War in the Heartland: The St. Paul District

by John O. Anfinson

No Corps of Engineers district lay farther from the battlefields of World War II than the St. Paul District. Still, this district contributed to the country's war effort. Shifting from civilian to military projects, the district helped build ammunition plants, airport runways, and small assault boats. It provided navigable channels on the Mississippi and Minnesota rivers, relieving overburdened railroads and allowing for the transport of essential commodities.

One of the St. Paul District's most important contributions was the construction of a small arms ammunition plant. In response to Germany's invasion of Denmark, Norway, the Low Countries, and France in the spring of 1940, President Franklin D. Roosevelt sought to increase the size of the country's Army and its production of munitions. Consequently, the Army initiated a wave of ammunition plant construction. During the winter of 1940–41, as the Allies' situation became more desperate and the threat to America increased, rearmament became more critical. The need to supply the Allies with ammunition became paramount, and President Roosevelt called for the United States to become the "Arsenal of Democracy." Congress supported this call with the Lend–Lease Act of 1941. This act led to a second wave of munitions plant construction. The Army located one of the new plants, called the Twin City Ordnance Plant (now known as the Twin Cities Army Ammunition Plant), near New Brighton, Minnesota, a northern suburb of St. Paul. It planned to make this plant "one of the world's largest suppliers of .30-caliber and .50-caliber shells."

Initially, the Army assigned plant construction to the Quartermaster Corps and plant management to its Ordnance Department. A prime contractor was to superintend plant design and operation. On 14 July 1941, the Army signed a contract with the Federal Cartridge Corporation as the prime

contractor. The corporation was to subcontract for the design and engineering of the plant and its equipment and construction with subcontractors chosen by the Quartermaster General.

Before choosing Federal Cartridge, the Army had begun planning for the project and had examined a number of sites for the plant, preliminarily selecting one site. The Quartermaster Corps, in charge of military construction at this time, assigned Lieutenant Colonel Joe S. Underwood command of the plant's construction. Arriving on 17 July 1941, Colonel Underwood agreed that the site selected—a 2,425-acre site 8 miles north of the Twin Cities—would be best. Farmers, proprietors and residents who lived on the site had to leave by 4 August.

On 15 August 1941, the subcontractors moved equipment to the grounds and began building temporary buildings. Thirteen days later, the Army held a ground breaking ceremony with Major General Eugene Reybold, Chief of Engineers, Minnesota Governor Harold Stassen, and Representative Melvin Maas the principal speakers. "Across the two ocean-highways to our shores comes the lightning flash of war to arouse us from our double decade of delusion," said the Chief, emphasizing the urgency and importance of the ammunition plant. Based on the record of construction at other plants, he estimated that the Army would not receive ammunition from the Twin Cities plant until September 1942.

A large work force soon invaded the area. By 1 October, construction occupied 4,676 workers, and two months later, 11,102 workers, laboring six days per week, 24 hours per day, swarmed over the plant site. By the end of December, the number of construction workers peaked at 11,224.

The Japanese attack on Pearl Harbor on 7 December changed operations at the ammunition plant. The purpose and urgency of the workers' tasks assumed new meaning. An ordnance plant narrative observed that the attack "transformed. . .[the plant's] identity overnight into a vital war industry." The next day construction work on the plant went to seven days per week, 24 hours per day. On 15 December, the Army transferred the Quartermaster Corps construction director, Captain Lynn C. Barnes (who had replaced Colonel Underwood on 2 November), his staff, and the construction

Major Lynn C. Barnes (far right) inspects work at the Twin Cities Ordnance Plant.

mission at the plant to the St. Paul District of the Corps of Engineers. Captain Barnes became the area engineer.

When the St. Paul District took over construction, nearly all the principal buildings had been enclosed. But work on the plant was far from complete. Under the district's supervision, workers finished the first permanent structure, the administration building, on 31 January 1942, and the Ordnance Department headquarters and plant management staffs moved into the building.

With America's entrance into the war, the Army decided to double the plant's production capacity by constructing two additional .30-caliber buildings, one .50-caliber building, and the structures necessary to support this increased production. Unlike the brick, steel and concrete buildings of Plant I, the new plant, known as Plant II, had to be constructed on a "critical material and bare necessities" basis. This meant that the Corps constructed most buildings of wood. Construction on this phase began on 10 June 1942.

By the summer of 1942, the Army had determined that it needed more .50-caliber incendiary ammunition and had

decided to add to the plant another building with a capacity to produce 750,000 rounds per day. The new production building required the design and construction of 15 support buildings. This phase of construction became known as the Plant II Expansion. On 30 December 1942, Congress authorized the construction of additional buildings for the expansion of Plant II. The addition of Plant II, Plant II Expansion, and changes in ammunition design required adding to and remodeling some buildings in Plant I.

Despite the new work and modifications required, nearly all the major construction work had been completed by 15 January 1943. The St. Paul District, however, continued to oversee the construction of new buildings and building modifications until the end of the war. In 16 months the Army had constructed 323 buildings, a l-million-gallon water reservoir, and one water treatment plant of 300,000 gallons per hour capacity (reducing water hardness to zero); had laid 21.7 miles of bituminous surfaced roads, 9.8 miles of bituminous surfaced walkways, 15.6 miles of railroad tracks,

Brick laying at the Twin Cities Ordnance Plant.
(St. Paul Pioneer Press, *26 October 1941)*

31.3 miles of sewer line (sanitary and storm), 21.4 miles of water distribution lines, 14.1 miles of gas mains, and 16.8 miles of steam distribution lines; and had strung 28.9 miles of electrical wires and 11.1 miles of telephone lines. Construction costs (including design engineering, inspection and installation of production equipment) equaled $43,409,923, and production equipment costs came to $27,230,730.

According to Lieutenant Colonel John H. Hinrichs, the plant's commander, the "construction time and the time it took to get into production is recognized by the Army as a record." Well ahead of General Reybold's prediction, the production of .30-caliber shells started on 5 February 1942, and on 9 March the Ordnance Department accepted the first .50-caliber shell produced at the plant. On 31 March, the Ordnance Department loaded 48,000 rounds of .30-caliber shells onto waiting trucks, which hauled them to the Northwest terminal in Minneapolis for shipping by rail to the Milan Ordnance Depot at Wolf Creek, Tennessee. In its first ten months, the plant produced 684,536,400 rounds of ammunition. In August alone, the Ordnance Department accepted 119,367,900 cartridges, and in December 128,809,600 rounds. In constructing the Twin Cities Ordnance Plant, the St. Paul District made a quick and significant contribution to the Allied war effort.

The district also contributed to the nation's war effort by building hundreds of small wooden vessels for the crossing of the Roer River for the invasion of Germany. When, in February 1944, the Army asked the St. Paul District if it could build hundreds of small assault boats, the district engineer responded within half an hour that it could, "if Washington would guarantee the supply of waterproof plywood." Each boat was to be 16 feet long and carry eight soldiers.

Franklin Ryder, a district retiree, recalls that a local boatworks built the boats under contract. The project, he said, was hush–hush—one did not talk about the boatworks in the office. The district loaded the boats on trucks (under armed guard) and took them directly to Wold Chamberlain Airfield in Minneapolis and loaded them onto planes. After leaving Minneapolis, the planes refueled at Gander, Newfoundland,

and continued on to Europe. The Army used the boats "with limited effectiveness" to cross the Roer River in February 1945.

The St. Paul District also supported the war effort in an unexpected way. In 1943, the Cargill Corporation received two Defense Department contracts to build 18 ocean-going tankers at their shipyard, 13 miles up the Minnesota River at Savage. The tankers measured 315 feet in length. Congress, however, had authorized only a 4-foot channel for the Minnesota River. On 27 March 1942 local interests requested the Corps to extend the 9-foot channel to the Cargill shipyard and dredge a launching basin there. On 17 April, the Secretary of War, under authority of Section 4 of the Rivers

American Oil and Gas tanker built at Cargill Corporation on the Minnesota River. (Frank Ryder)

and Harbors Act of 4 March 1915, and with an initial contribution of $60,000 from the local interests, approved the request. The district began dredging on 3 August 1942, and the first tanker started downriver to New Orleans on 6 November 1943. In addition, in 1942 a St. Paul boatworks built a 110-foot sub-chaser that sailed the river to New Orleans. These ships were among the nearly 1,000 vessels built on the nation's inland waterways for the Navy and Coast Guard.

Another Corps project allowed the United States to move these ships on the Upper Mississippi River. Between 1933

and 1940, the St. Paul District, with the Rock Island and St. Louis Districts, constructed 23 locks and dams from above Red Wing, Minnesota, to near St. Louis, Missouri, and modified three existing locks and dams. These structures, comprising the Upper Mississippi River 9-foot channel project, established a deep-draft channel from Minneapolis to St. Louis. Some advocates of the project had claimed that it was necessary to national security. They warned that the nation's coasts might not be safe during another war and that shipping on the inland waterways would become essential. They did not know how quickly their argument and the Corps' project would be tested.

Traffic on the Upper Mississippi River had declined throughout the early 20th century and had nearly died in the mid-1920s. It climbed slowly during the 1930s as the Corps finished the 9-foot channel project. Tonnage grew from 1.7 million tons hauled in 1933, when construction began, to 2.6 million tons in 1938, when the St. Paul District completed its segment of the project, and to 3.5 million tons in 1940.

With the completion of the 9-foot channel project on the Upper Mississippi River, the St. Paul District and the waterway shipping industry confidently approached their roles in meeting the transportation demands created by World War II. Some transportation observers saw indications of a transportation boom even before the United States entered the war. In September 1941, the *Upper Mississippi River Bulletin* reported that the war in Europe was increasing waterways shipping in the United States. While railroads handled most of the new tonnage, displaced shippers began turning to the waterways.

River traffic increased slowly, however, and no boom occurred until after the United States entered the war. Even then, the Mississippi River did not receive all the business shippers had hoped for. In March 1943, *Business Week* reported that, while rivermen had been waiting for a surge in demand, railroads had been meeting all the war emergencies.

Several factors accounted for the river's slow start. During the war, especially in its early years, speed outweighed cost. Consequently, most war-related manufactures traveled by rail. As many industries shifted to war-related production,

commercial production declined, and the commodities available for shipping on waterways decreased. *Business Week* warned that as long as nonwar production declined, shipping on inland rivers also would fall. The loss of experienced waterways laborers to the war effort also hindered inland waterways shipping. By March 1943, the labor shortage had become so severe that the War Manpower Commission reminded draft boards to give occupational deferments to inland waterways workers. The great quantity of goods handled by barges occasionally limited their use, also. Some plants lacked storage facilities for barge-load quantities. In addition, many key war production facilities were located away from waterways, and cargoes had to be transferred to trains or trucks for delivery to the plants. As the government counted goods in transit as inventory, the large quantities tied up in slow-moving barges created other problems for manufacturers. River cities reported that, as wartime control of essential commodities became more stringent, some companies paid the higher rates of rail shipment "to hold down total inventories and boost working inventories." Despite these problems, traffic on the upper river increased during the war.

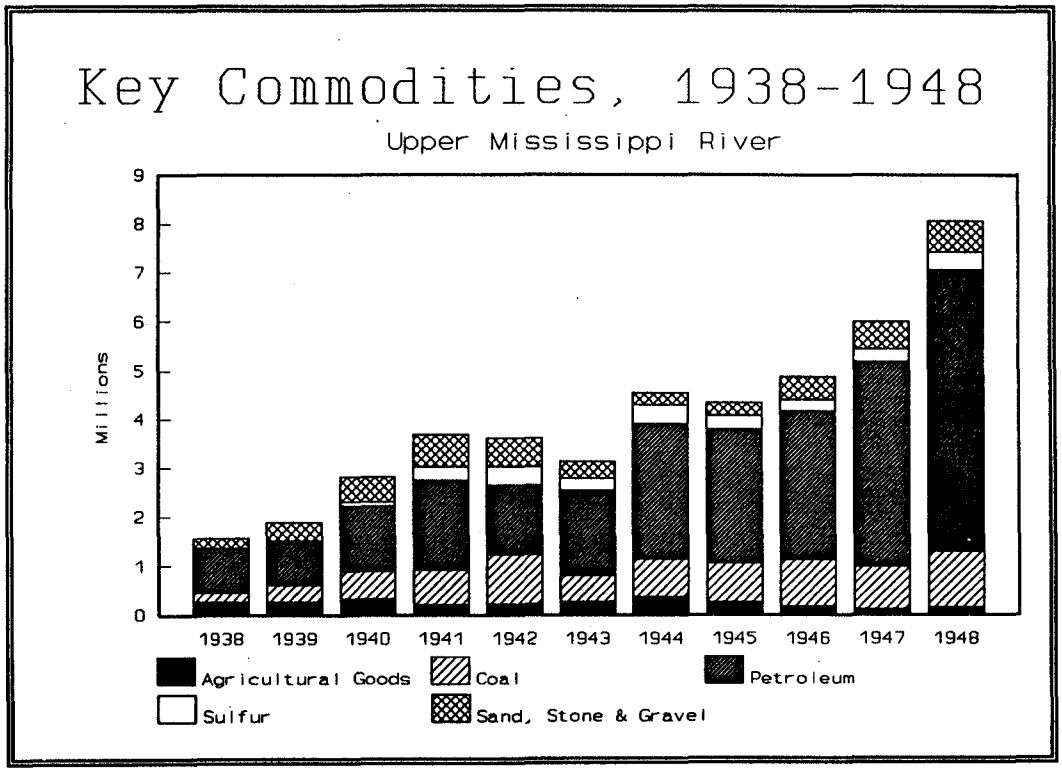
German submarine attacks on shipping off the East and Gulf coasts during the first seven months of 1942 boosted waterways transportation. With no more than a dozen submarines, the Germans attacked 285 ships off the East and Gulf coasts, sinking 248 and damaging 32. Five ships escaped. In March alone, the Germans sank 28 ships, totaling 159,340 tons, off the East Coast and another 15 ships, of 92,321 tons, in the Gulf and Caribbean. Tankers comprised over one-half of the ships sunk in this month. The Germans had recognized that they could cripple the Navy's Atlantic fleet and disrupt American civilian life by cutting off oil shipments to the East Coast, and they successfully did so.

As ocean-going tankers from the Gulf of Mexico, Venezuela, and the Dutch West Indies provided most of the fuel oil and gasoline for the East Coast, the German submarine campaign caused an acute shortage of these commodities. To supply the East, the United States turned to railroads and inland waterways. While railroads hauled the majority of the petroleum, waterways made a vital contribution. The Lower Mississippi River and its eastward-branching tributaries

directly benefitted from shortages along the Atlantic seaboard. The Upper Mississippi River indirectly profited; as the oil shortage demanded more railroad cars, more oil and other goods had to be shipped by water to the Upper Midwest.

For this reason, oil and oil products (fuel oil, kerosene, and gasoline) became even more important to shipping on the Upper Mississippi River than they had been before the war. Comprising from 35 to 40 percent of the upper river traffic, petroleum products grew to nearly 60 percent by the end of the war. By the end of 1943, approximately 90 percent of the fuel oil for the Twin Cities arrived in barges. Most of it came from the Wood River Refineries across from St. Louis, and the remainder from refineries in southern Louisiana. The Twin Cities used some 110 million gallons of fuel oil each year. In addition, about 25 to 30 percent of its gasoline arrived in river barges.

River boosters argued that oil shipping on the waterways made a great contribution to the war effort. It kept industrial plants operating on the East Coast and in the Midwest, it kept combat training planes flying, and it kept people from



Mississippi River key commodities, 1938–1948.
(Annual Reports, Chief of Engineers, 1939–1949)

freezing. The German submarine campaign had justified the river boosters' argument about the importance of inland waterways transportation to national security.

German submarine attacks on eastern seaboard shipping also affected the transportation of sulfur and coal. Sulfur was a key element in the production of munitions, wood pulp, and rubber. As the East Coast took rail cars that could have been used for shipping sulfur to the upper Midwest, sulfur movement on barges increased. Before 1941, barges moved under 100,000 tons of sulfur annually on the upper river. Between 1942 and 1945, however, they carried 200,000 to 300,000 tons, all upbound. Coal movement increased dramatically on the Upper Mississippi River during the first year of the war, declined as dramatically the next year, and then rose again during the last two years of the war. By 1943, barges delivered about 600,000 tons of coal—used mostly by power companies—to the Twin Cities.

While the war increased world demand for American agricultural production, some upper river observers complained it also closed export markets and created a shortage of ocean-going vessels. Both problems, they charged, limited grain shipping. Although agricultural products were among the most important goods shipped downstream before and during the war, agricultural producers had not yet turned to the river as a major alternate to railroads. Given world demand, agricultural shippers used the rail system even more exclusively during the war.

While Americans produced much more corn than wheat, they exported only 20 percent of the corn compared to about 75 percent of the wheat. Still, corn led agricultural commodities shipped on the upper river, accounting for over 70 percent of all agricultural products in the years immediately before the war. Corn shipping, however, declined steadily before and during the war. In contrast, shipments of wheat, oats, barley, rye, and soybeans generally increased in the years before the war and continued to rise during it. In 1944, grain exports from New Orleans tripled over the previous three years, demonstrating a recovery in the movement of agricultural goods on the river.

The war caused or furthered many important changes in shipping on the upper river. Sand, stone, and gravel

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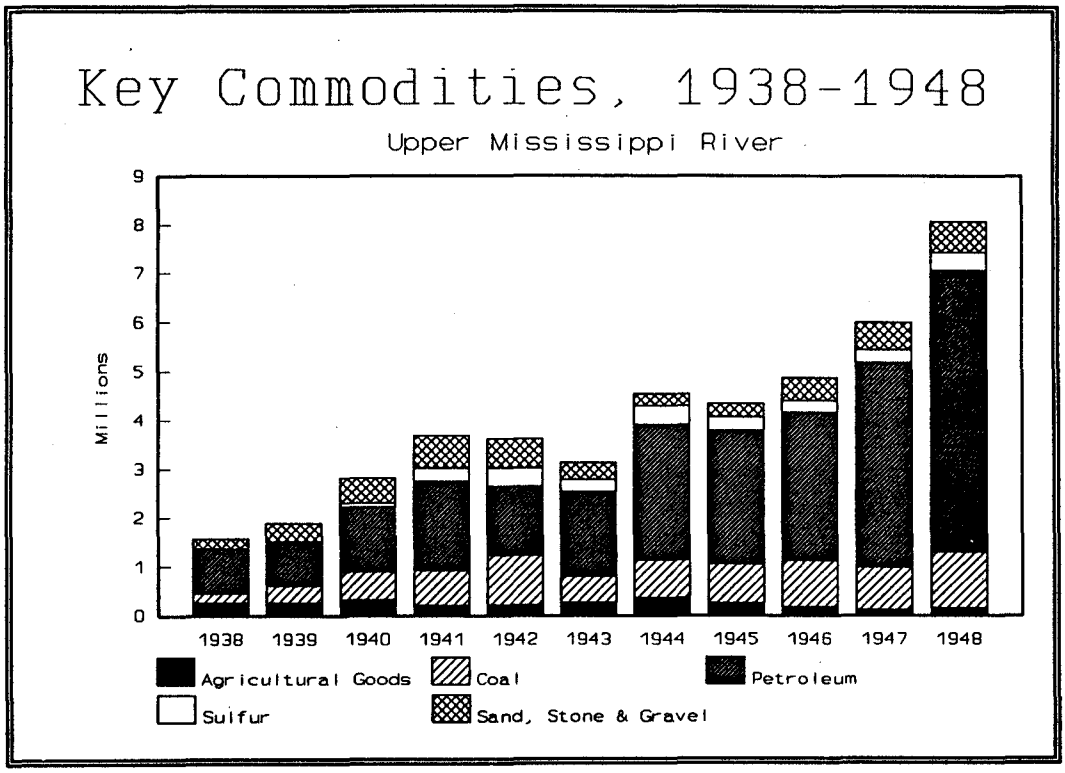

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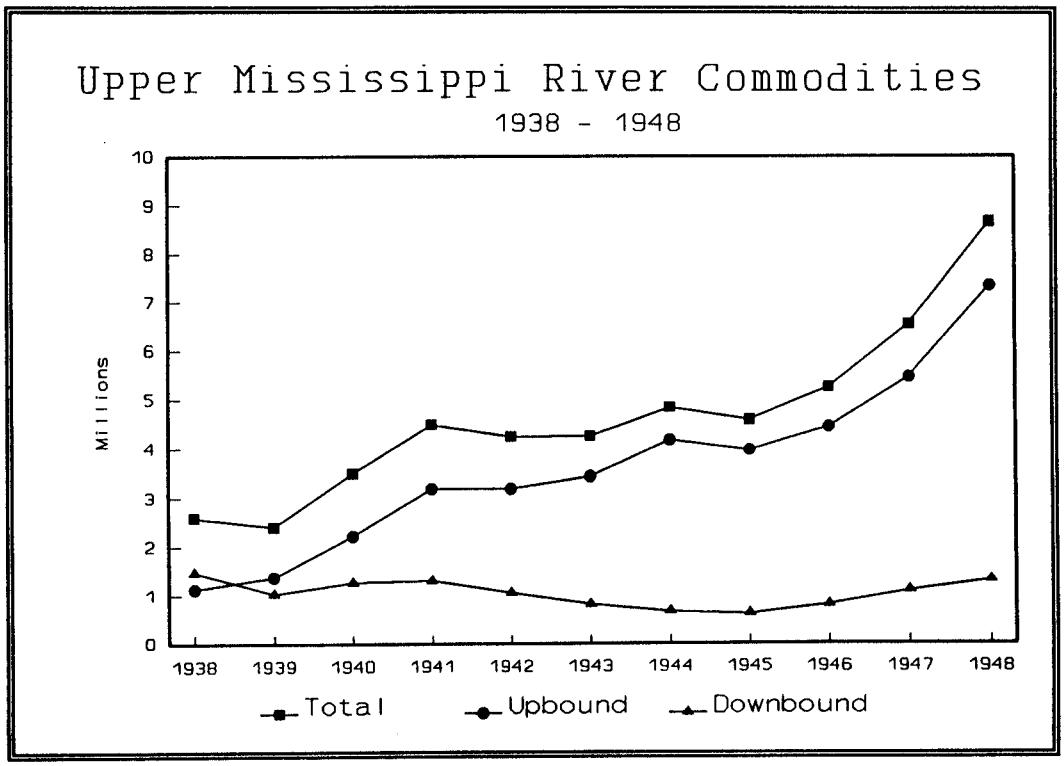
shipments declined markedly during the war and rebounded soon after it ended. Shipments of iron and steel (ore and manufactured products) also declined during the war and rose again once it was over. Iron and steel commodities—raw as well as finished—had been essential to the war and moved by rail rather than on the slower barges. While oil products had been important downbound commodities before the war, the war curtailed their movement in this direction. Nevertheless, they remained among the most important products shipped down the river.

One change often cited by river watchers was the increasing imbalance of traffic going upstream versus downstream—"the river man's bogey," as one writer called it. On the Upper Mississippi River, downbound and upbound traffic were about equal during most of the 1930s. After 1938, however, downbound traffic declined and did not begin increasing again until the war ended. Upbound traffic surpassed downbound shipping in 1939 and increased steadily thereafter, dipping slightly as the war drew to a close in 1945. Three commodities accounted for the great increase in upbound traffic:



Upper Mississippi River commodities, 1938–1948.
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petroleum, coal, and sulfur. Together, these commodities comprised 78 to 91 percent of upstream traffic. Oil alone represented 35 percent in 1942 and had reached nearly 65 percent by the end of the war.

Other factors besides the war increased upbound traffic. The availability of the 9-foot channel encouraged oil and coal shippers to use the river before the war started. Oil companies had been exploring the establishment of terminals in the Twin Cities since 1937. Yet, the war hastened the use of the river by oil companies and other shippers of bulk commodities. The scarcity and expense of rail transportation forced these shippers to use the river with less of a trial than they may have wanted.

While German submarine activity diverted oil and other goods to the nation's inland waterways, the war limited shipping expansion on those waterways. Not only did the Midwest relinquish oil barges for use in the East, but it gave up dry cargo steel barges for conversion to oil barges. During 1942, barge operators sacrificed 116 steel barges for conversion to oil carriers. Steel shortages prevented shippers from building replacement barges. During America's first year in the war, barge operators on the Ohio and Mississippi rivers reported that traffic demands would exceed capacity by over 1 million tons.

Late in 1942, the War Production Board authorized $50 million for construction of barges and tugboats. While the new boats were for use on the lower river and coastal waterways, the board expected that their operation on these waterways would reduce stress on the upper river's fleet and release railroad tank cars to the Midwest. Minnesota Senator Henrik Shipstead hoped that the new barges would relieve the Eastern crisis "enough to eliminate the danger of arbitrary removal of upper river transport equipment, which Minnesota needs to maintain its own supplies of fuel," and prevent an oil shortage in Minnesota during the winter of 1943.

The Upper Mississippi River's 9-foot channel project allowed the Midwest and the St. Paul District to make a greater contribution to the war effort than they could have made without it. It provided the channel depth required to float ocean-going ships to New Orleans. It enabled the

Midwest to ship out and receive essential commodities such as grain, oil, sulfur, and coal, and eased railroad congestion. It proved its value to the nation's security. Few Corps projects receive such strenuous testing so soon after construction, and few projects so quickly justify their existence.

Sources for Further Reading

Raymond Merritt, *Creativity, Conflict & Controversy: A History of the St. Paul District, U.S. Army Corps of Engineers,* (Washington: U.S. Government Printing Office, 1979), is the best source for general information about the district's missions during the war.

To understand the role of the Mississippi River during World War II, readers should go to *The Waterways Journal* and the *Upper Mississippi River Bulletin.*

Other publications such as *Fortune Magazine* and *Business Week* offer good insights on the river's contribution to the national economy.

For good accounts of how the German submarine campaign off the American coast during the war's early years affected coastal and inland waterways shipping, see Captain S. W. Roskill, *The War at Sea, 1939–1945,* (London: Her Majesty's Stationary Office, 1956), and Homer H. Hickman, *Torpedo Junction: U-Boat War off America's East Coast, 1942,* (Annapolis, Maryland: Naval Institute Press, 1989).

Joseph R. Rose, *Wartime Transportation,* (New York: Thomas Y. Crowell Company, 1953), provides an excellent account of wartime shipping in the United States.

No substantive secondary accounts of the Twin Cities Ammunition Plant have been written. Those interested in this subject must consult the primary records held by the plant.