SEVERE WEATHER IMPACTS ON SOLID WASTE DISPOSAL FACILITY OPERATIONS

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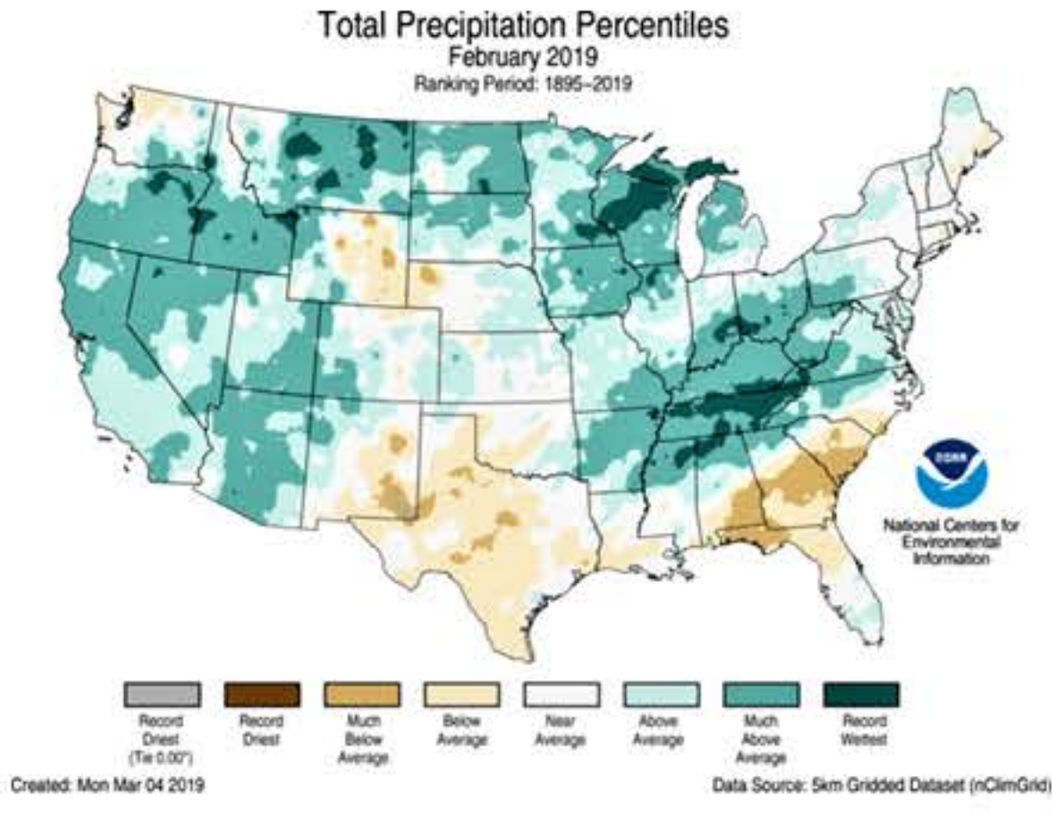
Throughout the world, the solid waste disposal facilities (landfills) that communities rely upon as an integral component of their solid waste management programs have experienced dramatic severe weather and climate-related consequences, which reduce their capacity to function properly.

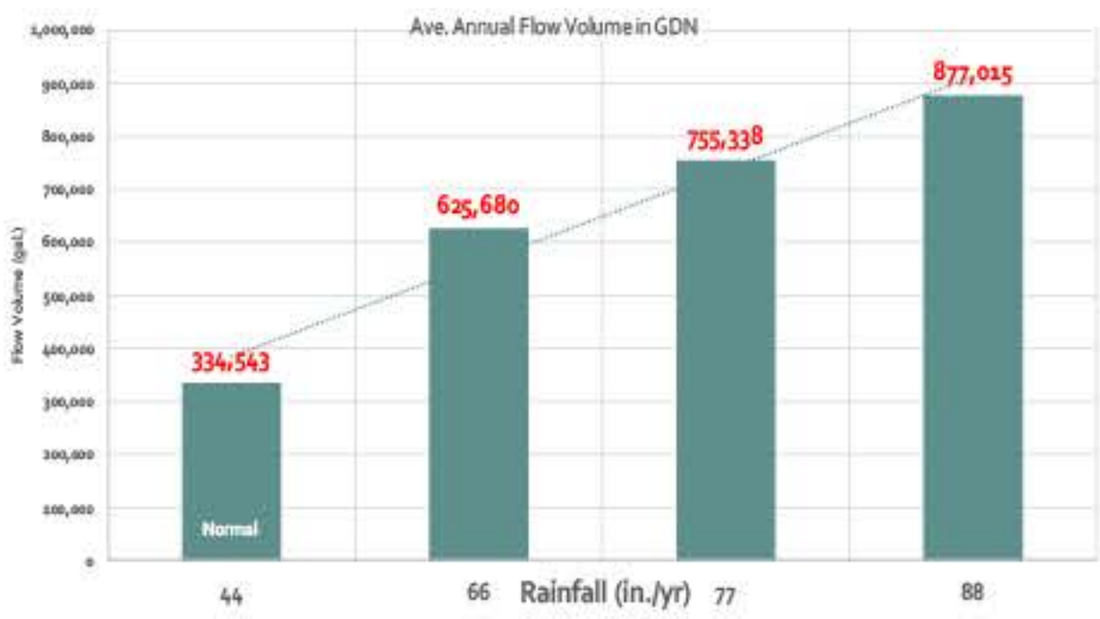
One specific example occurred in 2018, when the mid-Atlantic region of the USA experienced record-setting precipitation and numerous severe weather events, resulting in the introduction of substantial increases in moisture content within the waste mass, which contributed to landfill instability, increased differential settlement and consolidation, accelerated gas production (likely due to increased rate of waste biodegradation), and substantial increases in leachate generation.

Landfills attempt to respond to these severe weather and climate related conditions by adjusting standard operating procedures associated with waste placement activities,such as waste tipping protocols, compaction efforts, and cover material deployment, fill sequencing, as well as stormwater management, erosion and sediment control, slope maintenance, and access road construction. However, it is often nearly impossible to operate the necessary heavy equipment and perform earthwork activities during, and immediately after, these periods.



The potential design and construction strategies for mitigating the challenging impacts of severe weather events and excessive precipitation on landfill operations are as follows:

- Incorporation of "Mezzanine-Level" leachate collection layers and infrastructure, comprised of aggregate, geocomposite drainage nets, and perforated piping, to be installed within the waste lifts.
- Utilization of interim exposed geomembrane covers (EGC) in conjunction with larger stormwater conveyance and management features.
- Surface drainage trenches that function as "canals", along with portable pumps, to reduce ponding water caused by differential settlement.
- More frequent deployment and diligent maintenance of erosion and sediment control features ("super" silt fence, matting/blankets, rip rap check dams and outlet protection, straw bales, filter socks, etc.) to prevent mass erosion, sediment transport, and soil loss.
- Installation of landfill gas extraction wells at higher density (tighter spacing), equipping wells with dedicated dewatering pumps, use of automated wellheads with modulating valves, and increased collection piping size and redundancy to increase resiliency.



These landfill facilities are adapting to maintain functionality and effective operations of their landfill gas collection and control systems, leachate management and treatment systems, gradient control systems, groundwater monitoring network, and other environmental control systems.

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