BRIEF OVERVIEW

Career of Brigadier General Herbert D. Vogel, D.Eng., P.E., NAE

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“Vog” wins appointment to West Point in 1920

- Herbert D. Vogel grew up in Chelsea, Michigan, where his father was a pharmacist.
- He attended the University of Michigan for two years as an engineering student, briefly serving in the ROTC unit in 1918-19.
- He enrolled as a Plebe at West Point in August 1920, majoring in civil and military engineering.
- His undergraduate nick-name was “Hash,” short for “Hashimoito,” or “Amos,” because he was so quiet and studious.
In those days West Point granted diplomas, not accredited degrees in engineering.

This practice transitioned to degrees in the 1930s, when states began enacting legislation for engineering registration.

BGEN William A. “P” Mitchell (1878-1941) directed the CE department in the 1920s and 30s. He served as an assistant professor in 1907-11 and as professor, from 1922-38.
Vogel graduated in the Class of 1924 with a major in civil engineering and received a commission in the Corps of Engineers. Thereafter he was always known as “Vog”

Only 10% of any graduating class received engineer appointments, and all of these came from the top 20% of the class. This choice provided more options for alternative employment outside of the Army.
While stationed at the Engineering School at Fort Humphreys in Virginia, he met and married Loreine Elliot of Washington, DC, in December 1925.

He then served one year with the 13th Engineer Regiment.

In 1926-27 Vog was detached to the University of California to pursue his master’s in civil engineering.
In 1922 famed civil engineer John R. Freeman began advocating Congress for a national hydraulics laboratory, after viewing flood devastation in the Mississippi Delta.

In 1926 Freeman established a Fund for promising hydraulic engineers to study abroad, administered by ASCE, ASME, and the Boston Society of Civil Engineers. The first Freeman Fellows went to Europe to study hydraulics in 1927.

The Corps Chief Engineer, MGEN Edwin Jadwin, opposed the idea of a national laboratory operated by the National Bureau of Standards, feeling that it should be under the Corps of Engineers (because they had valuable field expertise in river mechanics).
• The disastrous **Flood of 1927** along the Mississippi River changed everything

• The Corps of Engineers was charged with solving the flood control woes of the Mississippi River, set forth in their **Jadwin Plan**, which was incorporated into the sweeping **Flood Control Act of 1928**

• Part of the act called for the establishment of a river hydraulics laboratory along the lower Mississippi River that would be under the Corps of Engineers control.
• Vogel was one of six Army Engineers working on master’s degrees at the University of California (Berkeley) in 1927-28, under Charles Derleth. In the spring of 1928 Vogel noticed an announcement of fellowships for foreign study in Germany through the Institute of International Education. He had grown up speaking some German and had taken two years of advanced German at Michigan.
• He received an offer to study at the hydraulic laboratory at the Berliner Technical Hochschule in Charlottenburg, beginning his studies on Nov 1st.
The Freeman Scholars were studying at the Prussian Institute for Hydraulic and Marine Engineering, located in Lock Island, next to the Berlin Technical Hochschule. Vogel worked with Prof. George Henry de Thierry, who had lectured at MIT in 1927.

During the semester break in March-April 1929, he visited the hydraulic laboratories at Delft, Lyon, Zurich, Karlsruhe, Dresden, Vienna, Munich, Gratz, and Brunn. His per diem allotment from the Army was $6/day.

He received his Doctor of Engineering degree on August 1, 1929, and was posted to the Memphis District of the Army Corps of Engineers.
The new 147 acre laboratory was christened the "Waterways Experiment Station," or WES, to placate President Hoover, who still favored a national hydraulics laboratory in Washington, DC.

Major General Lytle Brown succeeded Edwin Jadwin as Chief of Engineers on October 1, 1929. He switched the site of the new hydraulics laboratory from Memphis to Vicksburg because the Corps’ new Lower Mississippi Valley Division was to be based there.

- In May 1930 Hoover signed the act establishing a National Hydraulics Laboratory at the Bureau of Standards in Washington, DC, but it never received sufficient funding to establish itself as a prominent research facility.
When Vogel was assigned the role of developing WES he was given a budget of only $50K per annum.

At the time BGEN Thomas Jackson served as President of the Mississippi River Commission (MRC), from 1929-32.

Jackson funneled close to $1 million to Vogel during the first year (1929-30), through the new Mississippi River & Tributaries Project.

This allowed Vogel to construct a real facility, purchasing holding tanks, flumes, weirs, and traps inside the main buildings.

The administration building (shown here) alone cost $122,000.
Aerial oblique view of the new Administration Building at WES and the earth dam impounding a 40 acre lake with sufficient storage to run all the hydraulic models. Note concrete apron for spillway at extreme left.
Vogel christened the reservoir “Lake Brown,” after Corps of Engineers Commanding General Lytle Brown.

This shows the Vogel’s home overlooking the lake, from just above the dam’s right abutment.
The silty loess soils in Vicksburg were perfectly suited to outdoor models with vertical exaggeration, as shown here. Note vertical cuts in the loess for the reservoir spillway at extreme right background. The new Administration Building is at left.
During 1930-31 Vogel was able to employ former Freeman Scholar Professor Clarence Bardsley of the Missouri School of Mines (shown here with Vogel) to assist him in developing the first hydraulic models at WES.
Vogel employed the principles of *similitude* that had been pioneered by hydraulic modelers in Europe to examine various means to make the Mississippi River channel more hydraulically efficient.
Full scale overflow tests on railroad levee embankments, showing results after 226 hours (lower left)
The rail ballast overflow test drew considerable attention because everyone could understand their significance. They reinforced the idea of “armored” levee crests, but failed to examine toe undercutting impacts, which are often exacerbated by underseepage.
One aspect the hydraulic models that was difficult to predict were long-term bed and bank adjustments, engendered over decades by dramatically different flow. Vogel mentioned these limitations, but no one seemed to take note of them until after the 1973 flood.
The loess soils at Vicksburg were perfect for sculpting outdoor models. Vogel prepared a series of notable articles explaining the program of research at WES.
The Birds Point-New Madrid Floodway was located in Missouri west of the confluence of the Mississippi and Ohio Rivers at Cairo, IL. It incorporates an area of about 206 square miles.

In 1932 WES performed a model study to determine the effects of operating the floodway on the lands lying within it and to predict the draw-down on the Mississippi River with the floodway in use.

With more than 100 miles of river to simulate, Vogel built an 80-foot-long outdoor concrete model of the river channel, the overbank between levees, backwater areas, and the floodway.

Vog took special care to correctly place drainage ditches, levee borrow pits, and other details that would affect water levels, and raised miniature levees with soil taken from actual on-site levee borings. These tests indicated that the new levees were of sufficient height to contain any projected flood.
Design Intent of the Bird’s Point Floodway

The Corps of Engineers designed the floodway to save Cairo, IL, a key rail and highway junction. They also designed a drainage system to reclaim floodway lands for agriculture.
Brigadier General Harley Ferguson (West Point ‘97) succeeded General Jackson as was President of the Mississippi River Commission from 1932-39, during the formative years of the Corps’ Mississippi River & Tributaries Project.

Ferguson was the Corps most outspoken advocate of channel cutoffs to improve hydraulic efficiency. In November 1930 he released a report calling for a series of cutoffs between the White River and Old River, the first of 16 cutoffs, all of which were modeled at WES. Ferguson established WES an integral part of the MRC and the MR&T project.
Major Elements of the MR&T

- 2,200 miles of levees and floodwalls (avg 30 ft high) below Cape Girardeau
- **Bypass floodways**: Bird’s Pt-New Madrid (1931); Bonne Carre (1931); Morganza Diversion (1954); Old River Diversion (1960/1977)
- **Channel improvements**: incl. 16 cutoffs and two major chutes; and bank revetments. Initially lowered flood stages 16 ft at Ark City and 10 ft at Vicksburg
- **Major tributary improvements**, 4 dams in Yazoo Basin (Enid, Arkabutla, Sardis, Grenada) and Wappapello on the St Francis River
WES strove to improve channel efficiency.
Goal: reduce flood height thru increased channel efficiency. 16 cutoffs were made along the lower Mississippi River to increase grades and channel efficiency.
Fig. 5—Records of 165 years of channel changes below Baton Rouge reflect a high degree of stability. Compare with Fig. 4, which is typical above Red River.

Fig. 6—Much rectification of the high-water channel has been accomplished by setting back the levee line at projecting points, as shown in this stretch between Greenville and Vicksburg.
Effects of Mississippi River Cut-Offs

By Harley B. Ferguson

Member American Society of Civil Engineers
Brigadier General, Corps of Engineers; President, Mississippi River Commission, Vicksburg, Miss.

Fig. 2—River profile, on highly exaggerated vertical scale, shows an essential difference between the sections below and above Red River. Some of the present efforts of the Mississippi River Commission are directed toward smoothing out humps in the profile.

Stabilization and capacity increase

Mention of the Boeuf floodway will call to mind the controversy that raged around this part of the project. The people who live in the strip 10 or 12 miles wide and 150 miles long, which chief facts about the new work under way will be set forth in a series of articles. The present article gives a general account of the main problems at issue, the methods of attack and the views tentatively formulated. Subsequent articles will describe the cutoff operations, contraction works, new
Developing design standards for brush dikes

- WES also developed schemes for timber dikes and submerged brush foot mats and curtain tip mats
The Corps also employed framed dikes to assist in construction of channel cutoffs. Flotsam collected against these timber dikes during spring floods, forming reinforced brush dikes that were effective in trapping sediment.
Framed dikes were employed along the Mississippi River to confine flow and increase velocity along a preferred navigation channel. These dikes caught organic debris which aided in their becoming backfilled with sediment.
While working at Vicksburg, Vogel enrolled in summer studies at the University of Michigan, and completed his professional civil engineering degree in 1933.
Examining transient bed effects at constant flow values

Natural sand bed channel (lower left); dredged channel (upper right); and impact of structural dikes (lower right)
Between July 1-August 28, 1934 Vogel made a special return trip to Europe to tour their hydraulic laboratories. He found that WES had progressed far beyond anything in Europe.

He then reported to the Army’s Command and General Staff School at Fort Leavenworth, one of the most junior officers to ever attend this two-year course.

He was promoted to Captain in August 1935, nine years after graduating from West Point.
• Left: From mid 1936 to 1938 Vogel served with the 3rd Engineer Regiment at Schofield Barracks in Hawaii.

• Right: He then served as an instructor at the Army Engineer School at Fort Belvoir (Washington, DC) from 1938-40.
In July 1940 he was posted to Pittsburgh as an assistant to the District Engineer, and was promoted to major in August 1941.

He was promoted to Lt Colonel in Dec 1941, and to full Colonel and District Engineer in August 1942.
After his promotion to Colonel in August 1942, the press photos no longer show him wearing glasses, and he began smoking large cigars.
Vogel presided over dozens of Army-Navy Excellence in Wartime Production Awards in 1942-43.
Duties of a Corps district engineer during wartime

MINUTE MAN FLAG AWARDED TO DISTRICT

In recognition of the regular purchase of War Savings Bonds by civilian employees, through the convenience of the Army Pay Reserve Plan, Colonel Herbert D. Vogel, District Engineer of the Pittsburgh District, has been authorized by the Secretary of War to display the coveted "Minute Man Flag."

On receipt of the Certificate of Authorization, bearing the signature of the Hon. Henry L. Stimson, presentation of the blue emblem with its white figure was made by Captain W. L. English, Post War Bond Officer.

In accepting the award in behalf of the employees of the Pittsburgh, Pa., Engineer District, Colonel Vogel stated: "My heartiest congratulations to each of you who have been responsible for the success of the War Savings Bond campaign in this District. Your initial response has been more than gratifying ... your continued support of the program is essential."
The Pittsburgh District witnessed an unprecedented level of wartime construction projects, many associated with critical wartime industries, such as munitions plants.
Between July-October 1943 Vogel was sent to the newly formed **Army and Navy Staff College** (combined with the Army Air Force School of Applied Tactics), in Washington, DC prior to his assignment to the Southwest Pacific combat area.
Colonel Vogel served as Chief of Staff of the Intermediate Section of USASOS, under MGEN C. L. Sturdevant.

In March 1945 Vogel assumed command of Base M with 32,000 troops at Lingayen Gulf, supporting General Walter Krueger’s 6th Army of 10 divisions and 250,000 soldiers, engaged in the northern Philippines. He was awarded the Distinguished Service Medal (DSM) for this assignment.

In October 1944 the US Army Services of Supply (USASOS) established Base M for joint logistical support of all ground operations in the Southwest Pacific Area, under Generals J. L. Frink and Douglas MacArthur.

Service in Southwest Pacific 1944-45
Vog developed more streamlined methods of delivering supplies to soldiers in the field, by anticipating needs and caching critical supplies at various points, to allow rapid delivery.

He was recommended for promotion to brigadier general by MacArthur in May 1945, but by this time the war in Europe had concluded and there was a surplus of general officers, so his promotion was not acted upon.

General Vogel is reunited with General Douglas MacArthur in New York in 1954, during one of MacArthur’s periodic reunions of his Southwest Pacific staff.
Post-war opportunities

- In the fall of 1945 Vogel was offered several positions, **Knappen Engineering (TAMS)** in New York, and Chair of Civil Engineering at the **University of Michigan**, but the Corps of Engineers would not release him until he had served 30 years because they were short of ‘senior engineers’
- In November 1945 he was posted to Buffalo, New York as the Corps District Engineer, remaining there until June 1949
- In June 1947 Vogel’s regular Army of the United States rank reverted to Lt Colonel, Corps of Engineers
- He was promoted to full Colonel in the Corps of Engineers in March 1949
Colonel Vogel representing the United States at the World Association for Waterborne Transport Infrastructure (P.I.A.N.C.) conference in Brussels in 1948
RESOLUTION OF COMMENDATION TO COL. HERBERT D. VOGEL

Adopted by the Board of Directors
Buffalo Chamber of Commerce
June 20, 1949

The Board of Directors of the Buffalo Chamber of Commerce, while deeply regretting the departure of Col. Herbert D. Vogel, District Engineer of the Buffalo District for the past three years, extends congratulations to him upon a well-merited promotion to the post of District Engineer of the Panama Canal Zone.

Col. Vogel's period of service in Buffalo has been marked by unusually worthwhile achievements, such as the improvement of Buffalo Harbor and other Federal works in the Buffalo area. His cooperation with the Buffalo Chamber of Commerce is deeply appreciated by members of the Board of Directors and the entire membership of the Chamber. Col. Vogel's distinguished work has earned him a permanent place in the esteem of the Buffalo business community.
Colonel Vogel was transferred to the Panama Canal in July 1949 to assume duties as the Engineer of Maintenance and Lieutenant Governor. Lo and Vog enjoyed their tour in Panama, with their younger son Dick. Their older son, Herbert Jr., was a cadet at West Point.
During the late 1940s the Corps of Engineers examined the various options for converting the Panama Canal to a sea level waterway, to increase capacity and safeguard it from interdiction by nuclear weapons during time of war.

Colonel James H. Stratton (lower left) constructed a half-mile long hydraulic model of the Canal Zone (shown above in 1946) to examine the various facets of tidal influx and flood control on a sea level canal. Stratton retired in 1949 and joined Knappen Engineering, which became TAMS in 1954.
In April 1952 Vogel was the first Engineer of Maintenance and Lt Governor of the Canal Zone not to be selected as Governor, causing all sorts of speculation in Panama.
In June 1952 Vogel was promoted to brigadier general and appointed Southwestern Division Engineer in Dallas, overseeing the Little Rock, Tulsa, Fort Worth, and Galveston Districts of the Corps of Engineers.
In July 1954 Vogel was nominated by President Eisenhower to be the next **Chairman of the Board of Directors of the Tennessee Valley Authority**.

Vogel was grilled by the Senate’s Committee on Public Works in regards to his nomination as on August 9th and 10th, 1954.
Chairman of the TVA 1954-62

Vogel was the principal figure in transitioning the Tennessee Valley Authority to become 100% self-sustaining, in 1959. This became a model for other governmental agencies.

Luncheon party for Princess Sophie of Greece in Knoxville in Nov 1958.
The TVA was the largest electrical power system in the United States when Vogel assumed his responsibilities in late August 1954. Here he is standing next to Norris Dam on the Clinch River.

On August 6, 1959 President Eisenhower signed an amendment to the TVA Act making TVA’s power system self-financing. This came after 25 years of debate between free-enterprise Republicans and public-power Democrats.
• TVA’s transition to become self-financed became a legislative model for other subsidized agencies throughout the United States, at the state and federal levels.
• Representatives from many foreign countries visited the TVA as well, because the TVA was the first governmental agency to develop an all-encompassing program to benefit the residents of the Tennessee Basin, providing *education* in soil science, erosion control, botany, agronomy, forestry, as well as vocational training.
On June 30, 1962 General Vogel announced he would step down as TVA Chairman. Vogel was so popular with business in Tennessee that the Republicans sought to draft him to run for governor, but after considering their offer, he turned it down.
Vogel accepted a position with the World Bank in February 1965, succeeding Gail Hatheway. The Vogels moved to Washington, DC.
As Chief Engineer of the World Bank between 1964-67, most of Vogel’s efforts concerned the Indus River Basin Project in Pakistan, which included the massive Tarbela Dam, shown here, designed by Tippetts-Abbett-McCarthy-Stratton (TAMS) of New York, the same firm that tried to hire Vogel back in 1946.

Tarbela was the largest and most complicated embankment dam ever built, completed in 1976.

It suffered significant problems with piping erosion through the foundation, scour of the spillway stilling basins, cavitation of hydraulic conduits and spillways, and acute levels of sedimentation. It also became the first project where rolcrete technology was employed, in 1979, to repair the damaged spillways.
General Vogel was elected to the National Academy of Engineering in 1979. His son Herbert Jr. graduated from West Point in 1952 and rose to the rank of Colonel in the Army Supply Corps.

General Vogel died on his 84th birthday on August 26, 1984 at Walter Reed Army Hospital in Washington, DC and buried in Arlington National Cemetery.

Loreine Vogel died at age 95 in August 1997.