SRP Tech LPC No. 0990555005

MEMORANDUM

Date: August 27, 2015

To: Cleanup Objectives Review and Evaluation Group (CORE)

From: Jeff Guy, Voluntary Site Remediation Unit
Greg Dunn, Manager, Voluntary Site Remediation Unit

Subject: 0990555005/LaSalle County
Mendota/Black Brothers Company
Site Remediation Program/Technical Reports

Recommendations Requested from CORE:
Concur with development of a Tier 3 remediation objective of 1.48 mg/kg for total mercury for evaluation of the construction worker (outdoor) inhalation pathway.

Background:
- Former Manufactured Gas Plant (MGP)
- Comprehensive
- Residential
- General remedial approach: excavation of entire site (depths of 6' – 28')

The subject property, purchased by Black Brothers Company from Northern Illinois Gas in 1966, is located at the southeast corner of 5th Street and 9th Avenue, in Mendota, Illinois. The former MGP was constructed in 1875 and operated until 1941. Major features historically located on the former MGP property included the following: retorts and purifiers, two gas holders, two crude oil tanks, coal piles, a tar well and other MGP apparatus such as the tar/oil separator and miscellaneous small buildings.

The former MGP occupied approximately 0.65 acres and is currently covered by an asphalt parking lot, as well as a small one-story brick building that is currently used as a parking garage for Black Brothers Company vehicles.

The geology of the site is generally comprised of fill underlain by silty clays with intermittent sand layers. Groundwater is present within 10 feet below ground surface (bgs) and flows towards the north.

Environmental Media of Concern/COC as Related to CORE Request:
Soil/Mercury

Exposure Pathways of Concern as Related to CORE Request:
Construction worker (outdoor) inhalation pathway

Mercury Tier 1 Soil Remediation (Outdoor) Inhalation Objectives:
Residential: 10 mg/kg
Construction worker: 0.1 mg/kg

General Approach:

Total mercury concentrations exceed the Tier 1 remediation objective for the construction worker soil outdoor inhalation exposure route in several samples at the site. Mercury concentrations in environmental samples are generally measured as total mercury using analytical methods such as USEPA SW-846 Method 7471 (USEPA 1986). However, since mercury compounds differ greatly in their toxicity and environmental mobility, total mercury concentrations are not generally indicative of toxicological and environmental hazards. Furthermore, the construction worker soil outdoor inhalation remediation objective for mercury is based on elemental mercury toxicity rather than total mercury toxicity.

To assess the relationship between elemental mercury and total mercury, 35 additional soil samples were collected. Each sample was analyzed for total mercury using USEPA SW-846 Method 7471 and then speciated for elemental mercury using USEPA SW-846 Method 3200 (USEPA 1986) and analyzed using USEPA SW-846 Method 7471 (USEPA 1986). 27 of the 35 soil samples resulted in detected values for both total and elemental mercury. The relationship between elemental and total mercury was estimated through linear regression analysis.

This relationship can be represented mathematically as:

$$C_{Hg\text{-}0} = 0.0636\ C_{Hg\ total} + 0.0053$$

Where:

$C_{Hg\text{-}0}$ = elemental mercury concentration in soil (mg/kg)

$C_{Hg\ total}$ = total mercury concentration in soil (mg/kg)

Appendix M (attached) presents a detailed discussion of the process used to develop the site-specific ratio between total mercury and elemental mercury.

30 samples have a total mercury concentration above the Tier 1 remediation objective of 0.1 mg/kg. Of the 30 samples, 20 had elemental mercury analysis completed, and inadequate sample volume from 10 samples prevented elemental mercury analysis. The above equation was then used to develop a calculated elemental mercury concentration for the 10 samples without elemental mercury analysis. The elemental mercury results were compared to the Tier 1 construction worker outdoor inhalation remediation objective of 0.1 mg/kg.

Elemental mercury concentrations in three samples range from 0.12 mg/kg in SP12 (0.5 to 1.5 feet bgs) to 0.70 mg/kg in SP18 (0.0 to 1.0 feet bgs) – see attached table. The sample locations where elemental mercury exceeds the construction worker soil outdoor inhalation Tier 1 remediation objective are all within 3 feet bgs in fill material.

The equation above was used to calculate a Tier 3 total mercury remediation objective of 1.48 mg/kg as shown below:

$$C_{Hg\ total} = (C_{Hg\text{-}0} - 0.0053)/0.0636$$

Where:

$C_{Hg\text{-}0}$ = 0.1 mg/kg (Tier 1 remediation objective)

$C_{Hg\ total}$ = Tier 3 total mercury concentration in soil (mg/kg)

Recommended Action or Resolution:
Approval of Tier 3 remediation objective for total mercury for evaluation of the construction worker (outdoor) inhalation pathway.

Attachments:
Site Location Map
Surrounding Area Map
Table (one page): elemental mercury exceedances
Statistical Evaluation of Correlation between Total Mercury and Elemental Mercury

CORE Recommendation

0990555005/LaSalle County
Mendota/Black Brothers Company
Site Remediation Program/Technical Reports

Concur with action or resolution proposed by the project manager

Concur with action or resolution proposed by the project manager with the following conditions:

Reject action or resolution proposed by the project manager

Request the following information before issuing a final CORE recommendation:

Section Manager _____ Date 8/27/15

Unit Manager _____ Date 8/27/15

Project Manager _____ Date 8/27/15

Notes: