwise noted, the above-cited material is contained in RG 115, Entry 3, Box 673, File Number 865, NA-Washington.

[18]P.M. Fogg to F.H. Newell, 28 July 1913, RG 115, Entry 3, Box 673, File Number 865, NA-Washington.

[19]MID to Franklin K. Lane, 11 October 1913, RG 115, Entry 3, Box 648, File Number 250A, NA-Washington.

[20]D.W. Ross to F.H. Newell, 31 October 1904, RG 115, Entry 3, Box 646, File Number 250, NA-Washington; Fogg, "History," 90; "The Court Side-Steps," *Rupert Pioneer Record*, n.d., attached to F.E. Weymouth to Newell, 22 May 1911, RG 115, Entry 3, Box 633, File Number 157-1, NA-Washington; P.M. Fogg to Newell, 1 May 1911, RG 115, Entry 3, Box 673, File Number 865, NA-Washington.

[21]P.M. Fogg to F.H. Newell, 1 May 1911, RG 115, Entry 3, Box 673, File Number 865, NA-Washington.

[22]B.E. Stoutemyer to F.H. Newell, 29 April 1911, RG 115, Entry 3, Box 673, File Number 865, NA-Washington.

[23]First Assistant Secretary to W.R. Hyatt, Secretary, MID, 17 November 1913, RG 115, Entry 3, Box 648, File Number 250A, NA-Washington.

[24]F.E. Weymouth to F.H. Newell, 29 November, 24 December 1913, RG 115, Entry 3, Box 648, File Number 250A, NA-Washington.

[25]Morris Bien, Memorandum for Reclamation Commission, 11 November 1913; First Assistant Secretary to W.R. Hyatt, 17 November 1913; Will R. King, Chief Counsel to F.E. W eymouth, 11 April 1914; B.E. Stoutemyer to J.D. H u nsinger, 15 June 1914. All of the above-cited correspondence is located in RG 115, Entry 3, Box 648, File Number 250A, NA-Washington.

[26]F.H. Newell to Supervisor of Irrigation, Billings, Montana, 24 August 1914, RG 115, Entry 3, Box 648, File Number 250A, NA-Washington.

[27]The incessant delays and eventual approval are documented in the following correspondence which, unless otherwise noted, is contained in RG 115, Entry 3, Box 631, File Number 140A, NA-Washington: A.P. Davis to W.R. Hyatt, 7 December 1914, RG 115, Entry 3, Box 648, File Number 250A, NA-Washington; Davis to Addison T. Smith, 4 February 1915; Will R. King to James H. Brady, 6 February 1915; King to F.R. Randolph, 16 February 1915; Morris Bien to B.E. Stoutemyer, 20 April 1915, MID Office; F.R. Randolph to Davis, 22 April 1915; H.M. Schilling to R a ndolph, 12 May 1915, MID Office; J.D. O'Donnell to Reclamation Commission, 15 June 1915; Randolph to Franklin K. Lane, 30 June 1915; Stoutemyer, Memorandum to Chief Counsel, 26 February 1916; Davis to Lane, 9 March 1916.

[28]Refer to MID contract with Reclamation, contained in MID Office.

[29]MID Board Minutes, 2 August 1916, in MID Office.

[30]BID Board Minutes, 9 September 1916, BID Office.

[31]Quoted in B.E. Stoutemyer to Chief Counsel, 21 March 1918, BID Office.

[32]Refer to the following *Annual Reports*: 1911-1912, 84; 1912-1913, 98; 1913-1914, 118-119.

[33]"Annual Project History," 1915, 295.

[34]Refer to the following *Annual Reports*: 1915-1916, 167-168; 1919-1920, 159-160.

[35]"Annual Project History," 1915, 295.

[36]Holmes. *Swedish Homesteaders in Idaho*, 82.

[37]"Annual Project History," 1920, 108.

[38]See the following *Annual Reports*: 1920-1921, 162; 1924-1925, 169-173.

[39]The financial condition of the Project, particularly the state of the banks, is discussed in the following: Barry Dibble to Chief Engineer, 19 November 1921, RG 115, Entry 7, Minidoka Project, 1919-1929, Box 723, File Number 225.07, NA-Washington; S.D. Parke to Secretary of the Interior, 13 December 1921, RG 115, Entry 7, Minidoka Project, 1919-1929, Box 723, File Number 225.07, NA-Washington; R.J. Burke, "Statement of Facts Concerning the Financial Condition of the South Side Pumping Unit of the Minidoka Project," 26 November 1923, RG 115, Entry 7, Minidoka Project, 1919-1929, Box 727, File Number 301, NA-Washington.

[40]"Annual Project History," 1920, 25.

[41]"Annual Project History," 1915, 4.

[42]BID to Albert B. Fall, 5 April 1921, RG 115, Entry 7, Minidoka Project, 1919-1929, Box 723, File Number 225.07, NA-Washington.

[43]Barry Dibble to Chief Engineer, 25 November 1921, RG 115, Entry 7, Minidoka Project, 1919-1929, Box 723, File Number 225.07, NA-Washington. See also Dibble to Chief Engineer, 14 March 1921, RG 115, Entry 7, Minidoka Project, 1919-1929, Box 727, File Number 30, NA-Washington.

[44]Dibble himself admitted that this was a consideration. Dibble reported that during a meeting with the BID board he "took advantage of this opportunity to outline to the directors the financial situation of the Reclamation Service and the necessity of making collections if work was to continue. I also expressed myself on the absurdity of asking Congress for more money to put into construction if the older projects were not able to meet the payments of the liberal terms of the Reclamation Extension Act" (Dibble to Chief Engineer, 2 November 1921, BID Office).

[45]Robinson, *Water for the West*, 42-45.

[46]For information on the purpose and findings of the Fact Finders, refer to their report, entitled "Federal Reclamation by Irrigation," Senate Document 92, 68th Congress, 1st Session, 1924. Quote is on p. 24.

[47]U.S. Department of the Interior, *Federal Reclamation Laws Annotated* (Washington, D.C.: Government Printing Office, 1943): 277.

[48]For terms of the contract, refer to copies on file at BID Office. For date of election, see B.E. Stoutemyer to Commissioner, 27 February 1926, BID Office.

[49]The districts made their cases in the following documents: BID, "Claims and Contentions of the Burley Irrigation District," 12 March 1925, BID Office; MID, "Claims and Contentions of the Minidoka Irrigation District," 17 March 1925, MID Office.

[50]While giving testimony on the condition of the project in 1923, Dibble admitted that "there is a complicated question in the plan to be followed in dividing the net earnings. The South Side will ultimately pay for 95.6% of the power house but the Gravity Division is paying for 59.2% of the Minidoka dam which creates the head for the power house" ("Statement by Barry Dibble," September 1923, RG 115, Entry 7, Box 677, File Number 105.21, NA-Washington).

[51]The arbitration plan is included in early drafts of the contract. See copy of contract attached to B.E. Stoutemyer to Commissioner, 14 May 1925, BID Office.

[52]"The Board of Survey and Adjustments," *New Reclamation Era* 16 (March 1925): 33-34; E.B. Darlington and B.E. Stoutemyer to Commissioner, 14 October 1925, BID Office.

[53]Board of Survey and Adjustments, "Preliminary Report and Recommendations," March 1925, RG 115, Entry 7, Box 730, File Number 301.32, NA-Washington.

[54]E.B. Darlington and B.E. Stoutemyer to Commissioner, 10 March 1926, RG 115, Entry 7, Box 681, File Number 201.1, NA-Washington.

[55]"Secretary Work Apportions Credits to Minidoka Project," *Burley Bulletin*, 24 March 1927.

[56]In 1917, settlers on the Pumping Unit requested Reclamation to increase the capacity of the pumping system substantially. Reclamation did not believe that the pumping system needed to be enlarged to the extent demanded by the settlers, but noted that it might be possible to increase capacity slightly at very little expense. When Reclamation had altered the pump runners in 1913, it found that the runners raised the pump capacity to over 180-second-feet while increasing the motor load to 865 horsepower. At the time, this load was considered too high. Reclamation, therefore, altered the runners so that they would only have a capacity of around 160-second-feet. Given the demand for increasing pump capacity, Reclamation began to conduct tests to see whether the motors could stand the higher load. Settler interest in pump capacity apparently waned, however, and Reclamation abandoned its plans to alter the pump runners. Interest in enlarging the pumps revived in 1921, however, as the settlers began to petition the Secretary of the Interior for repayment extensions. In 1924, Reclamation began to alter the pump runners at Lift Station #1 and Lift Station #2, apparently in the hope that it would satisfy the water users and head off the demand for an even larger expansion. The expansion work is discussed in the following documents: "Annual Project History," 1920, 175-182; Barry Dibble to Chief Engineer, 15 December 1920, BID Office; Dana Templin to Dibble, 9 March 1921; Dibble to Chief Engineer, 14 March 1921; Chief Engineer to Director, 18 March 1921; Chief Engineer to Commissioner, 26 July 1923; D.W. Davis to F.E. Weymouth, 1 August 1923; "Statement by Barry Dibble," September 1923, 21-28, RG 115, Entry 7, Box 677, File 105.21, NA-Washington; R.F. Walter to Byron-Jackson Pump Manufacturing Co., 6 August 1924, BID Office; Superintendent to Chief Engineer, 11 October 1924, BID Office. Unless otherwise noted, the above-cited correspondence is contained in RG 115, Entry 7, Box 727, File Number 301, NA-Washington.

[57]"Report on Cost of Enlarging the South Side Pumping System," August 1928, BID Office. Notice of the vote is contained in project correspondence, BID Office.

[58]The expansion program is described in the following "Annual Project Histories": 1930, 75; 1931, 68; 1933, 34, 48-54; 1934, 37-42; 1937, 33-34.

9 POWER AND CONTROVERSY

The Power Controversy, 1929-1941

Expanding the pumping system during the early 1930s taxed the capacity of the Minidoka Powerplant. Although a sixth hydroelectric unit had been added in 1926, the plant simply could not supply enough electricity to meet pumping demands and still accommodate the growth of the commercial power system. But plans to expand the powerplant were stymied by continuing debate over the division of power profits. MID and Reclamation engineers believed that Secretary of the Interior Work had made a mistake in apportioning profit solely on the cost of the powerhouse, for many other features contributed to the power system. MID was unwilling to let the matter rest, and BID was just as opposed to allowing any redetermination.

In January 1929, MID had petitioned Work's successor, Roy O. West, for a rehearing. West questioned whether he could overturn the ruling, and in any case asserted that "all the facts presented to me now were before Secretary Work when the order . . . was entered, and it must be assumed that the action taken was the result of careful and deliberate consideration."[1] When Ray Lyman Wilbur became Secretary of the Interior later in 1929, MID again petitioned for a rehearing. Unlike West, Wilbur was at least willing to consider MID's case, and in August he appointed a committee to study the issue.[2]

Headed by J.H. Rothrock of the U.S. Geological Survey, the committee arrived on the Minidoka Project in September 1929. In its final report issued that month, the committee agreed that MID deserved a greater share in the power revenues based on its investment in Minidoka Dam. Including the dam's cost in the power system, the committee recommended that BID receive 72.7 percent and MID 23.7 percent of net profits.[3] BID immediately filed an injunction to restrain the Secretary from making a redetermination of power profits. In the case of *BID v. Wilbur*, the U.S. District Court eventually ruled that Work's division of profits had been "conclusive and final" and barred the Department of the Interior from "reconsidering or rehearing the matter of the ratio of ownership and participation of the Burley irrigation district and the Minidoka irrigation district in the power profits." The Federal Government appealed the decision, but the ruling was upheld.[4]

The outcome of *BID v. Wilbur* opened a deep rift between the two irrigation districts. The power situation seemed particularly unjust to MID, given the fact that half of all the power profits came from sales on the Gravity Unit. Every time an MID water user paid an electric bill, he was helping repay BID's construction costs. Relations were not improved by BID's insistence that power rates be kept as high as possible in order to ensure maximum returns. Rather than continue defraying BID's expenses, MID as early as 1929 began to explore the possibility of obtaining electricity from the Idaho Power Company or some other outside source.[5] Aware of the seriousness of the situation, Stoutemyer warned his superiors:

> There has been a bitter feud between the Minidoka Irrigation District and the Burley Irrigation District growing out of the division of the power profits from the Minidoka power plant.... This division of the power profits is so unsatisfactory to the Minidoka district that I am convinced that it is only a question of time when the district will either provide its own power facilities or secure power from some other source rather than to continue "paying tribute," as they call it, to the Burley district.[6]

The possibility of losing MID as a power customer alarmed Reclamation. Although under the terms of the Fact Finders Act the Government did not receive power monies directly, BID did return them in the form of construction repayments. A diminution of BID's income could result in more demands for moratoria on debt repayment and further losses to the Reclamation Fund.

A solution appeared in 1934, when Reclamation was seeking ways to conserve wintertime flow on the Snake River. Southern Idaho had been plagued by drought for several years, making it impossible to fill the American Falls reservoir. Nevertheless, American Falls was obligated to release 400,000 to 600,000 acre-feet of water each winter to generate power at the Minidoka hydroelectric plant for the commercial system. Reclamation began negotiating with the Idaho Power Company to supply winter power to the Minidoka Project, thus allowing the Government to close the Minidoka plant for the winter and conserve water that would otherwise have been lost for irrigation use the next year. In a contract signed in December 1934, Idaho Power agreed to relinquish certain storage rights in the American Falls reservoir and to supply the Minidoka Project with up to 4,000 kilowatts of electricity during the irrigation season and 10,000 kilowatts during the winter. Reclamation, in return, agreed to cancel the long-planned American Falls powerplant, to postpone expansion of the Minidoka Powerhouse for five years, and to supply Idaho Power with all the excess electricity produced at the Government's Black Canyon Dam hydroelectric plant, located on the Boise Project.[7]

Stoutemyer believed that this exchange presented an opportunity to address MID's dissatisfaction with the division of power profits. "What I have in mind," he wrote Reclamation's Commissioner in May 1934, "is that we might make a contract with the Minidoka Irrigation District to... furnish such power as is required to meet the requirements of the various power customers within the boundaries of the Minidoka Irrigation District, including such increased demands as may grow up in future years." Under Stoutemyer's proposal, Reclamation would supply the power—including any increase—for a flat annual fee of $50,000. MID would then be able to sell the electricity for its own profit, free from BID's domination.[8]

Stoutemyer's plan also served another purpose. Congressional appropriations for the Boise Project had specified that Black Canyon power revenue was to repay the cost of certain Boise Project facilities, including Deadwood Dam in Idaho and the expense of the Black Canyon powerplant itself. The $50,000 secured from MID by the contract could be used to repay the costs of the Boise Project, as required by law.

BID attorney S.T. Lowe objected to the plan to close the Minidoka powerplant during the winter and to sell electricity directly to MID. Lowe argued that water rights that currently generated winter power for the Minidoka Project were held by the Secretary of the Interior in a "fiduciary capacity," making it "the imperative duty of the Secretary to apply that water to the purposes for which it was decreed until the right is extinguished or the beneficiaries consent to it being used otherwise." BID was willing to allow the Secretary to store the water behind the American Falls Dam, but only if the electricity provided by the Idaho Power contract was marketed in the same way that power had been marketed from the Minidoka plant. Selling a portion of the electricity directly to MID did not allow BID adequate compensation, Lowe contended, and was nothing but an obvious attempt by Reclamation to circumvent the provisions of *BID v. Wilbur*.[9]

The Department of the Interior was initially inclined to believe that BID had a legitimate complaint. As the Department's legal staff advised:

> Somewhere in this complicated situation and under this nebulous state of law the Burley District is quite likely to develop a line of reasoning which would be successful.... It could certainly draft a statement of facts which would give the impression that the proposed contract purposefully and unnecessarily casts on it the whole burden of the plan, disturbs its vested rights, and is a mere subterfuge to avoid the injunction in the *[BID v.] Wilbur* case.

The Department of the Interior legal staff advocated that electricity from the Idaho Power contract simply be distributed as if it came from the Minidoka powerplant, and the profits divided accordingly. It also argued that the true beneficiaries of the supplemental power purchased from the Black Canyon powerplant would be the private irrigation interests located below the American Falls Dam, upstream from the Minidoka Project. In the early 1920s, these interests had formed the so-called "Big Irrigation District" to receive water from the American Falls Dam in return for repaying part of its construction cost. Since these

upstream irrigators would have the most direct use of the water conserved by the wintertime shutdown of the Minidoka Plant. According to this line of reasoning, the American Falls water users should pay the $50,000 a year required by the Boise Project.[10]

Despite these arguments, Secretary of the Interior Harold L. Ickes approved Stoutemyer's plan in January 1935. Ickes specified, however, that if BID successfully contested the contract with MID, the Department should secure the money from the upstream water users, as previously suggested.[11] Elwood Mead, Reclamation's Commissioner, strongly supported Ickes' decision, arguing that MID was more likely to pay the contracted amount than the water users of the Big Irrigation District. "Power charges are paid every year without fail, in good times and bad times, regardless of depression," Mead observed. "But if the past is any guide to the future, we may expect that in years of severe depression in the farming industry, the water users of the various reclamation projects will ask Congress to grant them a moratorium on the payment of water charges." Mead also pointed out that it did not seem fair to cast the burden of payment on the irrigators of the Big Irrigation District. These water users, after all, had helped pay for the American Falls power site that was now to be abandoned under terms of the Idaho Power Company contract. It would be inequitable, he wrote, to allow BID to profit while the upstream irrigators abandoned their own power site and paid for the Black Canyon plant.[12]

Another motivation for pursuing Stoutemyer's plan, though not directly mentioned, may have been Reclamation's desire to establish a matter of policy. The fundamental issue was whether the Secretary of the Interior had the right to manage water and power use on the Minidoka Project to benefit the entire Reclamation program even at the expense of individual project interests. To Stoutemyer's mind, the answer was clearly that the welfare of the whole region outweighed the interests of a single group. As he explained when he first suggested the plan in 1934:

> The lands of the Burley district are less than 5% of the total irrigated acreage of the Snake River Valley and less than 5% of the area adversely affected by failure to fill the American Falls reservoir. The winter flow of the Snake River and the excellent reservoir sites available on the stream are the natural heritage of the entire Snake River Valley. It would be preposterous to allow one small district to veto a proposal which is essential to the welfare of the entire valley, merely for the purpose of making a little extra power profit by wasting the winter flow of Snake River.[13]

In March 1936 the Secretary of the Interior announced the first division of profits under the contract with MID. For the power received under its contract, MID paid $50,000 as agreed. Deducting this amount from MID's share of the Minidoka powerplant's net revenues resulted in a total credit of about $5,000. If MID's profit was slight, BID's loss was significant. Under the old division of profits, BID would have received over $113,000. Under the new plan, BID received only $63,807.51. As expected, BID filed a bill of complaint in the Supreme Court of the District of Columbia to secure an injunction against any further distribution of profits in this manner.[14]

Due to a crowded docket and extensive preparations, the case of *BID v. Ickes* did not go to trial until March 1939. Despite the lengthy buildup, the court quickly reached a decision, issuing a ruling in May that favored the Government. Instead of finding that the Secretary was obligated to compensate BID for the "disuse" of the water power rights at the Minidoka Powerhouse, the court maintained that the wintertime shutdown of the Minidoka plant had been absolutely vital to the irrigation interests of the Snake River Valley. The loss of profits was, in effect, unavoidable. While the written opinion affirmed BID's right to revenues from power generated by the plant, it denied that the plaintiff deserved to profit from the electricity secured from the Idaho Power Company and sold to MID. On the whole, the court concluded, "The Secretary of the Interior was guided by the irrigation necessities of the communities in the Snake River Valley and on the Minidoka Project and violated no rights of the Burley district."[15]

Although the conclusion of *BID v. Ickes* finally legitimized the 1935 contract with MID, it did not end the controversy. Following the settlement of BID's case, the Secretary announced a division of profits for all the years from 1936 to 1941. This determination immediately touched off another round of protests, but this time from MID. According to the Secretary's accounting, MID was only entitled to the profits from electricity provided by the Idaho Power Company. Profits from the electricity produced by the Minidoka Powerplant, even if sold within MID's territory, was to be divided between MID and BID. MID disagreed, arguing that it was entitled to all the power sold within its own domain, regardless of the electricity's origin. Further complicating issues, Reclamation discovered that earlier profit announcements that had been released while *BID v. Ickes* was pending resolution had been in error, due to a discrepancy between monthly versus yearly accounting. The controversy threatened still more litigation. In 1945, however, MID reluctantly accepted the Government's determination, receiving approximately $110,000. Dissatisfied with the way the contract had been implemented, both MID and the Department of the Interior decided to allow it to expire at the end of 1944.[16]

Construction of the Seventh Power Unit

As in many other parts of the country, the economic depression of the 1930s brought some unexpected benefits. Federal relief programs initiated construction projects as an effective means to put the unemployed back to work. The Minidoka Project hosted two Civilian Conservation Corps [CCC] camps, one at Walcott Park that operated from 1935 to 1942, and another near the town of Paul that opened in 1938. In addition to significantly upgrading Walcott Park, CCC workers completed a number of canal improvements such as lining some canals with clay and gravel and laying rock riprap. The capacity of some canals was increased by dredging rock and earth. New service roads were built and deteriorated water-control structures replaced. The operators' housing complex at Lift Station #2 was attractively landscaped with terraces and lava-rock walls.[17]

The decade also saw efforts to add another power unit at Minidoka Dam. As early as 1933, the Milner Low Lift Irrigation District, located downstream of the Minidoka Project near the Twin Falls South Side Project, had petitioned Reclamation to expand the Minidoka powerplant so that it could purchase electricity for pumping. With the signing of the water conservation contract with Idaho Power Company in 1934, Reclamation believed it feasible to build an additional unit to utilize the extra summertime flow released from American Falls Reservoir. In 1937, therefore, Congress approved a $400,000 appropriation to construct a power unit at the Minidoka Dam to supply the Milner district with up to 2,500 kilowatts of electricity. In 1938, however, the Commissioner's office warned the Chief Engineer that the Government's case in *BID v. Ickes* hinged partly on the contention that the demands of the south-side pumping plants consumed all available power at the dam. Since the addition of another unit might undermine this claim, it was decided to suspend work on the expansion until after the case was settled.[18]

After the ruling, Reclamation's Commissioner John C. Page dispatched a telegram to Stoutemyer in late May 1939 informing him: "Proceed immediately with construction additional generating unit Minidoka powerplant."[19] Government engineers initially considered plans to install the unit in the north end of the existing powerhouse, but soon discovered that "the required size of the turbine draft tube apparently will eliminate this scheme." They, therefore, resurrected the oft-discussed idea of constructing an addition at the northwest corner of the powerplant, along the north bank of the tailrace.[20]

Plans for the addition were prepared in the Chief Engineer's Office at Denver in 1940. The design called for a flat-roofed, rectangular-plan, reinforced concrete box measuring 58 feet east-to-west, and 38 feet north-to- south. From the foundation to the roof line, the structure was to rise 91 feet, or approximately 63 feet above the normal surface elevation of the water in the tailrace. Architectural detailing was limited to a low projecting parapet along the roof line, a recessed panel in the cornice area of each facade, and corner pilasters. A massive steel door, divided into four folding leaves, was to be set in the west wall at the top of the tailrace embankment. Each leaf, from top to bottom, was divided into three panels, the lowest of which was solid steel, while the uppermost were fitted with industrial sash windows. The lowest panel of the northernmost leaf was to hold a "pilot" door, to allow entry and exit without opening the entire unit. Two rows of three, equally spaced, industrial sash windows were to be set in the south wall, overlooking the tailrace.[21]

According to the plans, the steel door in the west wall of the addition opened onto a balcony overlooking the main generator floor. A catwalk ran along the south wall of the addition and connected the balcony to a doorway cut through the west wall of the original powerplant. A stairway also led from the catwalk down to the generator floor, which lay at approximately the same level as the turbine floor of the main powerhouse. A 35-ton gantry crane was to be installed above the balcony to service machinery.

The proposed generating equipment included a 5,000-kilowatt generator direct-connected to a 7,000-horsepower turbine set in a reinforced concrete, spiral casing located below the generator floor. Reclamation planned to supply water to the turbine through the eighth and ninth penstock openings in the original corewall of the diversion control structure, north of the main powerplant. Fixed-wheel gates were to control the flow, and each opening was to be equipped with its own rectangular, welded, steel-plate penstock. The turbine was to discharge into a single, circular steel draft tube that separated into three rectangular concrete tubes before emptying into the tailrace.

Bids for the seventh unit were opened on 27 November 1939. In January 1940, the Government awarded the generator contract to the Westinghouse Electric and Manufacturing Company for $76,420. Baldwin-Southward Corporation of Eddystone, Pennsylvania, won the contract to supply the turbine and governor for $69,720. Government forces were to undertake all of the construction, with the total cost estimated at approximately $550,000.[22]

Construction commenced in March 1940, when workers began to enlarge the tailrace to accommodate the increased flow from the new unit. Power production was suspended at the plant until this work was completed in April. During the following summer, crews completed the excavations for the ell and penstocks. Considerable cribbing was erected to support the powerplant during this work, for the penstocks ran directly beneath the building to reach the corewall. Construction was further complicated by the sand stratum first encountered by the contractors who had built the dam. To prevent the sand from collapsing into the workings and undermining the overlying rock, the Government built retaining walls on all sides of the excavation. Additional difficulties resulted when Reclamation discovered that the concrete corewall had become cracked and unstable. As a temporary measure during excavation, Government forces braced the lower face of the corewall with gravel-filled bins.[23]

Workers began pouring concrete for the floors and walls of the addition during the fall of 1940, completing the structure before the end of the winter. In November, the reservoir was lowered and work began on a permanent concrete support for the corewall. In January 1941, Government forces built the concrete scroll case for the turbine as well as the generator foundations. The power unit was installed the following month. The transformers for the unit were eventually installed just north of the addition. The final phase of the project involved constructing the forebay, cutting openings into the corewall for the penstocks, and building the draft tubes. This work was delayed until the winter of 1941-1942, when the reservoir could be lowered and the tailrace dewatered. The seventh unit was put into operation on 27 March 1942, when, according to the annual project report, "a load of 1,800 k.w. was generated and delivered to the Milner Low Lift Irrigation District."[24]

As required by the Reclamation Act, the cost of the original five power units had been charged to the Minidoka Project water users for repayment. The sixth unit had been built with accrued power revenues. Under the Fact Finders Act, these revenues belonged to

the water users, so that Project settlers technically had paid for the sixth unit as well. Despite the requirements of the Fact Finders Act, Reclamation was strongly opposed to continuing this method of accounting. As Stoutemyer wrote to the Chief Engineer shortly after the appropriation for the seventh unit had been secured:

> It would be unwise to charge the proposed additional unit to the Burley and Minidoka irrigation districts, for if this unit is charged to those districts it would then become subject to the provisions of Subsection I of the Fact Finders Act and the Minidoka and Burley districts would thereafter be entitled to all net profits therefrom for all time to come.[25]

Reclamation officials were increasingly convinced that crediting water users with power profits was not only complicated and prone to controversy, but unfair to the Government. From Reclamation's point of view, the water users were not repaying the cost of the power features as much as the power system was simply paying for itself. "As the United States is furnishing all the money for this development and taking all the risk," Stoutemyer concluded, "there seems to be no good reason, either from an equitable or a business standpoint, why the Burley district should take the profit."[26]

Reclamation was also concerned that the irrigation districts' interest in profits was complicating power-system administration, particularly the Government's ability to set reasonable rates. For example, on the Minidoka Project in the early 1930s, the Minidoka Irrigation District, the townships, and many of the farmers' cooperatives had petitioned the Department of the Interior for cheaper electricity. Reclamation agreed that rates should be adjusted, but BID opposed the plan in order to maintain its high level of profits. Negotiations and hearings resulted in considerable delay and higher rates than the Government felt were warranted.[27] In response to criticism from power consumers and Federal agencies such as the Rural Electrification Administration, which was attempting to arrange power sales from Reclamation projects to farmers' cooperatives, Reclamation insisted that it was not to blame for the rates charged on the projects. As Commissioner Page explained in 1938: "This serious condition [of high rates] is created by the fact that the Bureau of Reclamation is not a free agent to determine these rates, since under the Act of Congress dated December 5, 1924, an interest in power revenues is granted to the water users, and any attempt to reduce these revenues is resisted by these interests."[28]

On the whole, Reclamation discovered that operation and administration of its projects was becoming increasingly complex as the water and power systems became ever more interdependent. Quite often, improving water use or power production for the benefit of some projects meant sacrificing the interests of another project. The plan for wintertime shutdown of the Minidoka power house to conserve the winter flow of the Snake River was a case in point. The resulting litigation illustrated the inevitable controversies that would arise under the current state of Reclamation law, which gave the water users a vested interest in the operation of the power system.

To avoid these problems, Reclamation had for several years adopted the policy of securing special Congressional appropriations for the construction of power features. Under the terms of this funding, the costs were repaid by power profits, not by the water users. The Boulder Canyon Act of 1928 was perhaps the most noteworthy of these appropriations, for it authorized $165 million to build Hoover Dam. Demonstrating a confidence that would have been unheard of 15 years earlier, the Act stipulated that almost the entire cost was to be repaid by power revenues, with interest. Under this tactic, the water users could not claim any of the power profits, and hence, could not interfere with the operation and administration of the system.[29]

For the seventh unit of the Minidoka Powerplant, Reclamation also planned to repay costs from power revenues. But as Stoutemyer pointed out, the original 1934 appropriation had not contained any special provisions on repayment. Instead, the money had been granted under the terms of the Reclamation Act, which required that costs be charged to the water users. Reclamation, however, soon discovered that several unexpected expenses required securing an additional appropriation, and it seized the opportunity to change the funding provisions. When Congress approved funding in May 1939, shortly after the conclusion of *BID v. Ickes*, the bill specified "that the expenditures from this or any other appropriation for the installation of an additional unit in the Minidoka powerplant shall be reimbursed wholly from power revenues derived from operation of said unit and after such reimbursement said revenues shall be the property of the United States."[30]

Reclamation's dissatisfaction with the profit-sharing provision of the Fact Finders Act was finally resolved with passage of a new Reclamation Act in August 1939. For the first time, the legislation specified that the entire cost of Reclamation projects did not have to be charged to the water users for irrigation purposes. Instead, costs could be apportioned between various uses, including irrigation, power, municipal water supply, and "other miscellaneous purposes." Costs charged to power were to be repaid by revenues that would thereafter accrue to the United States. Under the new legislation, Reclamation was free to return its power profits to the Reclamation Fund and administer its power systems as it saw fit, without being subject to the revenue claims of the water users.[31]

Post-War Changes

During the Second World War the Federal Government began to integrate the operations of its various power projects to maximize the energy available for wartime production. This was especially true in the Northwest, where the Government, through Reclamation and other agencies, had built several huge hydroelectric plants during the 1930s and early 1940s, such as Grand Coulee Dam and Bonneville Dam. These plants were interconnected with private utilities to form a regional power pool that enabled the Northwest to

become a major center for aluminum, lumber, and aircraft production, as well as nuclear weapons research.[32]

With the end of the war, Reclamation announced plans to upgrade existing powerplants and to build several new power projects. Many of the new developments were to be in Idaho, including the Anderson Ranch Dam on the Boise Project, the Palisades Dam on the Snake River above American Falls, and two plants on the Mountain Home Project in the south-central section of the state. Reclamation also unveiled plans to interconnect all of its powerplants with a network of Federally constructed transmission lines. The new lines were to free Reclamation from its reliance on private power utilities, through which most of the existing plants were connected. The improvements were intended to facilitate the West's transition to a peacetime economy by encouraging settlement and development. Encouraging Western development, and hence power sales, was especially important to Reclamation because it had relied increasingly on power revenues to fund its irrigation program since passage of the Reclamation Act of 1939.[33]

Reclamation hoped to integrate the operation of the Minidoka system with the other powerplants planned for Idaho. Indeed, the Minidoka Project was especially important for two reasons. First, it represented the only commercial system in the state operated by the Federal Government. Second, its proximity to the other planned powerplants meant that its market could readily be expanded. As one Interior Department official observed: "The Minidoka Project is the only place in Idaho where the Bureau has a power market. It can serve as a nucleus on which to build a public power system and there is a substantial amount of power to be produced by the potential projects in the area."[34]

The Burley and Minidoka Irrigation Districts, however, were still entitled to the profits from all but the seventh power unit in the Minidoka Plant. Fearing that the districts would continue to oppose lowering rates and interfere with power development, Reclamation prepared a tentative plan in July 1944 to acquire all the rights to the Minidoka power system. In exchange for all future profits from the plant, Reclamation proposed to waive the districts' outstanding construction charges, which at that time amounted to $1,036,950 for BID and $248,094 for MID. Reclamation also offered to drop all operation and maintenance charges for the Project features operated by the Government, including Minidoka Dam and reservoir. Power would be supplied to the project pumping and drainage plants at cost for 40 years. In outlining the proposal to Reclamation's Commissioner, the agency's Regional Director for the northwest observed that it would simplify operations and "permit the Bureau to institute a more progressive attitude toward development of the power market on and adjacent to the project."[35]

Reclamation presented its proposal to the irrigation districts in August 1944. Government officials stressed that the plan was in the water users' best interests, for competition with other, lower-priced, powerplants planned by the Federal Government within the area was certain to drive down Minidoka rates and diminish profits. Reclamation also warned that

it would soon embark on a $200,000 program to modernize the Minidoka power system, primarily by improving lines and substations. These costs would be deducted from power revenues, resulting in even lower profits, and perhaps deficits, for years. Reclamation concluded in a written statement of its offer:

> If the Districts accept the proposal, they would be left with a paid-up water right; would receive water delivered without cost into their main canals; would pay operation and maintenance costs of distribution from that point only, which costs and operations would be completely within their own control; would be guaranteed that cost of power for pumping would remain at a low level for at least 40 years; and would be freed from the hazards of increased costs related to storage works, costs of replacements of power system facilities and reduction or elimination of power profits due to competitive conditions.[36]

In essence, Reclamation was offering to purchase sole control of revenues from the powerplant from the irrigation districts for the total price of all their outstanding debts, amounting to almost $1.3 million. Departmental rulings and lengthy court proceedings had, of course, established that MID possessed only a 4.4 percent interest in the power system. This district, therefore, welcomed Reclamation's proposal, for it would receive $248,094, or approximately 20 percent, of the purchase price. BID, however, immediately objected to what it perceived as an offer that was too favorable to MID. Instead, it argued that the total purchase should be divided in proportion to the district's ownership of the power system: 95.6 percent to BID and 4.4 percent to MID. Under this plan, BID would receive approximately $1.2 million and MID only $55,000.[37]

Negotiations over the power system acquisition once again reopened old wounds over the division of profits. As one Federal official noted, "The whole affair is packed with dynamite." Following BID's suggestion would be "a real blow" to MID, for it perpetuated the division of ownership in the power system that had long been considered unjust. BID, however, opposed any plan to offer MID a greater price as another attempt to circumvent the findings of *BID v. Wilbur*.[38] To further complicate the situation, the Division of Power in the Department of the Interior, after reviewing the takeover proposal, objected that the cost was too high to be recovered through power revenues within a reasonable period. Unable to reach an agreement either within the Department or with MID and BID, Reclamation suspended negotiations in 1945.[39]

In 1948, Reclamation proceeded with its plans to modernize the Minidoka power system. In addition to erecting new transmission lines and substations, the work included securing spare runners for the six power units housed in the main Minidoka plant and installing new runners in the fifth and sixth power units. The total cost of improvements, up to 1952, amounted to more than $1.5 million, all of which was paid by commercial power revenues. Due to the construction, no profits were available for distribution to the irrigation districts in the years from 1948 to 1951. Throughout the remainder of the 1950s, however, revenues exceeded costs, and the districts enjoyed annual profits of at least $60,000.[40]

In 1959, Reclamation reopened negotiations with BID to acquire the District's rights to the power system profits. Although Reclamation planners had difficulty defining the acquisition's benefits precisely, they were convinced that "settlement of this problem once and for all would carry with it advantages to the government which are not susceptible of pricing in monetary concerns."[41] Certainly, it would give Reclamation considerably more freedom to operate the system as it saw fit, ending the constant series of meetings and negotiations with the water users on rates, repairs, operations, and profits. Perhaps above all else, Reclamation's acquisition of the power system would remove the main apple of discord on the Project.

In its proposal, Reclamation offered to continue to supply BID with power from the six units in the Minidoka plant at cost for forty years. In consideration of the District's past payments on power system features and for transferring its rights to the Government, the agency also offered BID a discount of 0.7 mills per kilowatt-hour over the same 40-year period, which at present consumption levels, amounted to a savings of approximately $1 million. When Reclamation had made its initial offer to BID in 1944, it had offered to waive all outstanding construction costs, representing at that time about $1 million. In essence, the Government was once again proffering the same proposal, although it chose to define the payment in terms of a rate discount instead of a write-off of an outstanding obligation. "The [BID] Board seems to believe," Reclamation's Regional Director observed, "that this type of proposal is one which it could explain and recommend to the water users with confidence since the terms do not cannote [sic] a 'sale' or giving up of the District's rights."

BID voters approved a contract embodying the terms of Reclamation's proposal in April 1961, and Congressional approval was secured a year later. At the time the transfer was made with BID, the Secretary of the Interior reported to Congress that the agreement allowed Reclamation "to operate the system without the present cumbersome arrangements which involve year-to-year approval by the districts. The Bureau of Reclamation and the Department can proceed with preparation of budgets, payout analyses, and power rate studies as required without speculation as to the effect of these plans upon the water users' interests."[42] With the Government's acquisition of the power rights, full integration of the Minidoka power system with other Federal power operations was quickly achieved. In the fall of 1963, the Secretary of the Interior announced that the marketing of Minidoka power had been transferred to the Bonneville Power Administration (BPA). First established to market electricity from the Bonneville Dam on the lower Columbia River, BPA became the marketing entity for Federal power in the Northwest following World War II.[43]

As part of the BPA system, Minidoka power was pooled with the output of other Federal plants for sale throughout the region. Power demands continued to increase, exceeding Federal generator capacity by the mid-1970s. In 1975, Reclamation received authorization to undertake a feasibility study to enlarge the Minidoka Powerhouse. Completed in 1981, the report recommended construction of a new 30-megawatt powerplant, to be con-

structed in the body of Minidoka Dam south of the existing plant. The new facility would be operated in conjunction with the seventh power unit, while the older power units were to be shut down.[44] Construction did not actually begin until the 1990s. The plant's sixth generator unit, installed in 1926 and shut down in 1985, was rehabilitated to produce 2.7 megawatts. The 5-megawatt unit dating from 1942 was automated, and two new 10-megawatt generator units were put into service in 1997. The five original generator units were retired in 1993-1994 after more than eight decades of service in the Minidoka Powerhouse—heart of the country's largest pump irrigation system and the pride of Reclamation's "Electric Project."

Endnotes

[1]For the rehearing request, see F.M. Goodwin to E.C. Finney, First Assistant Secretary of the Interior, 3 January 1929, RG 115, Entry 7, Box 680, File Number 201.1, NA-Washington. The text of West's reply is printed in "History of Rupert, 1923-1930," typewritten scrapbook, 392, in A.C. DeMary Collection, Rupert Public Library, Rupert, Idaho.

[2]For a summary of events leading up to the appointment of the so-called "Rothrock Committee," see "Annual Report" for BID, typewritten ms., n.d., attached to report of the Rothrock Committee, BID Office.

[3]"Commissioner's Hearing, Burley, Idaho," typewritten transcript of testimony before the Rothrock Committee, 16 September 1929, MID Office; J.H. Rothrock, C.G. Paulson, and A.W. Harrington, "Report to the Secretary of the Interior Relative to the Respective Ownership by the Minidoka Irrigation District and the Burley Irrigation District, Minidoka Project, Idaho, of Power Features and Regarding the Share of Each Division in Commercial Power Profits," 23 September 1929, BID Office.

[4]"Objection of the Burley Irrigation District to the Report of the Commission Appointed on the 16th Day of August, 1929, to Consider the Ratio of Ownership of the Minidoka and Burley Irrigation Districts of the Minidoka Irrigation Project and the Ratio of Participation of the Two Districts in the Proceeds of the Power Profits and to Report Their Findings to the Secretary of the Interior," November 1929, RG 115, Entry 7, Box 680, File Number 201.1, NA-Washington; Stephen H. Hart, Memorandum on power profit controversy, 1935, RG 115, Entry 7, Box 7559, File 320, NA-Washington.

[5]"Mutual Power Company Would Furnish North Side Projects with Energy," 25 April 1929, *Minidoka County News*.

[6]B.E. Stoutemyer to Commissioner, 14 May 1934, RG 115, Entry 7, Box 760, File Number 320, NA-Washington.

[7]To conserve the river's flow, many people urged Reclamation to build a powerplant at American Falls. The American Falls plant could be run in conjunction with the Minidoka plant, allowing the same amount of water to generate twice as much power—or to use half as much water to generate the same amount of power (W.C. Paul to John W. Hart, 8 December 1930, BID

Office). Reclamation agreed, and around 1933 began to proceed with plans to construct the long-awaited facility (S.T. Lowe to William E. Borah, 26 September 1934, BID Office; M.A. Schnurr, Acting Commissioner to Secretary of the Interior, 22 June 1934, RG 115, Entry 7, Box 760, File Number 320, NA-Washington). The Idaho Power Company opposed this plan, however, for the Government held prior rights to the water flow at the dam, and construction of a Reclamation plant would have limited the water available for Idaho Power's own facility (Elwood Mead to Secretary of the Interior, 6 February 1935, RG 115, Entry 7, Box 759, File Number 320, NA-Washington). For details of the resulting contract with Idaho Power, refer to B.E. Stoutemyer to Commissioner, 12 May 1934, RG 115, Entry 7, Box 760, File Number 320.

[8]For information in this paragraph and the next, refer to B.E. Stoutemyer to Commissioner, 14 May 1934, RG 115, Entry 7, Box 760, File Number 320, NA-Washington.

[9]S.T. Lowe to B.E. Stoutemyer, 29 August 1934, BID Office.

[10]Stephen Hart, Assistant Solicitor, Memorandum on MID contract, January 1935(?), 17, 34, RG 115, Entry 7, Box 759, File Number 320, NA-Washington.

[11]For the Secretary's decision, see the following: Elwood Mead to Secretary, 17 January 1935; T.A. Walters, First Assistant Secretary, Memorandum of meeting of 14 January 1935. The decision to pursue Stoutemyer's plan was apparently made at Stoutemyer's behest, and the Solicitor's Office remained unconverted to the cause. As one of the legal staff noted in an internal memo: "The plan in its present form is largely the work of [Reclamation's] District Counsel Stoutemyer, who has pushed it through against strong opposition in the field, in the Bureau [of Reclamation] and in the Department [of the Interior]. This is so much the case that the controversy might well be entitled 'Stoutemyer v. All persons claiming'"; see Frederick Bernays Wiener, Assistant Solicitor, Memorandum to Solicitor, 27 February 1935. All of the above-cited material is in RG 115, Entry 7, Box 759, File Number 320, NA-Washington.

[12]Elwood Mead to Secretary, 6 February 1935, RG 115, Entry 7, Box 759, File Number 320, NA-Washington.

[13]Stoutemyer to Mead, 25 May 1934, RG 115, Entry 7, Box 760, File Number 320, NA-Washington.

[14]"Findings of the Secretary of the Interior as to Net Profits from the Black Canyon and Minidoka Power Plants, Through Sales of Power on the Minidoka Project and Towns Adjacent Thereto, During the Year 1935," reprinted in "Answer" filed by BID in *BID v. Ickes*, Equity No. 61052, Supreme Court of the District of Columbia, 1936. Also see Solicitor to B.E. Stoutemyer, 31 March 1936. All of the above-cited material is contained in RG 115, Entry 7, Box 720, File Number 070, NA-Washington.

[15]The verdict is reprinted in B.E. Stoutemyer to Commissioner, 12 March 1940, RG 115, Entry 7, Box 735, File Number 223.03, NA-Washington.

[16]The facts of the controversy are sketched out in H.W. Bashor, Commissioner, to Secretary of the Interior, 24 July 1945, RG 48, Entry 864, Division of Water and Power 1941-51, Box 229, File Number 655, NA-Washington. Also see the following: S.R. Marean, Project Superintendent, to BID, 29 July 1944, BID Office; Director to Commissioner, 29 November 1944; J. Kennard Cheadle, Memorandum to the Commissioner, 28 December 1944; Acting Director to Commissioner, 5 April 1945; Thomas H. Wigglesworth, Memorandum to Mr. Wingfield, 27 April 1945. Unless otherwise

noted, all of the above-cited material is contained in RG 48, Entry 864, Division of Water and Power 1941-51, Box 228, File Number 650, NA-Washington.

[17]For more information on the CCC work at the Minidoka Project, see Demian J. Hess, Jeffrey A. Hess, and Clayton B. Fraser, "Walcott Park," Historic American Buildings Survey (HABS) Report No. ID-103, prepared by Fraserdesign and Hess, Roise and Company, 1994; and Abigail Christman and Clayton B. Fraser, "Minidoka Dam, South Side Pumping Division Lift #2 Station Operators' Housing Complex," Historic American Buildings Survey (HABS) Report No. ID-124, prepared by Hess, Roise and Company and Fraserdesign, 2002.

[18]For the Milner district's request, see "Electric Plant for North Side May Be Result," 6 April 1933, Scrapbook for 1933, 40, DeMary Collection. For the decision to proceed with the unit, and the appropriation, see the following in RG 115, Entry 7, Box 759, File 320, NA-Washington: B.E. Stoutemyer to Commissioner, 12 March 1940; Stoutemyer to Chief Engineer, 2 June 1938.

[19]John C. Page, Commissioner, telegram to B.E. Stoutemyer, 22 May 1939, RG 115, Entry 7, Box 759, File Number 320, NA-Washington.

[20]R.F. Walter to Commissioner, 2 August 1938, RG 115, Entry 7, Box 759, File Number 320, NA-Washington.

[21]The description of the seventh unit is based on the following plans prepared by the Bureau of Reclamation and held in the agency's Denver offices: "General Arrangement, Longitudinal and Transverse Sections," Plan No. 17-D-1129, 27 May 1940; "General Arrangement, Floor Plans," Plan No. 17-D-1140, 27 May 1940; "Substructure—Outline, `1' and `4' Line Walls," Plan No. 17-D-1145, 9 July 1940; "Superstructure—Outline `O' Line Wall," Plan No. 17-D-1146, 9 July 1940; "Architectural Elevations," Plan No. 17-D-1152, 9 July 1940; "Accordion Steel Door and Frame," Plan No. 17-D-1159, 7 October 1940; "Draft Tube—Concrete, Stages 2A to 2E," 21 October 1940; "Draft Tube—Concrete, Stages 2A to 2E," 21 October 1940; "Scroll Case—Outline, Floor, Stage 2G," Plan No. 17-D-1179, 21 October 1940; "Intake Structure, 11.25' x 13.67' Fixed Wheel Gate Hoist Assembly," Plan No. 17-D-1200, 11 October 1940; "Intake Structure, 11.25' x 13.67' Fixed Wheel Gate Hoist, Limit Switch and Indicator Assembly," Plan No. 17-D-1201, 11 October 1940; "Intake Structure, Excavation and Alterations," Plan No. 17-D-1210, 22 November 1940; "Intake Structure—Concrete Sections," Plan No. 17-D-1212, 22 November 1940; "Plot Plan and Drainage Layout," Plan No. 17-D-1284, 23 July 1942; "33 KV Switching Station, Electrical Installation Plan and Sections," Plan No. 17-D-1111, 16 April 1940; "Tailrace Enlargement Plan and Sections," Plan No. 17-D-1075, 8 February 1940; "35-Ton Traveling Crane, Clearance Diagram," Plan No. 17-D-1092, 1 March 1940; "Neat Lines of Intake and Scroll Case for 7000 HP. Turbine, Plan and Elevation," Plan No. 17-D-1093, 5 March 1940. Also see the following "Annual Project Histories": 1940, 47-65; 1941, 59-70.

[22]Press release, 10 January 1940, RG 115, Entry 7, Box 759, File 320, NA-Washington.

[23]Construction progress is detailed in the following "Annual Project Histories": 1940, 47-63; 1941, 59-67; 1942, 46-50.

[24]"Annual Project History," 1942, 50.

[25]B.E. Stoutemyer to Chief Engineer, 2 June 1938, RG 115, Entry 7, Box 759, File Number 320, NA-Washington.

[26]Reclamation introduced this same argument in *BID v. Ickes* to show that BID had not actually helped pay for the powerplant. The court had agreed, stating: "There was no money paid by the Burley Irrigation District to the United States on the cost of construction of the . . . Minidoka powerplant. What happened was that the Government made a profit in the power business, credited most of it to the Burley District, and by such credit wiped out the installment charges which otherwise would have been payable by the District to the United States"; quoted in Stoutemyer, Memorandum to Commissioner, 12 March 1940, RG 115, Entry 7, Box 759, File Number 320, NA-Washington.

[27]For discussions of the rate controversy, see the following: H.A. Baker, "Statement and Arguments of Applicants," Brief submitted to Secretary of the Interior, [1934?], RG 115, Entry 7, Box 736; S.T. Lowe, "Reply of Burley Irrigation District to Application of City of Rupert, et al," Brief submitted to Secretary of the Interior, [1934?], BID Office.

[28]John C. Page, Commissioner, Memorandum to Secretary, 1 April 1938, RG 115, Entry 7, General Correspondence 1930-45, Box 375, File Number 223.03, NA-Washington.

[29]For a brief discussion of the Boulder Canyon Act of 1928, see Robinson, *Water for the West*, 51. Reclamation's "policy" of developing power features to generate revenues is also discussed in Hugh A. Brown, "Hydro Power Provides Revenue for Irrigation Works," *Power* 74 (10 November 1931): 663-665. Stoutemyer described Reclamation's funding policy for power projects:

> I believe that the proper principle to be applied in cases of this kind is as follows: Where an appropriation is made out of the reclamation fund for the purpose of constructing a power plant or power unit to be used exclusively for the purpose of pumping water for irrigation purposes, then the power unit (or the part thereof devoted to such reclamation purpose) becomes, for all practical purposes, the same as a part of the irrigation system of the district subscribing for the use of the same and should be so considered and paid for in the same manner as other irrigation works; but where power is sold for commercial or industrial purposes at a price which will yield a profit, the receipts from such power business should be applied to payment for the power unit and for an equitable share of the dam which creates the power supply until such works have been paid for, and then the receipts from such commercial power sales should go into the reclamation fund to augment the fund and should not be given away to parties who assume no risk in advancing the funds used for the construction of the power plant in question.

Stoutemyer to Chief Engineer, 21 June 1938, RG 115, Entry 7, Box 759, File Number 320, NA-Washington.

[30]Although Stoutemyer did not want to charge costs to either BID or MID, he believed that the reclamation law required that some water users' group be charged part of the expense, since the appropriation had not specified otherwise. He therefore suggested contracting with the Milner Low Lift Irrigation District to repay half the cost of the unit, the remainder to be charged to power. Having Milner make the payments, Stoutemyer insisted, "would involve less complications" than negotiating with either BID and MID; see Stoutemyer to Chief Engineer, 21 June 1938. The Chief Engineer's office, however, strongly opposed this plan:

> A repayment contract should not be entered into with either, or both, the Burley or Minidoka Irrigation Districts, and to do so would make the earnings from the power plant subject to the same disposition, as is made of the profits of the units now installed. Nor do we believe that we should invite the claim by the Milner Low Lift Irrigation District to power profits from the

> additional unit by entering into a repayment contract with that district to repay the cost of construction of the unit, either in whole or in part, for in that case the reclamation fund would be assuming the risk of construction and profitable marketing of additional power made available by the new unit, and the district would claim any resulting profit.

S.A. Harper, Acting Chief Engineer, to Commissioner, 8 July 1938. Stoutemyer agreed with the Chief Engineer's office in spirit, but he made it clear that the appropriation, as it currently stood, was subject to the requirements of the general reclamation law (Stoutemyer to Commissioner, 25 July 1938). As a solution, the Chief Engineer finally suggested that a new appropriation be secured to revise the previous bill:

> All of the offices appear to be in agreement, that it would be unwise for the Reclamation fund to bear all the risk incident to the construction of the additional unit and the profitable marketing of power therefrom, and when the development is complete and it appears that the undertaking is profitable, the profit should then go to the divisions of the Minidoka project, rather than into the Reclamation Fund. . . . It is our opinion that the Appropriation Act should be amended at the time the additional $100,000, which will be required for the unit, is recommended for appropriation.

R.F. Walter, Chief Engineer to Commissioner, 9 September 1938. Walter's suggestion was carried out; see "An act making appropriations for the Department of the Interior for the fiscal year ending 30 June 1940, and for other purposes," Act of 10 May 1939, ch. 119, 53 Stat. 685, 714, reprinted in U.S. Department of the Interior, *Federal Reclamation Laws Annotated* (Washington: U.S. Government Printing Office, 1943), 569. Unless otherwise noted, all of the above-cited material is in RG 115, Entry 7, Box 759, File Number 320, NA-Washington.

[31]For the text of the 1939 Reclamation Act, see *U.S. Statutes at Large*, Vol. 53, Part 2 (Washington: U.S. Government Printing Office, 1939), 1187-1198.

[32]Federal power development during the war is touched upon in the following articles: Don Campbell, "The Pacific Northwest Power Pool," *Reclamation Era* 34 (October 1948): 190-192; Arthur Goldschmidt, "The Power Shortage," *Reclamation Era* 33 (November 1947): 231-240; Sidney D. Larson, "The Meaning of Power Utilization," *Reclamation Era* 32 (December 1946): 266-267.

[33]For Reclamation's post-war plans, see U.S. Department of the Interior, Bureau of Reclamation, "Bureau of Reclamation Program for Electric Power Development in the Western United States, Fiscal Years 1947-1952," Preliminary edition, December 1946; unpublished report, Water Resources Center Archives, University of California, Berkeley. For the importance of power developments to Reclamation, see Brown, "Hydro Power Provides Revenue for Irrigation Works"; Abe Fortas, "Relationship of Power to Reclamation," *Reclamation Era* 31 (December 1941): 305-308, 312; "The Place of Hydroelectric Power in Reclamation," *Reclamation Era* 30 (June 1940): 157-161, 165.

[34]Thomas H. Wigglesworth to Wingfield, 27 April 1945, RG 48, Entry 864, Division of Water and Power, 1941-1951, Box 228, File Number 650, NA-Washington.

[35]For a preliminary draft of plan, see Director to Commissioner, 29 July 1944, RG 48, Entry 864, Division of Water and Power, 1941-1951, Box 228, File Number 650, NA-Washington.

[36]For this quote and other information, see material attached to following letter: S.R. Marean to Denver Office, 16 November 1944, RG 48, Entry 864, Division of Water and Power, 1941-1951, Box 228, File Number 650, NA-Washington.

[37]For BID's counter offer, see S.R. Marean to Denver Office, 12 January 1945; also see Commissioner to Secretary of the Interior, 20 April 1945; aforementioned material is all contained in RG 48, Entry 864, Division of Water and Power, 1941-1951, Box 228, File Number 650, NA-Washington.

[38]Thomas H. Wigglesworth, Memorandum to Wingfield, 27 April 1945, RG 48, Entry 864, Division of Water and Power, 1941-1951, Box 228, File Number 650, NA-Washington.

[39]Objections to the plan are discussed in Thomas H. Wigglesworth, Memorandum for the Files, 23 July 1945, RG 48, Entry 864, Division of Water and Power, 1941-1951, Box 228, File Number 650, NA-Washington.

[40]The work performed during the 1950s is itemized in the following statements and correspondence, all held in BID Office: Regional Director to S.T. Lowe, 2 November 1951; "Cost of Betterment and Replacement on the Minidoka Power Plant and Distribution System, Expended from January 1, 1948, Through June 30, 1951," [1952?]; "Minidoka Project, Statement of Cost and Returns, Units 1-6 and Commercial Power Systems, as of December 31, 1952," [1953?].

[41]The quotation in this and the next paragraph is from H. T. Nelson, Regional Director to Commissioner, Bureau of Reclamation, 15 August 1960, BID Office.

[42]For acceptance by BID voters, see "Annual Project History," 1961, 255. For approval by Congress, and quote, see "Act Authorizing the Secretary of the Interior to Enter into an Amendatory Contract with the Burley Irrigation District, Idaho," House Report No. 1615, 87th Congress, 2nd Session.

[43]"Annual Project History," 1963, n.p.

[44]U.S. Department of the Interior, Water and Power Resources Service, "Minidoka Powerplant Rehabilitation and Enlargement," March 1981, Central Files, Bureau of Reclamation, Boise, Idaho.

10 SIGNIFICANCE OF MINIDOKA PROJECT

"I shall never forget my first impressions," wrote one visitor to the Minidoka d amsite in 1904, before the beginning of construction. "It was a journey of two days by team, mostly in dusty sagebrush . . . through a region devoid of human habitation. The engineer who took me on my exploring trip had a wonderful vision of the future of this vast area, but I confess . . . it was difficult for me to conjure up the picture he painted of a smiling landscape dotted with a thousand prosperous homes." A decade later, the visitor returned and found that "the desert has vanished as if by magic; the landscape is completely altered. . . . There are now wide vistas of productive farm lands, myriads of grain and hay stacks, sleek cattle, fat pigs and sheep, and 1,500 farm homes."[1]

In one version or another, this tale of transformation became the official history of the Minidoka Project. By the 1950s, Reclamation's story of the Project's origins and achievements had taken on an almost mythic quality, as though tribal elders were retelling a charmed fable of their ancestral past:

> In southern Idaho there is an irrigated oasis in the sagebrush desert called by its inhabitants the 'Magic Valley.' It has brought them the good things of life in proportions considerably above the average rural standards in these United States and, with better living, a large degree of contentment. There are in the six counties of this Magic Valley—Gooding, Lincoln, Twin Falls, Jerome, Minidoka and Cassia—some 675,000 acres of irrigated land from which the wealth of the region flows. Without the water taken from the Snake River and its tributaries, via the Minidoka project irrigation facilities, this area would still be part of the primitive Idaho plain, useful only because of the sparse forage it provides for cattle and sheep in the spring before the summer sun burns it dry.[2]

The tale was substantially true. Minidoka farmers did turn empty desert into productive fields in only a few years.[a] When Reclamation first delivered water to parts of the Gravity Unit in 1907, settlers had 14,000 acres under the plow. The cultivated area increased until, by 1917, it exceeded 100,000 acres. Every other index of settlement showed a similar ascent. From 1905 to 1919, land values rose from practically nothing to over $27 million. During the same period, population grew from only a few hundred to over 17,000. Although the number of inhabitants remained fairly stable for the next few decades, the population swelled again after World War II, partly as the result of the baby boom, and partly because of the opening of additional lands under the Minidoka Project nearby. In 1960, the total number of residents in Cassia and Minidoka counties exceeded 30,000.[3]

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[a]See HAER photos ID-16-114, 115, 117-120.

The history of the Minidoka Project, however, is more than a parade of statistics. It is more than the alteration of an ecosystem. Ultimately, it is the story of the men and women who settled the land. And for many of these people, the Minidoka Project was a bitter experience. Behind Reclamation's optimistic published accounts are literally hundreds of archival documents bearing witness, like a Greek chorus, to the profound disillusionment of project settlers. As one spokesperson for the Gravity Unit informed Reclamation's Director, F.H. Newell, in 1911, "I want you to feel, Mr. Newell, that the people here are dissatisfied; grievously dissatisfied; disappointed; dissatisfied with you; dissatisfied with your rulings; with your associates; with those who administer the law."[4] By the early 1920s, at least 75 percent of the original homesteaders had left the project.[5]

Despite laudable goals and the best of intentions, Reclamation fearfully mismanaged the construction and early administration of the project. Irrigation works were not completed on schedule, and water was not delivered as promised. Despite Government assurances that water would be turned into the north-side canals in 1907, most farmers on the Gravity Unit were left high and dry until the following year. "This crowning blunder," wrote A.P. Davis, in a confidential memo, "has well nigh demoralized the project."[6] But Reclamation's greatest breach of faith was its failure to build the pumping system simultaneously with the gravity system, as it had led the public to believe would occur. Instead, the Pumping Unit did not receive its first water until 1909, and some south-side tracts remained unwatered until 1915, when the Pumping Unit was officially declared completed. In the meantime, settlers who had sunk their savings into the land futilely attempted to dry farm the arid plains, watching their hopes wither with their crops.

Although Reclamation took refuge in legal technicalities that seemed to exonerate it from culpability, the agency's leaders in Washington and Idaho were well aware that their entire program was financially overextended and that they had made promises they could not keep. For the most part, they chose to remain silent rather than face political repercussions. Their actions helped create a climate of distrust that made it difficult for Project settlers to forgive subsequent miscalculations. The situation was scarcely improved by Reclamation's choice of D.W. Ross as the Minidoka Project's Supervising Engineer during the early construction. Even his own superiors concluded that Ross's "imperious disposition" made him totally unfit for an administrative position. As Davis ruefully noted, "I made no inquiries regarding Mr. Ross' attitude and manner toward the settlers, but the complaints of insolence and discourtesy were numerous and very bitter. From my own observation and experience I am convinced that in the main they are so well-founded as to seriously impair his usefulness in contact with settlers, contractors and the public generally."[7]

Even without these administrative problems, life on the Minidoka Project would have been difficult indeed. The land required extensive, back-breaking improvements to become productive. Sagebrush had to be grubbed out, rocks cleared, fields leveled, and ditches dug. Few of the first settlers were prepared for the task before them. As Newell

noted in the summer of 1908, "Over a thousand farmers are on the tract, many of them with no experience in irrigation. There is necessity for immediate advice here, as the sandy soils are quite difficult for successful agriculture."[8]

Reclamation's solution was to hire an agricultural educator, who opened an 85-acre "demonstration farm" in Heyburn Townsite in the spring of 1909. But the farm became a lesson in humility rather than successful agriculture. The manager's report for the first year sounded like the Book of Job: "The first seeding we did was our dry land [farming,] which come [sic] well for a time but was finally killed out by the winds." Next came the garden, which "was doing quite well until we had our hail storm in the fall."[9] The first season produced no crops; the second only a small amount of hay. The agency abandoned the farm at the end of the 1911 growing season.[10] Looking back on the effort, Reclamation's Supervising Engineer for Idaho, F.E. Weymouth observed: "In the early history of the [Minidoka] project a demonstration farm was conducted by the Reclamation Service, and, as a financial proposition, was a failure, and the settlers never lose an opportunity to point this fact out, and, as far as any practical benefits are concerned, I believe it would have been better if this demonstration farm had never been established."[11]

If professional agriculturalists found farming on the Minidoka Project daunting, it was not surprising that first-time irrigators had their problems. Crop selection was as important as method of cultivation, and since Idaho had no large cities, farmers had to look to the distant states of California, Oregon, and Washington for markets. Few products could profitably repay the cost of production and transportation. During the early years, settlers relied on grain and forage crops. Alfalfa was especially important, claiming 35 percent of the Project's acreage in 1911. Although costly to ship, alfalfa improved the land's fertility by fixing air-borne nitrogen into the soil. Beginning in the 1910s, Reclamation urged settlers to keep livestock so that these crops, through use as feed, could be converted into more valuable products. Livestock also produced manure, which further improved soil fertility. Most settlers followed this advice, adding sheep, beef, and dairy cattle to supplement their farm income.[12]

In addition to livestock, farmers raised cash crops. Cereals—primarily wheat—remained popular, generally accounting for 20 to 25 percent of available acreage. Farmers also devoted 15 to 20 percent of their land to seed plants and beans. Eventually, the most valuable crops proved to be potatoes and sugar beets. Idaho potatoes commanded high prices and could be shipped profitably throughout the country. Sugar beets, on the other hand, could be locally processed and transported in a more concentrated form. By 1930, the combined value of potatoes and sugar beets represented about half the Project's crop revenues.[13]

Figure No. 28 depicts the percentage of total farm income derived from each category of agricultural production. In 1920, for example, agricultural revenues totaled $14,183,885. Of this, 19 percent came from sales of sugar beets and potatoes; 12 percent from cereals

and beans; 31 percent from forage crops; and 37 percent from livestock. From 1930 to 1950, the percentage of income derived from forage crops declined substantially while livestock revenues rose. The change clearly reflects a trend toward greater livestock production. Income from sugar beets and potatoes also increased, primarily due to greater yields as soil fertility and farming techniques improved.

Since 1950, the relative financial importance of livestock, potatoes, and sugar beets has tended to shift from year to year. In one season, a greater percentage of income may come from livestock at the expense of potatoes and sugar beets; in other seasons, the opposite holds true. In contrast, cereals and beans have remained relatively stable throughout the history of the project. In general, livestock brings in roughly one-half of total project revenues, while potatoes and beets normally contribute one-third, and cereals and beans one-fifth to one-sixth. Miscellaneous crops, largely seeds and vegetables other than potatoes, account for any remaining fraction.

The fact that the Minidoka Project derived its income in 1987 from both livestock and crops seems to indicate a continued reliance on diversification, as recommended by Reclamation during the Project's early years. However, a close examination of the production data shows that this is not the case. Figure No. 29 depicts the percentage of farms engaged in cattle production over the history of the project. In 1930, more than 90 percent of all farms reported keeping cattle, thus following Reclamation's admonition to raise livestock in addition to cash crops. But the percentage of farms with cattle then declined, particularly between 1950 and 1964. In 1987, only 51 percent of all farms reported raising cattle. A similar pattern is apparent in the number of farms engaged in potato production. The percentage increased between 1930 and 1940, but then declined rapidly. In 1987, only 14 percent of all project farms were involved with this crop. These facts reveal that Minidoka farms have become increasingly specialized. Rather than drawing income from a diverse mix of agricultural products, farmers have chosen to focus exclusively on either cash crops or livestock, echoing a national trend in the last half of the twentieth century.

The reality of specialized commercial farms producing goods for distant markets contrasts sharply with Congress' initial goal, to be implemented through Reclamation, of establishing small, self-sufficient farmsteads. The difference underscores the fact that early proponents of Federal reclamation underestimated the expense of irrigated farming. Although the diversified, self-sufficient farm was an appealing notion to Jeffersonian idealists, such a farm simply could not return enough revenue to meet Government construction and operations payments while covering the cost of preparing the land for irrigation and building a home on the land. Early proponents of Federal reclamation had stressed that Government projects would draw lower and middle class families from the large Eastern cities, thereby reducing urbanization and its attendant social evils. The new rural settlers, it was assumed, would reaffirm America's founding agrarian values and democratic ideals. In 1907, one writer alluded to this Jeffersonian aim

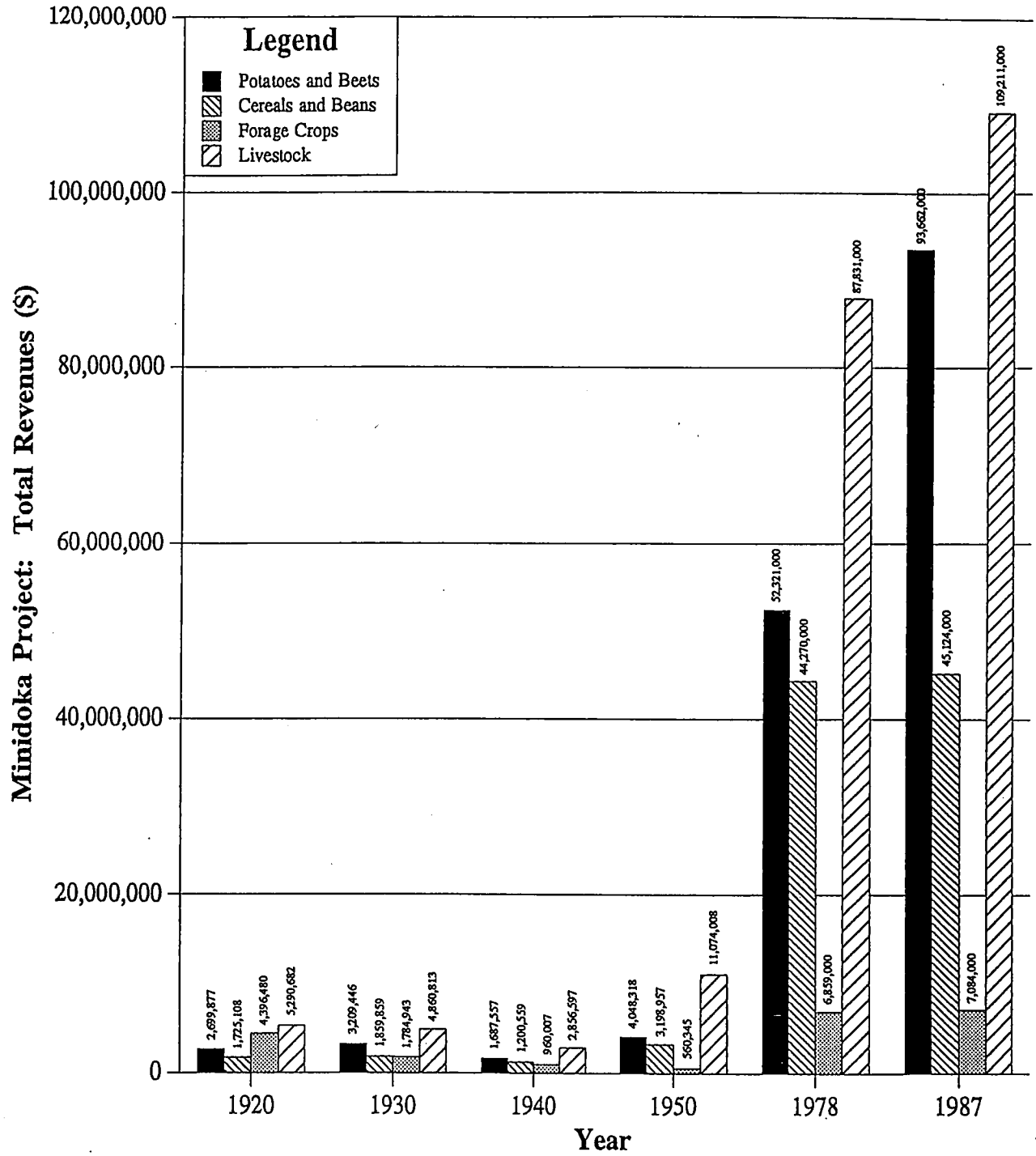

Figure 28. Agricultural revenues for Cassia and Minidoka Counties, 1920-1987. Source: U.S. Bureau of the Census.

aim when he predicted that the Reclamation Act would make the arid lands "bear abundantly the fruits of the earth at the hands of a prosperous and independent yeoman population."[14] But the hardships of the first settlers made it clear that the reclamation projects were not an outlet for the nation's urban masses or a panacea for its social problems.

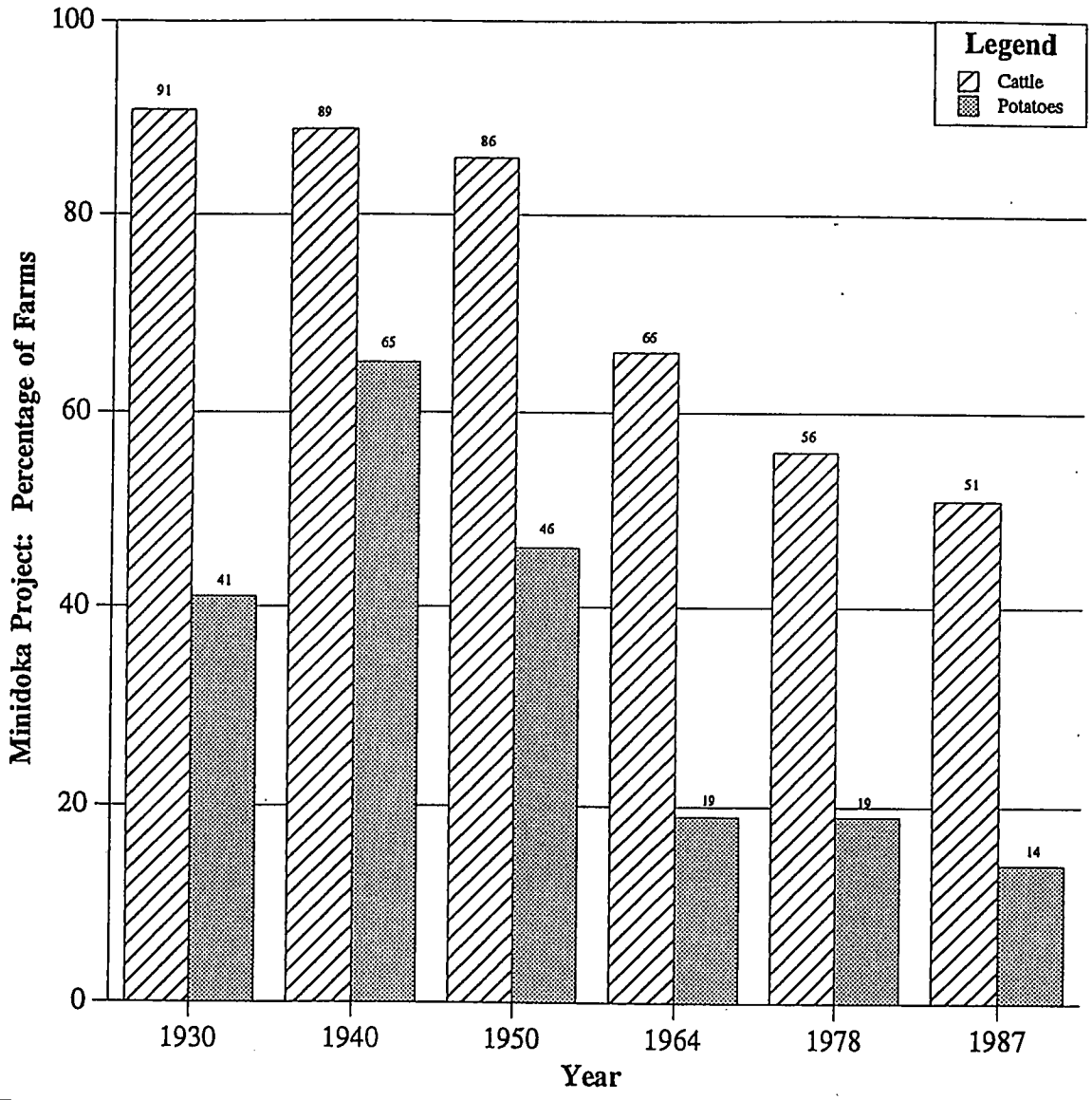

Figure 29. Cattle and potato production in Cassia and Minidoka Counties, by percentage of farms, 1920-1987. Source: U.S. Bureau of the Census.

Regardless of whether it achieved all of its proponents' high economic expectations or social goals, the Minidoka Project was an undeniably significant undertaking. As Reclamation had forecast, the Project completely transformed the landscape of southern Idaho. Where once there had been only sagebrush, farms and towns appeared. None of this development would have occurred without irrigation, as the history of a neighboring settlement readily demonstrates. Beginning in 1912, over 300 homesteaders occupied claims along the Oregon Shortline Railroad near the villages of Minidoka and Kimama, just north of the Minidoka Gravity Unit. Too far from the Snake River to receive water through irrigation, these settlers attempted to develop their lands through dry farming. Despite herculean efforts, they failed miserably. By 1932, all had moved on to greener, irrigated fields.[15]

In addition to transforming the landscape, the Minidoka Project also helped transform Reclamation itself. When Congress drafted the Reclamation Act in 1902, the agency was designed with a single avowed purpose: to provide water for irrigation. However, two of the earliest projects—Salt River in Arizona and Minidoka in Idaho—created significant amounts of hydroelectricity as a by-product. Since the agency's enabling legislation made no provision for the sale of electricity, Congress in 1906 tucked a few sentences into legislation dealing mostly with another matter in order to give Reclamation permission to lease out its power, stipulating that preference should be given to municipal purposes. According to William E. Warne, a long-time administrator of water and power issues for the Department of the Interior, the 1906 legislation was "more or less . . . an afterthought," proof that Reclamation "backed unwittingly into the power business."[16]

In its official pronouncements, Reclamation always affirmed much the same thing. At least as early as 1914 it coined the term "incidental" to characterize its commercial power policy: "Power plants . . . are operated principally for pumping water for irrigation and incidentally for other purposes, the excess power being sold for domestic or industrial uses."[17] Later writers would often interpret "incidental" to mean "insignificant." Historian Norris Hundley, for example, in his important study of Boulder Dam observed, "To be sure, power was being developed on a number of projects constructed under the Reclamation Act of 1902, but that development was small and incidental to the major purpose of the projects—irrigation."[18] According to Hundley and other historians, it was not until the Boulder Canyon Project Act of 1928 that Reclamation entered a new era of "multiple-purpose" projects in which the development and sale of power assumed equal footing with irrigation.[19] This, too, followed Reclamation's own interpretation of events. As Gilbert G. Stamm, Assistant Commissioner of Reclamation, set forth in 1964:

> It was through the Boulder Canyon Act that Congress first gave ample recognition to the desirability of including hydro-power generation as an important project purpose in its own right and as a primary tool to underwrite a project's financial success. This recognition of hydro-power as a "paying partner" has since proved to be an important adjunct of the multi-purpose resource development concept.[20]

The history of the Minidoka Project, however, indicates that the transition of Reclamation's power policy from "incidental" commercial sales to full-fledged "paying partner" was not as sharply defined as a focus on the Boulder Canyon Act might lead one to believe. From the very beginning, Reclamation officials seem to have understood the economic importance of power development for the Minidoka and Salt River Projects, and they attempted to build and operate the Minidoka Project to maximize hydroelectric output for both irrigation pumping and commercial sales. In 1907, before plans for the Minidoka Powerplant were finalized, Reclamation's Chief Engineer, A.P. Davis, argued for the immediate installation of a temporary hydroelectric unit, partly to pump irrigate some project lands that unexpectedly proved to be too high for conventional gravity irrigation, but also to protect Reclamation's future client base from private power companies. "If this small installation cannot be provided," he stated, "probably some private corporation will secure franchises for lighting the towns. . . . This will complicate the situation when the date arrives for the sale of power developments from the Minidoka dam and will result in the loss of considerable revenue to the reclamation fund and the Minidoka project."[21]

When Reclamation completed the Minidoka Powerplant in 1909, the facility contained five hydroelectric generating units capable of producing about 7,000 kilowatts under a normal head of 46 feet. Government engineers originally estimated that the irrigation pumping operation required no more than 6,100 kilowatts, leaving at least 900 kilowatts available for sale during the growing season. During the winter when the pumps shut down, the plant's entire capacity would be at the disposal of paying customers. To manage the sale of electricity, Reclamation set up a separate "Commercial Power Division" on the Minidoka Project and hired as "Power Superintendent" electrical engineer Barry E. Dibble.

As required by law, Reclamation first made the surplus power available to the Project's towns, which were guaranteed about 60 percent of the powerplant's output during the non-irrigation season. Initially, power consumption by municipal residents was far less, representing a total connected load of only about 700 kilowatts at the end of 1911, the first full year of service. To increase residential power use and to develop new commercial and industrial accounts, Dibble embarked on an energetic promotional campaign that included a complex rate schedule designed to optimize power demand. Dibble was particularly resourceful in marketing power for electric heating, which seemed a perfect wintertime load. He also encouraged project settlers to form power distribution cooperatives to reap the benefits of rural electrification. By 1920, virtually all of the powerplant's output was spoken for, and by 1926, accrued profits from power sales reached $300,000.[22]

Unfortunately, Reclamation underestimated the amount of power required for its pumping operations, and eventually it became necessary to curtail summertime commercial sales. But Dibble recognized that commercial power development could not stand still. It obeyed an internal expansionist logic that was sharply in conflict with its purported ancillary role. If Reclamation did not keep pace with consumer power demand, it would

lose its customers. As Dibble wrote to a fellow electrical engineer, "It is very hard to get persons who are not familiar with electrical work to realize how serious a thing it is to stop absolutely the growth of load in communities like these."[23] Dibble, therefore, strongly opposed Reclamation's plan to limit the expansion of the Minidoka Powerplant to only one unit, instead of adding two more units as originally planned. "This country is just beginning to develop," he argued. "One of the points that we have criticised in commercial power companies is their failure to develop their power site for the best ultimate use. In this case I believe we will be making the same mistake if we fail to plan for the 7th unit here."[24]

When funding problems stalled the construction of any addition at all, Dibble arranged for a power-swapping agreement with the state's largest utility, Idaho Power Company. Under a contract executed in 1921, Idaho Power supplied approximately 500 kilowatts to the Minidoka Project in exchange for an equal amount of power from Reclamation's hydroelectric plant on the Boise Project. The necessary transmission line was built that same year, and the Minidoka Powerplant joined the regional power grid. As part of a larger system, the Minidoka Project had new options in balancing and satisfying its competing power needs. Technologically speaking, the notion of "incidental" power had become obsolete.

At the very time that Reclamation was beginning to develop a system-wide perspective in terms of commercial power, it found its decision-making capabilities increasingly limited by purely local concerns. In 1924, as part of the Fact Finders Act, Congress gave water users the right to profits arising from the sale of power on Reclamation projects. Since the original Reclamation Act of 1902 had required water users to reimburse the Government for all irrigation works, including powerplants, it seemed only reasonable that project settlers should reap the full benefit of their investment.

Although the power provision of the Fact Finders Act seemed fairly straightforward, its implementation on the Minidoka Project proved tortuous indeed. The main problem was that the two water users' groups on the Project could not agree on an equitable division of power profits. Beginning in 1925, they spent several years in litigation trying to resolve the issue. Reclamation needed the approval of the water users for its plans to manage and expand the power system, but consensus was difficult to find in a divided house. The dispute not only disrupted the administration of the Minidoka Project, but affected settlers throughout southeastern Idaho. When Reclamation attempted to implement a system-wide water and power sharing scheme to soften the impact of drought in the Snake River Valley during the mid-1930s, its actions were challenged by one of the Minidoka combatants, fearful that the plan might undermine its own legal position in the power controversy on the Minidoka Project. In 1939, a federal court sided with Reclamation, decreeing that in this case the "irrigation necessities of the communities in the Snake River Valley" had precedence over the profits of a single irrigation district.[25]

From Reclamation's perspective, the power controversy on the Minidoka Project was perhaps the worse-case scenario resulting from the power provision of the Fact Finders Act of 1924. It demonstrated that as long as local water users controlled power profits, they would strongly influence power policy, often sacrificing regional concerns for local interests. The major innovation of the Boulder Canyon Project Act, then, was not that it introduced the "multiple-purpose" administration of water resources, which was already underway on the Minidoka Project. Rather, the law allowed Reclamation to fund completely construction of a hydroelectric project from anticipated power revenues, thereby eliminating water users from the future profits and administration of the power system.

In 1931, Reclamation pushed for a general law that would apply the Boulder Canyon funding principle to all future hydroelectric plant construction. Without rehearsing the unpleasant details, Reclamation's Commissioner Elwood Mead announced that "the experience on the earlier projects has shown that while the full commercial power possibilities of these projects should be developed, power costs and revenues should be kept separate from irrigation costs and payment." Secretary of the Interior Ickes was more pointed in his comments:

> While the hydroelectric works contemplated in this bill will be built as adjuncts to irrigation development, experience has shown that the best results will be obtained if their ownership and operation is made separate and distinct from the ownership and operation of the irrigation system. The generation and distribution of power requires different training and experience from that needed to irrigate and manage farms. To secure this distinct division the bill provides that these power plants shall remain perpetually the property of the Government, that the money to build them shall be furnished by the Government and that the income from sales or rentals of power shall be used by the Government to reimburse its outlay and in the construction of other works in the future. The rates for power will be fixed by the Government which will be in a position to give consideration to the social and economic conditions of the communities and industries this power helps to create.[26]

In 1938, Congress finally gave Reclamation the powerplant legislation it sought. Since previous contractual arrangements remained in effect, the new law had no immediate impact on the Minidoka Project, which continued to be vexed by the wrangling of the two irrigation districts over power profits. It was not until the Government bought out the power rights of both groups in the 1960s that the 40-year-old controversy was laid to rest. By that time, the Minidoka Project was a venerable institution, and its transformation of the southeast Idaho landscape a much-told tale. It is understandable if its promoters were less eager to commemorate the project's more painful contribution to the evolution of Federal power policy and multiple-purpose water resource management.

Endnotes

[1]C.J. Blanchard, "The Minidoka Project, South Side Unit," *Reclamation Record* 8 (January 1917): 23.

[2]"Six Counties in the Magic Valley," *Reclamation Era* 36 (January 1950): 16.

[3]"Data for Committee of Special Advisers on Reclamation of the Department of the Interior, Minidoka Project," 20 December 1923, BOR-Burley; Barry Dibble, "What Has Been Done on the Minidoka Project in Southern Idaho," *Reclamation Record* 11 (February 1920): 73; Susan E. Williams, "An Urban Study of Rupert, Idaho," Masters thesis, Kent State University, 1963, 43.

[4]"Presentation of Grievances of Minidoka Water Users' Association," RG 115, Entry 3, Box 632, File Number 157, NA-Washington.

[5]Field Commissioner to D.W. Davis, Commissioner, 6 August 1925, RG 115, Box 772, Cases 201, NA-Denver; John Theodore Montgomery and James Warren Barber, "An Economic Study of the History, Present Situation, and Outlook of Agriculture on the Minidoka Irrigation Project," Masters thesis, University of Idaho, Moscow, 1927, 3.

[6]A.P. Davis to F.H. Newell, 4 May 1907, RG 115, Entry 3, Box 646, File Number 250, NA-Washington.

[7]Ibid.

[8]F.H. Newell to James R. Garfield, Secretary of the Interior, 13 August 1908, RG 115, Entry 3,, Box 2, File Number 22, NA-Washington.

[9]Will J. Jones, "Report on Demonstration Farm for the Year 1909," RG 115, Entry 3, Box 1, File Number 22, NA-Washington.

[10]F.E. Weymouth to F.H. Newell, 15 January 1910; P.M. Fogg to F.H. Newell, 2 March 1911, in RG 115, Entry 3, Box 1, File Number 22, NA-Washington.

[11]F.E. Weymouth to Reclamation Commission, Washington, D.C., 22 June 1914, RG 115, Entry 3, Box 630, File Number 140, NA-Washington.

[12]On early alfalfa cultivation, see "Annual Project History," 1911, 43-44; "Data for Committee of Special Adviser," 1923. By the late 1980s, at least 40 percent of the project's acreage was still covered by alfalfa; U.S. Department of Commerce, *1987 Census of Agriculture*, vol. 1, part 12 (Washington, D.C.: Government Printing Office, 1987). Livestock raising is discussed in many sources, including: "Minidoka Farmers Get Results," *Reclamation Record* 5 (February 1914): 40; U.S. Department of Agriculture, *The Sheep Industry of the Minidoka Project*, by E.F. Rinehart (Washington, D.C.: Government Printing Office, 1917).

[13]Data on acreage and farm revenues are based on federal census data for Minidoka and Cassia counties. Until the development of underground pumping operations after World War II, almost all farming in these two counties was confined to the Minidoka Project. The following censuses, all published by the U.S. Department of Commerce, Bureau of the Census, were

examined: *14th Census, 1920*, vol. 6, pt. 3; *15th Census, 1930*, vol. 3, pt. 3; *16th Census, 1940*, vol. 1, pt. 6, vol. 2, pt. 3; *U.S. Census of Agriculture, 1950*, vol. 1, pt. 28; *U.S. Census of Agriculture, 1954*, vol. 1, pt. 28; *U.S. Census of Agriculture, 1959*, vol. 1, pt. 39; *U.S. Census of Agriculture, 1964*, vol. 1, pt. 39; *U.S. Census of Agriculture, 1969*, vol. 1, pt. 39; *1982 Census of Agriculture*, vol. 1, pt. 12; *1987 Census of Agriculture*, vol. 1, pt. 12.

[14]C.H. Forges-Lindsay, "Spending a Billion and a Half Dollars to Make a Desert Bloom," *Harper's Weekly* 51 (2 February 1907): 161.

[15]William D. Gertsch, "The Upper Snake River Project," Ph.D. Dissertation, University of Washington, 1974, 1-17; Gerhard Riedesel, *Arid Acres* (Pullman, WA: The Copy Machine, 1980).

[16]William E. Warne, *The Bureau of Reclamation* (New York: Prager Publishers, 1973), 88.

[17]*Annual Report*, 1913-1914, 34. See also "Federal Power Development Incidental to Reclamation Work," *Electrical Review and Western Electrician* 65 (7 November 1914): 915.

[18]Norris Hundley, *Water and the West* (Berkeley: University of California Press, 1975), 118.

[19]Norris Hundley, "The Politics of Reclamation: California, the Federal Government, and the Origins of the Boulder Canyon Act—A Second Look," *California Historical Quarterly* 52 (Winter 1983): 292; Linda J. Lear, "Boulder Dam: A Crossroads in Natural Resource Policy," *Journal of the West* 24 (No. 4, 1985): 82-94; Donald C. Swain, "The Bureau of Reclamation and the New Deal, 1933-1940," *Pacific Northwest Quarterly* 61 (July 1970): 137-136; Lawrence B. Lee, "100 Years of Reclamation Historiography," *Pacific Historical Review* 47 (November 1978): 543-545.

[20]Gilbert G. Stamm, "Integrated Operation of Multipurpose Reservoirs for Irrigation, Flood Control, and Other Purposes on Bureau of Reclamation Projects," paper presented at the joint Meeting of the United States National Committee of the International Commission on Irrigation and Drainage and the Irrigation and Drainage Division of the American Society of Civil Engineers, El Paso, Texas, December, 1964, 3, in Water Resources Center Archives, University of California, Berkeley.

[21]D.W. Ross and A.P. Davis to F.H. Newell, 1 May 1907, RG 115, Entry 3, Box 646, File Number 250, NA-Washington.

[22]Acting Chief Engineer to Commissioner, 19 May 1926, RG 115, Entry 7, Minidoka Project, Box 734, File Number 320, NA-Washington.

[23]Barry Dibble to James M. Gaylord, 7 August 1920, BR-Burley.

[24]Barry Dibble to F.E. Weymouth, 6 August 1918, RG 115, Entry 3, Box 634, File Number 158, NA-Washington.

[25]B.E. Stoutemyer to Commissioner, 12 March 1940, RG 115, Entry 7, Minidoka Project 1930-455, Box 735, File Number 223.03, NA-Washington.

[26]The remarks by Mead and Ickes are in U.S. Congress, House, Committee on Irrigation and Reclamation, *Distribution of Power Revenue on Federal Reclamation Projects*, 73d Congress, 2d Sess., 1934, H.R. 2002.

11 DOCUMENTATION PROJECT SUMMARY

Built during 1905-1910, the Minidoka Dam and Powerhouse created an irrigation storage reservoir and generated hydroelectricity for the Minidoka Project, a Federally sponsored irrigation venture in southeast Idaho. It was constructed by the U.S. Reclamation Service, an agency reorganized in 1923 as the U.S. Bureau of Reclamation. In 1974 Reclamation recognized the historical and technological significance of the dam and powerhouse by listing them on the National Register of Historic Places.

In 1989, prior to altering the dam's spillway, Reclamation mitigated the adverse impact of its action by recording the original spillway construction according to the standards of the Historic American Engineering Record [HAER]. Consisting of a brief historical narrative and 25 photographs, this documentation is filed at the Library of Congress under HAER No. ID-16-A. During the late 1980s, Reclamation also set in motion a program of even greater structural modification, involving the deactivation of most generators in the original powerhouse and the construction of a new hydroelectric facility a short distance west of the original power plant. To mitigate the adverse impact of these proposed actions, Reclamation commissioned a more extensive HAER documentation of the technological and historical significance of the Minidoka Project and its earliest engineering facilities.

This narrative is part of that undertaking. Its authors also have completed a similar study—which contains complementary information and photographs—of Walcott Park (HABS No. ID-103), an area immediately adjacent to the Minidoka Dam and Powerplant. The Walcott Park HABS and the Minidoka Dam, Powerplant and South Side Pump Division HAER were initiated by a contract between the Bureau of Reclamation, Pacific Northwest Region, Boise, Idaho, and Clayton Fraser of Fraserdesign, Loveland, Colorado. In addition to overall project coordination, Fraser was responsible for the preparation of photographic documentation and measured drawings. On a subcontract basis, Jeffrey A. Hess, principal, Hess, Roise and Company, Minneapolis, Minnesota, was responsible for the preparation of the historical narratives and site descriptions. Demian Hess, an historian with Hess Roise, researched and wrote the narratives under Jeffrey Hess' supervision.

In 2000, Reclamation retained Hess, Roise and Company to document the Minidoka Dam South Side Pumping Division Lift Station #2 Operators' Housing Complex for the Historic American Buildings Survey (HABS No. ID-124). As part of the project, supplemental written historic and descriptive information about the design, construction, and early operation of Pump Division facilities was incorporated into this HAER report. Additional large-

format photographs and sketch drawings were also prepared. Charlene K. Roise, a principal of Hess Roise, served as the principal investigator for the project and worked on report editing and production. Abigail Christman, an historian with Hess Roise, drafted the additional narrative, which was reviewed by Jeffrey Hess. Clayton Fraser of Fraserdesign completed the additional photography and drawings as a subcontractor to Hess Roise. Lynne MacDonald, Archeologist, Pacific Northwest Region, has served as contract administrator for Reclamation for these projects.

The authors owe a tremendous debt to the board of directors of the Burley Irrigation District and the Minidoka Irrigation District, who made their organization's archives available for extended research. The authors also take great pleasure in acknowledging the courtesy and assistance of the following individuals who, in a variety of ways, helped make this study possible: Randy Bingham, Water Manager, Burley Irrigation District; Cheryl Davis, Archivist, Denver Office, Bureau of Reclamation; Joan Falkner, Director, and Barbara Kelly, Librarian, Rupert Public Library; Mary Francis, Archivist, National Archives, Washington, D.C.; Hugh Lovin, Professor of History, Boise State University; and Ruth DeThomas, Curator, Minidoka County Historical Society.

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