

## GeE 342 INTRODUCTION TO MILITARY GEOLOGY BRIEFING TOPICS

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### Revolutionary War (1775-83)

- Formation of the U.S. Corps of Engineers and Recruitment of Engineer Troops in the American Revolutionary War (see *Engineers of Independence* [1981])
- Military Geology of Brant's Minisink Raid and the Battle of Minisink in July 1779 (see *Guidebook 66<sup>th</sup> Annual Field Conference of Pennsylvania Geologists*)
- Defense of West Point on the Hudson, 1775-1783 (see *Engineers of Independence* [1981] and *Chaining the Hudson* by Lincoln Diamant [1994])
- Yorktown: The Grand Siege, 1781 (in *Engineers of Independence* [1981]; and *The Yorktown Campaign and the Surrender of Cornwallis 1781*, H.P. Johnson, 1881)

### American Civil War (1861-65)

- Geology and the Civil War campaign of Second Manassas (see *Rocks and War* by E-an Zen and Alta Walker, 2000)
- Battle for Island No. 10 New Madrid, MO 1862 (see *Scope of Military Geology* by Palka and Galgano, 2000)
- Military Geology in the Battle of Gettysburg July 1863 (see *Geology and the Gettysburg Campaign*, PA DCNR Educational Series 5 [1997])
- Siege of Vicksburg, MS Jan-July 1863 (numerous handouts and *Geologic History of Vicksburg National Military Park Area*, MS State Geological Survey Bulletin 28, by W.C. Morse, 1935)
- The 50<sup>th</sup> New York Volunteer Engineer Regiment During the Civil War (*Engineer Historical Studies No 4*)
- Military Geology of the Richmond and Petersburg National Battlefield Parks (*PA Dept of Conservation and Natural Resources Open File Report 95-08*)
- Undermining enemy entrenchments During the Siege of Petersburg- US Civil War (in *PA Open File Rept 95-08* and *Military Geology in War and Peace*)
- Naval Dry Docks of the United States through 1870 (see Charles B. Stuart, *The Naval Dry Docks of the United States*: Van Nostrand, New York, c. 1870)
- System of Naval Defenses in American Civil War (see James B. Eads, *System of Naval Defences*: Van Nostrand, New York, c. 1866)
- Submarine warfare against ironclad ships (see J. S. Barnes, *Submarine Warfare, offensive and defensive, incl. a discussion of the offensive Torpedo System, its effects upon Iron Clad Ship Systems and influence upon future naval wars*: Van Nostrand, c.1868)
- **Union Navy's river ironclad excursion up the Red River in the Spring 1864**, which became stranded near Springfield Landing and Alexandria, LA. LCOL Joseph Bailey, USCOE constructed a series of timber dams across the Red River

- in order to navigate back downstream (see R. MacBride, *Civil War Ironclads*, 1962 and excerpts from other texts in custody of instructor)
- *Geology and the Union Raid on New River Valley in May 1864* to interdict flow of salt, lead and railroad transportation (see article of same name in Virginia Minerals Nov 1997 by R.C. Whisonant)

### Spanish American War Era and Oceanic Canals

- Geographic Constraints on Amphibious Operations, Drinking Water and Sanitation during the Invasion and Occupation of Cuba by U.S. forces (1898-99)
- Construction of the Suez Canal 1864-69
- Construction of the Panama Canal 1879-1914
- **Sheet pile cofferdam method and exhumation of the battleship MAINE** in Havana Harbor by US Corps of Engineers 1910-12 (see H. G. Rickover, H. G. *How the Battleship Maine Was Destroyed*, 1976, and official report of exhumation in possession of instructor)
- Defense of the Panama Canal 1914-1970
- James B. Eads and the St Louis Bridge (see Ch. 5 in *Dams and Other Disasters* by A.E. Morgan, 1973; and The Great Bridge)

### First World War (1914-1918)

- Geologic Input to the Royal Engineers 1914-1918 (*Geological Work on the Western Front* by W.B. R. King, 1919)
- **The control exerted by geography in the disastrous amphibious assault at Galipoli**
- Cut and cover entrenchments of First World War
- Undermining enemy entrenchments – First World War (see *Military Geology in War and Peace; Fortification* by William A. Mitchell, 1928; )
- LCOL Peter N. Nissen and His Ubiquitous Nissen Hut
- American Military Geology First World War 1917-18

### Between the Wars (1919-39)

- Engineering geology, design and construction of the Pearl Harbor Naval Base 1911-1941
- **Corps of Engineers Planning for Interoceanic Canal across Nicaragua in late 1920s-early 1930s and the Managua Earthquake of 1931**
- **The 1913 Dayton Flood and Creation of the Miami Conservancy District** by Arthur E. Morgan (*The Miami Conservancy District*, by A.E. Morgan, 1952)
- **Evolution of the Corps of Engineers Levees-Only Policy for flood control** (versus reservoir storage) along the Mississippi River Valley (see discussions in *River Tide*, 1995 and pp. 106-118 in *Of Men and Rivers*, 1978)

- Impacts of the 1912 Flood of the Mississippi River (see *Report of Board on Examination and Survey of the Mississippi River*, 1909; *River Tide*, by John Barry, 1995, and *Floods of the Mississippi Valley* by J. P. Kemper, 1929, in instructor collection)
- **Debate over creation of the Army Corps of Engineers Hydraulic Laboratory in the 1920s** (see Ch 7 in *Dams and Other Disasters* by A.E. Morgan, 1973)
- **The Mississippi River Flood of 1927** (see *River Tide*, by John Barry, 1995; *Of Men and Rivers*, 1978; and *Floods of the Mississippi Valley* by J. P. Kemper, 1929, in instructor collection)
- **Federal Flood Control Act of 1928** (see Document 6 in *Army Engineers in Memphis District*, M. Reuss, 1982)
- **Corps of Engineers Jadwin Plan for Flood Control of the Mississippi River in 1928** (see Great Inland Waterway Project of the U.S. [1928] in instructor's collection)
- Personalities of the Mississippi River flood control plans (MG A.A. Humphries, James B. Eads; COL Ernest Graves; LG Edwin Jadwin, BG T.H. Jackson, MG Lytle Brown, BG Harley B. Ferguson, LCOL John C. H. Lee, among others)
- Flood Control in the Atchafalaya Basin by US Corps of Engineers (*Designing the Bayous: The Control of Water in the Atchafalaya Basin 1800-1995*, by Martin Reuss, 1998)
- Jadwin's Floodways at Birds Point-New Madrid, Red-Atchafalaya Rivers and the Bonnet Carre Spillway in Louisiana (see *Great Projects* by James Tobin, 2001)
- Evolution of the Federal Flood Control Protection Acts of 1938 and 1941 and the US Corps of Engineers role in providing flood control (see *Designing the Bayous*, by Martin Reuss, 2001)
- Evolution of Potamology and the evolution in River Science in river improvement and navigation (see Corps District histories for New Orleans, Vicksburg, Memphis, St Louis, and Rock Island)
- **Evolution of Mississippi River Levees 1888-present** (see p. 148 in *Of Men and Rivers*, 1978; and many other references, incl. books on 1993 floods)

### **Second World War (1939-1945)**

- Expansion of the Pearl Harbor Naval Base facilities during World War II 1940-45
- Engineering Geology in Wehrmacht Operations-WW2 (see *Wehrgeologie* by Kurd von Bulow [1938])
- Impact of Geology on Blitzkrieg Operations; Megiddo (1917); The Low Countries (spring 1940); Libian Plateau (Dec 1940) [Born in Battle No. 15 (1980)]
- **German Army Engineer Operations** (*German Combat Engineers in World War II* by Horst Riebenstahl, 1998)
- Geology and Trafficability in the Ardennes Forest During the German Offensive against France and the Low Countries in May 1940
- Use of engineering geology by the German Afrika Corps 1941-43

- **Building of the Alaska (Alcan) Highway** by the U.S. Army 1942-43 (*Alcan Trail Blazers* by 648<sup>th</sup> Eng'r Topo Battalion (1992) and *Crooked Road, The Story of the Alaska Highway*, by D.A. Remley (1976).
- Underground structures and German War Production Second World War
- **US Army Desert Warfare Training in the east central Mojave and western Colorado Deserts of California and Arizona in preparation for North Africa Operations-1942** (*Off-road Vehicle Effects on California's Mojave Desert*, by H.G. Wilshire, California Geology, June 1976; *Processes of Accelerated Pluvial Erosion on Desert Hillslopes Modified by Vehicular Traffic*, by R.M. Iverson, Earth Surface Processes, v. 5, 1980; The Environmental Effects of Off Road Vehicles, R.H. Webb and H. G. Wilshire (1983); *Persisting Effects of Armored Military Maneuvers on Some Soils of the Mojave Desert*, D.V. Prose, Environ Geol Water Sci, v.7:3,1985; USGS Map MF-1885; *Recovery of soils and vegetation in World War II military base camps*, by D.V. Prose and S.K. Metzger, USGS OFR 85-234; *Effects of Substrate Disturbance on Secondary Plant Succession; Mojave Desert, CA*: D.V. Prose, S.K. Metzger and H.G. Wilshire Ayers, PD, 1994. [Environmental Damage From Tracked Vehicle Operation. \*Journal of Terramechanics\*, 31 \(3\): 173-183](#); Ayers, PD, Shaw, RB, Diersing, VE and Van Riper, J, 1990. *Soil Compaction From Military Vehicles*. 90-1096, American Society of Agricultural Engineers, St. Joseph, Missouri; [Braunack, MV, 1986a. Changes in Physical Properties of Two Dry Soils During Tracked Vehicle Passage. \*Journal of Terramechanics\*, 23 \(3\): 141-151](#); \_\_\_\_\_, 1986b. [The Residual Effects of Tracked Vehicles on Soil Surface Properties. \*Journal of Terramechanics\*, 23 \(1\): 37-50](#); Milchunas, DG, Schulz, KA and Shaw, RB, 1999. [Plant Community Responses to Disturbance by Mechanized Military Maneuvers. \*Journal of Environmental Quality\*, 28 \(5\): 1533-1547](#); [Webb, RH and Wilshire, HG, 1983 \(Editors\). \*Environmental Effects of Off-Road Vehicles: Impacts and Management in Arid Regions\*. Springer Series on Environmental Management. Springer-Verlag, New York.](#)
- **Japanese Pacific Island Defenses** (see book of same name by G.L. Rottman, 2003)
- **U-Boat Bases and Bunkers 1941-45** (see book of same name by Gordon Williamson, 2003)
- **American Defenses of Corrigidor and Manilla Bay** (see book of same name by T.C. McGovern and M.A. Berhow, 2003)
- *Architecture of War* by Arvid Ottar
- British Application of Geology for the Normandy Invasion June 1944 (*British applications of military geology for "Operation Overlord" and the battle of Normandy, France, 1944* by E.P.F. Rose and C. Pareyn, 1998, in course text #1)
- Overview of Operation Overlord – The Normandy Invasion of June 1944: Critical Contributions of inclement weather, disinformation and German prejudice about logistical support through break-bulk cargo ports
- The American "Mulberry A" harbor operations at Normandy (*The Far Shore* by LCDR Max Miller, 1945; *Force Mulberry* by CDR Alfred Stanford, 1951; and *The Far Shore* by RADM Edward Ellsberg, 1960)

- **Evolution of the Bailey Prefabricated Segmented truss bridge in World War II** (see *A Bridge to Victory* by Brian Harpur, 1992)
- Royal Engineers Bridging operations between Normandy and Berlin 1944-45 (see *Bridging: Normandy to Berlin*, 1945, in possession of instructor)
- Role of 291st Engineer Combat Battalion in Thwarting German Advance During Battle of the Bulge, Dec 1944-Jan 1945 (*First Across the Rhine*, D. E. Pergrin, 1989)
- Role of the 51<sup>st</sup> Engineer Combat Battalion in thwarting the German Advance during the Battle of the Bulge (book, *Studies in Military Eng'g No 4*)
- Construction of the Bailey Pontoon Bridge at Remagen by the 291<sup>st</sup> ECB (see *First Across the Rhine* by D. E. Pergrin, 1989)
- **Bridging the Rhine River** (see *Bridging: Normandy to Berlin*, 1945)
- Temporary Restoration of Port Facilities seized in wake of the Normandy Invasion Summer 1944 by US Army Port Engineer units (Cherbourg, LeHavre and Brest)
- **Temporary Restoration of Railroad Network in ETO 1944-45** (see books in instructor's collection)
- Salvage of the capsized battleships USS Oklahoma and USS Utah at Pearl Harbor, 1942-46 (see engineering files in instructor's possession and *Pearl Harbor: Why How, Fleet Salvage and Final Appraisal* by Homer N. Wallin, 1968)
- **Amphibious Assault of Guadalcanal and logistic sustenance during Battle for Guadalcanal in Solomon Islands** (August 1942 to May 1943)
- Engineer Intelligence and the Pacific Geologic Mapping Program
- Background Surrounding Formation of Naval Mobile Construction Battalions (Seabees) during World War II
- **Formation of Coral Atolls, reefs and cays in the Pacific and Indian Oceans**
- Origins and Evolution of the Nissen Hut in WW1 and the Quonset Hut series of military structures in WW2 (*The Instant Building* by Michael Lamm in *American Heritage Invention and Technology* Winter 1998, *Erection Instructions, US Navy Quonset Buildings*, 1943, *Building the Navy's Bases in World War II*, vol.1, Bureau of Yards and Docks, 1947 and *Outpost in the North Atlantic* by J. A. Donovan, 1992)
- **Feasibility Studies and Planning for the Ruhr Dams Raids of May 1943** (The Dams Raid through the Lens by Helmuth Euler, 2001)
- **The Prosecution of the Ruhr Dams Raid May 16-17, 1943** (The Dams Raid through the Lens by Helmuth Euler, 2001)
- Naval Construction Battalion Operations in Pacific Theater WW2
- Establishment of Advanced Base Construction Depots by Navy Seabees During WW2 (*Advanced Base Construction Detachment Admiralty Islands* cruise book, 1945)
- **Role of the 2nd Engineer Special Brigade 1942-45 in Pacific Theater Operations** (*Put 'Em Across*, *Studies in Military Engineering No. 2*, US Army Office of History, 1988)

- Establishment of the USGS Military Geology Branch During World War II (*Military Geology Branch of the U.S. Geological Survey from 1945-1972* by M.J. Terman in course text #1)
- Establishment of the Manhattan District, Corps of Engineers (*Racing for the Bomb*, by R.S. Norris, 2002: *Now It Can Be Told: The Story of the Manhattan Project*, L.R. Groves, 1962)
- **Infrastructure Engineering and Construction of the Manhattan Project** (see *History of Manhattan Project, US Corps of Engineers*; US Army )
- **Design and Construction of Manhattan Project facilities at Oak Ridge, TN** (book by Stone and Webster)

### Cold War Conflicts (1950-90) and Post World War (1991-present)

- **Construction of the Libby and Teal Bridges across the Imjin River** during the Korean War (see *Bridging the Imjin*, Studies in Military Engineering No. 5, 1989)
- **Army Engineer's Raid on the Hwachon Dam (April 1951)** (see **MANSEN Library** for IX Corps Comd Rpt, Nar, Apr 51; IX Corps Engr Sec, Study of Hwachon Dam, 4 Apr 51; Eighth Army G3 Jnl, Sum, 6 Apr 51; and Martin Blumenson, "**Hwachon Dam**--Korea 1951: The 4th Ranger Company and the 7th Cavalry in Action." Inf 86 (May/Jun 1996): pp. 20-30).
- **Navy Aerial Attack on the Hwachon Dam by VA-195 using torpedoes (May 1, 1951)** (see files in instructor's collection)
- **Military Geology of the Eastern DMZ, central Korean Peninsula** (*Military Geology in War and Peace*)
- Clandestine Tunnel 4, northern Punchbowl, Korean Demilitarized Zone (*Military Geology in War and Peace*)
- Siege of Dien Bien Phu Vietnam 1954
- Siege of Khe Sanh South Vietnam 1965-66
- **Offshore "Texas Towers" constructed off coast of United States in the 1950s** (see articles in instructor's collection)
- **Distant Early Warning (DEW) Network** constructed in the 1950s (see articles in instructor's collection)
- **Interstate and Defense Highway Program of 1955**
- Underground Intercontinental Ballistic Missile (ICBM) Complexes
- Swords into Plowshares: Military geology and national security projects (check internet for film on Swords into Plowshares and atomic excavation of transoceanic canal through Honduras)
- Military geology programs in the arctic 1950-70 (*Military Geology in War and Peace*)
- Location of sites for Airfields in North Greenland
- The Suez Canal crossing by Israeli Defense Forces October 1973 Yom Kippur War (*The Suez canal crossing 1973* in Born in Battle Nos 18 and 19 (1981), in instructor's collection.
- Vulnerability to Underground Fortifications to Conventional Weapons Attacks

- **Playas and Military Operations:** 1) Afrika Krops 1941-43; 2) Desert One Rescue Mission, Iran April 1980; 3) Gulf War in 1991 (see article by J.T. Neal in *Military Geology in War and Peace*)
- US Army Rescue Mission, Trapped Missionaries During Civil Uprisings in Belgian Congo 1960 (see *Herk: Hero of the skies*, by J.E. Dabney, 1979)
- Nuclear Test Monitoring by U.S. Geological Survey during the Cold War 1949-91
- Military Geology in the Gulf War 1990-91
- Engineering Operations in assistance to Bosnia 1990s
- Engineering Operation in Afghanistan and Pakistan 2001-onward
- **Hardened Air Bases in Israel and the Middle East, with high speed taxiways and bunkered replenishment hardstands**
- **Seismic discriminant for discerning nuclear detonations from earthquakes** (article by Woods and Helmberger in EOS, Feb 23, 1993)
- **Use of satellite data to locate Nuclear test sites** (EOS v. 82:3 Jan 16, 2001)
- **Forensic geophysics applied to the 1995 Oklahoma City bombing of the Alfred Murrah Federal Building** (Tom Holzer, USGS)
- **Forensic geophysics applied to the Sinking of the Russian submarine Kursk** (August 2000; see article in EOS, v. 82:4 Jan 23, 2001)
- **Collapse mechanisms of the World Trade Center towers, New York City 9-11-01** (see official report by FEMA)
- **Collapse mechanism of the Pentagon 9-11-01 attack** (see ASCE report)

### Environmental Security

- **Conflicts over water resources** (see Water Conflicts at <http://www.worldwater.org/conflict.htm>)
- Bingham, G., A. Wolf, and T. Wohlegenant. 1994. “**Resolving water disputes: Conflict and cooperation in the United States, the Near East, and Asia.**” US Agency for International Development (USAID). Bureau for Asia and the Near East. Washington DC.
- Kirschner, O. 1949. “**Destruction and Protection of Dams and Levees.**” Military Hydrology, Research and Development Branch, U.S. Corps of Engineers, Department of the Army, Washington District. From Schweizerische Bauzeitung 14 March 1949, Translated by H.E. Schwarz, Washington.
- Plant, G. 1995. “**Water as a weapon in war.**” Water and War, Symposium on Water in Armed Conflicts, Montreux 21-23 November 1994, Geneva, ICRC.
- Waterman, S. 2003. “**Al-Qaida threat to U.S. water supply.**” United Press International (UPI), May 28, 2003
- Carl von Clausewitz addressed the **military significance of river lines** early in the 19<sup>th</sup> century. See *On War*, eds. and translators Michael Howard and Peter Paret (Princeton, NJ: Princeton University Press, 1976), 433-446, 532-534.
- Corps of Engineers. 1953. “**Applications of Hydrology in Military Planning and Operations and Subject Classification Index for Military Hydrology**”

**Data.**” Military Hydrology R&D Branch, Engineering Division, Corps of Engineers, Department of the Army, Washington.