A Brief (Geologic) History of Hanford

Tom Sicilia, RG
Hanford Hydrogeologist

Oregon Hanford Cleanup Board January 2022 Meeting
Lesson One: It is all relative
Roadmap
(A Tale of Floods)

- Old to New (bottom to top)
- Hot Floods
- Confused Channel
- Cold Floods
- Hanford
17.5 Million Years Ago (Floods: A Hot Mess)
Old Faithful as a Youth
Rock is Solid, Right?

Moses Coulee

Latourell Falls
Rock is Solid, Right?

Flow Top
Vesicular to rubbly and/or brecciated basalt. Typically pahoehoe.

Upper Colonnade
Rarely developed in most flows.

Entablature
Typically consists of small irregular columns with quenched texture. Sometimes called curvi-columnar jointing. Patterns can form as chevrons, fans, and rosettes.

Lower Colonnade
Often shows 'pinch and swell,' chisel marks from column growth, 'ball and socket joints' on horizontal joints.

Flow Bottom
Can have pillow pagonite, hyaloclastite, or vesicular base.
Thousands of years between flows
Lake Ringold 8-2.8 Million Years
(Oh River, Where Art Thou?)
Lake Ringold 8-2.8 Million Years
(Oh River, Where Art Thou?)
Lake Ringold 8-2.8 Million Years
(Oh River, Where Art Thou?)
Lake Ringold 8-2.8 Million Years
(Oh River, Where Art Thou?)
Uplift Wins Some Battles (Twice Dammed)
How Much Dirt is in the River, Anyway?
Change the Channel (again)
Lake Ringold 8-2.8 Million Years (Why aren’t the White Bluffs at Hanford?)

Figure 5.2. Schematic Cross Section of the Pasco Basin (see Figure 5.1 for location)

Figure 5.4. Distribution of Hydrogeologic Units at the Top of the Model (maximum water table)
2.8-0.15 Million Years Ago
(Error 404: Rocks not Found)
Floods 2: The Big Chill
Floods 2: Icebreakers
Lake Missoula
When the Dam Breaks
Why aren’t the White Bluffs at Hanford?
Rollin’ on the River

Diagram showing different types of sediment transport:
- **Flow**
- **Dissolved load**
  - Rolling
  - Sliding
- **Silt and clay suspended by turbulence**
- **Sand moving by saltation**
- **Bed load**
  - Sand
  - Gravel
  - Silt and clay

Source: OREGON DEPARTMENT OF ENERGY
Cracking Under Pressure
The Next Million
Below Hanford: A Complex Catastrophe
Questions?
Resources


https://www.researchgate.net/publication/340567841_The_Columbia_River_Flood_Basalt_Province


http://www.nickzentner.com/#/downtown-geology-lectures/


https://www.researchgate.net/publication/268981775_The_late_Cenozoic_evolution_of_the_Columbia_River_system_in_the_Columbia_River_flood_basalt_province


https://opentextbc.ca/geology/chapter/16-1-glacial-periods-in-earths-history/


https://www.nrc.gov/docs/ML0319/ML031950249.pdf