A Practical Method to Assess Groundwater Remediation System Resiliency: Groundwater Plume Stability is your Indicator Light

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Background/Objectives. An evolution in groundwater remediation has occurred over the past several decades. Early groundwater remediation systems were primarily anthropogenic, energy-intensive and focused mostly on contaminant mass removal, many of which are still in operation today. The industry then transitioned to more holistic approaches to groundwater remediation by moving toward green/sustainable remedies. Now the industry is progressing further by recommending groundwater remediation systems that are not only sustainable, but also climate resilient. However, the challenge is how to actually measure the climate resiliency of an existing remediation system, when local effects of climate challenges are typically not defined sufficiently to be comprehensively modeled. The position of this presentation is that effects of climate change are already impacting systems. Monitoring and quantifying these impacts by correlating climate change influence with groundwater plume stability changes is one of the most robust approaches to resiliency assessment available. Further, sustained plume stability assessments can be the indicator light as to whether climate change is having either a deleterious or insignificant impact on a remediation system and answer the question as to whether the remediation system is resilient enough.

Approach/Activities. Robust statistical plume stability assessment is key to measuring impacts of past climate events on existing remediation systems and providing needed information for prospective modeling of potentially more impactful future effects. The ideal tool for this evaluation is the Ricker Method® plume stability analysis. This method is in the public domain and overcomes limitations posed by conventional well-by-well analysis techniques. Through a Ricker Method® analysis, plume stability trends over time can be correlated to immediate climatic events such as a hurricane or gradual climate change influence such as increasing precipitation trends over a long period of time. Additionally, by applying a visualization component to the Ricker Method®, the practitioner can have an even better understanding of system resiliency.

Results/Lessons Learned. The authors have conducted hundreds of Ricker Method®-based groundwater plume analyses. This presentation will highlight several of these sites as well as elaborate on how evaluating groundwater plume stability changes over time will alert the stakeholder as to whether climate change is having a deleterious impact on a groundwater plume before that realization comes too late.