DECLARATION FOR THE RECORD OF DECISION

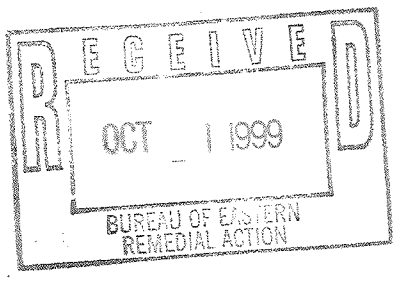
SITE NAME AND LOCATION

Li Tungsten Superfund Site

City of Glen Cove

Nassau County, New York

1-30-646



STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected remedial action for the Li Tungsten Site, which was chosen in accordance with the requirements of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended (CERCLA), and to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan. This decision document explains the factual and legal basis for selecting the remedy for this Site.

The New York State Department of Environmental Conservation (NYSDEC) concurs with the selected remedy. A letter of concurrence from the NYSDEC is attached to this document (Appendix IV).

The information supporting this remedial action decision is contained in the administrative record for this Site. The index for the administrative record is attached to this document (Appendix III).

ASSESSMENT OF THE SITE

Actual or threatened releases of hazardous substances from the Li Tungsten Site, if not addressed by implementing the response actions selected in this Record of Decision, may present an imminent and substantial endangerment to the public health or welfare, or to the environment.

DESCRIPTION OF THE SELECTED REMEDY

This Record of Decision (ROD) selects a remedy for contaminated soil and groundwater at the Site, which includes both the Li Tungsten facility (operable unit 1) as well as those portions of the Captain's Cove property (operable unit 2) on which radioactive ore residuals were disposed of.

Selected Soil Remedy

The major components of the selected soil remedy include:

- Excavation of soils and sediments contaminated above cleanup levels
- Separation of radionuclide-contaminated soil from non-radionuclide metals-contaminated soil
- Off-Site disposal of both radionuclide soil and non-radionuclide metals-contaminated soil at appropriately licensed facilities
- Off-Site disposal of radioactive waste contained 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
- Off-site disposal of contaminated surface water on Parcels B and C.

The Remedial Action Objectives for soil are to prevent or minimize exposure to contaminants of concern through inhalation, direct contact or ingestion, and to prevent or minimize cross-media impacts from contaminants of concern in soil/sediments migrating into underlying groundwater.

Selected Groundwater Remedy

The selected groundwater remedy includes no action, other than a long-term groundwater monitoring program to assess the recovery of the Upper Glacial Aquifer after the soil remedy is implemented.

The Remedial Action Objectives for metals-contaminated groundwater are to prevent or minimize ingestion, dermal contact and inhalation of metals-contaminated groundwater on lower Parcel C and on Parcel A that are above State and Federal MCLs, as well as to restore groundwater quality to levels which meet State and Federal standards. The metals-contaminated groundwater in the Upper Glacial Aquifer can be characterized as generally low-level and sporadic in nature. EPA believes that attainment of State and Federal standards for metals-contaminated groundwater will be hastened by the soil cleanup that is part of the selected remedy. EPA also believes that the objective related to exposures to contaminated groundwater are presently satisfied, and will remain so in the future use commercial development scenario.

DECLARATION OF STATUTORY DETERMINATIONS

The selected remedy meets the requirements for remedial actions set forth in CERCLA §121, 42 U.S.C. §9621. It is protective of human health and the environment, complies with Federal and State requirements that are legally applicable or relevant and

appropriate to the remedial action, and is cost-effective. The selected remedy utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable, and satisfies the statutory preference for remedies that employ treatment that reduces toxicity, mobility, or volume of contaminants as their principal element.

Because this remedy will result in hazardous substances remaining on the Site above health-based levels, a review will be conducted within five years after commencement of the remedial action, and every five years thereafter, to ensure that the remedy continues to provide adequate protection of human health and the environment.

_____ _____

Jeanne M. Fox Date
Regional Administrator

RECORD OF DECISION

Li Tungsten Superfund Site

City of Glen Cove
Nassau County, New York

United States Environmental Protection Agency
Region II
New York, New York
September 1999

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SITE NAME, LOCATION AND DESCRIPTION

The Li Tungsten Site (Site) consists of two tracts of land - the real property comprising the former Li Tungsten facility (referred to below as the Li Tungsten facility) and portions of the real property comprising the former Captain's Cove Condominium development and Garvies Point dump site (referred to below as the Captain's Cove property). The Li Tungsten facility is located at 63 Herbhill Road in the City of Glen Cove, Nassau County, Long Island, New York. The Captain's Cove property is located 0.5 miles to the west of the Li Tungsten facility on Garvies Point Road (see **FIGURE** 1).

The 26-acre Li Tungsten facility (see upper **FIGURE 2**) consists of four parcels 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 the buildings and structures (mostly aboveground tanks).

Parcel B is a six-acre tract north of Parcel A. Parcel B is undeveloped and contains a small pond, an intermittent stream and a small wetland. Two separate areas on Parcel B, south of the pond and directly opposite the Benbow Building (Parcel C), were used as parking areas when the Li Tungsten facility was active. The northernmost portion of Parcel B was used as an employee picnic area. The area between the two parking areas was used for disposal of ore residues. Directly north of Parcel B is residential housing along The Place, an historic street dating from Glen Cove's original settlement in the seventeenth century.

Parcel C, approximately ten acres in size, is north of Parcel A and west of Parcel B. The Dickson Warehouse and the Benbow Building, shown on upper **FIGURE 2**, are located on Parcel C. A 500,000-gallon aboveground fuel oil tank and two other storage tanks were removed from this Parcel during an EPA removal action completed in 1998. In addition, three surface impoundments (one lined impoundment called "Mud Pond" and two unlined impoundments called "Mud Holes") were present on Parcel C during facility operations.

Parcel C' is approximately four acres and consists of undeveloped land adjacent to Parcel C. Parcel C' was not part of the facility during active operations; however, some limited disposal activity also took place on a small portion of this Parcel. Residential housing on Janet Lane abuts Parcel C' to the north. For the purposes of this Proposed Plan, EPA is addressing Parcel C' as part of Parcel C.

The Captain's Cove property (see lower **FIGURE 2**) is a 23-acre parcel at the end of Garvies Point Road, approximately 0.5 miles west of the Li Tungsten facility. The property is bounded by Hempstead Harbor to the west, Garvies Point Preserve to the north (across Garvies Point Road), the Glen Cove Anglers' Club to the east, and Glen Cove Creek to the south. A four-acre wetland makes up a portion of the property's southern boundary with the Creek. The portions of the Captain's Cove property which are part of the Li Tungsten Site consist of two areas where radioactive wastes were deposited. The remainder of the property has been investigated as a State Superfund site by the State of New York.

The Li Tungsten and Captain's Cove properties are located in a mostly commercial area along the north side of Glen Cove Creek. The immediate area includes light and heavy industry, commercial businesses, a sewage treatment plant, a Nassau County public works facility, and five State or Federal hazardous waste sites. The area, which was settled in the seventeenth century, has been industrialized since the mid-1800's. However, there are residences within 100 feet of the northern ends of Parcels B and C of the Li Tungsten property, along Janet Lane and The Place, and within 1,000 feet of Captain's Cove on McLoughlin Street. Other area land uses include marinas, yacht clubs, beaches, and Garvies Point Preserve. The Li Tungsten property is presently zoned industrial, while Captain's Cove is zoned residential.

Also located on the north side of Glen Cove Creek are two other State Superfund sites; namely, the Konica Imaging, USA, Inc., property (formerly known as Powers Chemco - prior to that, it was known as the Columbia Ribbon and Carbon Company property), and the Crown Dykman Site **(To be inserted: NAME OF THE AUTO BODY PLACE CURRENTLY THERE)**, as well as one other Federal Superfund site, the Mattiace Petrochemical Site, which adjoins the Li Tungsten facility to the west. EPA's remedial efforts at the Mattiace Site have included a remedial investigation and feasibility study (RI/FS) which addressed Glen Cove Creek as a potential receptor of hazardous waste. Remedial action at the Mattiace Site involved removal and off-site disposal of chemical storage tanks and heavily contaminated soils; extraction and treatment of contaminated soil gases and groundwater at a newly constructed treatment facility; and monitoring of groundwater as well as Glen Cove Creek's sediments and water column for the duration of the estimated 30 years of the treatment facility operation.

A three mile radius of the Site includes the City of Glen Cove, as well as a large portion of Long Island Sound, sections of Oyster Bay, Sea Cliff, Brookville, Glen Head, Locust Valley, Sands Point, Port Washington, and Lattingtown. Notable features within this

area are Garvies Point Preserve, a community hospital, and several schools, country clubs and municipal parks. Approximately 44,000 people are estimated to reside within this three mile radius.

The City of Glen Cove has begun a revitalization effort involving over 200 acres surrounding the Glen Cove Creek. The City's Glen Cove Creek Revitalization Plan was finalized in 1998. The future use of the study area for the revitalization, according to the Plan, is commercial and may include a high-speed ferry to Manhattan and Connecticut, as well as boardwalks, museums, restaurants, shops, a hotel, and a conference center. The City is utilizing both State and Federal Brownfields funding to relocate several non water-dependent businesses presently adjacent to the Creek to other areas.

SITE HISTORY AND ENFORCEMENT ACTIVITIES

History

The processing of tungsten and other metals at the Li Tungsten facility began in 1942 and ended in 1985. The facility's operations consisted mainly of processing tungsten ore concentrates and scrap metal containing tungsten (collectively referred to below as tungsten material) into ammonium paratungstate (APT) and the formulating of APT into tungsten powder and tungsten carbide powder. Other products produced at the facility included tungsten carbide powder for plasma spraying, tungsten titanium carbide powder, tantalum carbide powder, tungsten spray powder, crystalline tungsten powder, and molybdenum spray powder. From 1945 to the early 1950's, the facility processed significant amounts of antimony (tin) ore concentrates into pure antimony.

A variety of extraction processes were used to separate the various accessory metals from the tungsten, depending upon the specific type of tungsten material being processed. Typical operations in the extraction process included physical, chemical and mechanical processes such as sizing and crushing, gravity separation, magnetic and electrostatic separation, roasting, leaching, flotation and fusion.

Numerous aboveground wooden, steel, and fiberglass tanks were used at the facility to perform these operations and to store reactants. As certain tungsten material moved through the various processing stages, accessory metals including radioactive isotopes of thorium, uranium, and radium, as well as other heavy metals, became more concentrated in the residue or slag. The other accessory metals which became concentrated in the tungsten material and were removed as impurities during the extraction process included arsenic, barium, bismuth, copper, cobalt, chromium, lead, manganese, mercury, nickel, vanadium, and zinc.

EPA performed interim remedial activities in 1995 and 1996 at the Li Tungsten facility, in order to temporarily relocate ore materials to the Dickson Warehouse on Parcel C to facilitate performance of EPA's RI. A subsequent EPA removal action was performed from October 1996 to October 1998, primarily to address the hazards associated with the remaining Li Tungsten tank wastes. The removal action resulted in the disposal of large volumes of waste liquid and sludge from the 271 process and storage tanks, as well as removal and disposal of asbestos and other hazardous chemicals found at the facility. EPA also demolished two structures on Parcel A, the Dice Complex and East Building, because of the danger posed by their structural instability and in order to facilitate access to tanks.

Some radioactive ore residuals from the Li Tungsten facility were buried at Captain's Cove. In addition, radioactive ore residuals and other wastes from the processing of the tungsten material wastes were deposited on Parcels B and C. Liquid wastes are believed to have been disposed of through numerous subsurface drainage pipes in the bulkhead which empty directly into Glen Cove Creek. State Pollutant Discharge Elimination System (SPDES) permits for the facility allowed for up to as many as 250,000 gallons per day of discharge to Glen Cove Creek. The two unlined Mud Holes were also reportedly used to dispose of liquid wastes.

From the late 1950's to the late 1970's, Captain's Cove 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. The property was purchased by Village Green Realty at Garvies Point, Inc. in 1983 for a residential condominium development project. Development efforts were abandoned in the mid-1980's when the New York State Department of Environmental Conservation (NYSDEC), after determining that the property was contaminated with radionuclides and other hazardous wastes, designated it as a State Superfund site. The NYSDEC, which is not authorized under State law to address the cleanup of radioactive wastes, requested that EPA address the radioactive contamination at Captain's Cove, while the NYSDEC addressed the chemical contamination under its own Superfund program. EPA subsequently determined that the areas of Captain's Cove where radioactive wastes were located could be considered as part of the Li Tungsten Site, after sampling showed that the radioactive residuals profile matched that at the Li Tungsten facility. The two primary areas of EPA concern, designated as Area A and Area G, constitute approximately two acres of the entire Captain's Cove property, and are located in the northwestern and eastern corners of the property, respectively.

EPA developed a workplan for field investigation of the radioactive ore residuals at Captain's Cove in April 1997 as part of a focussed feasibility study (FFS). Prior to this, the NYSDEC at EPA's

request performed a gamma radiation survey of the entire property in 1996, in order to confirm the results obtained during a previous NYSDEC investigation. In March 1997, the NYSDEC entered into an Order with the City of Glen Cove, a former owner of the Captain's Cove property, to perform an RI/FS for the municipal waste portion of the fill, which is generally segregated from the radioactive ore residuals areas. The fieldwork was performed by the City concurrently with EPA's FFS fieldwork. The City completed a feasibility study and the NYSDEC issued a Record of Decision (ROD) in March 1999, calling for excavation of all materials and the off-Site disposal of any chemically hazardous waste and any materials greater than one inch in diameter.

Earlier, EPA had issued an Administrative Order on Consent to the Glen Cove Developemnt Corporation (GCDC) on July 21, 1989 to conduct a removal action at the Li Tungsten facility. Activities included addressing radioactive materials, removal of drummed chemicals and laboratory reagents, cleanup of a mercury spill, and assorted sampling, analysis, and inventory work. Work was completed pursuant to the Order in July 1990.

Enforcement Activity

As noted above, EPA issued an Administrative Order on Consent to the GCDC in 1989 to conduct a removal action at the Li Tungsten facility. Activities included addressing radioactive materials, removal of drummed chemicals and laboratory reagents, cleanup of a mercury spill, and assorted sampling, analysis, and inventory work.

EPA sent Special Notice letters on February 12, 1992 to five potentially responsible parties (PRPs), namely, Teledyne, Inc.; Wah Chang Smelting and Refining Co. of America, Inc.; Li Tungsten, Inc.; the Glen Cove Development Corp.; and Mr. John Li. These letters gave the PRPs 60 days (until April 14, 1992) to submit a good faith proposal to finance or undertake the RI/FS at the Li Tungsten facility. A conditional good faith proposal from Teledyne was received, but subsequent negotiations did not result in a settlement.

EPA then developed an RI/FS workplan in March 1993, and again requested that the PRPs agree to perform the RI/FS, and enter into a settlement with EPA. However, none of the responses that EPA received were deemed to be acceptable. During the performance of the RI/FS, EPA has continued to develop information as part of its search for additional PRPs, and has succeeded in naming 24 additional parties as PRPS since the original 5 notifications. These PRPs will be provided an opportunity to negotiate the performance of the selected remedy after the ROD.

HIGHLIGHTS OF COMMUNITY PARTICIPATION

The RI/FS and FFS reports and the Proposed Plan for the Site were released to the public for comment on July 28, 1999. These documents, as well as other documents in the administrative record (see Administrative Record Index, Appendix III) have been made available to the public at two information repositories maintained at the EPA Docket Room in Region II, New York and the Glen Cove Public Library, located at 4 Glen Cove Avenue, Glen Cove, New York. A public notice announcing the public meeting on the Proposed Plan as well as the availability of the above-referenced documents was published in Newsday on July 28, 1999. The public comment period established in the public notice was from July 28 to August 27, 1999. Subsequent requests for an extension to the public comment period were granted by the Agency and the public comment period was extended through September 17, 1999. The Agency's decision to extend the comment period was announced at the August 16, 1999 public meeting on the Proposed Plan, as well as publicized through mailings to more than 150 interested parties on the Site mailing list.

The August 16, 1999 public meeting was held at the Glen Cove City Hall, located at 9 Glen Street, Glen Cove, New York, to present the Proposed Plan to interested citizens and to address any questions concerning the Plan and other details related to the RI and FS reports. Responses to the comments and questions received at the public meeting, along with other written comments received during the public comment period, are included in the Responsiveness Summary (see **APPENDIX V**).

In the early 1990's, EPA entered into a cooperative agreement for Superfund pilot studies with Clean Sites, Inc. as a result of Clean Sites' January 1989 Report entitled "Making Superfund Work". EPA selected the remediation of the Li Tungsten Superfund site in New York as a "pilot" for Clean Sites to apply some of its Superfund improvement concepts, most notably early stakeholder involvement and early identification of most realistic future use of a site. Clean Sites conducted interviews of State/local government officials, local organizations, potentially responsible parties, and interested members of the community, and developed a citizen's advisory group called the Li Tungsten Task Force, complete with a Charter of Rules and Procedures, in March 1994. Although Clean Sites' cooperative agreement expired in July 1996, the Task Force has continued to conduct monthly meetings with EPA without Clean Sites' involvement, usually on the first Thursday of each month. The Task Force also applied for and received a technical assistance grant (TAG) from EPA in September 1995.

Consistent with the Task Force's charter and in the interests of making the Task Force's stakeholders more active partners in the

Superfund process, EPA has provided draft versions of the risk assessment, RI and FS for Li Tungsten as well as the FFS for Captain's Cove, to the Task Force for its review and, by extension, for review by the TAG advisor, i.e., Disposal Safety Inc., concurrent with EPA and State review of these documents.

SCOPE AND ROLE OF RESPONSE ACTION

Site remediation activities are sometimes segregated into different phases, or operable units, so that remediation of different environmental media or areas of a site can proceed separately, resulting in an expeditious remediation of the entire site. EPA has designated two operable units for the Li Tungsten Corporation Site as follows:

Operable Unit 1 (OU 1) - the Li Tungsten Facility
Operable Unit 2 (OU 2) - the Captain's Cove Property

The primary objective of the remedy selected in this ROD is to reduce contaminant levels in affected media, including soils, groundwater and ponded water/sediments, to levels that are protective of human health and the environment.

The selected remedy will complement cleanup actions previously conducted under the removal program (described above) which has addressed the removal of radioactive materials, drummed chemicals, laboratory reagents, elemental mercury, asbestos, and disposal of large volumes of waste liquid and sludge from 271 process and storage tanks. EPA has also demolished two structures on Parcel A, the Dice Complex and East Building, because of the danger posed by their structural instability and in order to facilitate access for tank removal activity.

SUMMARY OF SITE CHARACTERISTICS

The purpose of the RI for the Li Tungsten facility and the FFS for the Captain's Cove property was to define the nature and extent of any contamination resulting from previous activities at the Site. The RI and FFS were performed by Malcolm Pirnie for EPA between March 1993 and November 1998, and included sampling and analysis of surface and subsurface soils, ponded water and wetlands sediments, storm sewers, and groundwater. The RI Report was issued in May 1998, while the FFS Report was issued concurrently with the FS report in July 1999.

Field work at the Site included the following activities:

- ❑ soil gas survey
- ❑ gamma radiation survey

- ❑ surface soil/ore residuals sampling
- ❑ soil borings for purposes of both sampling and gamma logging
- ❑ test pitting/sampling
- ❑ groundwater monitoring well installation/sampling
- ❑ groundwater elevation and aquifer characteristics measurements
- ❑ storm sewer/sediment sampling

See **FIGURE 3** for the locations of some of the above field work activities.

To determine which media (soil, groundwater, air etc.) contain contamination at levels of concern, the analytical data from the fieldwork was compared to applicable or relevant and appropriate requirements (ARARs), or other relevant guidance if no ARARs were available.

There are many contaminants left behind as a result of prior Site activity that may pose a risk to human health and/or the environment. The primary contaminant categories of concern at the Site are radionuclides and heavy metals.

Based upon the results of the RI, certain areas and media of the Site require remediation. These are summarized below. More complete information can be found in the RI and FFS Reports.

Physical Site Conditions

The four parcels of land that made up the Li Tungsten facility have been unused since the facility closed in 1985. Two of the 1buildings on Parcel A - the Dice Complex and the East Building - were razed and disposed offsite in 1998 by EPA during the performance of the tank removal action. The Dice Complex alone occupied an area of approximately 100,000 square feet. The property remains fenced (except for Parcel C', which was purchased in the latter stages of Li Tungsten's history and never used during facility operations) and placarded with warnings regarding the hazardous nature of the Site. EPA has removed all equipment and debris from the remaining buildings on Parcel A i.e., interior of the Carbide Building, Lab/Wire Building and Loung Building. The structural stability of these buildings is considered marginal at the present time. A few areas within the Carbide Building and Lab/Wire Building are contaminated with low levels of radioactivity.

The middle of Parcel B and the northern end of Parcel C were used as dumping areas for spent ore residues. Consequently, some of the highest concentrations of the heavy metals and radionuclides of concern were recorded there.

Of the two remaining buildings on Parcel C, the Dickson Warehouse is in relatively good shape and is presently being used by EPA to temporarily stockpile approximately 5,000 cubic yards of ore/slag residuals that are considered radioactive. The Benbow Building still contains a bank of hydrogen reduction furnaces, which represents the only significant plant equipment still on-Site.

The Captain's Cove property, large parts of which were wetlands prior to being filled in the 1960's and 70's, still has the rubble from two demolished four-story condominium buildings remaining on the eastern end of the property. While these buildings were being erected in the early 1980's by Village Green Realty, the NYSDEC determined that the property should be investigated for releases of hazardous materials, most notably methane and radioactivity. Wooden pilings at several other locations on the property mark the spots where additional condominium structures were to be built. Two man-made, lined ponds are located along the northeastern boundary of the property, and a paved road enters the site off Garvies Point Road and leads to a parking lot and a demolished condominium sales office near the western end of the site. The site is completely fenced along adjacent land areas; however, the property is not fenced along its southern border with the Creek. There is limited signage warning of the hazardous nature of the property.

Geology and Hydrogeology

There are two discrete aquifers in the Glen Cove region - the Upper Glacial and the Lloyd Aquifers. In addition to these, local bodies of perched groundwater occur above the water table, typically atop lenses of clay. 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 (**FIGURE 4**).

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. The thickness of the confining unit is about 112 feet beneath the Site, based on the log of Well 1917 (the industrial well located on Parcel A). In the Glen Cove region, discontinuous beds of low permeability sediments limit the amount of water which can be pumped from the Upper Glacial Aquifer; hence, Glen Cove's three municipal water supply wells tap the deeper Lloyd aquifer in excess of 250 feet below MSL. The three wells are located approximately one mile hydraulically upgradient of the Site to the east of the Creek (**FIGURE 5**). The potable water supply drawn from these wells is tested in accordance with State law on a regular basis.

Ecology

Wetlands at the Li Tungsten facility appear to be associated with natural drainage patterns and impoundments due to human activity. No wetland areas are depicted on either the U.S. Fish and Wildlife Service's National Wetlands Inventory Map or the NYSDEC Freshwater Wetland Map (Sea Cliff, NY quadrangle). However, four delineated areas meet the federal criteria for wetland designation on Parcels B and C. Cumulatively, they occupy 1 acre of the facility.

There are two surface water systems on the facility property. A drainage ditch located on the eastern half of parcel B runs south approximately two-thirds the length of the parcel. A small pond is located approximately midway along the drainage ditch. A series of drainage ditches on the western portion of middle Parcel C end in a pond.

At Captain's Cove, precipitation collects in two man-made interconnected retention basins on the northern border of the property, as well as in low-lying areas in the center of the property. Along the southern border of the property is a four-acre tidal wetland which is inundated at high tide. None of these wet areas are located in the two ore residual areas.

Numerous on-Site wildlife observations have been made, including the direct observations of many waterfowl and wading birds, as well as red foxes and raccoons. No threatened or endangered birds, mammals, reptiles, amphibians, fish or invertebrates were listed for this area. However, Hempstead Harbor is listed as a Waterfowl

Nesting Area and a Significant Coastal Fish and Wildlfe Habitat under New York State's Coastal Management Program.

Several areas on both Li Tungsten and the Captain's Cove properties were found to have possible cultural resource significance.

As a result of the field work and sampling exercises performed during the RI at Li Tungsten and the FFS at Captain's Cove, the nature and extent of various radiological and chemical contamination was further defined at these properties. A general discussion of these findings is presented below, organized by media e.g., soil, groundwater, etc. and contaminant e.g., volatile organics, heavy metals, radionuclides, etc. For a more complete examination of the analytical results of the RI and FFS, please see the summary information contained in **TABLES 1** through **4**.

Soil, Sediment and Surface-Water and Groundwater Contamination

Li Tungsten Facility

Surface and Subsurface Soils

Volatile organic compounds (VOCs) detected during the RI at the Li Tungsten facility were limited to a few soil samples at low concentrations (less than 5 micrograms per kilogram, or µg/kg) and at shallow depths (less than 4 feet below grade level, or bgl). VOCs were detected in three main areas; the northern portion of Parcel A; the southern portion of Parcel B; and the southern portion of Parcel C in the vicinity of the former aboveground fuel oil tank and Mud Pond. Semi-volatile organic compounds (SVOCs) were detected predominantly in the surface and subsurface soils on Parcel A, but also in the middle portion of Parcel B and the upper and lower portions of Parcel C. Concentrations of various SVOCs on Parcel A regularly exceeded 1,000 µg/kg; for example, the highest levels of benzo(a)anthracene were found in surficial soil at 3,100 µg/kg and in borings around storm sewers at 9,900 µg/kg. The levels of SVOCs on Parcels B and C were generally much lower; for example, the highest level of benzo(a)anthracene found outside of Parcel A was 360 µg/kg, in a test pit on Parcel B. No SVOCs were detected in the four soil background samples. The three parcels were also sampled for pesticides and PCBs, which were predominantly found in the central portion of Parcel B, with the highest level of total PCB detected in a soil boring at 15,890 µg/kg. Pesticides were detected in only a few samples; the highest concentration reported was 70 µg/kg for endrin on Parcel B.

Inorganics were widely detected in the soils and included antimony, arsenic, barium, copper, cobalt, chromium, lead, manganese, mercury, nickel, radium, thorium, uranium, vanadium and zinc. In general, many of the individual inorganic constituents had vertical

and horizontal distribution patterns that were similar to one another. For example, arsenic, antimony, chromium, and manganese were found at elevated concentrations in the middle and lower portions of Parcel B, the upper portion of Parcel C and the lower portion of Parcel C, in similar horizontal and vertical distribution patterns, with concentrations generally decreasing with increasing depths below 4 feet bgl. The highest concentration of antimony was 5,610 milligrams per kilogram, or mg/kg from a soil boring on Parcel B and 3,490 mg/kg from a soil boring on the lower part of Parcel C. The highest level of arsenic in soil was found in upper Parcel C at 6,300 mg/kg. The highest level of lead in soil was 6,100 mg/kg, also on upper Parcel C.

The radionuclides of concern include Uranium-238 (^{238}U), Radium-226 (^{226}Ra), Radium-228 (^{228}Ra), Thorium-230 (^{230}Th) and Thorium-232 (^{232}Th). These are constituents of the ores processed at the Li Tungsten facility (or otherwise waste products of the manufacturing processes there), and also detected at the facility within the top 4 feet bgl. The radionuclides ^{238}U, ^{232}Th, and ^{226}Ra were detected primarily in five main areas: outside the fence along Herbhill Road in the northwest corner of Parcel A, the middle portion of Parcel B, the upper portion of Parcel C, the vegetated area north of the Dickson Warehouse on Parcel C and the lower portion of Parcel C. The highest concentrations of ^{238}U (470 picocuries per gram, or pCi/g) and ^{226}Ra (250 pCi/g) were found on the upper portion of Parcel C, while ^{232}Th was found at 220 pCi/g in the middle of Parcel C.

Groundwater

Three rounds of groundwater samples were collected in December 1996, January 1997 and October 1998. Thirty-two monitoring wells were sampled in each of the first two rounds. In the third round, only twenty-eight wells were sampled as a result of the decommissioning of four wells during earlier RI/FS and removal activities. Low-flow sample collection techniques were used during the third round to minimize turbidity and any resulting potential bias in analytical results.

Groundwater analytical results indicated that contaminants that were found in soil were also generally found in groundwater. SVOCs and pesticides were generally found in trace amounts, except in the four wells immediately north of the Mattiace Site; contamination found in these wells has resulted from past commercial operation on the Mattiace property and is now being remediated by EPA under the Mattiace cleanup program. PCBs were not detected in any groundwater samples.

The most concentrated plume of VOCs was detected in four wells immediately north of the Mattiace Site. This plume is attributable

to the leaking underground storage tanks that were removed from the Mattiace Site by EPA in 1996/97, with concentrations of trichloroethylene (TCE) as high as 34,000 micrograms per liter, or ug/l. EPA subsequently constructed a groundwater and soil treatment facility at Mattiace to remediate the source as well as to capture and treat the groundwater plume. This facility is presently in the start-up phase of operation. Another less concentrated plume of VOCs was also detected in the middle portion of Parcel A/lower portion of Parcel B, downgradient of the Crown Dykman State Superfund site, which is the suspected source. During the second round of sampling, the concentrations of TCE and the dry cleaning chemical tetrachloroethylene (PCE) were measured at 2,200 ug/l and 6,900 ug/l, respectively, in well GM-1 located on the northern part of Parcel A, directly across the street from Crown Dykman, a former dry cleaning facility. In the almost two years between the second and third sampling rounds, concentrations of VOCs have diminished in wells close to Crown Dykman, e.g., TCE decreased to 9 ug/l in GM-1. However, evidence that VOCs have increased in wells closer to the Creek, e.g., TCE in well MP-2D near the Creek has been measured sequentially at 87 ug/l, 96 ug/l, and 650 ug/l during the three sampling rounds, suggests that the bulk of the VOCs may have moved further south. None of the VOCs in groundwater under the Li Tungsten facility are suspected of having originated from the Li Tungsten operations.

Inorganics of concern were detected in groundwater samples above EPA maximum contaminant levels (MCLs) in several locations, but in no clearly defined areal pattern. The vertical and horizontal distribution patterns for individual inorganics were similar. Most of the elevated levels were not significantly above MCLs, although levels of arsenic and antimony as high as 14,500 ug/l and 4,300 ug/l, respectively, were detected in a well near the former aboveground fuel oil tank on lower Parcel C. EPA's MCLs for arsenic and antimony are 50 ug/l and 6 ug/l, respectively. Radionuclides, although found to be above background in several wells on-Site, generally met or only slightly exceeded standards. The elevated levels of radionuclides also do not appear to form a recognizable plume or pattern of contamination. In the third round of groundwater sampling, all of the radionuclides of concern met standards except for radium, which slightly exceeded its standard in one well.

Ponded Water and Wetlands

Seven water samples were collected from the ponds and wetland areas on Parcels A, B and C. VOCs were not detected in surface water on Parcels B and C. SVOCs (e.g., bis(2-ethylhexyl)phthalate at 4 ug/l) exceeded the NYSDEC Class C Surface Water Standard of 0.6 ug/l on Parcel C. PCBs/pesticides (e.g., aroclor 1254/1260 at 3.8 ug/l and 4,4'-DDD at 9.1 ug/l) were detected in three locations in

excess of NYSDEC Class D Surface Water Standards (total PCBs=0.01 ug/l and 4,4'-DDD=0.001 ug/l, respectively). A significant number of inorganics in the ponded water exceeded the State water quality standards and guidance values on Parcels B and C, the highest being arsenic, for example, which was detected at 8,090 ug/l in ponded water on Parcel B. Radionuclides were generally found to be within surface water quality standards.

Pond/Wetlands Sediments

Eight sediment samples were collected from the ponds and wetland areas on Parcels adjacent to surface water sample locations on Parcels A, B, and C. VOCs were generally detected in trace levels in most of these samples, although acetone was detected at a concentration of 240 µg/kg on Parcel B. SVOCs were generally detected in all the samples; the highest SVOC level detected was 290 µg/kg of benzo(a)anthracene. PCBs were detected in three of the eight sediment samples, with the highest level of 2,891 µg/kg total PCBs found in lower Parcel C. The NYSDEC screening level for total PCBs, from the NYSDEC Technical Guidance for Screening Contaminated Sediments, is 328 µg/kg.

Inorganics that were detected in significant concentrations in each of the eight sediment samples included antimony, arsenic, calcium, chromium, cobalt, copper, iron, lead, mercury, nickel, selenium, silver, sodium and zinc. Arsenic, for example, was reported at a maximum concentration of 2,080 mg/kg on Parcel C. Radionuclides were found in low, but significant concentrations on the lower part of Parcel C (two Mud Holes and Mud Pond), e.g., ^{238}U at 46 pCi/g.

Additionally, four storm sewer sediment samples were also collected from storm sewers on Parcel A. Trace levels of several VOCs were detected in each of the four storm sewer sediment samples. SVOCs were detected in each of the four storm sewer sediment samples in significant concentrations, e.g., 13,000 µg/kg of pyrene. PCBs were detected in each of the four storm sewer sediment samples at generally low levels, with a maximum of 853 µg/kg of total PCBs in a storm sewer on Parcel A.

Inorganics detected in significant concentrations in each of the four storm sewer sediment samples included antimony (maximum 477 mg/kg) and arsenic (maximum 454 mg/kg). Chromium, cobalt, copper, iron, lead, mercury, nickel, selenium, silver, and zinc were also detected in significant concentrations. Radionuclides were found in low, but significant concentrations in all four storm sewer sediment samples, e.g., ^{238}U at 29 pCi/g.

Captain's Cove Property

Surface and Subsurface Soils

At the Captain's Cove property, a gamma survey, as well as samples obtained from soil borings and monitoring wells confirmed that the radionuclides which were the focus of EPA's FFS were limited to two separate areas of the property, denoted as Area A (northwest corner) and Area G (east end). To develop a complete contaminant profile within the two radionuclide areas, EPA also sampled for a standard array of non-radioactive hazardous chemicals. VOCs were primarily limited to several samples in the northeast portion of Area A, generally in concentrations below 400 µg/kg, except for one subsurface soil sample containing chlorobenzene at 42,000 µg/kg. Seven SVOCs were detected at concentrations exceeding NYSDEC's recommended soil cleanup objectives identified in the Technical and Administrative Guidance Memoranda (TAGM) in six locations in Area A, four locations in Area G and one location not associated with either area, e.g., benzo(b)fluoranthene at 1,200 µg/kg in SB-4 (soil boring no. 4). Two samples, one in each area, had significant concentrations of total PCBs, i.e., SB-21 at 5,500 µg/kg in Area A, and TP-6 (test pit no. 6) at 12,000 µg/kg in Area G. Numerous inorganics were detected frequently in Areas A and G at concentrations exceeding NYSDEC's soil cleanup objectives, e.g., arsenic exceeded its TAGM value in 23 samples, with the highest measured concentration at 2,760 mg/kg in Area A.

In Area A, elevated concentrations (greater than 5 pCi/g) of thorium and uranium series radionuclides were found in all five test pits and seven of the 15 soil/monitoring well borings. The remaining soil borings reflected radionuclide concentrations that ranged from background (generally about 1 pCi/g for each of the radionuclides of concern) to less than 2.5 times background. The maximum concentrations of radionuclides in test pit samples were found at 2 to 6 feet bgl in TP-3. At this location, uranium series concentrations ranged from 191 to 494 pCi/g, and thorium series concentrations ranged from 56 to 113 pCi/g. Elevated concentrations of radionuclides were also found in soil boring samples. Maximum concentrations of 211 to 273 pCi/g for the uranium series and 70 to 126 pCi/g for the thorium series radionuclides were measured at a depth of 6 to 7 feet bgl in SB-13. Several soil borings exhibited contamination at similar depths throughout Area A.

In Area G, concentrations of thorium and uranium series radionuclides greater than 5 pCi/g were found in both test pits (TP-5 and TP-6) and five of the eight soil/monitoring well borings. The remaining three soil borings reflected radionuclide concentrations that ranged from background to less than 2.5 times background. In samples collected from the test pits, the highest concentrations of ^{226}Ra and ^{228}Ra were found at 4 to 6 feet bgl in TP-6 and ranged from 13 to 28 pCi/g and 4 to 6 pCi/g, respectively. In the soil borings, the highest concentrations of ^{226}Ra and ^{228}Ra were found at 6 to 8 feet bgl in SB-8 and measured 169 pCi/g and 49

pCi/g, respectively. The highest radionuclide concentration was 1,041 pCi/g of ^{234}U measured in SB-23.

Groundwater

Eleven wells were sampled as part of one round of groundwater sampling performed at Captain's Cove. The objective of the sampling was to assess whether the groundwater has been impacted by the radionuclides of concern; however, samples were also analysed for other chemical categories, such as VOCs, heavy metals, pesticides/PCBs etc. The highest concentrations of the uranium (7 picoCuries per liter, or pCi/l) and thorium (8 pCi/l) series radionuclides were measured in MW-7 and MW-2, respectively. The highest value for the sum of ^{226}Ra and ^{228}Ra was 4.83 pCi/l measured in MW-3. The MCL for the sum of ^{226}Ra and ^{228}Ra is 5 pCi/l and the gross alpha MCL is 15 pCi/l. While there are no specific groundwater standards for uranium and thorium, thorium concentrations at the site do not cause contravention of the gross alpha MCL.

Several wells on the property also were contaminated with significant levels of nonradioactive hazardous substances, such as VOCs and inorganics. A total of eight VOCs were detected in significant concentrations in the northeast part of the property, and are likely part of the plume related to the Mattiace Site. SVOCs and PCBs/pesticides were generally either not detected or found at low levels in no particular pattern. Inorganic compounds such as arsenic, antimony, selenium, iron, and manganese, were detected in significant amounts in several wells.

Ponded Water

Three samples were collected from each of the two retention ponds and from a topographic depression in the southwest portion of the Captain's Cove property. Radionuclides were found to be within surface water quality standards. No VOCs, SVOCs, pesticides or PCBs were detected in the three surface water samples. Many of the inorganics detected in the topographic depression exceeded New York State or EPA Ambient Water Quality Criteria.

Sediments

Seven sediment samples were collected on the property; five from the large wetland area along the southern border, one from a retention pond area, and one from the topographic depression in the southwest corner. The concentrations of radionuclides in all sediment samples were within the range of background concentrations. No SVOCs or PCBs were detected in sediment samples. While VOCs and pesticides were found in the topographic depression, the levels were generally low. Several inorganics,

such as iron, mercury, lead, silver and zinc were detected in the topographic depression at concentrations significantly above background values.

Glen Cove Creek

No samples of sediments or surface water were collected from Glen Cove Creek as part of the Li Tungsten field work, as there is a sampling program for the entire Creek being routinely performed as a result of the June 1991 ROD for the Mattiace Superfund Site. A third round of Creek sampling was conducted as part of the Mattiace program in Summer 1998, the results of which generally support a decreasing trend in overall contaminant concentrations in Creek sediments over the past nine years. The impact of the US Army Corps' dredging of the mouth of the Creek was also clearly demonstrable through reduced contaminant levels in the westernmost sampling location (GC-03). In the latest round of results, arsenic was detected at a maximum concentration of 15.9 mg/kg and lead at 181 mg/kg. VOCs were not detected, except for acetone in very low concentrations. SVOCs generally have decreased in the Creek, although an increase was detected in the easternmost sampling location (maximum concentrations of benzo(a)anthracene and benzo(a)pyrene 2,300 and 1,900 ug/kg, respectively). Low levels of pesticides continue to be found in the Creek, and PCBs were also recorded in concentrations ranging from 69 to 240 ug/kg. Radionuclides from the uranium and thorium series were not sampled for, but previous sampling of this type has indicated no radioactive Creek contamination above background.

SUMMARY OF SITE RISKS

Based upon the results of the RI and the FFS, baseline risk assessments were conducted to estimate the human and ecological risks associated with current and future Site conditions. A baseline risk assessment estimates the human health and ecological risk which could result from the contamination at the Site, if no remedial action was taken.

The assessments conducted for this Site include separate chemical and radiological risk assessments for both human health, as well as for flora and fauna. For human health, risks were estimated for current receptors, as well as for future receptors in both residential and commercial scenarios. EPA believes that, based on historical uses of the Li Tungsten and Captain's Cove properties and the City's Waterfront Revitalization Plan, the most reasonably anticipated future land use of the Li Tungsten Site is most likely to be commercial. However, EPA evaluated residential as well as comercial future populations, primarily as a result of a request from the Li Tungsten Task Force to evaluate the risk to potential future residential populations on the Site. Separate cancer risks

were evaluated for both chemical and radiological exposures, and a total cancer risk was also calculated. In addition, noncancer human health risks were evaluated for chemical exposures. The general methodology used in performing human health risk assessment is presented below.

Human Health Risk Assessment

A four-step process is utilized for assessing Site-related human health risks for a reasonable maximum exposure scenario: *Hazard Identification*--identifies the contaminants of concern at the Site based on several factors such as toxicity, frequency of occurrence, and concentration. *Exposure Assessment*--estimates the magnitude of actual and/or potential human exposures, the frequency and duration of these exposures, and the pathways (e.g., ingesting contaminated well-water) by which humans are potentially exposed. *Toxicity Assessment*--determines the types of adverse health effects associated with chemical exposures, and the relationship between magnitude of exposure (dose) and severity of adverse effects (response). *Risk Characterization*--summarizes and combines outputs of the exposure and toxicity assessments to provide a quantitative assessment of Site-related risks.

Current Federal guidelines for acceptable exposures are an individual lifetime excess carcinogenic risk in the range of 10^{-4} to 10^{-6} (e.g., a one-in-ten-thousand to a one-in-a-million excess cancer risk or likelihood of an additional incidence of cancer) and a maximum health Hazard Index (HI) (which reflects non-carcinogenic effects for a human receptor) equal to 1.0. An HI greater than 1.0 indicates a potential for noncarcinogenic health effects.

Hazard Identification

During data evaluation, relevant site information is compiled and analyzed, in order to select contaminants of potential concern (COPC). For the Li Tungsten Site, several radionuclides, inorganic chemicals, and organic compounds were selected as COPCs because of the potential hazard they pose to human health and the environment. Predominant contributors to the risk estimates for contaminated soil calculated at both the Li Tungsten facility and Captain's Cove property included inorganic chemicals such as arsenic and antimony, as well as thorium and uranium series radionuclides. Predominant contributors to hypothetical groundwater risks were VOCs such as trichloroethylene and vinyl chloride, and inorganics such as arsenic and antimony.

Exposure Assessment

Exposure point concentrations were calculated from soil sample data sets to represent the reasonable maximum exposure (RME) to various current and hypothetical future populations on and around the Li Tungsten facility and Captain's Cove property. Specifically, the existing populations that were examined include children and adult off-site residents, and adolescent trespassers, as well as hypothetical future populations of adult and child residents, adolescent trespassers, site workers and construction workers. Future residential receptors were evaluated primarily for reference value, since EPA believes that the future use of the Site will be commercial. The exposures evaluated included soil and groundwater ingestion, inhalation of volatilized organics during showering, and inhalation of wind-blown dust.

Many of the soil sample locations were biased, i.e., they were selected due to the presence of elevated levels of contaminants. Therefore, the values calculated on those data sets are a conservative estimate of the RME.

In addition to the calculation of exposure point concentrations, several Site-specific assumptions regarding future land-use scenarios and exposure pathways, e.g., inhalation, ingestion, and dermal contact, were made. Assumptions were based on Site-specific conditions to the greatest degree possible, and default parameter values found in EPA risk assessment guidance documents were used in the absence of Site-specific data.

Toxicity Assessment

Standard dose conversion factors, risk slope factors, and reference doses were used to estimate the carcinogenic and noncarcinogenic hazards associated with Site contaminants. The risk estimators used in this assessment are generally accepted by the scientific community as representing reasonable projections of the hazards associated with exposure to the various chemicals of potential concern.

Human epidemiological data on carcinogenesis from exposure to ionizing radiation are more extensive than that for most chemical carcinogens. However, these data are based primarily upon studies of populations exposed to radiation doses and dose rates that are higher than the levels of concern at the Site. Use of these data to predict excess cancer risk from low-level radiation exposure requires extrapolation based upon somewhat uncertain dose-response assumptions.

Risk Characterization

Li Tungsten Facility

Soil data were evaluated to determine risk at the Li Tungsten facility by dividing the Site into four areas (Areas A, B, B + C, and C) to more realistically assess inhalation risks to nearby receptors, as well as to evaluate exposures from areas of similar contaminants, e.g., the ore dumping areas of middle/upper Parcel B and middle/upper Parcel C. These areas were therefore defined as follows:

Area A = Parcel A
Area B = lower Parcel B
Area B + C = middle/upper Parcel B combined with middle/upper Parcel C
Area C = lower Parcel C

Chemical Risk

Chemical analyses of soil samples showed that inorganics, e.g., heavy metals like arsenic, manganese, cobalt, antimony, and nickel, are present in all four areas at concentrations that may pose unacceptable risks and hazards depending on activities. These metals are the predominant contributors to unacceptable human health risks calculated for all areas of the Li Tungsten facility. The populations evaluated included future adult and child on-Site residents, future Site and construction workers, adolescent trespassers, and off-Site residents. For several populations evaluated, including both residential and commercial scenarios, the total excess lifetime cancer risk and hazard indices that were estimated based on exposure to these contaminants exceeded the cancer risk range of 10^{-4} to 10^{-6} and the Hazard Index of 1 used in evaluating Superfund sites. For example, a commercial Site worker's exposure to the chemicals of concern in Area B + C during future commercial activities would result in an unacceptable cancer risk of $5x10^{-3}$ (or an increased risk of 5 in 1,000) based on specific exposure assumptions. Likewise, the same Site worker's exposure to heavy metals (primarily from arsenic) would contribute to a noncancer hazard index of 40. A future child resident's exposure to the chemicals of concern in Area C would result in an unacceptable cancer risk of $6.0x10^{-3}$ and a noncancer HI of 300, as a result of exposure to arsenic and antimony. Likewise, a present off-Site child resident's exposure to the chemicals of concern from inhalation would result in a noncancer HI of 90, although this risk is mitigated by factors such as vegetative soil cover. A review of the calculated risks and hazards indicate that the most highly contaminated soil is located in Area B + C.

Potential exposure of an adolescent trespasser to ponded water and sediments on Parcels B and C also results in unacceptable hazard indices (4 and 7, respectively) due to the presence of arsenic. Hypothetical exposure to groundwater underlying the facility, although unlikely, would result in unacceptable cancer risks and

hazard indices to residential occupants and commercial Site workers through ingestion, inhalation while showering, and dermal contact. The primary chemicals contributing to these risks include inorganics such as arsenic and volatile organics like trichloroethene, tetrachloroethene, and vinyl chloride. Exposure to the contaminated groundwater in the Upper Glacial Aquifer underlying the facility is considered unlikely because of the general availability of Glen Cove's municipal water supply. This supply, which is periodically tested to ensure its quality in accordance with New York State law, is pumped from the deeper Lloyd Aquifer at locations approximately one mile hydraulically upgradient from the Site. See **TABLE 5** for a summary of the carcinogenic and non-carcinogenic risks posed by the non-radioactive chemicals of concern at the Li Tungsten facility.

Radiological Risk

Radionuclide analyses of soil samples showed that thorium and uranium series radionuclides are present in all areas at concentrations that exceed the range of normal background. For several populations evaluated, including both residential and commercial scenarios, the total excess lifetime cancer risk estimates due to exposure to these radioactive contaminants for all four areas evaluated exceed the cancer risk range of 10^{-4} to 10^{-6}. For example, a Site worker's exposure to radionuclides in Area B + C in a commercial future-use scenario would result in an unacceptable cancer risk of 1.4×10^{-2} (or a risk of approximately 14 in 1,000). Similarly, an adult resident living in Area B + C would result in an excess cancer risk from exposure to radionuclides of 1.9×10^{-3} (or a risk of approximately 19 in 10,000). As reflected in the risk calculations, the soil most highly contaminated with radionuclides was found in Area B + C.

Radionuclides in sediments and groundwater were found at very low levels and would not pose an unacceptable risk.

See **TABLE 6** for a summary of the carcinogenic risks posed by both the non-radioactive chemicals of concern and the radionuclides of concern at the Li Tungsten facility.

Ecological Risk Assessment

The purpose of the ecological risk assessment was to evaluate environmental samples for Site-related contaminants and to estimate any potential risks that these contaminants may pose to the environment. The ecological assessment included a risk characterization of chemical contaminants in ponded water/wetlands and sediments and surface soil for aquatic, semi-aquatic and terrestrial receptors. Also, a separate risk characterization for radionuclides occurring in surface water, sediment and surface

soil, for aquatic, semi-aquatic and terrestrial receptors was performed.

A four-step process is utilized for assessing Site-related ecological risks for a reasonable maximum exposure scenario:

- *Problem Formulation* - a qualitative evaluation of contaminant release, migration, and fate; identification of contaminants of concern, receptors, exposure pathways, and known ecological effects of the contaminants; and selection of endpoints for further study.

- *Exposure Assessment* - a quantitative evaluation of contaminant release, migration, and fate; characterization of exposure pathways and receptors; and measurement or estimation of exposure point concentrations.

- *Ecological Effects Assessment* - literature reviews, field studies, and toxicity tests, linking contaminant concentrations to effects on ecological receptors.

- *Risk Characterization* - measurement or estimation of both current and future adverse effects.

Wildlife near the Li Tungsten facility may have incidental contact with or ingest contaminants while foraging, nesting, or engaging in other activities in the terrestrial portions of the Site. Chemical contaminants can also adversely affect plants and animals in surrounding habitats via the food chain. Contaminants in ponded water may be taken up by aquatic life as well as semi-aquatic and terrestrial wildlife. Receptor species chosen were considered representative of the local wildlife populations that would use and frequent the Li Tungsten area. The receptors chosen were: aquatic invertebrates, fish, reptiles, and amphibians; mallard; meadow vole; raccoon; herbaceous terrestrial vegetation; American robin; deer mouse; and red fox. Exposure media of ecological concern included surface soils, surface water, and sediment.

The Hazard Quotient (HQ) method was used to characterize risks to receptor species. If an HQ exceeds 1, there is concern for possible adverse effects. The results of the ecological risk characterization indicate that many of the chemicals of concern in ponded water/sediments and soil at the Li Tungsten facility had HQs which exceeded 1, and in some cases ranged up to and beyond 10,000. The highest HQs were exhibited for mallard, raccoon, earthworm, robin, deer mouse and red fox, resulting primarily from inorganics like arsenic, copper, lead, nickel, selenium and zinc.

Captain's Cove Property

Chemical Risk

Chemical analyses of soil samples showed that inorganics, e.g., heavy metals like arsenic, manganese, and antimony, and PCBs are present in Areas A and G at concentrations that pose an unacceptable human health risk. For primarily the residential and construction worker scenarios, the hazard indices and total excess lifetime cancer risk estimates due to exposure to these contaminants exceed the cancer risk range of 10^{-4} to 10^{-6} and the Hazard Index of 1 used in evaluating Superfund sites. For example, an adult resident's exposure to the chemicals of concern in Area A in a residential future-use scenario would result in an unacceptable cancer risk of $9x10^{-3}$ (or a risk of approximately 9 in 1,000). Similarly, the same adult resident in Area G would be exposed to chemicals resulting in a cancer risk of $1.0x10^{-3}$ (or a risk of approximately 1 in 1,000). Construction workers in Areas A and G would be exposed to chemicals that contribute to hazard indices of 100 and 900, respectively.

Potential exposure to surface water and sediment on the Captain's Cove property does not result in unacceptable hazard indices or in cancer risks which exceed the risk range. Hypothetical exposures to groundwater underlying the property, although unlikely because of the high level of dissolved solids in the aquifer from saltwater intrusion as well as the availability of the City public water supply, would result in unacceptable hazard indices to residential occupants and commercial Site workers, and unacceptable cancer risks to residents, with arsenic as the predominant contributor to risk. See **TABLE 7** for a summary of the carcinogenic and non-carcinogenic risks posed by the non-radioactive chemicals of concern at the Captain's Cove property.

Radiological Risk

Radionuclide analyses of soil samples showed that thorium and uranium series radionuclides present at Area A and Area G are at concentrations which exceed the range of normal background. For several populations evaluated, including both residential and commercial scenarios, the total excess lifetime cancer risk estimates due to exposure to these radioactive contaminants exceed the cancer risk range of 10^{-4} to 10^{-6}.

As reflected in the risk calculations, the soils in both Areas A and G pose a similar degree of unacceptable cancer risk to future Site workers. The cancer risk in Area A was calculated to be $2.5X10^{-4}$ (or a risk of approximately 25 in 10,000), while the cancer risk in Area G was calculated to be $1.1\ X10^{-4}$ (or a risk of approximately 11 in 10,000), predominantly from external gamma radiation. Further, a future adult resident living in Area A would

be exposed to an excess cancer risk from exposure to radionuclides of 3.8 $x10^{-2}$ (or a risk of approximately 38 in 1,000); in Area G, the same resident would be exposed to a risk of $3x10^{-2}$ (or a risk of approximately 3 in 100). Radionuclides in sediments and groundwater were found not to pose unacceptable risk. See **TABLE 8** for a summary of the carcinogenic risks posed by both the non-radioactive chemicals of concern and the radionuclides of concern at the Captain's Cove property.

Discussion of Uncertainties in Risk Assessment

The procedure and inputs used to assess risks in this evaluation, as in all such assessments, are subject to a wide variety of uncertainties. In general, the main sources of uncertainty include:

- environmental chemistry sampling and analysis;
- environmental parameter measurement;
- fate and transport modeling;
- exposure parameter estimation; and,
- toxicological data.

Uncertainty in environmental sampling arises, in part, from the potentially uneven distribution of chemicals in the media sampled. Consequently, there is significant uncertainty as to the actual levels present. Environmental chemistry-analysis error can stem from several sources, including the errors inherent in the analytical methods and characteristics of the matrix being sampled.

Uncertainties in the exposure assessment are related to estimates of how often an individual would actually come in contact with the contaminants of concern, the period of time over which such exposure would occur, and in the models used to estimate the concentrations of the contaminants of concern at the point of exposure.

Uncertainties in toxicological data occur in extrapolating both from animals to humans and from high to low doses of exposure, as well as from the difficulties in assessing the toxicity of a mixture of chemicals. These uncertainties are addressed by making conservative assumptions concerning risk and exposure parameters throughout the assessment. As a result, the baseline human health risk assessment provides upper-bound estimates of the risks to populations near the Site, and it is highly unlikely to underestimate actual risks related to the Site.

Specifically, several aspects of risk estimation contribute uncertainty to the projected risks. EPA recommends that the arithmetic average concentration of the data be used for evaluating long-term exposure and that, because of the uncertainty associated

with estimating the true average concentration at a site, the 95% upper confidence limit (UCL) on the arithmetic average be used as the exposure point concentration. The 95% UCL provides reasonable confidence that the true average will not be underestimated. Exposure point concentrations were calculated from soil sample data sets to represent the reasonable maximum exposure (RME) to various current and hypothetical future populations on and around the Li Tungsten and Captain's Cove properties. Many of the soil sample locations were biased, i.e., they were selected due to the presence of elevated levels of contamination. Therefore, the UCL values calculated on those data sets are a conservative estimate of the RME. In fact, the true UCL values on the actual distributions of chemicals of concern in soil are less than the values calculated from the analytical data. Uncertainty associated with sample laboratory analysis and data evaluation is considered low as a result of a rigorous quality assurance program which included data validation of each sample result.

In addition to the calculation of exposure point concentrations, several site-specific assumptions regarding future land use scenarios, intake parameters, and exposure pathways are a part of the exposure assessment stage of a baseline risk assessment. Assumptions were based on site-specific conditions to the greatest degree possible, and default parameter values found in EPA risk assessment guidance documents were used in the absence of site-specific data. However, there remains some uncertainty in the prediction of future use scenarios and their associated intake parameters and exposure pathways. The exposure pathways selected for current scenarios were based on the site conceptual model and related RI and FFS data. The uncertainty associated with the selected pathways for these scenarios is low because site conditions support the conceptual model.

Standard dose conversion factors, risk slope factors, and reference doses are used to estimate the carcinogenic and noncarcinogenic hazards associated with site contaminants. The risk estimators used in this assessment are generally accepted by the scientific community as representing reasonable projections of the hazards associated with exposure to the various chemicals of potential concern.

Human epidemiological data on carcinogenesis from exposure to ionizing radiation are more extensive than that for most chemical carcinogens. However, these data are based primarily upon studies of populations exposed to radiation doses and dose rates that are higher than the levels of concern at the Li Tungsten/Captain's Cove site. Use of these data to predict excess cancer risk from low-level radiation exposure requires extrapolation based upon somewhat uncertain dose-response assumptions.

Results calculated from using the RESRAD computer model were used to present the cancer risks for the radiological portion of the Li Tungsten and Captain's Cove risk assessments.

Radiological risk calculations were performed using both the RESRAD/RESRAD-BASELINE computer models, developed by Argonne National Lab, and EPA's RAGS methodology for calculating the carcinogenic risk due to exposure to radioactive materials. Whenever possible, parameter values used by RESRAD were set equal to default values incorporated in the RAGS methodology. The largest pathway discrepancy between the two methodologies was the risk from produce ingestion, with the RESRAD risk exceeding the RAGS risk by an order of magnitude in some cases. Overall, the results of both analyses were compared and found to be extremely consistent.

More specific information concerning public health risks, including a quantitative evaluation of the degree of risk associated with various exposure pathways, is presented in the EPA's baseline human health risk assessment report for OU 1, contained in Volume I of the RI Report, and OU 2, contained in Volume II of the FS report.

Based on the results of the baseline risk assessment, EPA has determined that actual or threatened releases of hazardous substances from the Site, if not addressed by the preferred alternative or one of the other active measures considered, may present a current or potential threat to human health and the environment.

REMEDIAL ACTION OBJECTIVES

Remedial action objectives (RAO) are specific goals to protect human health and the environment. These objectives are based on available information and standards, such as applicable or relevant and appropriate requirements (ARARs), NYSDEC's recommended soil cleanup objectives, Site-specific risk-based levels, and the most reasonably anticipated future land use for the Site i.e., commercial development. The RAOs which were developed for soil, sediment and ground water are designed, in part, to mitigate the health threat posed by ingestion, dermal contact or inhalation of particulates where these soils are contacted or disturbed. The RAOs are also intended to mitigate the health threat posed by the ingestion of groundwater. Such objectives are also designed to prevent further leaching of contaminants from the soil to the groundwater.

The following remedial action objectives were established for the Site:

Building Materials

- Prevent exposure to building materials contaminated with radionuclides or chemicals of concern.

- Eliminate hazards to future Site workers posed by unstable structures.

- 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.

- Prevent or minimize cross-media impacts from contaminants of concern in soil/sediments migrating into underlying groundwater (Note: contamination of Glen Cove Creek's sediments has been ddressed as part of the Mattiace Record of Decision for OU 1, and is therefore not included in the remedial objectives of this Plan).

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 contamination of groundwater from the Crown Dykman State Superfund Site will be subsequently addressed by the NYSDEC and is therefore not included in the remedial objectives of this Plan).

- Restoration of groundwater quality to levels which meet State and Federal standards.

- Remediation of contaminated surface water in on-Site ponds to reduce risks to public health and the environment.

In order to meet these objectives, preliminary remedial goals, or PRGs, were developed during the FS for various contaminants of concern. In developing the final soil cleanup numbers presented below, consideration was given to risks posed by the contaminants under reasonably anticipated future uses of the Site, consistency with cleanup levels developed for the State Superfund cleanup at Captain's Cove, and the New York State TAGMs. Site-wide cleanup levels developed for metals and radionuclides are presented in **TABLE 9**; these contaminants are intended to be indicators for other co-located metals contaminants. Due to the spatial and vertical location of contaminants of concern, EPA believes that if the contaminated soils are remediated to the cleanup levels presented

in **TABLE 9** for the indicator contaminants, then the remaining inorganic contaminants in soils will also be adequately addressed. In addition, total PCBs were found in significant concentrations only in the dumping area of Parcel B at the Li Tungsten facility; therefore, cleanup levels for PCBs in that area will be 1 mg/kg in the top two feet and 10 mg/kg below two feet, based on TAGMs. Cleanup levels for contaminated sediments will include arsenic at 6 mg/kg and lead at 31 mg/kg, based on New York State Sediment Criteria.

Groundwater cleanup levels are State and Federal MCLs, i.e., arsenic =0.05 µg/l and $^{226}Ra + ^{228}Ra = 5$ pCi/l.

SUMMARY OF REMEDIAL ALTERNATIVES

CERCLA requires that each selected remedy be protective of human health and the environment, be cost-effective, comply with other statutory laws, and utilize permanent solutions and alternative treatment technologies and resource recovery alternatives to the maximum extent practicable. In addition, the statute includes a preference for the use of treatment as a principal element for the reduction of toxicity, mobility, or volume of the hazardous substances.

Separate soil and groundwater alternatives were developed for the Li Tungsten facility and Captain's Cove property. The soil alternatives address both contaminated soil and sediments. Soil alternatives evaluated for the Captain's Cove property address only the two areas of ore residuals disposal, since the areas of this property with only nonradioactive contamination are being addressed under NYSDEC's March 1999 ROD. Similarly, alternatives for groundwater remediation were not evaluated for the Captain's Cove property because radionuclides slightly exceeded remediation goals in only one of eleven wells. The soil and groundwater alternatives for the Site are presented below.

The construction time for each alternative reflects only the time required to construct or implement the remedy and not the time required to design the remedy, negotiate its performance by the parties responsible for the contamination, or procure contracts for design and construction.

Because of the lengthy half-lives of the radionuclides of concern, e.g., both U^{238} and Th^{232} have half-lives exceeding 1 billion years, as well as Long Island's sole source aquifer designation, remedies that would not permanently remove wastes containing the thorium and the uranium series radionuclides from the Site were considered not protective, nor were they felt to meet the criteria included in the Nuclear Regulatory Commission regulations in 10 CFR 40 regarding the siting of radioactive waste permanent disposal areas. EPA also

felt that other State and local laws and regulations e.g., the Long Island Landfill Law, 6 NYCRR Part 380 etc., could be employed to prevent the on-Site containment of radioactive wastes. Thus, in developing the alternatives for soil remediation, on-Site containment of radioactive wastes was not included.

Soil Remediation Alternatives - Li Tungsten Facility

Alternative LS - 1: No Action

Capital Cost:	$0
Annual Operation and Maintenance (O&M) Cost:	N/A
Construction Time:	N/A
30-Year Present Worth:	N/A

The Superfund program requires that the "No-Action" Alternative be considered as a baseline for comparison with the other alternatives. The No-Action Alternative includes no remedial measures to address the contamination at the Site.

The No-Action Alternative would include the development and implementation of a public awareness and education program for the residents in the area surrounding the Site. This program would include the preparation and distribution of informational press releases and circulars and convening public meetings. These activities would serve to enhance the public's knowledge of the conditions existing at the Site.

Because this alternative would result in contaminants remaining on-Site above health-based levels, CERCLA would require that the Site be reviewed every five years.

Alternative LS - 2: Excavation and Off-Site Disposal of Radioactive and Nonradioactive Metals-Contaminated Soils

Capital Cost:	$16,754,000
Annual O&M Cost:	$0
Construction Time:	5 months
30-Year Present Worth:	N/A

Under this alternative, approximately 27,000 cubic yards (cy) of soil, sediment and ore residuals (including those radioactive ore residuals presently staged in the Dickson Warehouse) would be addressed. Soils, sediments and ore residuals contaminated above cleanup levels would be excavated in the various contaminated areas of the facility. Radioactive wastes would require excavation to an average depth of four feet (maximum depth of four to six feet on Parcel C). Heavy metals-contaminated soils, while typically co-located with the radioactive materials, would require excavation to depths greater than four feet in several areas, because of a

greater propensity of these metals to leach from the ore residuals into the groundwater. Excavations to depths as much as ten feet would be required in a few areas of Parcel C in order to achieve the soil cleanup levels listed earlier under **REMEDIAL ACTION OBJECTIVES.**

Radioactive wastes would be disposed of at an off-Site disposal facility licensed to manage this type of material. Any nonradioactive, inorganic-contaminated wastes would be disposed of at an appropriate off-site landfill. If necessary, these excavated wastes would be chemically stabilized at the disposal facility to achieve compliance with the Land Ban requirements of the federal Resource Conservation and Recovery Act (RCRA), due to the presence of inorganic contamination.

The existing storm sewers would be pressure-washed and the washwater and sediments collected for off-Site disposal. Sumps on Parcel A contaminated with heavy metals would also be cleaned out, and contaminated sediment disposed of off-Site.

Additionally, several structures would be demolished to eliminate hazards posed by structural instability and hazardous construction materials (e.g., asbestos), or in order to facilitate pre-design sampling and removal of radioactive and chemical wastes. This action would include, at a minimum, demolition of the Dickson Warehouse on Parcel C, and the Carbide Building and Lab and Wire Building on Parcel A.

EPA would also recommend that institutional controls be placed on the Li Tungsten facility property to prevent the property from being used for residential purposes, and to discourage the installation of potable water wells. Five-year reviews would be required as this alternative does not allow for unrestricted future use of the property.

Alternative LS - 3: Excavation with Radioactive Waste Volume Reduction, Off-Site Radioactive Waste Disposal and Stabilization and On-Site Containment of Other Nonradioactive Metals-Contaminated Soils

Capital Cost:	$12,579,000
Annual O&M Cost:	$60,000
Construction Time:	13 months
30-Year Present Worth:	$14,379,000

This alternative is different from Alternative LS-2 in that a radioactive materials separation technology or strategy would be used to reduce the volume of radioactive wastes after excavation in order to reduce the costs of off-Site disposal. Nonradioactive

soils contaminated with inorganics would be stabilized and contained on-Site.

Excavated soils, sediments and ore residuals would be addressed via a volume reduction technology or strategy e.g., the Segmented Gate System, or SGS; or the Automated Conveyor Monitoring System; or precision excavation techniques specifically applicable to excavation of radioactive materials. The concentrated radioactive wastes would be disposed of at an off-Site disposal facility licensed to manage this type of material. Some or all of the remaining nonradioactive materials are expected to contain other hazardous substances, such as heavy metals. The remaining material would be disposed of on-Site in a prepared cell after chemical fixation. The cell would likely be located in the middle of Parcel B of the Li Tungsten facility. The success of these efforts is dependent on the effectiveness of soil separation testing which would be conducted during the remedial design. For costing purposes, the volume reduction efficiency was considered to be 50 percent.

Alternative LS - 4: Excavation with Radioactive Waste Volume Reduction, Off-Site Radioactive Waste Disposal and Off-Site Disposal of Other Nonradioactive Metals-Contaminated Soils

Capital Cost:	$14,445,000
Annual O&M Cost:	$0
Construction Time:	9 months
30-Year Present Worth:	N/A

This alternative is the same as Alternative LS-3, except that after utilization of a radioactive materials separation technology or strategy, any nonradioactive but metals-contaminated waste soils would be shipped off-Site for disposal instead of being contained on-Site. These wastes would be disposed of at an off-Site Subtitle D facility, unless they were determined to be hazardous pursuant to RCRA, in which case they would be disposed of at an off-Site RCRA Subtitle C facility.

Soil Remediation Alternatives - Captain's Cove Property

Alternative CS - 1: No Action

Capital Cost:	$0
Annual O&M Cost:	N/A
Construction Time:	N/A
30-Year Present Worth:	N/A

The Superfund program requires that the "No-Action" Alternative be considered as a baseline for comparison with the other alternatives. The No-Action Alternative does not include any

remedial measures that address the problem of contamination at the Site.

The No-Action Alternative would include the development and implementation of a public awareness and education program for the residents in the area surrounding the Site. This program would include the preparation and distribution of informational press releases and circulars and convening public meetings. These activities would serve to enhance the public's knowledge of the conditions existing at the Site.

Because this alternative would result in contaminants remaining on-Site above health-based levels, CERCLA would require that the Site be reviewed every five years.

Alternative CS - 2: Excavation and Off-Site Disposal of Radioactive and Nonradioactive Metals-Contaminated Soils

Capital Cost:	$15,465,000
Annual O&M Cost:	$0
Construction Time:	3 months
30-Year Present Worth:	N/A

This alternative is similar to Alternative LS-2 for the Li Tungsten facility. Approximately 31,000 cy of soil, sediment, and ore residuals contaminated above radioactive cleanup levels would be excavated in Areas A and G of the Captain's Cove property.

Radioactive wastes would be disposed of at an off-Site disposal facility licensed to manage this type of material. Any nonradioactive, heavy metals-contaminated soils would be disposed of at an appropriate off-Site landfill. If necessary, excavated waste would be chemically fixated at the disposal facility to achieve Land Ban compliance, due to the presence of inorganic contamination.

EPA would also recommend that institutional controls be placed on the Captain's Cove Property both to prevent the Property from being used for residential purposes and to discourage the installation of potable water wells. Five-year reviews would be required as this alternative does not allow for unrestricted future use of the property.

Alternative CS - 3: Excavation with Radioactive Waste Volume Reduction, Off-Site Radioactive Waste Disposal and Stabilization and On-Site Containment of Other Nonradioactive Metals-Contaminated Soils at the Li Tungsten Facility

Capital Cost:	$10,432,000
Annual O&M Cost:	$60,000

Construction Time:	11 months
30-Year Present Worth:	$11,787,000

This alternative is different from Alternative CS-2 in that a radioactive materials separation technology or strategy would be used to further reduce the volume of radioactive wastes after excavation, in order to reduce the costs of off-Site disposal, and on-Site stabilization and containment would be utilized for disposal of non-radioactive, but metals-contaminated wastes.

Excavated soils and ore residuals would be addressed via a volume reduction technology or strategy. The concentrated radioactive wastes would be disposed of at an off-Site disposal facility licensed to manage this type of material. Some or all of the remaining nonradioactive material is anticipated to contain other hazardous substances, such as heavy metals. The remaining material would be disposed of on-Site in a prepared cell after chemical fixation. The cell would likely be located in the middle of Parcel B of the Li Tungsten facility. The success of these efforts is dependent on the effectiveness of soil separation testing which would be conducted during the remedial design. For costing purposes, the volume reduction efficiency was considered to be 50 percent.

Alternative CS - 4: Excavation with Radioactive Waste Volume Reduction, Off-Site Radioactive Waste Disposal and Off-Site Disposal of Other Nonradioactive Metals-Contaminated Soils

Capital Cost:	$13,597,000
Annual O&M Cost:	$0
Construction Time:	7 months
30-Year Present Worth:	N/A

This alternative is the same as Alternative CS-3, except that after utilization of a radioactive materials separation technology or strategy, any nonradioactive but metals-contaminated wastes would be shipped off-Site for disposal instead of being contained on-Site. These wastes would be disposed of at an off-Site Subtitle D facility, unless they were determined to be hazardous pursuant to RCRA, in which case they would be disposed of at an off-Site RCRA Subtitle C facility.

Groundwater Remediation Alternatives

Alternative LW - 1: No Action

Capital Cost:	$0
Annual O&M Cost:	$32,000
Construction Time:	N/A
30-Year Present Worth:	$722,000

The Superfund program requires that the "No-Action" Alternative be considered as a baseline for comparison with the other alternatives. The No-Action Alternative does not include any remedial measures that address the contamination at the Site.

This alternative would serve as a groundwater monitoring mechanism for the Li Tungsten Site. A long-term sampling program would be developed to monitor groundwater quality. New monitoring wells would also be added to the existing monitoring well networks to increase the network's coverage in areas of known contamination.

Because this alternative would result in contaminants remaining on-Site above health-based levels, CERCLA would require that the Site be reviewed every five years.

Alternative LW - 2: Interceptor Trench/Extraction Wells with On-Site Treatment and Disposal

Capital Cost:	$351,000
Annual O&M Cost:	$84,000
Construction Time:	6 months
30-Year Present Worth:	$2,247,000

This alternative uses a combination of an interceptor trench and low-flow extraction wells to capture groundwater contaminated with heavy metals for on-Site treatment consisting of chemical precipitation/settling, and on-Site reinjection to groundwater. To capture shallow inorganic contaminated groundwater (less than 20 feet bgl), an interceptor trench would be installed on the lower portion of Parcel C. The trench would measure approximately 350 feet long. Multi-tiered horizontal high density polyethylene perforated piping would be installed perpendicular to the groundwater flow direction. Low-flow extraction wells would also be installed in inorganic "hot spot" areas to capture isolated pockets of groundwater contamination. Contaminated groundwater from the interceptor trench and and wells would be collected and channeled via gravity flow to collection sump areas. Contaminated groundwater at the sump areas would be pumped at approximately 10 gallons per minute to an on-Site treatment facility where it would be treated to State and Federal MCLs and groundwater standards through chemical precipitation, clarification and pH adjustment. The treated groundwater would then be conveyed to upgradient on-Site reinjection galleries.

A long-term sampling program would be developed to monitor groundwater quality. New monitoring wells would be added to the existing monitoring well network to increase the network's area of coverage.

Alternative LW - 3: Interceptor Trench/Extraction Wells with Off-Site Treatment and Reinjection at the Nearby Mattiace Superfund Site Treatment Facility

Capital Cost:	$208,000
Annual O&M Cost:	$47,000
Construction Time:	6 months
30-Year Present Worth:	$1,269,000

This alternative is similar to Alternative LW-2 in that it would use an interceptor trench and low-flow extraction wells to capture contaminated groundwater. Instead of on-Site treatment, however, the contaminated groundwater would be conveyed via an underground pumping station and force main from the Li Tungsten Site to the Mattiace groundwater treatment plant. The flow from the Site (estimated at approximately 10 gallons per minute), when combined with flow from the Mattiace extraction wells, would be approximately 25 gallons per minute. Treatment would consist of chemical precipitation, clarification and pH adjustment. Some modifications to the existing Mattiace plant and/or operating procedures might be necessary to accept the wastestream from the Li Tungsten Site. For example, because the Li Tungsten waste influent is predominantly heavy metals, an additional metals clarifier might have to be added. Chemical feed rates for metals treatment would also change, and the amount of sludge generated by the facility would increase, requiring more frequent sludge hauling.

A long-term sampling program would be developed to monitor groundwater quality. New monitoring wells would be added to the existing monitoring well network to increase the network's area of coverage.

Alternative LW - 4: Reactive Walls with Slurry Walls and In-Well Adsorption Treatment

Capital Cost:	$644,000
Annual O&M Cost:	$29,000
Construction Time:	7 months
30-Year Present Worth:	$1,299,000

This alternative consists of the installation of a reactive wall on lower Parcel C, directly downgradient of the existing inorganic contamination. The reactive wall would be installed below-ground to a depth of approximately 30 feet bgl. The reactive wall would be designed as a funnel and gate system and would consist of a passive permeable barrier through which groundwater would pass. The funnel, consisting of a soil-bentonite slurry wall, would be designed to channel contaminated groundwater toward the treatment gates, which would contain adsorption media to capture the inorganic contamination. Collection galleries consisting of pea

gravel would be installed adjacent to the wall. Treated groundwater would then flow to a distribution trench, located immediately downgradient of the slurry wall.

"Hot spot" inorganic contamination areas would be treated via in-well adsorption using media that selectively adsorbs dissolved heavy metals. The media would be periodically retrieved and disposed of while new media was reinserted for additional cycles of adsorption.

A long-term sampling program would be developed to monitor groundwater quality. New monitoring wells would be added to the existing monitoring well network to increase the network's area of coverage.

EVALUATION OF ALTERNATIVES

During the detailed evaluation of remedial alternatives, each alternative is assessed against nine evaluation criteria; namely, overall protection of human health and the environment; compliance with applicable or relevant and appropriate requirements, long-term effectiveness and permanance; reduction of toxicity, mobility, and volume through treatment; short-term effectiveness; implementability; cost; and State and community acceptance. The evaluation criteria are described below.

- Overall protection of human health and the environment addresses whether or not a remedy provides adequate protection and describes how risks posed through each exposure pathway (based on a reasonable maximum exposure scenario) are eliminated, reduced, or controlled through treatment, engineering controls, or institutional controls.

- Compliance with applicable or relevant and appropriate requirements (ARARs) addresses whether or not a remedy would meet all of the applicable or relevant and appropriate requirements of other Federal and State environmental statutes and requirements or provide grounds for invoking a waiver.

- Long-term effectiveness and permanence refers to the ability of a remedy to maintain reliable protection of human health and the environment over time, once cleanup goals have been met. It also addresses the magnitude and effectiveness of the measures that may be required to manage the risk posed by treatment residuals and/or untreated wastes.

- Reduction of toxicity, mobility, or volume through treatment is the anticipated performance of the treatment technologies, with respect to these parameters, a remedy may employ.

- Short-term effectiveness addresses the period of time needed to achieve protection and any adverse impacts on human health and the environment that may be posed during the construction and implementation period until cleanup goals are achieved.

- Implementability is the technical and administrative feasibility of a remedy, including the availability of materials and services needed to implement a particular option.

- Cost includes estimated capital and operation and maintenance (O&M) costs, and net present worth costs.

- State acceptance indicates whether, based on its review of the RI/FS and Proposed Plan, the State concurs with, opposes, or has no comment on the preferred remedy.

- Community acceptance will be assessed in the ROD and refers to the public's general response to the alternatives described in the Proposed Plan and the RI/FS reports.

Comparative Analysis of Soil Remedial Alternatives

Overall Protection of Human Health and the Environment

Alternatives LS-1 and CS-1, the No-Action Alternatives, would not protect human health or the environment beyond discouraging entry to the presently fenced Site.

All remaining soil alternatives would protect human health and the environment by reducing the existing exposures to radiological and chemical Site contaminants to below soil/sediment cleanup levels. Alternatives LS-2 and CS-2 and Alternative LS-4 and CS-4, would achieve protection of human health and the environment by removing the contaminated soils, sediments and ore residues above cleanup levels for off-Site treatment and disposal. Alternatives LS-3 and CS-3 would achieve similar protection vis-a-vis the radionuclides of concern by removing them off-Site and would achieve protectiveness from the heavy metal contaminants by stabilizing and containing them on-Site and thereby reduce or eliminate the various exposure pathways and potential for cross-media impacts to groundwater that presently exists.

Compliance with ARARs

Alternatives LS-2 and CS-2, and LS-4 and CS-4 may have to comply with land disposal restrictions (LDR - 40 CFR Part 268) for the off-Site disposal of any excavated wastes contaminated with certain heavy metals above LDR levels. This ARAR also describes minimum technology requirements needed to construct the on-Site cell in Alternative LS-3 and CS-3. The construction of the containment

cell in Alternative LS-3 and CS-3 would be subject to 6 NYCRR Parts 360 and 364 which outline requirements of solid and hazardous waste management facilities and transporters for managing radioactive and hazardous materials. Off-Site transportation of radioactive materials under Alternatives LS-2 and CS-2, LS-3 and CS-3, and LS-4 and CS-4 which exceed a concentration of 2,000 pCi/g would be regulated by 49 CFR 173. Since Alternatives LS-2 and CS-2, LS-3 and CS-3, and LS-4 and CS-4 would involve the excavation of some PCB-contaminated soils, their disposition would be governed by the requirements of the Federal Toxic Substances Control Act (TSCA).

During excavation activities, the radionuclide emissions standards of 40 CFR Part 61 which limits exposures to the maximally exposed member of the public to 10 mrem/year must be met.

For a complete listing of ARARs, see Tables 2-6, 2-7 and 2-8 of the Li Tungsten FS, Volume 1.

Long-Term Effectiveness and Permanence

Alternatives LS-1 and CS-1 would not provide any long-term effectiveness or permanence in protecting human health and the environment.

All of the other soil alternatives would permanently protect public health and the environment over the long term because the radioactive wastes would be excavated and removed to an off-Site facility licensed to manage this type of material. Implementation of Alternatives LS-2 and CS-2 and Alternatives LS-4 and CS-4 would ensure permanent protection of public health and the environment at the Site over the long term because the nonradioactive, metals-contaminated soils at the Site would be removed to an off-Site disposal location designed for long-term containment. Alternatives LS-3 and CS-3 would provide for long-term effectiveness and permanence through a properly designed on-Site containment cell which would require institutional controls and extended maintenance to provide long-term protection to public health and the environment.

Reduction of Toxicity, Mobility, or Volume through Treatment

Alternatives LS-1 and CS-1 would not reduce the toxicity, mobility or volume of any contaminants at the Site. Alternatives LS-2 and CS-2 and Alternatives LS-4 and CS-4 would reduce the toxicity, mobility, and volume of contaminants at the Site through excavation and off-Site disposal of the radioactive and metals-contaminated wastes. Alternatives LS-3 and CS-3 would reduce the toxicity, mobility, and volume of the radiological contaminants in the same manner. Alternatives LS-3 and CS-3 would reduce the toxicity and mobility of the heavy metals-contaminated soils that would be

contained on-Site by chemically fixating the metals to prevent them from leaching. Alternatives LS-3 and CS-3 and LS-4 and CS-4 may reduce the volume of the radioactive materials through the use of a separation technology; however, the percent volume reduction is uncertain and would be the result of a physical separation process rather than treatment.

Short-Term Effectiveness

The No-Action Alternatives LS-1 and CS-1 would not result in any adverse short-term impacts. Potential short-term impacts would be associated with Alternatives LS-2 and CS-2, LS-3 and CS-3 and LS-4 and CS-4 due to the direct contact with soil by workers and through the potential for generation of dust during excavation. Such impacts would be minimized through worker health and safety protective measures and dust suppression techniques such as covering waste piles and water spraying during dust-generating activities. Monitoring the excavation and soil handling areas to determine emission levels will also ensure that off-Site receptors are not being significantly impacted. Alternatives LS-3 and CS-3 and LS-4 and CS-4 would involve additional handling during on-Site radioactive materials separation and Alternatives LS-3 and CS-3 would also result in increased handling of materials during stablization of the metals-contaminated wastes and their disposition in the on-Site cell; dust control measures, worker health and safety measures and process controls would minimize any adverse impacts resulting from increased handling of contaminated soils. The vehicle traffic associated with all alternatives other than no action could impact the local roadway system and nearby residents through increased noise level and traffic.

Proper protective equipment, air monitoring during excavation and soil handling, and appropriate soil handling procedures would minimize the short-term risks to workers and the surrounding community for all the alternatives, other than the No-Action Alternatives.

Implementability

The level of success of Alternatives LS-3 and CS-3, and LS-4 and CS-4 will depend on the efficiency of the separation technology or strategy selected for separation of radionuclide-contaminated soil from other excavated soils. Institutional controls to restrict residential development of the Li Tungsten and Captain's Cove properties should be readily implementable for all the action alternatives.

Cost

TABLE 10 provides the capital costs, operation and maintenance costs, and present worth costs associated with each of the combined soil alternatives. Present worth costs were calculated over a 30 year period using 1999 as the base year, 5% as the discount rate, and 3% as the rate of inflation. The three sets of soil alternatives other than the No-Action Alternative are relatively similar in their present worth estimates. Capital cost outlays would be significantly less expensive, though, for LS-3/CS-3 than for LS-2/CS-2 or LS-4/CS-4.

State Acceptance

NYSDEC concurs with the selected remedy, **Excavation with Radioactive Waste Volume Reduction, and Off-Site Disposal of Radioactive and Nonradioactive Metals-Contaminated Soils (LS-4/CS-4), and No Action with continued groundwater monitoring (LW-1).** A letter of concurrence is attached as Appendix IV.

Community Acceptance

Community acceptance of the selected remedy for soil was assessed during the public comment period. While the community had some comments and questions regarding the extent of the remedy, and how safely it could be performed, EPA believes there was general community support for its preferred remedy. Specific responses to public comments are addressed in the Responsiveness Summary, which is attached as Appendix V.

Comparative Analysis of Groundwater Remedial Alternatives

Overall Protection of Human Health and the Environment

The remedial action objective of the groundwater alternatives is to eventually restore groundwater quality to State and Federal groundwater and drinking water standards i.e., MCLs. However, even without deed restrictions or other institutional controls, the human health impacts from potable water consumption that were calculated in the risk assessment represent a hypothetical risk. The likelihood of drawing potable water from the Upper Glacial Aquifer is very remote because of the high level of dissolved solids in the aquifer from saltwater intrusion, as well as the ready availability of the City public water supply. Alternative LW-1, the No-Action Alternative, would not in itself provide any protection of human health and the environment as no active remedial measures or institutional controls are included in this alternative. However, remediation of contaminated soil should greatly decrease the degree of leaching of contaminants from the soil into the groundwater, which in turn would significantly reduce the magnitude and duration of any hypothetical future impacts on human health and the environment from the localized groundwater

contamination at the Site. Alternatives LW-2, LW-3 and LW-4 would provide protection of human health and the environment because the groundwater contaminated with inorganics on the Li Tungsten Facility would be gradually intercepted and prevented from discharging to Glen Cove Creek.

Compliance with ARARs

Alternative LW-1 would not actively address the concentrations of arsenic, antimony, and other heavy metals in groundwater that are presently in excess of MCLs promulgated under the Federal Safe Drinking Water Act (40 CFR Part 141), the New York State MCLs (10 NYCRR Part 5), or New York State Water Quality Standards (6 NYCRR Part 703); although it is anticipated that soils remediation could result in MCLs being achieved in the near future by removing the source of groundwater contamination.

Alternatives LW-2, LW-3, and LW-4 all use treatment technologies capable of removing the inorganics of concern from the groundwater to meet the standards; LW-2 and LW-3, both of which involve some active groundwater extraction techniques, may also result in achieving groundwater restoration in a shorter timeframe than LW-1 and LW-4.

Off-Site disposal of any sludges or treatment residues generated as a result of groundwater treatment processes included as part of Alternatives LW-2, LW-3, and LW-4 would be required to be sent to an appropriate off-Site treatment/disposal facility.

Long-Term Effectiveness and Permanence

Removal of the source of groundwater contamination under any of the soil alternatives would improve the long-term effectiveness and permanence of all of the groundwater alternatives.

Contaminants would not be actively removed under Alternative LW-1 except by the natural movement of groundwater which would dilute the remaining contaminants prior to flowing into Glen Cove Creek, where they would continue to be dispersed. Given the relatively sporadic inorganic contamination that currently exists in the Upper Glacial Aquifer, it is anticipated that this mechanism when combined with the soil remediation would provide long-term effectiveness in meeting groundwater standards. The monitoring program would be designed to determine if LW-1 is effective.

Alternatives LW-2, LW-3, and LW-4 would all be similarly effective over the long term in permanently removing inorganic contaminants from groundwater.

Reduction of Toxicity, Mobility, or Volume through Treatment

Alternative LW-1 would not reduce the toxicity, mobility, or volume of contaminated groundwater through treatment. Using different technologies, Alternatives LW-2 and LW-3 would reduce the toxicity, mobility, and volume of contaminated groundwater through chemical precipitation of heavy metals, clarification and pH adjustment. Alternative LW-4 would rely on an adsorptive treatment media to adsorb dissolved heavy metals for subsequent off-Site disposal.

Short-Term Effectiveness

Alternative LW-1 would not include any remediation and therefore would not pose any short-term impacts to the community or to workers.

Alternatives LW-2, LW-3, and LW-4 would all require trenching in the vicinity of Garvies Point Road and Herbhill Road to accommodate the installation of different subsurface features (i.e., wells, drains, force main, slurry wall). Potential short-term impacts would be associated with the direct contact with soil by workers and through the potential for generation of dust during construction. Such impacts would be minimized through worker health and safety protective measures and dust suppression techniques such as covering waste piles and water spraying during dust-generating activities.

Alternative LW-3 would have the most impact on the local community as it would require that a forcemain be installed below grade for approximately 700 feet from the groundwater collection point to the treatment facility at the Mattiace Site.

Potential short-term impacts would be associated with the three treatment alternatives as a result of the direct contact of groundwater by workers. However, impacts would be minimized through worker health and safety protective measures.

Implementability

All of the alternatives are considered technically and administratively implementable. Alternatives LW-2, LW-3, and LW-4 all would be able to achieve MCLs in the treated effluent with the proposed treatment methods, although LW-2 and LW-3's reliance on standard proven technology improves their degree of implementability. Off-Site property easements or permits to construct should also be relatively easy to obtain for all three action alternatives.

Cost

TABLE -- provides the capital costs, operation and maintenance costs, and present worth costs associated with each of the groundwater alternatives. Present worth costs were calculated over a 30 year period using 1999 as the base year, 5% as the discount rate, and 3% as the rate of inflation. LW-4 has the highest capital cost outlay, being three times as expensive as the least expensive action alternative, LW-3. LW-2 has the highest present worth costs, due to the relatively high maintenance costs of operating a treatment facility. LW-1 predictably costs the least in a present worth analysis, because the only costs associated with this alternative is the long-term monitoring program.

State Acceptance

NYSDEC concurs with the selected remedy, **Excavation with Radioactive Waste Volume Reduction, and Off-Site Disposal of Radioactive and Nonradioactive Metals-Contaminated Soils (LS-4/CS-4), and No Action with Continued Groundwater Monitoring (LW-1).** A letter of concurrence is attached as Appendix IV.

Community Acceptance

Community acceptance of the selected remedy for groundwater was assessed during the public comment period. EPA believes that the community generally supports this approach. Specific responses to public comments are addressed in the Responsiveness Summary, which is attached as Appendix V.

SELECTED REMEDY

Soils, Sediments and Debris

Based upon an evaluation of the various alternatives and consideration of community acceptance, EPA and NYSDEC have selected **Alternative LS-4 and CS-4: Excavation with Radioactive Waste Volume Reduction, and Off-Site Disposal of Radioactive and Nonradioactive Metals-Contaminated Soils** for the contaminated soils, sediments and debris at the Li Tungsten facility and the Captain's Cove property. The selected remedy at both Li Tungsten and Captain's Cove will include excavation, volume reduction, and off-Site disposal of all radioactive/chemical wastes, consistent with the cleanup levels developed for this Site. Soil and sediment will be excavated in the various contaminated areas of the Site. Excavation is expected to yield an estimated 18,281 cy and 13,200 cy of radioactive wastes at the Li Tungsten facility and Captain's Cove property, respectively. An estimated 17,300 cy and 20,550 cy cf excavated,nonradioactive, metals-contaminated wastes are expected at the Li Tungsten facility and Captain's Cove property,

respectively. The remedial action cleanup levels for these wastes were provided earlier in **TABLE 9**.

There are multiple areas requiring excavation on all three parcels of the Li Tungsten facility (**FIGURE 6**) and there are two large areas requiring excavation at Captain's Cove (**FIGURE 7**). At the Li Tungsten facility, radioactive wastes require excavation to an average depth of four feet (with a maximum estimated depth of six feet, on Parcel C). Heavy metals-contaminated soils, while typically co-located with the radioactive wastes, will require excavation to depths greater than four feet in several areas, because of the elevated concentrations of heavy metals and the propensity of these metals to leach from the ore residuals into the subsurface and eventually into the groundwater. Excavations to depths as much as ten feet will be required in a few areas of Parcel C in order to achieve the cleanup levels for these metals-contaminated soils.

At Captain's Cove, where the radioactive wastes were buried deeper, wastes will require excavation to an average depth of eight feet in Area A, and twelve feet in Area G. Excavated wastes will be treated through a volume reduction technology or strategy in order to minimize the volume of the radioactive wastes that will require off-Site disposal. Treatability tests will be required to determine the efficiency of any volume reduction technology employed. Radioactive wastes will be disposed of at an off-Site disposal facility licensed to manage naturally occurring radioactive material, or NORM. Some or all of the remaining non-radioactive wastes are anticipated to contain other contaminants, such as heavy metals. These wastes will be disposed of at an off-Site RCRA Subtitle D facility, unless toxic compound leaching procedure (TCLP) testing indicates that they are hazardous, in which case they will be disposed of at a RCRA Subtitle C facility. Post-excavation sampling will be required to ensure that soil cleanup levels have been met prior to backfilling the holes. Excavated soils that did not exceed cleanup levels or contain debris could be used as backfill. In addition, a minimum of two feet of clean fill will then be used to complete the backfilling to match the surrounding grade.

The existing storm sewers will be pressure-washed and the effluent and sediments collected for off-Site disposal. Sumps on Parcel A contaminated with heavy metals will also be cleaned out, and contaminated sediment disposed of off-Site.

The selected remedy will also include demolition of several structures at the Li Tungsten facility to eliminate hazards posed by structural instability, hazardous materials of construction (i.e., asbestos), or contamination with radionuclides; as well as to facilitate both pre-design sampling and implementation of future

remedial actions. This action will include, at a minimum, demolition of the Dickson Warehouse on Parcel C, and the Carbide Building and the Lab and Wire Building on Parcel A.

Groundwater and Surface Water

Based upon an evaluation of the various alternatives and consideration of community acceptance, EPA and NYSDEC have selected **Alternative LW-1: No Action** for contaminated groundwater at the Li Tungsten Facility.

The preferred alternative at Li Tungsten will require monitoring of the Upper Glacial Aquifer in the vicinity of the Site to determine the effects of the soil remedy on groundwater quality. The preference for no action is based on the sporadic and generally low-level nature of the inorganic contamination; the availability of the City's potable water to the affected area; and the non-use of the contaminated aquifer as a potable water source, primarily because of saltwater intrusion. Nassau County Public Health Ordinance Article #4, which prohibits the installation of new private potable water systems in areas served by a public water supply, should effectively preclude any future potable water well installations in this portion of the aquifer. The excavation of inorganic contamination to the specified cleanup levels will also minimize leaching of the contaminants in the soil to groundwater. As a result, the groundwater quality beneath the Site is expected to improve significantly after excavation is completed. Given the localized and generally low-level nature of heavy metals in groundwater, EPA expects that achievement of ARARs will take only slightly longer in the affected part of the aquifer than the timeframes associated with the pump and treat alternatives i.e., LW-2 and LW-3. As noted above, 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. The recent dredging of the mouth of the Creek by the US Army Corps of Engineers, as well the planned dredging of the remainder of the Creek in the Fall and Winter 1999/2000, will provide a new baseline for future evaluation of the Creek through the Mattiace long-term monitoring program.

To complete the proposed remedial action, EPA recommends that institutional controls be placed on the Li Tungsten Site to prevent

the Site from being used for residential purposes. The deed restriction will also include controls to ensure the protection of public health until the groundwater beneath the Site has reached cleanup levels. During implementation of the selected remedy, best management practices at the Site will also include 1) decommissioning industrial water supply well N1917 on Parcel A, which is screened 311 bgl in the Lloyd Aquifer, in order to prevent any potential transmission of contaminants from the Upper Glacial Aquifer, and 2) draining surface water in ponds on Parcels B and C, concurrent with the excavation of contaminated sediments. Five year reviews of the Site will also be conducted of the Site to ensure the protectiveness of the remedy.

The selected remedy will result in an effective, long-term permanent remedy because all soils with radioactivity greater than the radionuclide cleanup levels will be disposed of in a licensed radiological waste disposal facility. Implementation of the selected remedy will allow redevelopment of the Li Tungsten Superfund Site in substantial conformance with the City of Glen Cove's Revitalization Plan, which is the "centerpiece" for EPA's Showcase Community designation of Glen Cove.

EPA and NYSDEC will attempt to expedite the implementation of the soil remedy for the southern portion of the Li Tungsten facility, encompassing Parcel A, lower Parcel B and lower Parcel C. The estimated volume of soil targeted for excavation in these areas is approximately 5,000-6,000 cy, a disproportionately small volume of the facility's contaminated soils. Fast tracking this portion of the remediation would allow for the accelerated placement of this portion of the property back into a commercially viable scenario. This potential action would not only facilitate the City's revitalization of the Creek area, it would also be actively promoting EPA's "Recycling Superfund Sites" initiative.

The selected remedy will provide the best balance of trade-offs among alternatives with respect to the evaluating criteria. EPA and NYSDEC believe that the selected remedy will be protective of human health and the environment, would comply with ARARs, would be cost-effective, and would utilize permanent solutions to the maximum extent practicable, as discussed below.

STATUTORY DETERMINATIONS

Under its legal authorities, EPA's primary responsibility at Superfund sites is to undertake remedial actions that are protective of human health and the environment. In addition, Section 121 of CERCLA establishes several other statutory requirements and preferences. These specify that when complete the selected remedial action for this Site must comply with applicable, or relevant and appropriate environmental standards established

under Federal and State environmental laws unless a statutory waiver is justified. The selected remedy also must be cost-effective and utilize permanent solutions and alternative treatment technologies or resource-recovery technologies to the maximum extent practicable. Finally, the statute includes a preference for remedies that employ treatment that permanently and significantly reduce the volume, toxicity, or mobility of hazardous substances, as available. The following sections discuss how the selected remedy meets these statutory requirements.

Protection of Human Health and the Environment

The selected remedy is protective of human health and the environment. The selected cleanup levels for soil include 5 parameters from 3 categories i.e., radionuclides, non-radionuclide heavy metals, and PCBs, to ensure that the excavation removes the contaminants of concern at this Site, which tend ot be co-located. Further, the numerical cleanup levels are sufficiently protective from the standpoint of carcinogenic and non-carcinogenic risk for all future on-Site populations except for residential use. However, as noted above, the most reasonably anticipated future land use of the Site is commercial. Excavating contaminated soils and sediments above the selected cleanup levels and disposing of them off-Site will eliminate the principal threat posed by the Site and greatly reduce future human exposures and environmental impacts from the contaminated soils, as well as removing the source of the localized inorganic groundwater contamination. Because the low levels of radionuclides and heavy metals that are left behind may still be technically above their respective regional background levels and above levels considered safe for residential occupation, institutional controls in the form of deed restrictions on residential future use of the properties will help protect human health by limiting the properties to commercial/industrial uses.

The selection of no-action for groundwater is considered protective of human health and the environment because of the very low level nature of the groundwater threat. There is a very strong likelihood that the groundwater in the Upper Glacial Aquifer will not be used for any purpose which could allow for human health or environmental impact in the Site area. An additional institutional control in this case is provided by the Nassau County Department of Health Ordinance Article #4 which prohibits potable water wells in an area serviced by a municipal water supply. In addition, the remedy provides for decommissioning and hydraulically plugging Industrial Well N1917 on Parcel A, to eliminate a possible conduit for contamination of the deeper, more productive Lloyd Aquifer.

The long-term monitoring of the groundwater in the vicinity of the Site will assess the rate of recovery of the Upper Glacial Aquifer as the localized pockets of heavy metal contamination dissipate in

the absence of a contaminant source. The concurrent monitoring of Glen Cove Creek will continue to assess the levels of heavy metals and other contaminants in the Creek during and after soil remedy implementation.

Compliance with ARARs

Chemical-specific ARARs for groundwater are Federal MCLs and New York State drinking-water standards. The selected remedy will allow the Upper Glacial Aquifer to eventually attain these ARARs for the inorganics of concern through the removal of the source i.e., contaminated soil, thereby accelerating groundwater restoration. Groundwater will be monitored until such time as ARARs are achieved.

During excavation activities, the radionuclide emissions standards of 40 CFR Part 61 which limits exposures to the maximally exposed member of the public to 10 mrem/year must be met. Off-Site transportation of radioactive materials which exceed a concentration of 2,000 pCi/g would be regulated by 49 CFR 173. In general, transporters of hazardous wastes from the Site will have to meet the requirements of 40 CFR Part 263. Excavated waste may be subject to Federal land disposal restrictions (LDR) for the off-site disposal of wastes containing heavy metals in excess of LDR levels pursuant to 40 CFR Part 268.

There are no chemical-specific ARARs for soil left behind after remediation. Instead, EPA evaluates "to be considered" criteria, as well as results from the Site risk assessment, to determine these soil cleanup levels. Therefore, soil cleanup levels vary depending on the specific nature of the site and its intended future use. Cleanup levels for this Site are contained in Table -.

Location-specific ARARs for the Site include Executive Order 11990 on wetlands protection. The selected remedy will comply with these standards by removing contaminated soils and sediments which are presently impacting the small wetland areas on-Site. A wetlands assessment will be performed during the remedial design and a mitigation plan will be developed to address any adverse impacts on the wetlands that may be caused by the remedial action. Although the site is partially within the 100-year floodplain, no treatment facilities will be constructed as a result of the selected remedy; therefore, no floodplain managment considerations are required. Cultural resources have also been identified on or near the areas targeted for excavation on both properties, and the State Historic Preservation Act is an ARAR. Additional cultural resource follow-up necessary to meet the requirements of this Act will be assessed during remedial design.

See **TABLE 12** for a complete listing of ARARs and other criteria to be considered when developing/implementing the remedy.

Cost-Effectiveness

Each of the alternatives underwent a detailed cost analysis. In that analysis, capital costs and O&M costs have been estimated and used to develop present worth costs. In the present-worth cost analysis, annual costs were calculated for 30 years (estimated life of an alternative) using a five percent discount rate and a three percent rate of inflation, with 1999 as the base year. The selected remedy for soil, although it is somewhat more expensive than alternative **LS-3/CS-3**, nevertheless was felt to provide correspondingly greater benefits in terms of permanent reductions in toxicity, mobility, and volumes of contaminants, as well as in implementability, community and State acceptance. The selected remedy for groundwater has associated costs for long-term monitoring only, and is therefore very low relative cost. The effectiveness of this part of the remedy derives from the removal of the contaminated soils which should accelerate restoration of the Upper Glacial Aquifer, as well as the very low level of threat posed by the contaminated groundwater to human health and the environment at this Site. For costing purposes, the duration of the monitoring program was 30 years; given the fact that the soil excavation will remove the source of the localized groundwater contamination, EPA anticipates that the the duration of the monitoring program and its associated cost will be reduced significantly.

The selected remedy will achieve the goals of the response actions and is cost-effective because it will provide the best overall effectiveness proportional to its cost. For a detailed breakdown of costs associated with the selected remedy, please see **TABLE 13.**

Utilization of Permanent Solutions and Alternative Treatment Technologies to the Maximum Extent Practicable

The selected remedy utilizes a permanent solution to the principal threat posed by the soil contamination which has rendered the Site unusable at the present time. Implementing the selected remedy will allow the Site to be reused either commercially or industrially. The City of Glen Cove currently has a final Revitalization Plan which includes commercial use of the properties that are the subject of the selected remedy. EPA believes the selected remedy is compatible with the City's Revitalization Plan. The selected remedy includes the most appropriate solution to contamination in the soil and groundwater at the Site because it provides the best balance of trade-offs among the alternatives with respect to the nine evaluation criteria.

Alternative radionuclide separation technologies may be employed where effective to reduce the volume of radionuclide-contaminated soil for off-Site disposal. The actual technology utilized will be dependent on the physical properties of the materials to be excavated, which could vary from place to place on-Site, e.g., depth, method of original deposition, moisture content, levels and types of radionuclides,other co-located contaminants, etc., as well as the degree of safety with which the operation can be achieved, in terms of impacts to both on-Site workers and off-Site populations.

Preference for Treatment as a Principal Element

The statutory preference for remedies that employ treatment as a principal element is satisfied since the remedy for the principal threat posed by the radioactive and metals-contaminated soils at the Site employs the use of measures to reduce the volume of radioactive soil requiring off-Site disposal. In addition, metals-contaminated soil may be chemically stabilized at the disposal facility to achieve compliance with the Land Ban requirements of RCRA.

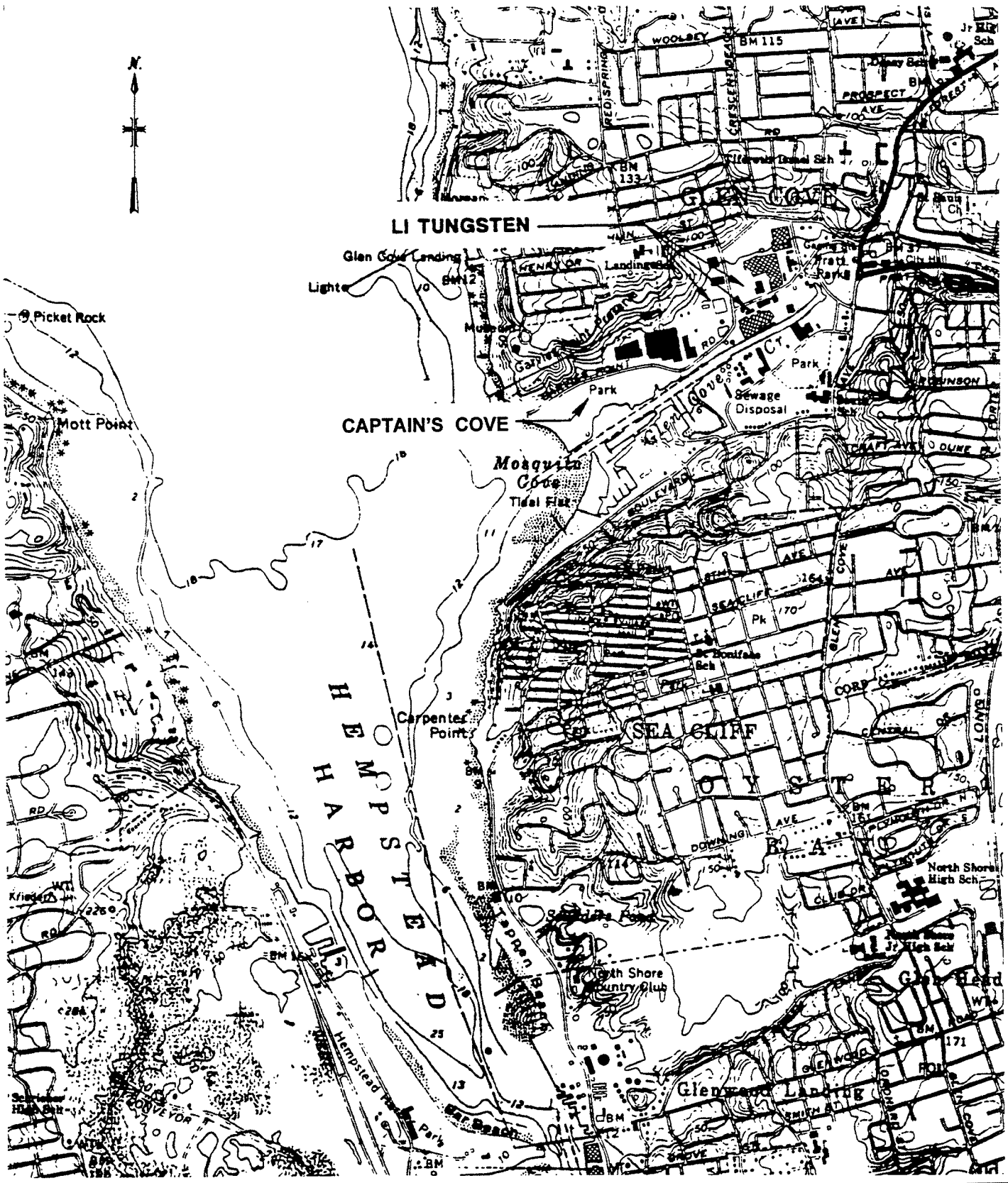
DOCUMENTATION OF SIGNIFICANT CHANGES

There are no significant changes from the preferred remedy presented in the Proposed Plan.

APPENDIX I

Figures

FIGURE 1



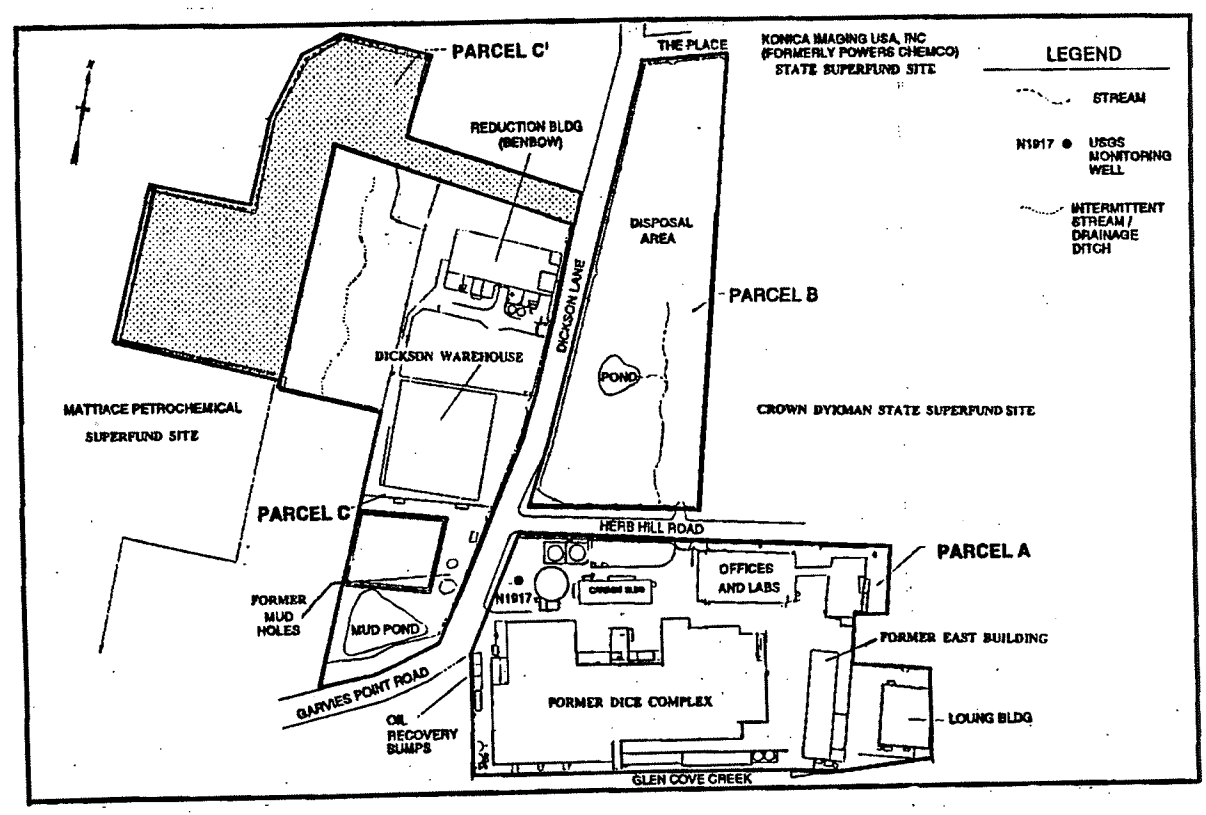
TITLE:	DATE:
SITE LOCATION MAP	MAY 1998

MALCOLM PIRNIE

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

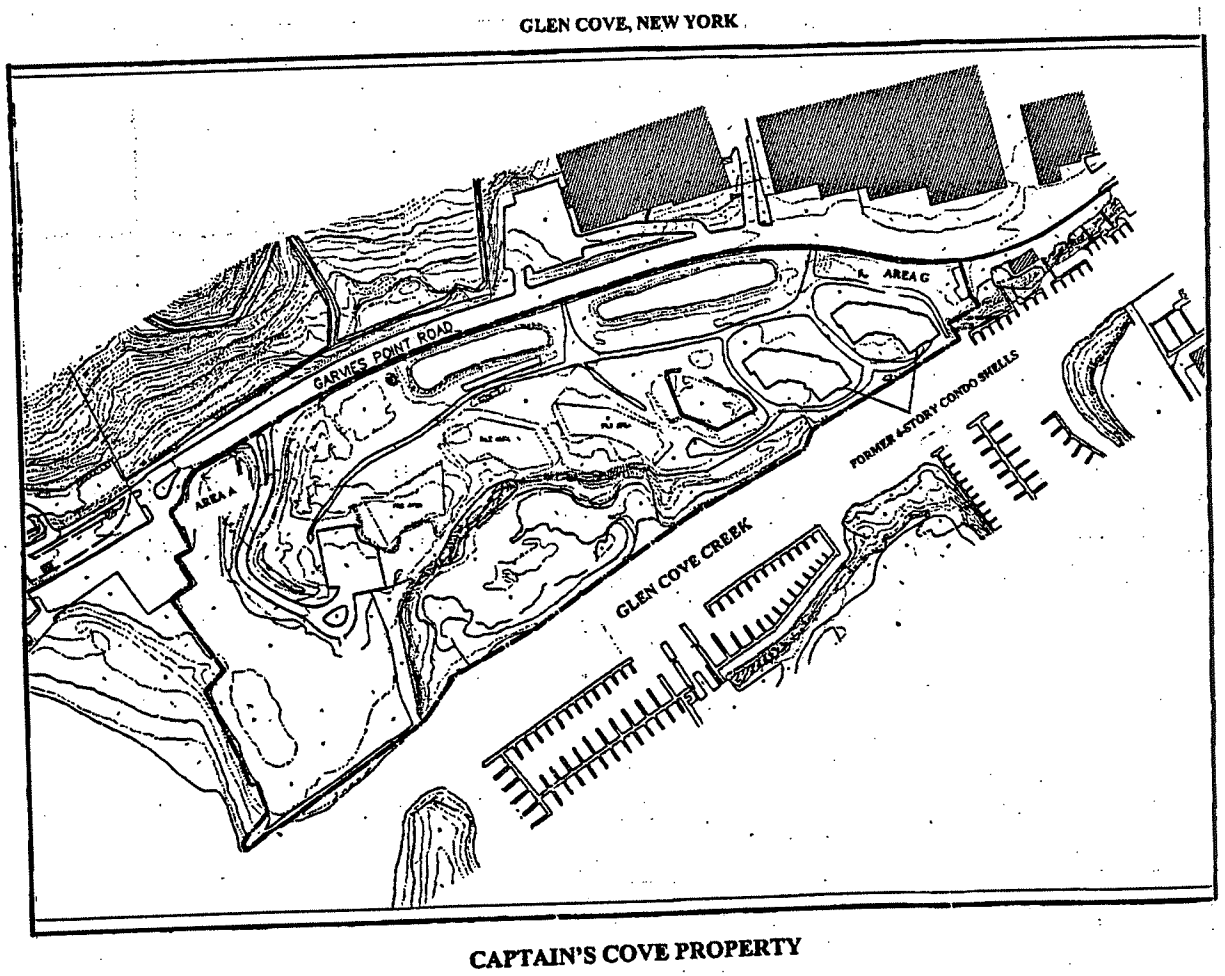
LI TUNGSTEN REMEDIAL INVESTIGATION
GLEN COVE, NEW YORK
USEPA REGION II ARCS
CONTRACT NO. 68-W9-0051; W.A. NO. 025-2L4L

FIGURE 2



LI TUNGSTEN FACILITY

GLEN COVE, NEW YORK



CAPTAIN'S COVE PROPERTY

GLEN COVE, NEW YORK

FIGURE 3

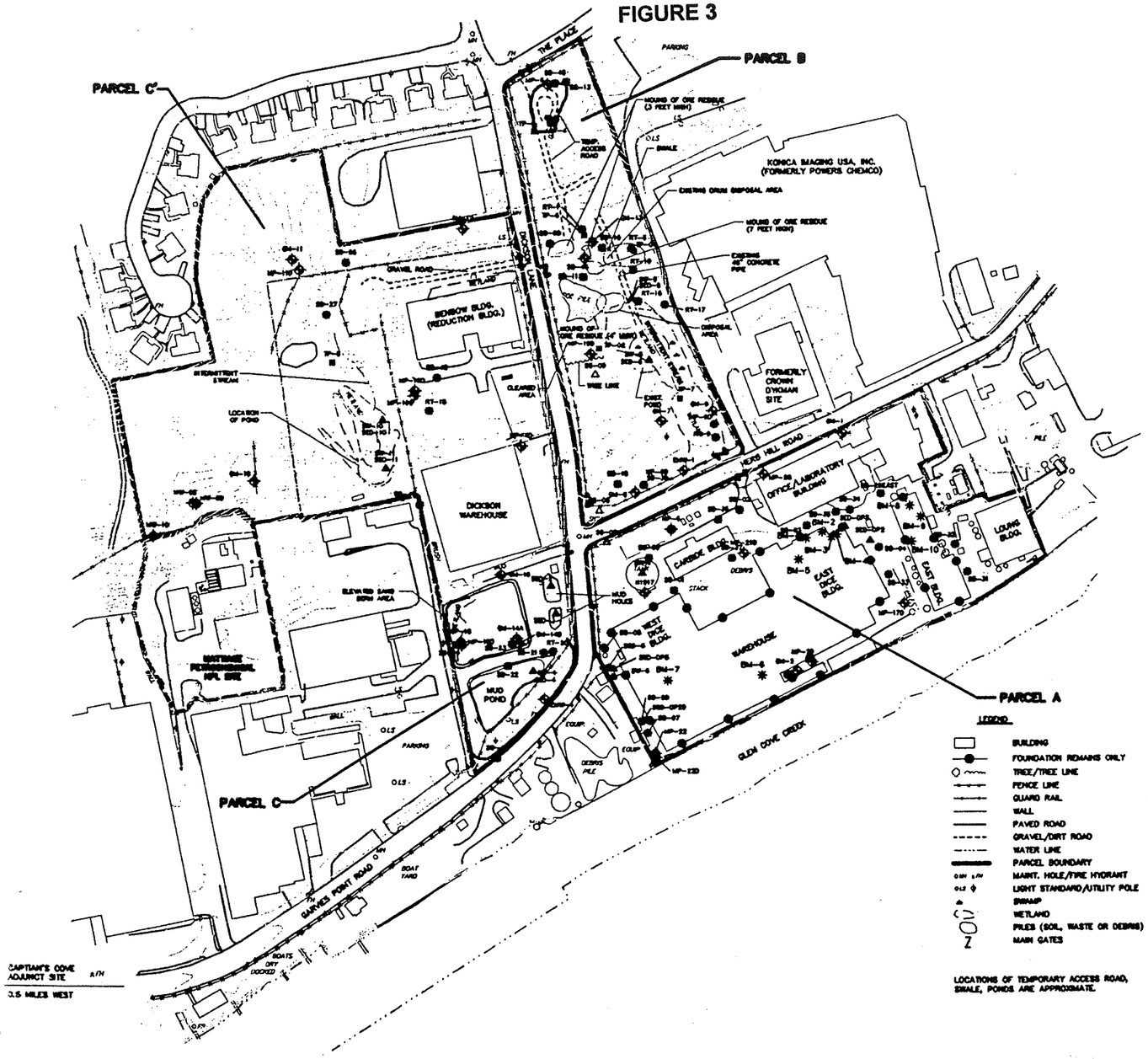
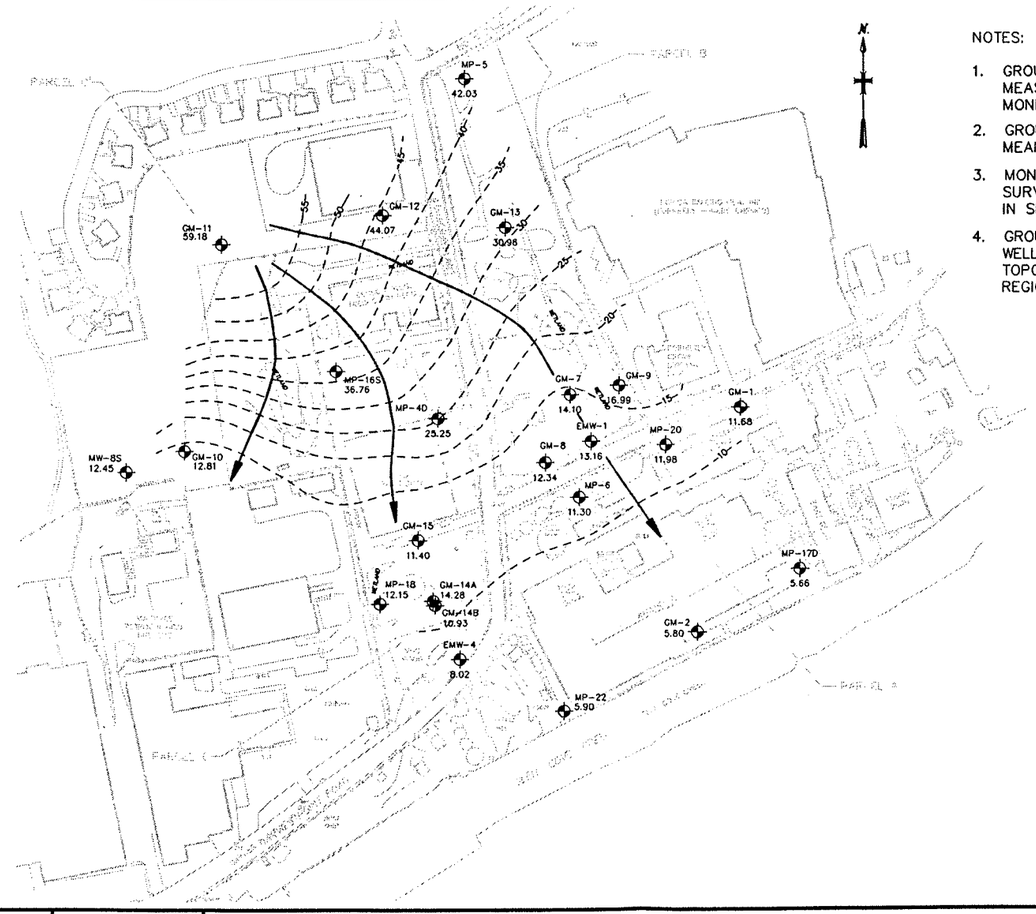

PARCEL C
PARCEL B
PARCEL A
PARCEL C
THE PLACE
PARKING
MOUND OF ORE RESIDUE (3 FEET HIGH)
ACCESS ROAD
SWALE
KONICA IMAGING USA, INC. (FORMERLY POWERS CHEMCO)
EXISTING DRUM DISPOSAL AREA
MOUND OF ORE RESIDUE (7 FEET HIGH)
EXISTING 48" CONCRETE PIPE
DISPOSAL AREA
DRAINS ROAD
WETLAND
BENSHOW BLDG. (REDUCTION BLDG.)
INTERMITTENT STREAM
LOCATION OF POND
CLEARED AREA
WIRE LINE
FORMERLY CROWN DYKEMAN SITE
HOPE HILL ROAD
DICKSON WAREHOUSE
OFFICE/LABORATORY BUILDING
CARBIDE BLDG.
DEBRIS
STACK
EAST DICE BLDG.
LOUNGE BLDG.
ELEVATED SAND BERM AREA
SOUTHERN PETROCHEMICAL SITE
MUD HOUSE
WEST DICE BLDG.
WAREHOUSE
MUD POND
FILL
PARKING
EQUIP.
DEBRIS PILE
GLEN COVE CREEK
GARVIES POINT ROAD
BOAT YARD
BOATS DRY DOCKED
CAPTAIN'S COVE ADJUNCT SITE
3.5 MILES WEST
BUILDING
FOUNDATION REMAINS ONLY
TREE/TREE LINE
FENCE LINE
GUARD RAIL
WALL
PAVED ROAD
GRAVEL/DIRT ROAD
WATER LINE
PARCEL BOUNDARY
MAINT. HOLE/FIRE HYDRANT
LIGHT STANDARD/UTILITY POLE
SWAMP
WETLAND
PILES (SOIL, WASTE OR DEBRIS)
MAIN GATES
NEW MONITORING WELLS
EXISTING MONITORING WELLS
SOIL BORINGS
RADIOLOGICAL BORINGS (GAMMA LOGS)
TEST PITS
SEDIMENT SAMPLES
DUPLICATED SEDIMENT SAMPLES
SURFACE WATER SAMPLES
SURFACE SOIL SAMPLES
BUILDING MATERIAL SAMPLE
LOCATIONS OF TEMPORARY ACCESS ROAD, SWALE, PONDS ARE APPROXIMATE.
0
100
200
300
SCALE IN FEET
1"=100'

FIGURE 4



NOTES:

1. GROUNDWATER ELEVATIONS ARE BASED ON MEASUREMENT OF WATER LEVELS IN MONITORING WELLS ON NOVEMBER 18, 1996.
2. GROUNDWATER ELEVATIONS ARE IN FEET ABOVE MEAN SEA LEVEL DATUM.
3. MONITORING WELL LOCATIONS ARE BASED ON SURVEY BY AMERICAN GEOTECH, INC. CONDUCTED IN SEPTEMBER 1996.
4. GROUNDWATER ELEVATION CONTOURS AWAY FROM WELL LOCATIONS ARE INTERPOLATED BASED ON TOPOGRAPHIC CONDITIONS AND KNOWLEDGE OF REGIONAL HYDROGEOLOGY.

LEGEND

- 10 — APPROXIMATE GROUNDWATER ELEVATION CONTOUR
- GROUNDWATER FLOW DIRECTION
- BUILDING
- TREE/TREE LINE
- FENCE LINE
- GUARD RAIL
- WALL
- PAVED ROAD
- GRAVEL/DIRT ROAD
- WATER LINE
- PARCEL BOUNDARY
- MAINT. HOLE/FIRE HYDRANT
- LIGHT STANDARD/UTILITY POLE
- SWAMP
- WETLAND
- PILES (SOIL, WASTE OR DEBRIS)
- MAIN GATES
- MP-20 / 11.98 — MONITORING WELL AND GROUNDWATER ELEVATION

LOCATIONS OF TEMPORARY ACCESS ROAD, SWALE, PONDS ARE APPROXIMATE.

0 100 200 300
SCALE IN FEET
1"=200'

MALCOLM PIRNIE

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

DATE: MAY 1998

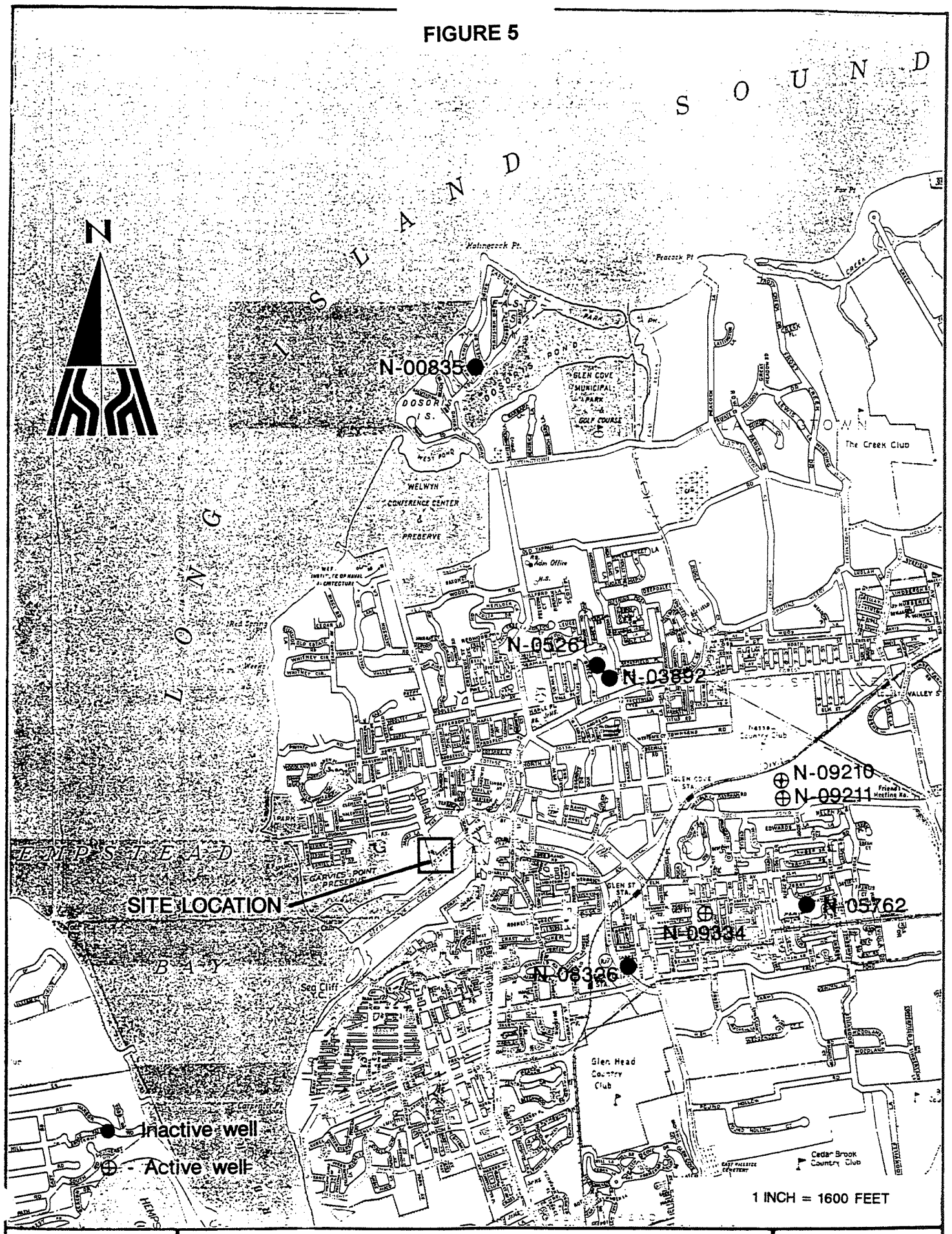
SHALLOW GROUNDWATER CONTOUR MAP WITH FLOW DIRECTION- NOV. 18, 1996

PROJECT NO.: 8001202

I:\ACAD\PROJ\8001202O\GISFILES\REPORT\8001L717 Scale: 1:1 Date: 05/06/1998 Time: 13:59

7308 ADMIN

FIGURE 5

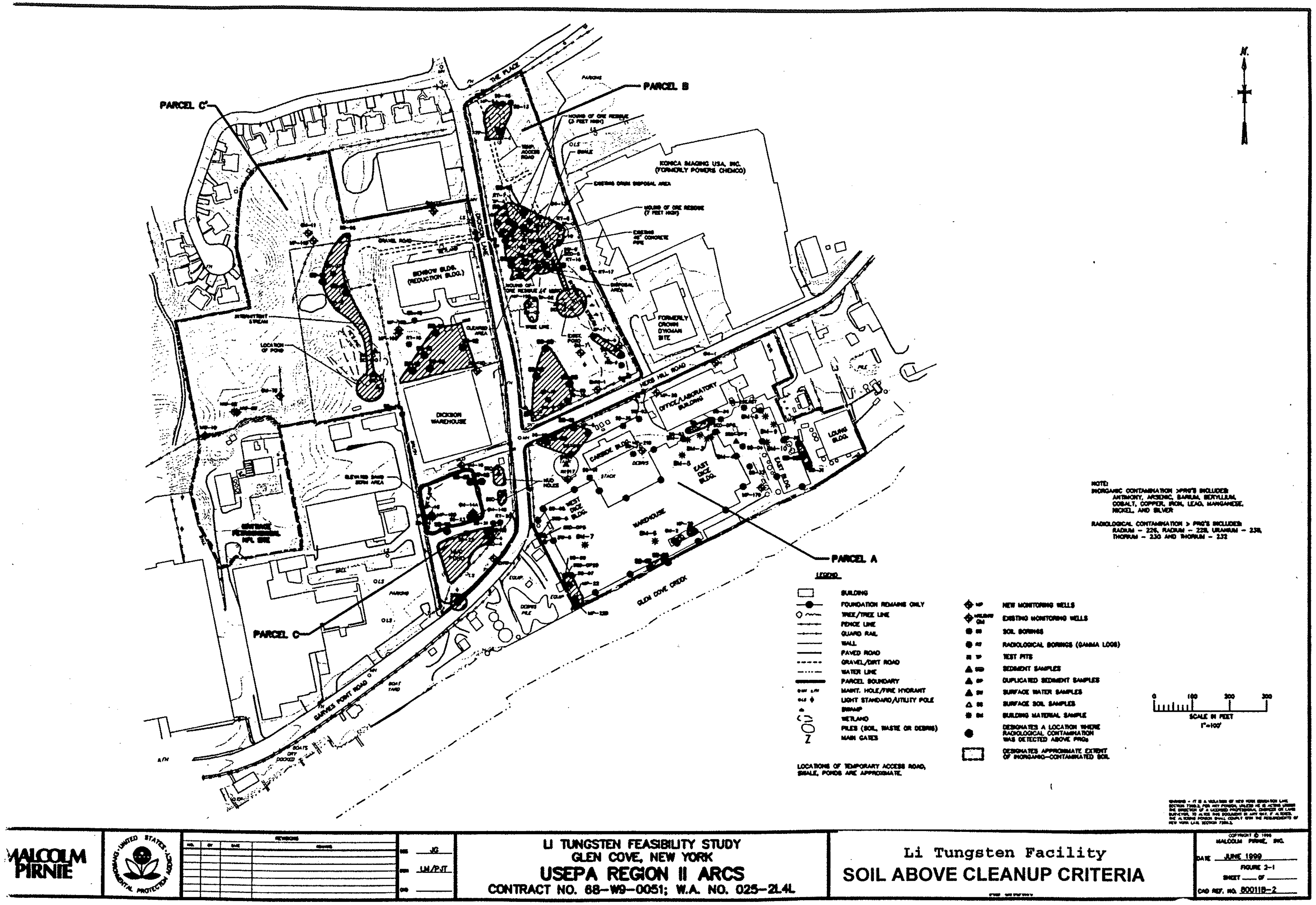


MALCOLM PIRNIE

MUNICIPAL WATER SUPPLY
WELL LOCATIONS

MALCOLM PIRNIE, INC.

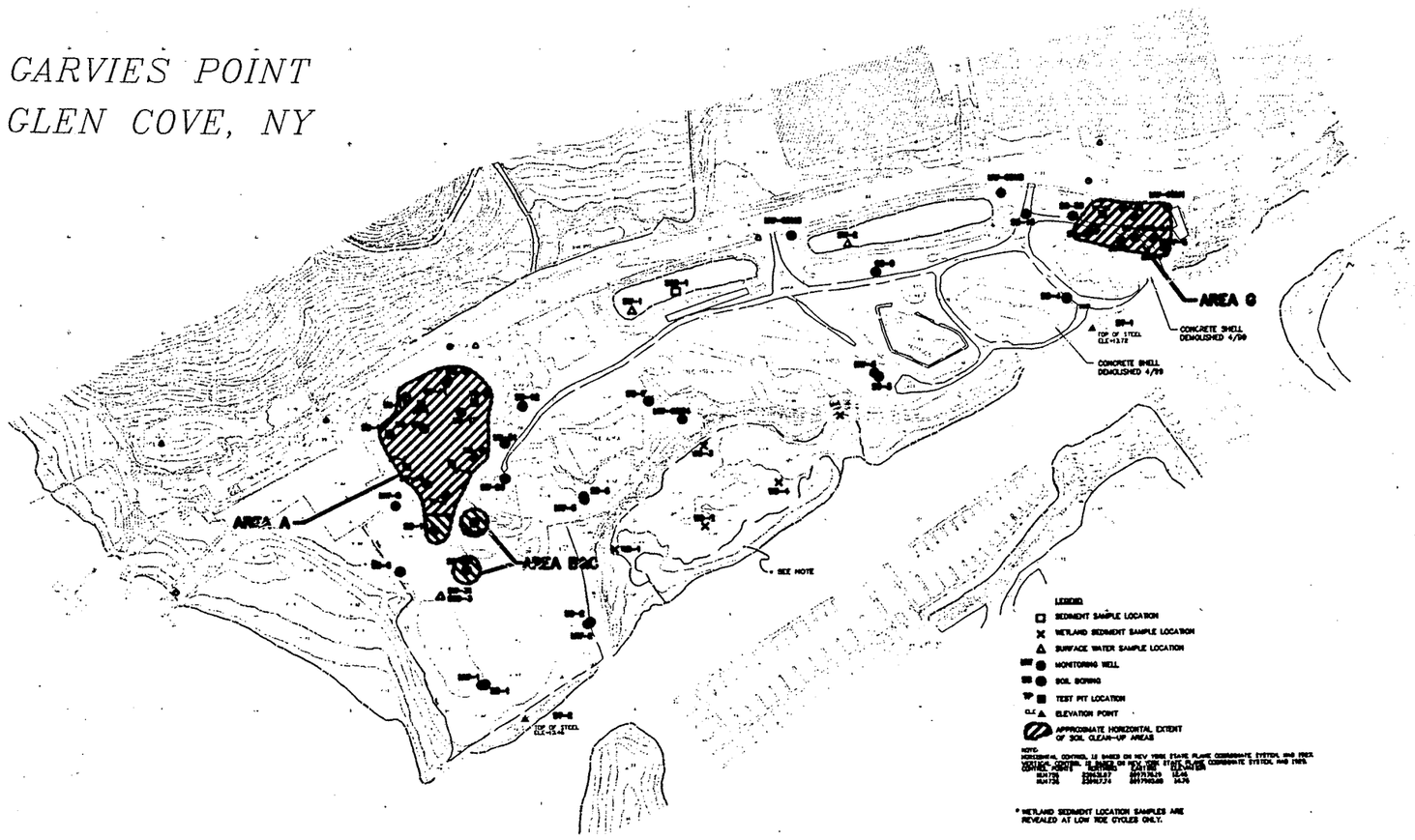
FIGURE 6



PARCEL A
PARCEL B
PARCEL C
PARCEL C'
KONICA IMAGING USA, INC. (FORMERLY POWERS CHEMCO)
FORMERLY CROWN DYKMAN SITE
DICKSON WAREHOUSE
OFFICE/LABORATORY BUILDING
CARBIDE BLDG.
WAREHOUSE
LOUNG BLDG.
GLEN COVE CREEK
LEGEND
BUILDING
FOUNDATION REMAINS ONLY
TREE/TREE LINE
FENCE LINE
GUARD RAIL
WALL
PAVED ROAD
GRAVEL/DIRT ROAD
WATER LINE
PARCEL BOUNDARY
MAINT. HOLE/FIRE HYDRANT
LIGHT STANDARD/UTILITY POLE
SWAMP
WETLAND
PILES (SOIL, WASTE OR DEBRIS)
MAIN GATES
NEW MONITORING WELLS
EXISTING MONITORING WELLS
SOIL BORINGS
RADIOLOGICAL BORINGS (GAMMA LOGS)
TEST PITS
SEDIMENT SAMPLES
DUPLICATED SEDIMENT SAMPLES
SURFACE WATER SAMPLES
SURFACE SOIL SAMPLES
BUILDING MATERIAL SAMPLE
DESIGNATES A LOCATION WHERE RADIOLOGICAL CONTAMINATION WAS DETECTED ABOVE PRGs
DESIGNATES APPROXIMATE EXTENT OF INORGANIC-CONTAMINATED SOIL
LOCATIONS OF TEMPORARY ACCESS ROAD, SWALE, PONDS ARE APPROXIMATE.
NOTE:
INORGANIC CONTAMINATION >PRG'S INCLUDES: ANTIMONY, ARSENIC, BARIUM, BERYLLIUM, COBALT, COPPER, IRON, LEAD, MANGANESE, NICKEL, AND SILVER
RADIOLOGICAL CONTAMINATION > PRG'S INCLUDES: RADIUM - 226, RADIUM - 228, URANIUM - 238, THORIUM - 230 AND THORIUM - 232
0 100 200 300
SCALE IN FEET
1"=100'
MALCOLM PIRNIE
LI TUNGSTEN FEASIBILITY STUDY
GLEN COVE, NEW YORK
USEPA REGION II ARCS
CONTRACT NO. 68-W9-0051; W.A. NO. 025-2L4L
Li Tungsten Facility
SOIL ABOVE CLEANUP CRITERIA
COPYRIGHT © 1999 MALCOLM PIRNIE, INC.
DATE JUNE 1999
FIGURE 2-1
SHEET ___ OF ___
CAD REF. NO. 800118-2

FIGURE 7

GARVIES POINT
GLEN COVE, NY



MALCOLM PIRNIE		LI TUNGSTEN FEASIBILITY STUDY GLEN COVE, NEW YORK USEPA REGION II ARCS CONTRACT NO. 68-W9-0051; W.A. NO. 025-2L4L	Captain's Cove Property SOIL ABOVE CLEANUP CRITERIA
REVISIONS	DES. PJT DR. JC CHK.	COPYRIGHT © 1999 MALCOLM PIRNIE, INC.	JUNE 1999 FIGURE 2-2

APPENDIX II

Tables

TABLE 1

Summary of Sampling Results for Radionuclides

Li Tungsten Facility

TABLE 7-2

SUMMARY OF RADIONUCLIDES IN SURFACE SOIL
LI TUNGSTEN SITE

RADIONUCLIDE	AREA A		AREA B		AREA B&C		AREA C		BACKGROUND	
	Sample Size	Range of Concentrations[1] pCi/g	Sample Size	Range of Concentrations[1] pCi/g	Sample Size	Range of Concentrations[1] pCi/g	Sample Size	Range of Concentrations[1] pCi/g	Sample Size	Range of Concentrations[2] pCi/g
Uranium-238	23	<0.3 - 110	11	0.3 - 3.7	34	0.2 - 470	11	0.4 - 27	13	<0.1 - 1.1
Radium-226	22	0.58 - 41	11	0.54 - 5.0	34	0.77 - 250	11	1.2 - 9.7	13	<0.3 - 1.4
Radium-228	22	<0.29 - 530	11	<0.52 - 48	34	<0.31 - 420	11	0.91 - 37	13	<0.32 - 1.7
Thorium-230	22	<0.21 - 58	11	0.41 - 7.8	31	<0.21 - 310	11	0.76 - 13	13	<0.16 - 1.6
Thorium-232	22	0.30 - 93	11	0.72 - 16	31	0.36 - 220	11	<0.47 - 24	13	0.34 - 1.5

1 = Range of detected concentrations.
2 = Background samples are surface and subsurface combined.

TABLE 7-2 (Continued)

SUMMARY OF RADIONUCLIDES IN ALL SOILS
LI TUNGSTEN SITE

RADIONUCLIDE	AREA A		AREA B		AREA B&C		AREA C		BACKGROUND	
	Sample Size	Range of Concentrations[1] pCi/g	Sample Size	Range of Concentrations[1] pCi/g	Sample Size	Range of Concentrations[1] pCi/g	Sample Size	Range of Concentrations[1] pCi/g	Sample Size	Range of Concentrations[2] pCi/g
Uranium-238	35	<0.3 - 110	16	<0.2 - 3.7	67	<0.2 - 470	21	0.4 - 27	13	<0.1 - 1.1
Radium-226	34	<0.36 - 41	16	0.41 - 5	67	<0.32 - 250	21	0.97 - 9.7	13	<0.3 - 1.4
Radium-228	34	<0.22 - 530	16	<0.52 - 48	67	<0.31 - 420	21	0.78 - 37	13	<0.32 - 1.7
Thorium-230	34	<0.21 - 58	16	0.41 - 7.8	64	<0.1 - 310	21	0.56 - 13	13	<0.16 - 1.6
Thorium-232	34	0.26 - 93	16	0.66 - 16	64	<0.32 - 220	21	<0.47 - 24	13	0.34 - 1.5

1 = Range of detected concentrations.
2 = Background samples are surface and subsurface combined.

TABLE 7-3

SUMMARY OF RADIONUCLIDES IN GROUNDWATER
LI TUNGSTEN SITE

RADIONUCLIDE	Li Tungsten Site		Background		USEPA MCLs [2]	NYSDEC WQS[3]
	Sample Size	Range of Concentrations[1] pCi/l	Sample Size	Range of Concentrations[1] pCi/l	pCi/l	Human Health Standards (pCi/L)
Uranium-238	60	<0.23 - 80	5	0.29 - 4.6	NA	NA
Radium-226	60	<0.2 - 11	5	<0.35 - 10	5 [4]	5g [4]
Radium-228	60	<0.94 - 10	5	<0.94 - 5.2	5 [4]	5g [4]
Thorium-230	59	<0.22 - 9.4	5	<0.22 - 1.4	NA	NA
Thorium-232	59	<0.2 - 7	5	0.29 - 1.7	NA	NA

[1] Range of detected concentrations.
[2] USEPA Maximum Contaminant Levels; 40 CFR Part 141
[3] NYSDEC Water Quality Standards and
Guidance Values (NYSDEC, 1993). Standards
and guidance values (designated "g") for Class GA groundwater.
[4] 5 pCi/l MCL is combined for Radium 226 and 228.
NA = Not Available

TABLE 7-4

SUMMARY OF RADIONUCLIDES IN SEDIMENT
LI TUNGSTEN SITE

RADIONUCLIDE	PARCEL B Sample Size	PARCEL B Range of Concentrations[1] pCi/g	PARCEL C Sample Size	PARCEL C Range of Concentrations[1] pCi/g	BACKGROUND Sample Size	BACKGROUND Range of Concentrations[2] pCi/g
Uranium-238	2	0.89 - 0.9	2	0.58 - 1.7	13	<0.1 - 1.1
Radium-226	2	1.0 - 1.1	2	0.94 - 2.2	13	<0.3 - 1.4
Radium-228	2	<0.27 - 1.2	2	0.91 - 1.8	13	<0.32 - 1.7
Thorium-230	2	<0.24 - 0.32	2	0.2 - 1.3	13	<0.16 - 1.6
Thorium-232	2	0.52 - 0.78	2	0.56 - 1.5	13	0.34 - 1.5

1 = Range of detected concentrations.
2 = Background samples are surface and subsurface combined.

TABLE 2

Summary of Sampling Results for Non-radioactive Chemicals

Li Tungsten Facility

TABLE 7-19

SUMMARY OF CHEMICALS IN SURFACE SOIL
LI TUNGSTEN SITE

CHEMICAL	AREA A		AREA B		AREA B&C		AREA C	
	Frequency	Range of Concentrations[1] mg/kg	Frequency	Range of Concentrations[1] mg/kg	Frequency	Range of Concentrations[1] mg/kg	Frequency	Range of Concentrations[1] mg/kg
VOLATILE ORGANICS								
Acetone	3 / 22	0.055 - 0.19	2 / 9	0.01 - 0.056	1 / 19	0.011	3 / 8	0.033 - 0.05
Benzene	1 / 21	0.001	1 / 9	0.004	0 / 19	ND	1 / 8	0.002
2-Butanone	5 / 21	0.007 - 0.052	2 / 9	0.004 - 0.014	1 / 19	0.003	3 / 8	0.002 - 0.015
Carbon disulfide	2 / 21	0.001 - 0.007	0 / 9	ND	0 / 19	ND	0 / 8	ND
Chlorobenzene	0 / 21	ND	0 / 9	ND	0 / 19	ND	0 / 8	ND
Chloroform	1 / 21	0.003	0 / 9	ND	0 / 19	ND	1 / 8	0.001
1,2-Dichloroethane	1 / 21	0.002	0 / 9	ND	0 / 19	ND	0 / 8	ND
1,2-Dichloroethene (total)	1 / 21	0.004	0 / 9	ND	0 / 19	ND	0 / 8	ND
1,1-Dichloroethene	1 / 21	0.006	0 / 9	ND	0 / 19	ND	0 / 8	ND
1,2-Dichloropropane	0 / 21	ND	0 / 9	ND	0 / 19	ND	1 / 8	0.003
Ethylbenzene	1 / 21	0.008	0 / 9	ND	0 / 19	ND	0 / 8	ND
2-Hexanone	1 / 21	0.007	0 / 9	ND	1 / 19	0.001	2 / 8	0.026 - 0.045
4-Methyl-2-Pentanone	1 / 21	0.003	1 / 9	0.017	0 / 19	ND	4 / 8	0.003 - 0.029
Methylene chloride	8 / 22	0.001 - 0.022	2 / 9	0.003 - 0.016	1 / 19	0.004	2 / 8	0.003 - 0.004
Styrene	0 / 21	ND	0 / 9	ND	0 / 19	ND	0 / 8	ND
1,1,2,2-Tetrachloroethane	0 / 21	ND	0 / 9	ND	0 / 19	ND	0 / 8	ND
Tetrachloroethene	4 / 21	0.001 - 0.039	0 / 9	ND	0 / 19	ND	0 / 8	ND
Toluene	1 / 21	0.005	0 / 9	ND	0 / 19	ND	0 / 8	ND
1,1,1-Trichloroethane	1 / 21	0.006	0 / 9	ND	0 / 19	ND	0 / 8	ND
Trichloroethene	1 / 21	0.003	0 / 9	ND	0 / 19	ND	0 / 8	ND
Xylenes (total)	0 21	ND	0 / 9	ND	0 / 19	ND	0 / 8	ND
SEMI-VOLATILE ORGANICS								
Acenaphthene	6 / 22	0.064 - 0.64	0 / 9	ND	0 / 19	ND	0 / 8	ND
Acenaphthylene	1 / 22	0.05	0 / 9	ND	0 / 19	ND	0 / 8	ND
Anthracene	10 / 22	0.022 - 0.7	0 / 9	ND	4 / 19	0.021 - 0.066	0 / 8	ND
Benzo[a]anthracene	15 / 22	0.068 - 3.1	1 / 9	0.092	7 / 19	0.051 - 0.36	1 / 8	0.029
Benzo[a]pyrene	16 / 22	0.043 - 3.9	1 / 9	0.12	6 / 19	0.075 - 0.39	2 / 8	0.021 - 0.05
Benzo[b]fluoranthene	17 / 22	0.058 - 10	1 / 9	0.5	11 / 19	0.086 - 1	2 / 8	0.062 - 0.15
Benzo[g,h,i]perylene	14 / 22	0.081 - 4.7	1 / 9	0.083	7 / 19	0.042 - 0.31	2 / 8	0.022 - 0.062
Benzo[k]fluoranthene	8 / 22	0.081 - 1.5	1 / 9	0.12	1 / 19	0.37	1 / 8	0.036
bis(2-Ethylhexyl)phthalate	10 / 22	0.051 - 16	1 / 9	0.1	2 / 19	0.12 - 0.14	1 / 8	0.021
Butylbenzylphthalate	0 / 22	ND	1 / 9	0.051	1 / 19	0.1	0 / 8	ND
Carbazole	4 / 22	0.09 - 1	0 / 9	ND	1 / 19	0.021	0 / 8	ND
Chrysene	16 / 22	0.09 - 4	1 / 9	0.19	12 / 19	0.041 - 0.4	2 / 8	0.054 - 0.094
Di-n-butylphthalate	0 / 22	ND	1 / 9	0.017	1 / 19	0.058	0 / 8	ND
Dibenz[a,h]anthracene	7 / 22	0.065 - 1.3	0 / 9	ND	0 / 19	ND	0 / 8	ND
Dibenzofuran	5 / 22	0.046 - 0.83	0 / 9	ND	0 / 19	ND	0 / 8	ND
Diethylphthalate	2 / 22	0.1 - 0.5	0 / 9	ND	0 / 19	ND	0 / 8	ND
Dimethylphthalate	1 / 22	0.036	0 / 9	ND	0 / 19	ND	0 / 8	ND
Fluoranthene	20 / 22	0.048 - 10	2 / 9	0.064 - 0.24	11 / 19	0.074 - 0.59	2 / 8	0.066 - 0.098

TABLE 7-19 (Continued)

SUMMARY OF CHEMICALS IN SURFACE SOIL
LI TUNGSTEN SITE

CHEMICAL	AREA A		AREA B		AREA B&C		AREA C	
	Frequency	Range of Concentrations[1] mg/kg	Frequency	Range of Concentrations[1] mg/kg	Frequency	Range of Concentrations[1] mg/kg	Frequency	Range of Concentrations[1] mg/kg
Fluorene	5 / 22	0.074 - 0.57	0 / 9	ND	1 / 19	0.047	0 / 8	ND
Indeno[1,2,3-cd]pyrene	13 / 22	0.075 - 3.8	1 / 9	0.11	8 / 19	0.049 - 0.25	2 / 8	0.027 - 0.049
2-Methylnaphthalene	5 / 22	0.048 - 0.61	0 / 9	ND	0 / 19	ND	0 / 8	ND
N-nitrosodiphenylamine	0 / 22	ND	0 / 9	ND	0 / 19	ND	2 / 8	5.3 - 10
Naphthalene	2 / 22	0.047 - 0.19	0 / 9	ND	1 / 19	0.045	0 / 8	ND
Pentachlorophenol	1 / 22	3.6	0 / 9	ND	0 / 19	ND	1 / 8	0.08
Phenanthrene	16 / 22	0.071 - 3.8	1 / 9	0.072	8 / 19	0.05 - 0.4	2 / 8	0.041 - 0.064
Pyrene	20 / 22	0.052 - 7.3	2 / 9	0.086 - 0.21	11 / 19	0.067 - 0.82	2 / 8	0.051 - 0.11
PESTICIDES/PCBs								
Endrin	0 / 20	ND	1 / 6	0.0053	2 / 12	0.037 - 0.07	0 / 7	ND
4,4'-DDT	0 / 22	ND	1 / 9	0.01	0 / 16	ND	0 / 7	ND
PCBs (total)	2 / 22	0.34 - 1.02	4 / 9	0.037 - 0.51	10 / 18	0.152 - 15.89	2 / 8	0.873 - 2.891
INORGANICS								
Aluminum	22 / 22	2140 - 16900	9 / 9	3690 - 56600	19 / 19	393 - 27700	8 / 8	1380 - 16200
Antimony	6 / 22	2.3 - 21.9	8 / 9	1.4 - 416	14 / 19	7.1 - 5610	7 / 8	30.7 - 2430
Arsenic	14 / 14	6.4 - 523	9 / 9	10 - 1790	16 / 17	2 - 6300	7 / 7	7.3 - 1440
Barium	22 / 22	11.3 - 6400	9 / 9	22.3 - 313	19 / 19	13.5 - 1820	8 / 8	26.6 - 1350
Beryllium	12 / 22	0.22 - 1.1	5 / 9	0.29 - 0.82	9 / 19	0.59 - 8.5	1 / 8	11
Cadmium	9 / 22	0.86 - 10.2	6 / 9	1.3 - 8	13 / 19	1.4 - 21.9	5 / 8	0.89 - 23.9
Calcium	22 / 22	1040 - 145000	9 / 9	285 - 11200	19 / 19	109 - 47800	8 / 8	506 - 76000
Chromium	21 / 21	7.8 - 109	9 / 9	9.3 - 93.7	19 / 19	9.8 - 1620	8 / 8	12.9 - 434
Cobalt	22 / 22	3.1 - 1560	9 / 9	4.2 - 4660	19 / 19	3.1 - 4620	8 / 8	6.7 - 764
Copper	22 / 22	5.8 - 1630	9 / 9	14.8 - 2160	19 / 19	3 - 4610	8 / 8	9.6 - 2070
Iron	22 / 22	7610 - 124000	9 / 9	16800 - 193000	19 / 19	7920 - 313000	8 / 8	11600 - 74300
Lead	19 / 19	14.6 - 688	9 / 9	30.6 - 3710	15 / 19	4 - 19600	8 / 8	8.3 - 5140
Magnesium	22 / 22	633 - 38200	9 / 9	1400 - 94000	19 / 19	908 - 5480	8 / 8	167 - 24800
Manganese	21 / 21	72.5 - 11600	9 / 9	155 - 5680	18 / 18	57.1 - 90000	8 / 8	106 - 2930
Mercury	20 / 22	0.05 - 3.5	7 / 9	0.17 - 1.8	17 / 19	0.05 - 8.4	8 / 8	0.06 - 6.2
Nickel	22 / 22	5.8 - 1100	9 / 9	6.9 - 28900	19 / 19	5.1 - 22000	8 / 8	14.4 - 304
Potassium	22 / 22	331 - 1340	9 / 9	419 - 1800	19 / 19	354 - 2510	8 / 8	508 - 6780
Selenium	14 / 19	1.5 - 149	9 / 9	1.5 - 33.1	12 / 17	2.2 - 140	7 / 8	7.4 - 262
Silver	9 / 16	0.39 - 34.3	7 / 7	0.69 - 103	13 / 18	0.39 - 114	7 / 8	2.8 - 110
Sodium	22 / 22	35.3 - 3060	8 / 9	35.7 - 36500	18 / 19	25.9 - 16600	8 / 8	198 - 2960
Thallium	0 / 22	ND	0 / 9	ND	3 / 19	3.6 - 22.7	0 / 8	ND
Vanadium	22 / 22	9.9 - 92.5	9 / 9	14.2 - 52.8	17 / 19	12.1 - 165	8 / 8	10.6 - 148
Zinc	22 / 22	17.9 - 816	9 / 9	39.8 - 1270	19 / 19	17.3 - 2900	8 / 8	70.9 - 1960
OTHER								
Cyanide	5 / 22	0.33 - 1.5	2 / 9	0.46 - 0.56	10 / 19	0.31 - 2.3	2 / 8	0.3 - 0.41

1 = Range of detected concentrations.
ND = Not detected

TABLE 7-20

SUMMARY OF CHEMICALS IN ALL SOILS
LI TUNGSTEN SITE

CHEMICAL	AREA A		AREA B		AREA B&C		AREA C	
	Frequency	Range of Concentrations[1] mg/kg	Frequency	Range of Concentrations[1] mg/kg	Frequency	Range of Concentrations[1] mg/kg	Frequency	Range of Concentrations[1] mg/kg
VOLATILE ORGANICS								
Acetone	5 / 34	0.041 - 0.19	2 / 12	0.01 - 0.056	4 / 37	0.011 - 0.05	4 / 14	0.027 - 0.05
Benzene	1 / 34	0.001	1 / 12	0.004	0 / 37	ND	1 / 13	0.002
2-Butanone	9 / 34	0.004 - 0.052	2 / 12	0.004 - 0.014	2 / 37	0.003 - 0.012	5 / 13	0.002 - 0.015
Carbon disulfide	5 / 34	0.001 - 0.007	0 / 12	ND	0 / 37	ND	0 / 13	ND
Chlorobenzene	0 / 34	ND	0 / 12	ND	0 / 37	ND	1 / 13	0.001
Chloroform	1 / 34	0.003	0 / 12	ND	0 / 37	ND	1 / 13	0.001
1,2-Dichloroethane	1 / 34	0.002	0 / 12	ND	0 / 37	ND	0 / 13	ND
1,2-Dichloroethene (total)	3 / 34	0.004 - 0.014	0 / 12	ND	0 / 37	ND	1 / 13	0.005
1,1-Dichloroethene	1 / 34	0.006	0 / 12	ND	0 / 37	ND	0 / 13	ND
1,2-Dichloropropane	0 / 34	ND	0 / 12	ND	0 / 37	ND	1 / 13	0.003 - 0.003
Ethylbenzene	2 / 34	0.008 - 0.01	0 / 12	ND	0 / 37	ND	0 / 13	ND
2-Hexanone	2 / 34	0.007 - 0.008	0 / 12	ND	1 / 37	0.001	3 / 13	0.026 - 0.045
4-Methyl-2-Pentanone	1 / 34	0.003	1 / 12	0.017	0 / 37	ND	6 / 13	0.003 - 0.029
Methylene chloride	9 / 35	0.001 - 0.022	2 / 12	0.003 - 0.016	3 / 37	0.002 - 0.004	2 / 14	0.003 - 0.004
Styrene	0 / 34	ND	0 / 12	ND	0 / 37	ND	2 / 13	0.007 - 0.019
1,1,2,2-Tetrachloroethane	0 / 34	ND	0 / 12	ND	0 / 37	ND	1 / 13	0.004
Tetrachloroethene	5 / 34	0.001 - 0.045	0 / 12	ND	0 / 37	ND	1 / 13	0.002
Toluene	1 / 34	0.005	0 / 12	ND	1 / 37	0.001	1 / 13	0.002
1,1,1-Trichloroethane	2 / 34	0.005 - 0.006	0 / 12	ND	0 / 37	ND	0 / 13	ND
Trichloroethene	1 / 34	0.003	0 / 12	ND	0 / 37	ND	2 / 14	0.002 - 0.005
Xylenes (total)	0 / 34	ND	0 / 12	ND	0 / 37	ND	1 / 13	0.002
SEMI-VOLATILE ORGANICS								
Acenaphthene	11 / 35	0.064 - 3.8	0 / 12	ND	0 / 37	ND	1 / 15	0.17
Acenaphthylene	1 / 35	0.05	0 / 12	ND	0 / 37	ND	0 / 15	ND
Anthracene	15 / 35	0.022 - 2.4	0 / 12	ND	4 / 37	0.021 - 0.066	0 / 15	ND
Benzo[a]anthracene	22 / 35	0.068 - 9.9	2 / 12	0.068 - 0.092	9 / 37	0.043 - 0.36	2 / 15	0.029 - 0.26
Benzo[a]pyrene	26 / 35	0.043 - 3.9	2 / 12	0.077 - 0.12	7 / 37	0.075 - 0.39	3 / 15	0.021 - 0.25
Benzo[b]fluoranthene	28 / 35	0.03 - 14	1 / 12	0.5	14 / 37	0.086 - 1	4 / 15	0.062 - 0.67
Benzo[g,h,i]perylene	23 / 35	0.035 - 6.9	1 / 12	0.083	10 / 37	0.042 - 0.31	3 / 15	0.022 - 0.32
Benzo[k]fluoranthene	11 / 35	0.081 - 1.5	1 / 12	0.12	1 / 37	0.37	2 / 15	0.036 - 0.22
bis(2-Ethylhexyl)phthalate	12 / 35	0.051 - 16	2 / 12	0.1 - 0.31	4 / 37	0.068 - 0.29	2 / 15	0.021 - 0.23
Butylbenzylphthalate	1 / 35	0.38	1 / 12	0.051	1 / 37	0.1	0 / 15	ND
Carbazole	7 / 35	0.058 - 1.0	0 / 12	ND	1 / 37	0.021	0 / 15	ND
Chrysene	27 / 35	0.02 - 11	2 / 12	0.09 - 0.19	15 / 37	0.041 - 0.4	4 / 15	0.054 - 0.31
Di-n-butylphthalate	1 / 35	0.38	1 / 12	0.017	1 / 37	0.058	0 / 15	ND
Di-n-octylphthalate	1 / 35	0.38	0 / 12	ND	0 / 37	ND	0 / 15	ND
Dibenz[a,h]anthracene	10 / 35	0.065 - 1.3	0 / 12	ND	0 / 37	ND	0 / 15	ND
Dibenzofuran	9 / 35	0.046 - 0.83	0 / 12	ND	0 / 37	ND	0 / 15	ND
3,3'-Dichlorobenzidine	1 / 35	0.38	0 / 12	ND	0 / 37	ND	0 / 15	ND
Diethylphthalate	2 / 35	0.1 - 0.5	0 / 12	ND	0 / 37	ND	0 / 15	ND

TABLE 7-20 (Continued)

SUMMARY OF CHEMICALS IN ALL SOILS
LI TUNGSTEN SITE

CHEMICAL	AREA A		AREA B		AREA B&C		AREA C	
	Frequency	Range of Concentrations[1] mg/kg	Frequency	Range of Concentrations[1] mg/kg	Frequency	Range of Concentrations[1] mg/kg	Frequency	Range of Concentrations[1] mg/kg
Dimethylphthalate	1 / 35	0.036	0 / 12	ND	0 / 37	ND	0 / 15	ND
Fluoranthene	32 / 35	0.027 - 26	3 / 12	0.064 - 0.24	15 / 37	0.027 - 0.59	5 / 15	0.063 - 0.53
Fluorene	10 / 35	0.068 - 3.1	0 / 12	ND	1 / 37	0.047	1 / 15	0.38
Indeno[1,2,3-cd]pyrene	21 / 35	0.022 - 6.3	1 / 12	0.11	9 / 37	0.049 - 0.25	3 / 15	0.027 - 0.35
2-Methylnaphthalene	7 / 35	0.048 - 4.6	0 / 12	ND	0 / 37	ND	0 / 15	ND
N-nitrosodiphenylamine	0 / 35	ND	0 / 12	ND	0 / 37	ND	4 / 15	0.53 - 10
Naphthalene	7 / 35	0.047 - 0.74	0 / 12	ND	1 / 37	0.045	0 / 15	ND
Pentachlorophenol	1 / 34	3.6	0 / 12	ND	0 / 36	ND	1 / 15	0.08
Phenanthrene	26 / 35	0.032 - 33	2 / 12	0.072 - 0.086	12 / 37	0.03 - 0.46	3 / 15	0.041 - 0.32
Pyrene	32 / 35	0.034 - 28	3 / 12	0.086 - 0.21	14 / 37	0.064 - 0.82	5 / 15	0.051 - 0.42
PESTICIDES/PCBs								
Endrin	0 / 29	ND	1 / 7	0.0053	2 / 25	0.037 - 0.07	0 / 14	ND
4,4'-DDT	0 / 35	ND	1 / 12	0.01	0 / 32	ND	0 / 14	ND
PCBs (total)	2 / 35	0.34 - 1.02	4 / 12	0.037 - 0.51	12 / 35	0.065 15.89	3 / 15	0.873 - 2.891
INORGANICS								
Aluminum	35 / 35	1050 - 20300	12 / 12	3690 - 56600	37 / 37	393 - 27700	15 / 15	1380 - 16200
Antimony	9 / 35	2.3 - 21.9	10 / 12	1.4 - 416	24 / 37	1.3 - 5610	14 / 15	10.2 - 3490
Arsenic	24 / 24	2.2 - 523	12 / 12	5.5 - 1790	31 / 34	1.4 - 6300	14 / 14	7.3 - 2950
Barium	35 / 35	11.3 - 6400	12 / 12	19.5 - 313	37 / 37	12.8 - 1820	15 / 15	26.6 - 1350
Beryllium	16 / 35	0.22 - 1.1	7 / 12	0.29 - 0.82	14 / 37	0.23 - 8.5	2 / 15	0.82 - 11
Cadmium	15 / 35	0.63 - 10.2	6 / 12	1.3 - 8	18 / 37	0.65 - 179	11 / 15	0.89 - 23.9
Calcium	35 / 35	812 - 145000	12 / 12	285 - 11200	37 / 37	98 - 47800	15 / 15	506 - 76000
Chromium	33 / 33	7.8 - 109	12 / 12	9.3 - 93.7	37 / 37	8.4 - 1620	15 / 15	12.9 - 434
Cobalt	35 / 35	3.1 - 1560	12 / 12	2.5 - 4660	36 / 37	1.7 - 4620	14 / 15	2.9 - 764
Copper	35 / 35	5.8 - 1630	12 / 12	6 - 2160	36 / 36	2 - 4610	15 / 15	9.6 - 6740
Iron	35 / 35	4600 - 124000	12 / 12	16800 - 193000	37 / 37	5730 - 313000	15 / 15	11600 - 144000
Lead	28 / 28	9.2 - 688	12 / 12	2.7 - 3710	29 / 37	3.2 - 19600	15 / 15	8.3 - 5140
Magnesium	35 / 35	633 - 38200	12 / 12	913 - 94000	37 / 37	314 - 6170	15 / 15	167 - 24800
Manganese	34 / 34	46.9 - 11600	12 / 12	155 - 5680	35 / 35	57.1 - 90000	13 / 13	58.1 - 2930
Mercury	30 / 35	0.05 - 3.5	8 / 12	0.09 - 1.8	21 / 37	0.05 - 8.4	15 / 15	0.06 - 29.5
Nickel	35 / 35	5.8 - 1100	12 / 12	5.8 - 28900	37 / 37	3.4 - 22000	15 / 15	7.7 - 311
Potassium	35 / 35	331 - 6070	12 / 12	419 - 1850	37 / 37	156 - 4260	15 / 15	508 - 6780
Selenium	22 / 30	1.1 - 149	10 / 12	1.3 - 33.1	15 / 29	1.1 - 140	13 / 15	3.9 - 262
Silver	11 / 23	0.39 - 34.3	7 / 8	0.69 - 103	22 / 36	0.33 - 114	13 / 15	0.95 - 110
Sodium	35 / 35	32 - 3060	11 / 12	35.7 - 36500	32 / 37	25.9 - 16600	15 / 15	57.6 - 2960
Thallium	0 / 35	ND	0 / 12	ND	4 / 37	1.4 - 22.7	0 / 15	ND
Vanadium	35 / 35	8.1 - 92.5	12 / 12	13.7 - 52.8	32 / 37	5.4 - 165	15 / 15	10.6 - 148
Zinc	35 / 35	14.3 - 816	12 / 12	15.4 - 1270	37 / 37	11.8 - 10400	15 / 15	40.8 - 2870
OTHER								
Cyanide	7 / 35	0.31 - 1.5	2 / 12	0.46 - 0.56	11 / 37	0.25 - 2.3	3 / 15	0.3 - 8

1 = Range of detected concentrations.
ND = Not detected

TABLE 7-21

SUMMARY OF SITE-SPECIFIC BACKGROUND SOIL DATA
LI TUNGSTEN SITE

CHEMICAL	SITE-SPECIFIC BACKGROUND* Frequency	Range of Concentrations*** mg/kg	Average Concentration*** mg/kg	Elemental Composition of Soils ** Range of Concentrations mg/kg	
INORGANICS					
Aluminum	7 / 7	3760 - 20700	9790	7000 - >100000	(1)
Antimony	1 / 7	1.6	1.60	NA	
Arsenic	6 / 6	2.4 - 14.9	6.30	1.5 - 16	(2)
Barium	7 / 7	11.5 - 87.4	49	200 - 500	(2)
Beryllium	4 / 7	0.71 - 1.1	0.85	ND - 2.0	(2)
Cadmium	0 / 7	ND	ND	ND - 4.0	(1)
Calcium	7 / 7	66.1 - 2470	1070	100 - 280000	(1)
Chromium	7 / 7	6.5 - 34.4	18.33	7.0 - 100	(2)
Cobalt	7 / 7	1.6 - 15.9	7.27	<3.0 - 70	(1)
Copper	7 / 7	4.1 - 38.6	15.99	3.0 - 70	(2)
Iron	7 / 7	7040 - 36700	20591	100 - >100000	(1)
Lead	7 / 7	3.9 - 103	24	ND - 50	(2)
Magnesium	7 / 7	790 - 4510	2147	50 - 5000	(1)
Manganese	7 / 7	55 - 2220	677	<2.0 - 7000	(1)
Mercury	2 / 7	0.06 - 0.11	0.09	0.05 - 0.60	(2)
Nickel	7 / 7	4.1 - 21	13	ND - 30	(2)
Potassium	7 / 7	422 - 2790	1427	50 - 37000	(1)
Selenium	3 / 5	1.4 - 2.7	2.0	<0.1 - 0.6	(2)
Silver	2 / 7	0.34 - 0.6	0.47	ND - 5.0	(3)
Sodium	5 / 7	62.2 - 91.3	74.96	<500 - 100000	(1)
Thallium	1 / 7	1.1	1.1	NA	
Vanadium	7 / 7	4.7 - 46.3	25.20	20 - 150	(2)
Zinc	7 7	13.9 - 81.2	43.89	20 - 120	(2)
OTHER					
Cyanide	1 / 7	0.23	0.23	NA	

ND = Not Detected
NA = Not Available
* Background data set includes LT-SB-MP-5, LT-SB-MP-5B, LT-SB-13, LT-SB-13D, LT-SB-TP-06, LT-SB-MP-11D, and LT-SB-MP-11DB.
** Dragun and Chiasson, 1991.
(1) = Eastern United States
(2) = New York State
(3) = Coterminous United States
*** Range and average of detected concentrations.

TABLE 7-22

SUMMARY OF CHEMICALS IN GROUNDWATER
LI TUNGSTEN SITE

CHEMICAL	Frequency	Range of Concentrations [1] mg/L	BACKGROUND Frequency	BACKGROUND Range of Concentrations [1] mg/L	USEPA MCLs mg/L [2]	NYS MCLs mg/L [3]	NYSDEC WQS mg/L [4]
VOLATILE ORGANICS							
Acetone	19 / 59	0.004 - 17	3 / 5	0.006 - 0.025	NA	0.05	0.05g
Benzene	8 / 59	0.0009 - 0.54	1 / 5	0.001	0.005	0.005	0.0007g
2-Butanone	8 / 59	0.072 - 1.5	1 / 5	0.12	NA	0.005	0.05g
Carbon disulfide	1 / 59	0.001	0 / 5	ND	NA	0.05	NA
Carbon tetrachloride	2 / 59	0.002 - 0.17	0 / 5	ND	0.005	0.005	0.005g
Chlorobenzene	1 / 59	0.001 - 0.001	0 / 5	ND	0.1	0.005	0.005g
Chloroethane	2 / 59	0.027 - 0.028	0 / 5	ND	NA	0.005	0.005g
Chloroform	3 / 59	0.23 - 4	0 / 5	ND	0.1/0.08*	0.1*	0.007g
Chloromethane	1 / 59	0.0022	0 / 5	ND	NA	0.005	NA
1,1-Dichloroethane	15 / 59	0.001 - 3.6	1 / 5	0.001	NA	0.005	0.005g
1,2-Dichloroethane	5 / 59	0.002 - 0.79	0 / 5	ND	0.005	0.005	0.005g
1,1-Dichloroethene	4 / 59	0.003 - 0.65	0 / 5	ND	0.007	0.005	0.005g
1,2-Dichloroethene (total)	29 / 59	0.002 - 150	0 / 5	ND	0.07/0.1**	0.005	0.005g
Ethylbenzene	8 / 59	0.002 - 7.6	0 / 5	ND	0.7	0.005	0.005g
4-Methyl-2-Pentanone	2 / 59	7.9 - 17	0 / 5	ND	NA	0.005	NA
Methylene chloride	9 / 59	0.0009 - 120	2 / 5	0.001 - 0.17	0.005	0.05	0.005g
1,1,2,2-Tetrachloroethane	2 / 59	0.001 - 0.002	0 / 5	ND	NA	0.005	0.005g
Tetrachloroethene	26 / 59	0.001 - 7.8	0 / 5	ND	0.005	0.005	0.005g
Toluene	12 / 59	0.001 - 90	1 / 5	0.001	1	0.005	0.005g
1,1,1-Trichloroethane	10 / 59	0.003 - 16	0 / 5	ND	0.2	0.005	0.005g
1,1,2-Trichloroethane	4 / 59	0.001 - 0.065	0 / 5	ND	0.005	0.005	0.005g
Trichloroethene	26 / 59	0.001 - 31	0 / 5	ND	0.005	0.005	0.005g
Vinyl chloride	10 / 59	0.001 - 0.096	0 / 5	ND	0.002	0.002	0.002g
Xylenes (total)	9 / 59	0.003 - 36	0 / 5	ND	10	0.005	0.005g
SEMI-VOLATILES ORGANICS							
Acenaphthene	3 / 59	0.00068 - 0.004	0 / 5	ND	NA	NA	0.02g
Fluorene	4 / 59	0.00067 - 0.004	0 / 5	ND	NA	NA	0.05g
Phenanthrene	5 / 59	0.00059 - 0.003	0 / 5	ND	NA	NA	0.05g
bis(2-Ethylhexyl)phthalate	23 / 59	0.00051 - 2.4	0 / 5	ND	0.006	NA	0.05g
Dibenzofuran	3 / 59	0.00051 - 0.005	0 / 5	ND	NA	NA	NA
Di-n-butylphthalate	13 / 59	0.0005 - 0.79	0 / 5	ND	NA	NA	0.05g
Di-n-octylphthalate	1 / 59	0.001	0 / 5	ND	NA	NA	0.05g
1,2-Dichlorobenzene	4 / 59	0.24 - 1.3	0 / 5	ND	0.6	NA	0.047g[d]
1,3-Dichlorobenzene	1 / 59	0.02	0 / 5	ND	NA	NA	0.05g
1,4-Dichlorobenzene	4 / 59	0.02 - 0.1	0 / 5	ND	0.075	NA	0.047g[d]
Diethylphthalate	3 / 59	0.007 - 0.062	0 / 5	ND	NA	NA	0.05g
Dimethylphthalate	1 / 59	0.0013	0 / 5	ND	NA	NA	0.05g
2,4-Dimethylphenol	2 / 59	0.026 - 0.11	0 / 5	ND	NA	NA	NA
Isophorone	5 / 59	0.006 - 0.53	0 / 5	ND	NA	NA	0.05g
2-Methylnaphthalene	10 / 59	0.0005 - 0.12	0 / 5	ND	NA	NA	NA
2-Methylphenol	6 / 59	0.002 - 0.41	0 / 5	ND	NA	NA	NA
4-Methylphenol	11 / 59	0.0021 - 0.42	0 / 5	ND	NA	NA	NA
Naphthalene	11 / 59	0.00054 - 2.3	0 / 5	ND	NA	NA	0.01g
Phenol	9 / 59	0.003 - 0.63	0 / 5	ND	NA	NA	0.01g[a]
PESTICIDES/PCBs							
Aldrin	5 / 56	0.000042 - 0.000066	0 / 5	ND	NA	NA	1.0E-6[e]
alpha-BHC	2 / 56	0.000032 - 0.00005	0 / 5	ND	NA	NA	1E-05g
beta-BHC	1 / 54	0.000048	0 / 5	ND	NA	NA	1E-05g
gamma-BHC (Lindane)	3 / 55	0.000031 - 0.00004	0 / 5	ND	0.0002	0.0002	1E-05g

TABLE 7-22 (Continued)

SUMMARY OF CHEMICALS IN GROUNDWATER
LI TUNGSTEN SITE

CHEMICAL	Frequency	Range of Concentrations [1] mg/L	BACKGROUND Frequency	BACKGROUND Range of Concentrations [1] mg/L	USEPA MCLs mg/L [2]	NYS MCLs mg/L [3]	NYSDEC WQS mg/L [4]
alpha-Chlordane	1 / 55	0.000038	0 / 5	ND	0.002	0.002	0.0001g
gamma-Chlordane	1 / 55	0.000038	0 / 5	ND	0.002	0.002	0.0001g
4,4'-DDD	1 / 57	0.00023	0 / 5	ND	NA	NA	1E-06g[c]
4,4'-DDE	1 / 55	0.000045	0 / 5	ND	NA	NA	1E-06g
4,4'-DDT	2 / 56	0.000054 - 0.000093	0 / 5	ND	NA	NA	1E-06g
Dieldrin	2 / 56	0.000058 - 0.00032	0 / 5	ND	NA	NA	1E-06g[e]
Endosulfan I	3 / 56	0.00003 - 0.000068	0 / 5	ND	NA	NA	9E-06
Endosulfan II	3 / 57	0.00008 - 0.00019	0 / 5	ND	NA	NA	9E-06
Endosulfan sulfate	1 / 56	0.000081	0 / 5	ND	NA	NA	NA
Endrin	2 / 57	0.00044 - 0.0013	0 / 5	ND	0.002	0.0002	0.2
Endrin aldehyde	1 / 56	0.00016	0 / 5	ND	NA	NA	0.005
Heptachlor	3 / 55	0.000029 - 0.000046	0 / 5	ND	0.0004	0.0004	9E-06
INORGANICS							
Aluminum	60 / 60	0.0654 - 122	5 / 5	0.17 - 134	NA	NA	0.1
Antimony	30 / 60	0.0055 - 11.1	0 / 5	ND	0.006	NA	0.003g
Arsenic	34 / 41	0.0099 - 10.9	2 / 3	0.0093 - 0.152	0.050	0.05	0.025g
Barium	60 / 60	0.0215 - 1.64	5 / 5	0.0239 - 4.18	2	2	1g
Beryllium	34 / 60	0.00032 - 0.0124	3 / 5	0.00029 - 0.0015	0.004	NA	0.003g
Cadmium	56 / 60	0.00043 - 1.16	4 / 5	0.0012 - 0.0216	0.005	0.05	0.01g
Calcium	60 / 60	5.44 - 554	5 / 5	5.35 - 112	NA	NA	NA
Chromium	57 / 59	0.0014 - 0.561	5 / 5	0.0016 - 0.378	0.1	0.1	0.05g
Cobalt	58 / 60	0.0015 - 17.6	4 / 5	0.0162 - 0.127	NA	NA	0.005
Copper	59 / 60	0.0025 - 36.9	5 / 5	0.0037 - 0.312	1.3***	NA	0.2g
Iron	60 / 60	0.15 - 1260	5 / 5	0.788 - 317	NA	0.3/0.5**	0.3g[b]
Lead	51 / 60	0.0014 - 0.836	4 / 5	0.0163 - 0.133	0.015***	NA	0.025g
Magnesium	60 / 60	3.2 - 247	5 / 5	1.38 - 21.8	NA	NA	35g
Manganese	59 / 59	0.164 - 68.3	5 / 5	0.0482 - 93.7	NA	0.3/0.5**	0.3g[b]
Mercury	31 / 57	0.00007 - 0.0148	2 / 5	0.0002 - 0.00097	0.002	0.002	0.002g
Nickel	60 / 60	0.0036 - 110	5 / 5	0.0045 - 1.68	0.1	NA	*
Potassium	57 / 57	2.16 - 236	5 / 5	6.5 - 27.1	NA	NA	NA
Selenium	31 / 58	0.003 - 1.31	2 / 5	0.0027 - 0.0138	0.05	NA	0.01g
Silver	38 / 60	0.001 - 0.352	1 / 5	0.0038	NA	NA	0.05g
Sodium	59 / 59	7.82 - 8400	5 / 5	22.2 - 204	NA	NA	20g
Thallium	35 / 58	0.0041 - 0.0237	2 / 5	0.0098 - 0.156	0.002	NA	0.004g
Vanadium	51 / 59	0.0047 - 0.431	4 / 5	0.0302 - 0.28	NA	NA	0.014g
Zinc	60 / 60	0.0084 - 17.1	5 / 5	0.0066 - 2.52	NA	5	.3g
OTHER							
Cyanide	3 / 60	0.0053 - 0.0063	1 / 5	0.0419	0.2	NA	0.1g

ND = Not Detected
NA = Not Available
[1] Range of Detected Concentrations
[2] USEPA Maximum Contaminant Levels; 40 CFR Part 141
* 0.1 1994 proposed rule for disinfection by-products: 0.08 for total halomethanes
** 0.07 for cis-isomer; 0.1 for trans-isomer
*** action levels
[3] NYS Maximum Contaminant Levels; 10 NYCRR Part 1
* 0.1 1994 proposed rule for disinfection by-products: 0.08 for total halomethanes
** 0.5 mg/L for sum of iron and managanese
[4] NYSDEC Water Quality Standards and Guidance Values (NYSDEC, 1993). Standards and guidance values (designated "g") for Class GA groundwater.
* exp (0.76 [ln (ppm hardness)] +1.06)
a = for phenolic compounds (total phenols)
b = 0.5 mg/L for sum of iron and managanese
c = for the sum of DDD, DDE, and DDT
d = for the sum of 1,2 and 1,4 Dichlorobenzene
e = for the sum of Aldrin and Dieldrin

TABLE 7-23

SUMMARY OF CHEMICALS IN SURFACE WATER
LI TUNGSTEN SITE

CHEMICAL	PARCEL B SURFACE WATER		PARCEL C SURFACE WATER	
	Frequency	Range of Concentrations[1] mg/l	Frequency	Range of Concentrations[1] mg/l
VOLATILE ORGANICS				
Acetone	1 / 2	0.013	0 / 2	ND
1,1-Dichloroethane	1 / 2	0.002	0 / 2	ND
1,2-Dichloroethene (total)	1 / 2	0.015	0 / 2	ND
Tetrachloroethene	1 / 2	0.006	0 / 2	ND
SEMI-VOLATILE ORGANICS				
bis(2-Ethylhexyl)phthalate	1 / 2	0.001	1 / 2	0.004
Di-n-butylphthalate	0 / 2	ND	1 / 2	0.001
PESTICIDES/PCBs				
4,4'-DDD	1 / 2	0.0091	0 / 2	ND
4,4'-DDE	1 / 2	0.0016	0 / 2	ND
4,4'-DDT	1 / 2	0.0046	0 / 2	ND
INORGANICS				
Aluminum	2 / 2	0.127 - 77	2 / 2	13.2 - 28.0
Antimony	1 / 2	2.26	1 / 2	0.0154
Arsenic	1 / 2	8.09	2 / 2	0.115 - 0.246
Barium	2 / 2	0.101 - 0.463	2 / 2	0.0227 - 0.0271
Beryllium	0 / 2	ND	1 / 2	0.0055
Cadmium	1 / 2	0.846	2 / 2	0.0227 - 0.0792
Calcium	2 / 2	29.8 - 106	2 / 2	40.9 - 47.5
Chromium	1 / 2	0.215	1 / 2	0.012
Cobalt	2 / 2	0.0557 - 42.3	0 / 0	ND
Copper	1 / 2	17.1	2 / 2	0.956 - 4.14
Iron	2 / 2	13 - 722	2 / 2	24.5 - 33.6
Lead	1 / 2	1.18	2 / 2	0.292 - 0.377
Magnesium	2 / 2	9.77 - 30.1	2 / 2	12.2 - 15
Manganese	2 / 2	4.97 - 5.39	2 / 2	3.35 - 3.81
Mercury	1 / 2	0.0036	1 / 2	0.00012
Nickel	2 / 2	0.0177 - 27.9	2 / 2	0.0549 - 0.116
Potassium	2 / 2	4.69 - 18.1	2 / 2	2.62 - 3.76
Selenium	1 / 2	0.2		N/A
Silver	1 / 2	0.256	1 / 2	0.0051
Sodium	2 / 2	47.8 - 296	2 / 2	19.9 - 23.0
Vanadium	1 / 2	0.21	0 / 2	ND
Zinc	1 / 2	91.2	2 / 2	2.04 - 4.89
OTHER				
Cyanide	1 / 2	0.0051	0 / 2	ND

1 Range of Detected Concentrations.
ND = Not Detected
N/A = Not Analyzed

TABLE 7-24

SUMMARY OF CHEMICALS IN SEDIMENT
LI TUNGSTEN SITE

CHEMICAL	PARCEL B SEDIMENT Frequency	PARCEL B SEDIMENT Range of Concentrations[1] mg/kg	PARCEL C SEDIMENT Frequency	PARCEL C SEDIMENT Range of Concentrations[1] mg/kg
VOLATILE ORGANICS				
Acetone	2 / 2	0.16 - 0.24	0 - 2	ND
Benzene	1 / 2	0.002	0 - 2	ND
2-Butanone	2 / 2	0.027 - 0.067	1 - 2	0.021
1,1-Dichloroethane	1 / 2	0.002	0 - 2	ND
1,2-Dichloroethene (total)	1 / 2	0.002	0 - 2	ND
SEMI-VOLATILE ORGANICS				
Benzo[a]anthracene	0 / 2	ND	1 / 2	0.08
Benzo[a]pyrene	0 / 2	ND	1 / 2	0.075
Benzo[b]fluoranthene				
Benzo[g,h,i]perylene	0 / 2	ND	1 / 2	0.13
Benzo[k]fluoranthene	0 / 2	ND	1 / 2	0.066
Chrysene	0 / 2	ND	1 / 2	0.1
Fluoranthene	1 / 2	0.074	1 / 2	0.16
Indeno[1,2,3-cd]pyrene	0 / 2	ND	1 / 2	0.085
Phenanthrene	1 / 2	0.053.	1 / 2	0.099
Pyrene	2 / 2	0.052 - 0.059	1 / 2	0.13
PESTICIDES/PCBs				
4,4'-DDD	1 / 2	0.116	0 / 2	ND
4,4'-DDE	1 / 2	0.056	0 / 2	ND
PCBs (total)	1 / 2	1.806	0 / 2	ND

TABLE 7-24 (Continued)

SUMMARY OF CHEMICALS IN SEDIMENT
LI TUNGSTEN SITE

CHEMICAL	PARCEL B SEDIMENT Frequency	PARCEL B SEDIMENT Range of Concentrations[1] mg/kg	PARCEL C SEDIMENT Frequency	PARCEL C SEDIMENT Range of Concentrations[1] mg/kg
INORGANICS				
Aluminum	2 / 2	5260 - 5860	2 / 2	1060 - 6890
Antimony	2 / 2	3.8 - 5	2 / 2	35.2 - 87.8
Arsenic	2 / 2	11.8 - 25.6	2 / 2	1610 - 2080
Barium	2 / 2	67.6 - 82.1	2 / 2	38.9 - 71.7
Beryllium	0 / 2	ND	0 / 2	ND
Cadmium	0 / 2	ND	2 / 2	4.9 - 5.1
Calcium	2 / 2	1190 - 1360	2 / 2	477 - 962
Chromium	2 / 2	15.1 - 18.2	2 / 2	9 - 37.5
Cobalt	2 / 2	47.8 - 77.2	2 / 2	7.9 - 8.7
Copper	2 / 2	34.2 - 191	2 / 2	239 - 418
Iron	2 / 2	23100 - 33000	2 / 2	52900 - 54400
Lead	2 / 2	22.1 - 94.2	2 / 2	1950 - 2840
Magnesium	2 / 2	1610 - 1650	2 / 2	346 - 1640
Manganese	2 / 2	372 - 543	2 / 2	137 - 354
Mercury	2 / 2	0.08 - 0.18	2 / 2	0.17 - 2.1
Nickel	2 / 2	37.5 - 43.4	2 / 2	6.5 - 15.5
Potassium	2 / 2	871 - 1090	2 / 2	1340 - 1860
Selenium	2 / 2	2.7 - 3.6	2 / 2	9.8 - 15.8
Silver	2 / 2	0.65 - 3	2 / 2	19.8 - 63.3
Sodium	2 / 2	51.5 - 53.7	2 / 2	75.6 - 182
Vanadium	2 / 2	23 - 31.5	2 / 2	8.5 - 20.6
Zinc	2 / 2	60.4 - 87.2	2 / 2	435 - 466
OTHER				
Cyanide	0 / 2	ND	1 / 2	0.53

1 Range of Detected Concentrations
ND = Not Detected

TABLE 3

Summary of Sampling Results for Radionuclides

Captain's Cove Property

TABLE 13
OCCURRENCE, DISTRIBUTION AND SELECTION OF RADIONUCLIDES OF POTENTIAL CONCERN
CAPTAIN'S COVE

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Upper Glacial Aquifer

(1) Radionuclide	(2) Minimum Concentration	(2) Maximum Concentration	Units	Location of Maximum Concentration	Concentration Used for Screening to Background	(3) Maximum Background Value	(4) ROPC Flag	(5) Rationale for Radionuclide Selection or Deletion
Uranium 234	0 85	7 2	pCi/L	CC-MW-7	7 2	4 6	YES	TX, BSL
Uranium 238 + D	0 58	4 4	pCi/L	CC-MW-7	4 4	4 6	NO	TX, BSL
Radium 226 + D	0 8	3 03	pCi/L	CC-MW-2	3 03	10	NO	TX, BSL
Radium 228 + D	0 8	7 8	pCi/L	CC-MW-2	7 8	5 2	YES	TX, ASL
Thorium 228 + D	0 091	0 95	pCi/L	CC-MW-2	0 95	5 2	NO	TX, BSL
Thorium 230	0 139	3 68	pCi/L	CC-MW-7	3 68	1 4	YES	TX, BSL
Thorium 232	0 066	0 57	pCi/L	CC-MW-7	0 57	1 7	NO	TX, BSL
Lead 210 + D	0 8	3 03	pCi/L	CC-MW-2	3 03	10	NO	

(1) Risk from decay products (+D) included as appropriate; secular equilibrium assumed between Lead-210 and Radium-226, between (background samples) Uranium-234 and Uranium-238, and between (background samples) Thorium-228 and Radium-228

(2) Minimum/maximum detected concentration

(3) Maximum concentrations from background samples See text

(4) Selection (YES) or deletion (NO) of radionuclides of potential concern (ROPC)

(5) Rationale Codes

Selection Reason	Infrequent Detection but Associated Historically (HIST)
	Frequent Detection (FD)
	Toxicity Information Available (TX)
	Above Screening Levels (ASL)
Deletion Reason	Infrequent Detection (IFD)
	Background Levels (BKG)
	No Toxicity Information (NTX)
	Essential Nutrient (NUT)
	Below Screening Level (BSL)

TABLE 2 12
OCCURRENCE, DISTRIBUTION AND SELECTION OF RADIONUCLIDES OF POTENTIAL CONCERN
CAPTAIN'S COVE

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Wetland Area

(1) Radionuclide	(2) Minimum Concentration	(2) Maximum Concentration	Units	Location of Maximum Concentration	Concentration Used for Screening to Background	(3) Maximum Background Concentration	(4) ROPC Flag	(5) Rationale for Radionuclide Selection or Deletion
Uranium 234	0 229	0 79	pCi/g	CC-WS-2	0 79	1 1	NO	BSL
Uranium 238 + D	0 167	0 75	pCi/g	CC-WS-2	0 75	1 1	NO	BSL
Radium 226 + D	0 267	0 625	pCi/g	CC-WS-4	0 625	1 4	NO	BSL
Radium 228 + D	0 229	0 477	pCi/g	CC-WS-3	0 477	1 7	NO	BSL
Thorium 228 + D	0 087	0 5	pCi/g	CC-WS-3	0 5	1 7	NO	BSL
Thorium 230	0 023	0 72	pCi/g	CC-WS-2	0 72	1 6	NO	BSL
Thorium 232	0 099	0 48	pCi/g	CC-WS-2	0 48	1 5	NO	BSL
Lead 210 + D	0 267	0 625	pCi/g	CC-WS-4	0 625	1 4	NO	BSL

(1) Risk from decay products (+D) included as appropriate, secular equilibrium assumed between Lead-210 and Radium-226, between (background samples) Uranium-234 and Uranium-238, and between (background samples) Thorium-228 and Radium-228

(2) Minimum/maximum detected concentration

(3) Maximum concentrations from background samples See text

(4) Selection (YES) or deletion (NO) of radionuclides of potential concern (ROPC)

(5) Rationale Codes

Selection Reason	Infrequent Detection but Associated Historically (HIST)
	Frequent Detection (FD)
	Toxicity Information Available (TX)
	Above Screening Levels (ASL)
Deletion Reason	Infrequent Detection (IFD)
	Background Levels (BKG)
	No Toxicity Information (NTX)
	Essential Nutrient (NUT)
	Below Screening Level (BSL)

TABLE 2 11
OCCURRENCE, DISTRIBUTION AND SELECTION OF RADIONUCLIDES OF POTENTIAL CONCERN
CAPTAIN'S COVE

Scenario Timeframe Current/Future
Medium Sediment
Exposure Medium Sediment
Exposure Point Retention Ponds

Radionuclide (1)	Minimum Concentration (2)	Maximum Concentration (2)	Units	Location of Maximum Concentration	Concentration Used for Screening to Background	Maximum Background Concentration (3)	ROPC Flag (4)	Rationale for Radionuclide Selection or Deletion (5)
Uranium 234	0.158	0 79	pCi/g	CC-SED-3	0.79	1.1	NO	BSL
Uranium 238 + D	0 123	0 86	pCi/g	CC-SED-3	0 86	1.1	NO	BSL
Radium 226 + D	0 251	0 166	pCi/g	CC-SED-3	0 166	1.4	NO	BSL
Radium 228 + D	0 226	1 31	pCi/g	CC-SED-3	1 31	1.7	NO	BSL
Thorium 228 + D	0 087	0 95	pCi/g	CC-SED-3	0 95	1.7	NO	BSL
Thorium 230	0 031	0 89	pCi/g	CC-SED-3	0 89	1.6	NO	BSL
Thorium 232	0 158	0 9	pCi/g	CC-SED-3	0 9	1.5	NO	BSL
Lead 210 + D	0 251	0 166	pCi/g	CC-SED-3	0.166	1.4	NO	BSL

(1) Risk from decay products (+D) included as appropriate, secular equilibrium
assumed between Lead-210 and Radium-226, between (background samples) Uranium-234 and Uranium-238, and between (background samples) Thorium-228 and Radium-228
(2) Minimum/maximum detected concentration
(3) Maximum concentrations from background samples See text
(4) Selection (YES) or deletion (NO) of radionuclides of potential concern (ROPC)
(5) Rationale Codes

Selection Reason	Infrequent Detection but Associated Historically (HIST)
	Frequent Detection (FD)
	Toxicity Information Available (TX)
	Above Screening Levels (ASL)
Deletion Reason	Infrequent Detection (IFD)
	Background Levels (BKG)
	No Toxicity Information (NTX)
	Essential Nutrient (NUT)
	Below Screening Level (BSL)

TABLE 2 10
OCCURRENCE, DISTRIBUTION AND SELECTION OF RADIONUCLIDES OF POTENTIAL CONCERN
CAPTAIN'S COVE

Scenario Timeframe: Future
Medium: All Soil
Exposure Medium: Home Grown Produce
Exposure Point: Area G

(1) Radionuclide	(2) Minimum Concentration	(2) Maximum Concentration	Units	Location of Maximum Concentration	Concentration Used for Screening to Background	(3) Maximum Background Concentration	(4) ROPC Flag	(5) Rationale for Radionuclide Selection or Deletion
Uranium 234	0 48	1041	pCi/g	CC-SB-23-6-8	1041	1 1	YES	TX, ASL
Uranium 238 + D	0 46	1031	pCi/g	CC-SB-23-6-8	1031	1 1	YES	TX, ASL
Radium 226 + D	1 01	169	pCi/g	CC-SB-08-6-8	169	1 4	YES	TX, ASL
Radium 228 + D	0 739	48 9	pCi/g	CC-SB-08-6-8	48 9	1 7	YES	TX, ASL
Thorium 228 + D	0 92	47 7	pCi/g	CC-SB-08-6-8	47 7	1 7	YES	TX, ASL
Thorium 230	0 032	150	pCi/g	CC-SB-26-2-4	150	1 6	YES	TX, ASL
Thorium 232	0 88	47 8	pCi/g	CC-SB-08-6-8	47 8	1 5	YES	TX, ASL
Lead 210 + D	1 01	169	pCi/g	CC-SB-08-6-8	169	1 4	YES	TX, ASL

(1) Risk from decay products (+D) included as appropriate, secular equilibrium assumed between Lead-210 and Radium-226, between (background samples) Uranium-234 and Uranium-238, and between (background samples) Thorium-228 and Radium-228
(2) Minimum/maximum detected concentration
(3) Maximum concentrations from background samples See text
(4) Selection (YES) or deletion (NO) of radionuclides of potential concern (ROPC)
(5) Rationale Codes

Selection Reason	Infrequent Detection but Associated Historically (HIST)
	Frequent Detection (FD)
	Toxicity Information Available (TX)
	Above Screening Levels (ASL)
Deletion Reason	Infrequent Detection (IFD)
	Background Levels (BKG)
	No Toxicity Information (NTX)
	Essential Nutrient (NUT)
	Below Screening Level (BSL)

TABLE 2 9
OCCURRENCE, DISTRIBUTION AND SELECTION OF RADIONUCLIDES OF POTENTIAL CONCERN
CAPTAIN'S COVE

Scenario Timeframe: Future
Medium: All Soil
Exposure Medium: Radon Decay Products
Exposure Point: Area G

Radionuclide (1)	Minimum Concentration (2)	Maximum Concentration (2)	Units	Location of Maximum Concentration	Concentration Used for Screening to Background	Maximum Background Concentration (3)	ROPC Flag (4)	Rationale for Radionuclide Selection or Deletion (5)
Uranium 234	0 48	1041	pCi/g	CC-SB-23-6-8	1041	1 1	YES	TX, ASL
Uranium 238 + D	0 46	1031	pCi/g	CC-SB-23-6-8	1031	1 1	YES	TX, ASL
Radium 226 + D	1 01	169	pCi/g	CC-SB-08-6-8	169	1 4	YES	TX, ASL
Radium 228 + D	0 739	48 9	pCi/g	CC-SB-08-6-8	48 9	1 7	YES	TX, ASL
Thorium 228 + D	0 92	47 7	pCi/g	CC-SB-08-6-8	47 7	1 7	YES	TX, ASL
Thorium 230	0 032	150	pCi/g	CC-SB-26-2-4	150	1 6	YES	TX, ASL
Thorium 232	0 88	47 8	pCi/g	CC-SB-08-6-8	47 8	1 5	YES	TX, ASL
Lead 210 + D	1 01	169	pCi/g	CC-SB-08-6-8	169	1 4	YES	TX, ASL

(1) Risk from decay products (+D) included as appropriate, secular equilibrium assumed between Lead-210 and Radium-226, between (background samples) Uranium-234 and Uranium-238, and between (background samples) Thorium-228 and Radium-228

(2) Minimum/maximum detected concentration

(3) Maximum concentrations from background samples See text

(4) Selection (YES) or deletion (NO) of radionuclides of potential concern (ROPC)

(5) Rationale Codes

Selection Reason:
- Infrequent Detection but Associated Historically (HIST)
- Frequent Detection (FD)
- Toxicity Information Available (TX)
- Above Screening Levels (ASL)

Deletion Reason:
- Infrequent Detection (IFD)
- Background Levels (BKG)
- No Toxicity Information (NTX)
- Essential Nutrient (NUT)
- Below Screening Level (BSL)

TABLE 2 8
OCCURRENCE, DISTRIBUTION AND SELECTION OF RADIONUCLIDES OF POTENTIAL CONCERN
CAPTAIN'S COVE

Scenario Timeframe: Future
Medium: All Soil
Exposure Medium: Particulates
Exposure Point: Area G

(1) Radionuclide	(2) Minimum Concentration	(2) Maximum Concentration	Units	Location of Maximum Concentration	Concentration Used for Screening to Background	(3) Maximum Background Concentration	(4) ROPC Flag	(5) Rationale for Radionuclide Selection or Deletion
Uranium 234	0 48	1041	pCi/g	CC-SB-23-6-8	1041	1 1	YES	TX, ASL
Uranium 238 + D	0 46	1031	pCi/g	CC-SB-23-6-8	1031	1 1	YES	TX, ASL
Radium 226 + D	1 01	169	pCi/g	CC-SB-08-6-8	169	1 4	YES	TX, ASL
Radium 228 + D	0 739	48 9	pCi/g	CC-SB-08-6-8	48 9	1 7	YES	TX, ASL
Thorium 228 + D	0 92	47 7	pCi/g	CC-SB-08-6-8	47 7	1 7	YES	TX, ASL
Thorium 230	0 032	150	pCi/g	CC-SB-26-2-4	150	1 6	YES	TX, ASL
Thorium 232	0 88	47 8	pCi/g	CC-SB-08-6-8	47 8	1 5	YES	TX, ASL
Lead 210 + D	1 01	169	pCi/g	CC-SB-08-6-8	169	1 4	YES	TX, ASL

(1) Risk from decay products (+D) included as appropriate, secular equilibrium assumed between Lead-210 and Radium-226, between (background samples) Uranium-234 and Uranium-238, and between (background samples) Thorium-228 and Radium-228

(2) Minimum/maximum detected concentration

(3) Maximum concentrations from background samples See text

(4) Selection (YES) or deletion (NO) of radionuclides of potential concern (ROPC)

(5) Rationale Codes

Selection Reason:	Infrequent Detection but Associated Historically (HIST)
	Frequent Detection (FD)
	Toxicity Information Available (TX)
	Above Screening Levels (ASL)
Deletion Reason:	Infrequent Detection (IFD)
	Background Levels (BKG)
	No Toxicity Information (NTX)
	Essential Nutrient (NUT)
	Below Screening Level (BSL)

TABLE 2 7
OCCURRENCE, DISTRIBUTION AND SELECTION OF RADIONUCLIDES OF POTENTIAL CONCERN
CAPTAIN'S COVE

Scenario Timeframe: Future
Medium: All Soil
Exposure Medium: All Soil
Exposure Point: Area G

Radionuclide (1)	Minimum Concentration (2)	Maximum Concentration (2)	Units	Location of Maximum Concentration	Concentration Used for Screening to Background	Maximum Background Concentration (3)	ROPC Flag (4)	Rationale for Radionuclide Selection or Deletion (5)
Uranium 234	0 48	1041	pCi/g	CC-SB-23-6-8	1041	1.1	YES	TX, ASL
Uranium 238 + D	0 46	1031	pCi/g	CC-SB-23-6-8	1031	1 1	YES	TX, ASL
Radium 226 + D	1 01	169	pCi/g	CC-SB-08-6-8	169	1 4	YES	TX, ASL
Radium 228 + D	0 739	48 9	pCi/g	CC-SB-08-6-8	48 9	1 7	YES	TX, ASL
Thorium 228 + D	0 92	47 7	pCi/g	CC-SB-08-6-8	47.7	1.7	YES	TX, ASL
Thorium 230	0 032	150	pCi/g	CC-SB-26-2-4	150	1 6	YES	TX, ASL
Thorium 232	0.88	47 8	pCi/g	CC-SB-08-6-8	47 8	1 5	YES	TX, ASL
Lead 210 + D	1 01	169	pCi/g	CC-SB-08-6-8	169	1 4	YES	TX, ASL

(1) Risk from decay products (+D) included as appropriate; secular equilibrium assumed between Lead-210 and Radium-226, between (background samples) Uranium-234 and Uranium-238, and between (background samples) Thorium-228 and Radium-228
(2) Minimum/maximum detected concentration
(3) Maximum concentrations from background samples See text
(4) Selection (YES) or deletion (NO) of radionuclides of potential concern (ROPC)
(5) Rationale Codes

Selection Reason:
- Infrequent Detection but Associated Historically (HIST)
- Frequent Detection (FD)
- Toxicity Information Available (TX)
- Above Screening Levels (ASL)

Deletion Reason:
- Infrequent Detection (IFD)
- Background Levels (BKG)
- No Toxicity Information (NTX)
- Essential Nutrient (NUT)
- Below Screening Level (BSL)

TABLE 2 6
OCCURRENCE, DISTRIBUTION AND SELECTION OF RADIONUCLIDES OF POTENTIAL CONCERN
CAPTAIN'S COVE

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Area G

(1) Radionuclide	(2) Minimum Concentration	(2) Maximum Concentration	Units	Location of Maximum Concentration	Concentration Used for Screening to Background	(3) Maximum Background Concentration	(4) ROPC Flag	(5) Rationale for Radionuclide Selection or Deletion
Uranium 234	1 92	2 66	pCi/g	CC-TP-5-0-1	2 66	1 1	YES	TX, ASL
Uranium 238 + D	1 9	2 64	pCi/g	CC-TP-5-0-1	2 64	1 1	YES	TX, ASL
Radium 226 + D	2 45	3 14	pCi/g	CC-TP-5-0-1	3 14	1 4	YES	TX, ASL
Radium 228 + D	1.47	1 5	pCi/g	CC-SB-22-0-2	1 5	1 7	NO	TX, BSL
Thorium 228 + D	1 21	1 42	pCi/g	CC-TP-5-0-1	1 42	1 7	NO	TX, BSL
Thorium 230	1 86	2 18	pCi/g	CC-TP-5-0-1	2 18	1 6	YES	TX, ASL
Thorium 232	1 26	1 34	pCi/g	CC-TP-5-0-1	1 34	1 5	NO	TX, BSL
Lead 210 + D	2 45	3 14	pCi/g	CC-TP-5-0-1	3 14	1 4	YES	TX, ASL

(1) Risk from decay products (+D) included as appropriate, secular equilibrium assumed between Lead-210 and Radium-226, between (background samples) Uranium-234 and Uranium-238, and between (background samples) Thorium-228 and Radium-228
(2) Minimum/maximum detected concentration
(3) Maximum concentrations from background samples See text.
(4) Selection (YES) or deletion (NO) of radionuclides of potential concern (ROPC)
(5) Rationale Codes

Selection Reason:	Infrequent Detection but Associated Historically (HIST)
	Frequent Detection (FD)
	Toxicity Information Available (TX)
	Above Screening Levels (ASL)
Deletion Reason	Infrequent Detection (IFD)
	Background Levels (BKG)
	No Toxicity Information (NTX)
	Essential Nutrient (NUT)
	Below Screening Level (BSL)

TABLE 2 5
OCCURRENCE, DISTRIBUTION AND SELECTION OF RADIONUCLIDES OF POTENTIAL CONCERN
CAPTAIN'S COVE

Scenario Timeframe Future
Medium All Soil
Exposure Medium Home-grown Produce
Exposure Point Area A

(1) Radionuclide	(2) Minimum Concentration	(2) Maximum Concentration	Units	Location of Maximum Concentration	Concentration Used for Screening to Background	(3) Maximum Background Concentration	(4) ROPC Flag	(5) Rationale for Radionuclide Selection or Deletion
Uranium 234	0 415	232	pCi/g	CC-TP-3-5-6	232	1 1	YES	TX, ASL
Uranium 238 + D	0 349	162	pCi g	CC-SB-13 6 7	162	1 1	YES	TX, ASL
Radium 226 + D	0 483	252	pCi/g	CC-TP-3-5-6	252	1 4	YES	TX, ASL
Radium 228 + D	0 291	113	pCi/g	CC-TP-3-5-6	113	1 7	YES	TX, ASL
Thorium 228 + D	0 19	160	pCi g	CC-TP-3-5-6	160	1 7	YES	TX, ASL
Thorium 230	0 48	494	pCi/g	CC-TP-3-5-6	494	1 6	YES	TX, ASL
Thorium 232	0 08	126	pCi/g	CC-SB-13-6-7	126	1.5	YES	TX, ASL
Lead 210 + D	0 483	252	pCi/g	CC-TP-3-5-6	252	1 4	YES	TX, ASL

(1) Risk from decay products (+D) included as appropriate; secular equilibrium assumed between Lead-210 and Radium-226, between (background samples) Uranium-234 and Uranium-238, and between (background samples) Thorium-228 and Radium-228
(2) Minimum/maximum detected concentration
(3) Maximum concentrations from background samples See text
(4) Selection (YES) or deletion (NO) of radionuclides of potential concern (ROPC)
(5) Rationale Codes

Selection Reason	Infrequent Detection but Associated Historically (HIST)
	Frequent Detection (FD)
	Toxicity Information Available (TX)
	Above Screening Levels (ASL)
Deletion Reason	Infrequent Detection (IFD)
	Background Levels (BKG)
	No Toxicity Information (NTX)
	Essential Nutrient (NUT)
	Below Screening Level (BSL)

TABLE 2 4
OCCURRENCE, DISTRIBUTION AND SELECTION OF RADIONUCLIDES OF POTENTIAL CONCERN
CAPTAIN'S COVE

Scenario Timeframe: Future
Medium: All Soil
Exposure Medium: Radon Decay Products
Exposure Point: Area A

(1) Radionuclide	(2) Minimum Concentration	(2) Maximum Concentration	Units	Location of Maximum Concentration	Concentration Used for Screening to Background	(3) Maximum Background Concentration	(4) ROPC Flag	(5) Rationale for Radionuclide Selection or Deletion
Uranium 234	0 415	232	pCi/g	CC-TP-3-5-6	232	1 1	YES	TX, ASL
Uranium 238 + D	0 349	162	pCi g	CC-SB-13-6 7	162	1 1	YES	TX, ASL
Radium 226 + D	0 483	252	pCi/g	CC-TP-3-5-6	252	1 4	YES	TX, ASL
Radium 228 + D	0 291	113	pCi/g	CC-TP-3-5-6	113	1 7	YES	TX, ASL
Thorium 228 + D	0 19	160	pCi/g	CC-TP-3-5-6	160	1 7	YES	TX, ASL
Thorium 230	0 48	494	pCi/g	CC-TP-3-5-6	494	1 6	YES	TX, ASL
Thorium 232	0 08	126	pCi/g	CC-SB-13-6-7	126	1 5	YES	TX, ASL
Lead 210 + D	0 483	252	pCi/g	CC-TP-3-5-6	252	1 4	YES	TX, ASL

(1) Risk from decay products (+D) included as appropriate; secular equilibrium assumed between Lead-210 and Radium-226, between (background samples) Uranium-234 and Uranium-238, and between (background samples) Thorium-228 and Radium-228
(2) Minimum/maximum detected concentration
(3) Maximum concentrations from background samples See text
(4) Selection (YES) or deletion (NO) of radionuclides of potential concern (ROPC)
(5) Rationale Codes

Selection Reason	Infrequent Detection but Associated Historically (HIST)
	Frequent Detection (FD)
	Toxicity Information Available (TX)
	Above Screening Levels (ASL)
Deletion Reason	Infrequent Detection (IFD)
	Background Levels (BKG)
	No Toxicity Information (NTX)
	Essential Nutrient (NUT)
	Below Screening Level (BSL)

TABLE 2 3
OCCURRENCE, DISTRIBUTION AND SELECTION OF RADIONUCLIDES OF POTENTIAL CONCERN
CAPTAIN'S COVE

Scenario Timeframe: Future
Medium: All Soil
Exposure Medium: Particulates
Exposure Point: Area A

Radionuclide (1)	Minimum Concentration (2)	Maximum Concentration (2)	Units	Location of Maximum Concentration	Concentration Used for Screening to Background	Maximum Background Concentration (3)	ROPC Flag (4)	Rationale for Radionuclide Selection or Deletion (5)
Uranium 234	0 415	232	pCi/g	CC-TP-3-5-6	232	1 1	YES	TX, ASL
Uranium 238 + D	0 349	162	pCi/g	CC-SB-13-6-7	162	1 1	YES	TX, ASL
Radium 226 + D	0 483	252	pCi/g	CC-TP-3-5-6	252	1 4	YES	TX, ASL
Radium 228 + D	0 291	113	pCi/g	CC-TP-3-5-6	113	1 7	YES	TX, ASL
Thorium 228 + D	0 19	160	pCi/g	CC-TP-3-5-6	160	1 7	YES	TX, ASL
Thorium 230	0 48	494	pCi/g	CC-TP-3-5-6	494	1 6	YES	TX, ASL
Thorium 232	0 08	126	pCi/g	CC-SB-13-6-7	126	1 5	YES	TX, ASL
Lead 210 + D	0 483	252	pCi/g	CC-TP-3-5-6	252	1 4	YES	TX, ASL

(1) Risk from decay products (+D) included as appropriate, secular equilibrium
assumed between Lead-210 and Radium-226, between (background samples) Uranium-234 and Uranium-238, and between (background samples) Thorium-228 and Radium-228
(2) Minimum/maximum detected concentration
(3) Maximum concentrations from background samples See text
(4) Selection (YES) or deletion (NO) of radionuclides of potential concern (ROPC)
(5) Rationale Codes

Selection Reason	Infrequent Detection but Associated Historically (HIST)
	Frequent Detection (FD)
	Toxicity Information Available (TX)
	Above Screening Levels (ASL)
Deletion Reason	Infrequent Detection (IFD)
	Background Levels (BKG)
	No Toxicity Information (NTX)
	Essential Nutrient (NUT)
	Below Screening Level (BSL)

TABLE 2 2
OCCURRENCE, DISTRIBUTION AND SELECTION OF RADIONUCLIDES OF POTENTIAL CONCERN
CAPTAIN'S COVE

Scenario Timeframe: Future
Medium: All Soil
Exposure Medium: All Soil
Exposure Point: Area A

(1) Radionuclide	(2) Minimum Concentration	(2) Maximum Concentration	Units	Location of Maximum Concentration	Concentration Used for Screening to Background	(3) Maximum Background Concentration	(4) ROPC Flag	(5) Rationale for Radionuclide Selection or Deletion
Uranium 234	0.415	232	pCi/g	CC-TP-3-5-6	232	1.1	YES	TX, ASL
Uranium 238 + D	0 349	162	pCi/g	CC-SB-13-6-7	162	1 1	YES	TX, ASL
Radium 226 + D	0 483	252	pCi/g	CC-TP-3-5-6	252	1 4	YES	TX, ASL
Radium 228 + D	0 291	113	pCi/g	CC-TP-3-5-6	113	1 7	YES	TX, ASL
Thorium 228 + D	0 19	160	pCi/g	CC-TP-3-5-6	160	1 7	YES	TX, ASL
Thorium 230	0 48	494	pCi/g	CC-TP-3-5-6	494	1.6	YES	TX, ASL
Thorium 232	0 08	126	pCi/g	CC-SB-13-6-7	126	1 5	YES	TX, ASL
Lead 210 + D	0 483	252	pCi/g	CC-TP-3-5-6	252	1 4	YES	TX, ASL

(1) Risk from decay products (+D) included as appropriate; secular equilibrium assumed between Lead-210 and Radium-226, between (background samples) Uranium-234 and Uranium-238, and between (background samples) Thorium-228 and Radium-228

(2) Minimum/maximum detected concentration

(3) Maximum concentrations from background samples See text

(4) Selection (YES) or deletion (NO) of radionuclides of potential concern (ROPC)

(5) Rationale Codes

Selection Reason	Infrequent Detection but Associated Historically (HIST)
	Frequent Detection (FD)
	Toxicity Information Available (TX)
	Above Screening Levels (ASL)
Deletion Reason	Infrequent Detection (IFD)
	Background Levels (BKG)
	No Toxicity Information (NTX)
	Essential Nutrient (NUT)
	Below Screening Level (BSL)

TABLE 2.1
OCCURRENCE, DISTRIBUTION AND SELECTION OF RADIONUCLIDES OF POTENTIAL CONCERN
CAPTAIN'S COVE

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Area A

(1) Radionuclide	(2) Minimum Concentration	(2) Maximum Concentration	Units	Location of Maximum Concentration	Concentration Used for Screening to Background	(3) Maximum Background Concentration	(4) ROPC Flag	(5) Rationale for Radionuclide Selection or Deletion
Uranium 234	0.415	2.53	pCi/g	CC-TP-4-0-1	2.53	1.1	YES	TX, ASL
Uranium 238 + D	0.351	2.89	pCi/g	CC-TP-4-0-1	2.89	1.1	YES	TX, ASL
Radium 226 + D	0.483	4.63	pCi/g	CC-TP-4-0-1	4.63	1.4	YES	TX, ASL
Radium 228 + D	0.314	1.9	pCi/g	CC-TP-4-0-1	1.9	1.7	YES	TX, ASL
Thorium 228 + D	0.435	1.83	pCi/g	CC-TP-4-0-1	1.83	1.7	YES	TX, ASL
Thorium 230	0.48	4.47	pCi/g	CC-TP-4-0-1	4.47	1.6	YES	TX, ASL
Thorium 232	0.41	1.76	pCi/g	CC-TP-4-0-1	1.76	1.5	YES	TX, ASL
Lead 210 + D	0.483	4.63	pCi/g	CC-TP-4-0-1	4.63	1.4	YES	TX, ASL

(1) Risk from decay products (+D) included as appropriate; secular equilibrium assumed between Lead-210 and Radium-226, between (background samples) Uranium-234 and Uranium-238, and between (background samples) Thorium-228 and Radium-228

(2) Minimum/maximum detected concentration.

(3) Maximum concentrations from background samples. See text.

(4) Selection (YES) or deletion (NO) of radionuclides of potential concern (ROPC).

(5) Rationale Codes

Selection Reason:	Infrequent Detection but Associated Historically (IHST)
	Frequent Detection (FD)
	Toxicity Information Available (TX)
	Above Screening Levels (ASL)
Deletion Reason:	Infrequent Detection (IFD)
	Background Levels (BKG)
	No Toxicity Information (NTX)
	Essential Nutrient (NUT)
	Below Screening Level (BSL)

TABLE 4

Summary of Sampling Results for Non-radioactive Chemicals

Captain's Cove Property

T4
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
LT TUNGSTEN-CAPTAIN'S COVE ADJUNCT SITE

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Area A

CAS Number	Chemical	(1) Minimum Concentration	Minimum Qualifier	(1) Maximum Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	Background Value	(3) Screening Toxicity Value		Potential ARAR/TBC Value (4)	Potential ARAR/TBC Source	COPC Flag	(5) Rationale for Contaminant Deletion or Selection
7439-92-1	Lead	95.1		512		mg/kg	CC-SB-21-0-2	3/3	0.65-0.79	512	(2)	--	--	400	SSL	YES	NTX, ABKG
7439-95-4	Magnesium	1160		2480		mg/kg	CC-SB-19-0-2	3/3	1076-1314	2480	(2)	--	--	N/A	N/A	NO	NUT
7439-96-5	Manganese	194		1850		mg/kg	CC-SB-19-0-2	3/3	3.23-3.94	1850	(2)	1.6E+03	N	N/A	N/A	NO	BBKG
7439-97-6	Mercury	0.06	J	0.14		mg/kg	CC-SB-19-0-2	3/3	0.11-0.13	0.14	(2)	--	--	2	SSL	NO	BCTS
7440-02-0	Nickel	6.2	J	36.7		mg/kg	CC-SB-21-0-2	3/3	8.61-10.5	36.7	(2)	1.6E+03	N	130	SSL	NO	BCTS, BSL
7440-09-7	Potassium	631	J	805	J	mg/kg	CC-SB-19-0-2	3/3	1076-1314	805	(2)	--	--	N/A	N/A	NO	NUT
7782-49-2	Selenium	3.8		5.4		mg/kg	CC-SB-19-0-2	2/3	1.08-1.31	5.4	(2)	3.9E+02	N	5	SSL	NO	BCTS, BSL
7440-22-4	Silver	0.28	J	11.3		mg/kg	CC-SB-19-0-2	3/3	2.15-2.63	11.3	(2)	3.9E+02	N	34	SSL	NO	BCTS
7440-23-5	Sodium	49.3	J	688	J	mg/kg	CC-SB-21-0-2	3/3	1076-1314	688	(2)	--	--	N/A	N/A	NO	NUT
7440-28-0	Thallium	1.6	J	2.6	J	mg/kg	CC-SB-21-0-2	2/3	2.15-2.63	2.6	(2)	5.5E+00	N	0.7	SSL	NO	BBKG
7440-62-2	Vanadium	12.3		23.2		mg/kg	CC-SB-19-0-2	3/3	10.8-13.1	23.2	(2)	5.5E+02	N	6000	SSL	NO	BCTS, BSL
7440-66-6	Zinc	79.8		714		mg/kg	CC-SB-21-0-2	3/3	4.31-5.26	714	(2)	2.3E+04	N	12000	SSL	NO	BCTS, BSL

(1) Minimum/maximum detected concentration.

(2) Background values from LT-MP-5, LT-MP-5B, LT-MP-11D, LT-MP-11DB, LT-SB-13, LT-SB-13B, LT-TP-06. See Appendix A.

(3) U.S. EPA Region III, 1998d, Risk-Based Concentration Table, Soil Residential RBCs
(Cancer benchmark value = 1E-06, HQ = 1.0)

(4) Soil Screening Levels Migration to Groundwater 20 DAF (mg/kg)

(5) Rationale Codes Selection Reason:
- Infrequent Detection but Associated Historically (IHST)
- Frequent Detection (FD)
- Toxicity Information Available (TX)
- Above Screening Levels (ASL)
- Above Background Levels (ABKG)
- Above CTS (ACTS)

Deletion Reason:
- Infrequent Detection (IFD)
- Below Background Levels (BBKG)
- No Toxicity Information (NTX)
- Essential Nutrient (NUT)
- Below Screening Level (BSL)
- Below CTS (BCTS)

Definitions:
- N/A = Not Applicable
- CRQL = Contract Required Quantitation Limit
- CRDL = Contract Required Detection Limit
- COPC = Chemical of Potential Concern
- ARAR/TBC = Applicable or Relevant and Appropriate Requirement/To Be Considered
- RBC = Risk-Based Concentration
- CTS = Concentration / Toxicity Screen (See Appendix C)
- E = Estimated Value
- J = Estimated Value, compound present below CRQL but above IDL
- C = Carcinogenic
- N = Non-Carcinogenic

TABL
OCCURRENCE, DISTRIBUTION AND SELECTIO[illegible] CHEMICALS OF POTENTIAL CONCERN
LETUNGSTEN/CAPTAIN'S COVE ADJUNCT SITE

Scenario Timeframe: Future
Medium: All Soil
Exposure Medium: All Soil
Exposure Point: Area A

CAS Number	Chemical	(1) Minimum Concentration	Minimum Qualifier	(1) Maximum Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	Background Value	(3) Screening Toxicity Value		Potential ARAR/TBC Value (4)	Potential ARAR/TBC Source	COPC Flag	(5) Rationale for Contaminant Deletion or Selection
319-84-6	alpha-BHC	0.0044		0.0044		mg/kg	CC-SB-13-4-6	1/19	0.0018-0.097	0.0044	N/A	1.0E-01	C	0.0005	SSL	NO	BCTS, BSL
319-85-7	beta-BHC	0.0084		0.015		mg/kg	CC-SB-27-0-2	2/19	0.0018-0.097	0.015	N/A	3.5E-01	C	0.003	SSL	NO	BCTS, BSL
319-85-7	delta-BHC	0.0075		0.017		mg/kg	CC-SB-27-0-2	3/19	0.0018-0.097	0.017	N/A	3.5E-01	C	N/A	N/A	NO	BCTS, BSL
57-74-9	Chlordane (total)	0.0033		0.43		mg/kg	CC-TP-2-4-5	11/19	0.0018-0.097	0.43	N/A	1.8E+00	C	10	SSL	NO	BCTS, BSL
72-54-8	4,4'-DDD	0.0047	EN	0.18		mg/kg	CC-TP-2-4-5	8/19	0.0035-0.19	0.18	N/A	2.7E+00	C	16	SSL	NO	BCTS, BSL
72-55-9	4,4'-DDE	0.002	J	0.12	E	mg/kg	CC-TP-2-4-5	11/19	0.0035-0.19	0.12	N/A	1.9E+00	C	54	SSL	NO	BCTS, BSL
50-29-3	4,4'-DDT	0.0066	EN	0.1	E	mg/kg	CC-SB-MW8-2-4	7/19	0.0035-0.19	0.1	N/A	1.9E+00	C	32	SSL	NO	BCTS, BSL
60-57-1	Dieldrin	0.0049	EN	0.0049	EN	mg/kg	CC-SB-20-4-6	1/19	0.0035-0.19	0.0049	N/A	4.0E-02	C	0.004	SSL	NO	BCTS, BSL
115-29-7	Endosulfan I	0.013	EN	0.1	EN	mg/kg	CC-SB-21-0-2	2/19	0.0018-0.097	0.1	N/A	4.7E+02	N	18	SSL	NO	BCTS, BSL
7421-93-4	Endrin aldehyde	0.0084	E	0.0084	E	mg/kg	CC-TP-3-5-6	1/19	0.0035-0.19	0.0084	N/A	--	--	N/A	N/A	YES	NTX
76-44-8	Heptachlor	0.0041	J	0.0041	J	mg/kg	CC-TP-4-5-6	1/19	0.0018-0.097	0.0041	N/A	1.4E-01	C	23	SSL	NO	BCTS, BSL
1024-57-3	Heptachlor epoxide	0.0022	J	0.034	E	mg/kg	CC-TP-2-4-5	5/19	0.0018-0.097	0.034	N/A	7.0E-02	C	0.7	SSL	NO	BCTS, BSL
12672-29-6	PCBs (total)	0.021	J	5.5		mg/kg	CC-SB-21-0-2	10/19	0.035-1.88	5.5	N/A	3.2E-01	C	1	SSL	YES	ACTS, ASL
7429-90-5	Aluminum	839		19700		mg/kg	CC-SB-14-2-4	19/19	42.9-63.6	19700	(2)	7.8E+04	N	N/A	N/A	NO	BCTS, BSL
7440-36-0	Antimony	1.9	J	1160	E	mg/kg	CC-SB-14-2-4	17/19	12.9-19.1	1160	(2)	3.1E+01	N	5	SSL	YES	ACTS, ASL
7440-38-2	Arsenic	3		2760		mg/kg	CC-TP-1-7-8	19/19	2.15-3.18	2760	(2)	4.3E-01	C	29	SSL	YES	ACTS, ASL
7440-39-3	Barium	6.5	J	1200		mg/kg	CC-SB-14-2-4	19/19	42.9-63.6	1200	(2)	5.5E+03	N	1600	SSL	YES	ACTS
7440-41-7	Beryllium	0.18	J	6.8		mg/kg	CC-SB-14-2-4	18/19	1.07-1.59	6.8	(2)	1.6E+02	N	63	SSL	NO	BCTS, BSL

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OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
TUNGSTEN CAPTAINS COVE ADJACENT SITE

Scenario Timeframe: Future
Medium: All Soil
Exposure Medium: Particulates
Exposure Point: Area A

CAS Number	Chemical	(1) Minimum Concentration	Minimum Qualifier	(1) Maximum Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	Background Value	(3) Screening Toxicity Value		Potential ARAR/TBC Value (4)	Potential ARAR/TBC Source	COPC Flag	(5) Rationale for Contaminant Deletion or Selection
83-32-9	Acenaphthene	0.052	J	0.36	J	mg/kg	CC-SB-18-4-6	4/19	0.354-4.65	0.36	N/A	4.7E+03	N	570	SSL	NO	BCTS, BSL
120-12-7	Anthracene	0.065	J	0.7	J	mg/kg	CC-SB-18-4-6	5/19	0.354-4.65	0.7	N/A	2.3E+04	N	12000	SSL	NO	BCTS, BSL
56-55-3	Benzo(a)Anthracene	0.055	J	2.7		mg/kg	CC-SB-18-4-6	11/19	0.354-4.65	2.7	N/A	8.7E-01	C	2	SSL	YES	ASL
205-99-2	Benzo(b)Fluoranthene	0.074	J	5.6		mg/kg	CC-SB-18-4-6	12/19	0.354-4.65	5.6	N/A	8.7E-01	C	5	SSL	YES	ASL
207-08-9	Benzo(k)Fluoranthene	0.11	J	0.21	J	mg/kg	CC-SB-12-4-6	3/19	0.354-4.65	0.21	N/A	8.7E+00	C	49	SSL	NO	BCTS, BSL
50-32-8	Benzo(a)Pyrene	0.051	J	3.2		mg/kg	CC-SB-18-4-6	10/19	0.354-4.65	3.2	N/A	8.7E-02	C	8	SSL	YES	ACTS, ASL
191-24-2	Benzo(g,h,i)Perylene	0.069	J	1.6		mg/kg	CC-SB-18-4-6	8/19	0.354-4.65	1.6	N/A	--	--	N/A	N/A	YES	NTX
86-74-8	Carbazole	0.063		0.48	J	mg/kg	CC-SB-18-4-6	4/19	0.354-4.65	0.48	N/A	3.2E+01	C	0.6	SSL	NO	BCTS, BSL
218-01-9	Chrysene	0.055	J	1.9		mg/kg	CC-SB-18-4-6	10/19	0.354-4.65	1.9	N/A	8.7E+01	C	160	SSL	NO	BCTS, BSL
53-70-3	Dibenz(a,h)Anthracene	0.054	J	0.31	J	mg/kg	CC-SB-18-4-6	2/19	0.354-4.65	0.31	N/A	8.7E-02	C	2	SSL	YES	ASL
132-64-9	Dibenzofuran	0.046	J	0.13	J	mg/kg	CC-SB-18-4-6	2/19	0.354-4.65	0.13	N/A	3.1E+02	N	N/A	N/A	NO	BCTS, BSL
206-44-0	Fluoranthene	0.084	J	5.8		mg/kg	CC-SB-18-4-6	12/19	0.354-4.65	5.8	N/A	3.1E+03	N	4300	SSL	NO	BCTS, BSL
86-73-7	Fluorene	0.043	J	0.25	J	mg/kg	CC-SB-18-4-6	5/19	0.354-4.65	0.25	N/A	3.1E+03	N	560	SSL	NO	BCTS, BSL
193-39-5	Indeno(1,2,3-cd)Pyrene	0.064	J	1.5		mg/kg	CC-SB-18-4-6	7/19	0.354-4.65	1.5	N/A	8.7E-01	C	14	SSL	YES	ASL
91-20-3	Naphthalene	0.041	J	0.041	J	mg/kg	CC-SB-13-4-6	1/19	0.354-4.65	0.041	N/A	1.6E+03	N	84	SSL	NO	BCTS, BSL
85-01-8	Phenanthrene	0.053	J	3		mg/kg	CC-SB-18-4-6	11/19	0.354-4.65	3	N/A	--	--	N/A	N/A	YES	NTX
129-00-0	Pyrene	0.087	J	4.5		mg/kg	CC-SB-18-4-6	13/19	0.354-4.65	4.5	N/A	2.3E+03	N	4200	SSL	NO	BCTS, BSL

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OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
LT TUNGSTEN-CAPTAIN'S COVE ADJUNCT SITE

Scenario Timeframe: Future
Medium: All Soil
Exposure Medium: Particulates
Exposure Point: Area A

CAS Number	Chemical	(1) Minimum Concentration	Minimum Qualifier	(1) Maximum Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	Background Value	(3) Screening Toxicity Value	Potential ARAR/TBC Value (4)	Potential ARAR/TBC Source	COPC Flag	(5) Rationale for Contaminant Deletion or Selection
16065-83-1	Chromium	5.7	E	91.2		mg/kg	CC-TP-3-5-6	19/19	2.15-3.18	91.2	(2)	1.2E+05 N	38	SSL	NO	BCTS, BSL
7440-48-4	Cobalt	2.1	J	379	E	mg/kg	CC-TP-4-5-6	19/19	10.7-15.9	379	(2)	4.7E+03 N	N/A	N/A	YES	ACTS
7440-50-8	Copper	16.5		11300		mg/kg	CC-TP-1-7-8	19/19	5.36-7.95	11300	(2)	3.1E+03 N	N/A	N/A	YES	ACTS, ASL
7439-89-6	Iron	5850		203000		mg/kg	CC-SB-14-2-4	19/19	21.5-31.8	203000	(2)	2.3E+04 N	N/A	N/A	YES	ACTS, ASL
7439-92-1	Lead	57.5		29500		mg/kg	CC-TP-1-7-8	19/19	0.64-0.95	29500	(2)	-- --	400	SSL	YES	NTX, ABKG
7439-95-4	Magnesium	248	J	39100		mg/kg	CC-TP-4-5-6	19/19	1073-1590	39100	(2)	-- --	N/A	N/A	NO	NUT
7439-96-5	Manganese	115		30900		mg/kg	CC-TP-6-5-6	19/19	3.22-4.77	30900	(2)	1.6E+03 N	N/A	N/A	YES	ACTS, ASL
7439-97-6	Mercury	0.04	J	2.4		mg/kg	CC-SB-18-4-6	19/19	0.11-0.16	2.4	(2)	-- --	2	SSL	NO	BCTS
7440-02-0	Nickel	2.2	J	145		mg/kg	CC-TP-1-7-8	19/19	8.58-12.7	145	(2)	1.6E+03 N	130	SSL	NO	BCTS, BSL
7440-09-7	Potassium	105	J	2500		mg/kg	CC-TP-2-4-5	19/19	1073-1590	2500	(2)	-- --	N/A	N/A	NO	NUT
7782-49-2	Selenium	1.3		72		mg/kg	CC-TP-1-7-8	18/19	1.07-1.59	72	(2)	3.9E+02 N	5	SSL	NO	BCTS, BSL
7440-22-4	Silver	0.28	J	245		mg/kg	CC-TP-1-7-8	19/19	2.15-3.18	245	(2)	3.9E+02 N	34	SSL	NO	BCTS
7440-23-5	Sodium	28.8	J	14100		mg/kg	CC-SB-14-2-4	19/19	1073-1590	14100	(2)	-- --	N/A	N/A	NO	NUT
7440-28-0	Thallium	1.6	J	2.6	J	mg/kg	CC-SB-21-0-2	3/18	2.15-3.18	2.6	(2)	5.5E+00 N	0.7	SSL	NO	BCTS, BSL
7440-62-2	Vanadium	7.4	J	41.7		mg/kg	CC-SB-14-2-4	19/19	10.7-15.9	41.7	(2)	5.5E+02 N	6000	SSL	NO	BCTS, BSL
7440-66-6	Zinc	27.7		17300		mg/kg	CC-SB-14-2-4	19/19	4.29-6.36	17300	(2)	2.3E+04 N	12000	SSL	NO	BCTS, BSL
57-12-5	Cyanide	0.61	J	0.79		mg/kg	CC-TP-1-7-8	2/19	0.54-0.8	0.79	(2)	1.6E+03 N	40	SSL	NO	BCTS, BSL

(1) Minimum/maximum detected concentration.

(2) Background values from LT-MP-5, LT-MP-5B, LT-MP-11D, LT-MP-11DB, LT-SB-13, LT-SB-13B, LT-TP-06. See Appendix A.

(3) U.S. EPA Region III, 1998d, Risk-Based Concentration Table, Soil Residential RBCs
(Cancer benchmark value = 1E-06, HQ = 1.0)

(4) Soil Screening Levels Migration to Groundwater 20 DAF (mg/kg)

(5) Rationale Codes Selection Reason:
- Infrequent Detection but Associated Historically (IHST)
- Frequent Detection (FD)
- Toxicity Information Available (TX)
- Above Screening Levels (ASL)
- Above Background Levels (ABKG)
- Above CTS (ACTS)

Deletion Reason:
- Infrequent Detection (IFD)
- Below Background Levels (BBKG)
- No Toxicity Information (NTX)
- Essential Nutrient (NUT)
- Below Screening Level (BSL)
- Below CTS (BCTS)

Definitions:
- N/A = Not Applicable
- CRQL = Contract Required Quantitation Limit
- CRDL = Contract Required Detection Limit
- COPC = Chemical of Potential Concern
- ARAR/TBC = Applicable or Relevant and Appropriate Requirement/To Be Considered
- RBC = Risk-Based Concentration
- CTS = Concentration / Toxicity Screen (See Appendix C)
- E = Estimated Value
- J = Estimated Value, compound present below CRQL but above IDL
- C = Carcinogenic
- N = Non-Carcinogenic

TAI
OCCURRENCE, DISTRIBUTION AND SELECTIO. OF CHEMICALS OF POTENTIAL CONCERN
LI TUNGSTEN-CAPTAIN'S COVE ADJUNCT SITE

Scenario Timeframe: Future
Medium: All Soil
Exposure Medium: All Soil
Exposure Point: Area G

CAS Number	Chemical	(1) Minimum Concentration	Minimum Qualifier	(1) Maximum Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	Background Value	(3) Screening Toxicity Value		Potential ARAR/TBC Value (4)	Potential ARAR/TBC Source	COPC Flag	(5) Rationale for Contaminant Deletion or Selection
78-93-3	2-Butanone	0.012		0.012		mg/kg	CC-TP-5-6-7	1/10	0.011-0.013	0.012	N/A	4.7E+04	N	N/A	N/A	NO	BCTS, BSL
1330-20-7	Xylenes (total)	0.018		0.018		mg/kg	CC-TP-6-5-6	1/10	0.011-0.013	0.018	N/A	1.6E+05	N	190	SSL	NO	BCTS, BSL
83-32-9	Acenaphthene	0.47		4.1		mg/kg	CC-SB-22-2-4	3/10	0.356-4.41	4.1	N/A	4.7E+03	N	570	SSL	NO	BCTS, BSL
208-96-8	Acenaphthylene	0.077	J	0.077	J	mg/kg	CC-SB-22-2-4	1/10	0.356-4.41	0.077	N/A	--	--	N/A	N/A	YES	NTX
120-12-7	Anthracene	0.85		4.6		mg/kg	CC-SB-22-2-4	3/10	0.356-4.41	4.6	N/A	2.3E+04	N	12000	SSL	NO	BCTS, BSL
56-55-3	Benzo(a)Anthracene	0.054	J	4		mg/kg	CC-SB-22-2-4	6/10	0.356-4.41	4	N/A	8.7E-01	C	2	SSL	YES	ACTS, ASL
205-99-2	Benzo(b)Fluoranthene	0.19	J	3.7		mg/kg	CC-SB-22-2-4	6/10	0.356-4.41	3.7	N/A	8.7E-01	C	5	SSL	YES	ASL
207-08-9	Benzo(k)Fluoranthene	0.064	J	0.57	J	mg/kg	CC-SB-22-2-4	2/10	0.356-4.41	0.57	N/A	8.7E+00	C	49	SSL	NO	BCTS, BSL
50-32-8	Benzo(a)Pyrene	0.1	J	1.6		mg/kg	CC-SB-22-2-4	6/10	0.356-4.41	1.6	N/A	8.7E-02	C	8	SSL	YES	ACTS, ASL
191-24-2	Benzo(g,h,i)Perylene	0.077	J	0.45	J	mg/kg	CC-SB-22-2-4	5/10	0.356-4.41	0.45	N/A	--	--	N/A	N/A	YES	NTX
86-74-8	Carbazole	0.14	J	2.7		mg/kg	CC-SB-22-2-4	3/10	0.356-4.41	2.7	N/A	3.2E+01	C	0.6	SSL	NO	BCTS, BSL
218-01-9	Chrysene	0.1	J	3.1		mg/kg	CC-SB-22-2-4	6/10	0.356-4.41	3.1	N/A	8.7E+01	C	160	SSL	NO	BCTS, BSL
132-64-9	Dibenzofuran	0.23	J	2.5		mg/kg	CC-SB-04-2-4	3/10	0.356-4.41	2.5	N/A	3.1E+02	N	N/A	N/A	NO	BCTS, BSL
84-74-2	Di-n-butylphthalate	0.045	J	0.098	J	mg/kg	CC-SB-23-4-6	3/10	0.356-4.41	0.098	N/A	7.8E+03	N	2300	SSL	NO	BCTS, BSL
105-67-9	2,4-Dimethylphenol	0.12	J	0.12	J	mg/kg	CC-SB-04-2-4	1/10	0.356-4.41	0.12	N/A	1.6E+03	N	9	SSL	NO	BCTS, BSL
206-44-0	Fluoranthene	0.13	J	8.6		mg/kg	CC-SB-22-2-4	7/10	0.356-4.41	8.6	N/A	3.1E+03	N	4300	SSL	NO	BCTS, BSL
86-73-7	Fluorene	0.39		3.7		mg/kg	CC-SB-22-2-4	3/10	0.356-4.41	3.7	N/A	3.1E+03	N	560	SSL	NO	BCTS, BSL
193-39-5	Indeno(1,2,3-cd)Pyrene	0.085	J	0.49	J	mg/kg	CC-SB-22-2-4	5/10	0.356-4.41	0.49	N/A	8.7E-01	C	14	SSL	NO	BCTS, BSL
91-57-6	2-Methylnaphthalene	0.15	J	3.2		mg/kg	CC-SB-04-2-4	4/10	0.356-4.41	3.2	N/A	1.6E+03	N	N/A	N/A	NO	BCTS, BSL
106-44-5	4-Methylphenol	0.13	J	0.13	J	mg/kg	CC-SB-04-2-4	1/10	0.356-4.41	0.13	N/A	3.9E+02	N	N/A	N/A	NO	BCTS, BSL
91-20-3	Naphthalene	0.18	J	6.1		mg/kg	CC-SB-04-2-4	3/10	0.356-4.41	6.1	N/A	1.6E+03	N	84	SSL	NO	BCTS, BSL
86-30-6	N-nitrosodiphenylamine	0.14	J	0.14	J	mg/kg	CC-SB-04-2-4	1/10	0.356-4.41	0.14	N/A	1.3E+02	C	1	SSL	NO	BCTS, BSL
85-01-8	Phenanthrene	0.088	J	8.6		mg/kg	CC-SB-22-2-4	7/10	0.356-4.41	8.6	N/A	--	--	N/A	N/A	YES	NTX
108-95-2	Phenol	0.2	J	0.2	J	mg/kg	CC-SB-24-6-8	1/10	0.356-4.41	0.2	N/A	4.7E+04	N	100	SSL	NO	BCTS, BSL
129-00-0	Pyrene	0.04	J	9.5		mg/kg	CC-SB-22-2-4	8/10	0.356-4.41	9.5	N/A	2.3E+03	N	4200	SSL	NO	BCTS, BSL

TAL
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
LI TUNGSTEN-CAPTAIN'S COVE ADJUNCT SITE

Scenario Timeframe: Future
Medium: All Soil
Exposure Medium: All Soil
Exposure Point: Area G

CAS Number	Chemical	(1) Minimum Concentration	Minimum Qualifier	(1) Maximum Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	Background Value	(3) Screening Toxicity Value		Potential ARAR/TBC Value (4)	Potential ARAR/TBC Source	COPC Flag	(5) Rationale for Contaminant Deletion or Selection
7440-48-4	Cobalt	6.6	J	172		mg/kg	CC-SB-24-6-8	10/10	10.8-13.4	172	(2)	4.7E+03	N	N/A	N/A	NO	BCTS, BSL
7440-50-8	Copper	17.6		1850		mg/kg	CC-SB-26-6-8	10/10	5.39-6.68	1850	(2)	3.1E+03	N	N/A	N/A	NO	BCTS, BSL
7439-89-6	Iron	10500		132000		mg/kg	CC-SB-23-4-6	10/10	21.6-26.7	132000	(2)	2.3E+04	N	N/A	N/A	YES	ACTS, ASL
7439-92-1	Lead	21.9		3000		mg/kg	CC-SB-24-6-8	10/10	0.65-0.8	3000	(2)	--	--	400	SSL	YES	NTX, ABKG
7439-95-4	Magnesium	887	J	2990		mg/kg	CC-SB-04-2-4	10/10	1079-1335	2990	(2)	--	--	N/A	N/A	NO	NUT
7439-96-5	Manganese	269		215000		mg/kg	CC-SB-24-6-8	10/10	3.24-4	215000	(2)	1.6E+03	N	N/A	N/A	YES	ACTS, ASL
7439-97-6	Mercury	0.02	J	4.1		mg/kg	CC-TP-6-5-6	10/10	0.11-0.13	4.1	(2)	--	--	2	SSL	NO	BCTS
7440-02-0	Nickel	10		82.2		mg/kg	CC-SB-22-2-4	10/10	8.63-10.7	82.2	(2)	1.6E+03	N	130	SSL	NO	BCTS, BSL
7440-09-7	Potassium	339	J	1310		mg/kg	CC-SB-04-2-4	10/10	1079-1335	1310	(2)	--	--	N/A	N/A	NO	NUT
7782-49-2	Selenium	0.69	J	133		mg/kg	CC-SB-24-6-8	8/10	1.08-1.34	133	(2)	3.9E+02	N	5	SSL	NO	BCTS, BSL
7440-22-4	Silver	0.26	J	72.2		mg/kg	CC-TP-6-5-6	10/10	2.15-2.67	72.2	(2)	3.9E+02	N	34	SSL	NO	BCTS, BSL
7440-23-5	Sodium	30	J	9150		mg/kg	CC-SB-26-6-8	10/10	1079-1335	9150	(2)	--	--	N/A	N/A	NO	NUT
7440-28-0	Thallium	3.9		3.9		mg/kg	CC-SB-04-2-4	1/8	2.16-2.67	3.9	(2)	5.5E+00	N	0.7	SSL	NO	BCTS, BSL
7440-62-2	Vanadium	13.3	J	31.6		mg/kg	CC-SB-23-4-6	10/10	10.8-13.4	31.6	(2)	5.5E+02	N	6000	SSL	NO	BCTS, BSL, BBKG
7440-66-6	Zinc	33.8		1780		mg/kg	CC-SB-26-6-8	10/10	4.32-5.34	1780	(2)	2.3E+04	N	12000	SSL	NO	BCTS, BSL

(1) Minimum/maximum detected concentration.

(2) Background values from LT-MP-5, LT-MP-5B, LT-MP-11D, LT-MP-11DB, LT-SB-13, LT-SB-13B, LT-TP-06. See Appendix A.

(3) U.S. EPA Region III, 1998d, Risk-Based Concentration Table, Soil Residential RBCs
(Cancer benchmark value = 1E-06, HQ = 1.0)

(4) Soil Screening Levels Migration to Groundwater 20 DAF (mg/kg)

(5) Rationale Codes Selection Reason:
- Infrequent Detection but Associated Historically (HIST)
- Frequent Detection (FD)
- Toxicity Information Available (TX)
- Above Screening Levels (ASL)
- Above Background Levels (ABKG)
- Above CTS (ACTS)

Deletion Reason:
- Infrequent Detection (IFD)
- Below Background Levels (BBKG)
- No Toxicity Information (NTX)
- Essential Nutrient (NUT)
- Below Screening Level (BSL)
- Below CTS (BCTS)

Definitions:
- N/A = Not Applicable
- CRQL = Contract Required Quantitation Limit
- CRDL = Contract Required Detection Limit
- COPC = Chemical of Potential Concern
- ARAR/TBC = Applicable or Relevant and Appropriate Requirement/To Be Considered
- RBC = Risk-Based Concentration
- CTS = Concentration / Toxicity Screen (See Appendix C)
- E = Estimated Value
- J = Estimated Value, compound present below CRQL but above IDL
- C = Carcinogenic
- N = Non-Carcinogenic

TAB
OCCURRENCE, DISTRIBUTION AND SELECTIO . . CHEMICALS OF POTENTIAL CONCERN
LETUNGSTEN CAPTAIN'S COVE ADJUNCT SITE

Scenario Timeframe: Future
Medium: All Soil
Exposure Medium: Particulates
Exposure Point: Area G

CAS Number	Chemical	(1) Minimum Concentration	Minimum Qualifier	(1) Maximum Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	Background Value	(3) Screening Toxicity Value		Potential ARAR/TBC Value (4)	Potential ARAR/TBC Source	COPC Flag	(5) Rationale for Contaminant Deletion or Selection
319-85-7	beta-BHC	0.0021	EN	0.0021	EN	mg/kg	CC-SB-23-4-6	1/10	0.0018-0.23	0.0021	N/A	3.5E-01	C	0.003	SSL	NO	BCTS, BSL
319-85-7	delta-BHC	0.0019	E	0.0019	E	mg/kg	CC-SB-22-2-4	1/10	0.0018-0.23	0.0019	N/A	3.5E-01	C	N/A	N/A	NO	BCTS, BSL
57-74-9	Chlordane (total)	0.0025		0.065		mg/kg	CC-SB-MW7-2-4	6/10	0.0018-0.23	0.065	N/A	1.8E+00	C	10	SSL	NO	BCTS, BSL
72-54-8	4,4'-DDD	0.003	J	0.061		mg/kg	CC-SB-MW7-2-4	4/10	0.0036-0.44	0.061	N/A	2.7E+00	C	16	SSL	NO	BCTS, BSL
72-55-9	4,4'-DDE	0.0086	EN	0.014	EN	mg/kg	CC-SB-23-4-6	2/10	0.0036-0.44	0.014	N/A	1.9E+00	C	54	SSL	NO	BCTS, BSL
50-29-3	4,4'-DDT	0.011	EN	0.028	EN	mg/kg	CC-SB-04-2-4	4/10	0.0036-0.44	0.028	N/A	1.9E+00	C	32	SSL	NO	BCTS, BSL
60-57-1	Dieldrin	0.0068	EN	0.012	EN	mg/kg	CC-SB-23-4-6	2/10	0.0036-0.44	0.012	N/A	4.0E-02	C	0.004	SSL	NO	BCTS, BSL
115-29-7	Endosulfan I	0.0024		0.25	EN	mg/kg	CC-TP-6-5-6	5/10	0.0018-0.23	0.25	N/A	4.7E+02	N	18	SSL	NO	BCTS, BSL
1031-07-8	Endosulfan sulfate	0.0052	EN	0.0052	EN	mg/kg	CC-SB-22-2-4	1/10	0.0036-0.44	0.0052	N/A	--	--	N/A	N/A	YES	NTX
53494-70-5	Endrin ketone	0.0068	EN	0.024	EN	mg/kg	CC-SB-MW7-2-4	6/10	0.0036-0.44	0.024	N/A	--	--	N/A	N/A	YES	NTX
76-44-8	Heptachlor	0.0039	EN	0.0039	EN	mg/kg	CC-SB-23-4-6	1/10	0.0018-0.23	0.0039	N/A	1.4E-01	C	23	SSL	NO	BCTS, BSL
1024-57-3	Heptachlor epoxide	0.0024		0.0057	J	mg/kg	CC-SB-MW7-2-4	2/10	0.0018-0.23	0.0057	N/A	7.0E-02	C	0.7	SSL	NO	BCTS, BSL
12672-29-6	PCBs (total)	0.152		12		mg/kg	CC-TP-6-5-6	6/10	0.036-4.4	12	N/A	3.2E-01	C	1	SSL	YES	ACTS, ASL
7429-90-5	Aluminum	3300		8230		mg/kg	CC-SB-04-2-4	10/10	43.1-53.4	8230	(2)	7.8E+04	N	N/A	N/A	NO	BCTS, BSL
7440-36-0	Antimony	2.1	J	201		mg/kg	CC-SB-24-6-8	6/10	12.9-16	201	(2)	3.1E+01	N	5	SSL	YES	ACTS, ASL
7440-38-2	Arsenic	3.9		341		mg/kg	CC-SB-26-6-8	10/10	2.16-2.67	341	(2)	4.3E-01	C	29	SSL	YES	ACTS, ASL
7440-39-3	Barium	41.2	J	855		mg/kg	CC-SB-24-6-8	10/10	43.2-53.4	855	(2)	5.5E+03	N	1600	SSL	NO	BCTS, BSL
7440-41-7	Beryllium	0.08	J	5.4		mg/kg	CC-TP-6-5-6	9/10	1.08-1.34	5.4	(2)	1.6E+02	N	63	SSL	NO	BSL, BBKG
7440-43-9	Cadmium	0.33	J	37.2		mg/kg	CC-SB-26-6-8	10/10	1.08-1.34	37.2	(2)	7.8E+01	N	8	SSL	YES	ACTS
7440-70-2	Calcium	988	J	204000		mg/kg	CC-SB-26-6-8	10/10	1079-1335	204000	(2)	--	--	N/A	N/A	NO	NUT
16065-83-1	Chromium	9.1	E	244		mg/kg	CC-SB-24-6-8	10/10	2.16-2.67	244	(2)	1.2E+05	N	38	SSL	NO	BCTS, BSL

T.
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
TUNGSTEN-CAPTAIN'S COVE ADJUNCT SITE

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Underlying the site

CAS Number	Chemical	(1) Minimum Concentration	Minimum Qualifier	(1) Maximum Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	Background Value	(3) Screening Toxicity Value		Potential ARAR/TBC Value (4)	Potential ARAR/TBC Source	COPC Flag	(5) Rationale for Contaminant Deletion or Selection
71-43-2	Benzene	0.0084	J	0.013	J	mg/L	CC-MW-CDM-2	2/10	0.01	0.013	N/A	3.6E-04	C	0.005	MCL	YES	ACTS, AC
108-90-7	Chlorobenzene	0.0026	J	0.5		mg/L	CC-MW-CDM-2	5/10	0.01	0.5	N/A	3.5E-02	N	N/A	N/A	YES	ACTS, ASL
67-66-3	Chloroform	0.61		0.61		mg/L	CC-MW-CDM-2	1/10	0.01	0.61	N/A	1.5E-04	C	0.1/0.08	MCL	YES	ACTS, ASL
107-06-2	1,2-Dichloroethane	0.0042		0.0042		mg/L	CC-MW-CDM-4	1/10	0.01	0.0042	N/A	1.2E-04	C	0.005	MCL	YES	ACTS, ASL
540-59-0	1,2-Dichloroethene	0.0022	J	0.218		mg/L	CC-MW-CDM-2	2/10	0.01	0.218	N/A	5.5E-02	N	0.1/0.07	MCL	YES	ASL
75-09-2	Methylene chloride	0.026	J	0.026	J	mg/L	CC-MW-CDM-2	1/10	0.01	0.026	N/A	4.1E-03	C	0.005	MCL	YES	ASL
127-18-4	Tetrachloroethene	0.13		0.13		mg/L	CC-MW-CDM-2	1/10	0.01	0.13	N/A	1.1E-03	C	0.005	MCL	YES	ASL
108-88-3	Toluene	0.088		0.088		mg/L	CC-MW-3	1/10	0.01	0.088	N/A	7.5E-01	N	1	MCL	YES	ACTS
79-01-6	Trichloroethene	0.07		0.07		mg/L	CC-MW-CDM-2	1/10	0.01	0.07	N/A	1.6E-03	C	0.005	MCL	YES	ASL
75-01-4	Vinyl chloride	0.0026	J	0.19		mg/L	CC-MW-CDM-2	2/10	0.01	0.19	N/A	1.9E-05	C	0.002	MCL	YES	ASL
1330-20-7	Xylenes (total)	0.0025	J	0.0025	J	mg/L	CC-MW-3	1/10	0.01	0.0025	N/A	1.2E+01	N	10	MCL	NO	BCTS, BSL
83-32-9	Acenaphthene	0.0013	J	0.019		mg/L	CC-MW-2	2/10	0.01	0.019	N/A	2.2E+00	N	N/A	N/A	NO	BCTS, BSL
111-44-4	bis(2-chloroethyl)ether	0.0037	J	0.0037	J	mg/L	CC-MW-CDM-1	1/10	0.01	0.0037	N/A	6.1E-05	C	N/A	N/A	YES	ASL
117-81-7	bis(2-ethylhexyl)phthalate	0.0028	J	0.0028	J	mg/L	CC-MW-CDM-2	1/10	0.01	0.0028	N/A	4.8E-03	C	0.006	MCL	NO	BCTS, BSL
86-74-8	Carbazole	0.0018	J	0.0018	J	mg/L	CC-MW-2	1/10	0.01	0.0018	N/A	3.3E-03	C	N/A	N/A	NO	BCTS, BSL
95-57-8	2-Chlorophenol	0.0015	J	0.0021	J	mg/L	CC-MW-CDM-1	2/10	0.01	0.0021	N/A	1.8E-01	N	N/A	N/A	NO	BCTS, BSL
132-64-9	Dibenzofuran	0.0062	J	0.0062	J	mg/L	CC-MW-2	1/10	0.01	0.0062	N/A	2.4E-02	N	N/A	N/A	NO	BCTS, BSL
95-50-1	1,2-Dichlorobenzene	0.019		0.019		mg/L	CC-MW-CDM-2	1/10	0.01	0.019	N/A	6.4E-02	N	0.6	MCL	NO	BCTS, BSL
541-73-1	1,3-Dichlorobenzene	0.01		0.01		mg/L	CC-MW-CDM-2	1/10	0.01	0.01	N/A	1.4E-02	N	N/A	N/A	NO	BCTS, BSL
106-46-7	1,4-Dichlorobenzene	0.037		0.037		mg/L	CC-MW-CDM-2	1/10	0.01	0.037	N/A	4.7E-04	C	0.075	MCL	YES	ASL
84-66-2	Diethylphthalate	0.0012	J	0.0012	J	mg/L	CC-MW-3	1/10	0.01	0.0012	N/A	2.9E+01	N	N/A	N/A	NO	BCTS, BSL
86-73-7	Fluorene	0.0047	J	0.0047	J	mg/L	CC-MW-2	1/10	0.01	0.0047	N/A	1.5E+00	N	N/A	N/A	NO	BCTS, BSL
91-57-6	2-Methylnaphthalene	0.0017	J	0.0017	J	mg/L	CC-MW-3	1/10	0.01	0.0017	N/A	1.2E+02	N	N/A	N/A	NO	BCTS, BSL
106-44-5	4-Methylphenol	0.0022	J	0.0022	J	mg/L	CC-MW-3	1/10	0.01	0.0022	N/A	1.8E-01	N	N/A	N/A	NO	BSL
91-20-3	Naphthalene	0.0055	J	0.0055	J	mg/L	CC-MW-3	1/10	0.01	0.0055	N/A	7.3E+02	N	N/A	N/A	NO	BCTS, BSL
108-95-2	Phenol	0.0021	J	0.0021	J	mg/L	CC-MW-CDM-1	1/10	0.01	0.0021	N/A	2.2E+01	N	N/A	N/A	NO	BCTS, BSL
120-82-1	1,2,4-Trichlorobenzene	0.0025	J	0.031		mg/L	CC-MW-CDM-2	2/10	0.01	0.031	N/A	1.9E-01	N	0.07	MCL	NO	BCTS, BSL
1031-07-8	Endosulfan sulfate	0.00017		0.00017		mg/L	CC-MW-CDM-4	1/10	0.0001	0.00017	N/A	--	--	N/A	N/A	YES	NTX
7429-90-5	Aluminum	0.467		121		mg/L	CC-MW-5	10/10	0.2	121	(2)	3.7E+01	N	N/A	N/A	NO	BBKG
7440-36-0	Antimony	0.0155	J	0.0566	J	mg/L	CC-MW-6	3/10	0.06	0.0566	(2)	1.5E-02	N	0.006	MCL	YES	ASL
7440-38-2	Arsenic	0.0105	J	11.4		mg/L	CC-MW-8	10/10	0.01	11.4	(2)	4.5E-05	C	0.05	MCL	YES	ACTS, ASL
7440-39-3	Barium	0.121	J	0.448		mg/L	CC-MW-3	10/10	0.2	0.448	(2)	2.6E+00	N	2	MCL	NO	BCTS, BSL
7440-41-7	Beryllium	0.00017	J	0.0066		mg/L	CC-MW-5	7/10	0.005	0.0066	(2)	7.3E-02	N	0.004	MCL	NO	BCTS, BSL
7440-43-9	Cadmium	0.00071	J	0.0043	J	mg/L	CC-MW-6	4/10	0.005	0.0043	(2)	1.8E-02	N	0.005	MCL	NO	BCTS, BSL
7440-70-2	Calcium	30.2		203		mg/L	CC-MW-5	10/10	5	203	(2)	--	--	N/A	N/A	NO	NUT

TA
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
LI TUNGSTEN-CAPTAIN'S COVE ADJUNCT SITE

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Air
Exposure Point: Underlying the site

CAS Number	Chemical	(1) Minimum Concentration	Minimum Qualifier	(1) Maximum Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	Background Value	(3) Screening Toxicity Value		Potential ARAR/TBC Value (4)	Potential ARAR/TBC Source	COPC Flag	(5) Rationale for Contaminant Deletion or Selection
71-43-2	Benzene	0.0084	J	0.013	J	mg/L	CC-MW-CDM-2	2/10	0.01	0.013	N/A	3.6E-04	C	0.005	MCL	YES	ACTS, AC
108-90-7	Chlorobenzene	0.0026	J	0.5		mg/L	CC-MW-CDM-2	5/10	0.01	0.5	N/A	3.5E-02	N	N/A	N/A	YES	ACTS, ASL
67-66-3	Chloroform	0.61		0.61		mg/L	CC-MW-CDM-2	1/10	0.01	0 61	N/A	1.5E-04	C	0.1/0.08	MCL	YES	ACTS, ASL
107-06-2	1,2-Dichloroethane	0.0042		0.0042		mg/L	CC-MW-CDM-4	1/10	0 01	0 0042	N/A	1.2E-04	C	0.005	MCL	YES	ACTS, ASL
540-59-0	1,2-Dichloroethene	0.0022	J	0.218		mg/L	CC-MW-CDM-2	2/10	0 01	0 218	N/A	5.5E-02	N	0.1/0.07	MCL	YES	ASL
75-09-2	Methylene chloride	0.026	J	0.026	J	mg/L	CC-MW-CDM-2	1/10	0 01	0 026	N/A	4.1E-03	C	0.005	MCL	YES	ASL
127-18-4	Tetrachloroethene	0.13		0.13		mg/L	CC-MW-CDM-2	1/10	0 01	0 13	N/A	1.1E-03	C	0.005	MCL	YES	ASL
108-88-3	Toluene	0.088		0.088		mg/L	CC-MW-3	1/10	0 01	0 088	N/A	7.5E-01	N	1	MCL	YES	ACTS
79-01-6	Trichloroethene	0.07		0.07		mg/L	CC-MW-CDM-2	1/10	0 01	0 07	N/A	1.6E-03	C	0.005	MCL	YES	ASL
75-01-4	Vinyl chloride	0.0026	J	0.19		mg/L	CC-MW-CDM-2	2/10	0 01	0 19	N/A	1.9E-05	C	0.002	MCL	YES	ASL
1330-20-7	Xylenes (total)	0.0025	J	0.0025	J	mg/L	CC-MW-3	1/10	0.01	0.0025	N/A	1.2E+01	N	10	MCL	NO	BCTS, BSL

(1) Minimum/maximum detected concentration.
(2) Background not applicable for volatile organics
(3) U.S. EPA Region III, 1998, Risk-Based Concentration Table, Tap Water RBCs
(Cancer benchmark value = 1E-06, HQ = 1.0)
(4) Soil Screening Levels Migration to Groundwater 20 DAF (mg/kg)
(5) Rationale Codes Selection Reason: Infrequent Detection but Associated Historically (HIST)
Frequent Detection (FD)
Toxicity Information Available (TX)
Above Screening Levels (ASL)
Above Background Levels (ABKG)
Above CTS (ACTS)
Class A Carcinogen (AC)
Deletion Reason: Infrequent Detection (IFD)
Below Background Levels (BBKG)
No Toxicity Information (NTX)
Essential Nutrient (NUT)
Below Screening Level (BSL)
Below CTS (BCTS)

Definitions: N/A = Not Applicable
CRQL = Contract Required Quantitation Limit
CRDL = Contract Required Detection Limit
COPC = Chemical of Potential Concern
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/To Be Considered
RBC = Risk-Based Concentration
CTS = Concentration / Toxicity Screen (See Appendix C)
E = Estimated Value
J = Estimated Value, compound present below CRQL but above IDL
C = Carcinogenic
N = Non-Carcinogenic

T7
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
TUNGSTEN CAPTAINS COVE ADJUNCT SITE

Scenario Timeframe: Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Retention Ponds and low area

CAS Number	Chemical	(1) Minimum Concentration	Minimum Qualifier	(1) Maximum Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	Background Value	(3) Screening Toxicity Value	Potential ARAR/TBC Value (4)	Potential ARAR/TBC Source	COPC Flag	(5) Rationale for Contaminant Deletion or Selection

(1) Minimum/maximum detected concentration.

(3) Not Available for surface water

(5) Rationale Codes Selection Reason:

Infrequent Detection but Associated Historically (HIST)
Frequent Detection (FD)
Toxicity Information Available (TX)
Above Screening Levels (ASL)
Above Background Levels (ABKG)
Above CTS (ACTS)

Deletion Reason Infrequent Detection (IFD)
Below Background Levels (BBKG)
No Toxicity Information (NTX)
Essential Nutrient (NUT)
Below Screening Level (BSL)
Below CTS (BCTS)

Definitions: N/A = Not Applicable
CRQL = Contract Required Quantitation Limit
CRDL = Contract Required Detection Limit
COPC = Chemical of Potential Concern
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/To Be Considered
RBC = Risk-Based Concentration
CTS = Concentration / Toxicity Screen (See Appendix C)
E = Estimated Value
J = Estimated Value, compound present below CRQL but above IDL
C = Carcinogenic
N = Non-Carcinogenic

TABI
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
LI TUNGSTEN-CAPTAIN'S COVE ADJUNCT SITE

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Retention Ponds

CAS Number	Chemical	(1) Minimum Concentration	Minimum Qualifier	(1) Maximum Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	Background Value	(3) Screening Toxicity Value	Potential ARAR/TBC Value (4)	Potential ARAR/TBC Source	COPC Flag	(5) Rationale for Contaminant Deletion or Selection
7439-95-4	Magnesium	332	J	2780	J	mg/kg	CC-SED-3	2/2	1221-3058	2780	(2)	--	--	--	NO	NUT
7439-96-5	Manganese	52.5		386	E	mg/kg	CC-SED-3	2/2	3.66-9.17	386	(2)	--	--	--	NO	BBKG
7439-97-6	Mercury	0.35	E	0.35	E	mg/kg	CC-SED-3	1/2	0.12-0.31	0.35	(2)	--	--	--	NO	BCTS
7440-02-0	Nickel	2.3	J	41.2	E	mg/kg	CC-SED-3	2/2	9.77-24.5	41.2	(2)	--	--	--	NO	BBKG
7440-09-7	Potassium	150	J	1420	J	mg/kg	CC-SED-3	2/2	1221-3058	1420	(2)	--	--	--	NO	NUT
7782-49-2	Selenium	3.1	E	3.1	E	mg/kg	CC-SED-3	1/2	1.22-3.06	3.1	(2)	--	--	--	NO	BCTS
7440-22-4	Silver	7.2	E	7.2	E	mg/kg	CC-SED-3	1/2	2.44-6.12	7.2	(2)	--	--	--	YES	ACTS
7440-23-5	Sodium	121	J	121	J	mg/kg	CC-SED-3	1/2	1221-3058	121	(2)	--	--	--	NO	NUT
7440-62-2	Vanadium	3.6	J	43.9	E	mg/kg	CC-SED-3	2/2	12.2-30.6	43.9	(2)	--	--	--	NO	BBKG
7440-66-6	Zinc	364	E	364	E	mg/kg	CC-SED-3	1/2	4.88-12.2	364	(2)	--	--	--	YES	ACTS

(1) Minimum/maximum detected concentration.

(2) Background values from LT-MP-5, LT-MP-5B, LT-MP-11D, LT-MP-11DB, LT-SB-13, LT-SB-13B, LT-TP-06. See Appendix A.

(3) Not Available for sediment

(5) Rationale Codes Selection Reason:
- Infrequent Detection but Associated Historically (HIST)
- Frequent Detection (FD)
- Toxicity Information Available (TX)
- Above Screening Levels (ASL)
- Above Background Levels (ABKG)
- Above CTS (ACTS)
- Class A Carcinogen (AC)

Deletion Reason:
- Infrequent Detection (IFD)
- Below Background Levels (BBKG)
- No Toxicity Information (NTX)
- Essential Nutrient (NUT)
- Below Screening Level (BSL)
- Below CTS (BCTS)

Definitions:
- N/A = Not Applicable
- CRQL = Contract Required Quantitation Limit
- CRDL = Contract Required Detection Limit
- COPC = Chemical of Potential Concern
- ARAR/TBC = Applicable or Relevant and Appropriate Requirement/To Be Considered
- RBC = Risk-Based Concentration
- CTS = Concentration / Toxicity Screen (See Appendix C)
- E = Estimated Value
- J = Estimated Value, compound present below CRQL but above IDL
- C = Carcinogenic
- N = Non-Carcinogenic

TABLE 5

Summary of Hazard Indices and Cancer Risks

Non-radioactive Chemicals

Li Tungsten Facility

TABLE 7-38

SUMMARY OF HAZARD INDICES AND CANCER RISKS
LI TUNGSTEN SITE

EXPOSURE POPULATION AND PATHWAY	RME HAZARD INDEX	CENTRAL TENDENCY HAZARD INDEX	RME CANCER RISK	CENTRAL TENDENCY CANCER RISK
CURRENT SCENARIO				
OFF-SITE ADULT RESIDENT				
Inhalation of Respirable Particulates	2E+01	2E+01	1E-04	3E-05
TOTAL PATHWAY HAZARD INDEX/CANCER RISK:	**2E+01**	**2E+01**	**1E-04**	**3E-05**
OFF-SITE CHILD RESIDENT				
Inhalation of Respirable Particulates	9E+01	9E+01	1E-04	1E-04
TOTAL PATHWAY HAZARD INDEX/CANCER RISK:	**9E+01**	**9E+01**	**1E-04**	**1E-04**
CURRENT AND FUTURE SCENARIOS				
ADOLESCENT TRESPASSERS				
Ingestion of Surface Soil from Area B	5E+00	1E+00	1E-04	2E-05
Dermal Contact with Surface Soil from Area B	3E+00	6E-01	1E-04	2E-05
TOTAL PATHWAY HAZARD INDEX/CANCER RISK:	**8E+00**	**2E+00**	**2E-04**	**4E-05**
Ingestion of Surface Soil from Area B&C	2E+01	4E+00	5E-04	1E-04
Dermal Contact with Surface Soil from Area B&C	9E+00	2E+00	3E-04	6E-05
TOTAL PATHWAY HAZARD INDEX/CANCER RISK:	**3E+01**	**6E+00**	**8E-04**	**2E-04**
ngestion of Surface Soil from Area C	6E+00	1E+00	1E-04	2E-05
Dermal Contact of Surface Soil from Area C	2E+00	4E-01	8E-05	2E-05
TOTAL PATHWAY HAZARD INDEX/CANCER RISK:	**9E+00**	**1E+00**	**2E-04**	**4E-05**
Dermal Contact with Surface Water from Parcel B	4E+00	2E+00	3E-05	2E-05
Ingestion of Sediment from Parcel B	1E-01	2E-02	2E-06	4E-07
Dermal Contact with Sediment from Parcel B	2E-01	2E-02	2E-06	4E-07
TOTAL PATHWAY HAZARD INDEX/CANCER RISK:	**4E+00**	**2E+00**	**3E-05**	**2E-05**
Dermal Contact with Surface Water from Parcel C	3E-01	2E-01	5E-06	3E-06
Ingestion of Sediment from Parcel C	4E+00	8E-01	2E-04	4E-05
Dermal Contact with Sediment from Parcel C	3E+00	6E-01	1E-04	2E-05
TOTAL PATHWAY HAZARD INDEX/CANCER RISK:	**7E+00**	**2E+00**	**3E-04**	**6E-05**
FUTURE SCENARIO				
ADOLESCENT TRESSPASSER				
Ingestion of Surface Soil from Area A	8E-01	2E-01	3E-05	6E-06
Dermal Contact with Surface Soil from Area A	5E-01	1E-01	2E-05	4E-06
TOTAL PATHWAY HAZARD INDEX/CANCER RISK:	**1E+00**	**3E-01**	**5E-05**	**1E-05**
SITE WORKERS				
Ingestion of Surface Soil from Area A	7E-01	4E-01	1E-04	8E-06
Dermal Contact with Surface Soil from Area A	1E+00	3E-01	2E-04	1E-05
TOTAL PATHWAY HAZARD INDEX/CANCER RISK:	**2E+00**	**7E-01**	**3E-04**	**2E-05**
ngestion of Surface Soil from Area B	5E+00	3E+00	5E-04	4E-05
ermal Contact with Surface Soil from Area B	6E+00	2E+00	9E-04	6E-05
TOTAL PATHWAY HAZARD INDEX/CANCER RISK:	**1E+01**	**5E+00**	**1E-03**	**1E-04**

TABLE 7-38 (Continued)

SUMMARY OF HAZARD INDICES AND CANCER RISKS
LI TUNGSTEN SITE

EXPOSURE POPULATION AND PATHWAY	RME HAZARD INDEX	CENTRAL TENDENCY HAZARD INDEX	RME CANCER RISK	CENTRAL TENDENCY CANCER RISK
CHILD RESIDENT				
Ingestion of All Soils from Area A	8E+00	4E+00	3E-04	2E-04
Dermal Contact with All Soils from Area A	1E+00	5E-01	5E-05	3E-05
TOTAL PATHWAY HAZARD INDEX/CANCER RISK:	**9E+00**	**5E+00**	**3E-04**	**2E-04**
Ingestion of All Soils from Area B	1E+02	5E+01	3E-03	2E-03
Dermal Contact with All Soils from Area B	1E+01	5E+00	5E-04	3E-04
TOTAL PATHWAY HAZARD INDEX/CANCER RISK:	**1E+02**	**6E+01**	**3E-03**	**2E-03**
Ingestion of All Soils from Area B&C	3E+02	2E+02	1E-02	5E-03
Dermal Contact with All Soils from Area B&C	4E+01	2E+01	2E-03	1E-03
TOTAL PATHWAY HAZARD INDEX/CANCER RISK:	**4E+02**	**2E+02**	**1E-02**	**6E-03**
Ingestion of All Soils from Area C	2E+02	1E+02	5E-03	3E-03
Dermal Contact with All Soils from Area C	2E+01	1E+01	8E-04	2E-03
TOTAL PATHWAY HAZARD INDEX/CANCER RISK:	**3E+02**	**1E+02**	**6E-03**	**5E-03**
SITE WORKERS				
Ingestion of Groundwater	6E+01	6E+01	4E-03	4E-04
Dermal Contact with Groundwater	2E-01	2E-01	9E-06	1E-06
TOTAL PATHWAY HAZARD INDEX/CANCER RISK:	**6E+01**	**6E+01**	**4E-03**	**4E-04**
ADULT RESIDENT				
Ingestion of Groundwater	2E+02	2E+02	1E-02	2E-03
Dermal Contact with Groundwater	2E+00	2E+00	1E-04	3E-05
Inhalation of Chemicals Volatilized from Groundwater	4E-01	1E-01	4E-04	4E-05
TOTAL PATHWAY HAZARD INDEX/CANCER RISK:	**2E+02**	**2E+02**	**1E-02**	**2E-03**
CHILD RESIDENT				
Ingestion of Groundwater	4E+02	2E+02	6E-03	3E-03
Dermal Contact with Groundwater	3E+00	3E+00	4E-05	4E-05
Inhalation of Chemicals Volatilized from Groundwater	2E+00	7E-01	4E-04	1E-04
TOTAL PATHWAY HAZARD INDEX/CANCER RISK:	**4E+02**	**2E+02**	**7E-03**	**3E-03**

* Based on 30 year exposure, 6 year child exposure plus 24 year adult exposure.
** Based on 15 year exposure, 6 year child exposure plus 9 year adult exposure.

TABLE 7-38 (Continued)

SUMMARY OF HAZARD INDICES AND CANCER RISKS
LI TUNGSTEN SITE

EXPOSURE POPULATION AND PATHWAY	RME HAZARD INDEX	CENTRAL TENDENCY HAZARD INDEX	RME CANCER RISK		CENTRAL TENDENCY CANCER RISK	
Ingestion of Surface Soil from Area B&C	2E+01	1E+01	2E-03		2E-04	
Dermal Contact with Surface Soil from Area B&C	2E+01	1E-04	3E-03		2E-04	
TOTAL PATHWAY HAZARD INDEX/CANCER RISK:	**4E+01**	**1E+01**	**5E-03**		**4E-04**	
Ingestion of Surface Soil from Area C	6E+00	3E+00	4E-04		3E-05	
Dermal Contact with Surface Soil from Area C	5E+00	2E+00	7E-04		4E-05	
TOTAL PATHWAY HAZARD INDEX/CANCER RISK:	**1E+01**	**5E+00**	**1E-03**		**7E-05**	
CONSTRUCTION WORKER						
Ingestion of All Soils from Area A	7E-01	1E-01	4E-06		7E-07	
Dermal Contact with All Soils from Area A	1E-01	1E-02	8E-07		1E-07	
Inhalation of Respirable Particulates at Area A	2E+00	7E-01	2E-06		6E-07	
TOTAL PATHWAY HAZARD INDEX/CANCER RISK:	**3E+00**	**8E-01**	**7E-06**		**1E-06**	
Ingestion of All Soils from Area B	1E+01	2E+00	4E-05		7E-06	
Dermal Contact with All Soils from Area B	1E+00	1E-01	9E-06		1E-06	
Inhalation of Respirable Particulates at Area B	6E+01	2E+01	2E-05		7E-06	
TOTAL PATHWAY HAZARD INDEX/CANCER RISK:	**7E+01**	**2E+01**	**7E-05**		**2E-05**	
Ingestion of All Soils from Area B&C	3E+01	5E+00	2E-04		3E-05	
Dermal Contact with All Soils from Area B&C	5E+00	6E-01	3E-05		4E-06	
Inhalation of Respirable Particulates at Area B&C	9E+01	3E+01	8E-05		3E-05	
TOTAL PATHWAY HAZARD INDEX/CANCER RISK:	**1E+02**	**4E+01**	**3E-04**		**6E-05**	
Ingestion of All Soils from Area C	2E+01	3E+00	7E-05		1E-05	
Dermal Contact with All Soils from Area C	2E+00	3E-01	1E-05		1E-06	
Inhalation of Respirable Particulates at Area C	2E+01	7E+00	4E-05		1E-05	
TOTAL PATHWAY HAZARD INDEX/CANCER RISK:	**5E+01**	**1E+01**	**1E-04**		**2E-05**	
ADULT RESIDENT						
Ingestion of All Soils from Area A	8E-01	4E-01	4E-04	*	3E-04	**
Dermal Contact with All Soils from Area A	7E-01	4E-01	2E-04	*	7E-05	**
TOTAL PATHWAY HAZARD INDEX/CANCER RISK:	**2E+00**	**8E-01**	**6E-04**		**4E-04**	
Ingestion of All Soils from Area B	1E+01	5E+00	4E-03	*	3E-03	**
Dermal Contact with All Soils from Area B	7E+00	4E+00	2E-03	*	7E-04	**
TOTAL PATHWAY HAZARD INDEX/CANCER RISK:	**2E+01**	**9E+00**	**6E-03**		**4E-03**	
Ingestion of All Soils from Area B&C	3E+01	2E+01	1E-02	*	7E-03	**
Dermal Contact with All Soils from Area B&C	3E+01	2E+01	6E-03	*	2E-03	**
TOTAL PATHWAY HAZARD INDEX/CANCER RISK:	**6E+01**	**4E+01**	**2E-02**		**9E-03**	
estion of All Soils from Area C	3E+01	2E+01	7E-03	*	4E-03	**
Dermal Contact with All Soils from Area C	1E+01	5E+00	3E-03	*	3E-03	**
TOTAL PATHWAY HAZARD INDEX/CANCER RISK:	**4E+01**	**3E+01**	**1E-02**		**7E-03**	

TABLE 6

Summary of Cancer Risks

Radionuclides and Non-radioactive Chemicals

Li Tungsten Facility

TABLE 7- 39

SUMMARY OF CANCER RISKS: CHEMICAL AND RADIOLOGICAL
LI TUNGSTEN CORPORATION SITE

EXPOSURE POPULATION AND PATHWAY	CANCER RISK
CURRENT SCENARIO	
OFF-SITE ADULT RESIDENT	
Inhalation of respirable particulates (chemical)	1E-04
Inhalation of respirable particulates (radiological)	7.6E-05
TOTAL PATHWAY HAZARD INDEX/CANCER RISK:	**2E-04**
OFF-SITE CHILD RESIDENT	
Inhalation of respirable particulates (chemical)	1E-04
Inhalation of respirable particulates (radiological)	3.9E-06
TOTAL PATHWAY HAZARD INDEX/CANCER RISK:	**1E-04**
CURRENT AND FUTURE SCENARIOS	
ADOLESCENT TRESPASSERS	
Ingestion of surface soil from Area B (chemical)	1E-04
Dermal contact with surface soil from Area B (chemical)	1E-04
Ingestion of and external gamma from surface soil from Area B (radiological)	2.9E-05
TOTAL PATHWAY HAZARD INDEX/CANCER RISK:	**3E-04**
Ingestion of surface soil from Area B&C (chemical)	5E-04
Dermal contact with surface soil from Area B&C (chemical)	3E-04
Ingestion of and external gamma from surface soil from Area B&C (radiological)	4.8E-04
TOTAL PATHWAY HAZARD INDEX/CANCER RISK:	**1E-03**
Ingestion of surface soil from Area C (chemical)	1E-04
Dermal Contact of Surface Soil from Area C (chemical)	8E-05
Ingestion of and external gamma from Surface Soil from Area C (radiological)	2.9E-05
TOTAL PATHWAY HAZARD INDEX/CANCER RISK:	**2E-04**
Dermal contact with surface water from Parcel B (chemical)	3E-05
Ingestion of sediment from Parcel B (chemical)	2E-06
Dermal contact with sediment from Parcel B (chemical)	2E-06
Ingestion of and external gamma from sediment from Area B (radiological)	<background
TOTAL PATHWAY HAZARD INDEX/CANCER RISK:	**3E-05**
Dermal contact with surface water from Parcel C (chemical)	5E-06
Ingestion of sediment from Parcel C (chemical)	2E-04
Dermal contact with sediment from Parcel C (chemical)	1E-04
Ingestion of and external gamma from sediment from Area C (radiological)	2.1E-06
TOTAL PATHWAY HAZARD INDEX/CANCER RISK:	**3E-04**

TABLE 7- 39 (Continued)

SUMMARY OF CANCER RISKS: CHEMICAL AND RADIOLOGICAL
LI TUNGSTEN CORPORATION SITE

EXPOSURE POPULATION AND PATHWAY	CANCER RISK
FUTURE SCENARIO	
ADOLESCENT TRESSPASSER	
Ingestion of surface soil from Area A (chemical)	3E-05
Dermal contact with surface soil from Area A (chemical)	2E-05
Ingestion of and external gamma from surface soil from Area A (radiological)	2.5E-04
TOTAL PATHWAY HAZARD INDEX/CANCER RISK:	**3E-04**
SITE WORKERS	
Ingestion of surface soil from Area A (chemical)	1E-04
Dermal contact with surface soil from Area A (chemical)	2E-04
Ingestion of groundwater (chemical)	4E-03
Dermal contact with groundwater (chemical)	9E-06
Ingestion of and external gamma from surface soil from Area A (radiological)	7.5E-03
TOTAL PATHWAY HAZARD INDEX/CANCER RISK:	**1E-02**
Ingestion of surface soil from Area B (chemical)	5E-04
Dermal contact with surface soil from Area B (chemical)	9E-04
Ingestion of groundwater (chemical)	4E-03
Dermal contact with groundwater (chemical)	9E-06
Ingestion of and external gamma from surface soil from Area B (radiological)	9.2E-04
TOTAL PATHWAY HAZARD INDEX/CANCER RISK:	**6E-03**
Ingestion of surface soil from Area B&C (chemical)	2E-03
Dermal contact with surface soil from Area B&C (chemical)	3E-03
Ingestion of groundwater (chemical)	4E-03
Dermal contact with groundwater (chemical)	9E-06
Ingestion of and external gamma from surface soil from Area B&C (radiological)	1.5E-02
TOTAL PATHWAY HAZARD INDEX/CANCER RISK:	**2E-02**
Ingestion of surface soil from Area C (chemical)	4E-04
Dermal contact of surface soil from Area C (chemical)	7E-04
Ingestion of groundwater (chemical)	4E-03
Dermal contact with groundwater (chemical)	9E-06
Ingestion of and external gamma from surface soil from Area C (radiological)	9.7E-04
TOTAL PATHWAY HAZARD INDEX/CANCER RISK:	**6E-03**

TABLE 7- 39 (Continued)

SUMMARY OF CANCER RISKS: CHEMICAL AND RADIOLOGICAL
LI TUNGSTEN CORPORATION SITE

EXPOSURE POPULATION AND PATHWAY	CANCER RISK	
CONSTRUCTION WORKER		
Ingestion of all soils from Area A (chemical)	4E-06	
Dermal contact with all soils from Area A (chemical)	8E-07	
Inhalation of respirable particulates at Area A (chemical)	2E-06	
Ingestion of, external gamma from, and inhalation of respirable particulates from all soils from Area A (radiological)	1.8E-05	
TOTAL PATHWAY HAZARD INDEX/CANCER RISK:	**2E-05**	
Ingestion of all soils from Area B (chemical)	4E-05	
Dermal contact with all soils from Area B (chemical)	9E-06	
Inhalation of respirable particulates at Area B (chemical)	2E-05	
Ingestion of, external gamma from, and inhalation of respirable particulates from all soils from Area B (radiological)	4.5E-06	
TOTAL PATHWAY HAZARD INDEX/CANCER RISK:	**8E-05**	
Ingestion of all soils from Area B&C (chemical)	2E-04	
Dermal contact with all soils from Area B&C (chemical)	3E-05	
Inhalation of respirable particulates at Area B&C (chemical)	8E-05	
Ingestion of, external gamma from, and inhalation of respirable particulates from all soils from Area B&C (radiological)	3.8E-05	
TOTAL PATHWAY HAZARD INDEX/CANCER RISK:	**3E-04**	
Ingestion of all soils from Area C (chemical)	7E-05	
Dermal contact with all soils from Area C (chemical)	1E-05	
Inhalation of respirable particulates at Area C (chemical)	4E-05	
Ingestion of, external gamma from, and inhalation of respirable particulates from all soils from Area C (radiological)	3.8E-06	
TOTAL PATHWAY HAZARD INDEX/CANCER RISK:	**1E-04**	
ADULT RESIDENT		
Ingestion of all soils from Area A (chemical)	4E-04	*
Dermal contact with all soils from Area A (chemical)	2E-04	*
Ingestion of groundwater (chemical)	1E-02	
Dermal contact with groundwater (chemical)	1E-04	
Inhalation of chemicals volatilized from groundwater (chemical)	4E-04	
Ingestion, external gamma, produce ingestion, radon from soil at Area A and groundwater ingestion (radiological)	4.8E-03	
TOTAL PATHWAY HAZARD INDEX/CANCER RISK:	**2E-02**	
Ingestion of all soils from Area B (chemical)	4E-03	*
Dermal contact with all soils from Area B (chemical)	2E-03	*
Ingestion of groundwater (chemical)	1E-02	
Dermal contact with groundwater (chemical)	1E-04	
Inhalation of chemicals volatilized from groundwater (chemical)	4E-04	
Ingestion, external gamma, produce ingestion, radon from soil at Area B and groundwater ingestion (radiological)	1.4E-03	
TOTAL PATHWAY HAZARD INDEX/CANCER RISK:	**2E-02**	
Ingestion of all soils from Area B&C (chemical)	1E-02	*
Dermal contact with all soils from Area B&C (chemical)	6E-03	*
Ingestion of groundwater (chemical)	1E-02	
Dermal contact with groundwater (chemical)	1E-04	
Inhalation of chemicals volatilized from groundwater (chemical)	4E-04	
Ingestion, external gamma, produce ingestion, radon from soil at Area B&C and groundwater ingestion (radiological)	1.2E-02	
TOTAL PATHWAY HAZARD INDEX/CANCER RISK:	**5E-02**	

TABLE 7- 39 (Continued)

SUMMARY OF CANCER RISKS: CHEMICAL AND RADIOLOGICAL
LI TUNGSTEN CORPORATION SITE

EXPOSURE POPULATION AND PATHWAY	CANCER RISK	
Ingestion of all soils from Area C (chemical)	7E-03	*
Dermal contact with all soils from Area C (chemical)	3E-03	*
Ingestion of groundwater (chemical)	1E-02	
Dermal contact with groundwater (chemical)	1E-04	
Inhalation of chemicals volatilized from groundwater (chemical)	4E-04	
Ingestion, external gamma, produce ingestion, radon from soil at Area C and groundwater ingestion (radiological)	1.3E-03	
TOTAL PATHWAY HAZARD INDEX/CANCER RISK:	**2E-02**	
CHILD RESIDENT		
Ingestion of all soils from Area A (chemical)	3E-04	
Dermal contact with all soils from Area A (chemical)	5E-05	
Ingestion of groundwater (chemical)	6E-03	
Dermal contact with groundwater (chemical)	4E-05	
Inhalation of chemicals volatilized from groundwater (chemical)	4E-04	
Ingestion, external gamma, produce ingestion, radon from soil at Area A and groundwater ingestion (radiological)	9.5E-04	
TOTAL PATHWAY HAZARD INDEX/CANCER RISK:	**8E-03**	
Ingestion of all soils from Area B (chemical)	3E-03	
Dermal contact with all soils from Area B (chemical)	5E-04	
Ingestion of groundwater (chemical)	6E-03	
Dermal contact with groundwater (chemical)	4E-05	
Inhalation of chemicals volatilized from groundwater (chemical)	4E-04	
Ingestion, external gamma, produce ingestion, radon from soil at Area B and groundwater ingestion (radiological)	2.7E-04	
TOTAL PATHWAY HAZARD INDEX/CANCER RISK:	**1E-02**	
Ingestion of all soils from Area B&C (chemical)	1E-02	
Dermal contact with all soils from Area B&C (chemical)	2E-03	
Ingestion of groundwater (chemical)	6E-03	
Dermal contact with groundwater (chemical)	4E-05	
Inhalation of chemicals volatilized from groundwater (chemical)	4E-04	
Ingestion, external gamma, produce ingestion, radon from soil at Area B&C and groundwater ingestion (radiological)	2.3E-03	
TOTAL PATHWAY HAZARD INDEX/CANCER RISK:	**2E-02**	
Ingestion of all soils from Area C (chemical)	5E-03	
Dermal contact with all soils from Area C (chemical)	8E-04	
Ingestion of groundwater (chemical)	6E-03	
Dermal contact with groundwater (chemical)	4E-05	
Inhalation of chemicals volatilized from groundwater (chemical)	4E-04	
Ingestion, external gamma, produce ingestion, radon from soil at Area C and groundwater ingestion (radiological)	2.6E-04	
TOTAL PATHWAY HAZARD INDEX/CANCER RISK:	**1E-02**	

* Based on 30 year exposure, 6 year child exposure plus 24 year adult exposure.

TABLE 7

Summary of Hazard Indices and Cancer Risks

Non-radioactive Chemicals

Captain's Cove Property

TABLE 5-4

COMPARISON OF CANCER RISKS AND HAZARD INDICES
CAPTAIN'S COVE

EXPOSURE POPULATION AND PATHWAY	RME CANCER RISK		CENTRAL TENDENCY CANCER RISK		RME HAZARD INDEX	CENTRAL TENDENCY HAZARD INDEX
FUTURE SCENARIO						
SITE WORKERS						
Ingestion of Surface Soil from Area A	2E-05		2E-06		5E-01	3E-01
Dermal Contact with Surface Soil from Area A	6E-05		4E-06		1E+00	4E-01
TOTAL PATHWAY HAZARD INDEX/CANCER RISK:	**8E-05**		**5E-06**		**2E+00**	7E-01
Ingestion of Surface Soil from Area G	2E-06		1E-07		1E-02	6E-03
Dermal Contact with Surface Soil from Area G	3E-06		2E-07		2E-02	8E-03
TOTAL PATHWAY HAZARD INDEX/CANCER RISK:	**5E-06**		**4E-07**		**3E-02**	**1E-02**
CONSTRUCTION WORKER						
Ingestion of All Soils from Area A	7E-05		1E-05		2E+01	3E+00
Dermal Contact with All Soils from Area A	1E-05		2E-06		2E+00	3E-01
Inhalation of Respirable Particulates at Area A	4E-05		1E-05		9E+01	3E+01
TOTAL PATHWAY HAZARD INDEX/CANCER RISK:	**1E-04**		**2E-05**		**1E+02**	**3E+01**
Ingestion of All Soils from Area G	9E-06		1E-06		1E+01	2E+00
Dermal Contact with All Soils from Area G	2E-06		2E-07		7E-01	9E-02
Inhalation of Respirable Particulates at Area G	4E-06		1E-06		9E+02	3E+02
TOTAL PATHWAY HAZARD INDEX/CANCER RISK:	**2E-05**		**3E-06**		**9E+02**	3E+02
ADULT RESIDENT						
Ingestion of All Soils from Area A	7E-03	*	3E-03	**	2E+01	0E+00
Dermal Contact with All Soils from Area A	3E-03	*	6E-04	**	1E+01	0E+00
TOTAL PATHWAY HAZARD INDEX/CANCER RISK:	**9E-03**		**3E-03**		**3E+01**	**0E+00**
Ingestion of All Soils from Area G	9E-04	*	3E-04	**	2E+01	0E+00
Dermal Contact with All Soils from Area G	4E-04	*	3E-04	**	4E+00	0E+00
TOTAL PATHWAY HAZARD INDEX/CANCER RISK:	**1E-03**		**6E-04**		**2E+01**	**0E+00**
CHILD RESIDENT						
Ingestion of All Soils from Area A	5E-03		2E-03		2E+02	9E+01
Dermal Contact with All Soils from Area A	7E-04		4E-04		2E+01	1E+01
TOTAL PATHWAY HAZARD INDEX/CANCER RISK:	**5E-03**		**3E-03**		**2E+02**	**1E+02**
Ingestion of All Soils from Area G	6E-04		3E-04		2E+02	8E+01
Dermal Contact with All Soils from Area G	1E-04		5E-05		7E+00	3E+00
TOTAL PATHWAY HAZARD INDEX/CANCER RISK:	**7E-04**		**4E-04**		**2E+02**	**8E+01**

TABLE 5-4 (Continued)

COMPARISON OF CANCER RISKS AND HAZARD INDICES
CAPTAIN'S COVE

EXPOSURE POPULATION AND PATHWAY	RME CANCER RISK	CENTRAL TENDENCY CANCER RISK	RME HAZARD INDEX	CENTRAL TENDENCY HAZARD INDEX
SITE WORKERS				
Ingestion of Groundwater	6E-02	7E-03	4E+02	4E+02
Dermal Contact with Groundwater	4E-05	5E-06	2E-01	2E-0*
TOTAL PATHWAY HAZARD INDEX/CANCER RISK:	**6E-02**	**7E-03**	**4E+02**	**4E+**
ADULT RESIDENT				
Ingestion of Groundwater	2E-01	4E-02	1E+03	1E+03
Dermal Contact with Groundwater	5E-04	1E-04	3E+00	3E+00
Inhalation of Chemicals Volatilized from Groundwater	4E-08	4E-09	4E+01	1E+01
TOTAL PATHWAY HAZARD INDEX/CANCER RISK:	**2E-01**	**4E-02**	**1E+03**	**1E+03**
CHILD RESIDENT				
Ingestion of Groundwater	9E-02	5E-02	2E+03	1E+03
Dermal Contact with Groundwater	2E-04		4E+00	
Inhalation of Chemicals Volatilized from Groundwater	4E-08	1E-08	2E+02	6E+01
TOTAL PATHWAY HAZARD INDEX/CANCER RISK:	**9E-02**	**5E-02**	**3E+03**	**1E+03**

* Based on 30 year exposure, 6 year child exposure plus 24 year adult exposure.
** Based on 15 year exposure, 6 year child exposure plus 9 year adult exposure.

TABLE 8

Summary of Cancer Risks

Radionuclides and Non-radioactive Chemicals

Captain's Cove Property

TABLE 5-5

SUMMARY OF CANCER RISKS: RADIOLOGICAL AND CHEMICAL
CAPTAIN'S COVE

EXPOSURE POPULATION AND PATHWAY	CANCER RISK
CURRENT AND FUTURE SCENARIOS	
ADOLESCENT TRESPASSERS	
Ingestion of surface soil from Area A (chemical)	7E-06
Dermal contact with surface soil from Area A (chemical)	6E-06
Ingestion of and external gamma from surface soil from Area A (radiological)	5.9E-06
TOTAL PATHWAY HAZARD INDEX/CANCER RISK:	**2E-05**
Ingestion of surface soil from Area G (chemical)	5E-07
Dermal contact with surface soil from Area G (chemical)	4E-07
Ingestion of and external gamma from surface soil from Area G (radiological)	1.2E-06
TOTAL PATHWAY HAZARD INDEX/CANCER RISK:	**2E-06**
Dermal contact with surface water from the Retention Ponds and low area (chemical)	7E-08
Ingestion of sediment from the Retention Ponds (chemical)	1E-06
Dermal contact with sediment from the Retention Ponds (chemical)	N/A
Ingestion of and external gamma from sediment from Area B (radiological)	N/A
TOTAL PATHWAY HAZARD INDEX/CANCER RISK:	**1E-06**
FUTURE SCENARIOS	
SITE WORKERS	
Ingestion of surface soil from Area A (chemical)	2E-05
Dermal contact with surface soil from Area A (chemical)	6E-05
Ingestion of groundwater (chemical)	6E-02
Dermal contact with groundwater (chemical)	4E-05
Ingestion of and external gamma from surface soil from Area A and groundwater ingestion (radiological)	1.8E-04
TOTAL PATHWAY HAZARD INDEX/CANCER RISK:	**6E-02**
Ingestion of surface soil from Area G (chemical)	2E-06
Dermal contact with surface soil from Area G (chemical)	3E-06
Ingestion of groundwater (chemical)	6E-02
Dermal contact with groundwater (chemical)	4E-05
Ingestion of and external gamma from surface soil from Area G (radiological)	3.6E-05
TOTAL PATHWAY HAZARD INDEX/CANCER RISK:	**6E-02**
CONSTRUCTION WORKER	
Ingestion of all soils from Area A (chemical)	7E-05
Dermal contact with all soils from Area A (chemical)	1E-05
Inhalation of respirable particulates at Area A (chemical)	4E-05
Ingestion of, external gamma from, and inhalation of respirable particulates from all soils from Area A (radiological)	1.4E-04
TOTAL PATHWAY HAZARD INDEX/CANCER RISK:	**3E-04**
Ingestion of all soils from Area G (chemical)	9E-06
Dermal contact with all soils from Area G (chemical)	2E-06
Inhalation of respirable particulates at Area G (chemical)	4E-06
Ingestion of, external gamma from, and inhalation of respirable particulates from all soils from Area G (radiological)	1.5E-04
TOTAL PATHWAY HAZARD INDEX/CANCER RISK:	**2E-04**

TABLE 5-5 (Continued)

SUMMARY OF CANCER RISKS: CHEMICAL AND RADIOLOGICAL
CAPTAIN'S COVE

EXPOSURE POPULATION AND PATHWAY	CANCER RISK	
ADULT RESIDENT		
Ingestion of all soils from Area A (chemical)	7E-03	*
Dermal contact with all soils from Area A (chemical)	3E-03	*
Ingestion of groundwater (chemical)	2E-01	
Dermal contact with groundwater (chemical)	5E-04	
Inhalation of chemicals volatilized from groundwater (chemical)	4E-08	
Ingestion, external gamma, produce ingestion, radon from soil at Area A and groundwater ingestion (radiological)	1.3E-01	
TOTAL PATHWAY HAZARD INDEX/CANCER RISK:	**3E-01**	
Ingestion of all soils from Area G (chemical)	9E-04	*
Dermal contact with all soils from Area G (chemical)	4E-04	*
Ingestion of groundwater (chemical)	2E-01	
Dermal contact with groundwater (chemical)	5E-04	
Inhalation of chemicals volatilized from groundwater (chemical)	4E-08	
Ingestion, external gamma, produce ingestion, radon from soil at Area G and groundwater ingestion (radiological)	1.1E-01	
TOTAL PATHWAY HAZARD INDEX/CANCER RISK:	**3E-01**	
CHILD RESIDENT		
Ingestion of all soils from Area A (chemical)	5E-03	
Dermal contact with all soils from Area A (chemical)	7E-04	
Ingestion of groundwater (chemical)	9E-02	
Dermal contact with groundwater (chemical)	2E-04	
Inhalation of chemicals volatilized from groundwater (chemical)	4E-08	
Ingestion, external gamma, produce ingestion, radon from soil at Area A and groundwater ingestion (radiological)	3.1E-02	
TOTAL PATHWAY HAZARD INDEX/CANCER RISK:	**1E-01**	
Ingestion of all soils from Area G (chemical)	6E-04	
Dermal contact with all soils from Area G (chemical)	1E-04	
Ingestion of groundwater (chemical)	9E-02	
Dermal contact with groundwater (chemical)	2E-04	
Inhalation of chemicals volatilized from groundwater (chemical)	4E-08	
Ingestion, external gamma, produce ingestion, radon from soil at Area G and groundwater ingestion (radiological)	2.4E-02	
TOTAL PATHWAY HAZARD INDEX/CANCER RISK:	**1E-01**	

* Based on 30 year exposure, 6 year child exposure plus 24 year adult exposure.

TABLE 9

Parameter (In Soil)	Cleanup Levels
Arsenic	24 mg/kg
Lead	400 mg/kg
Thorium-232	5 pCi/g [1]
Radium-226	5 pCi/g [1]

[1] These cleanup levels do not include the natural background radiation of each radionuclide i.e., appproximately 1 pCi/g.

TABLE 10

Soil Alternative	Capital	Annual O&M	Present-Worth 30 Year
LS-1/CS-1	0	0	0
LS-2/CS-2	$32,219,000	0	$32,219,000
LS-3/CS-3	$23,011,000	$120,000	$26,166,000
LS-4/CS-4	$28,042,000	0	$28,042,000

TABLE 11

GroundwaterAlternative	Capital	Annual O&M	Present-Worth 30 Year
LW-1	0	$32,000	$722,000
LW-2	$351,000	$84,000	$2,247,000
LW-3	$208,000	$47,000	$1,269,000
LW-4	$644,000	29,000	$1,299,000

TABLE 12

Applicable or Relevant and Appropriate Requirements

and

Other Criteria To Be Considered

Chemical Specific ARARs
Table 2-6

REGULATORY LEVEL	ARAR IDENTIFICATION	STATUS	REQUIREMENT SYNOPSIS	FS CONSIDERATION
Federal	40 CFR, Part 268.35 Waste specific prohibitions-Third Third wastes	Relevant and appropriate	Debris contaminated with any characteristic hazardous waste for which treatment standards are established are prohibited from land disposal.	Debris is defined as nonfriable inorganic solids or metal that are incapable of passing through a 9.5 mm standard sieve that require cutting, crushing and grinding in mechanical sizing equipment.
Federal	40 CFR, Part 268.40 Treatment Standards found in Table 1 in 40 CFR Part 261.24	Relevant and appropriate	Hazardous constituents in hazardous waste or in treated residue must be at or below the values found in the table ("total waste standards) for that waste and the extract of treated residue must be at or below the values found in the "waste extract standards" and the waste must be treated using specified technology.	Technology standards or an equivalent treatment technology approved by the administrator exists for wastes prior to land disposal.
Federal	40 CFR, Part 268	Relevant and appropriate	Land Disposal Restrictions (LDRs) identifies hazardous wastes that are restricted from land disposal and defines the limited circumstances under which an otherwise prohibited waste may be land disposed.	Soils and sediments removed for off-site disposal may contain inorganic contaminants at concentrations which trigger LDRs.
Federal	40 CFR, Part 262	Relevant and appropriate	Standards Applicable to generators of hazardous waste	Some remedial actions will generate hazardous waste for treatment and disposal.
Federal	40 CFR, Part 263	Relevant and appropriate	Standards applicable to transporters of hazardous waste	Some remedial actions require transportation and off-site disposal of hazardous wastes.

Chemical Specific ARARs
Table 2-6

REGULATORY LEVEL	ARAR IDENTIFICATION	STATUS	REQUIREMENT SYNOPSIS	FS CONSIDERATION
Federal	Application of Subtitle D to Mining Waste	To be Considered	If materials to be disposed of are determined to be a RCRA hazardous waste, they may be subject to control under Subtitle C	Some remedial actions may require fully compliance with RCRA hazardous waste disposal requirements under Subtitle C if determined to be mining wastes.
Federal	Joint NRC/EPA Guidance on Testing Requirements for Mixed Waste	To be Considered	Used to determine the wastes' RCRA hazard status and LDR sampling requirements. Mixed waste must comply with both AEA and RCRA statutes and regulations (AEA takes precedence where there is inconsistency between the two laws)	Testing requirements must be considered in developing sampling programs for mixed wastes.

Location Specific ARARs
Table 2-7

REGULATORY LEVEL	ARAR IDENTIFICATION	STATUS	REQUIREMENT SYNOPSIS	FS CONSIDERATION
Federal	40 CFR Part 261, RCRA Section 3001 (b) (3) (c)	Relevant and appropriate	Regulatory determination for solid waste from the extraction and beneficiation of ores and minerals	This section of RCRA requires Administrator to determine whether to promulgate regulations under Subtitle C of the Act for these wastes or to determine that such regulations are unwarranted
Federal	Wetlands	Relevant and appropriate	Functional assessment and impacts mitigation	Some remedial actions may disturb the three wetand areas identified on Parcel B and C.
Federal	Floodplains Assessment	Relevant and appropriate	Must be developed if remedial action impact flood plains.	Assessment of the remedial action's impacts on the floodplain as well as recommending appropriate measures to protect the remedy against a potential flood event
Federal	Cultural Resources	Relevant and appropriate	Determination whether the sites are sensitive for the presence of potentially significant cultural resources-	NB still working on their comments as of 1/98
Federal	Endangered Species	Relevant and appropriate	Regulations for the protection of endangered species.	No further action required as indicated by USEPA, Region II.
Federal	Coastal Zone	Relevant and appropriate	Evaluation must be conducted to evaluate any proposed remedial actions	Impacts to coastal zones must be evaluated for some remedial actions.

Action Specific ARARs
Table 2-8

REGULATORY LEVEL	ARAR IDENTIFICATION	STATUS	REQUIREMENT SYNOPSIS	FS CONSIDERATION
Federal	40 CFR, Part 268.35 Waste specific prohibitions-Third third wastes	Relevant and appropriate	Debris contaminated with any characteristic waste for which treatment standards are established are prohibited from land disposal.	Debris is defined as nonfriable inorganic solids or metal that are incapable of passing through a 9.5 mm standard sieve that require cutting, crushing and grinding in mechanical sizing equipment.
Federal	40 CFR, Part 268	Relevant and appropriate	Land Disposal Restrictions (LDRs) identifies hazardous wastes that are restricted from land disposal and defines the limited circumstances under which an otherwise prohibited waste may be land disposed.	LDRs contain requirements for testing, treatment, storage, notification, certification of compliance, variances and record keeping. Wastes may be excluded from the ban under select circumstances defined in 40 CFR Part 268
Federal	40 CFR 192	Relevant and appropriate	Standards for the disposal and control of uranium and thorium tailings. Requires excavation of soil with radium concentrations (sum of ^{228}Th and ^{232}Th) greater than 5 pCi/g over the first 15 cm below the surface and 15 pCi/g in subsequent subsurface soils (over areas >100 square meters). *Provides radon progeny standard for exposure of 0.02 WL*	These standards provide guidelines for the remediation /excavation of materials contaminated with the ROPC
Federal	40 CFR 50	Relevant and Appropriate	Defines levels of air quality to protect the public health and welfare from any known or anticipated adverse effects of a pollutant.	Provides ambient air quality standards during remediation.

Action Specific ARARs
Table 2-8

REGULATORY LEVEL	ARAR IDENTIFICATION	STATUS	REQUIREMENT SYNOPSIS	FS CONSIDERATION
Federal	49 CFR 173 Hazardous Materials Transportation Act	Applicable	Requirements for the transportation of hazardous and radioactive materials. Radioactive materials defined as: (1) Material having a specific activity greater than 0.002 micro-Curie per gram (uCi/g) (2) Low Specific Activity (LSA) material-uranium or thorium ores and nonradioactive material externally contaminated with no more than 0.1 uCi per square cm.	Some remedial actions require the off-site disposal of hazardous and radioactive materials.
Federal	49 CFR 173.411-423	Applicable	Outlines specific packing requirements for LSA materials.	For remedial action alternatives involving off-site shipment, a single shipment must not exceed 2,000 pCi/g for total radioactivity concentration.
Federal	OSHA - General Industry Standards (29 CFR 1910)	Applicable	These regulations specify the 8-hour time-weighted average concentration for worker exposure to various organic compounds. Training requirements for workers at hazardous waste operations are specified in 29 CFR 1910.120	These regulations are applicable during remedial actions during construction of facilities for soil and groundwater remediation at the Li Tungsten and Captain's Cove Adjunct sites.

Action Specific ARARs
Table 2-8

REGULATORY LEVEL	ARAR IDENTIFICATION	STATUS	REQUIREMENT SYNOPSIS	FS CONSIDERATION
Federal	CWA Water Quality Criteria (WQC) for Protection of Human Health and Aquatic Lifes	To Be Considered	Contaminant levels regulated by WQC are provided to protect human health for exposure from drinking water and from consuming aquatic organisms (primary fish) and from fish consumption alone.	WQC are also relevant and appropriate to evalute surface water discharge acceptability.
Federal	RCRA 3004 (f), (g), and (m) 40 CFR Parts 148 & 268.2 established under the Hazardous and Solid Waste Amendments (HSWA)	Relevant and Appropriate	Hazardous waste to be injected is subject to land ban regulations. Treated groundwater that meets the definition of hazardous waste and is to be injected also is subject to land ban regulations. Groundwater contamination with restricted RCRA hazardous waste, which is extracted must meet the best demonstrated available technology (BDAT) identified for that waste under the RCRA CDRs prior to each reinjection, in a pump-and-treat reinjection remediation system.	Groundwater remediation alternatives under consideration include options for withdrawal and reinjection of treated groundwater. Treated groundwater that meets the definition of hazardous waste and is to be injected also is subject to land ban regulations.
State	NY TOGS 2.1.2 April 1987	To be Considered	Provides standards for reinjection of treated groundwater. References the application NY effluent limitation for discharge of treated groundwater, 6 NYCRR 703.6. Groundwater to be treated to drinking water standards prior to reinjection.	Standards for pump and treat groundwater alternatives and application of NY effluent limitations for discharge of treated groundwater.

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Action Specific ARARs
Table 2-8

REGULATORY LEVEL	ARAR IDENTIFICATION	STATUS	REQUIREMENT SYNOPSIS	FS CONSIDERATION
State	NYSDEC, Division of Hazardous Waste Remediation - Technical and Administrative Guidance Memorandum (TAGM): Determination of Soil Cleanup Objectives and Cleanup Levels	To be Considered	Provides the basis and procedures to determine soil cleanup levels at State Superfund Sites	Provides soil cleanup objectives for consideration in the development of soil cleanup levels for nonradioactive contaminants.
State	NYSDEC - Technical Guidance for Screening Contaminated Sediments	To be Considered	Provides methodology used by the Division of Fish and Wildlife to establish sediment criteria to identify contaminated sediments.	Provides guidance values to identify contaminated sediments.

Action Specific ARARs
Table 2-8

REGULATORY LEVEL	ARAR IDENTIFICATION	STATUS	REQUIREMENT SYNOPSIS	FS CONSIDERATION
State	NY TOGS 1.1.1 June 1998	To be Considered	Provides contaminant levels guidance for discharge of treated groundwater.	Provides discharge standards of treated groundwater.
Federal	40 CFR 144.12, 144.13, 144.16, 144.28, 144.51, 14.55, 40 CFR 144.55	Relevant and Appropriate	Provides criteria for reinjection of treated groundwater.	Criteria for remedial action alternatives involving pump and treat of groundwater at the Li Tungsten site.
Federal	40 CFR 147	Relevant and Appropriate	Provides requirements to comply with state underground injection.	On-site injection of treated groundwater must comply with state requirements.
Federal	40 CFR 148.20	To be Considered	The injection of a restricted hazardous waste from mineral processing into an injection well should submit a petition to the administrator demonstrating that there will be no migration of hazardous constituents under the injection zone.	Remedial action alternatives involving the injection of treated groundwater into injection wells will consider this criteria.
State	6 NYCRR Groundwater Quality Standards Part 703.5	Applicable	Provide quality standards for groundwater. Certain contaminant levels are specified.	Remedial action alternatives for groundwater must meet the quality standards specified under 6 NYCRR, Part 703.5.
State	New York State Air Guidelines for Control of Toxins (Air Guide-1)	Applicable	Provides NYSDEC guidelines for ambient air concentrations for individual compounds.	Provides ambient air quality guidance values during remediation.

Action Specific ARARs
Table 2-8

REGULATORY LEVEL	ARAR IDENTIFICATION	STATUS	REQUIREMENT SYNOPSIS	FS CONSIDERATION
Federal	40 CFR 122.44	Relevant and Appropriate	Requires to use best available technology (BAT) to control toxic and nonconventional pollutants; use of best conventional pollutant control technology (BCT) for conventional pollutants. Technology-based limitations may be determined on a case-by-case basis.	Remedial action alternatives require the best available technology to control toxic and nonconventional pollutants.
Federal	40 CFR 12.100 and 40 CFR 125.104	Relevant and Appropriate	Requires to develop and implement a Best Management Practices program to prevent the release of toxic constituents to surface water.	Since portions of the Li Tungsten and Captain's Cove Adjunct sites border bodies, a Best management Practice Program will need to be implemented to prevent the release of toxic constituents.
Federal	40 CFR 136.1-136.4	Relevant and Appropriate	Approved test methods for waste constituents to be monitored must be followed. Detailed requirements for analytical procedures and quality controls are provided. Samples preservation procedures, container materials and maximum allowable holding times are prescribed.	Analytical samples collected and analyzed for remedial action of soils and groundwater must follow approved test methods and quality control procedures. Applicable to confimration of post-remediation sampling and long-term groundwater monitoring.

Action Specific ARARs
Table 2-8

REGULATORY LEVEL	ARAR IDENTIFICATION	STATUS	REQUIREMENT SYNOPSIS	FS CONSIDERATION
Federal	40 CFR 61	Relevant and Appropriate	Provides radionuclides exposure standard of 10 mrem/yr to maximally exposed member of public	Provides emissions standards during remediation
State	Naturally Occurring Radioactive Material (NORM)	Applicable	Waste materials including soil and/or building materials are analyzed for chemically hazardous constituents (as defined by RCRA regulations)	RCRA disposal requirements would be ARARs if the waste disposed contains both chemical constituents at hazardous levels (as defined by RCRA)
State	6 NYCRR Parts 200, 201, 211, and 257	Applicable	Criteria to prevent air pollution. Requirements of owners and/or operators of air contamination sources. Provides ambient air quality standards.	Provides ambient air quality protection requiements and guidelines during remediation efforts.
State	6 NYCRR Parts 360 and 364	Applicable	Outline requirements of solid and hazardous waste mangement facilities and transporters for managing radioactive/hazardous materials.	For management of radioactive/hazardous waste generated during the remediation efforts (which includes on-site treatment).
State	New York Hazardous Waste Treatment, Storage and Disposal Facility Permitting Requirements (6 NYCRR 370 and 373)	Relevant and Appropriate	This regulation outlines general waste facility requirements, outline general waste analyses, security measures, inspections and training requirements.	These requirments must be considered for on-site landfill alternatives.

Chemical Specific ARARs
Table 2-6

REGULATORY LEVEL	ARAR IDENTIFICATION	STATUS	REQUIREMENT SYNOPSIS	FS CONSIDERATION
Federal	40 CFR, Part 264	Relevant and appropriate	Standards for owners and operators of hazardous waste treatment, storage and disposal facilities are applicable to any on-site units that treat, store, or dispose of RCRA listed or characteristic hazardous wastes	Some remedial alternatives include options which depend on on-site disposal of inorganic contaminated waste.
Federal	OSWER Off-site Policy Directive Number 98934.11	Relevant and appropriate	This ensures that facilities authorized to CERCLA generated wastes comply with RCRA operating standards	Some remedial action alternatives include options for off-site disposal.
Federal	40 CFR Part 264	Relevant and appropriate	Offsite units that treat, store or dispose of RCRA listed or characteristic wastes. Regulations address groundwater and closure.(Subpt F & G)	Some remedial action alternatives include options which depend on on-site disposal of contaminated waste. Groundwater will require monitoring for remedial action alternatives.
Federal	40 CFR Part 265, subparts I & J	Relevant and appropriate	Defines time frame wastes may be stored on-site. The date on which the accumulation began must be clearly indicated on each container/ tank.	Some remedial action alternatives will require the temporary storage of hazardous wastes on-site prior to transfer or on-site disposal.
Federal	40 CFR 141 Safe Drinking Water Act (SDWA) Maximum Contaminant Levels (MCLs)	Relevant and Appropriate	Provides standards for the protection of drinking water.	The promulgated values are included in the SDWA MCLs. The standards are compared with the maximum contaminant levels at the Li Tungsten and Captain's Cove Adjunct Sites.

TABLE 13

Detailed Cost Estimate of Selected Remedy

Alternative LS-4/CS-4	
1) Soil Excavation	$238,700
2) Volume Reduction[1]	$2,996,000
3) Load Radioactive Soil for Disposal	$65,300
4) Transportation of Radioactive Soil[2]	$6,113,000
5) Disposal of Radioactive Soil	$5,093,000
6) Load Non-Radioactive Soil for Disposal	$119,000
7) Transportation/Disposal of Non-radioactive Soil[3]	$5,805,000
8) Building Demolition	$212,000
9) Storm sewer drains/sumps	$30,000
10) Surface Water Remediation	$100,000
SUB TOTAL	**$20,772,000**
8) Engineering @10%	$2,077,200
9) Construction Management @ 10%	$2,077,200
10) Contingencies @ 15%	$3,115,800
SOIL TOTAL CAPITAL COST	**$28,042,200**
11) Annual O&M	0
SOIL TOTAL PRESENT WORTH	**$28,042,200**
Alternative LW-1	
1) First year Sampling/Analytical Program	$104,000
GROUNDWATER TOTAL CAPITAL COST	**$104,000**
2) Annual O&M	$32,000
GROUNDWATER TOTAL PRESENT WORTH	**$722,000**

APPENDIX III

Administrative Record Index

LI TUNGSTEN CORP SITE
ADMINISTRATIVE RECORD FILE
INDEX OF DOCUMENTS

1.0 SITE IDENTIFICATION

1.2 Notification/Site Inspection Reports

P. 100001-100487 Report: Final Draft Site Inspection Report, Li Tungsten Corp Site, Glen Cove, New York, Volume I of V, prepared by NUS Corporation, Superfund Division, prepared for the Environmental Services Division, U.S. EPA, September 28, 1990.

P. 100488-100919 Report: Final Draft Site Inspection Report, Li Tungsten Corp Site, Glen Cove, New York, Volume II of V, prepared by NUS Corporation, Superfund Division, prepared for the Environmental Services Division, U.S. EPA, September 28, 1990.

P. 100920-101231 Report: Final Draft Site Inspection Report, Li Tungsten Corp Site, Glen Cove, New York, Volume III of V, prepared by NUS Corporation, Superfund Division, prepared for the Environmental Services Division, U.S. EPA, September 28, 1990.

P. 101232-101636 Report: Final Draft Site Inspection Report, Li Tungsten Corp Site, Glen Cove, New York, Volume IV of V, prepared by NUS Corporation, Superfund Division, prepared for the Environmental Services Division, U.S. EPA, September 28, 1990.

P. 101637-102113 Report: Final Draft Site Inspection Report, Li Tungsten Corp Site, Glen Cove, New York, Volume V of V, prepared by NUS Corporation, Superfund Division, prepared for the Environmental Services Division, U.S. EPA, September 28, 1990.

P.	102114-102491	Report: Final Screening Site Inspection (SSI), Captain's Cove Condominium Site, Glen Cove, Nassau County, New York, Volume I of V, prepared by Ebasco Services Incorporated, prepared for the U.S. EPA, Region II, September 1995.
P.	102492-102922	Report: Final Screening Site Inspection (SSI), Captain's Cove Condominium Site, Glen Cove, Nassau County, New York, Volume II of V, prepared by Ebasco Services Incorporated, prepared for the U.S. EPA, Region II, September 1995.
P.	102923-103241	Report: Final Screening Site Inspection (SSI), Captain's Cove Condominium Site, Glen Cove, Nassau County, New York, Volume III of V, prepared by Ebasco Services Incorporated, prepared for the U.S. EPA, Region II, September 1995.
P.	103242-103424	Report: Final Screening Site Inspection (SSI), Captain's Cove Condominium Site, Glen Cove, Nassau County, New York, Volume IV of V, prepared by Ebasco Services Incorporated, prepared for the U.S. EPA, Region II, September 1995. (Note: This document is **Confidential**. It is located at the U. S. EPA Superfund Records Center, 290 Broadway, 18th Floor, N.Y., N.Y. 10007.)
p.	103425-103795	Report: Final Screening Site Inspection (SSI), Captain's Cove Condominium Site, Glen Cove, Nassau County, New York, Volume V of V, prepared by Ebasco Services Incorporated, prepared for the U.S. EPA, Region II, September 1995.

1.3 Preliminary Assessment Reports

q.	103796-104338	Report: Final Draft Preliminary Assessment Li Tungsten, Glen Cove, New York, prepared by NUS Corporation, Superfund Division, prepared for the Environmental Services Division, U.S. EPA, September 18, 1989 (Revision No.1: October 18, 1989).

3.0 REMEDIAL INVESTIGATION

3.1 Sampling and Analysis Plans

p. 300001-300356 Plan: RI/FS Draft Final Field Sampling Plan, Li Tungsten, Glen Cove, New York, prepared by Malcolm Pirnie, Inc., prepared for U.S. EPA, Region II, July 1996.

p. 300357-300511 Plan: RI/FS Draft Final Quality Assurance Project Plan, <14> QA Plan, prepared by Malcolm Pirnie, Inc., prepared for U.S. EPA, Region II, July 1996.

3.3 Work Plans

p. 300512-300728 Plan: Remedial Investigation/Feasibility Study Work Plan, Li Tungsten, Glen Cove, New York, Part I of II, prepared by Malcolm Pirnie, Inc., prepared for U.S. EPA, Region II, March 1993.

p. 300729-300867 Plan: Remedial Investigation/Feasibility Study Work Plan, Li Tungsten, Glen Cove, New York, Part II of II, prepared by Malcolm Pirnie, Inc., prepared for U.S. EPA, Region II, March 1993.

p. 300868-300931 Plan: Interim Remedial Actions, Revised Work Plan, Li Tungsten, Glen Cove, New York, prepared by Malcolm Pirnie, Inc., prepared for U.S. EPA, Region II, December 1994.

3.4 Remedial Investigation Reports

p. 300932-301271 Report: Draft Final, Remedial Investigation Report Volume I of IV, Li Tungsten, Glen Cove, New York, prepared by Malcolm Pirnie, Inc., prepared for U.S. EPA, Region II, May 1998.

P. 301272-301512 Report: Draft Final, Remedial Investigation Report Volume II of IV, Li Tungsten, Glen Cove, New York, prepared by Malcolm Pirnie, Inc., prepared for U.S. EPA, Region II, May 1998.

p. 301513-302155 Report: Draft Final, Remedial Investigation Report Volume III of IV, Li Tungsten, Glen Cove, New York, prepared by Malcolm Pirnie, Inc., prepared for U.S. EPA, Region II, May 1998.

p. 302156-302913 Report: Draft Final, Remedial Investigation Report Volume IV of IV, Li Tungsten, Glen Cove, New York, prepared by Malcolm Pirnie, Inc., prepared for U.S. EPA, Region II, May 1998.

4.0 FEASIBILITY STUDY

4.2 Feasibility Study Work Plans

p. 400001-400137 Plan: Draft Final Work Plan-Volume I, Focussed Feasibility Study, Li Tungsten-Captain's Cove Adjunct, Glen Cove, New York, prepared by Malcolm Pirnie, Inc., prepared for the U.S. EPA, Region II, December 1997.

4.3 Feasibility Study Reports

p. 400138-400227 Report: Draft Final Report, Stage Ia Archaeological Survey, Li Tungsten, Glen Cove, New York, prepared by Malcolm Pirnie, Inc., prepared for U.S. EPA, Region II, April 1995.

p. 400228-400254 Report: Supplemental Investigation to the Stage Ia Archaeological Survey, Li Tungsten-Captain's Cove Adjunct, Glen Cove, New York, prepared by Malcolm Pirnie, Inc., prepared for U.S. EPA, Region II, August 1998.

1-30-046

RESPONSIVENESS SUMMARY

Li Tungsten Superfund Site
Operable Units 1 and 2
City of Glen Cove, Nassau County, New York

INTRODUCTION

A responsiveness summary is required by Superfund regulation. It provides a summary of citizens' comments and concerns received during the public comment period. The responsiveness summary also provides the United States Environmental Protection Agency's (EPA) responses to those comments and concerns. All comments summarized in this document have been considered in EPA's final decision a remedy selection for the Li Tungsten Superfund site. EPA has designated two operable units of site remediation for the Li Tungsten site. Operable Unit 1 includes the former Li Tungsten facility consisting of four parcels of land. Operable Unit 2 consists of the nearby Captain's Cove Property. EPA's final decision regarding remedial selection addresses both operable units.

SUMMARY OF COMMUNITY RELATIONS ACTIVITIES

The Remedial Investigation (RI) report for Operable Unit 1, the Focused Feasibility Study (FFS) for Operable Unit 2 and the Feasibility Study (FS) for both operable units and the Proposed Plan for the Site were released to the public for comment on July 28, 1999. These documents, as well as other documents in the administrative record (see Administrative Record Index, Appendix III) have been made available to the public at two information repositories maintained at the EPA Docket Room in Region II, New York and the Glen Cove Public Library, located at 4 Glen Cove Avenue, Glen Cove, New York. A public notice announcing the public meeting on the Proposed Plan as well as the availability of the above-referenced documents was published in Newsday on July 28, 1999. The public comment period established in the public notice was from July 28 to August 27, 1999. Requests for an extension to the public comment period were granted by EPA and the public comment period was extended through September 17, 1999. EPA's decision to extend the comment period was announced at the August 16, 1999 public meeting on the Proposed Plan, as well as publicized through mailings to more than 150 interested parties on the Site mailing list.

The August 16, 1999 public meeting was held at the Glen Cove City Hall, located at 9 Glen Street, Glen Cove, New York, to present the Proposed Plan and to address questions and comments

concerning the Plan and other details related to the RI, FS and FS reports raised by local officials, residents and other interested parties. Responses to the comments and questions received at the public meeting, along with other written comments received during the public comment period, are included in this Responsiveness Summary.

In the early 1990's, EPA entered into a cooperative agreement for pilot studies with Clean Sites, Inc. to evaluate approaches to improve the Superfund process and facilitate remediation at sites. EPA selected the Li Tungsten site as a pilot for Clean Sites to facilitate remediation most notably through early stakeholder involvement and early identification of the most realistic future use of the site. Clean Sites conducted interviews of State/local government officials, local organizations, potentially responsible parties,(PRPs) and interested members of the community, and developed a citizen's advisory group called the Li Tungsten Task Force in March 1994. Although Clean Sites' cooperative agreement expired in July 1996, the Task Force has continued to conduct monthly meetings with EPA without Clean Sites' involvement, usually on the first Thursday of each month. The purpose of these meetings is to keep the Task Force informed of EPA's activities at the Site and share data and information as it becomes available. The Task Force also applied for and received a technical assistance grant (TAG) from EPA in September 1995.

Attached to this Responsiveness Summary are the following Appendices:

Appendix A - Proposed Plan
Appendix B - Public Notice
Appendix C - August 16, 1999 Public Meeting Attendance Sheet
Appendix D - Letters Submitted During the Public Comment Period

SUMMARY OF COMMENTS AND RESPONSES

Comments were expressed at the public meeting and written comments were received during the public comment period. While the public seemed generally supportive of the remedy at the public meeting, approximately 1,000 identical (form) letters were received asking EPA, to change the proposed alternatives for soil remediation from Alternatives LS-4 and CS-4 to Alternatives LS-2 and CS-2. The letters also requested that EPA take adequate preventive measures to control fugitive dust, establish radioactive air monitoring stations during cleanup activities and conduct further risk assessment analyses. Because of the large number of letters received, EPA decided to begin its response to comments by addressing these comments first in Section A of this Responsiveness Summary.

Other significant major issues and concerns expressed by interested parties including members of the public relate to the cost evaluation of the soil alternatives; EPA's failure to consider on-site containment of radionuclide-contaminated soils; safe implementation of the selected remedy; funding of the remedial action; human health and risk assessment issues; and enforcement-related issues.

The specific comments have been organized as follows:

A. Public Concerns Stated in a Form Letter of which EPA Received about 1,000 Copies
B. Public Health and Risk Assessment Issues
C. Remedy Selection Issues
   i) general
   ii) cleanup levels/ARARs
   iii) data/volume estimates
   iv) remedial action cost estimates
   v) on-site containment
   vi) radionuclide separation
D. Remedy Implementation Issues
E. General Enforcement Issues
F. General Site Issues

A summary of the comments and concerns and EPA and NYSDEC's responses to the comments are provided below:

A. Public Concerns Stated in a Form Letter of Which EPA Received About 1000 Copies

Comment #1: The public requested that EPA select Alternatives LS-2 and CS-2 in place of Alternatives LS-4 and CS-4 because of concerns related to fugitive dust.

Response # 1: Both pairs of alternatives, i.e., Alternative LS-4 and CS-4 and Alternatives LS-2 and CS-2, call for the excavation transport and off-site disposal of large volumes of radiologically and nonradiologically contaminated soil. The difference between these pairs of alternatives is that Alternatives LS-4 and CS-4 call for the use of a volume reduction technology to minimize the volume of radiologically contaminated soil that must be disposed of off-site. As indicated in Proposed Plan and described in the Record of Decision, EPA has determined that volume reduction would be used, but has not specified the use of a particular volume reduction technology.

The benefits of soil reduction include less truck traffic in the community and lower disposal costs, which represent a significant portion of project costs. Some of the soil separation methods include surgical-type excavation techniques resulting in two

excavation piles - contaminated soil and clean material, soil washing to separate contaminated soil from clean soil utilizing a wet process, and a physical separation process known as SGS or segmented gate system to again separate contaminated soil from clean soil. Only the contaminated portion of the soil would then need to be transported off-site, reducing the number of trucks traveling through the community as well as reducing the transportation and disposal costs. The Superfund law does require EPA to implement remedies in a cost-effective manner. It also makes little sense to utilize limited landfill capacity space for the disposal of clean soil.

During design, EPA would evaluate the various volume reduction methods to determine whether any would be effective for use at the Li Tungsten site and, if so, to what degree. For the Glen Ridge and Montclair/West Orange Radium sites in Essex County, New Jersey, neither soil washing nor SGS was found to be cost-effective. However, the soils at most sites are different, thus necessitating a similar evaluation of the Li Tungsten soils. It should also be noted, in response to an expressed concern, that fugitive dust emissions from such a separation process are insignificant. To the extent that dust control measures become necessary during cleanup activities, they result mostly from excavation of the contaminated soil as well as loading of the soil onto trucks. Here too, EPA has developed extensive experience in controlling any fugitive dust emissions associated with these operations.

Comment #2: Commentors raised concerns regarding the generation and transport of fugitive dusts during cleanup operations, especially during any ex-situ separation activities if employed. The Commentors wanted to know how EPA would ensure protection of off-site receptors from radioactive dust emissions. Commentors requested that: monitoring stations would be set up at the site and in Glen Cove and surrounding communities; the community be notified if contamination migrated beyond the site boundary during construction; a sprung structure or other containment be include in the cleanup plan to prevent radioactive dust from migrating from the Site; and a comprehensive and detailed safety and monitoring plan be incorporated into the Record of Decision.

Response #2: EPA is sensitive to the concerns of the community regarding the airborne transport of contaminants during the implementation of the remedy. Fortunately, EPA has significant experience in controlling fugitive emissions during construction at chemically contaminated and radioactively contaminated Superfund sites across the country. Protection of off-site receptors can be achieved through a combination of health and safety monitoring, site control procedures and engineering controls. These controls are routinely used at all Superfund sites requiring excavation or other earth moving activities.

Examples of health and safety monitoring activities that can be

implemented include the following: perimeter radionuclide monitoring; perimeter dust monitoring; establishment of conservative action levels and appropriate emergency response actions if/when the action levels are attained. During the Remedial Design a Health and Safety Plan (HASP) will be developed for the Site. The HASP will comply with the standards outlined in 29 CFR 1910.120, referred to as Hazardous Waste Operations and Emergency Response (HAZWOPER) standards. These standards contain specific requirements to minimize the health and safety hazards associated with actions at hazardous waste sites. In addition, the HASP will include other Occupational Safety and Health Act (OSHA) safety standards for traditional construction activities. An Emergency Response Plan (ERP) is a required element of the HASP and includes a description of how to handle potential site emergencies and how to minimize the risks associated with a response. Although the details of the monitoring program will be developed during the design, it is anticipated that at least two monitoring stations will be established at the perimeter of the Site which would be monitored for dusts and radionuclides; the need for monitoring stations in the community, though not thought necessary at this time, will be further evaluated when the HASP is developed. Monitoring programs typically include provisions for specific actions to be taken when concentrations at the monitoring station reach certain levels; these actions might include additional monitoring, employment of specific construction control methods or the cessation of construction. The action levels established are typically quite conservative, to ensure that actions are taken before unsafe levels are observed at the perimeter of the site. The ERP will include procedures for notifying local, state and federal officials. Since local emergency responders may be involved in certain emergency responses, EPA will invite local officials and or emergency responders to participate in the development of the ERP.

Examples of site control procedures that are likely to be implemented include the following: misting soils with water to maintain dust levels as low as possible without compromising operation of the equipment; covering piles; ceasing operations when windspeeds are high; scanning and decontamination of vehicles and/or vehicle tires before leaving the site. Examples of engineering controls include the following: use of temporary structures, such as a sprung structure, to enclose the excavation/separation areas and the use of separation equipment that is designed to minimize dust emissions. The need for such is typically included in the remedial design documents so that it is readily apparent to the construction contractor that these or similar measures will need to be employed to minimize the generation of fugitive dust.

As indicated above, EPA has extensive experience in the cleanup of sites contaminated with radiological materials. At the Glen Ridge and Montclair/West Orange Radium sites in Essex County, New Jersey, EPA has been cleaning up residential and public

properties since 1991. Radiologically-contaminated soil originating from a nearby radium processing facility in the early 1900s was used to bring low-lying areas in the residential communities up to grade. Several hundred homes were subsequently built on top of the contaminated soil. The contamination extends down to about fifteen feet below the ground surface in many locations. Removal of the contaminated soil requires that the houses be underpinned and subsequently restored to their original conditions. To date, more than 150,000 cubic yards of contaminated soil have been successfully removed from hundreds of properties at a cost of over $200 million.

Similar to the Glen Cove community, the residents of the densely-populated Essex County communities were very concerned about the contamination and cleanup project. EPA worked closely with local officials and affected residents to allay their fears. Health and safety plans and monitoring programs as well as transportation plans were developed with considerable input from the communities. Monitoring stations were established around the perimeter of the impacted areas to ensure that no contaminated materials migrated away from the site. All vehicles leaving the site were thoroughly decontaminated and scanned, again to ensure that the vehicles would not carry contaminated dirt onto local roads. The trucks carrying contaminated soil away were securely covered and checked with scanning monitors so that fugitive dust would not impact residential areas. These and other measures have enabled EPA to implement the cleanup project without incident. The experiences gained at the Essex County sites as well as sites in Maywood and Wayne, New Jersey will be used to make the cleanup of the Li Tungsten site as successful.

Comment #3: The ROD should provide details of all safety control measures that will be utilized to prevent any migration of rad dust offsite, including air monitoring procedures.

Response #3: As noted above, the details of the air monitoring program will be developed during the RD as part of the HASP. Again it is important to point out that the ROD describes a remedy in general terms, while future plans developed during design determine exactly how the ROD will be implemented, including all relevant details of site operations.

Comment # 4: The public requested a further risk assessment analysis of the various cleanup options proposed and a public education effort resulting in a better understanding of the risks associated with the various cleanup options.

Response #4: As part of the Feasibility Study clean-up criteria are determined for the appropriate chemicals of concern identified in the risk assessment using risk assessment procedures. The clean-up goals must meet the first two of the nine criteria i.e., protection of human health and the environment and compliance with applicable or relevant and

appropriate requirements (ARAR). The alternatives are designed to reduce the existing risk and are evaluated based on the remaining seven criteria i.e., long-term effectiveness, reduction of toxicity, mobility or volume through the use of treatment, short-term effectiveness, implementability, cost, state acceptance and community acceptance. The alternatives are evaluated to make sure that the remediation will not create any additional risks or hazards. Once a final remedial alternative is selected, the remedial design will incorporate an evaluation of the potential exposures to the surrounding populations and develop appropriate measures to reduce or eliminate this exposure. Actions may include wetting the soils for dust suppression, installing monitors to identify the potential for contaminants to move off site, location of equipment to minimize exposure to residents, etc.

The further risk assessment analysis for different cleanup alternatives that is requested is similar to EPA's comparative analysis of "short-term effectiveness" which is one of the nine evaluation criteria. The short-term impacts of all for the excavation alternatives are similar and pertain to generation of fugitive dust and the volume of soil that must be transported from the Site. Alternatives LS-4 and LC-4 may include an insignificant increase in fugitive dust compared with Alternatives LS-2 and LC-2, and there is no discernable difference in terms of risk between these pairs of alternatives. However, without using a soil volume reduction technology, the increase in the number of trucks traveling through the community for Alternatives LS -2 and LC-2 would have more of a potential negative impact on the community because the potential for accidents would increase. Also refer to EPA's response to Comment 1.

Concerning the request for public education, EPA is committed to working with the community to keep residents informed of all site-related activities and addressing their concerns throughout the cleanup process. EPA agrees that continuation of its community involvement, particularly with organizations like the Li Tungsten Task Force, is important to keep the public apprised of the progress being made at the Site, and to continue to solicit community input on those issues which have ben demonstrated as being of community interest and concern.

Note: EPA received other specific concerns and comments on remedy implementation that were not included in the form letter. These are addressed in detail in Section D of this Responsiveness Summary.

B. Public Health and Risk Assessment Issues

Comment # 5: The only safe level of uranium in air is absolutely 0, since humans cannot tolerate any exposure.

Response #5: EPA disagrees with this statement. The statement suggests that any environmental exposure to uranium is unsafe. Review of the Agency for Toxic Substances and Disease Registry Toxicological Profile for Uranium (September 1997) indicates, however, that uranium is a naturally occurring radionuclide that is present in nearly all rocks and soil. Uranium becomes airborne due to direct releases into the air from anthropogenic (human-induced) and natural processes. The background levels of uranium suggest that individuals are being exposed to uranium based on background exposures. The introductory section of the Toxicological Profile further concludes AThe Committee on the Biological Effects of Ionizing Radiation (BEIR IV) reports that eating food or drinking water that has normal amounts of uranium will not likely cause cancer or other health problems in people. The Committee reports that if people steadily eat food or drink water containing 1 pCi of uranium every day of their lives, bone sarcomas would be expected to occur in 1 to 2 of every million people based on the radiation dose. However, we do not know this for certain because even enriched uranium has not been shown to cause bone sarcomas in people or animals@.

Comment #6: Was the cancer survey in Glen Cove in 1990 done throughout the entire city and what was the time frame of the Study?

Response #6: According to the NYSDOH, the cancer survey was performed within a study area conforming to the zip code 11542, which corresponds closely to the boundaries of the City of Glen Cove. The survey used data from the New York State cancer registry from the years 1978 to 1987.

Comment #7: Incidents of unspecified illnesses and cancers may be attributable to the Li Tungsten facility. People need to know whether they have been or are being affected by the contamination at the Site. A new cancer survey should be implemented which includes those who are or have lived or worked within a one half mile radius of the site.

Response #7: The cancer cluster evaluations described in the comment are not conducted by EPA but by the Agency for Toxic Substance and Disease Registry, usually in collaboration with the State Department of Health. At the public meeting, a representative from the New York State Department of Health indicated that they had conducted a study of workers and agreed to discuss the results with the community residents following the meeting. The NYSDOH will need to determine whether a cancer

cluster investigation in this area is warranted.

Comment #8: How close is the nearest off-site resident who is currently at an unacceptable risk from airborne particulates?

Response #8: The risk assessment did conclude that off-site residents may be subject to an unacceptable risk due to airborne transport of dust (fugitive dust) from the Site. Exposed areas at the Site do have the potential to emit fugitive dust due to the action of the wind. This process of wind erosion can result in the transport of contaminated dust particles downwind. Dust particles with an aerodynamic diameter below PM10 can be inhaled. The fate of these inhalable particles was estimated using the USEPA approved atmospheric dispersion model (Industrial Source Complex Model) and modeling techniques to calculate the downwind air concentrations. The model considered emissions from multiple ground level area sources and the resulting impact at five receptor locations.

The five receptor locations represent locations at or near the fence line in the northeastern portion of the property. The five receptor locations were all at ground level. It should be noted however, that the model was quite conservative; the model also assumed that the contaminated areas did not have any ground cover. As most of the Site is covered with vegetation or building structures/foundations, the actual amount of exposed contamination which could actually be subject to airborne transport is limited.

Comment #9: What were the specific risks to off-site residents, and the contaminants responsible for it?

Response #9: The cancer risks to the off-site adult and child resident were 1 in 10,000 with arsenic as the primary contaminant of concern. This risk is within the EPA risk range.

The non-cancer hazard was 20 based on manganese and cobalt for the adult resident. The non-cancer hazard for the child was 90 based on exposure to cobalt and manganese. These values exceed EPA's Hazard Index of 1.

In considering the results of the risk assessment it is important to consider the uncertainties associated with the model that may overestimate the risks and hazards. Possible overestimates could derive from the following: the model assumes no terrain, the maximum annual average impacts regardless of meteorology were used in the calculations, the emissions were considered to be from an Aunlimited reservoir@, and the assumption was made that no vegetative cover exists.

Comment #10: The separation process in LS-4/CS-4 would create a lot more radioactive airborne dust (than LS-2/CS-2). This dust would shorten the lifespans of potentially thousands of people in the community, because it takes only 1 inhalation or ingestion of a radioactive dust particle to cause cancers and mutations, and in

pregnant women, birth defects or fetal death. If radioactive gammas or betas are deposited in the lung, it will increase lung cancers and cause thousands of premature deaths.

Response #10: In conducting human health risk assessments for chemicals and radioactive materials capable of causing cancer, EPA assumes a potential increased risk associated with each exposure; however, this increased risk may be extremely small (USEPA Cancer Guidelines, 1986, 1992 and 1999). Combining information on the toxicity of the chemical or radioactive material with information on the exposure routes (i.e., inhalation, ingestion and dermal contact), frequency and duration of exposure, EPA calculates specific risk levels and compares these with an an acceptable risk range set in the National Contingency Plan (1 in 10,000 to 1 in 1,000,000); this information can then be used to calculate levels of contaminants which present an unacceptable risk. These risk levels are presented in the Remedial Investigation.. During the Feasibility Study, this same methodology can be utilized to develop health protective concentrations to assure potential exposures to residents are within EPA's risk range.

The statement suggests that thousands of people will be exposed during remediation at the Site; such a conclusion is not consistent with wind patterns and population areas at the Site. The remedial design will evaluate the potential routes of exposure by which an individual may be exposed and work to reduce this exposure to within specified risk levels. Techniques that have been used at other Sites to reduce exposure include: wetting the soil to suppress dust, setting up monitors on the fence line to detect whether radioactive particulates are released during the remedial activities, and selection of locations within the property for separation of materials to minimize potential exposures to nearby residents. If certain remedial processes (e.g., ex-situ separation of materials) cannot be safely implemented, they will not be employed.

The remedial design will assure that exposure is minimized to within acceptable risk levels and that all appropriate and relevant regulations are met that protect residences near the Site and Site workers. The standards that will be used include the appropriate air regulations set under the Clean Air Act, 40 CFR 61 for radioactive elements, and appropriate worker regulations. These standards are developed at the national level to be protective of sensitive populations including children and adults using risk assessment methodologies depending on the legislation used to set the standards.

Comment #12: Because the ores were ground to a very fine consistency as part of the processes at Li Tungsten, this material when dry will be extremely prone to becoming airborne. Radioactive particulates small enough to become airborne defy many of the dose model (RAGs and RESRAD) risk assessments in use by the health risk assessment community. Consequently, we believe the risks calculated in the radiation risk assessment could have been skewed too low for inhalation as well as ingestion. This hypthesis is supported by experimental and epidemiological evidence from the examination of radiation effects of particulate alpha-emitters deposited in the lung. There is additional risk also attendant to airborne dust containing arsenic, a well known carcinogen.

Response #12: It is important to note that the risk assessment has indicated potential risks under future Site use scenarios in excess of the EPA acceptable range of 10E-4 to 10E-6; therefore, even if the baseline risk assessment had underestimated risks, the risks were still deemed sufficient to take remedial action.

EPA uses chemical and radiological specific cancer slope factors for evaluating inhalation and ingestion of the various radioactive elements and chemicals identified as contaminants of concern at the Site. The cancer slope factor provides a measure of the lifetime excess total cancer risk per unit intake or exposure. The evaluation of this data involves a comprehensive evaluation of the human epidemiological literature, which for radiological data primarily comes from studies of workers in mines where exposure is much higher than that in the general environment. Following the selection of a specific animal or epidemiological study, the EPA uses appropriate models to extrapolate from the higher worker exposures to the lower environmental exposures that may occur in the general environment. The models are designed to be protective of the general populations by the incorporation of a 95% confidence limit that is protective of the majority of the population. The methodologies used are provided in the USEPA Cancer Guidelines (1986, 1992 and 1999), the on-line Integrated Risk Information System, and the Health Effects Assessment Summary Tables (1997 and 1995). Since the cancer slope factors are based on human epidemiological data where appropriate, or animal data if the human data is not adequate, the conclusion that the risk assessment is skewed is not appropriate.

In evaluating the potential human health risks through inhalation and ingestion, EPA evaluates data from animal laboratory studies and/or human epidemiological studies when available to develop cancer slope factors for chemicals and radiological contaminants. These studies are further evaluated using appropriate models to extrapolate from the higher levels of exposure experienced by workers in the case of radiological contamination to potential environmental exposures. The toxicity information is then combined with site-specific exposure information to calculate the risks. Information on particulate sizes are evaluated to the extent that they are available in the human epidemiological data used in the development of the toxicity cancer slope factors.

Comment #14: The TAG advisor commented on risks which might be posed should the Site ever be used for residential purposes after the proposed remediation is implemented; the advisor noted that if deed restrictions fail, and residences are built on-site, the risk would still fall between 10-4 and 10-6, within EPA's risk range. EPA has allowed as high as 20 ppm of arsenic to remain in soil at residential areas at other Superfund Sites.

Response #14: An arsenic soil concentration of 20 ppm would result in a Hazard Index of 1 for a child resident and a cancer risk of approximately 5 x 10E-5 at the Li Tungsten Site. A concentration of 27 ppm could possibly be considered marginally acceptable as a residential cleanup number.

PRP Comments: The following comments were submitted by Potentially Responsible Parties

Comment #15: The radionuclide data set is highly biased, and skewed towards higher concentrations; the use of maximum measured radionuclide concentrations thus leads to unrealistic radiation risk assessment. If mean rather than maximum concentrations were used at Captain's Cove, several future receptors, e.g., site worker at Area A and construction worker in Area G, would no longer be an unacceptable risk scenario.

Response #15: The radionuclide data set is skewed slightly towards higher concentrations for conservatism since 95% upper confidence limits on the average concentrations or the maximum detected concentrations are used as exposure point concentrations. This conservatism is generally used nationwide to account for uncertainties and unknown subsurface concentrations that might be higher than the measured radionuclides concentrations.

Comment #16: The radiological risk assessment did not use radionuclide depth/distribution profile when deriving exposure point concentrations. This is an important consideration when external gamma radiation is the dominant contributor to effective dose equivalent (EDE) and evaluation of excess risk.

Response #16: The radionuclide risk assessment did consider radionuclide depth/distribution profiles when deriving exposure point concentrations. The soil pathways was evaluated based on *surface soil* or *all soil*, as appropriate for the potentially exposed population.. *Surface soil* (first two feet of contamination) data were used to evaluate potential exposure to trespassers and site workers, while *all soil* (surface and subsurface) data were used to evaluate potential exposure to construction workers and residents.

Comment #17: In the FFS, the EPCs used to calculate a reasonable maximum exposure grossly overstate external gamma exposure. The

EPCs are not consistent with exposure rate measurements at the Li Tungsten facility and Captain's Cove. The resultant risks calculated are overestimated by two orders of magnitude, and therefore the need for remedial action based on external gamma radiation risks is not justified for the Site.

Response #17: Exposure rate data cannot be used to estimate potential health risks because of the uncertainty associated with measuring gamma radiation from commingled radionuclides at different energies. The exposure point concentrations (EPCs) used to estimate external gamma radiation exposure were appropriately calculated based on the measured radionuclide concentration data.

Comment #18: The risk assessment fails to distinguish the incremental risk posed by the Sites from the risk posed by background levels of the contaminants of concern, particularly for radionuclides at Captain's Cove.

Response #18: Radionuclide concentrations due to natural background were accounted for. For example the site worker scenario in Appendix G in Volume II of the Draft Final Feasibility Study Report, Table 6.4 (last column), shows the cancer risk in surface soil due to site contamination and natural background "gross"; Table 6.5 (last column), shows cancer risk in surface soil due to natural background only; and Table 6.8, (last column), shows the net "gross risk - background risk" cancer risk.

Comment #19: The risk assessment uses biased sampling to estimate potential sources of exposure. EPA explains that the values calculated on those data sets are a conservative estimate of the reasonable maximum exposure (RME). These values are overly conservative, and result in unrealistic assessments of both radionuclide and chemical risk. The use of biased sampling artificially raises the calculated 95% upper confidence limit (UCL) for risk assessment. A Monte Carlo statistical analysis should have been used, due to the biased nature of the data.

Response #19: The central tendency analysis conducted in the FFS is based on the RME exposure point concentration and inclusion of average exposure information. Based on the lack of site-specific exposure information it was determined that the application of a Monte Carlo analysis would not be appropriate for this site.

Comment #20: The risk assessment evaluates a groundwater pathway where none exists. The groundwater pathway should be eliminated from the risk assessment.

Response #20: It is true that the pathway for groundwater exposure is not complete under the current use scenario; however, this is not sufficient justification to eliminate the groundwater pathway risk assessment. EPA must consider the best beneficial use of aquifers beneath Superfund sites; drinking water happens to be the best beneficial use of the Upper Glacial Aquifer. In addition, the

results of the RI indicated that groundwater and drinking water standards were exceeded, and in some localized areas metals were significantly above standards. Given the above information, EPA determined that an assessment of risks due to exposure of groundwater under a future use scenario was appropriate.

Comment #21: the risk calculations assume that 100% of the soil ingested during every exposure event contains the highest concentration of each contaminant. Use of mean or median concentrations, even with overly conservative default assumptions used in the FFS, yield estimated risks that are generally within or below the acceptable risk range.

Response #21: The calculations used in calculating the Exposure Point Concentrations represent a range of values including maximums and 95% Upper Confidence Limits on the Mean. As shown in the Tables in Appendix O of the RI Report summarizing the Medium Specific Exposure Point Concentrations, the 95% UCL was calculated where adequate information was available for chemicals. The calculation of the exposure point concentrations followed EPA's guidance on calculating the 95% UCL. As stated in the guidance, if a 95% UCL on the Mean can not be calculated, then the maximum concentration should be used. The use of a mean or median concentration suggested in the comment is inconsistent with EPA's guidance.

Comment #22: Default assumptions used assume that the body absorbs 100% of the ingested or inhaled dose. However, bioavailability of metals is a critical factor in assessing risks since inorganic metal species typically have lower adsorption rates. Physiologically-based/Pharmacokinetic (PB/PK) modelling should have been used to determine the actual adsorbed dose. Ignoring the effects of the soil matrix on decreasing bioavailability may result in substantial overestimation of site risks.

Response #22: Currently USEPA is developing guidance on evaluating bioavailability of metals. The comment does not address the significant resources that will be necessary to conduct a bioavailability study on a Site of this size. First, it would be necessary to conduct studies in swine or another animal model to develop bioavailability data. Since studies at a site in Denver found considerable variability in bioavailability across the site, it would be necessary to conduct studies on several different samples from the site. In addition, it may be necessary to conduct studies on several different chemicals. Associated with these activities would be the separation of the individual chemicals so that they could be tested. Tests of this nature run $100,000 or more for each chemical and animal species in additional to a considerable amount of time that would be necessary for each of the individual studies. Therefore, it is not feasible to conduct the types of studies identified in the comment at this time especially since this is a new procedure that has not been adequately evaluated for different metals and soil types.

Comment #23: There is a high degree of uncertainty regarding the cancer slope factor for arsenic. There is also a growing body of scientific literature demonstrating a threshold effect for arsenic; that is, a dose that has no adverse effect. Given these uncertainties, a risk-based cleanup criteria based on a non-cancer endpoint would be appropriate. Other EPA Regions have used cleanup levels for arsenic of up to 480 mg/kg at industrial sites, using this approach. Arsenic cleanup criteria in this range would be appropriate for this Site, given future development plans, land use restrictions, as well as the 2 foot protective soil cover.

Response #23: The comment fails to identify which EPA program office has determined this significant uncertainty regarding the cancer potential of arsenic. Within the Superfund program, the Integrated Risk Information System toxicity values are used in the risk assessment. Until the value in IRIS which represents the Agency's consensus on specific chemicals is changed, the Superfund program continues to use the IRIS values. When the IRIS updating process for arsenic has been completed, and the IRIS value is modified, it will be incorporated in future risk assessments.

In addition, the Risk Assessment Guidance for Superfund - Part B sets forth a methodology for evaluating clean-up goals based on both cancer and non-cancer toxicity. The suggestion of calculating only a non-cancer clean-up goal is inconsistent with USEPA's policy and guidance. In addition, the planned development of this Site is commercial/light industrial where the potential exists for young children to be present on the Site. Therefore, an industrial clean-up value where only adults may be present at the Site would not be appropriate. Furthermore, assessment of the appropriateness of soil cleanup numbers cannot be done without consideration of groundwater quality. One of the objectives of the soil cleanup remedy is to minimize additional cross-media impacts of soil contaminants on the groundwater; arsenic was present in some groundwater samples at concentrations which were several orders of magnitude above the MCL for arsenic. Part of the rationale for not selecting a groundwater remedy at the Site, was the assumption that remediating the soils to the proposed cleanup numbers, thereby eliminating the continuing source of contamination, would significantly improve the groundwater quality at the Site.

Comment #24: Residential lead screening levels were inappropriately utilized in the FFS to establish site cleanup criteria. OSWER directives 9355.4-12 and 9200.4-27P state that 400 mg/kg is a residential screening level and that screening levels are not cleanup goals. The 400 mg/kg screening level for lead is for residential exposure by children under 7 years of age and is based on exposure to lead-based paint. Also, lead in lead-based paint exhibits a higher degree of availability relative to lead relative to lead-containing minerals such as those found at the Site.

Response #24: As described above the 400 mg/kg screening level is based on running the Integrated Environmental Uptake and Biokinetic

Model in default mode not based on lead-based paint at Superfund sites since lead based paint is excluded from the assessment. EPA's use of 400 mg/kg is not inconsistent with the OSWER directives. The 400 mg/kg is used at Superfund sites for screening for residential exposure to soil. Since the potential development of this site is commercial future use where children may be exposed to lead in the soil, this concentration was selected to be protective of younger children that may be exposed to the site.

Comment #25: The point of departure for developing lead cleanup criteria should have been 1,700 mg/kg which is EPA's interim screening level for industrial sites. Lead cleanup criteria in this range is appropriate for the Site given the planned future development, proposed land use restrictions and protective soil cover. Risk-based cleanup criteria are sufficiently protective when the anticipated land use is considered.

Response #25: It is unclear how the 1,700 mg/kg value identified by the commenter was developed since a reference is not identified. If the Adult Lead Model methodology was used in developing this clean-up value, the comment only lists the highest value. The adult lead model usually uses a range of values from 750 to 1,750 mg/kg and does not default to the maximum concentration as suggested in the comment. Considering the anticipated use of the property as commercial where children under the age 7 may be exposed, the use of the screening level for lead is not inappropriate.

Comment #26: The risk assessment assumed residential exposures in setting some cleanup criteria, which is inconsistent with the site development plan.

Response #26: The risk assessment clean-up value for arsenic is based on a 1 x 10E-6 value for construction workers. The lead value is based on the potential for children to be on site and the use of the IEUBK model in default mode.

Comment #27: In developing chemical cleanup criteria for the Site, realistic default assumptions were not used for the exposure scenarios or for developing Site cleanup criteria. Overly conservative assumptions regarding exposures and dose were used that resulted in cleanup criteria that are essentially residential levels. The risk assessment should be re-done, using more realistic exposure scenarios and dose equivalents, and ultimately more realistic cleanup levels, followed by a more thorough data evaluation to delineate impacted areas for targeted removal actions.

Response #27: The risk assessment was performed using appropriate exposure variables identified in EPA's 1992 guidance on default exposure assumptions that represent Reasonable Maximum Exposure. Many of the comments identified are more appropriately responded to in other sections of this Responsiveness Summary.

C. Remedy Selection Issues

i) General Issues

Comment #29: The feasibility study analysis clearly favors Alternatives LS-2 and CS-2 over any of the other soil alternatives. The best way to clean up the Site is for the complete removal of toxic waste from the Site, especially radioactive waste, which presumably would be done under Alternatives LS-2 and CS-2. Shouldn't Alternatives LS-2 and CS-2 be the preferred remedy, since these alternatives surpass Alternatives LS-4 and CS-4 in protecting human health and the environment, even though Alternatives LS-4 and CS-4 meet this criterion?

Response #29: EPA believes that the protectiveness of public health and the environment afforded by either pair of alternatives in terms of the extent of cleanup is identical, i.e., both pairs of alternatives must meet the same numerical cleanup criteria that will be applied to soil left at the Site. In addition, the methods to achieve these cleanup levels are similar, i.e., excavation with off-site disposal. Alternatives LS-4 and CS-4 allow whoever prepares the remedial design, whether it be EPA or a PRP group, the flexibility of segregating wastestreams to reduce disposal costs. This alternative is clearly preferable from the perspective of the cost-effectiveness balancing criterion. As both alternatives require excavation and off-Site transportation of soils, both will require controls to minimize the generation and off-Site migration of dust. While some segregation methods may involve extra handling of contaminated materials, the fugitive dust emissions from such a separation process are insignificant relative to the handling required for the excavation and loading activities required for these alternatives.

Comment #30 : There's an absolute need to place the health and safety of the people of Glen Cove above monetary and all other considerations.

Response #30: EPA agrees. The two primary Superfund evaluation criteria, often referred to as *threshold* criteria, are to assure protection of public health and the environment, as well as to meet ARARs (applicable or relevant and appropriate requirements). These criteria must be met in any Superfund cleanup. Cost-effectiveness, on the other hand, is a *balancing* evaluation criterion, and is meant to help differentiate between various alternatives that have already passed the protectiveness "test." The community has raised concern regarding the additional materials handling required under Alternatives LS-4 and CS-4. Measures which will be implemented to ensure that the additional handling is performed safely are discussed in EPA's response to Comment 2.

Comment #31: Since semi-volatile compounds were found at dangerous levels in at least one location on Site, semi-volatiles

should be addressed as part of the cleanup plan.

Response #31: While semi-volatiles, specifically a group of semi-volatives known as polyaromatic hydrocarbons (PAHs)were found at relatives high levels on Parcel A, levels of PAHs found at the remainder of the Site were very low. These PAHs on Parcel A are believed to have originated from coal and wood processing done at the site around the turn of the century. It is not unusual to find these contaminants in commercial/industrial settings. EPA's risk assessment found that the semi-volatile compounds found on Parcel A of the Li Tungsten Site were not_dangerous, if that portion of the Site were developed commercially.

Comment #32: If the cleanup numbers are already pretty low, then why wouldn't you clean up the Site to a pristine level?

Response #32: The cleanup numbers must achieve the threshold evaluation criteria of protection of human health and the environment, and compliance with ARARs; beyond that, they are evaluated on other criteria such as construction impacts, cost-effectiveness, etc. Cleaning up the Site to a pristine level in this case means leaving "background" levels of the Site contaminants behind, since virtually all the contaminants of concern at this Site exist naturally in low concentrations. The closer the cleanup gets to background levels, the more exorbitant the cost - with virtually no "extra" return on the investment in terms of increasing protectiveness.

Comment #33: Is Glen Cove Creek involved in the cleanup plan?

Response #33: Monitoring of the sediments and water column of Glen Cove Creek will continue on an annual basis as part of the Mattiace Superfund long-term response action. The results of this monitoring program, as well as the groundwater monitoring program for Li Tungsten which is part of Alternative LW-1, 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 of the ROD, 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 year 2000 monitoring event should

provide valuable information regarding potential beneficial impacts of the Army Corp dredging effort; EPA and DEC will consider whether additional sampling locations should be added for this effort. In addition, the year 2000 monitoring results should be utilized by EPA and DEC to evaluate whether the monitoring program should be expanded to include ecological monitoring or toxicity testing.

Comment #34: If Alternative LS-2 had been cheaper than Alternative LS-4, would that have been the preferred alternative?

Response #34: Yes, obviously the additional time and effort required to achieve some separation of wastestreams would not be desirable unless it achieved a reduction in cost.

Comment #35: A hydro-mechanical mining technique similar to dredging might be employed for soil removal, especially for the deeper contamination on Captain's Cove. This process would involve, after excavating the surficial uncontaminated soil, saturating the contaminated soil with water until slurry is formed. The slurry would then be pumped out of the hole into tanker trucks or drums thereby minimizing the probability of airborne contaminants.

Response #35: Potential issues related to the idea of hydro-mechanical mining include: 1) this is an untested technology for this type of application; 2) control over the limits of soil removal would be compromised because you would not be able to see what you are removing - therefore disposal quantities would likely increase substantially; 3) post-excavation verification sampling of an amorphous sediment pit would be more difficult than a clean excavation pit; 4) there would probably be a large potential for the spread of contamination to groundwater during the operation; 5) this method would render the volume reduction technology or controlled excavation ineffective because it would mix radioactive with nonradioactive soils; therefore, disposal costs would be higher because all material would need to be sent to a specialized disposal facility.

Comment #36: The selection of Alternative LW-1 is appropriate, in that it is unnecessary and would be unduly costly to design and construct any active groundwater remediation and treatment system. Deed restrictions should be adequate to assure future nonuse of the aquifer.

Response #36: EPA agrees that the relatively small portion of the Upper Glacial Aquifer that is impacted by the Site doesn't warrant remediation at this time, because EPA believes the condition will improve over a relatively short period of time once the contaminated soils are removed. In addition, the availability of City water and various institutional controls makes the hypothetical use of contaminated groundwater during that time extremely unlikely. The

progress of aquifer improvement will be periodically monitored during the five years after the start of remedial action for soil, and then will be formally assessed at the time of EPA's first Five Year Review for this Site. EPA could choose to amend the Record of Decision concerning aquifer remediation, should circumstances at the time of the Review warrant it.

Comment #37: EPA should select an action alternative for groundwater, because the costs associated with groundwater remediation are relatively low with respect to the overall site remedy, and this way 5-year reviews would not be necessary and public health would be better protected.

Response #37: The cost of remedial action is low relative to the overall Site remedy, but EPA believes that groundwater remedial action is unwarranted at this time regardless of the cost. See response to preceding comment. Also, if either Alternative LW-2, LW-3, or LW-4 were selected, EPA's Five Year Reviews would still need to be conducted during the period that the groundwater was being actively remediated.

Comment #38: Why can't the building(s) be knocked down?

Response #38: Two large structures, i.e., the Dice Complex and the East Building, were razed during EPA removal activities at the Li Tungsten facility. The selected remedy includes demolition of several additional buildings to eliminate hazards posed by structural instability, hazardous materials of construction (i.e., asbestos) or contamination with radionuclides, as well as to facilitate both pre-design sampling and implementation of future remedial actions. In order to satisfy these objectives, it is likely that all but two of the original structures will need to be demolished.

Comment #39: Limiting access, by means of security, warning signs, fencing, etc. is not an effective way to overcome the dangers posed by the Site.

Response #39: EPA agrees that restricting site access is not a long-term protective solution given the expected commercial future use of the Site and therefore has selected remedial action involving excavation, radionuclide separation, and off-Site disposal of the various wastes presently contaminating the soil. Warning signs and limited access to the Site, however, will remain in effect until the remedial actions are completed, which is presently anticipated in the year 2002.

Comment #40: Alternatives LS-2 and CS-2 should be selected for soil and Alternative LW-3 for the groundwater. While these alternatives may be more costly, the added costs when divided between the PRPs

is insignificant and will ensure that the sites are fully cleaned up. These remedial measures will also impact the surrounding areas less.

Response #40: Please refer to EPA's responses to Comments # 29 and 37.

Comment #41: It is critical for the Proposed Plan alternatives to factor in rail transportation for the removal of this waste, as a safer and more cost-effective method.

Response #41: The Proposed Plan's costs for soil alternatives involving off-Site disposal of radionuclide wastes were based on the truck transportation from the Site to a Massachusetts transfer facility, followed by rail transportation to Envirocare of Utah (footnote #3 of soil alternatives, Appendix D of the Feasibility Study). The choice of disposal facility and location are for cost-estimating purposes only. The facility will be selected at the time of radionuclide waste disposal.

Comment #42: Deed restrictions on the two tracts of real property which make up the Site to prevent the potable use of contaminated groundwater that underlies the Site, should be expanded to include all potential uses of groundwater, such as irrigation, cooling, etc. Deed restrictions on residential use should also be aimed at day-care centers, schools, and similar child-oriented uses, which are ordinarily allowable on commercially zoned land.

Response #42: EPA agrees with that additional restrictions may be necessary and has noted in the ROD that further consideration should be given to such restrictions. EPA recently entered into a settlement with the prospective new owners of the Site property, i.e., the City of Glen Cove Industrial Development Agency and its successors in title. This settlement, referred to as a "Prospective Purchaser Agreement," reserves for EPA the right to require that restrictions be established on the future use of the Site. Such restrictions, known as "institutional controls," could include deed restrictions, easements, and/or zoning ordinances.

Comment #43: In order to make the remedy consistent with the TAGMs, (which EPA by law must do unless it grants itself a waiver) EPA proposes to impose deed restrictions forbidding future residential development. The ability of deed restrictions to prevent residential development is dubious.

Response #43: The NY State TAGMs are soil cleanup objectives which are not ARARs, but rather are to be considered (TBC) in the formulation of cleanup levels for soil at Federal Superfund sites. Therefore, EPA does not require a waiver if it does not select TAGM levels as its cleanup criteria. Moreover, EPA's purpose in requiring institutional controls was not to make the cleanup levels functionally equal to TAGMs, but rather to complement the selection

of cleanup levels that are compatible with commercial future use. The commercial future use evaluated in EPA's risk assessments for Li Tungsten and Captain's Cove resulted in cleanup levels that were not as stringent as the cleanup levels that would have been required had the future use been assumed to be residential. Therefore, EPA believes that institutional controls, while not a guarantee of a specific future use, are nevertheless important in directing commercial future uses of the Site.

Comment #44: The Agency has indicated that the final remedy would include radon testing of all buildings constructed on the Li Tungsten. However, this was not noted in the Proposed Plan.

Response #44: To mitigate future impacts of radon and/or thoron, any new construction on this Site would need to adhere to relevant building codes. This is so noted in the selected remedy section of the ROD.

Comment #45: The Site does not pose an unacceptable risk due to the presence of naturally occurring radioactive material (NORM). Independent RESRAD modeling demonstrates that the residual risks due to NORM presented in the FFS were overestimated by two orders of magnitude. The process utilized in identifying and screening remedial alternatives did not adequately consider the effectiveness of the prior removal actions in reducing site related risks, particularly radiological risks, nor do the estimates take into account the attenuation of gamma radiation by the 2-foot protective cover described in the Proposed Plan. Measured exposure rates after completion of the removal actions provide risk estimates that are within EPA's acceptable risk range of 10E-4 to 10E-6.

Response #45: Independent RESRAD modeling that demonstrates an overestimation of two orders of magnitude may be due to a variety of factors including the exposure pathways considered, the site-specific parameters used and how the model was set up. Without a detailed comparative analysis of the two methodologies that were used (EPA's vs independent), the finding does not necessarily mean that the EPA's risk estimates are substantially overestimated.

The risk assessment performed was a baseline risk assessment which does not incorporate the remedial alternatives that were selected. The protective cover, therefore, is not considered in the risk assessment model. The statement *"measured exposure rates after completion of the removal actions provide risk estimates that are within EPA's acceptable risk range of 10E-4 to 10E-6"* is true, but removal actions have to be performed to achieve the aforementioned statement in addition to the remaining exposure pathways.

Comment #46: The time required to implement the selected remedy was significantly underestimated in the FFS and cannot be completed within the 16-month period presented in the Proposed Plan. The schedule presented in the FFS did not adequately account for

completing the source reduction using the SGS system. This technology has significant limitations which limit its throughput and capacity. Also the volumes of soil to be processed are underestimated, and will require additional time to process. Three to six years will be required to complete the remedial activities outlined in the Proposed Plan. Targeted removal using precision excavation can be accomplished in significantly less time, while achieving a comparable level of protection.

Response #46: EPA estimated in the Proposed Plan that remedial action at Li Tungsten and Captain's Cove would take nine months and seven months, respectively, for a total of 16 months under Alternatives LS-4 and CS-4 (the Selected Remedy). EPA utilized SGS throughputs of approximately 175-200 cubic yards/day during the development of these estimates, which do not include the time to perform remedial design activities. These throughputs are consistent with the literature on this particular separation technology. Other separation strategies, techniques, or technologies may ultimately be used that can achiever effective separation even faster and cheaper. These would have to be evaluated by EPA for safety and effectiveness during remedial design.

Comment #47: Targeted removal of select "hot spots" and construction of protective covers, which are integrated into the overall site development plan, is substantively similar [provides similar to the Proposed Plan if realistic and credible risk-based criteria are applied. Targeted removal is equally protective of human health and the environment and can be implemented in a significantly shorter time frame. The Proposed Plan already incorporated a two-foot soil cover along with land use restrictions. Protective covers can easily be integrated into the site development plan and design, as have been successfully demonstrated at other Superfund Brownfield sites. Targeted removal can also be completed in less time and at a lower cost because it is driven by scientifically defensible reductions in site risks.

Response #47: EPA believes that "targeted removal" of selected hot spots is a modified containment alternative which, on the one hand, substantially reduces the risks associated with the highest contaminant levels on Site, but on the other hand, fails to adequately control the on-Site risks attendant to lower level contaminants being left on the Site. EPA's "two-foot soil cover" cited by the commenter is in reality a minimum backfill requirement to afford additional protectiveness for the two pairs of off-Site disposal Alternatives LS-2 and CS-2 and LS-4 and CS-4. EPA's on-Site containment Alternatives, LS-3 and CS-3, would include a much more permanent and protective RCRA-type cap. EPA does not feel that the on-Site containment portion of the commenter's suggestion is sufficiently protective. Further, upgrading the on-Site containment to meet EPA's remedial objectives would result in an alternative very similar to Alternatives LS-3 and CS-3, which was evaluated by EPA but not selected.

Comment #48: It is possible and plausible that all or most of the radioactive material would be acceptable for disposal at a RCRA Subtitle D facility, since it is properly classified as NORM. A licensed radiological disposal facility need not be the disposal location for some or all of the radioactive wastes at the Site. Perhaps only "hot spot" materials would require disposal at a licensed facility, with the rest going to a Subtitle D.

Response #48: EPA-Region II is not aware of any instance where NORM waste has been disposed of at a RCRA Subtitle D Facility. However, depending on the activity level, it may be possible to dispose of some of the radionuclide-contaminated soils/residues at a RCRA Subtitle C facility. During remedy implementation, all available disposable options will be investigated in order to find an appropriate facility.

Comment #49: Treatability studies are needed to determine efficiencies of separation technologies under Alternatives LS-3 and CS-3 and Alternatives LS-4 and CS-4 as well as stabilization technologies Alternatives LS-3 and CS-3.

Response #49: Comment noted. EPA expects that all necessary testing needed to implement the selected remedy will be completed during remedial design activities.

ii) *Cleanup levels/ARARs*

Comment #50: What's the difference in terms of numerical standards between a commercial cleanup and a residential cleanup, based on other Superfund sites?

Response #50: EPA guidance requires that the most reasonably anticipated future land use for a site be determined, and that the site be cleaned up to allow for that use. EPA typically performs a baseline risk assessment to determine whether contamination at the site presents an unacceptable risk under current and potential future uses of the site. The risk in turn is dependent on various considerations like the contaminants of concern, the exposure assumptions, likely exposure pathways, dose assumptions, etc. which vary from site to site. EPA can then utilize this information to develop corresponding cleanup levels which would allow the various site uses to occur. Therefore, the cleanup level for a particular contaminant - for example, arsenic - could be different for this Site when compared to another site that was also evaluated vis-a-vis a commercial future use. After determining the range of risk-based cleanup levels, EPA evaluates whether there are any ARARs which provide numerical cleanup levels which are more stringent than the risk-based cleanup level being targeted. If so, then the ARAR would be used. These ARARs could be either Federal or State standards, and therefore will vary from State to State.

In summary, the cleanups performed at Superfund sites across the country are highly site-specific and can be quite variable in terms

of cleanup numbers used. While it is usually true that a site with an expected residential future use will have more stringent cleanup numbers than if that site had been evaluated for commercial future use (although, if an ARAR applied at the Site, it would result in the same cleanup number regardless of future use) care and thorough evaluation should be used when comparing the cleanup levels at different Superfund sites.

Comment #51: The principle of reducing radiation exposures "as low as reasonably achievable" should prevail.

Response #51: The principal cited in the comment could be a factor in certain ARARs that contain cleanup standards based on what is considered achievable given the present state of technology; however, it is decidedly not a factor in EPA risk assessment methodology. When assessing risk, EPA believes that incremental risk between 10^{-4} to 10^{-6} (or 1 in 10,000 to 1 in 1 million) for cancer incidence, or Hazard Indices of less than 1, are sufficiently protective. Although technology could possibly reduce the cleanup number further in some cases, the exorbitant costs would no longer justify the extremely small increment of protectiveness thereby obtained. In the case of radionuclides at Captains' Cove and Li Tungsten, EPA feels that the selected cleanup levels from the risk assessment for the selected radioisotopes of radium and thorium are fairly close to their naturally occurring background levels; therefore, in this case, EPA believes that its selected remedy is relatively close to meeting the "as low as reasonably achievable" principal.

Comment #52: The cleanup target for arsenic in the Proposed Plan i.e., 27 ppm, has been changed from the value in the draft FS i.e., 7 ppm, which was the State's TAGM. This reduces the amount of soil to be disposed of and cuts the cleanup costs by tens of millions of dollars.

Response #52: The cleanup target for arsenic in the Proposed Plan is actually 24 mg/kg (or 24 ppm). This is a risk-based number that was generated utilizing the construction worker exposure scenario. TAGM's are not based on any site-specific data nor on any health risk data. TAGMs were derived from broad literature survey data of uncontaminated soils throughout New York State, the U.S. and Canada. Background concentrations of arsenic in soils throughout New York State range as high as 16 mg/kg; at other locations in the U.S. up to 73 mg/kg. In practice, an arsenic cleanup value of 7 mg/Kg was impractical; the average concentration of arsenic in seven background samples at Li Tungsten was 6.3 mg/Kg, indicating that some background samples were greater than the TAGM. The concentration of arsenic in approximately 80% of all soil samples collected at Li Tungsten (88 samples) and 75% of all soil samples collected at Captain's Cove (39 samples) exceeded 7 mg/Kg. At Li Tungsten and Captain's Cove, radionuclides and inorganics are generally co-located in the soils. As a result, removal of radiologically contaminated soils will also remove most of the

arsenic-contaminated soils. There will be relatively small volumes of soil with arsenic concentrations ranging between 7 and 24 mg/Kg that are not co-located with radiologically-contaminated or other inorganic-contaminated soils and will remain in the ground after remediation is completed. The reduction in cleanup costs for this volume of soil, however, should be much less than $1 million and would not begin to approach tens of millions of dollars.

Comment #53: The arsenic and lead cleanup criteria are inconsistent with cleanup levels established for other Brownfields industrial sites having similar patterns of contamination and physical characteristics.

Response #53: Pleas see Response # — above which discusses how cleanup numbers can vary given site specific circumstances. Further, the future use of this Site is commercial, not industrial. Additionally, the cleanup criteria utilized were based on CERCLA (not Brownfields) procedures as described in the National Contingency Plan and other relevant CERCLA-related guidances.

Comment #54: EPA's use of residential cleanup criteria is clearly inappropriate and inconsistent with OSWER Directive #9355.7-04.

Response #54: While EPA evaluated residential future use for this Site, the radionuclide and heavy metals cleanup numbers that will be used for soil are derived from a risk assessment evaluation of commercial future use, except for lead and to a lesser extent, PCBs. The lead cleanup level is not a residential cleanup number but a soil screening number. Although it is not an ARAR, EPA felt, after careful consideration of other potential lead levels that could have been chosen, that the cleanup number represented the lowest level that could easily be achieved through excavation of other co-located materials at the Site. Based on the available data, the lead cleanup level will not drive the soil cleanup in areas where it is co-located with arsenic and the radionuclides of concern.

PCBs are only anticipated to be found in an isolated location in the middle of Parcel B, co-located with heavy metals and radionuclides. EPA's cleanup level for PCBs in the selected remedy is based on NY State's TAGM values of 1 mg/kg in surface soil, and 10 mg/kg in subsurface soil. The risk-based construction worker scenario from EPA's risk assessment at Li Tungsten resulted in a 10.1 mg/kg cleanup level; therefore, EPA made a risk management decision to use the TAGM for the incremental protection it afforded in surface soils, at an anticipated low incremental cost.

Comment #55: No specific regulatory prohibitions were identified which preclude containment in place. The Long Island Landfill Law and 6 NYCRR Part 380 are cited as reasons why on-site management options were not more fully considered. However, these laws only address new disposal and not capping in place. Additionally, 6

NYCRR part 380 does not specifically require removal of NORM to meet the State gamma radiation exposure limits.

Response #55: EPA generally has not selected containment remedies for radiologically-contaminated waste materials. Unlike many types of chemical contaminants, radiological contaminants remain dangerous for very long periods of time. The toxicity of a radiological substances is measured in terms of its half life, or the amount of time necessary for the substance to lose half of its toxicity or potency. For example, the half life of radium 226 is 1600 years. It would take more than 5000 years for radium to lose 90 percent of its potency and more than 10,000 years to lose 95 percent of its toxic characteristics. If such materials were placed in a landfill, perpetual maintenance would be required to ensure the integrity of the landfill containment system, both the landfill cover and the liner to prevent leaching of the radiological materials to underground waters. Also, institutional controls would have to be established to ensure no contact with the contained materials. Like the maintenance requirements, the institutional controls would have to be maintained and enforced for thousands of years. Needless to say, EPA is extremely concerned about the long-term effectiveness and reliability of such perpetual controls, especially in a populated area such as Long Island. For these reasons, facilities licensed for the disposal of radiological wastes are located in remote areas of the country in areas where people do not live and where groundwater is not used for potable purposes. It is entirely inappropriate to locate a radioactive waste disposal facility in the populated Glen Cove area over Long Island's sole source aquifer.

Beyond the above technical issues, an on-Site landfill would inhibit reuse of the site property. Although portions of the property could be redeveloped for some purposes, restrictions would have to be placed on other portions preventing development. Such restrictions are inconsistent with the redevelopment goals of EPA's Brownsfield initiative. For all of the preceding reasons, EPA believes on-Site containment of the radioactive wastes is not a viable remedial option for the Li Tungsten site. It also should be noted that on-site containment has not been selected as the appropriate remedy for any of the radiologically-contaminated Superfund sites in New York or New Jersey. Rather, all have involved off-site disposal of the contaminated materials.

Comment #56: The radiological cleanup levels established for the Site are unduly conservative for the future commercial use of the Site. The cleanup levels are significantly lower than levels of naturally occurring radioactivity on Long Island. Black sands from 18 different beaches in Long Island easily exceed the cleanup levels specified in the Plan, and so do granite rocks found along the Ronkonkoma and Harbor Hill Ridges in the middle of Long Island. According to the FS, these cleanup levels are based on the cleanup standards promulgated by EPA for pursuant to Uranium Mill Tailings Radiation Cleanup Act (UMTRCA). However, the cleanup standards ignore the 15 pCi/g cleanup standard below 15 cm depth, as required by 40 CFR 192. At this Site, the critical element in meeting the

intent of the UMTRCA regulations contained in 40 CFR part 192 is limiting gamma radiation exposures, since residential radon exposure is not an issue. Acceptable risk levels and exposure limits can be achieved through targeted removal, implementation of land use restrictions, and a two-foot protective cover as specified in the Proposed Plan. Use of UMTRCA in its entirety could possibly reduce the amount of soil requiring remediation, and thus reduce the cost.

Response #56: There are undoubtedly background levels that can be found in various locations on Long Island that exceed the selected radionuclide cleanup levels. There are also homes in the metropolitan area that have unacceptably high levels of radon from naturally occurring subsurface uranium ores. The two important considerations are risk, and the immediate background concentration of the radionuclide. Background levels of the radionuclides of concern at the Site are sufficiently below risk-based cleanup levels so that remedial action can reasonably take place, and because the cleanup levels for radionuclides are risk-derived, the selected remedy is considered protective by EPA.

Comment #57: The FFS treated the Mud Pond and Mud Holes as viable aquatic habitats. These pits were used in ore processing activities and are not unique aquatic environments. Application of State ambient water quality criteria to standing water in these pits is not an appropriate use of the criteria; neither is using State sediment criteria (a TBC) to clean up the sediments in these pits.

Response #57: As noted, the Mud Pond and Mud Holes were utilized in ore processing activities. EPA will need to remove the soils underlying these areas, and in order to due so, the overlying materials i.e., ponded water and sediments, must be removed. These contaminated materials will be disposed of off-site at an appropriate disposal facility and will not be remediated as the comment suggests. Cleanup levels associated with the underlying contaminated soils will ultimately drive the volume of material from these areas that is shipped off-site for disposal.

iii) Data/volume estimates

Comment #58: The Proposed Plan makes no mention of the radioactive elements Polonium-210 and Lead-210, although there's a possibility of the presence of these two contaminants, according to a report prepared by Disposal Safety which reviewed the FS. If these radionuclides are present, then the proposed cleanup would not be effective, since they weren't sampled for and cannnot be detected by gamma-detecting field instruments. It is requested that the public be advised of the analyses done in relation to these substances, and if there's any uncertainty, an evaluation must be completed before any plan of action is taken.

Response #58: EPA did not consider these two radionuclides to be potential radionuclides of concern, and hence did not sample for

them during the fieldwork at Li Tungsten or Captain's Cove. However, based on a comment made by the TAG advisor for the Li Tungsten Task Force made during the review of the draft RI Report, EPA decided to perform some limited sampling and analysis for these two radionuclides at locations and conditions suggested by the TAG advisor. The results of the sampling and analysis conducted by EPA in March 1999 suggested that these radionuclides are not of concern at the Site, and therefore they were not mentioned in the Proposed Plan. The results of this work is attached in Appendix B, Volume I of the FFS. The TAG advisor has commented on the inclusion of this work and considers the limited Site characterization performed in March to be responsive to his concern (see EPA's response to Comment. Nonetheless, EPA will collect additional samples for these radionuclides, as well as the radionuclides of concern, during pre-design sampling to further define the excavation areas and volumes.

Comment #59: Additional sampling data conducted in March 1999 were not fully integrated into the FFS, and do not support the conclusions presented in the report regarding the limits of contamination in some areas.

Response #59: While the report from the March 1999 sampling event was included in Appendix B, Volume I of the FS, a discussion of the additional sampling results was not included in the context of the earlier more extensive RI and FFS sampling and analyses. However, the results *were* integrated into the FS Report to the extent that volume estimates and costs were modified for Captain's Cove as a direct result of the additional sampling.

Comment #60: The soil borings under the easternmost condo shell at Captain's Cove contained in the March 1999 data only extended 4 feet below ground surface. The majority of radiological contamination in this area (Area G) was encountered at depths greater than 4 feet, so the EPA sampling missed most of the contaminant zone. More importantly, the geoprobe sample (a composite) exceeded proposed cleanup criteria for radium. Also, the northern limits of and eastern contamination in Area G have not been defined. Area A was similarly not adequately defined in terms of areal extent of radiological contamination.

Response #60: There were four soil borings under the easternmost condo shell; namely, borings 41, 42, 43, and 44. Table I of the Trip Report indicates that these samples were composited over sample depths of 4-8 feet, 0-8 feet, 0-8 feet, and 0-8 feet, respectively. EPA believes that a uniform depth of 8 feet was sufficient to detect any ore residuals that may have been located under the shell. One sample, Sample 044, exceeded the 5.0 pCi/g cleanup level for Ra^{226} with a measurement of 9.7 pCi/g. For purposes of volume estimating, EPA considers this result potentially anomalous, given that samples 041 and 043 were closer to Area G and not contaminated with radionuclides. However, EPA will further investigate this area during pre-design sampling.

Comment #61: The basis of the volume estimates used in the engineering evaluation and cost estimates are not clearly documented. Even less clear are the reasons for the significant volume differences presented in the draft FS and draft final FS.

Response #61: Much of the basis for the volume estimates are contained in the RI Report for Li Tungsten and the FFS Report for Captain's Cove. The basis for the cost estimates are contained in Appendix B, Volume I of the FS Report. EPA believes that the level of detail provided in these documents is appropriate for FS estimates. The significant differences in volume estimates that occurred from the draft FS to the draft final FS were primarily as a result of a reconsideration of the volume estimates for Captain's Cove. The ore residuals located at Captain's Cove were buried at both Areas A and G, up to 14 feet deep in some places. EPA's consultant, Malcolm Pirnie first estimated these sub-surface volumes in the draft FS/FFS. EPA felt these first estimates were based on unduly conservative assumptions, most likely because of the buried nature of the materials, and requested a re-evaluation. These "mid-course" revisions frequently occur between first draft and final draft of Superfund documents as part of the process to produce a final document of good quality. Typically, these drafts are not reviewed by the public. At this Site, however, EPA has made draft documents public as part of its pilot study with Clean Sites to share information as it became available with the community.

Comment #62: The site characterization data were not sufficient to accurately estimate waste volumes and remediation costs, thereby skewing the comparison of alternatives. An example of such inaccuracy is the wide variation of cost estimates between the draft FS and the Final FS. Based on the same site characterization data and the same cleanup standards, Alternatives LS-2 and CS-2 went from $70 million in the draft FS to $32 million in the final FS. Underestimation of volumes makes off-site disposal alternatives appear more cost-effective and skews the evaluation of alternatives in favor of these alternatives.

Response #62: EPA disagrees and believes that the data were sufficient to characterize and determine the extent of contamination over the 50 acres of property associated with the Li Tungsten facility and Captain's Cove Property for purposes of supporting a remedy. EPA agrees that further characterization, as well as pilot/treatability testing, is necessary during design to prepare remedial design plans and specifications. The commenter is correct in that underestimation (or, for that matter, overestimation) can skew an alternatives analysis. This is the main reason why EPA sought to have its RI/FS consultant re-evaluate the volume estimates for Captain's Cove, which EPA believed were too conservative.

Comment #63: It's unclear from the data whether high hits represent isolated "hot spots" or are representative of a pattern of

concentrations at the elevated levels. At Captain's Cove, the NYSDEC surface radiological survey, which would measure radioactivity only in the upper soil layer, as well as the limited subsurface soil investigation would not be sufficient to fully characterize the radiological contents of Captain's Cove.

Response #63: Both comments are correct; when measuring any subsurface phenomenon, much of the data collected require certain extrapolations to get a sense of the "complete picture." This "picture" will, in a sense, only be completed when remedial excavation takes place and the exact boundaries of the subsurface volumes are uncovered. However, EPA believes that field investigation results at Captain's Cove were of sufficient quantity and quality to select a remedy for the radiologically contaminated materials.

iv) Cost estimates for remedial actions

Comment #64: What was the difference in cost in cleaning up the semi-volatile organic compounds (SVOAs) at the Site to residential vs. commercial scenario standards?

Response #64: For a residential exposure scenario, a total of approximately 9,000 cubic yards of SVOA contaminated soil would need to be removed, virtually all from Parcel A. Costs for excavation, transportation and disposal at a Subtitle D facility (using the unit rates in the Final FS Report) for these soils would be on the order of $1.5 million. Other miscellaneous costs, e.g, engineering, construction management and contingencies, would raise is figure to approximately $2 million. Hence, an additional $2 million would be required to upgrade the cleanup forma commercial level to a residential level.

Comment #65: If groundwater isn't cleaned now, and EPA decides 5 years from now, after performing the rest of the remediation that an action groundwater remedy is necessary, would the groundwater alternatives cost significantly more?

Response #65: Groundwater remediation may cost more due to inflation. However, the groundwater quality is expected to improve after the contaminated soil and ore residuals are removed. As a result, if groundwater treatment were still deemed to be necessary, a smaller, less costly groundwater remediation system than would currently be needed may be suitable.

Comment #66: Shouldn't a range of costs be presented for each alternative, as well as the preferred alternative, to account for some of the uncertainties in the estimate?

Response #66: Ranges of costs are not typically provided in FS or Proposed Plan documents. EPA attempts to arrive at FS estimates that, when implemented, will be correct to within a range of +50%

to -30%; this objective is typically discussed in the FS. The FS estimate also includes a 15% contingency for the cost of construction to account for some of the "hidden" costs of actual construction, which become evident later during design and actual construction.

Comment #67: The costs presented do not accurately reflect the real cost of transportation and disposal of radioactive soil. Economies of scale, rail vs. truck, plus a turnkey contract combining disposal and transportation would all achieve cost savings not included in the Proposed Plan.

Response #67: EPA agrees that there is potential for cost savings during implementation of the remedy. These cost savings are typically determined during a "value engineering" exercise which is conducted during the remedial design. Nonetheless, EPA believes that the cost estimates in the FS are based on realistic assumptions, and are accurate to within +50% and -30% of the actual costs of construction.

Comment #68: The analysis of remedial alternatives did not consider the impacts on cost or schedule that contaminated materials below the water table at Captain's Cove might have; this could add $100,000 to $500,000 to the cost.

Response #68: It was assumed that there would not be a significant volume of contaminated materials below the water table at Captain's Cove to significantly impact cost or schedule. The depth to groundwater in Area A, as determined during two rounds of groundwater measurements in monitoring wells MW-6 and MW-8, generally ranged from 10 to 11 feet below ground surface (bgs). The maximum concentration of radiologically contaminated materials in Area A generally occurred between 2 to 10 feet bgs. The depth to groundwater in Area G, as determined from two rounds of groundwater level measurements in monitoring wells MW-7 and CDM-1, generally ranged from 7 to 13 feet bgs. The maximum concentration of radiologically contaminated materials in Area G generally occurred between 2 to 12 feet bgs. Consequently, the great majority of soils to be excavated are expected to be above the water table.

Comment #69: The cost presented in the FFS to implement the selected remedy was underestimated by approximately $30 million to $75 million, due to unsupported assumptions regarding the effectiveness of the source reduction activities and underestimated volumes of the soil that exceed the proposed cleanup criteria. Even if EPA's soil volumes are correct, the cost of the Plan is still underestimated by $22 million to $52 million.

Response #69: EPA disagrees and believes its assumptions regarding radionuclide separation and general volume estimates are reasonable for the purposes of cost estimating, as discussed in its previous response.

Comment #70: The estimated costs do not appear to have included stockpiling and staging the excavated materials prior to source reduction activities or transport to an off-site disposal facility. The FFS estimated Site excavation costs at $2.75 per cubic yard. Actual costs for excavation, stockpiling and staging removed soils at a cleanup site in New York were $33/cubic yard. Similarly, actual soil removal costs at the Metcoa Radiation site were $55/cubic yard. Using the estimated soil volumes in the FFS, the excavation costs were underestimated by $1.7 to 2.8 million.

Response #70: Stockpiling and staging of excavated soils was factored into the processing cost, not the excavation cost. Rail transportation costs for all radiological contaminated materials were included in Alternatives LS-2 and CS-2, Alternatives LS-3 and CS-3 and Alternatives LS-4 and CS-4; truck transportation costs for all nonradiological contaminated materials was included in Alternatives LS-2/CS-2 and Alternatives LS-4/CS-4.

Comment #71: No costs for backfill were included, which could range from $750,000 to $1.1 million.

Response #71: Backfill costs were inadvertently omitted from the cost estimate. Some areas where ore residues were stockpiled or disposed of at the surface (e.g., Dickson Warehouse, middle portion of Parcel B, and upper portion of Parcel C) will not require backfill in amounts equivalent to the volume of cubic yards removed. While the cost of backfill might approach the cost indicated, because it is missing from all alternatives, the relative cost differences between alternatives would not change.

Comment #72: The unit cost for disposal of radiologically contaminated soils is significantly lower than quotes obtained from private PRPs. The unit costs for disposal used in the FFS appear to be low by a factor of 2 to 5 times. If volumes in the FFS are correct, then this underestimation could range from $8 M to 28 million. If the volumes are underestimated, then disposal costs are underestimated by $12 million to $42 million.

Response #72: The unit costs for disposal of radiologically contaminated material were based on a contract rate that the USEPA Region II and the Corps of Engineers has established with EnviroCare of Utah, Inc.

Comment #73: Actual disposal costs at Subtitle D landfills in the region were $30 per ton in the last year, a figure well below the value used in the FS. Therefore, increasing the amount of materials that can go to a Subtitle D landfill will significantly reduce costs.

Response #73: Disposal of nonradioactive material in a Subtitle D landfill, regardless of the actual dollar/ton cost, is the least

expensive disposal option of any considered in the FS. This in itself provides strong justification for the use of an effective volume reduction technology or strategy. The effectiveness of the volume reduction is directly proportional to the cost savings that can be realized on disposal costs.

Comment #74: The cost estimates in the FS do not address the following tasks:

- Construction of truck loading facilities, such as roadways, ramps, truck-washing facilities etc., demobilization of these facilities, as well as decontamination efforts at the truck-to-rail transfer station.

- Health physics and material sampling program, including training, personnel and equipment monitoring, effluent and environmental monitoring, medial checks, site access control, sample collection and control, and analyses using on-Site or off-Site labs.

- Administrative and management costs.

- On-site administrative offices, sample storage and facilities, wash facilities.

- Reimbursement of Agency costs and their consultants for oversight of the project.

- Development and implementation of a public awareness and education program for all alternatives.

- Decontamination of building debris before disposal at a Subtitle D facility.

Response #74: Cost estimates were developed in accordance with EPA's Remedial Action Costing Manual (EPA, 1985) and include direct, indirect and annual Operations and Maintenance (O&M) costs. The estimates are intended to be conceptual cost estimates, not detailed construction cost estimates. As stated previously, the estimated costs made during the FS are expected to provide an accuracy of +50% to -30%, based on the data collected during the RI. EPA believes that the costs derived for the FS are within these limits. In addition, EPA believes that the estimated FS costs account for nearly all of the items identified in the above tasks, except EPA oversight costs which are typically not included. More detailed cost estimates which will be prepared during remedial design will include the individual costs of most of the items listed above.

Comment #75: Concerning Alternatives LS-2 and CS-2, remediation may have to address substantial quantities of mixed wastes. No volume estimates or cost estimates of mixed wastes were provided.

Response #75: Analytical data (e.g., chemical, radiological and TCLP analyses) of ore residue samples collected from the Dickson Warehouse as well as other radiologically-contaminated soil samples were sent to EnviroCare. Based on examination of those samples, EnviroCare indicated that they would not consider this material as mixed waste. Therefore, no disposal costs for mixed waste were included in the FS report.

Comment #76: There is no cost component for Alternatives LS-3 and CS-3 for construction of an on-site containment cell, although costs for a RCRA capping system are estimated.

Response #76: EPA acknowledges that the footnotes and explanations provided with the cost estimates for Alternatives LS-3 and CS-3 could have been written more clearly. The costs did include construction of a cell (10 feet deep) over approximately 0.9 acre for Alternative LS-3 and 1.36 acres for Alternatives CS-3.

Comment #77: Reported unit costs using SGS are significantly higher than the $55/cubic yard assumed in the FFS and Proposed Plan, ranging from $87/cubic yard to $236/cubic yard (DOE Reports). Mobilization/demobilization costs are also not included in the FFS, and could range from $100,000 to more than $500,000. The costs to manage oversize material by screening, crushing, etc. was also not included. This could cost approximately $75/ton, also a total of $325,000 to $500,000 for the entire Site.

Response #77: The processing cost varies significantly with the volume of soil scheduled to be processed at the time a contract is awarded. The range of cost mentioned from DOE Reports is also a function of the following: 1) all projects were firm fixed price contracts to process a given volume of soil (e.g., 1,000 cubic yard) and during processing the client reduced or only allowed a

smaller volume (e.g., 400 cubic yard)to be processed; or 2) the client was more interested in collected data instead of volume processes or reduction. Based on 12 deployments of the SGS, the mob/demob costs have ranged from $85,000 to $135,000. An estimated volume of expected oversize material and type of material impacts the handling costs that would be included.

The cost of mobilization/demobilization for the SGS system was factored into the $55/cy unit cost for SGS. Special handling costs (e.g., oversize material) were not specifically addressed, however, we do not believe that there will be enough oversize material to significantly increase the true cost of separation.

v) On-site containment

Comment #78: The long-term effectiveness of an on-site containment cell is questionable.

Response #78: EPA agrees, and believes that excavation and disposal remedies are generally preferable to containment cells that require maintenance to ensure that site risks are managed properly.

Comment #79: Alternative LS-3 would be favorable in view of lower capital costs, and the fact that off-Site disposal of non-radioactive soils is unnecessary and would not provide significant additional overall protection of human health and the environment, if the on-Site containment was properly designed, constructed and operated, and the property used for non-residential purposes. The 9 criteria would be satisfied.

Response #79: While the on-Site containment of nonradioactive wastes was probably the least costly, protective alternative evaluated, EPA felt that the cost savings were not significant enough, especially when present worth costs were calculated, to offset EPA's preference for excavating the waste to avoid incurring long-term maintenance costs. EPA also took into consideration the additional restrictions on land use that would be required should a large cell be placed on Parcel B, as well as the community's preference that the material be removed from the Site.

Comment #80: For Alternatives LS-3 and CS-3, stabilization treatment and a RCRA disposal cell and cap were presumed necessary even though none of the RI samples failed TCLP. No technical basis for these protections was provided as opposed to other protective cover systems, e.g., parking lots, soil cover, etc. The risk reduction goals can be achieved (using on-Site disposal) without treatment/RCRA disposal technology, and there are no specific regulations requiring treatment and RCRA-type on-Site disposal.

Response #80: While none of the samples collected during the RI failed TCLP, there were several reasons why EPA developed an on-site

treatment and containment alternative. Alternatives LS-3 and CS-3 satisfy the preference for remedies that employ treatment as a principal element (the FS did not include any other treatment alternatives) and are cost-effective. Although none of the RI samples failed TCLP, the number of samples collected was limited, and EPA cannot be assured that all of the material will pass TCLP without additional testing. The fact that there were some high concentrations of metals in the groundwater, albeit localized, indicates that the metals-contaminated materials can leach and be mobilized to an extent, and therefore could continue to have an impact on the groundwater. Treatment of the metals-contaminated soils through on-site stabilization would minimize the continued leaching of these materials. While the stabilized materials would not necessarily need to be placed in a containment cell, given the fact that the site is located above a sole source aquifer and the fact that the concerns about this aquifer are significant enough that the Long Island Landfill Law was enacted, EPA felt that the containment cell could provide an extra measure of protection for the groundwater.

Comment #81: A PRP suggested that EPA's rejection of on-site containment of radioactive wastes was based upon improper assumptions, and did not consider some important benefits of containment as elaborated below:

(a)The Long Island Landfill Law does not preclude on-site containment of materials at CERCLA sites and is not sufficient reason to reject on-site containment of radioactive materials. The Landfill Law was also not identified by EPA as an ARAR, and therefore should not be used to reject alternatives. Further, the Landfill Law doesn't apply to CERCLA remedial actions. The use of the Site to contain the radioactive waste certainly does not represent the development of a new landfill, nor is it an expansion of an existing landfill. The rationale does not appear to be consistent with the fact that DEC just selected on site containment of certain solid wastes as the remediation for Captain's Cove, nor with the fact that EPA developed a containment alternative in the FS to address the nonradioactive wastes. Even if the Landfill Law were applicable, it does not absolutely prohibit on-Site containment, as the law contains several exemptions.

(b)The sole source aquifer designation for Long Island does not preclude on-site contaminment of wastes, it only precludes Federal financial assistance for projects which EPA determines may contaminate the aquifer. Incidentally, the sole source aquifer provisions are not identified as ARARs in either the Proposed Plan or the FFS.

(c) The explanations involving (containment) not being protective are without foundation. EPA has determined that on-Site containment is protective at other Superfund Sites, like Denver Radium, which is very similar to the Li Tungsten site in terms of contaminants, demographics, etc.

(d) Rejecting on-Site containment of radioactive wastes without evaluation was improper because it ignores CERCLA's statutory mandate that EPA select cost-effective remedial measures and the CERCLA preference for remedies which employ on-site treatment; the PRP indicated that on-site stabilization and contaminment would satisfy these objectives.

Response #81: EPA understands the PRP perspective that the Long Island Landfill Law might not be ARAR for containment of radioactive wastes in a situation where the remedy relies exclusively on containment. However practically speaking, given the areal exent of contamination, the hilly terrain on Parcels B and C, the presence of remaining structures and foundations, and redevelopment plans (and required infrastructure), EPA does not believe that a containment remedy could be implemented without significant excavation and subsequent placement of contaminated materials. It is clear that the placement of contaminated materials would trigger the Long Island Landfill Law. Therefore, from EPA's perspective, the containment remedy cannot practically be implemented without violating the Long Island Landfill Law. Furthermore, EPA believes that other laws and regulations, most notably 10 CFR Part 40 and NYS's NYCRR 6 Part 380, specifically address the containment of radioactive waste and puts forth criteria that would be difficult if not impossible to meet during a CERCLA cleanup of this Site. As a point of clarification, DEC's selected remedy for Captain's Cove did not include containment. EPA's rationale for evaluating a containment option for the stabilized nonradioactive soils is provided in **Response #81.**

EPA agrees with the comment regarding that EPA's sole source aquifer designation does not preclude containment of wastes. However, in selecting remedies for Superfund sites, EPA does give significant consideration to remedies that provide long-term, permanent protection of sole source aquifers.

EPA strongly disagrees with the comment that EPA's explanation regarding the lack of protection associated with on-site containment of radioactive materials is without foundation. The primary reason why the concept of on-site containment of radioactive materials was rejected by EPA without being carried forward to the formulation and detailed analysis of alternatives stage is that EPA could not consider it truly protective in the long-term in a densely developed area like the City of Glen Cove.
And finally, on-Site containment of radioactive materials would have been precedent-setting in EPA-Region II (New York, New Jersey, PR and VI), and as such, EPA feels that it simply would not have been implementable in the face of potential community and State opposition. EPA has received approximately 900 petitions from concerned citizens who are concerned about temporary fugitive radioactive dust emissions from this Site. EPA believes this response would have been greatly magnified, indeed overwhelming, had the first radioactive containment remedy in Region II been proposed for the Site.

vi) Radionuclide Separation

Comment #82: What monitoring has been done vis-a-vis radioactive separation technology at other sites? Have there been studies on the short-term or long-term impacts of these cleanups?

Response #82: Various types of air monitoring have been conducted at sites where the Segmented Gate System (SGS) technology has been utilized depending upon location. Some of these sites (e.g., Middlesex, NJ and West Valley, NY) have been in or near residential areas where there were community concerns regarding air releases. None of the monitoring data indicated that a release above allowable concentrations had occurred beyond the site boundaries. At a Department of Energy (DOE) site in Texas, it was determined by the Texas Natural Resources Conservation Commission that the proposed SGS operation was exempt from permitting requirements because the anticipated emissions were far below the allowable concentrations at the site perimeter. One of the ARARs that EPA will meet during implementation of the Selected Remedy will be the National Emissions Standards for Hazardous Air Pollutants (NESHAP) regulation contained in 40 CFR Part 61, which limits exposures to the maximally exposed member of the public to 10 mrem/year incremental dose.

Comment #83: Radiation separation effectiveness is uncertain until pilot testing can be performed during design. It is not mentioned whether a specific separation technology has been chosen. An unproven technology should not be relied upon to achieve cost savings, as it may wind up costing more than Alternatives LS-2 and CS-2 and not result in substantial separation. Therefore, its dubious cost savings outweigh the risks, flaws, and dangers that it poses. If there are problems with the separation of radioactive and nonradioactive fractions, the preferred remedy could be a higher cost than what is now estimated. Since the separation process will not be perfect, it could result in a higher level of contamination being left in the soil after remediation than if complete removal is accomplished under Alternatives LS-2 and CS-2.

Response #83: It is true that additional pilot or other testing of specific separation technologies would need to be performed during the remedial design which is why EPA is not selecting a specific separation technology at this time. Treatability studies and/or pilot testing during the remedial design, will provide the information necessary to determine if the technologies will be cost-effective.

Comment #84: The percent of radiation Superfund sites is small, and only a few have gotten to the remediation phase. Therefore, EPA's experience is limited in this regard. In fact, Li Tungsten could be unique, vis-a-vis its powdery ore residuals. Therefore, EPA does not have the experience with soil separation to assure the community that the selection of a less costly alternative will pose no additional health risk.

Response #84: As indicated previously, EPA has extensive experience in the cleanup of sites contaminated with radiological materials. At the Glen Ridge and Montclair/West Orange Radium sites in Essex County, New Jersey, EPA has been cleaning up residential and public properties since 1991. Radiologically-contaminated soil originating from a nearby radium processing facility in the early 1900s was used to bring low-lying areas in the residential communities up to grade. Several hundred homes were subsequently built on top of the contaminated soil. The contamination extends down to about fifteen feet below the ground surface in many locations. Removal of the contaminated soil requires that the houses be underpinned and subsequently restored to their original conditions. To date, more than 150,000 cubic yards of contaminated soil have been successfully removed from hundreds of properties at a cost of over $200 million.

Similar to the Glen Cove community, the residents of the densely-populated Essex County communities were very concerned about the contamination and cleanup project. EPA worked closely with local officials and affected residents to allay their fears. Health and safety plans and monitoring programs as well as transportation plans were developed with considerable input from the communities. Monitoring stations were established around the perimeter of the impacted areas to ensure that no contaminated materials migrated away from the site. All vehicles leaving the site were thoroughly decontaminated and scanned, again to ensure that the vehicles would not carry contaminated dirt onto local roads. The trucks carrying contaminated soil away were securely covered and checked with scanning monitors so that fugitive dust would not impact residential areas. These and other measures have enabled EPA to implement the cleanup project without incident.

It is important to note that most ore processing involves the grinding down of the ore to increase the surface area, thereby maximizing extraction efficiency. The finer ore materials at such sites however, are typically found "blended" with soils and other waste materials, which typically contain moisture in the percentage range, and therefore do not exhibit the properties associated with fine powders.

Comment #85: The SGS will prolong the presence of the radioactive material in residential locations. Therefore, Alternatives LS-2 and CS-2 should be selected, since it's the most expedited method of eliminating the risk to the public.

Response #85: EPA estimates that Alternatives LS-4 and CS-4 will take 8 months longer to implement than Alternatives LS-2 and CS-2. The risks from excavation and materials handling will be mitigated by health and safety considerations as discussed in EPA's response to Comment 2.

Comment #86: There is not a sufficiently demonstrated technical basis to conclude that the SGS will achieve the separation

efficiency assumed in the FFS, given the low cleanup criteria. The FFS assumed that 55% reduction in the volume of soils can be achieved. This is not supported by the technical literature.

Response #86: The ability of the SGS technology to detect radium or thorium contamination at 5 pCi/g has been demonstrated and documented at the New Brunswick, NJ cleanup project in 1996 where over 4,800 cubic yards of similar wastes and contamination were reduced in volume by 55%. Follow-up verification sampling documented that the cleanup levels were achieved.

Comment #87: Published reports indicate that the SGS is prone to unscheduled pauses and mechanical challenges, and that the system tends to be operational during only 50% of planned operating schedules.

Response #87: The published reports documented the material handling challenges that were unique at each site and how they were overcome. Some demonstrations were conducted under extreme conditions for the purpose of determining how to overcome the failures. During the Fall of 1998, software and mechanical upgrades were made which reduced and almost eliminated pauses due to gate failures. Delays due to material handling are expected but minimized by past experience when they occur. For example, if a site has a lot of grass or sod, the grass is mowed extremely short or killed prior to excavation. The grass is processed along with the soil. If the grass root ball is not reduced, it will clog the screen deck and cause delays.

The SGS was deployed to Los Alamos National Laboratory in March 1999 to remediate over 2,500 cubic yards and recorded an average daily operational time of 6.48 hours out of a 10-hour day and an average volume processed volume of 170 cubic yards/day.

Comment #88: The SGS cannot process oversize or wet material. Neither limitation was factored into EPA's costs or schedule for implementing the remedy.

Response #88: The SGS processes material that can pass through a 1.5-inch screen deck. It is true that the SGS does not process material that is rejected from the screen unless it is crushed and/or shredded. Based on previous experience, however, very little contamination will be present in the oversize material. Oversize material can easily be scanned with a hand-held detector or sampled. Depending on the volume of oversize, it may be less expensive to call it above criteria and dispose of off-site.

The SGS can process clay soils with moisture contents up to 16 percent by weight and sandy soils with moisture contents up to 25 percent by weight. The majority of soils that will be processed lie above the water table and consists of mainly of sandy soils. All soil to be processed by the SGS is first stockpiled allowing any excess moisture to evaporate or drain from the pile.

D. Remedy Implementation Issues

Comment #89: It was also requested that the required monitoring include an Environmental Radiation Ambient Monitoring System (ERAMS) to be operated by the EPA Office of Radiation and Indoor Air (ORIA), to monitor radioactive pollutants on the site, around the site, and at numerous monitoring stations around Glen Cove. The EPA should provide radioactive accident assessment capability to protect the Glen Cove population from radioactive fallout.

Response #89: As noted above, the details of the air monitoring program will be developed during the RD as part of the HASP. At that time, EPA will give consideration to the suggestion that monitoring include ERAMS; EPA can also seek support from ORIA in developing or reviewing any monitoring program that is implemented.

Comment #90: Community involvement during the design phase should take place to ensure that all possible safeguards are specified and implemented, particularly with regard to dust containment structures, decontamination procedures, air monitoring etc.

Response #90: EPA agrees that continuation of its community involvement, particularly with organizations like the Li Tungsten Task Force, is important to keep the public apprised of the progress being made at this Site, and to continue to solicit community input on those issues which have been demonstrated as being of community interest/concern.

Comment #91: What procedures will EPA incorporate into its cleanup plan to prevent trucks and other vehicles from tracking radioactive dirt throughout Glen Cove.

Response #91: Prior to leaving the Site all trucks that are transporting waste, or which have entered a hazardous zone will be subject required to move through a decontamination zone, where trucks will be inspected and screened for contamination; truck tires will be washed to ensure that soil is not tracked off the Site. The radioactive material will be placed in specialized containers prior to being placed on trucks for transport. The non-radioactive metals-contaminated soils will likely be loaded directly onto trucks fitted with tarps. These and other procedures/restrictions to ensure that truck or other traffic/equipment do not track contaminated soil beyond the Site boundaries will be outlined in the remedial design documents.

Comment #92: Will additional intrusive work be done to better define the extent of excavation required?

Response #92: Yes, it is anticipated that additional characterization will be needed to completely delineate contaminated

areas at both properties. This is commonly done at the start of the design phase of the remedy i.e., pre-design sampling. This sampling program will be developed as part of the initial workplans prepared for the remedial design.

Comment #93: Bulk excavation of materials during the Phase I remediation will inevitably lead to mixing of radiologically and non-radiologically contaminated soils and residues. Mixing of the excavated soils increases the overall volume of material which must then be processed through the SGS unit for volume reduction. The cost for this processing is apparently not accounted for in any of the cost estimates. In addition, Phase I activities will add other costs not presently accounted for vis-a-vis maintenance of stockpiled materials, Site security, and double handling after the removal activities.

Response #93: Phase I activities will address approximately 6,000 cy of soil on Parcels A, lower B, and lower C. Due to the contaminant profiles and surficial depth of the material to be excavated during Phase I, their associated volumes, the likely soil composition, etc. It is anticipated that the majority of these soils will be contaminated with heavy metals, but not be radioactive. EPA does not anticipate using sophisticated separation technology during Phase I operations. In certain areas like on lower Parcel C, precision excavation strategy will probably be all that is needed to effect a reasonable separation.
Heavy metals-contaminated soils will be directly disposed of off-site as part of Phase I. Any remaining wastes that require disposal as radioactive materials, will be placed in the Dickson Warehouse for disposal during Phase II cleanup. EPA does not anticipate that the costs associated with not disposing of the residual rad waste during Phase I will be particularly significant.

E. General Enforcement Issues

Comment #94: Who is responsible for the cleanup?

Response #94: Any parties that can be identified as responsible for creating the environmentally hazardous conditions at the Site can be held fully responsible for the cleanup. EPA generally attempts to identify as many of these parties as it can. Should no potentially responsible parties be found, then the responsibility becomes EPA's to use Superfund money to remediate the risks posed by the uncontrolled release or threat of release of hazardous materials at the Site.

Comment #95: How many potentially responsible parties are there, and what are their names?

Response #95: EPA has to date identified 33 entities as PRPs at the Li Tungsten Site. Among these entities are owners and operators of

the Site, as well as transporters and generators of the waste that came to be disposed of there. EPA continues to investigate entities that have some involvement with the Site, and anticipates identifying other PRPs. The PRPs identified to date are as follows:

Advanced Metallurgy, Inc./AMI Doduco, Inc.
Alloy Carbide Company, Cerametals Division
American National Carbide Company
Carbidie, Inc.
Chi Mei Corporation
City of Glen Cove, New York
Contacts, Metals and Welding, Inc./CMW, Inc.
County of Nassau, New York
Cyprus Amax Minerals Company
Duramet Corporation/Cerametal Group
Electrical Contacts, Ltd.
Ex-Cell-O Machine Tool/Textron Inc.
Fansteel, Inc.
    VR/Wesson Company, subsidiary of Fansteel, Inc.
    Hydro Carbide Corporation, subsidiary of Fansteel, Inc.
General Carbide Corporation
General Electric Company/GE Lighting
General Services Administration
Glen Cove Development Company
Hughes Christensen Company
Kennametal Inc.
Kulite Tungsten Corporation
John C. Li
Li Tungsten Corporation
Minmetals, Inc.
Multi Metals Division, Vermont American Corporation
Philips Elmet Corporation/Philips Electronics North America
Sandvik Inc.
Teledyne, Inc./Allegheny Teledyne Inc.
U.S. Department of Commerce
U.S. Department of the Treasury
W.R. Grace & Co.
Wah Chang Smelting and Refining Company of America, Inc.

Comment #96: What is the City's financial liability as a PRP for Captain's Cove? When will a figure be assessed?

Response #96: The Superfund statute is premised on the liability for cleanup costs being "joint and several." In other words, each responsible party at a Superfund site could be sued individually for the full cost of cleaning up a site. Nonetheless, based on the history of the Site, EPA believes that the City of Glen Cove's liability is limited to the costs associated with the Captain's Cove portion of the Li Tungsten site. As such, EPA would only consider the City of Glen Cove to be liable on a joint and several basis for the cost of remediating the Captain's Cove portion of the Li Tungsten site.

It is customary for a group of PRPs at a site to seek to allocate

the liability for cleanup costs among themselves based on each PRP's relative share of liability. EPA is prepared to offer alternative dispute resolution resources to the City and other potentially responsible parties who choose to work together on such an allocation of the Li Tungsten site costs. If the PRPs including the City undertake such an allocation process, a final figure for the City's liability may not be known for some time. On the other hand, if alternative dispute resolution is not used by the PRPs to develop a final allocation, litigation among the PRPs may ensue. An allocation of liability could also be achieved through a litigated outcome, but again, a final figure for the City's liability would not be known for approximately one year.

Comment #97: Has EPA begun to "go after" the PRPs?

Response #97: EPA has provided general notices of potential liability to 33 PRPs, which informs them of their status as PRPs. EPA has also held several informal meetings with some of the PRPS in an effort to acquaint them with Site activities, as well as to discuss their potential liability.

Comment #98: Does the cost or actual details of remedy implementation depend on the PRPs signing on and agreeing to do the work or providing funding?

Response #98: The ROD includes EPA's estimate of the costs for remedy implementation. However, many PRP groups claim they can get work done at less cost than the government. The elements of the remedy is outlined in the ROD would remain the same, i.e., the type of technology, the material targeted for treatment and the level to which contaminated materials are treated. Obviously, if PRPs agree to perform the work some implementation details would have to change. For example, the PRPs would have their own design and construction contractors. In this case, the PRPs would have to demonstrate that the contractors are qualified to perform the work, and EPA would oversee their work.

Comment #99: Is EPA still in the process of identifying PRPs?

Response #99: Yes, EPA is still assessing the information it has regarding other parties in addition to those that were named above. Some of these parties may receive notice in the near future that they are PRPs at the Li Tungsten site.

Comment #100: Will EPA seek to recoup the $10,000,000 in Superfund money already spent at the Li Tungsten site?

Response #100: Yes, EPA will first seek to recover its costs through an RD/RA settlement. Should negotiations fail to produce a settlement, EPA may seek to recover this money through a lawsuit brought pursuant to the seek recovery provisions of the Superfund statute.

Comment #101: Dividing the Site into two operable units is proper. Further, companies who did not send tungsten or radionuclide-related materials to Li Tungsten should not be compelled to contribute to the investigation or remediation of the Captain's Cove property. Likewise, PRPs who did not own, operate or control disposition of byproducts or wastes produced by Li Tungsten and removed to Captains' Cove shouldn't be saddled with cleanup costs of Captain's Cove.

Response #101: Issues regarding the nature of material sent to the Li Tungsten Site for processing and the hazardous substances produced by such processing speak to the divisibility of harm among the PRPs and the allocation of their liability. As such, these issues are more appropriate for an allocation process in which the PRPs may choose to engage.

EPA has identified a number of PRPs for the Site to date based on information that leads EPA to believe that such parties generated, either directly or through their business arrangements with the Li Tungsten Corporation or its predecessors, hazardous substances that came to be disposed of at both areas of the Site. EPA believes that a number of these parties sent tungsten and other material whose processing produced hazardous substances other than radionuclides - that were disposed of at the Site. It is not possible at this time, and may never be possible, to ascertain the specific time frame during which the hazardous substances, disposed of at the Captain's Cove were generated. Therefore, EPA considers parties identified as generator PRPs at the Site to be jointly and severally liable for the full Site costs.

Comment #102: For those who may be compelled to fund or implement remedial action at Superfund sites, cost minimization is an important goal.

Response #102: EPA recognizes the importance of cost-effective cleanups, whether actions are to be implemented by PRPs or utilizing the Superfund. The fact that cost is one of the nine criteria for evaluating remedial alternatives reflects the importance that EPA gives to this criterion. EPA's selection of Alternatives LS-4 and LC-4 which includes measures to reduce the volume of radioactive material, and thereby disposal costs, reflects an effort to try to reduce costs while ensuring remedies are protective of human health & environment and comply with ARARs.

F. General Site Issues

Comment #103: How much of the estimated $29,000,000 cost to clean up the Li Tungsten site will be provided by EPA?

Response #103: EPA follows an "enforcement first" policy, that is,

EPA first seeks to have those parties that are responsible for the contamination (PRPs) perform or pay for the cleanup before utilizing the Superfund. One of the key reasons that EPA has adopted this policy is that there is not sufficient money in the Superfund to pay for cleanup of all sites, so EPA attempts to preserve the fund for those sites which do not have viable PRPs. At this Site, however, EPA is attempting to secure federal Superfund money to perform Phase 1 of the Site cleanup, which involves remediation of the soil contamination on Parcel A and the lower portions of Parcels B and C, as an expedited step in the cleanup process. EPA's preliminary cost estimate for this work is $1.5 M. EPA-Region II believes that the Phase I cleanup represents a unique opportunity to clean up a large portion of a Superfund Site at a fraction of the total remedial costs, and subsequently get the cleaned property back into viable use; therefore, EPA-Region II is trying to secure funding to achieve the Phase I cleanup, which would not be subject to the usual policy of first exhausting the enforcement possibilities.

Funding for the remainder of the Site cleanup (Phase II) could be borne in part or totally by EPA depending on the extent of PRP involvement that develops during post-ROD negotiations. If fund money is needed, its availability would be subject to prioritization by EPA Headquarters depending on the risks posed by the Site in comparison to other Sites across the country; the greater the site risk, the higher the priority.

Comment #104: What is the project schedule, including enforcement steps?

Response #104: Concerning the Phase I cleanup referenced in the preceding response, EPA hopes to secure funding and begin the actual cleanup early in the year 2000. EPA estimates that Phase I cleanup may be completed as early as mid-2000, assuming that there is no delay due to the dredging of Glen Cove Creek (which is discussed in subsequent comments). Within about one month of the issuance of the ROD, EPA expects to begin negotiations with the PRPs for the Phase II work. EPA estimates that this work may be completed by 2002.

Comment #105: What is the current rating of the Site on the National Priorities List? Has the Li Tungsten Site been successful in getting funded in the past?

Response #105: Sites on the National Priorities List do not have numerical ratings which determine their priority for funding by the EPA. At Li Tungsten, funds to perform the RI/FS and removal activities have been readily available. At the present time, however, remedial actions, that is, the actual work needed to carry out the remedy prescribed in the ROD, are subject to prioritization by EPA Headquarters, based on the risks posed by the Site. This placement of a Site on the prioritization list only occurs, however, if no other source of funding is available, i.e., the PRPs are unwilling to conduct the remedial work themselves and are unwilling

to provide funding for EPA to conduct the work. The position of the Site on the prioritization list determines the timing of the funding.

Therefore, if the remedy is not performed by potentially responsible parties, evaluation and comparison of this Site's relative human health risks to other national Superfund sites that require remedial action funding would determine its placement on the prioritization list.

Response #106: Could the data that were used to make the decisions be made available in time to be reviewed and commented on before the comment period deadline?

Comment #106: Since the beginning of the comment period (July 28, 1999), the data used to develop the Proposed Plan and ROD have been available in the repositories for this Site, located at the Glen Cove Public Library, and EPA-Region II offices at 290 Broadway in New York City.

The data are contained in the RI report for Operable Unit 1, the FFS for Operable Unit 2 and the FS for both operable units.

Comment #107: Who are being supplied by the industrial wells mentioned in the Proposed Plan?

Response #107: At the present time, the one industrial well at the Li Tungsten facility is not operational. During the time when the facility was operational, this well was used for process water as well as for fire suppression.

Comment #108: Cost or the EPA's fiscal year should not be an issue as to when or how these decisions are made. The issue of concern should be the health and safety of the nearby workers and residents as well as the wildlife and their natural habitat.

Response #108: Cost-effectiveness is a balancing criterion for the evaluation of remedial alternatives, and EPA is obliged to consider cost-effectiveness when comparing alternatives that have already met the two threshold criteria of protectiveness of human health and the environment, and ARARs. EPA's fiscal year is only a consideration for planning purposes; it does not impact on how decisions are made.

Comment #109: Why wasn't the map showing active and inactive wells on or near the sites included in the Proposed Plan?

Response #109: The referenced map indicated active and inactive municipal water supply wells in the City of Glen Cove. The Proposed Plan is a summary document and only a limited number of tables and figures are typically included such as a site map and cleanup level and cost tables. The ROD, on the other hand, contains all relevant

tables and figures. EPA's RI Report for Li Tungsten, which is available in the public library as part of the Administrative Record for this Site, has a copy of the aforementioned map in Vol. II, Figure 3-6.

Comment #110: Why weren't the environmental problems associated with the Li Tungsten facility known at the time of the facility's closing? Doesn't EPA inspect or keep track of these things?

Response #110: Local and State environmental agencies are generally familiar with and aware of facilities or properties within their jurisdiction with environmental problems. These agencies may seek assistance in addressing these properties at the Federal level as was the case with the Li Tungsten facility which closed in 1985. EPA was made aware of the potential for environmental concerns at the closed facility in 1989. EPA's first action at the Li Tungsten facility was taken in 1989 when it ordered the property owner to perform removal of any acutely hazardous materials from the facility. The more work that EPA did at the Site, the more apparent it became how complex the contamination problems were. These problems were characterized as a result of a two-year comprehensive RI, involving analyses of hundreds of samples from different media. It would be impossible to have characterized the extent of contamination simply from site inspections.

Comment #111: Why hasn't the environmental problems at the Li Tungsten facility been cleaned up by now? When is it going to be cleaned up?

Response #111: There have been two EPA removal actions already completed at the Li Tungsten facility, which have resulted in the removal of many of the radiological, chemical and structural dangers posed by this property. The final stages of cleanup will follow EPA's issuance of this Record of Decision, and will include remedial design and remedial action activities. EPA estimates that cleanup activities at the Site should be completed by the year 2002.

Comment #112: How will the proposed dredging of Glen Cove Creek affect the EPA's efforts to remove waste from the sediment drying area? It does not seem as though EPA was aware of the long time frame associated with the dredging/interim storage at Li Tungsten since it is not mentioned in the Proposed Plan.

Response #112: Although EPA was aware that the City and the Army Corps were intending to dredge the creek in the near future, at the time that the Proposed Plan was issued, EPA was not fully aware of the Army Corps's specific schedule for the creek dredging nor the specific time frame required for sediment drying. At the time, EPA did not believe that there would be a significant conflict in the timing of the sediment-drying activities and the EPA Phase I activities. The creek dredging and sediment drying activities could present some implementation issues which could complicate or delay

the performance of Phase I activities. The intent of expediting the cleanup of the southern half of the facility property (Phase I) is to return part of a Superfund Site to the community for purposes of re-use. In this case, re-use will be determined, within the constraints of the provisions of this ROD, by the Glen Cove Industrial Development Agency, the prospective purchaser of this property. If the IDA feels that the dredging and sediment drying activities should occur as soon as possible, then EPA's fast tracking of Phase I activities may be delayed. Should EPA's Phase I activities not be able to be performed concurrently with the sediment drying, then Phase I activities may be limited to lower Parcels B and C, with the Parcel A cleanup performed after the sediment drying work is completed, or performed as part of the Phase II remediation.

Comment #113: The City, EPA, DEC, and Corps of Engineers must coordinate their efforts so that EPA's time estimates for remediation may be revised in light of whatever the final decisions on dredging might be.

Response #113: EPA agrees with the comment.

Comment #114: The TAG advisor commented that even though some problems existed with EPA's commissioned lab work by O'Brien and Gere regarding the analyses for Po-210 and Pb-210 in the soil/fill material at Captain's Cove, the effort still provided useful information. The TAG advisor noted that "the elevated levels of Po-210 appear to be present only in conjunction with other more easily detectable radioisotopes. Thus, cleanup of the radionuclides of concern will also remove these radionuclides as well. Therefore, no further sampling is needed for site characterization."

Response #114: Comment noted.

Comment #115: The Phase I Remediation activities are not technically justified and should not be implemented. These activities will also increase Site risk, because of the storage of radioactive materials. Exposure to gamma radiation is largely controlled at the present time by the overall areal distribution of the radiological contaminants, as well as their subsurface location. Excavation will result in higher exposure levels.

Response #115: The remedial actions that would take place during Phase I, except for the temporary storage of a relatively small volume of radionuclide-contaminated material in the Dickson Warehouse, are part of the selected remedy, and would merely be fast-tracked to allow for re-use of the lower portion of the Li Tungsten facility first. EPA does not believe that the temporary storage of these materials in the Dickson Warehouse is a significant contributor to any increase in Site risk.

Comment #116: The Phase I remediation was not an element of the Proposed Plan. No documentation has been developed regarding the

technical elements of the proposed Phase I activities that can be subjected to technical review by the PRP group. Additionally, no public comment period was provided for these activities.

Response #116: While the Phase I remediation was not cited in the Proposed Plan, the data and information which relate to this effort are contained in the RI and FS reports. Also, the Phase I activities were presented at the August 16, 1999 public meeting and were also discussed the following day in a meeting between EPA and some of the PRPs for the Site. The materials to be addressed under Phase I represent a relatively small fraction of the volume of waste that will be excavated at the Site.
Although the timing of the Phase I work may be impacted due to the Army Corps dredging of Glen Cove Creek, EPA has proposed to fund this work to allow redevelopment of the Li Tungsten Site in substantial Conformance with the City of Glen Cove Revitalization Plan, which is the " centerpiece for EPA `s Showcase Community designation of Glen Cove. The accelerated placement of these properties back into a commercially viable scenario would also meet the primary objective of EPA's "Recycling Superfund Sites" initiative.

Comment #117: There is insufficient information to link the radioactivity at the Captain's Cove Site to the Li Tungsten Site. Lack of knowledge about the constituents of other industrial wastes emplaced at the Site and of the content of potential sources of NORM (such as dredged material) leaves open the question of the origin of some or all of the radioactivity at the Captain's Cove Site. While the cumulative effect from other radionuclide-bearing waste materials disposed of at Captain's Cove would obviously not account for the localized high concentrations found in subsurface samples in Areas A and G, it could account for the majority of measurements at or slightly above the 5 pCi/g level.

Response #117: There is a significant amount of information regarding the constituents of other wastes that have been placed at the Captain's Cove Site over the years. The City of Glen Cove, pursuant to an order with the NYSDEC, recently conducted an RI/FS at this property under State Superfund law. The RI Report, prepared in 1998, describes the findings of that investigation. There is also much anecdotal evidence of how the ore residuals were disposed of in two locations on the Captain's Cove property during the years when the facility was operational. The ore residuals in the two disposal areas are chemically and visibly similar to the ore materials at Li Tungsten. At the time when EPA was considering linking Captain's Cove to the Li Tungsten Site, radioisotopic analyses of the Captain's Cove and Li Tungsten materials were evaluated by EPA and were found to exhibit characteristics sufficiently similar so that, together with the anecdotal evidence of dumping from the Li Tungsten facility, the linkage between the two properties was made.

Dal
Copied: Dale

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION II
290 BROADWAY
NEW YORK, NEW YORK 10007-1866

1-30-046

MAR 23 2000

VIA FACSIMILE TRANSMISSION
& CERTIFIED MAIL -- RETURN RECEIPT REQUESTED

(See attached list of addressees)

Re: Special Notice Pursuant to Section 122(e) of Comprehensive Environmental Response, Compensation, and Liability Act, 42 U.S.C. § 9622(e), for Remedial Action at Li Tungsten Corporation Superfund Site, City of Glen Cove, Nassau County, New York

Dear Sir or Madam:

As you know, the U.S. Environmental Protection Agency ("EPA") has documented the release of hazardous substances at the Li Tungsten Corporation Superfund Site (the "Site"), located in the City of Glen Cove, Nassau County, New York. Pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended ("CERCLA"), 42 U.S.C. §§ 9601-9675, and in response to these releases and the threat of future such releases, EPA has spent public funds and anticipates spending additional public funds.

Under CERCLA and other laws, responsible parties may be held liable for any costs incurred by the government in taking response actions at the Site. The costs may include, but need not be limited to, expenditures for investigation, planning, cleanup of the Site, and enforcement actions. Responsible parties may also be subject to orders requiring them to take response actions themselves. Responsible parties under CERCLA include, among others, the current and past owners or operators of a facility from which there has been a release or threatened release of hazardous substances, persons who transported hazardous substances to such a facility, and persons who arranged for the disposal or treatment of hazardous substances that came to be disposed of at such a facility. We have previously

notified each of you of your status as potentially responsible parties ("PRPs") for the Site under CERCLA.

As you are aware, EPA has performed certain response actions at the Site, including a remedial investigation and feasibility study, a focussed feasibility study for the Captain's Cove area of the Site, and various preliminary cleanup measures.

EPA released the proposed remedial action plan ("Proposed Plan") for the Site on July 28, 1999. The Proposed Plan documented the preferred remedial alternative as proposed by EPA and concurred on by the State of New York. Its release by EPA began a public comment period which closed on September 17, 1999. EPA documented the remedy it selected for the Site in a Record of Decision ("1999 ROD") issued on September 30, 1999.

As set forth in the 1999 ROD, EPA's selected remedy includes:

- 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.

The groundwater remedy selected in the 1999 ROD includes no action, other than a long-term groundwater monitoring program to assess the recovery of the Upper Glacial Aquifer after the soil remedy is implemented.

The estimated total present-worth cost of the selected remedy as shown in the ROD is $28,000,000. Should you wish to examine any of the documents which form the basis for the remedial actions selected by EPA's 1999 ROD, you may inspect copies of the administrative record during regular business hours at EPA's offices in New York City or at the local repository located at the City of Glen Cove Public Library, 4 Glen Cove Avenue,

Glen Cove, NY 11542. Please contact Edward Als of my staff at (212) 637-4272 if you wish to arrange an appointment to inspect the administrative record at EPA's offices.

In a letter dated December 22, 1999, EPA sought to determine whether you were willing to perform the design of the remedy specified in the 1999 ROD. We expect that the remedial design work will be the subject of an administrative order issued shortly.

In accordance with Section 122(e) of CERCLA, 42 U.S.C. § 9622(e), EPA now wishes to determine whether you are willing to perform or finance the remedial action ("RA") associated with the remedy described in the 1999 ROD, other than "Phase 1" of the RA, as described in footnote 1 of EPA's December 22, 1999 notice letter.[1] Note that the 1999 ROD has not been enclosed with this letter, since EPA enclosed a copy of it (without the attachments) in the December 22, 1999 remedial design notice letter you received.

Pursuant to Section 122(e) of CERCLA, a moratorium on EPA's commencement of the RA (other than Phase 1 of the remedy) will be in effect for a period of one-hundred twenty (120) days from the receipt of this notice, provided that within the first sixty (60) days of the moratorium you make a good faith offer for the performance or financing of the RA. If no such good faith offer is made within the first sixty (60) days, EPA may thereafter proceed with a Federally-funded RA (the costs of which you may be held liable for under Section 107(a) of CERCLA, 42 U.S.C. § 9607(a)), or EPA may issue a unilateral administrative order under Section 106(a) of CERCLA, 42 U.S.C. § 9606(a), requiring you to conduct the RA.

In order for your proposal to be considered a good faith offer, it must be consistent with the 1999 ROD and must include the following elements:

1. A statement of your willingness to conduct or finance the RA which is consistent with the ROD and the enclosed draft consent decree (including the statement of work which will be sent to you shortly);

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[1] We currently project that the "Phase 1" work now underway at the Site will account for approximately $2 million of the estimated $28 million in RA costs. This projection is subject to change as we obtain more information.

2. Your comments, if any, on the enclosed draft consent decree;

3. A demonstration of your ability to finance the RA;

4. A demonstration of your technical capability to carry out the RA, including identification of the organizations that may actually conduct the work or a description of the process which will be used to select such organizations;

5. A statement of your willingness to reimburse EPA for costs incurred in overseeing the implementation of the RA; and

6. The name, address, and phone number of the person or persons who will represent the PRPs in consent decree negotiations with the United States.

Any agreement for the implementation of the remedy selected in the 1999 ROD must be memorialized in a judicial consent decree, pursuant to Section 122 of CERCLA, 42 U.S.C. § 9622. Enclosed is a draft consent decree for the performance of the RA. Please note that many of the provisions of the consent decree are nationally consistent boiler-plate provisions that the United States does not plan to negotiate. Please note further that EPA intends to negotiate one consent decree with all PRPs who have submitted a good faith offer.

You will note that the draft consent decree includes provisions regarding the payment of EPA's past costs at the Site. EPA has incurred approximately $13,446,131.23 in past costs with respect to the Site.[2] The costs incurred by EPA with respect to the Site are charged to the Hazardous Substance Superfund, established pursuant to 26 U.S.C. § 9507 and administered by EPA. As PRPs, you are potentially liable for EPA's costs, plus interest.

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[2] These costs were incurred in both addressing radioactive metals contamination and non-radioactive metals contamination as well as other hazardous substances at the Site. These costs represent all payroll and indirect costs paid by EPA with regard to the Site through September 11, 1999, and all other EPA costs through September 16, 1999. Summary documentation concerning these costs is enclosed. EPA continues to incur additional costs in connection with the Site on an ongoing basis.