GERMAN MILITARY GEOLOGY:

BETWEEN THE WARS

BY

J. David Rogers

and

Gary Bonham
Evaluating Crater Effects

- Dependent on projectile, objective, rock, and the effect produced.
- Swamp and Moor - Deep penetration with high mud column but little damage.
- Drift Sand - Decreases shot effect but airborne sand = disablement.
- Soft loam and loamy sand - weakens burst effect, good for artillery positions.
- Coarse compacted sand, gravel, residual soil, firm loam and clay - full burst of projectile realized.
- Rock and rocky soils - intensifies burst effect and causes splintering.
Studies of Road Stability

- Drainage issues addressed in detail.
- Geologists to be consulted on type of material to be used.
- Location of roads: underlying material, slope stability, bearing capacity, flood plains.
- Corduroy roads required in some instances.
Railroad Construction

- Rock for railroads was preferred to be igneous and metamorphic rocks such as diabase, basalt, graywacke, quartzites, and hornestones. Limestones could be used in emergencies and all other sedimentary rocks along with granites and rhyolites were considered inadequate.
Soils and Fortifications

- Type of soil and/or rock must be known for design of long standing fortifications.
- Water from high groundwater tables or drainage must be planned for and dealt with.
- Loess soils have highly variable groundwater yields depending on seasons. Water seepage is a problem.
- Clay soils also prone to water seepage, especially between weathered and unweathered zones.
- Granite can be wet or dry depending on weathering of the rock.
Underground Galleries

- Victoria Gallery - Begun in the hard limestone with blasting. Moved tunnel to softer sand underneath until it reached existing limestone caves.
- 1. Gallery will be flooded due to presence of water bearing sand.
  2. Gallery will be dry due to entrance being out of water bearing sand.
- Incorrect and correct positioning of galleries.
● Approaches placed behind lines, hidden from enemy observation.
● Multiple entrances separated by distance to prevent on barrage from eliminating all entrances.
● Entrances must be hardened if not hidden and protected from splinters and gas.
● Dry rock = Inclined shafts, Wet rock = concrete or steel shafts.
● Cover must be sufficient to prevent damage from artillery.
● Listening posts placed at twice the listening distance.
● Number of mines based on geologic and hydrologic conditions.
Combres Height Mines

- **Begun in dry marl and water bearing iron bearing oolitic limestone.**
- **Water entered tunnels wherever tunnels passed through oolitic limestone layer.**
- **Geologists mapped section.**
- **Recommended moving attack tunnels lower into marls underlying oolitic layer where it was easier to tunnel.**

**Geologic Section**

- **Proposed Attack Mine**
- **Proposed Mine through water bearing layer**
- **Mine as Constructed in dry silty limestone beds**

**Water bearing silts**

**Water free silts and clays with dolomitic and limestone beds.**

**Water entered tunnels wherever tunnels passed through oolitic limestone layer.**
Wytschaete-Bogen Mines

- English used two geologists to plan mines in the salient near St.Yves.
- Especially complex geology with several different Tertiary and Quaternary formations with separate water tables.
- Used shallower attack tunnels to divert German attention from deep tunnels.
- English fired 19 mines containing 423,000 kg of explosives helping eliminate the Wytschaete salient.
Wytschaete-Bogen Mines

- Map shows locations of mines in Wyschaete salient.
- German geologists not brought in early, advice often unheeded.
- Major loss of German life resulted.
References

- Riebenstahl, Horst, *German Combat Engineers in World War II: A Photo Chronicle*; Schiffer Military/Aviation History, Atglen, PA.