



Consequences of Berm Failure at Smurfit-Stone

The Smurfit-Stone site is a former pulp mill located along the floodplain of the Clark Fork River near Frenchtown, and contains hazardous cancer-causing toxins including heavy metals, PCBs, dioxins, and furans. The Smurfit site has been partially protected from flooding by an earthen berm separating the site from the river channel, but erosion during recent spring runoff makes long-term protection offered by the berm questionable. To better understand flood risk at the Smurfit site, the Clark Fork Coalition and American Rivers commissioned River Design Group, a local engineering and restoration firm, to construct a hydraulic model of the site and study different berm-failure scenarios under current and future climate conditions.

A flood on the Clark Fork River could inundate the Smurfit site by piping floodwaters through the berm in places where burrowing rodents have created weak points, breaching the berm, or overtopping the berm. This study examines the consequences of these failures for a 66,000 cfs (cubic feet per second) flood that has a 1-in-100 chance of happening each year under current conditions, and 100,000 and 130,000 cfs floods with estimated 1-in-100 and 1-in-500 annual chance under a future climate scenario. The future climate scenario represents warmer temperatures and heavier precipitation which result from ongoing greenhouse gas emissions.

Piping

The piping scenario shows that portions of the Smurfit site adjacent to the river are vulnerable at the 1-in-100 flood under current climate conditions, which is only slightly higher than flows observed during recent spring flooding. The exact extent and erosive capacity of this type of flooding depends on where the berm fails due to piping and the size and duration of flooding.

Breaching

For a 1-in-100 chance flood under future climate conditions, the breaching scenario shows flooding of approximately 1/3 of the Smurfit site. Under this scenario, floodwaters are moving fast enough to pick up toxic soil and wash lighter sediment downstream.

Overtopping

Widespread overtopping of the berm occurs during a 1-in-500 flood under future climate conditions and inundates most of the site including numerous areas formerly used for holding, settling, and storing toxic waste. Water flowing through the site is fast and forceful enough to move waste downstream.

The exact size flood required to pipe through or erode and breach the berm is difficult to pinpoint, but observations of berm breaches in other places suggest that a berm failure at the Smurfit site could be rapid and unpredictable. Long-

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term protection from flooding is necessary at Smurfit, yet the chance of a large flood occurring at least once increases over longer periods of time. For example, in a 50-year period there is a 40% chance of at least one 1-in-100 flood and a 9.5% chance of a 1-in-500 flood. This level of risk is unacceptable, and the catastrophic floods of the Yellowstone in 2022 and the Clark Fork in 1908 demonstrate dynamic nature of Montana rivers, the possibility of extreme and unprecedented floods, and the potential severity of the consequences. This study suggests that the berm at the Smurfit site will not prevent a future catastrophe, and that storing toxic waste adjacent to the Clark Fork River is an unsafe gamble with substantial ongoing risk for the river and downstream communities.