

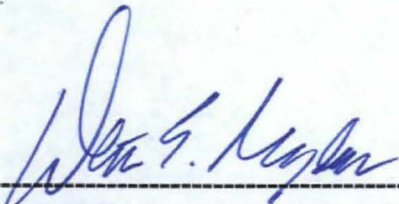
**THIRD FIVE-YEAR REVIEW REPORT FOR  
LI TUNGSTEN SUPERFUND SITE  
NASSAU COUNTY, NEW YORK**

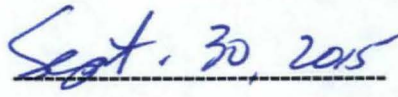


**Prepared by**

**U.S. Environmental Protection Agency  
Region 2  
New York, New York**

**September 2015**

  
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**Walter E. Mugdan, Division Director  
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**Date**

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# Table of Contents

Executive Summary .....	i
Five-Year Review Summary Form .....	ii
I. Introduction.....	1
II. Site Chronology .....	1
III. Background.....	1
Site Location .....	2
Physical Characteristics .....	2
Geology/Hydrogeology.....	3
Land and Resource Use.....	3
History of Contamination .....	4
Initial Response.....	4
Basis for Taking Action .....	5
IV. Site-wide Remedial Actions .....	8
OU 1/OU 2 Remedy Selection .....	8
OU 4 Remedy Selection.....	10
Remedy Implementation .....	11
System Operations, Maintenance and Monitoring .....	14
V. Progress Since Last Five-Year Review .....	16
VI. Five-Year Review Process .....	18
Administrative Components .....	18
Community Involvement.....	19
Document Review .....	19

## Table of Contents (Continued)

Data Review...	19
Site Inspection .....	21
Interview.....	21
Institutional Controls Verification and Effectiveness.....	21
VII. Technical Assessment.....	25
Question A: Is the remedy functioning as intended by the decision documents?.....	25
Question B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives used at the time of the remedy still valid?.....	27
Question C: Has any other information come to light that could call into question the protectiveness of the remedy?.....	28
Technical Assessment Summary .....	28
VIII. Issues/Recommendations, and Follow-up Actions .....	28
IX. Protectiveness Statement.....	30
X. Next Review.....	31

### Tables

- Table 1 – Site Chronology
- Table 2 – Document Review

### Figures

- Figure 1 - Site Location Map
- Figure 2 - Operable Unit Site Map
- Figure 3 - Groundwater and Creek Sampling Locations
- Figure 4 - 2008 – 2015 Arsenic Concentration Trend (Wells EMW-4 and MW-1) and Lead Concentration Trend (Well EMW-4)

### Appendices

- Appendix 1 – EPA Letter to City of Glen Cove Regarding Parcel A
- Appendix 2 – Groundwater Monitoring Data

## EXECUTIVE SUMMARY

This is the third five-year review for the Li Tungsten Superfund site, located in Glen Cove, Nassau County, New York. The purpose of this five-year review is to review information to determine if the remedy is and will continue to be protective of human health and the environment. The triggering action for this statutory five-year review is the completion date of the previous five-year review, signed July 13, 2010.

The remedy at the Site currently protects human health and the environment because there are no complete exposure pathways. However, in order for the remedy to be protective in the long-term, the following actions need to be taken to ensure protectiveness: **(1)** Complete analyses of additional soil samples and, based on results of this data and other recent soil data, evaluate, select (as appropriate) and implement measures to address residual contamination above the remedy cleanup criteria. **(2)** Implement institutional controls (ICs) to address the instances where soil contamination was left in place above residential standards and further remediation will not occur, and to prevent groundwater exposure. **(3)** Complete a Site Management Plan (SMP) which will address, among other things, oversight of ICs. **(4)** Sample and remove the dredge spoils that remain on Parcel A. **(5)** Implement ICs for the portion of the Parcel A bulkhead where radioactive slag was left in place due to logistical issues regarding removal.

## Five-Year Review Summary Form

SITE IDENTIFICATION		
<b>Site Name:</b> Li Tungsten Superfund Site		
<b>EPA ID:</b> NYD986882660		
<b>Region:</b> 2	<b>State:</b> NY	<b>City/County:</b> Glen Cove/Nassau County
SITE STATUS		
<b>NPL Status:</b> Final		
<b>Multiple OUs?</b> Yes	<b>Has the Site achieved construction completion?</b> Yes	
REVIEW STATUS		
<b>Lead agency:</b> EPA If “Other Federal Agency” was selected above, enter Agency name: <a href="#">Click here to enter text.</a>		
<b>Author name (Federal or State Project Manager):</b> Ashley Similo/Lorenzo Thantu		
<b>Author affiliation:</b> EPA		
<b>Review period:</b> 07/13/2010 – 04/30/2015		
<b>Date of Site inspection:</b> 10/28/2014		
<b>Type of review:</b> Statutory		
<b>Review number:</b> 3		
<b>Triggering action date:</b> 07/13/2010		
<b>Due date (five years after triggering action date):</b> 07/13/2015		

**Five-Year Review Summary Form (Continued)**

<b>Issues/Recommendations</b>
<b>OU(s) without Issues/Recommendations Identified in the Five-Year Review:</b>
Click here to enter text.

<b>Issues and Recommendations Identified in the Five-Year Review:</b>
-----------------------------------------------------------------------

<b>OU(s): 1 and 2</b>	<b>Issue Category:</b> Groundwater			
	<b>Issue:</b> Groundwater concentrations remain above MCLs			
	<b>Recommendation:</b> Continue monitoring groundwater at the Site annually to evaluate the effects of past remediation, any further remediation, and redevelopment on groundwater concentrations.			
<b>Affect Current Protectiveness</b>	<b>Affect Future Protectiveness</b>	<b>Implementing Party</b>	<b>Oversight Party</b>	<b>Milestone Date</b>
No	Yes	EPA/PRPs	EPA	October 2015
<b>OU(s): 1 and 2</b>	<b>Issue Category:</b> Soils			
	<b>Issue:</b> Surface and subsurface soils remain above ROD cleanup objectives across some areas of the Site.			
	<b>Recommendation:</b> Complete analyses of additional soil samples and, based on results of this data and other recent soil data, evaluate, select (as appropriate) and implement measures to address residual contamination above the remedy cleanup criteria.			
<b>Affect Current Protectiveness</b>	<b>Affect Future Protectiveness</b>	<b>Implementing Party</b>	<b>Oversight Party</b>	<b>Milestone Date</b>
No	Yes	EPA/PRPs	EPA	December 2015
<b>OU(s): 1 and 2</b>	<b>Issue Category:</b> Institutional Controls			
	<b>Issue:</b> Institutional controls have not been implemented at the Site.			
	<b>Recommendation:</b> Complete implementation of ICs in instances where soil contamination was left in place above remedy cleanup criteria and further remediation will not occur, as well as ICs associated with preventing exposure to Site groundwater. Finalize the SMP which will include measures to monitor ICs.			

**Five-Year Review Summary Form (Continued)**

<b>Affect Current Protectiveness</b>	<b>Affect Future Protectiveness</b>	<b>Implementing Party</b>	<b>Oversight Party</b>	<b>Milestone Date</b>
No	Yes	EPA/PRPs	EPA	December 2020
<b>OU(s): 1</b>	<b>Issue Category:</b> Soils			
	<b>Issue:</b> Dredge spoils remain stockpiled on Parcel A.			
	<b>Recommendation:</b> Ensure that the City of Glen Cove sample and remove the dredge spoils which was previously identified as the responsibility of the City after creek remediation in 2007.			
<b>Affect Current Protectiveness</b>	<b>Affect Future Protectiveness</b>	<b>Implementing Party</b>	<b>Oversight Party</b>	<b>Milestone Date</b>
No	Yes	EPA/PRPs	EPA	December 2015

**IX. Protectiveness Statement**

**Protectiveness Statement(s)**

<i>Operable Unit:</i> 1	<i>Protectiveness Determination:</i> Short-term protective	<i>Addendum Due Date (if applicable):</i>
<i>Protectiveness Statement:</i> The remedy at OU 1 currently protects human health and the environment because there is no risk due to incomplete exposure pathways. However, in order for the remedy to be protective in the long-term, the following actions need to be taken to ensure protectiveness: (1) Complete analyses of additional soil samples and, based on results of this data and other recent soil data, evaluate, select (as appropriate) and implement measures to address residual contamination above the remedy cleanup criteria. (2) Implement ICs to address the instances where soil contamination was left in place above residential standards and further remediation will not occur, and to prevent groundwater exposure. (3) Complete an SMP which will address, among other things, oversight of ICs. (4) Sample and remove the dredge spoils that remain on Parcel A.		
<i>Operable Unit:</i> 2	<i>Protectiveness Determination:</i> Short-term protective	<i>Addendum Due Date (if applicable):</i>
<i>Protectiveness Statement:</i> The remedy at OU 2 currently protects human health and the environment because there is no risk due to incomplete exposure pathways. However, in order for the remedy to be protective in the long-term, the following actions need to be taken to ensure protectiveness: (1) Implement ICs to address the instances where soil contamination was left in place above residential standards and further remediation will not occur, and to prevent groundwater exposure. (2) Complete an SMP which will address, among other things, oversight of ICs.		

**Five-Year Review Summary Form (Continued)**

<i>Operable Unit:</i> 4	<i>Protectiveness Determination:</i> Short-term protective	<i>Addendum Due Date (if applicable):</i>
<i>Protectiveness Statement:</i> The remedy at OU 4 currently protects human health and the environment because radioactive contaminated slag has been dredged from Glen Cove Creek, segregated from dredged sediments, and disposed of off Site. However, in order for the remedy to be protective in the long-term, ICs need to be implemented for the portion of the Parcel A bulkhead where radioactive slag was left in place due to logistical issues regarding removal.		

**Sitewide Protectiveness Statement (if applicable)**

<i>Protectiveness Determination:</i> Short-term protective	<i>Addendum Due Date (if applicable):</i> <a href="#">Click here to enter date.</a>
<i>Protectiveness Statement:</i> The remedy at the Site currently protects human health and the environment because there are no complete exposure pathways. However, in order for the remedy to be protective in the long-term, the following actions need to be taken to ensure protectiveness: <b>(1)</b> Complete analyses of additional soil samples and, based on results of this data and other recent soil data, evaluate, select (as appropriate) and implement measures to address residual contamination above the remedy cleanup criteria. <b>(2)</b> Implement ICs to address the instances where soil contamination was left in place above residential standards and further remediation will not occur, and to prevent groundwater exposure. <b>(3)</b> Complete an SMP which will address, among other things, oversight of ICs. <b>(4)</b> Sample and remove the dredge spoils that remain on Parcel A. <b>(5)</b> Implement ICs for the portion of the Parcel A bulkhead where radioactive slag was left in place due to logistical issues regarding removal.	



## **LI TUNGSTEN SUPERFUND SITE THIRD FIVE-YEAR REVIEW REPORT**

### **I. Introduction**

The purpose of a five-year review is to evaluate the implementation and performance of a remedy in order to determine if the remedy is and will continue to be protective of human health and the environment and is functioning as intended by the decision documents. The methods, findings, and conclusions of reviews are documented in the five-year review. In addition, five-year review reports identify issues found during the review, if any, and document recommendations to address them.

This is the third five-year review for the Li Tungsten site (Site), located in Glen Cove, Nassau County, New York. This five-year review was conducted by the United States Environmental Protection Agency (EPA) Remedial Project Managers (RPMs) Ashley Similo and Lorenzo Thantu. This review was conducted pursuant to Section 121 (c) of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), as amended, 42 U.S.C. §9601 *et seq.* and 40 CFR 300.430(f)(4)(ii), and in accordance with the *Comprehensive Five-Year Review Guidance*, OSWER Directive 9355.7-03B-P (June 2001). This report will become part of the Site file.

The triggering action for this statutory review is the completion date of the previous five-year review. A five-year review is required at the Site due to the fact that hazardous substances, pollutants or contaminants remain at the Site above levels that allow for unlimited use and unrestricted exposure. The Site consists of three operable units (OUs), some of which are addressed in this five-year review. OU 1 involves the excavation and off-site disposal of contaminated soils for the former Li Tungsten facility and contaminated groundwater, OU 2 involves the excavation and off-site disposal of contaminated soils for portions of the Captain's Cove property where Li Tungsten ore residuals were disposed of, and associated contaminated groundwater, and OU 4 involves the dredging of Glen Cove Creek in order to remediate radioactive slag contamination. OU 3, anticipated to be a contaminated building survey and remediation, was subsumed in the subsequent EPA removal action performed from October 1996 through October 1998. **Figure 2** shows the three OUs, OU 1, OU 2, and OU 4, which are addressed in this five-year review.

### **II. Site Chronology**

See **Table 1** for the Site chronology.

### **III. Background**

#### *Site Location*

The Li Tungsten Superfund Site is located in the City of Glen Cove, Nassau County, New York (**Figure 1**). The former Li Tungsten facility is located at 63 Herhill Road, while the Captain's Cove property is located one-half mile farther west on Garvies Point Road. These two properties lie along the northern edge of Glen Cove Creek.

#### *Physical Characteristics*

The Site includes the former Li Tungsten facility, the portions of the Captain's Cove property and adjacent areas where radiologically- and/or metals-contaminated ore residuals associated with the former facility were disposed of, and Glen Cove Creek.

The 26-acre former facility (OU 1) consists of four parcels that were designated by EPA as A, B, C, and C'. Parcel A is a seven-acre paved area abutting Glen Cove Creek which served as the main operations center when the facility was active. Historically, Parcel A contained the majority of buildings, including the Dice complex, as well as storage and processing tanks. Parcel B, a six-acre tract north of Parcel A, is undeveloped land that was used for parking during facility operations and includes a small pond, an intermittent stream and a small wetland. Parcel C, approximately ten acres in size, is north of Parcel A and west of Parcel B. The former Dickson Warehouse and the Benbow Building were located on Parcel C. Parcel C', an undeveloped four-acre tract adjacent to Parcel C, was not utilized as part of the facility and was not contaminated by facility operations.

The 23-acre Captain's Cove property (OU 2) is generally bounded by Hempstead Harbor to the west, Garvies Point Preserve to the north, the Glen Cove Anglers Club to the east, and Glen Cove Creek to the south. A five-acre wetland makes up a portion of the property's southern boundary with the Creek. The portions of Captain's Cove which are part of the Li Tungsten Superfund site consist of the areas designated as Areas A and G. Additionally, Areas A' and G' are smaller, adjacent areas. These areas are locations where radioactive ore residuals and related contaminants from the former facility were periodically disposed of during the time that the facility operated.

Glen Cove Creek (OU 4) is a mile-long tidal creek stretching from the Charles Street bridge at its eastern end to its confluence with Hempstead Harbor to the west. The Creek was channelized in the early 20<sup>th</sup> century by the U.S. Army Corps of Engineers (USACE), which continues to maintain it as a federal navigation channel. The Creek contains a bulkhead along its entire length.

### *Geology/Hydrogeology*

There are two discrete aquifers in the Glen Cove region - the Upper Glacial and the Lloyd Aquifers. In 1978, the aquifer system underlying Nassau and Suffolk Counties was designated a sole source aquifer by EPA in order to safeguard the capability of these aquifers to provide potable water.

The Upper Glacial Aquifer, which is not a source of potable water in the vicinity of the Site, consists of permeable deposits that occur below the water table. The water table at the Site occurs from mean sea level (MSL) to approximately 60 feet above MSL. Recharge is entirely from precipitation, occurring mostly during the late fall and winter when plant growth is dormant. Regionally, shallow groundwater discharges to streams, springs, and Long Island Sound and its harbors. No connection or discharge from the Upper Glacial Aquifer to the deeper Lloyd Aquifer exists in the Site area. Groundwater movement in the Upper Glacial Aquifer is generally to the south, with shallow discharge to Glen Cove Creek.

The clay member of the Raritan Formation is a confining, or relatively impermeable, unit that overlies the Lloyd Aquifer. The Port Washington unit occurs above, and is contiguous with, the clay member in many places. Together, these units form an effective confining unit separating the Lloyd Aquifer from the Upper Glacial Aquifer in the Glen Cove region. Glen Cove's municipal water supply system taps the deeper Lloyd Aquifer in excess of 250 feet below MSL.

### *Land and Resource Use*

The Glen Cove Creek area has been industrialized since the mid-1800s. The immediate area now includes light industry, commercial businesses, a sewage treatment plant, a County public works facility, and State and Federally-designated hazardous waste sites and Brownfields properties. Other land uses in the vicinity include marinas, yacht clubs, beaches, and the Garvies Point Preserve. There are residences within 100 feet of the former facility, along Janet Lane and The Place, and within 1,000 feet of the Captain's Cove property on McLoughlin Street. The Site resides on approximately 50 acres of waterfront property along the Creek, an area which is part of Long Island's "Gold Coast," so-called because of the wealth of those who have historically settled along that part of Long Island's north shore. The Site is split into two roughly equal areas bordering Glen Cove Creek, i.e., Captain's Cove at the western end of the Creek and the former facility property about a half mile east of Captain's Cove near the head of the Creek. The former facility property has been used for various industrial purposes over the years, but in recent times developers became interested in redeveloping land around the Creek into a "showcase" usage to take advantage of the scenic waterfront. Both "Seaport-style" commercial as well as residential

usages have been envisioned for the Li Tungsten site since the 1980's, but the many years of industrial use have created several Brownfields and Superfund sites along the one-mile stretch of the Creek. The City of Glen Cove, the State of New York, and EPA have been addressing the cleanups of these properties for years. The two Li Tungsten properties play a major role in the City's present redevelopment plan to revitalize the Creek area with improved infrastructure, condominiums, a hotel, a theater and arts center, and a ferry terminal as part of water transportation system to serve Connecticut and lower Manhattan. EPA's cleanup of the Li Tungsten site is generally intended to support residential future use, with the present exception of Parcel A which, in the absence of additional sampling/assessment, remediation and/or institutional controls, remains acceptable only for commercial future use. Future use of the Site is generally discussed in the 1999 Record of Decision (ROD), the 2005 Explanation of Significant Differences (ESD), and the Site's remedial action reports (RARs).

### *History of Contamination*

The processing of tungsten and other metals began at the Li Tungsten facility in 1942 and ended in 1985. Operations consisted mainly of processing tungsten ore concentrates and scrap metal containing tungsten into ammonium paratungstate (APT) and formulating APT into tungsten powder and tungsten carbide powder. These operations over the years resulted in contamination of the facility property with heavy metals and radionuclides, as well as contamination of Glen Cove Creek with slag and ore residuals containing elevated radionuclide concentrations.

The Captain's Cove property was used as a dump site for the disposal of incinerator ash, sewage sludge, rubbish, household debris, dredged sediments from Glen Cove Creek, and industrial wastes, including ore residuals from the Li Tungsten facility, from the 1950s to the late 1970s. The ore residuals were deposited at the western (Area A) and eastern (Area G) ends of the property.

### *Initial Responses*

EPA added the Site to the National Priorities List (NPL) on October 14, 1992. In 1993, EPA initiated a Remedial Investigation and Feasibility Study (RI/FS) to define the nature and extent of contamination on the former facility property (OU 1). In 1995, EPA expanded the Site definition to include two waste areas, designated "A" and "G," at the Captain's Cove property (OU 2), where ore residuals containing elevated heavy metal and radionuclide concentrations were disposed of. The NY State Department of Environmental Conservation (NYSDEC) designated the remaining portion of the Captain's Cove dumping area as a State Superfund site.

EPA has performed or provided oversight for three time-critical removal actions at the Site:

*1989* – EPA directed the then-owner of the facility property, Glen Cove Development Corporation, to perform various removal activities including disposal of laboratory reagents, drummed chemicals, containment and disposal of a mercury spill, and sampling, analyzing and inventorying work.

*1996* – EPA performed a second major removal action from October 1996 to October 1998, primarily to address the hazards associated with the remaining Li Tungsten tank wastes. This removal action resulted in the disposal of large volumes of waste liquid and sludge from 271 process and storage tanks, primarily on Parcel A, as well as removal and disposal of asbestos and other hazardous chemicals found at the former facility. EPA also demolished two structures on Parcel A, i.e., the Dice Complex and the East Building, because of the physical dangers posed by their structural instability and in order to facilitate access to tanks.

*2001* – EPA directed potentially responsible parties (PRPs) to segregate Creek sediments dredged by the USACE which were found to be contaminated with radionuclide slag from the former facility. These sediments had been placed on Parcel A for dewatering prior to eventual re-use in accordance with the City's beneficial use determination (BUD), issued by the NYSDEC. The radioactive slag was discovered while dredging was underway, forcing suspension of all dredging activity. TDY Industries, Inc., a performing PRP at the Site, segregated radioactive slag from the sediments on Parcel A in the Summer 2002. The segregation was performed under EPA oversight by methodically spreading and instrument-screening six-inch lifts of dewatered sediments, followed by manual removal of any materials exhibiting radiation greater than specified criteria. Afterwards, the City disposed of the non-radioactive sediment at the North Hempstead Landfill for use as grading material, and the segregated radioactive materials were ultimately disposed of at the US Ecology facility in Idaho.

### *Basis for Taking Action*

#### Soils

EPA's remedial investigation (RI) of the Li Tungsten and Captain's Cove properties, performed in the mid-1990's, revealed that many contaminants were left behind as a result of prior Site practices. These contaminants posed a risk to human health and the environment above the risk range established under the NCP. The primary contaminant categories of concern at the Site are radionuclides and heavy metals associated with spent ore residuals and slag.

At the former facility, the RI determined that surface and subsurface soils contained elevated levels of many metals, e.g., antimony, arsenic, barium, copper, cobalt, chromium, lead, manganese, mercury, nickel, radium, thorium, uranium, vanadium, and zinc. The radionuclides of potential concern (ROPC) included uranium-238, radium-226, radium-228, thorium-230 and thorium-232. These are constituents of the ores that were processed at the Li Tungsten facility or otherwise waste products of the manufacturing processes.

Investigation of the Captain's Cove property confirmed that the ROPCs were present but limited to two separate areas of the property, denoted as Area A (west end) and Area G (east end), where ore residuals from the former facility operations had been dumped.

A risk assessment conducted for the Li Tungsten site concluded that, for commercial and residential use scenarios, heavy metals (e.g., arsenic, manganese, cobalt, antimony, and nickel) are present in all four areas at concentrations that may pose unacceptable risks and hazards depending on activities. The risk assessment conducted for Captain's Cove Areas A and G concluded that, under residential and construction worker scenarios, inorganics, e.g., arsenic, manganese, and antimony, and PCBs are present in these areas at concentrations that pose an unacceptable human health risk. Radiological contamination in soils on the Li Tungsten property and Captain's Cove property were above background levels and presented an unacceptable risk to current and future populations.

An ecological risk assessment was also conducted and concluded that inorganic contaminants in soil at Li Tungsten and Captain Cove properties posed an unacceptable risk to ecological receptors.

### Groundwater

Groundwater sampling at the former facility showed contamination by volatile organic compounds (VOCs). The most concentrated area of VOCs was detected in four wells along the border of the Mattiace Petrochemical Co., Inc., Superfund site and Parcel C'. This plume contained high concentrations of a variety of VOCs, including trichloroethylene (TCE) and tetrachloroethylene (PCE), as well as benzene, toluene, ethylbenzene, and xylenes (collectively, BTEX) and was attributed to the leaking underground storage tanks that were removed from the Mattiace site by EPA in 1996/1997. EPA subsequently constructed a groundwater and soil vapor treatment facility at Mattiace to remediate on-site sources as well as to capture and treat the groundwater plume. The treatment facility had been operational since 1999, but the remedy was amended in September 2014 to *in-situ* thermal treatment, bioventing, bioremediation, and a partial vertical containment barrier. Design and implementation of the amended remedy at Mattiace is expected to begin in 2015. EPA completed a five-year review for the Mattiace site in September 2015.

Another less-concentrated plume of VOCs, primarily TCE and PCE, was also detected in the middle portion of Parcel A/Lower Parcel B, downgradient of the Crown Dykman State Superfund site and attributable to previous dry cleaning operations at that site. The NYSDEC issued a ROD in March 2010 selecting a remedy which includes *in-situ* chemical oxidation of the more concentrated areas of the groundwater plume, operation of a recovery system for light non-aqueous phase liquids, continued operation of an existing soil vapor extraction and sub-slab depressurization system, and monitored natural attenuation of the off-site plume. The NYSDEC is presently conducting pilot test to determine design parameters for soil vapor injection system and, upon its completion, will bid the remedy projected for late 2016.

Inorganic contaminants of concern were detected in groundwater samples above EPA and State maximum contaminant levels (MCLs) in several locations, but in no clearly defined areal pattern. Most of the elevated levels were not significantly above MCLs. Radionuclides, although found to be above background in a few wells on-site, generally met or only slightly exceeded drinking water standards.

Groundwater sampling at Captain's Cove found radionuclides in a few wells at low levels but detectable concentrations. Several wells on the property also were contaminated with generally low levels of a variety of VOCs, such as chlorobenzene, vinyl chloride, and 1,2-dichloroethane, and may be part of the plume related to the Mattiace site (although there are other potential source candidates in the immediate area). Inorganic compounds such as arsenic, antimony, selenium, iron, and manganese were also detected in significant amounts in several wells.

#### Ponds, Wetlands and Sediment

Samples collected from the ponds and wetland areas on Parcels A, B, and C on the former facility showed that a significant number of inorganics in the ponded water and sediments were present at levels exceeding NYSDEC criteria. Radionuclides were generally found to be within water quality and sediment guidance values.

Samples collected from each of the two retention ponds and from a topographic depression in the southwest portion of the Captain's Cove property similarly found that inorganics typically exceeded surface water and sediment criteria, while radionuclides did not.

A risk assessment was conducted for these areas on the Li Tungsten property and concluded that, under future adolescent trespasser scenario, inorganics in the pond sediment and surface water posed an unacceptable human health risk.

An ecological risk assessment was also conducted and concluded that pond, sediment and surface water inorganic contaminants posed an unacceptable risk to ecological receptors.

### Glen Cove Creek

No samples of sediments or surface water were collected from Glen Cove Creek as part of the Li Tungsten field work, since there has been a Creek monitoring program performed pursuant to the June 1991 ROD for the Mattiace site. Given the industrial nature of this area, there are many potential sources of contamination in the Creek. The former Mattiace monitoring program consisted of four locations along the length of the Creek, at which both the water column and sediments were analyzed for VOCs, SVOCs, inorganic contaminants, pesticides and polychlorinated biphenyls (PCBs) (see **Figure 3**). The sediment data from this monitoring program indicate that there are elevated levels of metals which exceed ecological values.

The USACE initiated navigational dredging for the inner half of the Creek in September 2000 and used Parcel A of the Li Tungsten property as a temporary dewatering area. A survey performed by EPA determined that the dredged sediments were contaminated with chunks of radioactive slag from earlier facility operations, which resulted in a stoppage of dredging activities at that time. EPA then directed TDY Industries, Inc., to segregate the radioactive slag from the dewatered sediment on Parcel A and dispose of it off-site, while the City was responsible for disposal of the dried sediment pursuant to a BUD from the State. In order to address the potential for remaining radioactive slag in the Creek, EPA performed a Focused Feasibility Study using existing data to determine that remedial action was needed to address the radioactively contaminated slag in the Creek.

A risk assessment was conducted for the Glen Cove Creek and found that radiological contaminants posed an acceptable risk to current/future recreational and construction workers in the creek. For the sediment that had already been dredged and consolidated on the property, the sediment posed an unacceptable risk to future workers and residents of the property.

A screening level ecological risk assessment was also conducted for the Creek and concluded that there is potential risk to ecological receptors.

## **IV. Site-wide Remedial Actions**

### *OU 1/OU 2 Remedy Selection*



The 1999 ROD included the following remedial action objectives (RAOs):

#### Building Materials

- Prevent exposure to building materials contaminated with radionuclides or chemicals of concern;
- Eliminate hazards to future Site workers posed by unstable structures; and
- Remove any structural impediments that might interfere with pre-design sampling and implementation of soil and groundwater remediation.

#### Soil/Sediment

- Prevent or minimize exposure to contaminants of concern through inhalation, direct contact or ingestion; and
- Prevent or minimize cross-media impacts from contaminants of concern in soil/sediments migrating into underlying groundwater.

#### Groundwater/Ponded Water

- Prevent or minimize ingestion, dermal contact and inhalation of inorganic-contaminated groundwater hot spot areas on Lower Parcel C and on Parcel A that are above State and Federal MCLs (Note: organic groundwater contamination from the Crown Dykman State Superfund site is being addressed by the NYSDEC);
- Restore groundwater quality to levels which meet State and Federal standards; and
- Remediate contaminated surface water in on-site ponds to reduce risks to public health and the environment.

In order to achieve these RAOs, EPA selected the following remedial actions as described in the 1999 ROD:

- Excavation of soils and sediments contaminated above cleanup levels;
- Separation of radionuclide-contaminated soil from non-radionuclide soil contaminated with heavy metals;
- Off-site disposal of both radionuclide and metals-contaminated soil at appropriately licensed facilities;
- Off-site disposal of radioactive waste located in the Dickson Warehouse at an appropriately licensed facility;

- Building demolition at the Li Tungsten facility;
- Storm sewer and sump cleanouts at the Li Tungsten facility;
- Institutional controls governing the future use of the Site;
- Decommissioning of Industrial Well N1917 on Parcel A; and
- Collection and off-site disposal of contaminated surface water from Parcels B and C (EPA's RI determined that Parcel C' was uncontaminated); and
- Long-term groundwater monitoring program to assess the recovery of the Upper Glacial Aquifer after the soil remedy is implemented.

#### *OU 4 Remedy Selection*

The 2005 ROD included the following RAOs:

- Reduce or eliminate any direct contact, ingestion, or external radiation threat to public health and the environment associated with ROPC-contaminated slag in the Creek project area; and
- Reduce or eliminate any direct contact, ingestion, inhalation or external radiation threat to public health and the environment associated with ROPC-contaminated slag placed in upland disposal areas.

In order to achieve these RAOs, EPA selected the following remedial actions as described in the 2005 ROD:

- Construction of a dewatering facility on the Li Tungsten property;
- Two phases of Creek dredging to remove radioactive slag materials;
- Dewatering of the dredged sediment followed by segregation of slag from the dewatered sediment; and
- Off-site transportation and disposal of the radioactive slag at an appropriately licensed facility.

All the above remedial actions for OUs 1, 2, and 4 had been considered completed as documented in their associated remedial action reports, except for the implementation of all necessary institutional controls; however, recent sampling by the Site's developer and EPA indicates that some remaining soils (in addition to those previously identified as "red flag areas" by EPA), exceed ROD cleanup criteria (See Recent Sampling Activities section below). The remedial work at the Site is summarized below.

## *Remedy Implementation*

After the issuance of a ROD in 1999 for OU 1 and OU 2, EPA attempted but failed to negotiate a settlement with the PRPs. EPA then issued a series of unilateral administrative orders (UAOs) to the PRPs, first in May 2000 to perform the remedial design (RD) for the northern half of the former facility and a second in September 2000 to complete the remedial action (RA) for certain portions of the remedy (i.e., excavation and off-site disposal work on the northern half of the former facility, and off-site disposal of wastes staged by EPA on the Captain's Cove property). Negotiations with the City of Glen Cove, also a PRP, resulted in an agreement by which the City agreed to finance some of EPA's RA activities at the Captain's Cove property.

### OU 1 - Former Facility

At the former facility (OU 1), soil above cleanup criteria was excavated on Parcels A and Lower Parcel C by EPA's Removal Action Branch (RAB). 528 cubic yards (cy) of soil exceeding radiation criteria were excavated and staged in the Dickson Warehouse for future off-site disposal. 2,295 tons of nonradioactive soils exceeding heavy metals criteria were excavated and disposed of off Site at a licensed subtitle D facility. In Spring 2004, TDY Industries, Inc., emptied the Dickson Warehouse by disposing of 5,180 tons of radioactive waste materials staged inside. TDY Industries, Inc., also excavated and disposed of 3,530 tons of radioactive soils, some of which failed the Toxicity Characteristic Leachate Procedure (TCLP) for lead, from upper Parcel C. The disposal facility for all radioactive wastes was U.S. Ecology, a licensed radioactive waste disposal facility located in Idaho. In addition, all buildings on Parcel A were razed and disposed of by the RAB, with the exception of the Loung building, which EPA determined to be structurally stable and uncontaminated. The RAB also performed storm sewer and sump clean-out, as well as decommissioning the industrial well on Parcel A.

TDY Industries, Inc., re-mobilized to the Site in June 2006 to complete the remedial work for OU 1. Excavated non-radioactive, heavy-metals contaminated soils were directly loaded on trucks for disposal at the GROWS/Tullytown facility in Pennsylvania. Other contaminated waste streams, i.e., radioactive soil, soil considered hazardous waste under the Resource Conservation and Recovery Act (RCRA), and PCB-contaminated soil, were staged in the Dickson Warehouse for specialized handling and disposal. TDY Industries, Inc., completed all excavation work in July 2007 and demobilized from the Site. TDY Industries, Inc., then re-mobilized to the Site in November 2007 pursuant to a global Consent Judgment which had been entered in Federal Court on October 29, 2007 (TDY Industries, Inc., had performed earlier remedial actions under Administrative Orders). The scope of work now included disposal of the stockpiled radioactive, RCRA-hazardous, and PCB-contaminated soils staged in the Warehouse, as well as

decontamination of the Warehouse itself. Radiologically contaminated soil was shipped to US Ecology in Idaho for disposal, while PCBs-contaminated soil was shipped to Wayne Disposal in Belleville, Michigan. The RCRA-hazardous soils, which were contaminated with lead, were first stabilized with Calciment inside the Dickson Warehouse prior to disposal at the GROWS/Tullytown facility in Pennsylvania. The decontamination of the Warehouse was then completed in July 2008. Radiologically or otherwise contaminated areas of the Warehouse were identified and remediated through employment of various techniques, including removal of sections of the roof that proved too difficult to decontaminate.

### OU 2 - Captains Cove

At the Captain's Cove property (OU 2), an estimated 112,000 tons of soil above cleanup criteria were excavated, segregated and staged by the RAB between 2001 and 2003. RAB segregated these waste soils on-site into five stockpiles of radioactive wastes, three stockpiles of non-radioactive, metals-contaminated wastes, as well as a concrete stockpile and a wood debris stockpile. On behalf of the EPA, the USACE then mobilized to Captain's Cove to commence stockpile load-out, transportation and disposal activities in February 2005. The scope of work generally included characterization sampling of the stockpiled waste materials, loading of stockpiled wastes and debris for off-site disposal, and final Site grading. Wastes were disposed of at a variety of off-site disposal locations, as described more fully in the EPA's RAR for OU 2.

The 1999 ROD's selected remedy for Captain's Cove called for excavation, volume reduction, and off-site disposal of all radioactive/chemical wastes, consistent with the cleanup levels developed for this Site. Post-excavation sampling of the Captain's Cove portion of the Site showed that not only the original cleanup criteria, but also the modified radionuclide criteria were met; therefore, EPA determined that the entire Captain's Cove portion of the Site was excavated to meet residential standards for arsenic, lead, and radionuclides. Sampling of groundwater during the remedial investigation indicated that radionuclides were generally at or below MCLs and a groundwater remedy was not considered. Sampling of monitoring wells on Captain's Cove showed groundwater concentrations above MCLs requiring continued inclusion of the monitoring wells within the Site's long term groundwater monitoring program.

### 2002 ESD

After excavation work was underway, it became apparent that the ROD's estimates of volumes requiring excavation were too low. The EPA issued an ESD for the Site in November 2002 which provided estimated increases in projected volumes of wastes requiring excavation pursuant to the 1999 ROD, from 69,350 cy to 132,100 cy.

Actual volumes reported in the RAR for OU 1 and OU 2 show that approximately 158,000 cy of contaminated soils were ultimately excavated and disposed of off Site. The greater discrepancy between estimated and actual soil excavation volumes occurred at Captain's Cove, partly because the stockpiling of contaminated soils for an extended period of time resulted in additional soils beneath the stockpile being contaminated as a result.

### 2005 ESD

The 1999 ROD stated that the OU 1 and OU 2 remedy would meet commercial cleanup levels, based on the City of Glen Cove's 1998 Glen Cove Creek Revitalization Plan. However, the City subsequently revised the Plan for the properties along the Creek to allow for a significant residential component. As a result, EPA prepared and issued an ESD in May 2005 that reevaluated the 1999 ROD remedy, and presented the following major determinations:

- 1) Based on a re-evaluation of the ROD's cleanup levels, EPA determined that access to any remaining radionuclides needed to be further restricted in soil to allow for residential future use of the Site
- 2) The lead cleanup level that EPA selected in 1999, i.e., 400 milligrams/kilogram (mg/kg), was and still is the residential cleanup level for Superfund sites and is protective of public health under a residential scenario as proposed for this Site;
- 3) The arsenic cleanup level of 24 mg/kg was considered sufficiently protective of a residential scenario using current toxicity values; and
- 4) EPA determined through a review of the post-excavation data that the areas of the Site that had already been excavated prior to the 2005 ESD generally met the residential standards for arsenic, lead, and radionuclides. However, EPA reserved judgment on Parcel A suitability for residential development, due to the presence of certain organic contaminants in the soil and in the shallow groundwater beneath it.

The remedial actions for OU 1 started in February 2000 and a final inspection was performed in August 2008, while the remedial actions for OU 2 started in January 2001 with a final inspection performed in July 2006.

## OU 4 - Glen Cove Creek

EPA designated Glen Cove Creek as OU 4 of the Li Tungsten site. EPA signed a ROD on March 30, 2005, selecting a remedy involving remedial dredging and removal of radioactive hot spots in the Creek. On behalf of the EPA, USACE initiated on-site construction activities in October 2006. First, two large sediment dewatering cells were constructed on Parcel A. To organize dredging operations, the Creek was then divided into four lengths, called acceptance areas. Acceptance Area 4, which was the innermost portion of the Creek between Li Tungsten and the Charles Street bridge, was determined to be outside the scope of Superfund response authority because that area exhibited no evidence of radioactive contamination. Nevertheless, Acceptance Area 4 was dredged as part of OU 4 using funds secured by the USACE for navigational dredging. Dredging was accomplished mechanically by means of a crane equipped with a clamshell bucket. Initially, each acceptance area was dredged to the navigational depth of between eight and ten feet below mean low water (elevation -3.0 feet [NGVD 1929]), followed by a gamma survey of the Creek bottom to determine whether any gamma signal was coming from the dredged channel. Any so-called “hot spots” were subsequently dredged and placed with the rest of the dredged material into the dewatering cells on Parcel A.

TDY Industries, Inc., mobilized to the Site in August 2007 to segregate radionuclide slag from the dewatered sediments. The segregation work typically involved spreading and radiologically scanning a “lift” of material spread out in a layer approximately 6 inches thick. After scanning a lift, any radioactive materials that were detected would be removed from the sediment and stockpiled for off-site disposal. The final volume of scanned sediments was 31,374 cy. The slag was disposed of at US Ecology in Idaho, while the disposal of the dewatered sediment was the responsibility of the City.

The RAB re-mobilized to the Site in October 2007 to complete dredging two isolated “hot spots” against the bulkhead on Parcel A, using a long-reach excavator from land to try to minimize the possibility of extensive bulkhead collapse. EPA also rebuilt part of the bulkhead along Parcel A that had collapsed earlier in a storm. EPA completed this work in July 2008.

### *System Operations, Maintenance and Monitoring*

The following excerpt from the 1999 ROD is relevant to the ongoing monitoring of groundwater on the Li Tungsten properties as well as in Glen Cove Creek (pursuant to the Mattiace remedy):

“...A groundwater monitoring program will be initiated as part of the selected remedy to monitor the quality of the aquifer beneath the Site. Additional monitoring wells will be

added to the existing monitoring well network to increase the network's coverage in areas of known contamination. Monitoring of the sediments and water column of Glen Cove Creek will also continue on an annual basis as part of the Mattiace Superfund long-term response action. The results of both monitoring programs will be integrated to provide a comprehensive analysis of the contaminant profile in groundwater and in the Creek, and to identify any discernible interrelationships or trends. As noted in the discussion on Glen Cove Creek under the Summary of Site Characteristics section, approximately 12,000 cy of sediment were dredged from the mouth of the Creek in 1996; sampling results from monitoring location GC-03, located in this dredged area, indicate significantly lower contaminant levels than previous results for this area. In addition, the planned dredging of the remainder of the Creek this Fall/Winter, which will include dredging of the entire width of the Creek fronting virtually all of Parcel A to a depth of 8 feet, will result in the removal of approximately 35,000 cy of sediment. This sediment removal coupled with EPA and DEC remedial actions planned for the Li Tungsten facility and Captain's Cove, as well as other actions planned or underway for other Federal or State sites, should result in significant improvement in the water quality and sediment quality in the Creek." (The planned dredging of approximately 35,000 cy of sediment was eventually carried out as part of OU 4, after the discovery of the radionuclide slag in sediment's made the Creek part of the Li Tungsten Superfund Site.)

**Figure 3** shows the present groundwater and sediment sampling locations on the Li Tungsten properties and in Glen Cove Creek, respectively. In addition, **Appendix 2** of this report provides sampling data from the 2008 – 2013 groundwater monitoring program. To examine sediment data from Glen Cove Creek, see the Mattiace third Five-Year Review Report (2015).

Following groundwater monitoring activities in 2010, monitoring well PRA-6 was destroyed during Glen Cove Ferry Terminal construction activities. The well was not replaced in time for the 2011 annual groundwater sampling event. On August 6, 2012, a contractor working on behalf of the City of Glen Cove mobilized to re-install replacement well PRA-6 in the new Ferry Terminal lot. The well was installed with a four-inch diameter PVC casing and 15 feet of well screen to a depth of 23.32 feet. Groundwater samples were collected annually through 2013. EPA's Division of Environmental Science and Assessment (DESA) conducted an additional round of sampling in January 2015.

#### Recent Sampling Activities

Additional sampling activities were also conducted by the City of Glen Cove and the potential developer for the Site. The potential developer took soil and groundwater samples on the Li

Tungsten parcels and Captain's Cove to satisfy data gaps identified for their insurance company. Results of the sampling are briefly discussed in the Data Review section of this report. Detailed results can be reviewed in the May 2014 "Pre-Construction Confirmatory/Insurance Data Gap Subsurface Investigation Report" (Pre-Construction Report) prepared by the City's consultant. At the request of NYSDEC, the potential developer also conducted a radiological Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM) final status survey on the Li Tungsten parcels, with the exception of Parcel B. Results of this study can be seen in Safety and Ecology Corporation's April 2015 "Final Status Survey Report Parcel A, Parcel Lower C and Parcel Upper C." This report has been reviewed and approved by EPA and NYSDEC concurring that radiological risks have been addressed at the Site.

Potential Site impacts from climate change have been assessed, and the performance of the remedy is currently not at risk due to the expected effects of climate change in the region and near the Site.

## **V. Progress since Last Five-Year Review**

The second Five-Year Review Report was issued on July 13, 2010. The report included the following protectiveness determinations:

### *OU 1*

The remedy at OUI currently protects human health and the environment because all contaminated surface soils have been excavated and disposed off Site. In order to be protective in the long-term, ICs need to be implemented for a few instances where subsurface soil contamination was left in place above residential standards, due to logistical issues regarding removal. A Site Management Plan (SMP) is being developed which will address, among other things, these types of issues during development of the properties. In a case where a long-term restriction needs to be implemented to prevent exposure, the City's IDA is required by the existing Prospective Purchaser's Agreement (PPA) with EPA to develop an appropriate IC, e.g., withdrawal of contaminated groundwater for irrigation, fountains, etc. ICs presently exist to restrict contaminated water withdrawals from the underlying Aquifer for potable water purposes.

### *OU 2*

The remedy at OU 2 currently protects human health and the environment because all contaminated surface and vadose zone soils have been excavated and disposed off-site. In a case where a long-term restriction needs to be implemented to prevent exposure, the City's IDA is required by the existing PPA with EPA to develop an appropriate IC, e.g., withdrawal of



contaminated groundwater for irrigation, fountains, etc. ICs presently exist to restrict contaminated water withdrawals from the underlying Aquifer for potable water purposes.

#### *OU 4*

The remedy at OU 4 currently protects human health and the environment because radioactive contaminated slag has been dredged from Glen Cove Creek, segregated from dredged sediments on Parcel A, and disposed off Site. In order to be protective in the long-term, an IC needs to be implemented by the USACE for the portion of the Parcel A bulkhead where radioactive slag was left in place due to logistical issues regarding removal.

#### *Site-wide Protectiveness Statement*

The remedies at OU 1, OU 2, and OU 4 currently are protective in the short-term because there is no human or environmental exposure to, or ingestion of, contaminated groundwater and soil, and no exposures are expected during the next five years. The community is serviced by public water that meets appropriate Federal and State standards. Remedial actions taken in accordance with the 1999 ROD, as modified by the 2005 ESD, and the 2005 ROD, are currently protecting public health and the environment. However, in order to be protective in the long term, final institutional controls for contamination left at OU 1 and OU 4 should be implemented.

The 2010 five-year review included the following issues/recommendations:

- EPA recommends the continuation of the groundwater monitoring program and the implementation of appropriate institutional controls and strategies through the SMPs.
- Although remedial construction is completed and long-term monitoring of groundwater is required, restricted access should still be maintained prior to redevelopment on the former facility property, primarily because of the physical hazards still posed at that location. Present perimeter fencing lacks integrity in certain locations. This issue should be addressed in the future SMP for the former facility property.
- Additional institutional controls and strategies should also be included in the SMPs to address the considerations listed under Section IV of the five-year review. Site-wide Remedial Actions; specifically, under Institutional Controls.
- The presence of dredged materials that remain stockpiled by the City of Glen Cove on the Parcel A concrete slab is a continuing concern. Failure to remove these materials in a timely fashion has resulted in an accumulation of ponded water that must be addressed. EPA will make these concerns and recommendations known to the City.

The following progress has been made on the 2010 recommendations.

- Groundwater sampling continued on an annual basis through 2013. After review of the data, it was determined annual groundwater sampling should continue, since arsenic levels in the Lower Parcel C area continue to exceed drinking water standards. EPA conducted an additional round of sampling in January 2015. Results of DESA's sampling are consistent with the previous sampling events.
- A draft SMP was submitted by the City of Glen Cove for agency review in 2013. EPA and NYSDEC have provided the City of Glen Cove with comments, and the Agencies are awaiting a revised document. The City still needs to implement ICs. Two items identified under the section "Institutional Controls" in the 2010 five-year review were restricting groundwater use, and managing areas that were known to have soils contamination remaining, or "red flag areas." EPA is evaluating how to best address the red flag areas in light of development plans and results from recent sampling.
- Over the past five years, the perimeter fencing has been secured. Additionally, all buildings on the Li Tungsten properties have been demolished, including the former Dickson Warehouse and Benbow Building on Parcel C, and the former Loung Building on Parcel A. The need for proper maintenance of engineering controls, such as perimeter fencing, will be addressed in the future SMP.
- The dredge spoils stockpiled on Parcel A remain. They have posed an issue for the potential redevelopment as they are covering a large portion of Parcel A. EPA has informed the City of Glen Cove that they need to be removed from the Site in order for development to be able to proceed. The City of Glen Cove is in the process of securing funding to have the dredge spoils removed from the property.

## **VI. Five-Year Review Process**

### *Administrative Components*

The EPA five-year review team included Ashley Similo (EPA-RPM), Lorenzo Thantu (EPA-RPM), Marian Olsen (EPA-Human Health Risk Assessor), Michael Scorca (EPA-Hydrologist), Michael Clemetson (EPA- Ecological Risk Assessor) and Cecilia Echols (EPA-Community Involvement Coordinator). This is a PRP-lead Site.

### *Community Involvement*

EPA published a public notice of the performance of the third five-year review for the Li Tungsten Superfund site on EPA's Li Tungsten site web page as well as on the City of Glen Cove's website. The announcement indicated that EPA is conducting a five-year review of the remedy for the Site to ensure that the implemented remedy remains protective of public health and the environment and is functioning as intended. Once the five-year review is completed, the results will be made available at the local Site repository, the Glen Cove Public Library located at 4 Glen Cove Avenue, Glen Cove, New York. In addition, efforts will be made to reach out to local public officials to inform them of the results. The notice included the telephone number, email and postal address of the RPM and Community Involvement Coordinator for questions related to the five-year review process or the Li Tungsten Site.

### *Document Review*

The documents, data and information which were reviewed in completing this five-year review are summarized in **Table 2**.

### *Data Review*

The Post-ROD groundwater monitoring network consists of five wells that were sampled quarterly from September 2008 to June 2009 and annually from 2010 to 2013. Samples were analyzed at a laboratory for metals (including contaminants of concern arsenic and lead), as well as Radium 226 and Thorium 232. One round of samples of the five wells was also collected by the EPA in January 2015.

Well EMW-4 (22 feet deep) is located on Lower Parcel C. Arsenic concentrations have varied during the monitoring period, ranging between 54 micrograms per liter (ug/L) (2008), to 510 ug/L (2013), to 100 ug/L (2015). Lead concentrations ranged between 10.8 to 1.7 ug/L; all lead values are below the EPA Action Level of 15 ug/L.

Well MW-1 (17.2 feet deep) is located at Captain's Cove, well beyond the area where EPA performed its excavation for radioactive ores and related contamination, and also outside the area where NYSDEC performed its remediation. Arsenic concentrations ranged from 1,660 to 460 ug/L during the 2008-2015 monitoring period. Lead concentrations were 1.0 ug/L or less in all samples.

**Figure 4** shows plots of arsenic concentration trend for Wells EMW-4 and MW-1 and lead concentration trend for Well EMW-4 for 2008 – 2015 period. These two wells have consistently showed elevated arsenic (EMW-4 and MW-1) concentrations.

Well MP-6 (16.2 feet deep) is located on the upgradient part of Parcel A. During the five-year review period, arsenic concentrations ranged between not-detected to 2.5 ug/L, all below the MCL of 10 ug/L. Lead concentrations ranged between 0.42 to 2.8 ug/L, all below the EPA Action Level of 15 ug/L.

Well PRA-7 (20.6 feet deep) is located on Parcel B. The concentration of arsenic exceeded the MCL during only one sampling round (15.3 ug/L in 2009). Arsenic was not detected in the latest round of sampling in January 2015. Lead concentrations have ranged between less than 1 ug/L to 9.5 ug/L, all below the EPA Action Level of 15 ug/L.

Wells PRA-6 (20.3 feet deep) and replacement well PRA-6 (23.32 feet deep) are located about 650 feet southwest of the Li Tungsten property, near the new Ferry Terminal lot and also one of EPA's former excavation areas at the east end of Captain's Cove. Arsenic concentrations ranged between 4 to 13.4 ug/L, exceeding the MCL of 10 ug/L only twice during the nine sampling rounds. Lead concentrations exceeded the MCL of 15 ug/L during the first two sampling rounds in 2008, but have since declined to not-detected in 2015.

A contractor for the Garvies Point redevelopment company conducted an investigation during 2013 to 2014 and provided findings in the May 2014 Pre-Construction Report. A total of 176 soil borings and five test pits were installed and 463 soil samples analyzed to confirm the existing conditions for the Li Tungsten Site, which includes Parcel A, Parcel B, Parcel Lower C, Parcel Upper C, Parcel C', Dickson Street, and Garvies Point Road. Analytical results of the soil samples indicated that twenty-five soil borings contained at least one sample with an arsenic concentration greater than 24 mg/kg. Only three soil borings contained a sample with a lead concentration greater than 400 mg/kg. Sporadic detections at concentrations in excess of NYSDEC Restricted-Residential Use Soil Cleanup Objectives were found for some other metals, SVOCs, pesticides, and some PCBs (PCB results were limited to Parcel B). EPA is evaluating how best to address the residual contamination.

A total of 13 groundwater samples were collected from temporary well borings throughout the Li Tungsten Site. Samples from these temporary wells provide screening level data. Samples from ten temporary wells contained total arsenic concentrations greater than 10 ug/L, but only three of those contained dissolved arsenic concentrations greater than 10 ug/L. Samples from nine temporary wells contained total lead concentrations greater than 15 ug/L, but no samples contained

dissolved lead concentrations greater than 15 ug/L. Some chlorinated VOCs were detected above NYSDEC Class GA Ambient Water Quality Standards (AWQS) on Parcel A and Parcel Lower C. Some SVOCs and other dissolved metals were detected in groundwater samples sporadically throughout the Site. These compounds were also detected in the saturated soil in the same vicinity as the groundwater detections. Radiological compounds were within AWQS with the exception of the sample collected from Parcel A which was elevated due to a reduction in sample volume due to heavy turbidity.

### *Site Inspection*

The inspection of the Site was conducted on October 28, 2014. In attendance were Ashley Similo and Michael Scorca from EPA, Myralee Machol from the City of Glen Cove, and Ellis Koch from Posillico, a representative of the potential developer. The purpose of the inspection was to assess the protectiveness of the remedy.

During the visit, it was observed that all of the commercial buildings on the Site had been demolished. Parcel C was cleared with no debris. Parcel B was clear with some vegetative growth.

Parcel A had construction activities occurring at the Site during the five-year review visit as part of ongoing efforts towards redevelopment. There was a large pile of petroleum-contaminated soil waiting to be disposed of, which has since been removed. These soils came from an excavation that occurred on Parcel A of petroleum contamination that was found during the potential developer's subsurface investigation. Tanks, which were also found, were removed under the NYSDEC Spills program. The excavation was still open, as sidewall data showed elevated contaminant concentrations that required further removal. In order to access the area, soils needed to be moved around on Site so that excavating equipment could get in. The large pile of dredge spoils still remained on Parcel A. The concrete slab has been dug up and crushed in order to perform a MARSSIM survey. The crushed concrete is planned to be used as backfill in some areas on eastern Parcel A, and the dredge spoils will be relocated there temporarily to allow access to the soils beneath them for testing, as well as to allow access to the petroleum excavation.

### *Interviews*

There were no interviews conducted as part of this five-year review.

### *Institutional Controls Verification and Effectiveness*

A discussion of the 1999 ROD's institutional controls language that was modified by the 2005

ESD as a result of the City's decision to re-zone the Site to allow for residential use is included in the ESD.

In July 1999, EPA signed a PPA with the Site owner, i.e., the Glen Cove Industrial Development Agency (IDA), which made provision for the EPA to require ICs it deems necessary on the property, upon the IDA's sale of the property.

The 1999 ROD stated that ICs should be used at the Site to ensure the protection of human health through restrictions on groundwater withdrawals for any purpose that could lead to human exposure, e.g., drinking water, irrigation, fountains, etc. until the groundwater beneath the Site reached cleanup levels, as well as requiring that any new construction on the Site adhere to relevant building codes for radon/thoron gases.

Because groundwater contamination remains beneath the Site, ICs are required to prevent the use of groundwater. New York State law already restricts to a large degree the future use of groundwater at this Site. New York Environmental Conservation Law Section 15-527 provides that on Long Island (which includes Nassau County), "no person or public corporation shall hereafter install or operate any new or additional wells...to withdraw water from underground sources for any purpose or purposes whatsoever where the installed pumping capacity of any such new well or wells singly or in the aggregate, or the total installed pumping capacity of old and new wells on or for use on one property is in excess of forty-five gallons a minute without a permit pursuant to this title." Furthermore, the New York Sanitary Code (Title 10 of the New York Code of Rules and Regulations Section 5-2.4) states that "no person shall construct or abandon any water well unless a permit has first been secured from the permit-issuing official."

The Remedial Action Reports (RARs) for OUs 1 and 4 identify additional instances where ICs may need to be used because contaminants of concern were left on the Site above ROD/ESD cleanup criteria. The RARs also contain additional details as to the nature and location of these conditions:

- Groundwater Beneath the Site (OU 1 and OU 2) - All excavation work during OU 1 and OU 2 by EPA, or by TDY Industries, Inc., under EPA direction, occurred primarily in the vadose (unsaturated) zone above the water table. Any radionuclide contamination found above cleanup criteria below the water table was also excavated; however, non-radioactive, metals-contaminated soils were not. Therefore, there are sporadic occurrences of heavy metals contamination below the water table on the Site (as well as contamination from VOCs in the groundwater under Parcel A and under certain portions of Captain's Cove), which must preclude the use of untreated groundwater from under the Site. As required by

the 1999 ROD, the long term groundwater monitoring program was performed by TDY Industries, Inc., for 5 years at the Site, which ended in 2013, to monitor the progress of groundwater improvement after the overlying contaminated soils were removed.

- Parcel A - Parcel A was remediated to the ROD cleanup criteria for commercial future use. The 2005 ESD recognized that while other portions of the Li Tungsten Site could be used for residential future use if they were excavated to the modified cleanup criteria, Parcel A may have levels of polycyclic aromatic hydrocarbons or possibly other contaminants, e.g., cobalt, that could preclude unrestricted residential use. A small area in the southwest corner of Parcel A may still have concentrations of arsenic above the water table that marginally exceed cleanup criteria, based on post-excavation data. Future intrusive activities in this area should take this into account. Post-excavation confirmatory sampling has demonstrated that the overall cleanup performed during OUs 1 and 2 will permit residential use on these properties, with the continued exception of Parcel A, which is still deemed suitable only for commercial or industrial future use, as per the 1999 ROD. EPA's November 23, 2009 letter to the City of Glen Cove outlines the Agency's position on Parcel A (**Appendix 1**).
- PCB Area on Parcel B - The area denoted as the PCB dumping area in the middle of Parcel B was excavated and PCB-contaminated soils were removed. Samples were then collected which indicated that the northern part of the PCB area marginally exceeded PCB surface soil standards. Therefore, two feet of clean fill were placed over the northern part of the PCB remedial area; moreover, the residual PCB concentrations were in compliance with subsurface soil standards. The need for maintenance of the clean cover or, should a new (lower) grade elevation be desired, additional sampling and remediation of PCBs in subsurface soil, must be communicated to future users of this area of Parcel B.
- Side Wall Along Western Edge of Parcel C - As part of the upper Parcel C excavation, TDY Industries, Inc., surveyed the side wall area of the excavation west of the Dickson Warehouse at 10-meter grid nodes. These survey results, as confirmed by subsequent sampling/laboratory analysis, showed 12 locations with readings above arsenic criteria and 2 locations above lead criteria. This line of arsenic and lead contamination is an extension of a similar line of arsenic and lead contamination running along the western edge of Lower Parcel C that was encountered by the RAB during its earlier excavations.

EPA determined that further excavation along this line of heavy metals contamination was infeasible because of the existing utility and infrastructure present within the immediate area beyond the fence line, (e.g., two storm drain systems as well as underground electric

services). In the area west of the Dickson Warehouse, TDY Industries, Inc.'s contractor provided a physical barrier over the contaminated area along its length by placing a 15-millimeter puncture-resistant poly sheeting. After the poly sheeting was installed, it was covered with clean fill. (EPA recently conducted additional subsurface soil sampling in August 2015 and expects to receive validated analytical results in the near future. Based on the data, EPA will re-evaluate the feasibility of additional remediation on Parcel C in this area.)

- Northeast Corner of Lower Parcel C – For the same reason as for the side wall along the western edge of Parcel C, above, arsenic contamination was left above cleanup criteria in the vicinity of a gas line along a short stretch of Garvies Point Road, abutting the east side of Lower Parcel C. (This area was also sampled by EPA in August 2015.)
- Radionuclides in the North Sideslope of Creek – One of the two “hot spot” locations in the north sideslope adjacent to Parcel A, that was dredged by EPA in October 2007, still showed elevated gamma radiation at 11 feet below mean low water at the point where dredging ceased, due to the potential for bulkhead collapse. The sideslope excavation was then backfilled to the approximate grade of the slope.
- Radionuclides below Navigational Depth in the Creek Channel – Although radionuclides in the Creek’s navigational channel have been effectively remediated to below navigational depth (8+2 feet below mean low water), it is still possible (though unlikely) that radioactive slag could be found at greater depths in the Creek.

As discussed in the *Data Review* section of this report, the potential developer identified additional areas of contamination that remain above ROD cleanup objectives in portions of the Site during their subsurface investigation in 2014. As a result of this new data, EPA has performed follow-up sampling on Lower Parcel C in August 2015. EPA will evaluate the recent data and determine how best to address any residual contaminated soil that is above the ROD cleanup criteria; additional remediation and ICs will be considered.

In addition, as the Site is developed, further evaluation of radon migration as well as soil vapor from off-site VOC groundwater plumes in the area has been recommended by EPA in its 2005 ESD, which explored the remedial consequences of the City’s re-zoning of the Site to allow residential development for both OUs 1 and 2; these issues were also addressed in the City’s SMP for the Captain’s Cove property, the Ferry terminal, and the draft SMP for the Li Tungsten Facility. Because of the potential for migration of radon, as well as soil vapor from off-site volatile chemical groundwater plumes in the study area, EPA believed that any Site controls should include an



assessment of the migration potential of radon gas and chemical vapor through soil for any new construction proposed on the Site, including an assessment of the need to incorporate appropriate safeguards.

Future construction work associated with development of the Site will be performed in conformance with the City's SMPs for the Site properties. Such work has to consider the above issues that remain at the Site and address them as necessary, e.g., institutional or engineering constraints or strategies that will effectively minimize human exposures to these residual contaminants. The City is presently working with Glen Isle Developers to develop the SMPs for the Federal and State Superfund properties that are presently owned by the Glen Cove IDA. These SMPs contain descriptions of the properties and the general methodologies that will be used during Site development that will ensure protection of human health, including that of construction personnel, as well as future employees and residential population. An SMP has already been developed for the ferry terminal location at the eastern end of Captain's Cove and for the Captain's Cove property. An SMP for the Li Tungsten former facility property has been drafted and is currently under review.

Presently, there is fencing and posted signs to limit Site access, particularly on the former facility property. The SMPs will provide direction for future Site maintenance and development, and must address the remaining Superfund issues at the Site described above.

## **VII. Technical Assessment**

*Question A: Is the remedy functioning as intended by the decision documents?*

The remedy is functioning as intended in that contaminated soils, structures and groundwater are have been addressed; however, the identification of residual contamination on portions of the property will require that EPA determine if additional soils need to be addressed pursuant to the measures identified in the 1999 ROD (as modified by the 2005 ESD) or through other measure.

The 1999 ROD, as modified by the 2005 ESD, called for, among other actions, excavation of soils and sediments contaminated above cleanup levels as well as separation of radionuclide-contaminated soil from non-radionuclide soil contaminated with heavy metals followed by replacement with clean backfill. As mentioned earlier, some areas were recognized as "exempted areas" in previous EPA reports that identified elevated levels of Site contaminants left in place in the soils. Also, additional investigations completed by parties for the potential developer on the property discovered soil contamination in areas outside of those previously identified or investigated. To better define the extent of residual contamination, EPA performed additional

sampling on Lower Parcel C in August 2015. EPA will assess all the recent data to determine how best to address the residual contamination. Soil excavation, capping/cover and ICs will all be considered as means to prevent exposure to the residual contamination. In the meantime, as noted above, presently, there is fencing and posted signs to limit Site access, particularly on the former facility property.

The 1999 ROD considered remedial alternatives for groundwater beneath a portion of the Site (Lower Parcel C into the western portion of Parcel A) that was contaminated with arsenic and lead. A “No Action” remedy was selected citing the expectation that the soils remedy (including excavation of arsenic and lead contaminated soils) would improve the groundwater quality beneath the Site. While lead concentrations in groundwater in this area have decreased to levels below the action level, arsenic concentrations still exceed the MCL. As noted above, no one is currently exposed to the groundwater and ICs will be put in place to ensure exposures do not occur in the future. However, an evaluation of the direct contact pathway with on-site groundwater showed that currently this is not a completed pathway since all nearby residents are currently connected to a public water supply and the residents are, therefore, not exposed through this pathway. At the current time, the Upper Glacial Aquifer is not used as a drinking water source in this area and residents rely on the City’s potable water supply. New York Environmental Conservation Law Section 15-527, New York Sanitary Code (Title 10 of the New York Code of Rules and Regulations Section 5-24), and Public Health Ordinance Article 4 all restrict any future potable water well installations in this portion of the aquifer.

Implementation of the ICs to restrict the use of the aquifer immediately underlying the Site for drinking water, irrigation, fountains, etc., will provide additional protections from exposure. The City is presently working with Glen Isle Developers to develop the SMPs for the Federal and State Superfund properties that are presently owned by the Glen Cove IDA. These SMPs will contain descriptions of the properties and the general methodologies that will be used during Site development that will ensure protection of human health, including that of construction personnel, as well as future employees and residential population. Controls on groundwater usage must be a part of the SMPs, as appropriate. An SMP has already been developed for the proposed ferry terminal and an update to an approved SMP to reflect current requirements is being developed for Captain’s Cove. An SMP for the Li Tungsten former facility property has been drafted, but not yet been approved. The groundwater monitoring program will continue. In addition, EPA, as noted above, is considering the removal of additional arsenic contaminated soil; if this contamination is removed from the Site, it may result in further improvement of groundwater quality.

The remedy selected in the 1999 and 2004 RODs addressed contaminated on-site soil and sediment in Glen Cove Creek, calling for the excavation and off-site disposal. The dredging of the creek involved two phases. One phase was dewatering of the sediment and the second was segregation of the slag. A sediment monitoring program was implemented pursuant to the 1991 ROD for the Mattiace site. Since the exposure pathways have been addressed, the remedy is functioning as intended for ecological receptors.

*Question B: Are the (a) exposure assumptions, (b) toxicity data, (c) cleanup levels and (d) remedial action objectives used at the time of the remedy selection still valid?*

Yes, the values used in the risk assessment are valid. The remedy was modified in the 2005 ESD to reflect residential exposures for all portions of the Site except Parcel A, and per the request of the City and developers, EPA is considering potential residential use of Parcel A. As explained above, exposure assumptions have changed, so that future exposure pathways will now involve residential receptors; however, the exposure assumptions used for the residential receptor in the human health risk assessment are still valid.

Other toxicity data and the RAOs, have not changed. EPA's Integrated Risk Information System program is re-evaluating the toxicity of arsenic, and this information will need to be evaluated in the future. In addition, EPA is evaluating the recommendation of the Centers for Disease Control and Prevention (CDC) which modified the blood lead level for protection of children to 5 ug/deciliter (ug/dl). EPA's current level is 10 ug/dl. Further evaluation of any potential changes in the lead level will need to be reviewed in future five-year reviews.

The 2005 ESD explains the modifications to the institutional controls discussed in the 1999 ROD, based on the changes in anticipated future use, as well as recognizing and addressing the potential for chemical vapor migration through soil as a result of groundwater contamination.

At the time of the 1999 ROD, a cleanup goal of 400 mg/kg for lead in soil was selected. It was assumed that, under commercial exposures, young children may be exposed at the property. The 400 mg/kg cleanup goal for lead is consistent with EPA's policy for acceptable residential levels of lead. The cleanup goal for arsenic of 24 mg/kg in soil was also selected in the ROD. Evaluation of residential exposure assumptions found that the 24 mg/kg is within the risk range of  $10^{-6}$  to  $10^{-4}$  and consistent with a noncancer hazard quotient of 1. The toxicity values for these chemicals and Site-related radionuclides have not changed; however a relative bioavailability factor for arsenic was updated but the cleanup levels remain protective.

At the current time, residential development at the Site has not occurred. In the future, as the property is developed, further evaluation of radon migration as well as soil vapor from off-site VOC groundwater plumes in the area has been recommended by EPA in its 2005 ESD for both OUs 1 and 2, and is also addressed in the City's SMP for the Captain's Cove property and the draft SMP for Li Tungsten facility, and is also addressed in the ferry terminal SMP. EPA's "Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils (EPA, 2002)" and updates will need to be used to evaluate vapor intrusion on the property. Based on the results of this analysis, mitigation procedures to reduce potential soil vapor or radon intrusion may be appropriate.

*Question C: Has any other information come to light that could call into question the protectiveness of the remedy?*

There is no other information that calls into question the protectiveness of EPA's remedies selected for this Site.

*Technical Assessment Summary*

The remedies for OU 1, OU 2 and OU 4 were performed in accordance with the 1999 ROD (as modified by the May 2005 ESD) and the 2005 ROD.

- OU 1/OU 2 contaminated soils have been excavated and disposed off-site;
- In a few limited instances where OU 1/OU 2 contamination has not been removed because of logistical or other issues, the areas will be further controlled through the development of additional controls and/or future materials-handling strategies as part of the City's Site-development SMPs or additional remediation.
- No one is presently using contaminated groundwater. In the future, no installation of potable wells is expected nor use of groundwater in any manner that could cause an unacceptable exposure to groundwater contamination. Institutional controls limiting groundwater use will be memorialized in easements and SMPs.

**VIII. Issues/Recommendations, and Follow-up Actions**

<b>OU(s):</b> 1 and 2	<b>Issue Category:</b> Groundwater
	<b>Issue:</b> Groundwater concentrations remain above MCLs

	<b>Recommendation:</b> Continue monitoring groundwater at the Site annually to evaluate the effects of past remediation, any further remediation, and redevelopment on groundwater concentrations.			
<b>Affect Current Protectiveness</b>	<b>Affect Future Protectiveness</b>	<b>Implementing Party</b>	<b>Oversight Party</b>	<b>Milestone Date</b>
No	Yes	EPA/PRPs	DEC	October 2015
<b>OU(s): 1 and 2</b>	<b>Issue Category:</b> Soils			
	<b>Issue:</b> Surface and subsurface soils remain above ROD cleanup objectives across areas of the Site.			
	<b>Recommendation:</b> Complete analyses of additional soil samples and, based on results of this data and other recent soil data, evaluate, select (as appropriate) and implement measures to address residual contamination above the remedy cleanup criteria.			
<b>Affect Current Protectiveness</b>	<b>Affect Future Protectiveness</b>	<b>Implementing Party</b>	<b>Oversight Party</b>	<b>Milestone Date</b>
No	Yes	EPA/PRPs	DEC	December 2015
<b>OU(s): 1 and 2</b>	<b>Issue Category:</b> Institutional Controls			
	<b>Issue:</b> Institutional controls have not been implemented at the Site.			
	<b>Recommendation:</b> Complete implementation of ICs in instances where soil contamination was left in place above remedy cleanup criteria and further remediation will not occur, as well as ICs associated with preventing exposure to Site groundwater. Finalize the SMP which will include measures to monitor ICs.			
<b>Affect Current Protectiveness</b>	<b>Affect Future Protectiveness</b>	<b>Implementing Party</b>	<b>Oversight Party</b>	<b>Milestone Date</b>
No	Yes	EPA/PRPs	EPA/DEC	December 2020
<b>OU(s): 1</b>	<b>Issue Category:</b> Soils			
	<b>Issue:</b> Dredge spoils remain stockpiled on Parcel A.			
	<b>Recommendation:</b> Ensure that the City sample and remove the dredge spoils which was previously identified as the responsibility of the City of Glen Cove after creek remediation in 2007.			
<b>Affect Current Protectiveness</b>	<b>Affect Future Protectiveness</b>	<b>Implementing Party</b>	<b>Oversight Party</b>	<b>Milestone Date</b>
No	Yes	EPA/PRPs	EPA/DEC	December 2015

**IX. Protectiveness Statement**

**Protectiveness Statement(s)**

<i>Operable Unit:</i> 1	<i>Protectiveness Determination:</i> Short-term protective	<i>Addendum Due Date (if applicable):</i> <a href="#">Click here to enter date.</a>
<i>Protectiveness Statement:</i> The remedy at OU 1 currently protects human health and the environment because there is no risk due to incomplete exposure pathways. However, in order for the remedy to be protective in the long-term, the following actions need to be taken to ensure protectiveness: <b>(1)</b> Complete analyses of additional soil samples and, based on results of this data and other recent soil data, evaluate, select (as appropriate) and implement measures to address residual contamination above the remedy cleanup criteria. <b>(2)</b> Implement ICs to address the instances where soil contamination was left in place above residential standards and further remediation will not occur, and to prevent groundwater exposure. <b>(3)</b> Complete an SMP which will address, among other things, oversight of ICs. <b>(4)</b> Sample and remove the dredge spoils that remain on Parcel A.		
<i>Operable Unit:</i> 2	<i>Protectiveness Determination:</i> Short-term protective	<i>Addendum Due Date (if applicable):</i> <a href="#">Click here to enter date.</a>
<i>Protectiveness Statement:</i> The remedy at OU 2 currently protects human health and the environment because there is no risk due to incomplete exposure pathways. However, in order for the remedy to be protective in the long-term, the following actions need to be taken to ensure protectiveness: <b>(1)</b> Implement ICs to address the instances where soil contamination was left in place above residential standards and further remediation will not occur, and to prevent groundwater exposure. <b>(2)</b> Complete an SMP which will address, among other things, oversight of ICs.		
<i>Operable Unit:</i> 4	<i>Protectiveness Determination:</i> Short-term protective	<i>Addendum Due Date (if applicable):</i> <a href="#">Click here to enter date.</a>
<i>Protectiveness Statement:</i> The remedy at OU 4 currently protects human health and the environment because radioactive contaminated slag has been dredged from Glen Cove Creek, segregated from dredged sediments, and disposed of off Site. However, in order for the remedy to be protective in the long-term, ICs need to be implemented for the portion of the Parcel A bulkhead where radioactive slag was left in place due to logistical issues regarding removal.		

<b>Sitewide Protectiveness Statement (if applicable)</b>	
<i>Protectiveness Determination:</i> Short-term protective	<i>Addendum Due Date (if applicable):</i> <a href="#">Click here to enter date.</a>

*Protectiveness Statement:* The remedy at the Site currently protects human health and the environment because there are no complete exposure pathways. However, in order for the remedy to be protective in the long-term, the following actions need to be taken to ensure protectiveness: **(1)** Complete analyses of additional soil samples and, based on results of this data and other recent soil data, evaluate, select (as appropriate) and implement measures to address residual contamination above the remedy cleanup criteria. **(2)** Implement ICs to address the instances where soil contamination was left in place above residential standards and further remediation will not occur, and to prevent groundwater exposure. **(3)** Complete an SMP which will address, among other things, oversight of ICs. **(4)** Sample and remove the dredge spoils that remain on Parcel A. **(5)** Implement ICs for the portion of the Parcel A bulkhead where radioactive slag was left in place due to logistical issues regarding removal.

## **X. Next Review**

The next five-year review report for the Li Tungsten Superfund Site is required five years from the completion date of this review.

## **List of Tables**

Table 1	Site Chronology
Table 2	Document Review



**Table 1 - Site Chronology**

<b>DATE</b>	<b>EVENT</b>
October 1992	Listing of Li Tungsten Site on NPL
September 1999	ROD for OU 1 and OU 2
July 2000	RAB completion of Parcel A RA
August 2001	RAB completion of Lower Parcel C RA
August 2002	PRP completion of dredged dewatered sediment remediation
October 2003	RAB completion of all Captain's Cove excavation work
April 2004	PRP completion of off-site disposal of wastes staged in Dickson Warehouse
March 2005	ROD for OU 4
May 2005	ESD regarding effect of City's zoning changes on the 1999 ROD
August 2005	First Five-Year Review for OU 1 and OU 2
July 2006	EPA/USACE completion of transportation and disposal of all wastes staged at Captain's Cove
February 2007	EPA/USACE completion of remedial dredging of the Creek and the navigational dredging of Acceptance Area 4
November 2007	PRP completion of segregation of radionuclide slag from dewatered Creek sediments on Parcel A
August 2008	PRP completion of excavation and off-site disposal activities for Parcel B and upper Parcel C, including off-site disposal of all "specialty" wastes staged in the Dickson Warehouse
September 2008	Issuance of PCOR
June 2010	Second Five-Year Review
May 2014	Potential Developer's Subsurface Investigation completed
January 2015	Potential Developer's MARSSIM study completed

**Table 2 - Document Review**

<b>Document</b>	<b>Date</b>
Record of Decision for the Li Tungsten Superfund Site, Operable Units 1 and 2	September 30, 1999
Record of Decision for the Li Tungsten Superfund Site, Operable Unit 4	March 30, 2005
Explanation of Significant Differences for the Li Tungsten Superfund Site	May 2005
Remedial Action Report for OU 1 of the Li Tungsten Superfund Site	October 22, 2008
Remedial Action Report for OU 2 of the Li Tungsten Superfund Site	September 29, 2006
Remedial Action Report for OU 4 of the Li Tungsten Superfund Site	September 30, 2008
Preliminary Close-out Report for the Li Tungsten Superfund Site	September 25, 2008
Second five-year review	June 2010
Annual Li Tungsten Groundwater Monitoring Reports	2010-2013
Glen Cove Creek Data Summary (Excel Spreadsheet)	
PWGC Pre-Construction Confirmatory/Insurance Data Gap Subsurface Investigation Report	May 2014
SEC Final Status Survey Report (RSSR) Parcel A, Parcel Lower C and Parcel Upper C	April 2015

## **List of Figures**

- |          |                                                                                                          |
|----------|----------------------------------------------------------------------------------------------------------|
| Figure 1 | Site Location Map                                                                                        |
| Figure 2 | Operable Unit Site Map                                                                                   |
| Figure 3 | Groundwater and Creek Sampling Locations                                                                 |
| Figure 4 | 2008 – 2015 Arsenic Concentration Trend (Wells EMW-4 and MW-1) and Lead Concentration Trend (Well EMW-4) |



TITLE: SITE LOCATION MAP	DATE: MAY 1998	FIGURE NO.: FIGURE 1
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**MALCOLM  
PIRNIE**



LI TUNGSTEN REMEDIAL INVESTIGATION  
 GLEN COVE, NEW YORK  
 USEPA REGION II ARCS  
 CONTRACT NO. 68-W9-0051; W.A. NO. 025-2L4L

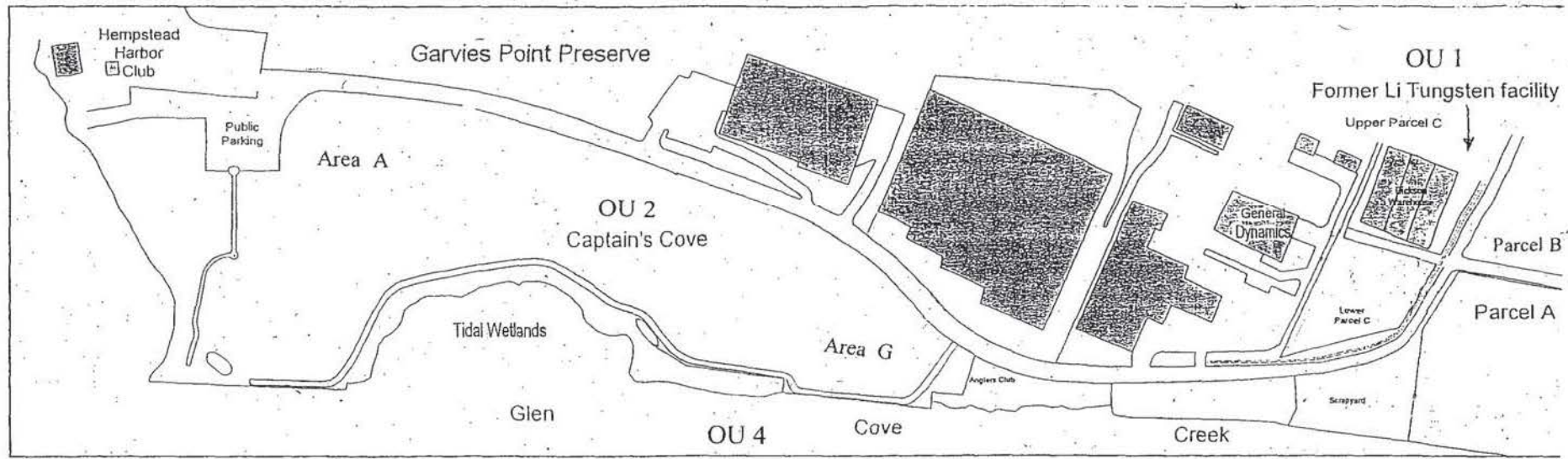


FIGURE 2  
Operable Unit Site Map

# LI TUNGSTEN CORP.

EST. POP. WITHIN A 1 MILE SITE BUFFER: 20779  
(based on Census 2000 Block-level data)

SITE AREA IN ACRES

51.17



SITE ID: NYD986882660

SITE NAME: LI TUNGSTEN CORP.

DATE OF MAP: Feb 26, 2007

RPM: ALS, ED

Contamination Polygon Source Document:  
ROD 09-1999, Capts Cove ROD 09-1999, GlenCove Creek ROD 03-2005

CITY: GLEN COVE

STATE: NY ZIP: 12801

CONG. DIST.: NY03

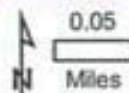
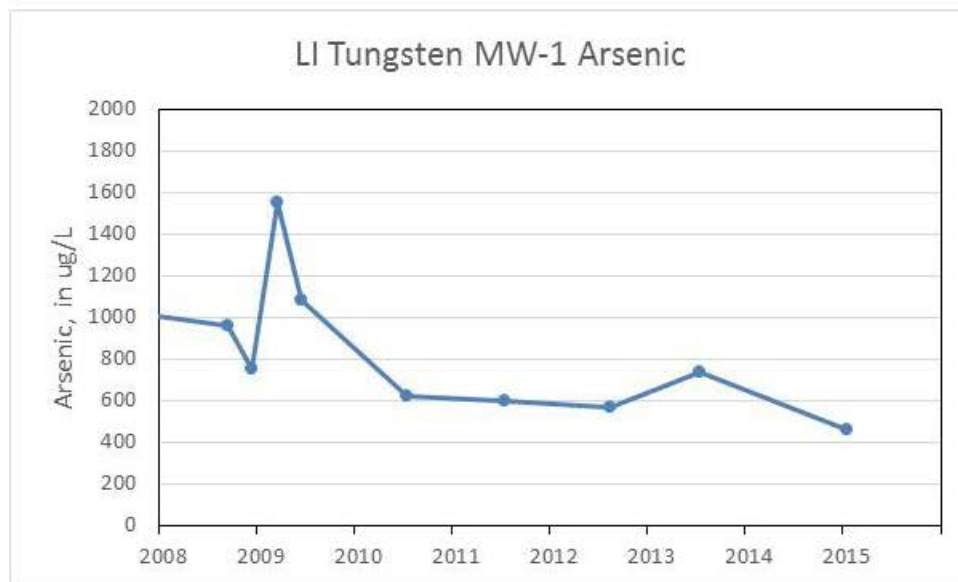
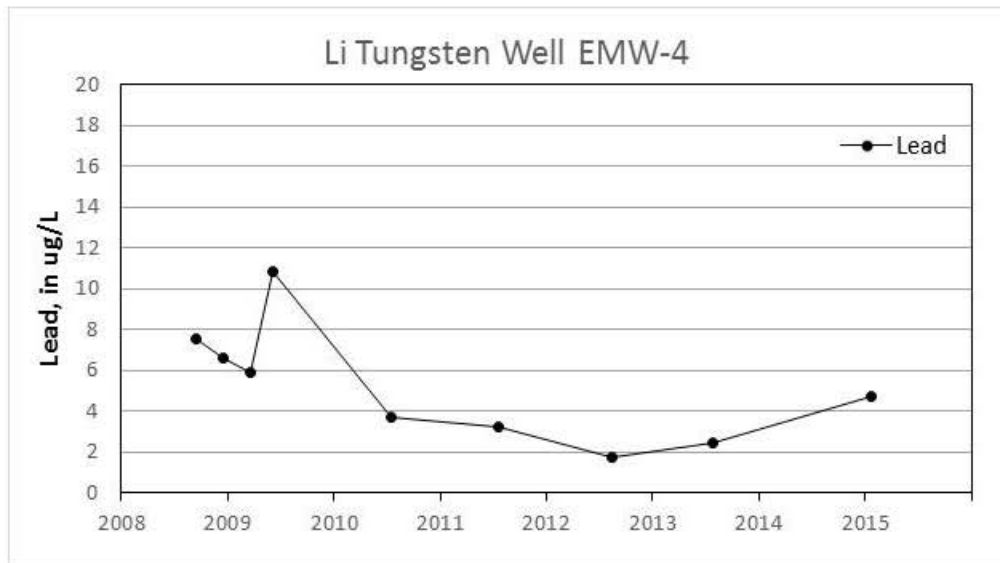
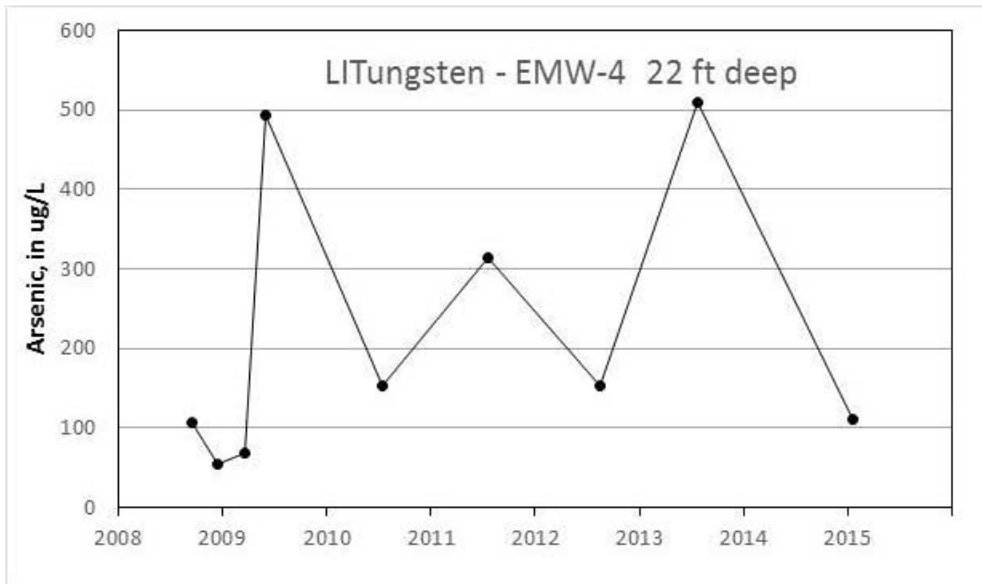


Figure 4 - 2008 – 2015 Arsenic Concentration Trend (Wells EMW-4 and MW-1) and Lead Concentration Trend (Well EMW-4)



**Appendix 1 – EPA Letter to City of Glen Cove Regarding Parcel A**





UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 2

290 BROADWAY

NEW YORK, NY 10007-1866

NOV 23 2009

Ralph Suozzi, Mayor  
City of Glen Cove  
City Hall  
9 Glen Street  
Glen Cove, NY 11542

Re: Request for Parcel A Future Use Re-evaluation, Li Tungsten Superfund site, Glen Cove, NY

Dear Mayor Suozzi:

This is in response to your letter of October 21, 2008, in which the City of Glen Cove requested that EPA evaluate its remedy as it pertains to Parcel A of the above-referenced site, to determine whether the original remedy, as implemented, supports a residential future use.

As you know, EPA selected a remedy in its 1999 Record of Decision (ROD) that was designed to be protective of a commercial, "seaport-style" future use at the Site. At the request of the City, EPA re-evaluated the remedy for portions of the Site, and we determined that the remedy for Parcels B, C, and C' of the former Li Tungsten facility property would be remediated sufficiently to support a residential future use if the radionuclides of potential concern, i.e., those of the uranium and thorium chains, were remediated to a more stringent cleanup level than that set forth in the ROD. This finding was documented in 2005 in EPA's Explanation of Significant Differences (ESD) document.

Specifically, EPA's ESD made the finding that the ROD's clean-up levels for arsenic and lead, i.e. 24 parts per million (ppm) and 400 ppm, respectively, were sufficiently protective of a residential use within the context of the Li Tungsten cleanup. EPA did find in the ESD, however, that the cleanup levels for the radionuclides of concern, i.e. the radionuclides associated with the uranium and thorium decay chains, required modification to a cleanup level approximately one half of that contained in the original ROD, to be sufficiently protective for future residents. In the ESD, EPA did not make a determination regarding a future residential use scenario of Parcel A, but EPA believes

that its cleanup of Parcel A with regard to the parameters mentioned above would meet residential cleanup requirements.

However, in response to your request, EPA has performed an evaluation which has determined that the pre-remediation concentrations of other potential contaminants on Parcel A, such as benzo(a)pyrene and other polycyclic aromatic hydrocarbons (PAHs), result in calculations of cumulative risk from all sources that are outside of EPA's cancer risk range. PAHs were not originally targeted by EPA for remediation because PAHs did not present an unacceptable risk for the anticipated commercial future use of the Site. Additionally, based upon new information, EPA has determined that another heavy metal associated with Li Tungsten operations, i.e., cobalt, could result in unacceptable non-cancer health hazards in residential children.

These findings require a note of explanation. This most recent evaluation used available data from Malcolm Pirnie's 1998 Remedial Investigation (RI) report to develop exposure point concentrations for chemicals that were not originally targeted in the ROD for cleanup i.e., it was assumed that these contaminant concentrations had not been reduced as a result of the Site remediation. For contaminants of concern, targeted clean-up values were used as the assumed concentration actually remaining at the Site. For example, the evaluation's exposure point concentration for arsenic was 24 ppm. Furthermore, at least one of these chemicals' toxicity values i.e., cobalt, has changed since the time of the ROD, and EPA believes that the revised toxicity information is appropriate to be used in its present re-evaluation of risk for Parcel A.

Therefore, in order to utilize Parcel A for future residential use, two possible options are:

- Performance of additional sampling to ascertain current conditions and risks on Parcel A. As a result of the 1999 ROD, EPA excavated many areas contaminated by lead, arsenic, and the radionuclides of concern which may have been co-located with cobalt, PAHs, etc. Additional sampling may reveal that levels of these "non ROD" contaminants may also have decreased because of subsequent remediation. Sample results and risk evaluation could be used to determine whether residential future use would be acceptable on Parcel A and, if not, the additional sampling could be used to target areas for additional excavation such that risks would be reduced to acceptable levels. Any additional sampling, risk assessment and/or remedial excavation on Parcel A would need to be undertaken by the City and would require EPA and State review and approval.
- Presumptive remediation to address risk by eliminating exposure pathways. Because the exposure pathways presently driving the risk are associated with the potential for extended human contact, the placement and maintenance of an acceptable barrier, e.g., two feet of clean cover between exposure points and final grade, may be an acceptable approach to address it. However, such remediation would naturally require additional restrictions on future development, e.g., maintenance of the two feet of cover and its effectiveness.

The above Parcel A discussion can be viewed in the context of the City's ongoing development of a Site Management Plan for the former facility property, which should address both the proper performance of construction activities as well as the necessary institutional controls that require implementation, e.g., no water withdrawals from the underlying Upper Glacial Aquifer, building/infrastructure designs consistent with eliminating the potential for soil vapor intrusion, etc. Also, depending on how the City plans to proceed with respect to Parcel A, EPA may determine that another Explanation of Significant Differences (ESD) or amendment to the remedy set forth in the 1999 ROD is necessary.

Please be advised that the New York State Departments of Environmental Conservation and Health would also have to review and concur on any actions taken with respect to your Parcel A request. Any institutional controls would also need to be implemented prior to development of the parcel.

In summary, should the City wish to proceed with either of these options or would like to discuss this matter further, please call Edward Als of my staff at (212) 637-4272.

Sincerely,



Doug Garbarini, Chief  
NY Remediation Branch

cc: K. Morris, GC IDA  
H. Dudek, DEC  
J. Yavonditte, DEC

## **Appendix 2 – Groundwater Monitoring Data**

**Appendix A**  
**Ground Water Monitoring Results Target Analyte Metals - 2008 - 2013**  
**Li Tungsten Superfund Site**  
**Glen Cove, N.Y.**  
**URS Project # 11140069**

Monitoring Well ID Well Depth Collection Date Matrix Units	Laboratory Reporting Limit (RL) ug/L				US EPA Federal Drinking Water MCL ug/L	New York State MCL ug/L	MW-1 17.2'	MW-1 17.2'	MW-1 (DUP-1) 16.2'	MW-1 17.2'	MW-1 17.2'	DUP-01(MW-1) 17.2'	MW-1 17.2'	MW-1 17.2'	DUP072111(MW-1) 17.2'	MW-1 17.2'	MW-1 17.2'
	9/14/2008	12/18/2008	7/15-16/2010 7/21/2011	other dates			9/14/2008 Water ug/L	12/18/2008 Water ug/L	12/18/2008 Water ug/L	3/18/2009 Water ug/L	6/2/2009 Water ug/L	6/2/2009 Water ug/L	7/15/2010 Water ug/L	7/21/2011 Water ug/L	7/21/2011 Water ug/L	8/13/2012 Water ug/L	7/26/2013 Water ug/L
<b>Target Analyte List (USEPA Method SW846 6020, 7470)</b>																	
Aluminum	300	30	30	30			127 J	ND BE	ND	67.2 J	ND J	ND J	89.9 J	ND	16.3 B	50.1	ND U
Antimony	5	5	5	5			ND	1.1 J	1.1 J	1 J	ND	ND	ND U	ND	ND	ND	ND U
Arsenic	10	10	10	10	10	NS	963	754	788	1550	1060 J	1080 J	623	600	590	565 E	740
Barium	2	10	2	20			59.5	54.1	57	99.7 J	69.4 J	70.1 J	42.1	39.2	39	43.5	69
Beryllium	5	0.5	0.5	0.5			ND	ND	ND	ND	ND	ND	ND U	ND	ND	ND	ND U
Calcium	1000	100	100	100			190000	144000	149000	174000	142000 J	130000 J	144000 <sup>+</sup>	143000 <sup>+</sup>	145000 <sup>+</sup>	188000 <sup>+</sup>	NE 240000
Cadmium	0.5	0.5	0.5	0.5			0.051 J	ND	ND	0.23 J	ND	ND	0.16 B	ND	ND	0.42 B	ND U
Cobalt	2	2	2	2			1.6 J	1.3 J	1.3 J	1.3 J	1.7 J	1.7 J	1.1 B	0.82 B	0.75 B	1.1 B	1.1 J
Chromium	10	10	10	10			ND	ND	ND	ND	ND	ND	ND U	ND	ND	ND	ND U
Copper	1	5	1	1			2	ND	ND	ND	ND J	ND J	1.2	0.72 B	ND	1.8	ND U
Iron	500	50	50	50			22100	15200	15400	31300	25100	26300	17600 J	19200	18600	20100	31000
Potassium	1000	100	100	100			15000	12400	12900	11800	14200 J	13700 J	12400	11100	11200	10900	17000
Magnesium	500	50	50	50			25400	20600	21700	28300	21700 J	19200 J	18900	19500	19700	20000 N	33000
Manganese	20	10	2	20			4660 J	3930 J	4180 J	5730	5130 J	5040 J	3370 <sup>+</sup>	3360 <sup>+</sup>	3390 <sup>+</sup>	2950 E	4000
Mercury	0.2	0.2	0.2	0.2			ND	ND	ND	ND	ND	ND	ND UJ	ND	ND	ND	ND UJ
Silver	2	2	2	2			ND	ND	ND	0.065 J	ND	ND	ND U	ND	ND	ND	ND U
Sodium	500	250	50	500			84500	98700	107000	95700	70400 J	64900 J	48700	51600 <sup>+</sup>	52300 <sup>+</sup>	68300 <sup>+</sup>	NE 86000
Nickel	5	5	5	5			4.7 J	ND	ND	4.8 J	5 J	5.2 J	1.4 B	ND	ND	1.4 B	ND U
Lead	3	3	3	3	15	50	0.94 J	ND	ND	0.96 J	ND	ND	1 B	ND	ND	0.71 B	ND U
Selenium	5	5	5	5			ND	ND	ND	ND	ND	ND	0.68 B	ND	ND	ND	ND U
Thallium	2	2	2	2			2.2 J	ND	ND	ND	ND	ND	0.65 B	ND	ND	ND	ND U
Vanadium	100	10	10	10			ND	ND	ND	ND	ND J	ND J	ND U	ND	ND	ND	ND U
Zinc	10	50	10	10			ND J	ND	ND	ND	ND J	10.5 J	4.6 B	ND	ND	11.4	ND U

**Appendix A**  
**Ground Water Monitoring Results Target Analyte Metals - 2008 - 2013**  
**Li Tungsten Superfund Site**  
**Glen Cove, N.Y.**  
**URS Project # 11140069**

Monitoring Well ID Well Depth Collection Date Matrix Units	Laboratory Reporting Limit (RL) ug/L				US EPA Federal Drinking Water MCL ug/L	New York State MCL ug/L	EMW-4 22'	EMW-4 22'	EMW-4 22'	EMW-4 22'	EMW-4 22'	EMW-4 22'	EMW-4 22'	EMW-4 22'
	9/14/2008	12/18/2008	7/15-16/2010 7/21/2011	other dates			9/14/2008 Water ug/L	12/17/2008 Water ug/L	3/18/2009 Water ug/L	6/2/2009 Water ug/L	7/15/2010 Water ug/L	7/21/2011 Water ug/L	8/13/2012 Water ug/L	7/26/2013 Water ug/L
Target Analyte List (USEPA Method SW846 6020, 7470)														
Aluminum	300	30	30	30			2040	1090 J	1020	826 J	523 J	530 J	216	380
Antimony	5	5	5	5			348	367	403	85.4 J	105	76.6	198	96
Arsenic	10	10	10	10	10	NS	107	54.2	68.2	493 J	153	314	154 E	510
Barium	2	2	2	20			76.6	35.3	32.4	93.1 J	80.5	69.1	72.9	72
Beryllium	5	0.5	0.5	0.5			ND	0.14 J	0.07 J	ND	0.16 B	ND	ND	ND U
Calcium	1000	100	100	100			241000	115000	116000	139000 J	234000	213000	199000 NE	190000
Cadmium	0.5	0.5	0.5	0.5			2.7	2	1.7 J	4.5	1.7	0.89	0.85 B	1.2 J
Cobalt	2	2	2	2			4.4	1.7 J	2.1	22.1	8.8	11.2	4	6.1 J
Chromium	10	10	10	10			4.3 J	ND	ND	ND	ND U	ND	ND	ND U
Copper	1	1	1	1			50.1	33.6	33.2	35.7 J	106	30.1	32	28
Iron	500	50	50	50			3730	1800	2030	6140	1910 J	5070	2520	13000
Potassium	1000	100	100	100			13600	7640	7600	14200 J	19200	14600	39000 E	54000
Magnesium	500	50	50	50			13700	7580	8420	7740 J	8820	7230	6640 N	7000
Manganese	20	2	2	20			175 J	28.5 J	46.2	1660 J	586 J	648	119 E	410
Mercury	0.2	0.2	0.2	0.2			0.1 J	0.074 J	ND	0.28	0.42 J	0.09 B	0.12 B	0.13 J
Silver	2	2	2	2			0.94 J	0.38 J	0.47 J	1.1 J	2.8	0.82 B	1.3 B	ND U
Sodium	500	50	50	500			31900	16800	18100	27000 J	52900	59700	90600 NE	110000
Nickel	5	5	5	5			10	6 J	5.6 J	12.6 J	6.4	6	4.3 B	7 J
Lead	3	3	3	3	15	50	7.5	6.6	5.9	10.8 J	3.7	3.2	1.7 B	2.4 J
Selenium	5	5	5	5			ND	0.52 J	ND	ND	2.5 B	ND	ND	ND U
Thallium	2	2	2	2			ND J	ND	ND	ND	1.5 B	0.74 B	ND	ND U
Vanadium	100	10	10	10			ND	ND	ND	ND J	ND U	ND	ND	ND U
Zinc	10	10	10	10			36.2 J	25.7 J	30.8 J	93.7 J	29.5	35.1	24.1	45 U

**Appendix A**  
**Ground Water Monitoring Results Target Analyte Metals - 2008 - 2013**  
**Li Tungsten Superfund Site**  
**Glen Cove, N.Y.**  
**URS Project # 11140069**

Monitoring Well ID Well Depth Collection Date Matrix Units	Laboratory Reporting Limit (RL) ug/L				US EPA Federal Drinking Water MCL ug/L	New York State MCL ug/L	MP-6 16.2'	MP-6 (DUP-1) 16.2'	MP-6 16.2'	MP-6 16.2'	MP-6 16.2'	MP-6 16.2'	MP-6 16.2'	MP-6 16.2'	DUP072613 (MP-6) 16.2'
	9/14/2008	12/18/2008	7/15-16/2010 7/21/2011	other dates			9/14/2008 Water ug/L	9/14/2008 Water ug/L	12/18/2008 Water ug/L	3/19/2009 Water ug/L	6/2/2009 Water ug/L	7/16/2010 Water ug/L	7/21/2011 Water ug/L	8/13/2012 Water ug/L	7/26/2013 Water ug/L
Target Analyte List (USEPA Method SW846 6020, 7470)															
Aluminum	300	30	30	30			863	956	626 J	629	492 J	1020 J	310	987	690
Antimony	5	5	5	5			4.4 J	3.6 J	1.9 J	0.77 J	ND	ND U	ND	ND	ND U
Arsenic	10	10	10	10	10	NS	ND	ND	ND	ND	1.7 B	1.4 B	1.3 BE	ND	ND
Barium	2	10	2	20			50.9	58.5	39	31.5 J	37.4 J	28.6	30.9	53.5	46
Beryllium	5	0.5	0.5	0.5			ND	ND	ND	0.065 J	ND	0.18 BJ	ND	ND	ND U
Calcium	1000	100	100	100			287000	295000	109000	164000	125000 J	151000 J	87500	143000	92000
Cadmium	0.5	0.5	0.5	0.5			21.3	21.8	6.3	8.5 J	9.4	16	5.5	9.3	2.8
Cobalt	2	2	2	2			24	25.4	11.1	13.4	16.4 J	20.3	20.5	22.7	15
Chromium	10	10	10	10			ND	ND	ND	ND	ND	ND U	ND	ND	ND U
Copper	1	5	1	1			33	33.5	14.4 J	21.9	13.2 J	22.7	12.4	34.1	35
Iron	500	50	50	50			1420	1650	964	1210	848	1210 J	688	1210	1700
Potassium	1000	100	100	100			12100	11900	6300	8490	9920 J	5430 J	5670	6990	5700
Magnesium	500	50	50	50			56700	57300	26100	40500	30100 J	14600 J	12900	16300	15000
Manganese	20	10	2	20			4380 J	4340 J	1120 J	3210	3100 J	1720 J	2160	2760	1800
Mercury	0.2	0.2	0.2	0.2			0.075 J	ND J	ND	ND	ND	ND UJ	ND	ND	0.079 J
Silver	2	2	2	2			ND J	0.25 J	ND	0.083 J	ND	ND U	ND	ND	ND U
Sodium	500	250	50	500			347000	346000	139000	280000	207000 J	55300 J	116000	125000	80000
Nickel	5	5	5	5			45.6	47.5	18.7	19.8 J	24.9 J	26.4	22.8	27.4	17
Lead	3	3	3	3	15	50	1.3 J	1.4 J	1.2 J	1.3 J	ND	1.6 B	0.42 B	1.3 B	1.5 J
Selenium	5	5	5	5			ND	ND	ND	ND	ND	1.4 B	2 B	ND	ND U
Thallium	2	2	2	2			ND J	ND J	ND	ND	ND	ND U	1.9 B	ND	ND U
Vanadium	100	10	10	10			ND	ND	ND	ND	ND J	ND U	ND	ND	ND U
Zinc	10	50	10	10			457 J	520 J	373	300 J	391 J	393	256	316	150

**Appendix A**  
**Ground Water Monitoring Results Target Analyte Metals - 2008 - 2013**  
**Li Tungsten Superfund Site**  
**Glen Cove, N.Y.**  
**URS Project # 11140069**

Monitoring Well ID Well Depth Collection Date Matrix Units	Laboratory Reporting Limit (RL) ug/L				US EPA Federal Drinking Water MCL ug/L	New York State MCL ug/L	PRA-6 20.3' 9/18/2008 Water ug/L	PRA-6 20.3' 12/17/2008 Water ug/L	PRA-6 20.3' 3/18/2009 Water ug/L	PRA-6 (DUP-1) 20.3' 3/18/2009 Water ug/L	PRA-6 20.3' 6/3/2009 Water ug/L	PRA-6 20.3' 7/15/2010 Water ug/L	PRA-6 20.3' 7/21/2011 Water ug/L	PRA-6 23.32' 8/13/2012 Water ug/L	DUP081312 (PRA-6) 23.32' 8/13/2012 Water ug/L	PRA-6 23.32' 7/26/2013 Water ug/L
	9/14/2008	12/18/2008	7/15-16/2010 7/21/2011	other dates												
Target Analyte List (USEPA Method SW846 6020, 7470)																
Aluminum	30	30	30	30			5480 J	7540 J	1700 J	2470 J	203 J	261 J	NS	1910	2090'	280
Antimony	5	5	5	5			ND J	1.1 J	0.54 J	0.49 J	ND	ND U	NS	ND	ND'	ND U
Arsenic	10	10	10	10	10	NS	8.4 J	7.6 J	9.6 J	10.3	ND	13.4	NS	4.8 BE	4 BE	6.5 J
Barium	2	10	2	20			71.8 J	114	128 J	123 J	160 J	209	NS	247	255'	180
Beryllium	0.5	0.5	0.5	0.5			0.26 J	0.38 J	0.064 J	0.12 J	ND	ND UJ	NS	0.51	ND'	ND U
Calcium	500	100	100	100			63600 J	50300	67600	64900	118000 J	74900 J	NS	126000'	125000'	240000
Cadmium	0.5	0.5	0.5	0.5			0.33 J	0.52	0.28 J	0.17 J	ND	ND U	NS	0.26 B	ND'	ND U
Cobalt	2	2	2	2			13.3	15	9.1	10.6	12 J	3.5	NS	4.9	4.2	3.2 J
Chromium	10	10	10	10			8.9 J	10.4	ND J	3.2 J	ND	ND U	NS	ND	ND'	ND U
Copper	1	5	1	1			19.2	34.5 J	7.8 J	10.4	ND J	1.2	NS	23.6	20.4	12
Iron	50	50	50	50			11600 J	15600	13600	15600	43600	31200 J	NS	14800	12900	13000
Potassium	500	100	100	100			42500	29600	32200	32300	39800 J	33800 J	NS	35100 E	37900'	37000
Magnesium	50	50	50	50			47100 J	42300	56300	56600	107000 J	50200 J	NS	89600 N	97300'	120000
Manganese	2	10	2	20			783 J	972 J	1340	1370	1730 J	955 J	NS	1110 E	996 E	780
Mercury	0.2	0.2	0.2	0.2			ND	ND	ND	ND	ND	ND UJ	NS	ND	ND	ND UJ
Silver	2	2	2	2			1.7 J	2 J	0.43 J	0.59 J	ND	0.069	NS	ND'	ND'	ND U
Sodium	1250	2500	50	500			528000 J	436000	462000	465000	837000 J	398000'	J NS	799000''	1060000''	680000
Nickel	5	5	5	5			11.4	13.3	6.6 J	7.6	10.6 J	2.2 B	NS	5.5	4.6 B	6.1 J
Lead	3	3	3	3	15	50	16.5	25.2	6 J	10.3 J	ND	0.97 BJ	NS	1.8 B	1.6' B	ND U
Selenium	5	5	5	5			ND	ND	ND	ND	ND	1.7 B	NS	ND	ND	ND U
Thallium	2	2	2	2			ND J	1.5 J	ND	ND	ND	ND UJ	NS	1.1 B	ND'	ND U
Vanadium	10	10	10	10			11.7	13.6	ND J	3.7 J	ND J	ND U	NS	2.8 B	ND'	ND U
Zinc	10	50	10	10			24.5	61 J	24.8 J	18.7 J	ND	14.4	NS	21.5	25	ND U



**Appendix A**  
**Ground Water Monitoring Results Target Analyte Metals - 2008 - 2013**  
**Li Tungsten Superfund Site**  
**Glen Cove, N.Y.**  
**URS Project # 11140069**

Monitoring Well ID Well Depth Collection Date Matrix Units	Laboratory Reporting Limit (RL) ug/L				US EPA Federal Drinking Water MCL ug/L	New York State MCL ug/L	PRA-7 20.6' 9/18/2008 Water ug/L	PRA-7 20.6' 12/18/2008 Water ug/L	PRA-7 20.6' 3/18/2009 Water ug/L	PRA-7 20.6' 6/3/2009 Water ug/L	PRA-7 20.6' 7/15/2010 Water ug/L	DUP-01(PRA-7) 20.6' 7/15/2010 Water ug/L	PRA-7 20.6' 7/21/2011 Water ug/L	PRA-7 20.6' 8/13/2012 Water ug/L	PRA-7 20.6' 7/26/2013 Water ug/L
	9/14/2008	12/18/2008	7/15-16/2010 7/21/2011	other dates											
<b>Target Analyte List (USEPA Method SW846 6020, 7470)</b>															
Aluminum	30	30	30	30			14600 J	444 J	5740	86.6 J	300 J	167 J	83.6	177	100 J
Antimony	5	5	5	5			ND J	ND	ND	ND	ND U	ND U	ND U	ND	ND U
Arsenic	10	10	10	10	10	NS	3.4 J	ND	15.3	ND	2.8 B	2.2 B	1.1 B	1.4 BE	ND U
Barium	2	2	2	20			103	54.4	92.5	57.8 J	48.3	47.8	49.9	46.5	47
Beryllium	0.5	0.5	0.5	0.5			0.51	ND	0.35 J	ND	ND UJ	ND UJ	ND	ND	ND U
Calcium	100	100	100	100			24700 J	35500	23800	24500 J	47400 J	47800 J	61800	57100	58000
Cadmium	0.5	0.5	0.5	0.5			0.3 J	0.13 J	0.23 J	ND	0.25 B	0.25 B	0.3 B	ND	ND U
Cobalt	2	2	2	2			10.4	3.1	7.4	3.5 J	13.2	13.5	34.3	29.7	46
Chromium	10	10	10	10			22.3	ND	12.3	ND	ND U	ND U	ND	ND	ND U
Copper	1	1	1	1			20.7	2	27.2	ND J	1.1	1.1	0.98 B	1.5	ND U
Iron	50	50	50	50			9210 J	1270	17200	2690	2080 J	1960 J	398	703	960
Potassium	100	100	100	100			5110	4950	3890	5290 J	7290 J	7310 J	9920	9340	11000
Magnesium	50	50	50	50			9560 J	12100	10500	9130 J	15900 J	15900 J	19300	20000	22000
Manganese	2	2	2	20			526 J	337 J	469	388 J	231 J	234 J	115	131	180
Mercury	0.2	0.2	0.2	0.2			ND	ND	ND	ND	ND UJ	ND UJ	ND	ND	ND UJ
Silver	2	2	2	2			ND	ND	0.066 J	ND	ND U	ND U	ND	ND	ND U
Sodium	50	50	50	500			26200 J	30500	18400	21300 J	38200 J	38900 J	38200	60800	76000
Nickel	5	5	5	5			22.6	47.8	44.6 J	77.3	140	142	217	158	220
Lead	3	3	3	3	15	50	8.8	0.6 J	9.5	ND	0.44 B	0.3 BJ	0.18 B	ND	ND U
Selenium	5	5	5	5			ND	ND	ND	ND	0.81 B	ND B	ND	ND	ND U
Thallium	2	2	2	2			ND J	ND	ND	ND	ND U	ND UJ	1.4 B	ND	ND U
Vanadium	10	10	10	10			27.6	ND	21.6	ND J	ND U	ND U	ND	ND	ND U
Zinc	10	10	10	10			43.2	6.8 J	49.7 J	7.4 J	5.6 B	5 B	ND	ND	ND U

**Appendix A**  
**Ground Water Monitoring Results Target Analyte Metals - 2008 - 2013**  
**Li Tungsten Superfund Site**  
**Glen Cove, N.Y.**  
**URS Project # 11140069**

Monitoring Well ID Well Depth	Laboratory Reporting Limit (RL) ug/L				US EPA Federal Drinking Water MCL ug/L	New York State MCL ug/L	Field Blank 9/14 Water ug/L	Field Blank 9/18 Water ug/L	Field Blank 12/18 Water ug/L	Field Blank 12/18 Water ug/L	Field Blank 3/19/2009 Water ug/L	Field Blank 6/3/2009 Water ug/L	Field Blank 7/15/10 Water ug/L	Field Blank 7/21/2011 Water ug/L	Field Blank 8/13/12 Water ug/L	Field Blank 7/26/13 Water ug/L
	9/14/2008	12/18/2008	7/15-16/2010 7/21/2011	other dates												
<b>Target Analyte List (USEPA Method SW846 6020, 7470)</b>																
Aluminum	300	30	30	30			ND	11.0 J	ND	10.8 J	10.9 J	ND J	6.0 J	ND	ND	ND U
Antimony	5	5	5	5			ND	ND	ND	ND	ND	ND U	ND	ND	ND	ND U
Arsenic	10	10	10	10	10	NS	ND	ND	ND	ND	0.79 J	6.3 J	ND U	ND	ND	ND U
Barium	2	2	2	20			ND	8.5	ND	0.58 J	0.38 J	1.5 J	ND U	0.22 B	ND*	0.26 J
Beryllium	5	0.5	0.5	0.5			ND	ND	ND	ND	ND	ND	ND UJ	ND	ND	ND U
Calcium	1000	100	100	100			ND	1100 J	142	77.3 J	ND	2980 J	ND UJ	ND	ND	NE
Cadmium	0.5	0.5	0.5	0.5			ND	ND	ND	0.3 J	ND	ND	ND U	ND	ND	0.31 J
Cobalt	2	2	2	2			ND	ND	ND	ND	ND	ND	ND U	ND	ND	ND U
Chromium	10	10	10	10			ND	ND	ND	ND	ND	ND	ND U	ND	ND	ND U
Copper	1	1	1	1			ND	1.8	13.2 J	12.4 J	0.59 J	ND J	ND U	ND	1	B
Iron	500	50	50	50			ND	ND	ND	ND	ND	ND	ND UJ	29.8 B	ND	ND U
Potassium	1000	100	100	100			ND	257	158	252	51.6 J	7200 J	11.8 BJ	ND	69.4	BE
Magnesium	500	50	50	50			ND	822 J	8.5 J	11.2	ND	335 J	ND UJ	18.5 B	8.6	BN
Manganese	20	2	2	20			ND R	3.6 J	1.1 J	0.87 J	0.29 J	ND	ND UJ	ND	0.34	BE
Mercury	0.2	0.2	0.2	0.2			ND	ND	ND	ND	ND	ND	ND UJ	ND	ND	ND U
Silver	2	2	2	2			ND	ND	ND	ND	ND	ND	ND U	ND	ND*	ND*
Sodium	500	50	50	500			417 J	542 J	97.4	136	91.1 J	563 J	68.8 J	ND	441*	NE
Nickel	5	5	5	5			ND	0.76 J	0.96 J	1	J	ND	ND U	ND	ND	ND U
Lead	3	3	3	3	15	50	ND	ND	ND	ND	ND	ND	ND UJ	ND	ND*	ND*
Selenium	5	5	5	5			ND	ND	ND	ND	ND	ND	ND U	ND	ND	ND U
Thallium	2	2	2	2			ND J	ND J	ND	ND	ND	ND	ND UJ	ND	ND*	ND*
Vanadium	100	10	10	10			ND	ND	ND	ND	ND	ND J	ND U	ND	ND	ND U
Zinc	10	10	10	10			ND	J	ND	12.7	7.1	J	ND	ND	10.2	11

**Notes:**

1. ND = Not Detected above the sample detection limit
  2. J = Estimated result.
  3. E = Matrix Interference
  4. N = Spiked analyte recovery is outside stated control limits
  5. NS = not sampled. Well has been removed and not yet replaced.
  - \* = sample dilution factor of 5.
  - \*\* = sample dilution factor of 20
- N/A = not applicable      NS = No Standard
6. MCL = Maximum Contaminant Level, for Arsenic is 0.01 mg/L = 10 ug/L, Lead is 0.015 mg/L = 15 ug/L
- Shading indicates that the compound is a contaminant of concern for the Li Tungsten Superfund Site

**Appendix A**  
**Ground Water Monitoring Results Radium 226**  
**2008 - 2013**  
**Li Tungsten Superfund Site**  
**Glen Cove, N.Y.**  
**URS Project # 11140069**

Monitoring Well ID	Laboratory Reporting Limit (RL) all dates pCi/L	NYS Ambient Water Quality Standards pCi/L	MW-1 17.2' 9/14/2008 Water pCi/L	MW-1 17.2' 12/18/2008 Water pCi/L	MW-1 (DUP-1) 16.2' 12/18/2008 Water pCi/L	MW-1 17.2' 3/18/2009 Water pCi/L	MW-1 17.2' 6/2/2009 Water pCi/L	DUP-01(MW-1) 17.2' 6/2/2009 Water pCi/L	MW-1 17.2' 7/15/2010 Water pCi/L	MW-1 17.2' 7/21/2011 Water pCi/L	DUPO72111 (MW-1) 17.2' 7/21/2011 Water pCi/L	MW-1 17.2' 8/13/2012 Water pCi/L	MW-1 17.2' 7/26/2013 Water pCi/L
Radium 226	1.0	3.0	0.233	0.279	0.146	0.05	0.229	0.0752	0.161	0.0332	0.0407	0.0362	0.0783
Uncertainty sigma			0.113	0.0861	0.0925	0.0669	0.124	0.0781	0.067	0.054	0.042	0.053	0.22
MDC			0.127	0.242	0.313	0.24	0.149	0.122	0.2	0.223	0.186	0.219	0.439
Qualifier			J	J	UJ	U	J	J	U	U	U	U	U

Monitoring Well ID	Laboratory Reporting Limit (RL) all dates pCi/L	NYS Ambient Water Quality Standards pCi/L	EMW-4 22' 9/14/2008 Water pCi/L	EMW-4 22' 12/17/2008 Water pCi/L	EMW-4 22' 3/18/2009 Water pCi/L	EMW-4 22' 7/29/2009 Water pCi/L	EMW-4 22' 7/15/2010 Water pCi/L	EMW-4 22' 7/21/2011 Water pCi/L	EMW-4 22' 8/13/2012 Water pCi/L	EMW-4 22' 7/26/2013 Water pCi/L
Radium 226	1.0	3.0	0.194	0.116	0.0987	0.495	0.294	0.269	0.217	0.22
Uncertainty sigma			0.034	0.0414	0.0443	0.213	0.13	0.1	0.082	0.31
MDC			0.139	0.109	0.135	0.222	0.394	0.323	0.265	0.577
Qualifier			J	J	U	J	UJ	U	U	U

Monitoring Well ID	Laboratory Reporting Limit (RL) all dates pCi/L	NYS Ambient Water Quality Standards pCi/L	MP-6 16.2' 9/14/2008 Water pCi/L	MP-6 (DUP-1) 16.2' 9/14/2008 Water pCi/L	MP-6 16.2' 12/18/2008 Water pCi/L	MP-6 16.2' 3/19/2009 Water pCi/L	MP-6 16.2' 6/2/2009 Water pCi/L	MP-6 16.2' 7/16/2010 Water pCi/L	MP-6 16.2' 7/21/2011 Water pCi/L	MP-6 16.2' 8/13/2012 Water pCi/L	MP-6 16.2' 7/26/2013 Water pCi/L	DUP072613 (MP-6) 16.2' 7/26/2013 Water pCi/L
Radium 226	1.0	3.0	0.706	0.535	0.241	0.452	0.242	0.312	0.186	0.286	0.223	0.45
Uncertainty sigma			0.273	0.192	0.0882	0.0875	0.115	0.095	0.072	0.098	0.25	0.24
MDC			0.254	0.139	0.263	0.15	0.128	0.259	0.229	0.315	0.451	0.377
Qualifier			J	J	U	J	J	U	U	U	U	U

Monitoring Well ID	Laboratory Reporting Limit (RL) all dates pCi/L	NYS Ambient Water Quality Standards pCi/L	PRA-6 20.3' 9/18/2008 Water pCi/L	PRA-6 20.3' 12/17/2008 Water pCi/L	PRA-6 20.3' 3/18/2009 Water pCi/L	PRA-6 (DUP-1) 20.3' 3/18/2009 Water pCi/L	PRA-6 20.3' 6/2/2009 Water pCi/L	PRA-6 20.3' 7/15/2010 Water pCi/L	PRA-6 20.3' 7/21/2011 Water pCi/L	PRA-6 23.32' 8/13/2012 Water pCi/L	DUP081312(PRA-6) 23.32' 8/13/2012 Water pCi/L	PRA-6 23.32' 7/26/2013 Water pCi/L
Radium 226	1.0	3.0	0.65	0.63	0.683	0.393	0.623	0.487	NS	1.54	1.37	1.09
Uncertainty sigma			0.20	0.11	0.11	0.0844	0.200	0.11		0.22	0.2	0.41
MDC			0.138	0.228	0.161	0.194	0.124	0.193		0.276	0.173	0.348
Qualifier			J	J	J	J	J	J		U	U	U

Monitoring Well ID	Laboratory Reporting Limit (RL) all dates pCi/L	NYS Ambient Water Quality Standards pCi/L	PRA-7 20.6' 9/18/2008 Water pCi/L	PRA-7 20.6' 12/18/2008 Water pCi/L	PRA-7 20.6' 3/18/2009 Water pCi/L	PRA-7 20.6' 6/3/2009 Water pCi/L	PRA-7 20.6' 7/15/2010 Water pCi/L	DUP-01(PRA-7) 20.6' 7/15/2010 Water pCi/L	PRA-7 20.6' 7/21/2011 Water pCi/L	PRA-7 20.6' 8/13/2012 Water pCi/L	PRA-7 20.6' 7/26/2013 Water pCi/L
Radium 226	1.0	3.0	0.668	0.236	0.478	0.176	0.433	0.163	0.455	0.195	0.527
Uncertainty sigma			0.206	0.0874	0.0947	0.097	0.1	0.086	0.13	0.082	0.31
MDC			0.108	0.269	0.206	0.111	0.214	0.281	0.368	0.262	0.483
Qualifier			J	U	J	J	J	U	U	U	U

Monitoring Well ID	Laboratory Reporting Limit (RL) all dates pCi/L	NYS Ambient Water Quality Standards pCi/L	Field Blank 9/14/2008 Water pCi/L	Field Blank 9/18/2008 Water pCi/L	Field Blank 12/18/2008 Water pCi/L	Field Blank 12/18/2008 Water pCi/L	Field Blank 3/19/2009 Water pCi/L	Field Blank 6/3/2009 Water pCi/L	Field Blank 7/15/10 Water pCi/L	Field Blank 7/21/2011 Water pCi/L	Field Blank 8/13/12 Water pCi/L	Field Blank 7/26/13 Water pCi/L
Radium 226	1.0	3.0	0.514	0.173	-0.113	0.422	-0.056	0.0147	0.147	0.192	0.117	0.246
Uncertainty sigma			0.110	0.892	0.099	0.114	0.056	0.0664	0.066	0.084	0.076	0.26
MDC			0.151	0.169	0.407	0.274	0.227	0.128	0.201	0.282	0.279	0.45
Qualifier			U	U	U	J	U	U	U	U	U	U

- Notes:**
- J = Estimated result
  - U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
  - UJ = The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.
  - NS = not sampled. Well has been removed and not yet replaced.

**Appendix A**  
**Ground Water Monitoring Results Thorium 232**  
**2008 - 2013**  
**Li Tungsten Superfund Site**  
**Glen Cove, N.Y.**  
**URS Project # 11140069**

Monitoring Well ID	Laboratory Reporting Limit (RL) all dates pCi/L	Malcolm Pirnie Remedial Investigation Report 1998 <sup>1</sup> pCi/L	MW-1 17.2' 9/14/2008 Water pCi/L	MW-1 17.2' 12/18/2008 Water pCi/L	MW-1 (DUP-1) 16.2' 12/18/2008 Water pCi/L	MW-1 17.2' 3/18/2009 Water pCi/L	MW-1 17.2' 6/2/2009 Water pCi/L	DUP-01 (MW-1) 17.2' 6/2/2009 Water pCi/L	MW-1 17.2' 7/15/2010 Water pCi/L	MW-1 17.2' 7/21/2011 Water pCi/L	DUP072111 (MW-1) 17.2' 7/21/2011 Water pCi/L	MW-1 17.2' 8/13/2012 Water pCi/L	MW-1 17.2' 7/26/2013 Water pCi/L
Thorium 232	1.0	1.6	0.018	-0.009	0.019	-0.044	0.027	0.015	0.01	ND	-0.00371	0.0385	-0.00715
Uncertainty sigma			0.085	0.019	0.093	0.04	0.055	0.051	0.05	0.042	0.047	0.057	0.09
MDC			0.22	0.21	0.24	0.3	0.074	0.12	0.13	0.169	0.187	0.302	0.204
Qualifier			U	U	U	U	U	U	U	U	U	U	U

Monitoring Well ID	Laboratory Reporting Limit (RL) all dates pCi/L	Malcolm Pirnie Remedial Investigation Report 1998 <sup>1</sup> pCi/L	EMW-4 22' 9/14/2008 Water pCi/L	EMW-4 22' 12/17/2008 Water pCi/L	EMW-4 22' 3/18/2009 Water pCi/L	EMW-4 22' 6/2/2009 Water pCi/L	EMW-4 22' 7/15/2010 Water pCi/L	EMW-4 22' 7/21/2011 Water pCi/L	EMW-4 22' 8/13/2012 Water pCi/L	EMW-4 22' 7/26/2013 Water pCi/L
Thorium 232	1.0	1.6	0	0	-0.028	0.12	-0.016	-0.00383	-0.00652	0.0325
Uncertainty sigma			0.034	0.056	0.028	0.15	0.019	0.048	0.082	0.065
MDC			0.11	0.18	0.21	0.21	0.15	0.192	0.328	0.131
Qualifier			U	U	U	U	U	U	U	U

Monitoring Well ID	Laboratory Reporting Limit (RL) all dates pCi/L	Malcolm Pirnie Remedial Investigation Report 1998 <sup>1</sup> pCi/L	MP-6 16.2' 9/14/2008 Water pCi/L	MP-6 (DUP-1) 16.2' 12/17/2008 Water pCi/L	MP-6 16.2' 12/18/2008 Water pCi/L	MP-6 16.2' 3/18/2009 Water pCi/L	MP-6 16.2' 6/2/2009 Water pCi/L	MP-6 16.2' 7/15/2010 Water pCi/L	MP-6 16.2' 7/21/2011 Water pCi/L	MP-6 16.2' 8/13/2012 Water pCi/L	MP-6 16.2' 7/26/2013 Water pCi/L	DUP072613(MP-6) 16.2' 7/26/2013 Water pCi/L
Thorium 232	1.0	1.6	0.028	0.016	0.11	-0.006	0.017	ND	-0.00363	0.0573	0.0872	-0.0051
Uncertainty sigma			0.092	0.075	0.14	0.013	0.055	0.021	0.045	0.058	0.12	0.064
MDC			0.22	0.19	0.12	0.15	0.13	0.14	0.182	0.231	0.176	0.176
Qualifier			U	U	U	U	U	UR	U	U	U	U

Monitoring Well ID	Laboratory Reporting Limit (RL) all dates pCi/L	Malcolm Pirnie Remedial Investigation Report 1998 <sup>1</sup> pCi/L	PRA-6 20.3' 9/18/2008 Water pCi/L	PRA-6 20.3' 12/17/2008 Water pCi/L	PRA-6 20.3' 3/18/2009 Water pCi/L	PRA-6 (DUP-1) 20.3' 3/18/2009 Water pCi/L	PRA-6 20.3' 6/3/2009 Water pCi/L	PRA-6 20.3' 7/15/2010 Water pCi/L	PRA-6 20.3' 7/21/2011 Water pCi/L	PRA-6 23.32' 8/13/2012 Water pCi/L	DUP0813812(PRA-6) 23.32' 8/13/2012 Water pCi/L	PRA-6 23.32' 7/26/2013 Water pCi/L
Thorium 232	1.0	1.6	0.23	0.03	0.022	0.03	-0.016	0.006	NS	-0.00923	0.0366	-0.00351
Uncertainty sigma			0.203	0.11	0.096	0.12	0.018	0.052		0.058	0.0044	0.088
MDC			0.138	0.27	0.24	0.32	0.15	0.14		0.285	0.199	0.177
Qualifier			J	U	U	U	U	U	U	U	U	U

Monitoring Well ID	Laboratory Reporting Limit (RL) all dates pCi/L	Malcolm Pirnie Remedial Investigation Report 1998 <sup>1</sup> pCi/L	PRA-7 20.6' 9/18/2008 Water pCi/L	PRA-7 (DUP-1) 20.6' 9/18/2008 Water pCi/L	PRA-7 20.6' 12/18/2008 Water pCi/L	PRA-7 20.6' 3/18/2009 Water pCi/L	PRA-7 20.6' 6/3/2009 Water pCi/L	PRA-7 20.6' 7/15/2010 Water pCi/L	DUP-01 (PRA-7) 20.6' 7/15/2010 Water pCi/L	PRA-7 20.6' 7/21/2011 Water pCi/L	PRA-7 20.6' 8/13/2012 Water pCi/L	PRA-7 20.6' 7/26/2013 Water pCi/L
Thorium 232	1.0	1.6	0.62	0.70	0.038	0.25	0.011	0.065	-0.017	-0.00926	0.0718	-0.00305
Uncertainty sigma			0.34	0.41	0.095	0.22	0.055	0.086	0.017	0.047	0.079	0.076
MDC			0.21	0.16	0.2	0.13	0.14	0.13	0.13	0.222	0.317	0.153
Qualifier			J	J	U	J	U	U	U	U	U	U

Monitoring Well ID	Laboratory Reporting Limit (RL) all dates pCi/L	Malcolm Pirnie Remedial Investigation Report 1998 <sup>1</sup> pCi/L	Field Blank 9/14/2008 Water pCi/L	Field Blank 9/18/2008 Water pCi/L	Field Blank 12/18/2008 Water pCi/L	Field Blank 12/18/2008 Water pCi/L	Field Blank 3/19/2009 Water pCi/L	Field Blank 6/3/2009 Water pCi/L	Field Blank 7/15/2010 Water pCi/L	Field Blank 7/21/2011 Water pCi/L	Field Blank 8/13/2012 Water pCi/L	Field Blank 7/26/2013 Water pCi/L
Thorium 232	1.0	1.6	0.017	0.042	0.010	-0.021	0.048	0.087	-0.0043	-0.0098	-0.0039	0.0000
Uncertainty sigma			0.056	0.084	0.110	0.029	0.092	0.087	0.0086	0.0500	0.0480	0.084
MDC			0.13	0.16	0.29	0.27	0.17	0.059	0.097	0.234	0.0194	0.168
Qualifier			U	U	U	U	U	J	U	U	U	U

**Notes:**  
J = Estimated result.  
R = The analyte was analyzed for, but was not detected above the reported sample quantization limit.  
U = The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.  
ND = not detected.  
NS = not sampled. Well has been removed and not yet replaced.  
1. This value is 2X background concentration as stated in Malcolm Pirnie 1998 Remedial Investigation Report for the Li Tungsten Site.