



Jacob H. Douma

JACOB HENRICK DOUMA

1912–2004

Elected in 1971

*“For contributions, as a hydraulic engineer and consultant,
to federal and private practice here and abroad.”*

BY MARTIN REUSS
SUBMITTED BY THE NAE HOME SECRETARY

AFTER 34 YEARS of distinguished government service, mostly with the U.S. Army Corps of Engineers, Jacob (Jake) H. Douma emerged as one of the preeminent hydraulic engineers in the world. He was chief of the Hydraulic Design Branch in the Corps of Engineers from 1961 to 1975 and then became chief of the combined Hydraulic and Hydrology Branch, a position he held until his retirement in 1979.

Douma made many contributions that improved and made more cost-efficient the federal water projects that now dot—and helped shape—the American landscape. He was influential in designing flood-control channels, dams, locks, navigation channels, and other water-control structures. He also encouraged the use of computer modeling and helped write numerous technical manuals that have become standard references. For many years after he retired from government service, he was a consultant on projects around the world. He died on October 4, 2004, at the age of 92.

Jake was born in Hanford, California, south of Fresno, on May 30, 1912, the son of Dutch immigrants. Jake grew up in California's "Inland Empire," where he irrigated alfalfa fields during his summer vacations. This backbreaking work involved periodically digging ditches to ensure that water ran to the right portion of the field. Determined to find a better way, Jake read about the Bureau of Reclamation's contributions to irrigation and decided to pursue engineering in college.

At the University of California, Berkeley, he excelled in his studies, was tapped for Tau Beta Pi, the Engineering Honor Society, and became president of the Berkeley chapter in the fall of his senior year. His principal mentors at Berkeley were Morrrough O'Brien and Bernard Etchevary, his favorite professor, whose practical, project-oriented approach he found particularly appealing. In 1935, after five years of study, he graduated, *cum laude*, with a B.S. in civil engineering and a focus on hydraulics and irrigation.

Jake applied for a job working on dams and irrigation projects for the Tennessee Valley Authority (TVA) and the Army Corps of Engineers Waterways Experiment Station (WES), a newly established hydraulic laboratory at Vicksburg, Mississippi. WES offered five dollars more a month than TVA, so he ended up in Vicksburg, where he learned that recent changes in pay scales would raise his monthly paycheck another 15 dollars—to \$120. His first job was reading water gauges on a three-dimensional model of the lower 600 miles of the Mississippi River. He later became a research assistant working on model studies of Conchas Dam, a flood-control dam on the Canadian River in New Mexico.

He later accepted a job at the Bureau of Reclamation working on irrigation and hydropower studies in the Project Investigations Branch in Denver. However, he was soon bored with the work, which involved routine tabulation of rainfall and runoff records. He was more interested in the bureau's model studies of dams, canals, and various irrigation systems, and he eventually obtained work in the bureau's laboratory in Denver, where he helped develop model studies for Lahontan Dam in Nevada and the Boulder (Hoover) Dam tunnel spillway. While in

Denver, he also completed graduate courses in hydraulics and soil mechanics at Colorado State University.

Anxious to return to California and promised more pay, Jake took a job in the Los Angeles District of the Corps of Engineers in 1939. Almost immediately, he was loaned out to the Nashville District to assist in the design of Wolf Creek Dam in Tennessee, which was similar to Conchas Dam. After three months, he returned to Los Angeles, where he worked in the hydraulic design section. After about a year he became section chief and oversaw the design of numerous debris and flood-control dams and channels, including the San Gabriel River channel and Prado Dam.

One of his most important innovations was the application of high-speed highway design to high-velocity flood-control channels to create spiral transitions between straight sections and curves like the ones in professional race tracks or toboggan runs. The design was first used in a water project in the Tujunga Wash Flood Channel.

In December 1946, Jake moved to the Office of the Chief of Engineers in Washington, D.C., where he spent the rest of his government career. His main task was to review hydraulic-design reports prepared in Corps subordinate offices. He also worked in the Structural Branch of the Civil Works Directorate, where he raised the Corps' awareness of the consequences of poorly designed concrete structures susceptible to cavitation erosion resulting from high-velocity flows. He participated in the model testing of many major dams, including Oahe, Fort Randall, and Garrison on the Missouri River; McNary on the Columbia River; and several locks and dams on the Ohio River. He also led efforts to develop design-criteria charts and manuals, many of which were soon in widespread use beyond the Corps of Engineers.

In 1961, Jake became chief of the Hydraulic Design Branch in the Engineering Division of the Corps of Engineers Headquarters. In 1975, he became chief of the new combined Hydraulics Design and Hydrology Branch. He was also representative of the Chief of Engineers on the Committee on Tidal Hydraulics, which he helped establish in 1947, and the

Committee on Channel Stabilization, which he proposed in 1965 and chaired until his retirement in 1979. He was also instrumental in developing a proposal for the Dredged Material Research Program (DMRP), which Congress authorized in 1970, to answer numerous questions about the impact of dredging on the environment.

Jake's expertise was recognized in his appointment as consultant on a large number of national and international water projects, including Guayaquil Harbor (Ecuador), Mactaquac Dam (Canada), Gull Island Dam (Canada), Tarbela Dam (Pakistan), and Reza Shah Kabir Dam (Iran). After retirement, he was consultant on Pardee Dam (California), Rafferty Dam (Canada), Susitna Dam (Alaska), and Horse Mesa Dam (Arizona). He was the author of 27 papers on multipurpose dams and flood-control channels and a contributor to *Handbook of Applied Hydraulics*, edited by V. Calvin Davis and K. Sorenson (1969) and a National Research Council report, *Safety of Existing Dams: Evaluation and Improvement* (1983).

Jake served on the U.S. Committees of the International Commission on Large Dams and the International Commission on Irrigation, Drainage, and Flood Control, as well as the Committee on Gates and Valves for Dams of the International Association for Hydraulic Research. He was a life member of the American Society of Civil Engineering and was elected a member of the National Academy of Engineering in 1971. In 1982 the Corps of Engineers named him to its Gallery of Distinguished Civilian Employees.

Jake's wife of 63 years, Allene Vartia Douma, died in 2002. He is survived by his sons, Allen Douma of Ashland, Oregon, and Mark Douma, and grandson, Jacob Mark Douma, both of Great Falls, Virginia.

His son remembers that his father really was born in a tarpaper shack by the side of the road. On a trip back to Hanford in 1998, he could point out the spot, but of course it wasn't there. At Berkeley, he earned money by being a waiter in a college girls boarding school. His parents spoke Dutch at home, so he had to take "bonehead" English to improve his proficiency. He got a "C" in railroad engineering, but otherwise did well. His

future wife was a spectator at a Bureau of Reclamation intramural basketball game in Denver. After moving to Washington, they bought land in Virginia to build a house, but only after checking the soil fertility. The land included a stream which provided irrigation water. The house was their own design, and he was the architect while she was the prime contractor. While his family lived in the basement of the unfinished house, he went to India for a conference on large dams, the first of many worldwide. He calculated that he covered 1.5 million miles in his travels. He never learned how to type, but eventually learned to write well.