



**U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION II**

Emergency and Remedial Response Division

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**MEMORANDUM**

**FROM:** Lorenzo Thantu, Remedial Project Manager  
Eastern New York Remediation Section

**TO:** File

**DATE:** May 26, 2016

**RE:** Technical Rationale for Use of 60 Dilution and Attenuation Factor (DAF) to Develop  
Impact to Ground Water Soil Remediation Standards (IGWSRS)

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The documents, entitled MIGRATION OF ARSENIC TO GROUNDWATER EVALUATION, GLEN COVE WATERFRONT REDEVELOPMENT PROJECT dated June 18, 2015 and MIGRATION OF LEAD TO GROUNDWATER EVALUATION, GLEN COVE WATERFRONT REDEVELOPMENT PROJECT dated July 10, 2015, were submitted by Ramboll Environ for the Glen Cove Redevelopment project in the City of Glen Cove, Nassau County to New York State Department of Environmental Conservation (NYSDEC) and the United States Environmental Protection Agency (USEPA). These documents were in response to previous attempts to establish site-specific Impact to Ground Water Soil Remediation Standards (IGWSRS) for arsenic and lead as per New Jersey Department of Environmental Protection's November 2013 Guidance Document on Development of Site-Specific Impact to Ground Water Soil Remediation Standards Using the Synthetic Precipitation Leaching Procedure. It is stated within the documents that the calculation was based on the use of a Dilution Attenuation Factor (DAF) of 100, as outlined in the NYSDEC's New York State Brownfield Cleanup Program Development of Soil Cleanup Objectives Technical Support Document, a technical paper supporting the Part 375 regulations for soil cleanup objectives (SCO). The technical basis for where the DAF was to be used was when dealing with organic compounds and the fate when the substance reaches the groundwater. To quote the document:

*When contamination leaves a particle of soil in the form of leachate, there are many mechanisms at work that prevent all of the contamination that leaves the contaminated soil from impacting groundwater. For instance, some of the contamination which initially leaches from the soil will be absorbed by other soil particles before it reaches groundwater, while some will be reduced through natural attenuation or other mechanism. These mechanisms occur during transport and may work simultaneously. They include: 1) volatilization; 2) sorption and desorption; 3) leaching and diffusion; 4) transformation and degradation; and 5) change in concentration of contaminants after reaching and/or mixing*

with the groundwater surface.

*Preventing the contamination of groundwater from leachate is an important consideration that must be addressed when determining the appropriate soil cleanup level. The NYSDEC addressed this pathway in its soil cleanup guidance, which has existed since 1992. This guidance assumes an organic carbon content of soil (used for organic chemicals only) and a DAF of 100. The NYSDEC and USEPA's experience with this approach has been that it is effective in protecting groundwater. While there are more sophisticated approaches to determining an SCO that is protective of groundwater, they require significantly more data in terms of soil characteristics, most of which is not routinely required when investigating sites or analyzed at the laboratories that accept environmental samples.*

The use of DAF 100 was not intended to be used for determining SCOs, or IGWSRS, for inorganics such as Arsenic. However, the NYSDEC and USEPA recognize that certain aspects of the Li Tungsten and Captains' Cove sites lends itself to employ a DAF to modify the groundwater IGWSRS for arsenic and lead. The specific site characteristics include the non-homogeneity of the soil, the restriction of any use of groundwater (the City's potable water supply is provided to the affected area), saline nature of the groundwater as a result of the impacts of saltwater intrusion on the affected aquifer, the tidal influence and isolation of the aquifer in the area bounded by Glen Cove Creek, which itself is an operable unit of the site, and continued monitoring of the groundwater in the area.

Therefore, it is appropriate to use a dilution attenuation factor for arsenic and lead to develop a site specific IGWSRS. Using the five criteria included in the technical document, two mechanisms that are not considered significant for dilution/attenuation of arsenic and lead at the site are volatilization; and sorption/desorption. The remaining mechanisms are: leaching and diffusion; transformation and degradation; and change in concentration of contaminants after reaching and/or mixing with the groundwater surface. Determining a DAF for an inorganic compound at the site by taking into account these three factors, a DAF of 60 as a site-specific correction factor is acceptable to the NYSDEC and USEPA. Using DAF of 60, the IGWSRS for arsenic is 175 ppm and lead is 660 ppm.