



A Guide to Long Term Equilibrium (LTE) in Newtown Creek

Understanding Background in Superfund

At Superfund sites like Newtown Creek, contamination arises from various sources. At Newtown Creek, this includes contamination from both current and historical industrial use within the site, as well as external influences, such as background levels of contamination that are present outside of the site. This text explores the concept of background concentrations and its impact on Long Term Equilibrium (LTE) concentrations when setting remedial goals for sediment sites. LTE Concentrations represent the expected surface sediment concentrations that will occur after the remedy has been completed, which are caused by inputs that are not controlled by the remedy.

What is Background?

The American Society for Testing and Materials (ASTM) defines background as conditions that are similar to those found at a sediment site, but without the influence of past and present contamination releases that have occurred at the sediment site. This background contamination is usually a combination of releases consistently present in the environment that may or may not be influenced by human activity, and anthropogenic (man-made) releases.

Contaminant of concern (COC) concentrations in sediments, that are not attributable to current or historical site releases or activities, are considered “background concentrations.” The Superfund remedy will remove or cap contaminated sediments, so that they are not a source of contaminants to the water, however, ongoing sources are the sources of contaminants that will continue to enter the water and can end up on the sediment surface. Ongoing sources may include fuel spills and leakage from boats, contaminants that enter Newtown Creek from East River tides, sewer overflow and stormwater runoff, non-aqueous phase liquid (NAPL) seeps, erosion from the banks of the creek, and precipitation, aerosols, and gasses that move from the atmosphere to the earth's surface.

Role of Background When Selecting Cleanup Levels at Superfund Sites

A United States Environmental Protection Agency (USEPA) policy for the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA; also called Superfund) program says that for any media at a site (including sediment), CERCLA “generally, does not clean up to concentrations below natural or anthropogenic background levels” [USEPA 2002]. Thus, USEPA policy allows a COC cleanup level to be based on a background concentration that is realistic and attainable. This policy was

reinforced by USEPA sediment-specific remediation guidance that states “if a risk-based remediation goal is below background concentrations, the cleanup level for that chemical may be established based on background concentrations” [USEPA 2005].

Principles for Setting Cleanup Goals

For an effective remedy at a sediment site that is protective of human health and the environment, it is critical that scientifically sound cleanup goals be set. Background concentrations based on scientific evidence will set the scope and scale of the remedy if these values are used as the cleanup level.

Remedy failure has been observed for at least 25 sediment sites across the United States, which have been recontaminated and have instituted (or are slated for) further remedial action. A number of these sites were recontaminated from off-site sediment sources and/or ongoing stormwater discharges that were not properly accounted for when setting site cleanup levels--this is because practical background concentrations were not utilized when developing the cleanup levels for these sites, resulting in remedy failure.

Estimating Long Term Equilibrium (LTE) Concentrations at Newtown Creek

NCG is working under the supervision of USEPA to determine long-term equilibrium (LTE) concentrations for different sections of Newtown Creek. LTE concentrations are an initial estimate, developed by using a mathematical model, of the levels of contaminants that will exist in the surface sediments following the remedy completion, which are a result of ongoing external inputs.

A more sophisticated and comprehensive chemical fate and transport (CFT) model is also being developed for this purpose, which will be used at a later point in the remedy development process. This model considers various sources contributing to surface sediment contamination, such as contaminants that enter Newtown Creek from East River tides, sewer overflow and stormwater runoff, non-aqueous phase liquid (NAPL) seeps, erosion from the banks of the creek, and precipitation, aerosols, and gasses that move from the atmosphere to the earth's surface. This data is used to predict a concentration associated with sediments that will settle on the remediated surface after the remedy is complete and the system has reached a steady state. Data to develop these are taken from the Newtown Creek Remedial Investigation Report [AQEA 2023].

This model aids in understanding how external inputs can affect sediment concentrations over time, particularly in areas where remediation efforts are undertaken, such as those covered by engineered caps. For example, consider a segment of the creek where contaminated sediment is covered by a two-foot-thick engineered cap constructed from imported clean materials. Immediately following the construction of the cap, COC concentrations in surface sediment would be near-zero. Over time, external inputs from the sources discussed above will naturally increase surface sediment concentrations. The predicted concentrations of contaminants are what is considered background for this

remedy. Other ongoing sources including contaminants associated with sewer overflows and stormwater drainage are controlled by the City of New York. Upland sources are generally addressed by the State of New York or USEPA. New York State is responsible for responding to spills in the Creek.

Conclusion

Taking background levels of contamination into consideration, which will continue to impact the site after the remedy has been completed, is a technically sound and commonly-accepted approach used by EPA to determine remedial actions at Superfund sites. The EPA will set achievable cleanup targets for the sediments that take into account background concentrations. It is a crucial component to remediate the creek effectively and in a manner that is protective of human health and the environment.