SDMS Document
99976

DECLARATION FOR THE RECORD OF DECISION

SITE NAME AND LOCATION

Li Tungsten Corporation Superfund Site

City of Glen Cove

Nassau County, New York

STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected remedial action for the Li Tungsten Corporation 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 Corporation 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

The remedial action described in this document addresses contaminated soil and groundwater at the Li Tungsten Corporation Site. The Site includes both the Li Tungsten facility (designated operable unit 1) as well as those portions of the Captain's Cove property (designated operable unit 2) on which radioactive ore residuals were deposited.

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 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.

In the event that separation of radionuclide-contaminated soil from nonradionuclide soil contaminated with heavy metals cannot be accomplished in a cost-effective manner, the excavated soils will be disposed at appropriately licensed facilities as described in Alternatives LS-2 and CS-2 in the Decision Summary of this Record of Decision.

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 to 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 groundwater are to prevent or minimize ingestion, dermal contact and inhalation of metals-contaminated groundwater on lower Parcel C and on Parcel A that is 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 contaminated groundwater will be hastened by the soil cleanup that is part of the selected remedy. EPA also believes that the

objectives related to minimizing exposure 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
Regional Administrator

Sept. 30, 1999
Date

RECORD OF DECISION

Li Tungsten Corporation Superfund Site

City of Glen Cove
Nassau County, New York

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

500004

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SITE NAME, LOCATION AND DESCRIPTION

The Li Tungsten Corporation 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 approximately 0.5 mile to the west of the Li Tungsten facility on Garvies Point Road (see **FIGURE 1**).

The 26-acre Li Tungsten facility (see **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 other 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, 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 and other metals-processing 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 **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 the remediation of the Site, EPA is addressing Parcel C' as part of Parcel C.

The Captain's Cove property (see **FIGURE 3**) is a 23-acre parcel at the end of Garvies Point Road, approximately 0.5 mile 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 general 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 the 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, Konica Imaging USA, Inc., (formerly the manufacturing facilities known as Powers Chemco and as Columbia Ribbon and Carbon Company), and Crown Dykman Laundry (now operated as a Volvo service facility), 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, 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 Glen Cove Creek. The City's Glen Cove Creek Revitalization Plan was finalized in 1998. The Revitalization Plan projects that future use of the area will be 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. To help implement the Revitalization Plan, 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 of the City.

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.

Some radioactive ore residuals from the Li Tungsten facility were disposed of at the Captain's Cove property. In addition, radioactive ore residuals and other wastes from the processing of the tungsten material 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 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 on Parcel C were also reportedly used to dispose of liquid wastes.

On July 21, 1989, EPA signed an Administrative Order on Consent with the current owner of the Li Tungsten facility property, the Glen Cove Development Corporation (GCDC), for the performance of a removal action at the Li Tungsten facility. Activities performed by GCDC included addressing radioactive materials, removing drummed chemicals and laboratory reagents, addressing a mercury spill, and sampling, analyzing, and inventorying work. Work pursuant to the Order was completed in July 1990.

In 1995 and 1996, EPA performed response activities at the Li Tungsten facility in order to facilitate performance of EPA's RI. The interim measures included the consolidation and temporary relocation of ore materials to the Dickson Warehouse on Parcel C, as well as the removal of significant quantities of debris and vegetation. EPA completed its phased removal activities 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.

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 radioactive wastes, requested that EPA address the radioactive contamination at the Captain's Cove property, while the NYSDEC addressed the chemical contamination under its own State program. EPA subsequently determined that the areas of Captain's Cove where radioactive wastes were located could be considered 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 23-acre Captain's Cove property, and the areas are located in the northwestern and eastern corners of the property, respectively.

Meanwhile, EPA developed a workplan for field investigation of the radioactive ore residuals at Captain's Cove in April 1997 as part of a focused 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.

Enforcement Activity

As noted above, EPA issued an Administrative Order on Consent to GCDC in 1989 to conduct a removal action at the Li Tungsten facility.

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.; Glen Cove Development Corp.; and John C. Li. These letters gave the PRPs 60 days (until April 14, 1992) to submit a good faith proposal to finance or undertake an 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 and in March 1993 again requested that the PRPs agree to perform the RI/FS and enter into an administrative order on consent with EPA. EPA did not receive any offers to perform the RI/FS . While performing the RI/FS, EPA

also continued to develop information as part of its search for additional PRPs, and it has identified and notified an additional 24 parties as PRPS since the original five notifications. EPA continues to investigate the potential Site liability of other parties.

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 notice established a thirty-day comment period. EPA subsequently received requests for an extension of the public comment period and extended the comment period 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 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 site as a "pilot" for the application of 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.

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 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 have 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, Inc. 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 the above field work activities at the Li Tungsten facility.

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 buildings on Parcel A - the Dice Complex and the East Building - were razed and their demolition debris disposed off-Site in 1998 by EPA during the 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., the Carbide Building, Lab/Wire Building, and Loung Building. The structural stability of these buildings is considered borderline. A few areas within the Carbide Building and Lab/Wire Building are contaminated with radioactivity.

The middle of Parcel B and the northern end of Parcel C were used as dumping areas for spent ore and other metals-processing

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 relatively structurally sound and is presently being used by EPA to temporarily stockpile approximately 5,000 cubic yards of radioactive ore/slag residuals. 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 Captain's Cove property, and a paved road enters the property off Garvies Point Road and leads to a parking lot and a demolished condominium sales office near the property's western end. The Captain's Cove property 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 up gradient 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 one acre of the facility.

There are two surface water systems on the Li Tungsten 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 inhabit this area. However, Hempstead Harbor is listed as a Waterfowl Nesting Area and a Significant Coastal Fish and Wildlife 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.

Soil, Sediment and Surface-Water and Groundwater Contamination

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 **TABLES 1** through **4**.

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 PCBs 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 which 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 operations on the Mattiace property and is now being remediated by EPA under the Mattiace Superfund 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; these tanks had 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. The Mattiace Site remedial 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, down gradient 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. The VOCs in groundwater under the Li Tungsten facility are not thought to have originated from the Li Tungsten operations. However, in response to the migrating plume of VOC contamination suspected of emanating from the Crown Dykman Site, the NYSDEC may require future access to portions of Parcel A. This is necessary to allow the State to address this migrating plume if a groundwater remedy is necessary. The preferred treatment alternative for this area will be detailed in the State's future Record of Decision for the Crown Dykman Site.

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, in a few instances, 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 Ra^{228}, which in one well slightly exceeded the EPA standard for that contaminant.

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, 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 is 328 µg/kg, according to the NYSDEC Technical Guidance for Screening Contaminated Sediments.

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). One sample from Area A and one from Area G 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 2.5 times background) 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 analyzed 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 drinking water 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 routine monitoring program for the entire Creek being performed pursuant to the June 1991 ROD for the Mattiace Superfund site. Given the industrial nature of this area, there are many potential sources of contamination in the Creek. The monitoring program was not designed to identify the specific sources of specific contaminants; it consists of four locations along the length of the creek which are analyzed for VOCs, SVOCs, inorganic contaminants, pesticides and PCBs. The results of the first two monitoring events are provided in the RI report, while the results for the third monitoring event are provided in the FS. The third event, conducted in Summer 1998, generally support a decreasing trend in overall contaminant concentrations in the Creek sediments over the past nine years.

The US Army Corps is about to initiate the second phase of the dredging of the Creek as part of the Glen Cove Creek Federal Navigation Project authorized by the Rivers and Harbors Act. The "maintenance dredging" is intended to restore adequate depth to the channel to provide safe navigation for barges and other vessels. The second phase of the project entails maintenance dredging of the Creek from mile 0.3 to mile 1.0; the entire width of the Creek fronting Parcel A will be dredged to a depth of 8 feet, with the exception of a very small area of Creek fronting the westernmost side of the Parcel, which already provides an 8 foot channel. Approximately 35,000 cy of material will be dredged and transported by pipeline to Parcel A for de-watering. The first phase of the project performed in 1996 was conducted at the mouth of the Creek (mile 0 to mile 0.3); approximately 12,000 cy of sediment was removed as part of this effort. Prior to performing the first phase of the dredging, the Army Corps sampled the length of the Creek in order to evaluate disposal options for the removed sediment; these results are provided in the FS.

The beneficial impact of the dredging of the mouth of the Creek was clearly evident in the third sampling event. The sampling results

for the westernmost sampling location (GC-03), located in the dredged area, detected arsenic at a maximum concentration of 15.9 mg/kg and lead at 181 mg/kg. VOCs were not detected in this location, except for acetone in very low concentrations. In general, the third sampling event results when compared to the two previous events, indicated decreasing levels of SVOCs, 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. Analyses were not performed for radionuclides from the uranium and thorium series, but previous sampling has indicated no radioactive contamination above background levels.

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 were 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 Glen Cove Creek 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 commercial future risks and hazards to 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 and is presented in the Tables for the main chemical contributors. In addition, noncancer human health hazards 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 results 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 to a reasonably maximally exposed individual 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 Hazard Index (HI) (which reflects noncarcinogenic effects for a human receptor) equal to 1.0. An HI greater than 1.0 indicates a potential for noncarcinogenic health effects.

For purposes of the risk assessment, the Li Tungsten facility was separated into the following areas:

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

The Captain's Cove property was separated into Area A and Area G. For both properties, the groundwater data is Site-wide.

Hazard Identification

During data evaluation, relevant site information is compiled and analyzed, in order to select contaminants of concern (COC). For the Li Tungsten Site, several radionuclides, inorganic chemicals, and organic compounds meeting appropriate QA/QC requirements were selected as COCs because of the potential hazard they pose to human health and the environment under current and future conditions. 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, manganese, cobalt, lead and antimony, as well as thorium and uranium series radionuclides. Predominant contributors to hypothetical groundwater risks were VOCs such as trichloroethylene, tetrachloroethylene, chloroform, methylene chloride, and vinyl chloride, and inorganics such as arsenic and antimony.

Soil data (i.e., surface soil and a composite of samples across various depths) 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.

The COCs were selected based on chemicals exceeding the upper bound of the cancer risk range (i.e., 1 in 1,000,000) or a Hazard Index of 1. The COCs are categorized based on areas and parcels for soil and site-wide data for groundwater. **Tables 5A-F** summarize the COCs, and exposure point concentrations for each of the COCs detected in soil at the Li Tungsten facility. Exposure point concentrations (EPCs) are defined as the concentrations used in estimating the exposure. Separate EPCs were developed for each COC in the soil, sediment, surface water and groundwater for specific portions of the Site. Separate modeling of air particulates for the off-site resident and worker were calculated and are shown in **Table 5F**. The tables include the range of concentrations detected for each COC, as well as the frequency of detection, the EPC, and the derivation of the EPC. Arsenic, antimony, lead and manganese had the highest frequency of detection in soil. Volatile organic compounds (VOCs) including benzene, vinyl chloride, and trichloroethylene were the primary chemicals found in groundwater.

For the Captain's Cove property, **Tables 6A-E** summarize the COCs, frequency of detection, and EPC for the COCs. A similar categorization scheme was used for Areas A and G on the property and for the site-wide groundwater COCs.

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 individuals on and around the Li Tungsten facility and Captain's Cove property. **Tables 7 and 8** provide conceptual site models of potential exposures for Li Tungsten and Captain's Cove, respectively. Specifically, current exposures were calculated for children and adults living off-Site (i.e., at the boundaries of the property) who may be exposed through wind-blown dust. The dust EPC was calculated using the results of the Industrial Source Complex Short-term model. Other populations evaluated include: adolescent trespassers who may enter the property without authorization and hypothetical future individuals such as adult and child residents, adolescent trespassers, Site workers and construction workers at both properties. Future residential receptors were evaluated primarily for reference value, since EPA believes that the future use of the Site will be commercial.

At the Li Tungsten facility, the exposures evaluated included soil and groundwater ingestion and dermal contact at ground surface and

a composite sample of several soil borings at depth. Other routes of exposure include: future residential use of groundwater including inhalation of volatilized organics while showering. The air concentrations in the shower were modeled. Off-Site residents may also be exposed through inhalation of wind-blown dust based on modeled concentrations. Other exposed populations include: construction workers who would be on the property for a shorter period of time than the on-Site workers who were also evaluated.

For the Captain's Cove property, similar populations were evaluated i.e., child and adult future resident, adolescent trespasser, on-Site worker, and construction worker. **Table 8A and 8B** provide conceptual models for the radiological portion of the assessment as well as the chemical assessment, respectively.

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, the wind-blown dust concentrations were modeled using the Industrial Source Complex Short-term model.

In addition to the calculation of exposure point concentrations (**Tables 5A-F and 6A-F**), 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, oral and inhalation cancer slope factors, and oral and inhalation reference doses were used to estimate the carcinogenic and noncarcinogenic hazards associated with Site contaminants. Tables **9A-E** (Li Tungsten) and **10A-E** (Captain's Cove) provide the chronic toxicity information for the COCs based on information in the Integrated Risk Information System (IRIS), the 1997 Health Effects Assessment Summary Tables, and EPA's National Center for Environmental Assessment Superfund Technical Support Team. The risk estimators used in this assessment are accepted by the scientific community as representing reasonable projections of the hazards associated with exposure to the various COCs.

At this time, cancer slope factors and Reference Doses are not available for the dermal route of exposure. Thus, the dermal slope factors used in the assessment have been extrapolated from oral values using appropriate adjustment factors based on data on the chemical's absorption. Adjustments in the oral cancer slope

factors and Reference Doses are listed in **Tables 9A and 10A** for the Li Tungsten facility and Captain's Cove property, respectively.

A number of chemicals lack adequate toxicity information to quantify the potential risks and hazards associated with exposure. A list of the chemicals not quantitatively evaluated are provided in the Li Tungsten RI and Captain's Cove FFS documents. Lack of data to quantify risks and hazards for these chemicals may potentially underestimate the risks and hazards at the Site.

Human epidemiological data on carcinogenesis from exposure to ionizing radiation are more extensive than that for most chemical carcinogens. The cancer slope factors were obtained from IRIS or the 1995 Health Effects Assessment Summary Tables consistent with EPA guidance.

Risk Characterization

The Risk Characterization summarizes the risks and hazards for chemical contaminants through various routes of exposure. For carcinogens, risks are generally expressed as the incremental probability of an individual's developing cancer over a lifetime as a result of exposure to carcinogens. Risk is a function of the chronic daily intake averaged over a 70-year period and the cancer slope factor that indicates the relative cancer potential of the chemical.

The potential for non-carcinogenic effects is evaluated by comparing an exposure level over a specified time with a Reference Dose. The Reference Dose represents a level that an individual may be exposed to that is not expected to cause any deleterious effects. The ratio of exposure to toxicity is represented as a Hazard Quotient. Hazard Quotients less than 1 indicate that a receptor's dose of a single contaminant is less than the RfD, and that toxic non-carcinogenic effects from that chemical are unlikely. The Hazard Index is the sum of multiple chemical exposures across multiple routes.

Li Tungsten Facility

The risks presented in **Tables 11A-F** for the Li Tungsten facility and **12A-E** for the Captain's Cove property summarize the cancer risks from chemical and radiological exposure for those chemicals and radionuclides with risks greater than 1 in 1,000,000. The analysis for individual receptors is identified based on Areas A, B, B + C, and C. Risks to the off-Site population and through groundwater were developed based on Site-wide groundwater information and an air dispersion model.

A similar procedure was followed for the evaluation of non-carcinogenic hazards. **Tables 13A-F** summarize the hazards for specific receptors based on exposure locations at the Li Tungsten facility. Tables **14A-F** summarize the hazards for the non-carcinogenic chemicals.

Lead was evaluated qualitatively based on the 1994 OSWER Directive and a screening level of 400 mg/kg. A quantitative evaluation was not possible based on the lack of specific toxicity factors.

Chemical Risk

Table **11A-F** and **13A-F** summarize the risk and hazard estimates for the significant routes of exposure (i.e., inhalation, dermal, ingestion and external radiation) for various receptors at the Li Tungsten facility. These risk estimates are based on a reasonable maximum exposure and were developed by using various exposure assumptions based on route of exposure and individual exposures (i.e., child, adult, worker).

Chemical analyses of soil samples at the Li Tungsten facility 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 carcinogenic risks for these metals primarily exceeded [illegible] x 10^{-4} for arsenic through the ingestion, inhalation and dermal pathways. The risks through ingestion of Site-wide groundwater were also predominated by arsenic with VOCs also contributing to the total risk. The radionuclides also resulted in exceedences of the upper bound of the risk range i.e., 1 x 10^{-4}. These elevated risks were seen for current trespassers, and future land use including commercial development and residential land use. Risks to construction workers and future Site workers also exceeded the upper bounds of the risk range.

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, the future commercial Site worker's exposure to the chemicals of concern in Areas 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 6.0×10^{-3} and a noncancer HI of 300, as a result of exposure to arsenic and antimony. Likewise, a current 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 based on highly conservative modeling and does not account for vegetative soil cover at the Site, which significantly reduces the potential for off-Site windblown transport of contaminated dust. 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 up gradient from the Site.

At the Captain's Cove facility the chemical risks exceeded the upper bound of the risk range for future adult site workers i.e., 6 in 100 primarily based on arsenic exposure. The risks to the construction worker were elevated at 5 in 10,000 primarily based on arsenic exposure. Similar elevated risks were also found for the future adult and child residents.

The non-cancer hazards also exceeded 1 at the Li Tungsten and Captain's Cove properties. **Tables 13A-F** and **14A-F**, respectively, summarize the hazards by specific organ groups. At Li Tungsten the hazards were consistently above 1 for each receptor group with arsenic as the primary contributor. Under the current scenario, the adolescent trespasser had an elevated hazard of 6 in Area B, 19 in Area B + C, and 5 in Area C. An elevated hazard of 4 from sediment exposure was also identified. Similar hazards were found for the future Site worker (HI = 30 for arsenic exposure in Area B + C) and construction worker (HI = 30 for surface soil exposure in Area B + C). Elevated HIs were also found for arsenic in groundwater (i.e., 50 for the future adult residents).

At the Captain's Cove property, the non-cancer hazards were also elevated for the future construction worker (i.e, HI = 91 for manganese and HI of 12 for arsenic in Area A and HI of 900 for manganese in Area G). Similar hazards were identified for the future child and adult resident.

Lead

Lead was identified as a contaminant of concern at the Li Tungsten and Captain's Cove properties. At Li Tungsten, lead in soil ranged from 30 to 3,710 mg/kg in Area B and 4 to 19,600 mg/kg in Area B + C. A similar pattern was found in Area C with lead concentrations ranging from 8.3 to 5,140 mg/kg. These levels were significantly above the background concentration of 3.9 to 103 mg/kg. The levels in groundwater also exceeded the current EPA Action Level.

At Captain's Cove, lead in soil ranged from 95.1 to 512 mg/kg. In Area G, the maximum lead concentration was 3,000 mg/kg.

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.

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.

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 100,000), while the cancer risk in Area G was calculated to be $1.1\ X10^{-4}$ (or a risk of approximately 11 in 100,000), 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.

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 (RAOs) 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 groundwater 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 and are 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 that contamination of Glen Cove Creek's sediments has been addressed 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 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 15**; 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 15** 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 for arsenic and radium 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.

The Proposed Plan evaluates, in detail, both soil and groundwater alternatives for the Li Tungsten Site. The soil alternatives address both contaminated soil and sediments. Soil alternatives evaluated in the Plan for the Captain's Cove property address the two areas of ore residuals disposal, since the other areas of this property with only nonradioactive contamination have been 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 one billion years, as well as Long Island's sole source aquifer designation,

alternatives that would not permanently remove wastes containing the thorium and the uranium series radionuclides from the Site to protect future generations 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 permanent radioactive waste disposal areas. Similarly, the consolidation and on-Site containment of radioactive wastes would not comply with the Long Island Landfill Law (NYS Environmental Conservation Law 27-0704), 6 NYCRR Part 380 etc. Thus, in developing the alternatives for soil remediation, on-Site containment of radioactive wastes was not included as an alternative.

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 and other metals-processing residuals (including those radioactive ore residuals presently staged in the

Dickson Warehouse) would be addressed. Soils, sediments, and ore and other metals-processing residuals contaminated above cleanup levels would be excavated in the various contaminated areas of the Li Tungsten 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 and other metals-processing 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.

Additionally, several structures would be demolished to eliminate hazards posed by structural instability and hazardous construction materials (i.e., 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 deed restrictions 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 and other metals-processing residuals would be addressed via a volume reduction technology or strategy, e.g., the Segmented Gate System, or SGS; 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 cubic yards of soil, sediment, and ore and other metals-processing 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 deed restrictions be placed on the Captain's Cove property both to prevent it 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 nonradioactive, but metals-contaminated wastes.

Excavated soils and ore and other metals-processing 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 perpendicularly 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 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 up gradient 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 its 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 facility to the Mattiace Site's groundwater treatment plant. The flow from the Li Tungsten facility (estimated at approximately 10 gallons per minute), when combined with flow from the Mattiace extraction wells, would be approximately 20 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 waste stream from the Li Tungsten facility. 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 its 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 down gradient of the existing inorganic contamination. The reactive wall would be installed below-ground to a depth of approximately 30 feet bgl. It 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 down gradient 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. These nine criteria are as follows: overall protection of human health and the environment; compliance with applicable or relevant and appropriate requirements; long-term effectiveness and permanence; 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. This criteria 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 Alternatives LS-4 and CS-4 would achieve protection of human health and the environment by removing the contaminated soils, sediments, and ore and other metals-processing 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. These alternatives would achieve protectiveness from the heavy metal contaminants by stabilizing and containing them on-

Site, thereby reducing or eliminating the various exposure pathways and potential for cross-media impacts to groundwater that presently exist.

Compliance with ARARs

Alternatives LS-2 and CS-2, and LS-4 and CS-4 may have to comply with land disposal restrictions (or LDR, codified at 40 C.F.R. § 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 C.F.R. § 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, disposition of the PCB waste would be governed by the requirements of the Federal Toxic Substances Control Act (TSCA).

During excavation activities, the radionuclide emissions standards of 40 C.F.R. § 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 in turn 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 Alternatives 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 a result of 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 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. Monitoring the excavation and soil handling areas to determine emission levels will also ensure that off-Site receptors were not being significantly impacted. Alternatives LS-3 and CS-3 and Alternatives 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 stabilization of the metals-contaminated wastes and their disposition in the on-Site cell. The vehicular traffic associated with all Alternatives other than No Action could impact the local roadway system and nearby residents through increased noise level and traffic flow.

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 implementability of Alternatives LS-2 and CS-2, LS-3 and CS-3, and LS-4 and CS-4 would likely be a function of the acceptability of transportation of low-level radioactive wastes to an off-Site disposal location. These wastes would be securely loaded and trucked to an appropriate rail spur, where the wastes would then be shipped by rail to their ultimate disposal location. The implementability of Alternatives LS-3 and CS-3 and Alternatives LS-4 and CS-4 would also depend on the efficiency of the separation technology or strategy selected for separation of radionuclide-contaminated soil from other excavated soils. The implementability of Alternatives LS-3 and CS-3, in which heavy metals-contaminated soil would be left on-Site in a containment cell above health-based levels, would depend on receiving State approval and local acceptance. Institutional controls through deed restrictions on the future residential development of the Li Tungsten facility and Captain's Cove property should be readily implementable for all the Alternatives.

Cost

Table 16 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. 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, over 700 identical (form) letters were received asking EPA, to change the proposed alternatives for soil remediation from Alternatives LS-4 and CS-4 (which include soil separation to reduce the volume of radiologically-contaminated

soil) to Alternatives LS-2 and CS-2 (which do not include volume reduction). 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. 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 in order to meet State and Federal 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 from Glen Cove Creek and Hempstead Harbor, 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 groundwater. Alternatives LW-2, LW-3, and LW-4 would directly provide protection of human health and the environment because the groundwater contaminated with inorganics at 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 C.F.R. § 141), the New York State MCLs (10 NYCRR Part 5), or New York State Water Quality Standards (6 NYCRR Part 703). However, 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 to meet the standards.

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. The natural movement of groundwater would dilute the remaining contaminated levels and eventually flush the inorganics 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, and slurry wall). Potential short-term impacts would be associated with the direct contact with soil by workers and 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 the reliance of LW-2 and LW-3 on standard proven technology improves their degree of implementability. Off-Site property easements or construction permits should also be relatively easy to obtain for all three action alternatives.

Cost

Table 17 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 are for the long-term monitoring program.

State Acceptance

As mentioned above, 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. The remedial action cleanup levels for these wastes were provided earlier in **Table 15**.

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 (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 and other metals-processing 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 chemical cleanup levels for these metals-contaminated soils. Excavation is expected to yield an estimated 18,300 cy of radioactive wastes and 17,300 cy of nonradiactive metals-contaminated wastes at the Li Tungsten facility.

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. Excavation is expected to yield an estimated 13,200 cy of radioactive wastes and 20,550 cy of nonradioactive, metals-contaminated wastes at the Captain's Cove property. Excavated Site 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 at a

disposal facility licensed to manage this type of material. Treatability tests will be required to determine the efficiency of any volume reduction technology employed. In the event that separation of radionuclide-contaminated soil from nonradionuclide soil contaminated with heavy metals cannot be accomplished in a cost-effective manner, the excavated soils will be disposed at appropriately licensed facilities as described in Alternatives LS-2 and CS-2 in the Decision Summary of this Record of Decision. Radioactive wastes will be disposed of at an off-Site disposal facility licensed to manage this type of material. 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 the toxicity characteristic 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 do 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 also be pressure-washed and the effluent and sediments collected for off-Site disposal.

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 and Lab and Wire Buildings 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 the Li Tungsten facility 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; as well as the impacts of saltwater intrusion on the Aquifer and the availability of the City's potable water supply to the affected area, which significantly contribute to the non-use of the contaminated aquifer

as a potable water source. 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 beneath the Site is expected to improve after excavation is completed.

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. As noted in the discussion on Glen Cove Creek under the Summary of Site Characteristics section, approximately 12,000 cy of sediment were dredged from the mouth of the Creek in 1996; sampling results from monitoring location GC-03, located in this dredged area, indicate significantly lower contaminant levels than previous results for this area. In addition, the planned dredging of the remainder of the Creek this Fall/Winter, which will include dredging of the entire width of the Creek fronting virtually all of Parcel A to a depth of 8 feet, will result in the removal of approximately 35,000 cy of sediment. This sediment removal coupled with EPA and DEC remedial actions planned for the Li Tungsten facility and Captain's Cove, as well as other actions planned or underway for other Federal or State sites, should result in significant improvement in the water quality and sediment quality in the Creek. The 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. At that time, the EPA and the NYSDEC will consider whether the scope of the monitoring program needs to be modified.

To complete the proposed remedial action, EPA recommends that deed restrictions be placed on the Li Tungsten Site, primarily to prevent the Site from being used for residential purposes. The deed restriction will also include controls to ensure the protection of public health through restrictions on groundwater withdrawals for any purpose that could lead to human exposure e.g., drinking water, irrigation, fountains, etc. until the groundwater

beneath the Site has reached cleanup levels; as well as requiring that any new construction on this Site should adhere to relevant building codes for radon/thoron gases.

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 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 at 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. The accelerated placement of these properties back into a commercially-viable scenario will also meet the primary objective of EPA's "Recycling Superfund Sites" initiative.

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 consistent with 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, comply with ARARs, be cost-effective, and 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 waiver from such standards 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 to 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. Excavating contaminated soils and sediments above the selected cleanup levels and disposing of them off-Site will greatly reduce future human exposures and environmental impacts from the contaminated soils, as well as remove the source of 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 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 virtual certainty that the groundwater in the Upper Glacial Aquifer will not be used for any purpose which could allow for human health or environmental impact. 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

The National Contingency Plan, Section 300.430 (P)(ii)(B) requires that the selected remedy attain federal and state ARARs. The remedy will comply with the following action-, chemical- and location-specific ARARs identified for the Site and will be demonstrated through monitoring, as appropriate.

Action-Specific ARARs:

- 40 CFR Part 61 - National Emissions Standards for Hazardous Air Pollutants
- 40 CFR Part 254.25 - Excavation and Fugitive Dust Emissions
- 49 CFR 173 - Off-Site Transportation of Radioactive Materials
- 40 CFR Parts 260-268 - RCRA Standards for Handling, Transportation and Disposal of Hazardous Waste, including Land Disposal Restrictions
- 6 NYCRR Part 200.6 - Ambient Air Quality Standards
- 6 NYCRR Parts 370-373 - New York State Standards for Handling, Transportation and Disposal of Hazardous Waste

Chemical-Specific ARARs:

- 40 CFR Part 141 - Federal Safe Drinking Water Act Maximum Contaminant Levels (MCLs)
- 6 NYCRR Part 703 - New York Water Quality Standards
- 10 NYCRR Part 5 - New York State Sanitary Code for Drinking Water

Location-Specific ARARs:

- National Historic Preservation Act
- U.S. Coastal Zone Management Act

To-Be-Considered:

- Air Guide I - NYSDEC Control of Toxic Ambient Air Contaminants
- NYSDEC TAGMs 4003 and 4046 - Hazardous and Radioactive Materials Soil Cleanup Levels

- 40 CFR 192 - Uranium Mill Tailings Radiation Control Act (UMTRCA) Standards for Disposal and Control of Uranium and Thorium Mill Tailings

Cost-Effectiveness

Each of the alternatives has undergone 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 and community and State acceptance. The selected remedy for groundwater has associated costs for long-term monitoring only, and is therefore relatively inexpensive. 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 assumed to be 30 years; given the fact that the soil excavation will remove the source of the localized groundwater contamination, EPA anticipates that 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 in proportion to its cost. For a detailed breakdown of costs associated with the selected remedy, please see **Table 18.**

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

The selected remedy utilizes a permanent solution to the soil contamination which has rendered the Site presently unusable. Implementing the selected remedy will allow the Site to be reused commercially. 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 that the selected remedy is compatible with the City's Revitalization Plan. The selected remedy represents 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 for soil through the use of measures to reduce the volume of radioactive soil requiring off-Site disposal.

No action, treatment or otherwise, was considered by the Agency to be the best groundwater remedy after evaluating it against the nine criteria.

DOCUMENTATION OF SIGNIFICANT CHANGES

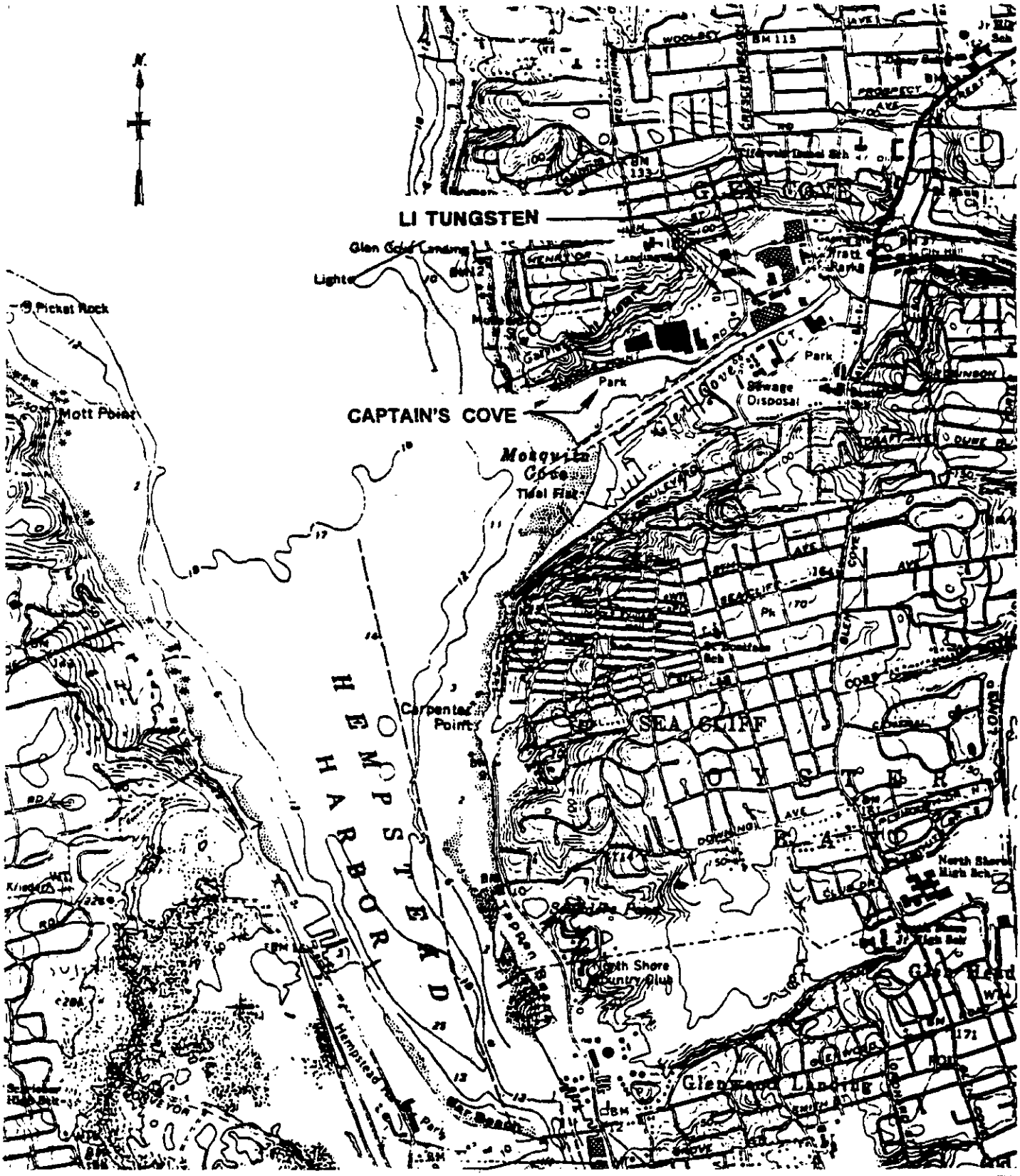
There are no significant changes from the preferred remedy presented in the Proposed Plan.

APPENDIX I

FIGURES

Figure 1 - Site Location Map
Figure 2 - Site Map
Figure 3 - Soil and Water Sampling Locations
Figure 4 - Upper Glacial Aquifer Groundwater Flow
Figure 5 - Municipal Water Supply Wells in Glen Cove
Figure 6 - Soil Above Cleanup Criteria - Li Tungsten
Figure 7 - Soil Above Cleanup Criteria - Captain's Cove

FIGURE 1



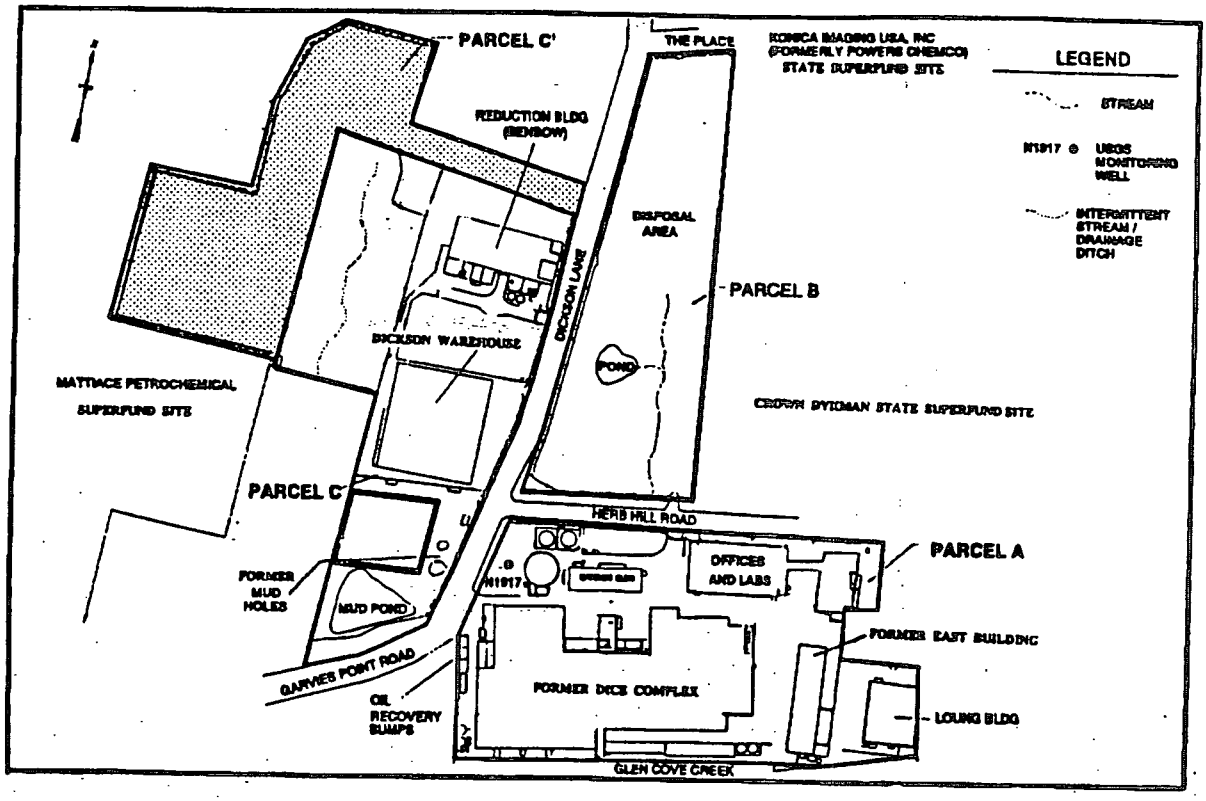
TITLE:	DATE:
SITE LOCATION MAP	MAY 1998

MALCOLM PIRNIE

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

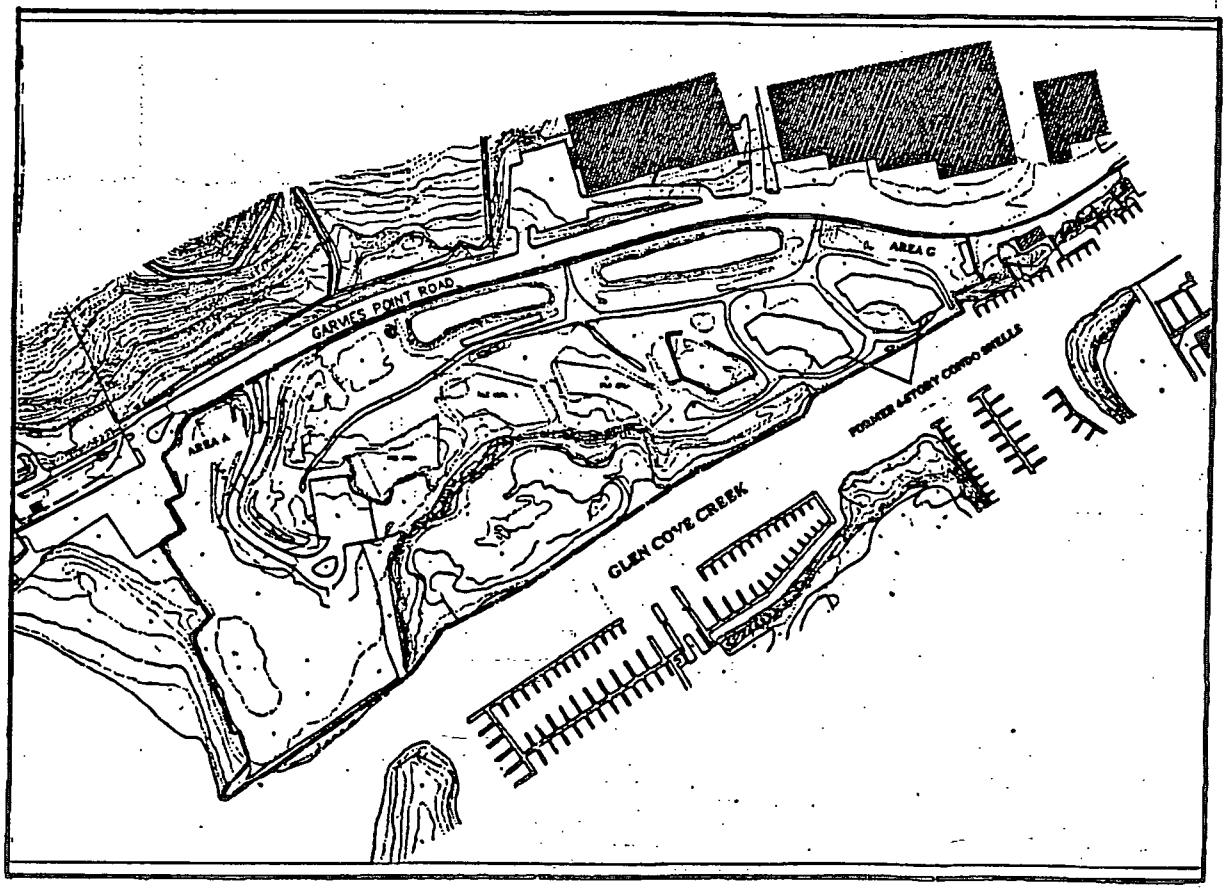
LI TUNGSTEN REMEDIAL INVESTIGATION
GLEN COVE, NEW YORK
USEPA REGION II ARCS
CONTRACT NO. 68-W9-0051; W.A. NO. 025-2L4L

FIGURE 2



LI TUNGSTEN FACILITY

GLEN COVE, NEW YORK



CAPTAIN'S COVE PROPERTY

GLEN COVE, NEW YORK

FIGURE 3

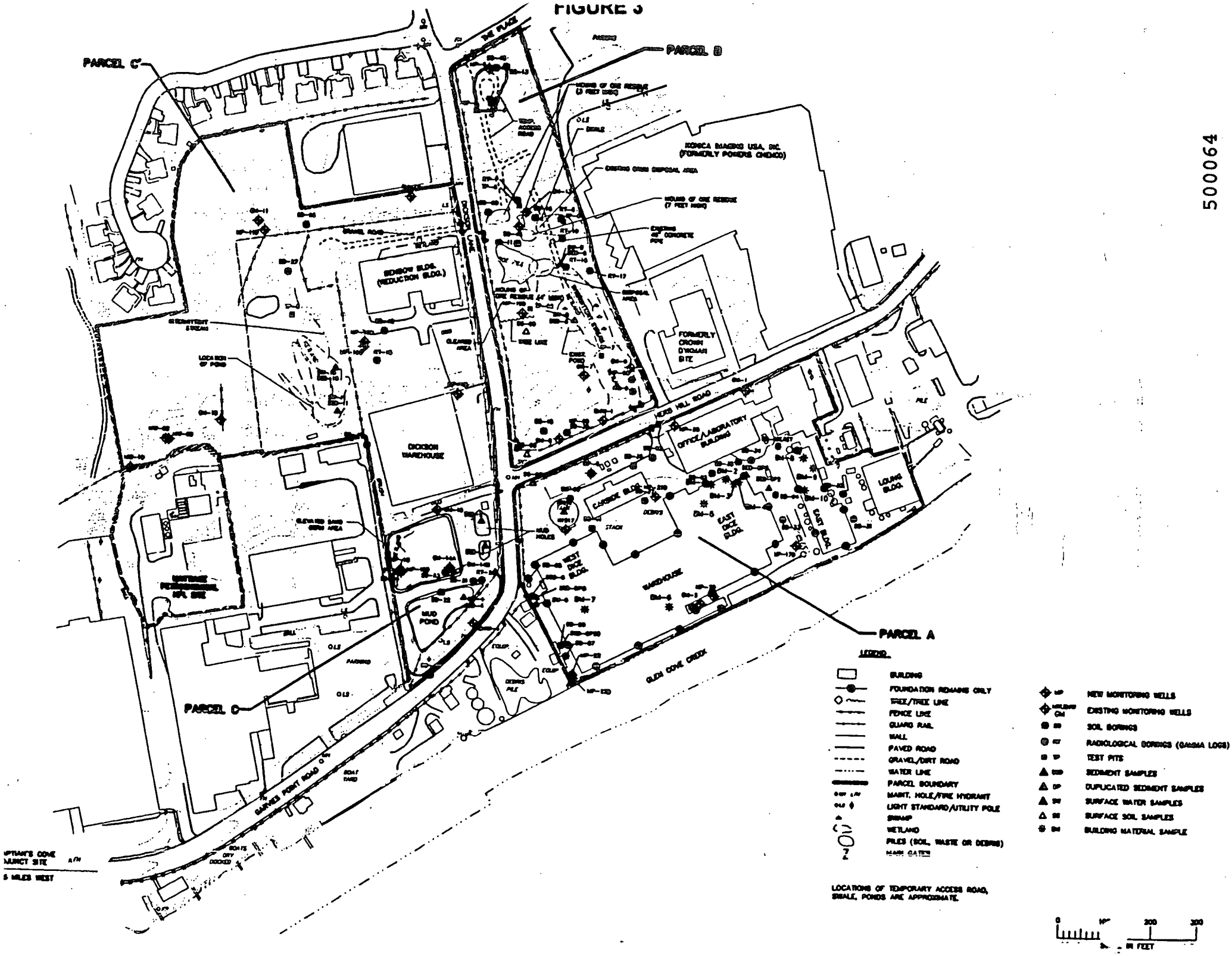


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FIGURE 4

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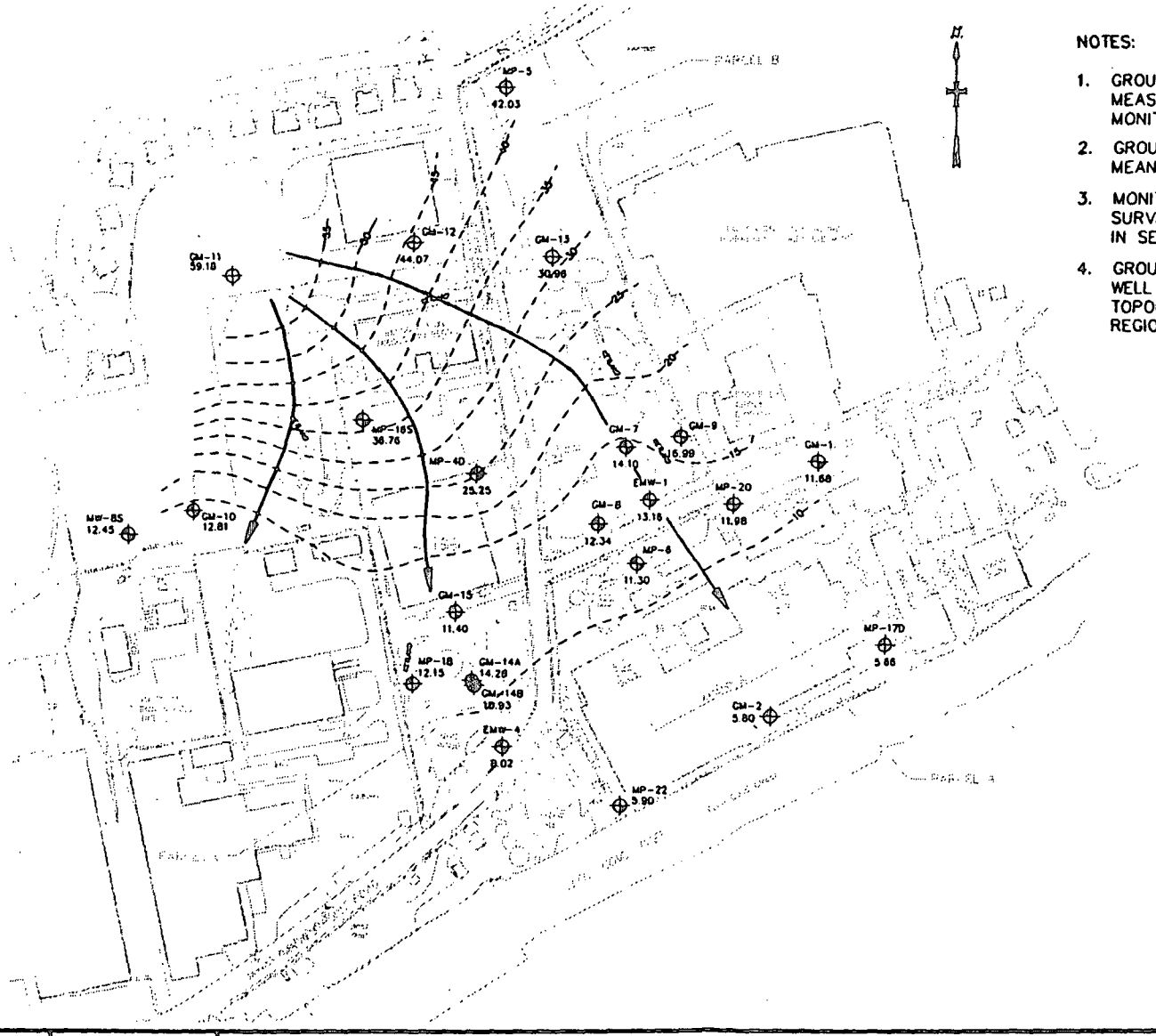


NOTES:

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

- 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

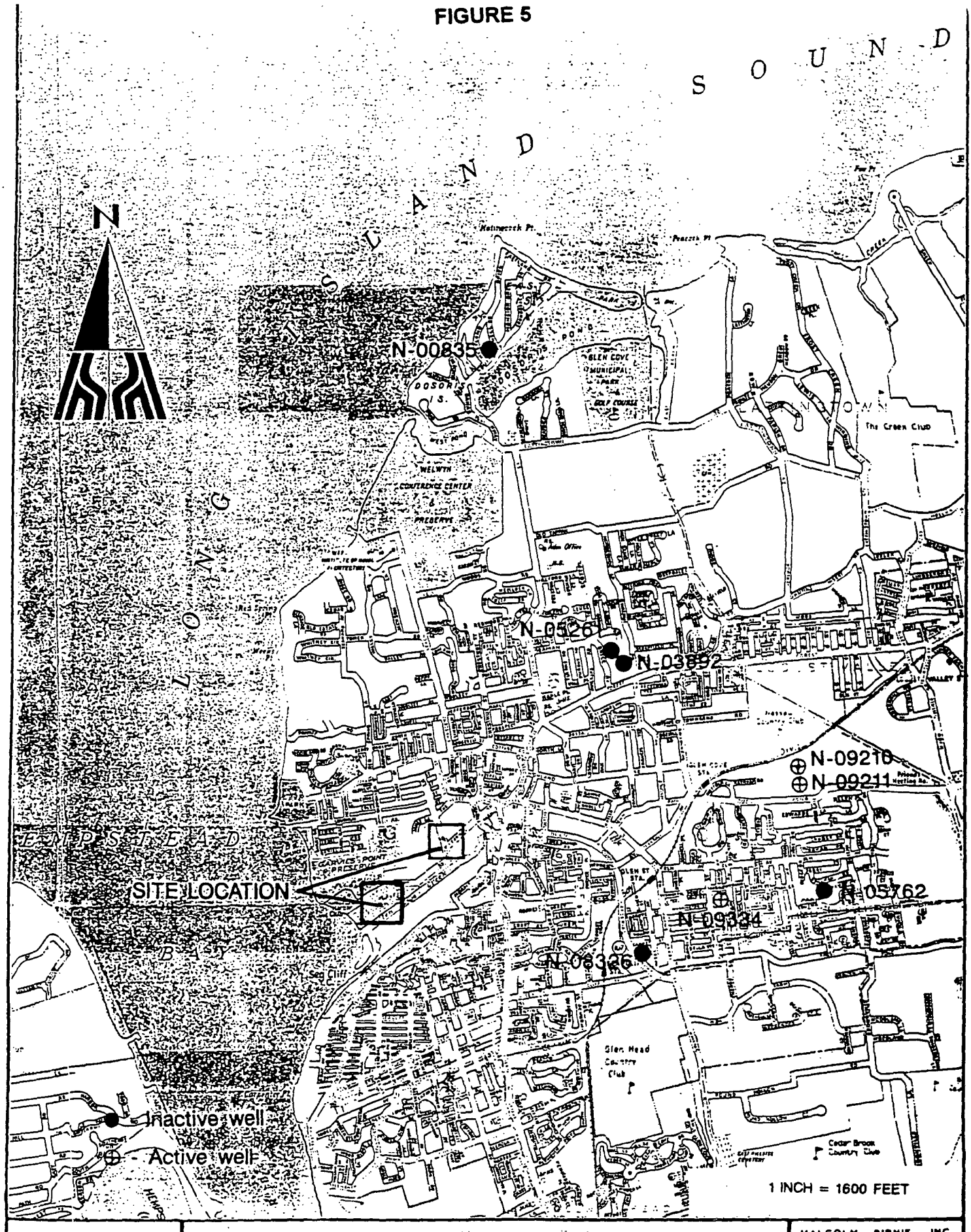
LI TUNGSTEN REMEDIAL INVESTIGATION
GLEN COVE, NEW YORK
USEPA REGION II ARCS
CONTRACT NO. 68-W9-0051; W.A. NO. 025-2L4L

DATE: MAY 1996

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

PROJECT NO.: 8001202

FIGURE 5



MALCOLM PIRNIE

MALCOLM PIRNIE, INC.

MUNICIPAL WATER SUPPLY WELL LOCATIONS

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FIGURE 6

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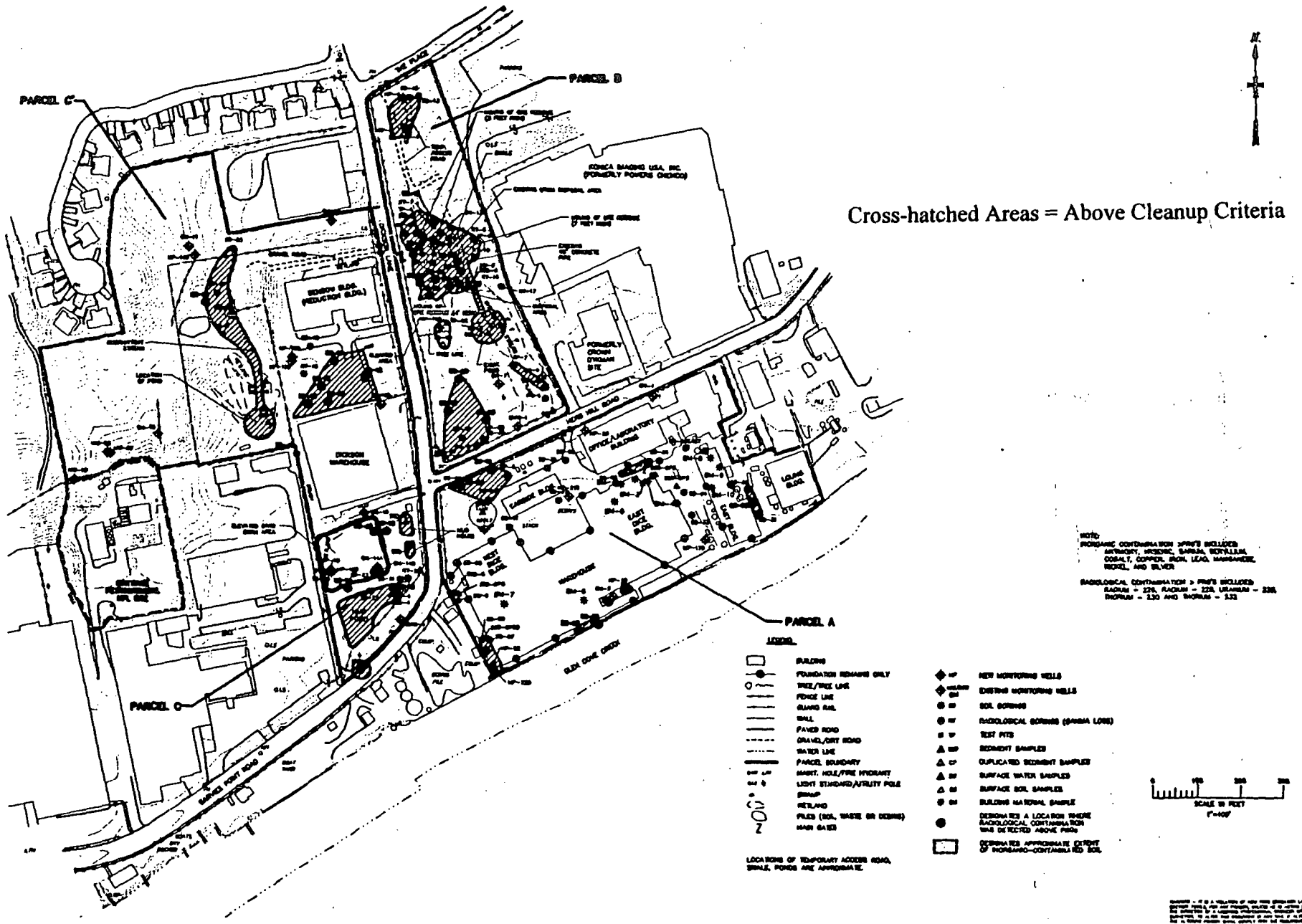
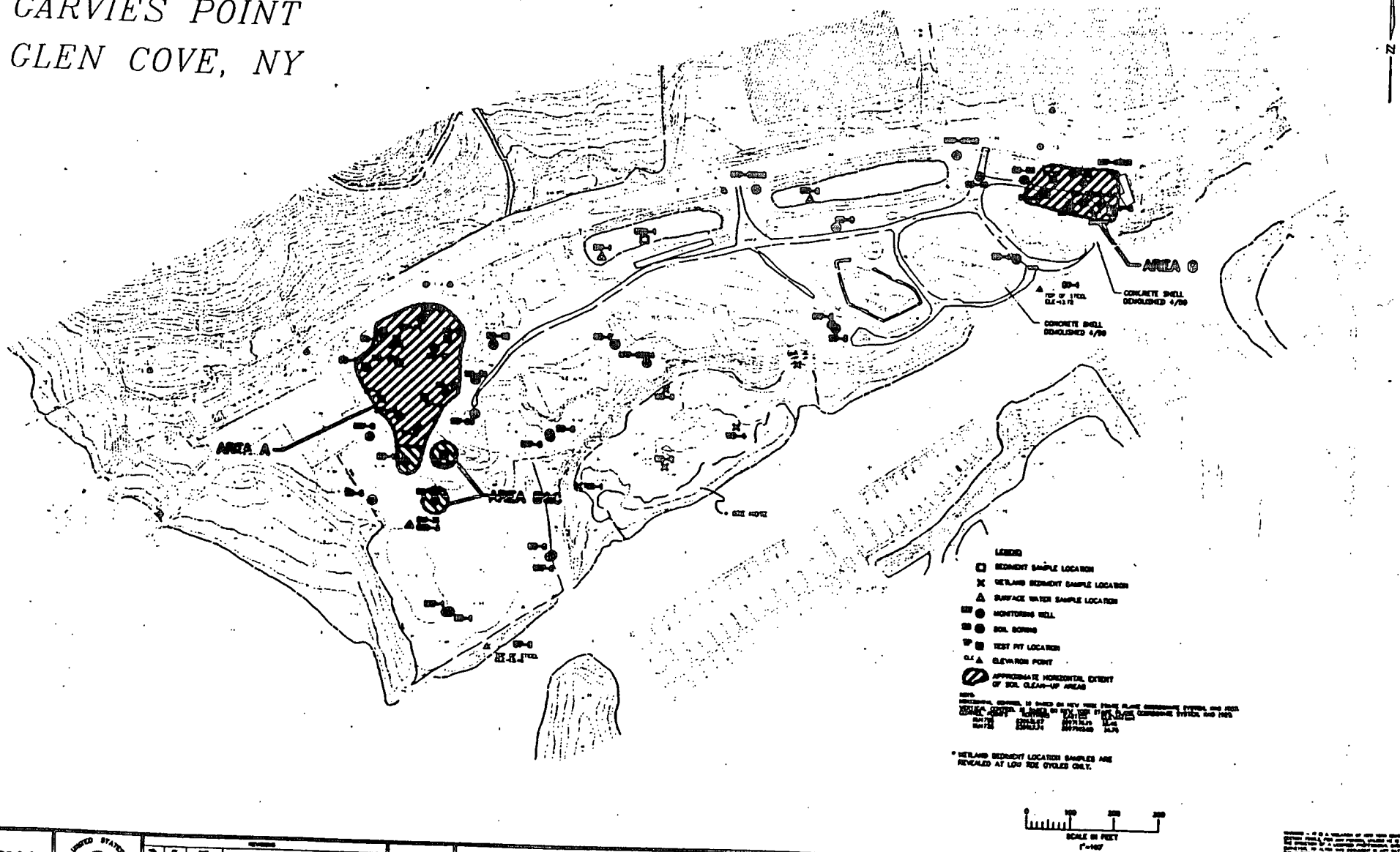


MALCOLM PIRNIE		LI TUNGSTEN FEASIBILITY STUDY GLEN COVE, NEW YORK USEPA REGION II ARCS CONTRACT NO. 68-W9-0051; W.A. NO. 025-2L4L	Li Tungsten Facility SOIL ABOVE CLEANUP CRITERIA
			DATE JUNE 1999 SHEET ___ OF ___ CAD REF. NO. 800118-2

FIGURE 7

Cross-hatched Areas = Above Cleanup Criteria

CARVIES POINT
GLEN COVE, NY



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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

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JUNE 1990

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TABLE 1

Summary of Sampling Results for Radionuclides

Li Tungsten Facility

Table 1A

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 1B

SUMMARY OF RADIONUCLIDES IN ALL SOILS
LI TUNGSTEN SITE

RADIONUCLIDE	AREA A Sample Size	AREA A Range of Concentrations[1] pCi/g	AREA B Sample Size	AREA B Range of Concentrations[1] pCi/g	AREA B&C Sample Size	AREA B&C Range of Concentrations[1] pCi/g	AREA C Sample Size	AREA C Range of Concentrations[1] pCi/g	BACKGROUND Sample Size	BACKGROUND 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.

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Table 1C

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 1D

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.

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TABLE 2

Summary of Sampling Results for Non-radioactive Chemicals

Li Tungsten Facility

Table 2A

SUMMARY OF CHEMICALS IN SURFACE SOIL
LI TUNGSTEN SITE

CHEMICAL	AREA A Frequency	AREA A Range of Concentrations[1] mg/kg	AREA B Frequency	AREA B Range of Concentrations[1] mg/kg	AREA B&C Frequency	AREA B&C Range of Concentrations[1] mg/kg	AREA C Frequency	AREA C 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 2A (cont'd)

SUMMARY OF CHEMICALS IN SURFACE SOIL
LI TUNGSTEN SITE

CHEMICAL	AREA A Frequency	AREA A Range of Concentrations[1] mg/kg	AREA B Frequency	AREA B Range of Concentrations[1] mg/kg	AREA B&C Frequency	AREA B&C Range of Concentrations[1] mg/kg	AREA C Frequency	AREA C 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 - 9140
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 2B

SUMMARY OF CHEMICALS IN ALL SOILS
LI TUNGSTEN SITE

CHEMICAL	AREA A Frequency	AREA A Range of Concentrations[1] mg/kg	AREA B Frequency	AREA B Range of Concentrations[1] mg/kg	AREA B&C Frequency	AREA B&C Range of Concentrations[1] mg/kg	AREA C Frequency	AREA C 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

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Table 2B (cont'd)

SUMMARY OF CHEMICALS IN ALL SOILS
LI TUNGSTEN SITE

CHEMICAL	AREA A Frequency	AREA A Range of Concentrations[1] mg/kg	AREA B Frequency	AREA B Range of Concentrations[1] mg/kg	AREA B&C Frequency	AREA B&C Range of Concentrations[1] mg/kg	AREA C Frequency	AREA C 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 2C

SUMMARY OF SITE-SPECIFIC BACKGROUND SOIL DATA
LI TUNGSTEN SITE

CHEMICAL	SITE-SPECIFIC BACKGROUND[a]			Elemental Composition of Soils [aa]	
	Frequency	Range of Concentrations[aaa] mg/kg	Average Concentration[aaa] mg/kg	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
[a] 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.
[aa] Dragun and Chiasson, 1991.
(1) = Eastern United States
(2) = New York State
(3) = Coterminous United States
[aaa] Range and average of detected concentrations.

Table 2D

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[e]
PESTICIDES/PCBs							
Aldrin	5 / 56	0.000042 - 0.000066	0 / 5	ND	NA	NA	1.0E-6[c]
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

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Table 2D (cont'd)

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 2E

SUMMARY OF CHEMICALS IN SURFACE WATER
LI TUNGSTEN SITE

CHEMICAL	PARCEL B SURFACE WATER Frequency	PARCEL B SURFACE WATER Range of Concentrations[1] mg/l	PARCEL C SURFACE WATER Frequency	PARCEL C SURFACE WATER 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 2F

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 2F (cont'd)

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 3A

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

Radionuclide (1)	Minimum Concentration (2)	Maximum Concentration (2)	Units	Location of Maximum Concentration	Concentration Used for Screening to Background	Maximum Background Value (3)	ROPC Flag (4)	Rationale for Radionuclide Selection or Deletion (5)
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 (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)

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Table 3B

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

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	0 229	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 (IIHST)
	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)

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Table 3C

OCCURRENCE, DISTRIBUTION AND SELECTION OF RADIONUCLIDES OF POTENTIAL CONCERN
CAPTAINS 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 (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)

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Table 3D

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	0.40	1041	pCi/g	CC-SB-23-6-0	1041	1.1	YES	TX, ASL
Uranium 238 + D	0.46	1031	pCi/g	CC-SB-23-6-0	1031	1.1	YES	TX, ASL
Radium 226 + D	1.01	169	pCi/g	CC-SB-03-6-0	169	1.4	YES	TX, ASL
Radium 228 + D	0.739	40.9	pCi/g	CC-SB-03-6-0	40.9	1.7	YES	TX, ASL
Thorium 228 + D	0.02	47.7	pCi/g	CC-SB-03-6-0	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	0.00	47.0	pCi/g	CC-SB-03-6-0	47.0	1.5	YES	TX, ASL
Lead 210 + D	1.01	169	pCi/g	CC-SB-03-6-0	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 concentration 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)

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Table 3E

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

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	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 (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)

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Table 3F

OCCURRENCE, DISTRIBUTION AND SELECTION OF RADIONUCLIDES OF POTENTIAL CONCERN
CAPTAINS COVE

Scenario Timeframe: Future
Medium: All Soil
Exposure Medium: All Soil
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	0.403	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	0.00	126	pCi/g	CC-SB-13-6-7	126	1.5	YES	TX, ASL
Lead 210 + D	0.403	252	pCi/g	CC-TP-3-5-6	252	1.4	YES	TX, ASL

(1) Rich 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 concentration 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)

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Table 3G

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

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	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)

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TABLE 4

Summary of Sampling Results for Non-radioactive Chemicals

Captain's Cove Property

Table 4A

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
CAPTAIN'S COVE

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

CAS Number	Chemical	Minimum Concentration (1)	Minimum Qualifier	Maximum Concentration (1)	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	Background Value	Screening Toxicity Value (3)		Potential ARAR/TBC Value (4)	Potential ARAR/TBC Source	COPC Flag	Rationale for Contaminant Deletion or Selection (5)
67-64-1	Acetone	0.011	E	0.011	E	mg/kg	CC-SB-27-0-2	1/3	0.011-0.013	0.011	N/A	7.8E+03	N	16	SSL	NO	BCTS, BSL
108-90-7	Chlorobenzene	0.042	E	0.042	E	mg/kg	CC-SB-21-0-2	1/3	0.011-0.013	0.042	N/A	1.6E+03	N	1	SSL	NO	BCTS, BSL
120-12-7	Anthracene	0.065	J	0.065	J	mg/kg	CC-SB-19-0-2	1/3	0.362-3.77	0.065	N/A	2.3E+04	N	12000	SSL	NO	BCTS, BSL
56-55-3	Benzo(a)Anthracene	0.064	J	0.24	J	mg/kg	CC-SB-19-0-2	2/3	0.362-3.77	0.24	N/A	8.7E-01	C	2	SSL	NO	BCTS, BSL
205-99-2	Benzo(b)Fluoranthene	0.18	J	0.43	J	mg/kg	CC-SB-19-0-2	2/3	0.362-3.77	0.43	N/A	8.7E-01	C	5	SSL	NO	BCTS, BSL
50-32-8	Benzo(a)Pyrene	0.092	J	0.25	J	mg/kg	CC-SB-19-0-2	2/3	0.362-3.77	0.25	N/A	8.7E-02	C	8	SSL	YES	ACTS, ASL
191-24-2	Benzo(g,h,i)Perylene	0.069	J	0.15	J	mg/kg	CC-SB-19-0-2	2/3	0.362-3.77	0.15	N/A	--	--	N/A	N/A	YES	NTX
218-01-9	Chrysene	0.076	J	0.17	J	mg/kg	CC-SB-19-0-2	2/3	0.362-3.77	0.17	N/A	8.7E+01	C	160	SSL	NO	BCTS, BSL
206-44-0	Fluoranthene	0.095	J	0.44	J	mg/kg	CC-SB-19-0-2	2/3	0.362-3.77	0.44	N/A	3.1E+03	N	4300	SSL	NO	BCTS, BSL
86-73-7	Fluorene	0.045	J	0.045	J	mg/kg	CC-SB-19-0-2	1/3	0.362-3.77	0.045	N/A	3.1E+03	N	560	SSL	NO	BCTS, BSL
193-39-5	Indeno(1,2,3-cd)Pyrene	0.078	J	0.13	J	mg/kg	CC-SB-19-0-2	2/3	0.362-3.77	0.13	N/A	8.7E-01	C	14	SSL	NO	BCTS, BSL
85-01-8	Phenanthrene	0.062	J	0.31	J	mg/kg	CC-SB-19-0-2	2/3	0.362-3.77	0.31	N/A	--	--	N/A	N/A	YES	NTX
129-00-0	Pyrene	0.13	J	0.3	J	mg/kg	CC-SB-19-0-2	2/3	0.362-3.77	0.3	N/A	2.3E+03	N	4200	SSL	NO	BCTS, BSL
12672-29-6	PCBs (total)	0.081		5.5		mg/kg	CC-SB-21-0-2	2/3	0.036-1.88	5.5	N/A	3.2E-01	C	1	SSL	YES	ACTS, ASL
319-85-7	beta-BHC	0.015		0.015		mg/kg	CC-SB-27-0-2	1/3	0.0018-0.097	0.015	N/A	3.5E-01	C	0.003	SSL	NO	BCTS, BSL
319-86-8	delta-BHC	0.0075		0.017		mg/kg	CC-SB-27-0-2	2/3	0.0018-0.097	0.017	N/A	--	--	0.003	SSL	NO	BCTS
57-74-9	Chlordane (total)	0.0033		0.13		mg/kg	CC-SB-21-0-2	3/3	0.0018-0.097	0.13	N/A	1.8E+00	C	10	SSL	NO	BCTS, BSL
72-55-9	4,4'-DDE	0.002	J	0.0081		mg/kg	CC-SB-19-0-2	2/3	0.0036-0.188	0.0081	N/A	1.9E+00	C	54	SSL	NO	BCTS, BSL
50-29-3	4,4'-DDT	0.014	EN	0.018		mg/kg	CC-SB-19-0-2	2/3	0.0036-0.188	0.018	N/A	1.9E+00	C	32	SSL	NO	BCTS, BSL
115-29-7	Endosulfan I	0.1	EN	0.1	EN	mg/kg	CC-SB-21-0-2	1/3	0.0018-0.097	0.1	N/A	4.7E+02	N	18	SSL	NO	BCTS, BSL
1024-57-3	Heptachlor epoxide	0.0022	J	0.0022	J	mg/kg	CC-SB-19-0-2	1/3	0.0018-0.097	0.0022	N/A	7.0E-02	C	0.7	SSL	NO	BCTS, BSL
7429-90-5	Aluminum	4260		9140		mg/kg	CC-SB-19-0-2	3/3	43.1-52.6	9140	(2)	7.8E+04	N	N/A	N/A	NO	BSL, BBKG
7440-36-0	Antimony	23		216	E	mg/kg	CC-SB-19-0-2	2/3	12.9-15.8	216	(2)	3.1E+01	N	5	SSL	YES	ACTS, ASL
7440-38-2	Arsenic	3.2		83.9		mg/kg	CC-SB-19-0-2	3/3	2.15-2.63	83.9	(2)	4.3E-01	C	29	SSL	YES	ACTS, ASL
7440-39-3	Barium	60.2		236		mg/kg	CC-SB-21-0-2	3/3	43.1-52.6	236	(2)	5.5E+03	N	1600	SSL	NO	BCTS, BSL
7440-41-7	Beryllium	0.22	J	0.37	J	mg/kg	CC-SB-19-0-2	3/3	1.08-1.31	0.37	(2)	1.6E+02	N	63	SSL	NO	BCTS, BSL
7440-43-9	Cadmium	0.26	J	4		mg/kg	CC-SB-19-0-2	3/3	1.08-1.31	4	(2)	7.8E+01	N	8	SSL	NO	BCTS, BSL, BBK
7440-70-2	Calcium	1000	J	14400	E	mg/kg	CC-SB-19-0-2	3/3	1076-1314	14400	(2)	--	--	N/A	N/A	NO	NUT
16065-83-1	Chromium	10		28.4		mg/kg	CC-SB-21-0-2	3/3	2.15-2.63	28.4	(2)	1.2E+05	N	38	SSL	NO	BCTS, BSL
7440-48-4	Cobalt	4.2	J	22.2		mg/kg	CC-SB-19-0-2	3/3	10.8-13.1	22.2	(2)	4.7E+03	N	N/A	N/A	NO	BCTS, BSL, BBK
7440-50-8	Copper	16.5		395		mg/kg	CC-SB-21-0-2	3/3	5.38-6.57	395	(2)	3.1E+03	N	N/A	N/A	YES	ACTS
7439-89-6	Iron	8620		63000		mg/kg	CC-SB-21-0-2	3/3	21.5-26.3	63000	(2)	2.3E+04	N	N/A	N/A	NO	BBKG

Table 4A (cont'd)

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
CAPTAIN'S COVE

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

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

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Table 4B

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
CAPTAIN'S COVE

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

CAS Number	Chemical	Minimum Concentration (1)	Minimum Qualifier	Maximum Concentration (1)	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	Background Value	Screening Toxicity Value (3)		Potential ARAR/TBC Value (4)	Potential ARAR/TBC Source	COPC Flag	Rationale for Contaminant Deletion or Selection (5)
67-64-1	Acetone	0.011	E	0.39	E	mg/kg	CC-SB-12-4-6	6/19	0.011-0.58	0.39	N/A	7.8E+03	N	16	SSL	NO	BCTS, BSL
78-93-3	2-Butanone	0.01	J	0.089	E	mg/kg	CC-SB-12-4-6	5/19	0.011-0.58	0.089	N/A	4.7E+04	N	N/A	N/A	NO	BCTS, BSL
75-15-0	Carbon Disulfide	0.011	E	0.012	J	mg/kg	CC-TP-3-5-6	2/19	0.011-0.58	0.012	N/A	7.8E+03	N	32	SSL	NO	BCTS, BSL
108-90-7	Chlorobenzene	0.042	E	42		mg/kg	CC-SB-21-2-4	2/19	0.011-0.58	42	N/A	1.6E+03	N	1	SSL	NO	BCTS, BSL
127-18-4	Tetrachloroethene	0.004	J	0.004	J	mg/kg	CC-SB-MW8-2-4	1/19	0.011-0.58	0.004	N/A	1.2E+01	C	0.06	SSL	NO	BCTS, BSL
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	3	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

Table 4B (cont'd)

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
CAPTAIN'S COVE

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

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

Table 4B (cont'd)

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
CAPTAIN'S COVE

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
7440-43-9	Cadmium	0.26	J	174		mg/kg	CC-TP-1-7-8	19/19	1.07-1.59	174	(2)	7.8E+01	N	8	SSL	YES	ACTS, ASL
7440-70-2	Calcium	918	J	87400	E	mg/kg	CC-TP-1-7-8	19/19	1073-1590	87400	(2)	--	--	N/A	N/A	NO	NUT
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 (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)

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 4B (cont'd)

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
CAPTAIN'S COVE

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

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

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Table 4C

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
CAPTAIN'S COVE

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

CAS Number	Chemical	Minimum Concentration (1)	Minimum Qualifier	Maximum Concentration (1)	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	Background Value	Screening Toxicity Value (3)	Potential ARAR/TBC Value (4)	Potential ARAR/TBC Source	COPC Flag	Rationale for Contaminant Deletion or Selection (5)
56-55-3	Benzo(a)Anthracene	0.054	J	0.054	J	mg/kg	CC-SB-08-0-2	1/1	0.366	0.054	N/A	8.7E-01 C	2	SSL	NO	BCTS, BSL
205-99-2	Benzo(b)Fluoranthene	0.26	J	0.26	J	mg/kg	CC-SB-08-0-2	1/1	0.366	0.26	N/A	8.7E-01 C	5	SSL	YES	ACTS
207-08-9	Benzo(k)Fluoranthene	0.064	J	0.064	J	mg/kg	CC-SB-08-0-2	1/1	0.366	0.064	N/A	8.7E+00 C	49	SSL	NO	BCTS, BSL
50-32-8	Benzo(a)Pyrene	0.13	J	0.13	J	mg/kg	CC-SB-08-0-2	1/1	0.366	0.13	N/A	8.7E-02 C	8	SSL	YES	ACTS, ASL
191-24-2	Benzo(g,h,i)Perylene	0.077	J	0.077	J	mg/kg	CC-SB-08-0-2	1/1	0.366	0.077	N/A	-- --	N/A	N/A	YES	NTX
218-01-9	Chrysene	0.14	J	0.14	J	mg/kg	CC-SB-08-0-2	1/1	0.366	0.14	N/A	8.7E+01 C	160	SSL	NO	BCTS, BSL
206-44-0	Fluoranthene	0.17	J	0.17	J	mg/kg	CC-SB-08-0-2	1/1	0.366	0.17	N/A	3.1E+03 N	4300	SSL	NO	BCTS, BSL
193-39-5	Indeno(1,2,3-cd)Pyrene	0.092	J	0.092	J	mg/kg	CC-SB-08-0-2	1/1	0.366	0.092	N/A	8.7E-01 C	14	SSL	YES	ACTS
85-01-8	Phenanthrene	0.16	J	0.16	J	mg/kg	CC-SB-08-0-2	1/1	0.366	0.16	N/A	-- --	N/A	N/A	YES	NTX
129-00-0	Pyrene	0.2	J	0.2	J	mg/kg	CC-SB-08-0-2	1/1	0.366	0.2	N/A	2.3E+03 N	4200	SSL	NO	BCTS, BSL
7429-90-5	Aluminum	6150		6150		mg/kg	CC-SB-08-0-2	1/1	44.4	6150	(2)	7.8E+04 N	N/A	N/A	NO	BSL, BBKG
7440-38-2	Arsenic	6.6		6.6		mg/kg	CC-SB-08-0-2	1/1	2.22	6.6	(2)	4.3E-01 C	29	SSL	YES	ACTS, ASL
7440-39-3	Barium	52.5		52.5		mg/kg	CC-SB-08-0-2	1/1	44.4	52.5	(2)	5.5E+03 N	1600	SSL	YES	ACTS
7440-41-7	Beryllium	0.43	J	0.43	J	mg/kg	CC-SB-08-0-2	1/1	1.11	0.43	(2)	1.6E+02 N	63	SSL	NO	BCTS, BSL
7440-43-9	Cadmium	0.42	J	0.42	J	mg/kg	CC-SB-08-0-2	1/1	1.11	0.42	(2)	7.8E+01 N	8	SSL	NO	BCTS, BSL
7440-70-2	Calcium	1150		1150		mg/kg	CC-SB-08-0-2	1/1	1109	1150	(2)	-- --	N/A	N/A	NO	NUT
16065-83-1	Chromium	10.9		10.9		mg/kg	CC-SB-08-0-2	1/1	2.22	10.9	(2)	1.2E+05 N	38	SSL	NO	BCTS, BSL
7440-48-4	Cobalt	7.5	J	7.5	J	mg/kg	CC-SB-08-0-2	1/1	11.1	7.5	(2)	4.7E+03 N	N/A	N/A	NO	BCTS, BSL
7440-50-8	Copper	24.7		24.7		mg/kg	CC-SB-08-0-2	1/1	5.54	24.7	(2)	3.1E+03 N	N/A	N/A	YES	ACTS
7439-89-6	Iron	13800		13800		mg/kg	CC-SB-08-0-2	1/1	22.17	13800	(2)	2.3E+04 N	N/A	N/A	NO	NUT
7439-92-1	Lead	31.1		31.1		mg/kg	CC-SB-08-0-2	1/1	0.67	31.1	(2)	-- --	400	SSL	YES	NTX
7439-95-4	Magnesium	1460		1460		mg/kg	CC-SB-08-0-2	1/1	1109	1460	(2)	-- --	N/A	N/A	NO	NUT
7439-96-5	Manganese	372		372		mg/kg	CC-SB-08-0-2	1/1	3.33	372	(2)	1.6E+03 N	N/A	N/A	NO	BSL, BBKG
7439-97-6	Mercury	0.02	J	0.02	J	mg/kg	CC-SB-08-0-2	1/1	0.11	0.02	(2)	-- --	2	SSL	NO	BCTS
7440-02-0	Nickel	10.5		10.5		mg/kg	CC-SB-08-0-2	1/1	8.87	10.5	(2)	1.6E+03 N	130	SSL	NO	BSL, BBKG
7440-09-7	Potassium	853	J	853	J	mg/kg	CC-SB-08-0-2	1/1	1109	853	(2)	-- --	N/A	N/A	NO	NUT
7440-22-4	Silver	1.1	J	1.1	J	mg/kg	CC-SB-08-0-2	1/1	2.22	1.1	(2)	3.9E+02 N	34	SSL	NO	BCTS
7440-23-5	Sodium	30	J	30	J	mg/kg	CC-SB-08-0-2	1/1	1109	30	(2)	-- --	N/A	N/A	NO	NUT
7440-62-2	Vanadium	18.4		18.4		mg/kg	CC-SB-08-0-2	1/1	11.1	18.4	(2)	5.5E+02 N	6000	SSL	NO	BSL, BBKG
7440-66-6	Zinc	52.9		52.9		mg/kg	CC-SB-08-0-2	1/1	4.43	52.9	(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

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Table 4D

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
CAPTAIN'S COVE

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

Table 4D (cont'd)

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
CAPTAIN'S COVE

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
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

Table 4D (cont'd)

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
CAPTAIN'S COVE

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

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

Table 4E

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
CAPTAIN'S COVE

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

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

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Table 4E (cont'd)

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
CAPTAIN'S COVE

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

CAS Number	Chemical	Minimum Concentration (1)	Minimum Qualifier	Maximum Concentration (1)	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	Background Value	Screening Toxicity Value (3)		Potential ARAR/TBC Value (4)	Potential ARAR/TBC Source	COPC Flag	Rationale for Contaminant Deletion or Selection (5)
16065-83-1	Chromium	0.0015	J	0.229	E	mg/L	CC-MW-5	10/10	0.01	0.229	(2)	5.5E+04	N	0.1	MCL	NO	BCTS, BSL
7440-48-4	Cobalt	0.0028	J	0.185		mg/L	CC-MW-5	10/10	0.05	0.185	(2)	2.2E+00	N	N/A	N/A	NO	BCTS, BSL
7440-50-8	Copper	0.0091	J	0.77		mg/L	CC-MW-5	10/10	0.025	0.77	(2)	1.5E+00	N	1.3	AL	NO	BCTS, BSL
7439-89-6	Iron	4.26		248		mg/L	CC-MW-5	10/10	0.1	248	(2)	1.1E+01	N	N/A	N/A	NO	BBKG
7439-92-1	Lead	0.002	J	0.544		mg/L	CC-MW-5	10/10	0.003	0.544	(2)	--	--	0.015	AL	YES	NTX, ABKG
7439-95-4	Magnesium	6.59		76.5		mg/L	CC-MW-5	10/10	5	76.5	(2)	--	--	N/A	N/A	YES	NTX
7439-96-5	Manganese	0.191		9.05		mg/L	CC-MW-6	10/10	0.015	9.05	(2)	7.3E-01	N	N/A	N/A	NO	BBKG
7439-97-6	Mercury	0.00004	J	0.013		mg/L	CC-MW-CDM-2	9/10	0.0002	0.013	(2)	--	--	0.002	MCL	NO	BCTS
7440-02-0	Nickel	0.0046	J	0.224		mg/L	CC-MW-5	10/10	0.04	0.224	(2)	7.3E-01	N	0.1	MCL	NO	BBKG
7440-09-7	Potassium	8.5	J	93.1		mg/L	CC-MW-6	10/10	5	93.1	(2)	--	--	N/A	N/A	NO	NUT
7782-49-2	Selenium	0.0045	J	0.142		mg/L	CC-MW-6	9/10	0.005	0.142	(2)	1.8E-01	N	0.05	MCL	NO	BCTS, BSL
7440-22-4	Silver	0.0022	J	0.0146		mg/L	CC-MW-6	4/10	0.01	0.0146	(2)	1.8E-01	N	N/A	N/A	NO	BCTS, BSL
7440-23-5	Sodium	40.1		1120		mg/L	CC-MW-6	9/9	5	1120	(2)	--	--	N/A	N/A	NO	NUT
7440-28-0	Thallium	0.0087	J	0.0177		mg/L	CC-MW-2	4/10	0.01	0.0177	(2)	2.6E-03	N	0.002	MCL	NO	BBKG
7440-62-2	Vanadium	0.0107	J	0.396		mg/L	CC-MW-5	10/10	0.05	0.396	(2)	2.6E-01	N	N/A	N/A	NO	BBKG
7440-66-6	Zinc	0.0425	E	2.59		mg/L	CC-MW-5	10/10	0.02	2.59	(2)	1.1E+01	N	N/A	N/A	NO	BCTS, BSL

(1) Minimum/maximum detected concentration.
(2) Background values from LT-MP-5, LT-MP-11D, LT-Konica-01, CC-CDM-3. See Appendix A.
(3) U.S. EPA Region III, 1998, Risk-Based Concentration Table, Tap Water RBCs
(Cancer benchmark value = 1E-06, HQ = 1.0)
(4) Federal Maximum Contaminant Levels (MCLs)
(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)

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 4E (cont'd)

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
CAPTAIN'S COVE

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

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

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Table 4F

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
CAPTAIN'S COVE

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

CAS Number	Chemical	Minimum Concentration (1)	Minimum Qualifier	Maximum Concentration (1)	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	Background Value	Screening Toxicity Value (3)	Potential ARAR/TBC Value (4)	Potential ARAR/TBC Source	COPC Flag	Rationale for Contaminant Deletion or Selection (5)
7429-90-5	Aluminum	16.8		16.8		mg/L	CC-SW-3	1/3	0.2	16.8	N/A	--	--	--	YES	ACTS
7440-36-0	Antimony	0.0251	J	0.0251	J	mg/L	CC-SW-3	1/3	0.06	0.0251	N/A	--	--	--	YES	ACTS
7440-38-2	Arsenic	0.0035	J	0.0399		mg/L	CC-SW-3	2/3	0.01	0.0399	N/A	--	--	--	YES	ACTS
7440-39-3	Barium	0.0114	J	0.444		mg/L	CC-SW-3	3/3	0.2	0.444	N/A	--	--	--	YES	ACTS
7440-41-7	Beryllium	0.00024	J	0.0011	J	mg/L	CC-SW-3	2/3	0.005	0.0011	N/A	--	--	--	NO	BCTS
7440-43-9	Cadmium	0.00047	J	0.0086		mg/L	CC-SW-3	3/3	0.005	0.0086	N/A	--	--	--	YES	ACTS
7440-70-2	Calcium	11.1		74		mg/L	CC-SW-3	3/3	5	74	N/A	--	--	--	NO	NUT
16065-83-1	Chromium	0.043		0.043		mg/L	CC-SW-3	1/3	0.01	0.043	N/A	--	--	--	NO	BCTS
7440-48-4	Cobalt	0.0036	J	0.0487	J	mg/L	CC-SW-3	2/3	0.05	0.0487	N/A	--	--	--	NO	BCTS
7440-50-8	Copper	0.0044	J	0.333		mg/L	CC-SW-3	3/3	0.025	0.333	N/A	--	--	--	YES	ACTS
7439-89-6	Iron	1.9		62		mg/L	CC-SW-3	3/3	0.1	62	N/A	--	--	--	YES	ACTS
7439-92-1	Lead	0.0021	J	0.436		mg/L	CC-SW-3	2/3	0.003	0.436	N/A	--	--	--	YES	NTX
7439-95-4	Magnesium	1.68	J	15.2	E	mg/L	CC-SW-3	3/3	5	15.2	N/A	--	--	--	NO	NUT
7439-96-5	Manganese	0.334		2.77		mg/L	CC-SW-3	3/3	0.015	2.77	N/A	--	--	--	YES	ACTS
7439-97-6	Mercury	0.00003	J	0.00055		mg/L	CC-SW-3	2/3	0.0002	0.00055	N/A	--	--	--	NO	BCTS
7440-02-0	Nickel	0.00076	J	0.0652		mg/L	CC-SW-3	3/3	0.04	0.0652	N/A	--	--	--	YES	ACTS
7440-09-7	Potassium	1.98	J	9.95		mg/L	CC-SW-3	3/3	5	9.95	N/A	--	--	--	NO	NUT
7782-49-2	Selenium	0.0083		0.0083		mg/L	CC-SW-3	1/3	0.005	0.0083	N/A	--	--	--	NO	BCTS
7440-22-4	Silver	0.0111		0.0111		mg/L	CC-SW-3	1/3	0.01	0.0111	N/A	--	--	--	NO	BCTS
7440-23-5	Sodium	2.34	J	25.3		mg/L	CC-SW-2	3/3	5	25.3	N/A	--	--	--	NO	NUT
7440-62-2	Vanadium	0.0024	J	0.0605		mg/L	CC-SW-3	2/3	0.05	0.0605	N/A	--	--	--	YES	ACTS
7440-66-6	Zinc	0.0122	J	0.776	E	mg/L	CC-SW-3	3/3	0.02	0.776	N/A	--	--	--	NO	BCTS

Table 4F (cont'd)

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
CAPTAIN'S COVE

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

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

(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

Table 4G

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
CAPTAIN'S COVE

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
67-64-1	Acetone	0.52	E	0.52	E	mg/kg	CC-SED-3	1/2	0.012-0.031	0.52	N/A	--	--	--	NO	BCTS
78-93-3	2-Butanone	0.11	E	0.11	E	mg/kg	CC-SED-3	1/2	0.012-0.031	0.11	N/A	--	--	--	NO	BCTS
120-12-7	Anthracene	0.18	J	0.18	J	mg/kg	CC-SED-3	1/2	0.40-1.0	0.18	N/A	--	--	--	NO	BCTS
56-55-3	Benzo(a)Anthracene	0.35	J	0.35	J	mg/kg	CC-SED-3	1/2	0.40-1.0	0.35	N/A	--	--	--	NO	BCTS
205-99-2	Benzo(b)Fluoranthene	0.36	J	0.36	J	mg/kg	CC-SED-3	1/2	0.40-1.0	0.36	N/A	--	--	--	NO	BCTS
50-32-8	Benzo(a)Pyrene	0.3	J	0.3	J	mg/kg	CC-SED-3	1/2	0.40-1.0	0.3	N/A	--	--	--	NO	BCTS
191-24-2	Benzo(g,h,i)Perylene	0.18	J	0.18	J	mg/kg	CC-SED-3	1/2	0.40-1.0	0.18	N/A	--	--	--	YES	NTX
218-01-9	Chrysene	0.28	J	0.28	J	mg/kg	CC-SED-3	1/2	0.40-1.0	0.28	N/A	--	--	--	NO	BCTS
105-67-9	2,4-Dimethylphenol	0.26	J	0.26	J	mg/kg	CC-SED-3	1/2	0.40-1.0	0.26	N/A	--	--	--	NO	BCTS
206-44-0	Fluoranthene	0.31	J	0.31	J	mg/kg	CC-SED-3	1/2	0.40-1.0	0.31	N/A	--	--	--	NO	BCTS
193-39-5	Indeno(1,2,3-cd)Pyrene	0.18	J	0.18	J	mg/kg	CC-SED-3	1/2	0.40-1.0	0.18	N/A	--	--	--	NO	BCTS
91-57-6	2-Methylphenol	0.74	J	0.74	J	mg/kg	CC-SED-3	1/2	0.40-1.0	0.74	N/A	--	--	--	NO	BCTS
106-44-5	4-Methylphenol	0.52	J	0.52	J	mg/kg	CC-SED-3	1/2	0.40-1.0	0.52	N/A	--	--	--	YES	NTX
85-01-8	Phenanthrene	0.53	J	0.53	J	mg/kg	CC-SED-3	1/2	0.40-1.0	0.53	N/A	--	--	--	YES	NTX
129-00-0	Pyrene	0.45	J	0.45	J	mg/kg	CC-SED-3	1/2	0.40-1.0	0.45	N/A	--	--	--	NO	BCTS
57-74-9	Chlordane (total)	0.032		0.032		mg/kg	CC-SED-3	1/2	0.0021-0.0052	0.032	N/A	--	--	--	NO	BCTS
57-74-9	gamma-Chlordane	0.014	E	0.014	E	mg/kg	CC-SED-3	1/2	0.0021-0.0052	0.014	N/A	--	--	--	NO	BCTS
72-54-8	4,4'-DDD	0.0072	J	0.0072	J	mg/kg	CC-SED-3	1/2	0.004-0.010	0.0072	N/A	--	--	--	NO	BCTS
50-29-3	4,4'-DDT	0.0055	J	0.0055	J	mg/kg	CC-SED-3	1/2	0.004-0.010	0.0055	N/A	--	--	--	NO	BCTS
1024-57-3	Heptachlor epoxide	0.0028	J	0.0028	J	mg/kg	CC-SED-3	1/2	0.0021-0.0052	0.0028	N/A	--	--	--	NO	BCTS
7429-90-5	Aluminum	1550		11800	E	mg/kg	CC-SED-3	2/2	48.8-122	11800	(2)	--	--	--	NO	BBKG
7440-36-0	Antimony	1.3	E	12.2	J	mg/kg	CC-SED-3	2/2	14.7-36.7	12.2	(2)	--	--	--	YES	ACTS
7440-38-2	Arsenic	0.96	J	17.8	E	mg/kg	CC-SED-3	2/2	2.44-6.12	17.8	(2)	--	--	--	YES	ACTS, AC
7440-39-3	Barium	5.8	J	126	E	mg/kg	CC-SED-3	2/2	48.8-122	126	(2)	--	--	--	NO	BBKG
7440-41-7	Beryllium	0.18	J	0.81	J	mg/kg	CC-SED-3	2/2	1.22-3.06	0.81	(2)	--	--	--	NO	BCTS
7440-43-9	Cadmium	0.26	J	2.8	J	mg/kg	CC-SED-3	2/2	1.22-3.06	2.8	(2)	--	--	--	YES	ACTS
7440-70-2	Calcium	421	J	3760	E	mg/kg	CC-SED-3	2/2	1221-3058	3760	(2)	--	--	--	NO	NUT
16065-83-1	Chromium	2.1	J	36.4	E	mg/kg	CC-SED-3	2/2	2.44-6.12	36.4	(2)	--	--	--	NO	BCTS
7440-48-4	Cobalt	1.3	J	19.5	J	mg/kg	CC-SED-3	2/2	12.2-30.6	19.5	(2)	--	--	--	NO	BCTS
7440-50-8	Copper	3.4	J	180	E	mg/kg	CC-SED-3	2/2	6.11-15.29	180	(2)	--	--	--	YES	ACTS
7439-89-6	Iron	3200		29200	E	mg/kg	CC-SED-3	2/2	24.4-61.2	29200	(2)	--	--	--	NO	ACTS, BBKG
7439-92-1	Lead	3.9		271	E	mg/kg	CC-SED-3	2/2	0.73-1.84	271	(2)	--	--	--	YES	NTX, ABKG

Table 4G (cont'd)

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
CAPTAIN'S COVE

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

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

TABLES 5 through 14

Risk Assessment Site Summary Tables

Table 5A.

Contaminants of Concern at Li Tungsten Site
Chemicals Listed Exceed a Cancer Risk of 1 x 10E-6 and/or a Hazard Quotient of 1.

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Surface Soil

		Concentrations Detected						
Exposure Point	Chemicals of Concern	Minimum	Maximum	Units	Frequency of Detection	Exposure Point Concentration	Exposure Point Concentration Units	Statistical Measure
Area B	Arsenic	10	1,790	mg/kg	9/9	1,790	mg/kg	Max
Area B&C	Antimony	7.1	5,610	mg/kg	14/19	4,340	mg/kg	UCL Log
	Arsenic	2	6,300	mg/kg	16/17	6,300	mg/kg	Max
	Manganese	57.1	90,000	mg/kg	18/18	90,000	mg/kg	Max
Area C	Antimony	30.7	2,430	mg/kg	7/8	2,430	mg/kg	Max
	Arsenic	7.3	1,440	mg/kg	7/7	1,440	mg/kg	Max
	Beryllium	-	11	mg/kg	1/8	11	mg/kg	Max

Table 5B.

Contaminants of Concern at the Li Tungsten Site
Chemicals Listed Exceed a Cancer Risk of 1 x 10E-6 and/or a Hazard Quotient of 1.

Scenario Timeframe: Current
Medium: Surface Water
Exposure Medium: Surface Water

		Concentrations Detected						
Exposure Point	Chemicals of Concern	Minimum	Maximum	Units	Frequency of Detection	Exposure Point Concentration	Exposure Point Concentration Units	Statistical Measure
Parcel B	Arsenic	-	8.09	mg/l	1/2	8.09	mg/l	Max
Parcel C	Beryllium	-	0.0055	mg/l	1/2	0.0055	mg/l	Max

Scenario Timeframe: Current
Medium: Sediment
Exposure Medium: Sediment

		Concentration Detected						
Exposure Point	Chemicals of Concern	Minimum	Maximum	Units	Frequency of Detection	Exposure Point Concentration	Exposure Point Concentration Units	Statistical Measure
Parcel B	Arsenic	11.8	25.6	mg/kg	2/2	25.6	mg/kg	Max
Parcel C	Arsenic	1,610	2,080	mg/kg	2/2	2,080	mg/kg	Max

Table 5C.

Contaminants of Concern at the Li Tungsten Site
Chemicals Listed Exceed a Cancer Risk of 1 x 10E-6 or a Hazard Quotient of 1.

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Surface Soil

		Concentrations Detected						
Exposure Point	Chemicals of Concern	Minimum	Maximum	Units	Frequency of Detection	Exposure Point Concentration	Exposure Point Concentration Units	Statistical Measure
Area A	Arsenic	6.4	523	mg/kg	14/14	368	mg/kg	UCL log
	Benzo-a-pyrene	0.043	3.9	mg/kg	16/22	1.27	mg/kg	UCL log
Area B	Arsenic	10	1,790	mg/kg	9/9	1,790	mg/kg	Max
Areas B&C	Antimony	7.1	5,610	mg/kg	14/19	4,340	mg/kg	UCL log
	Arsenic	2	6,300	mg/kg	16/17	6,300	mg/kg	Max
	Manganese	57.1	90,000	mg/kg	18/18	90,000	mg/kg	Max
	PCBs	0.152	15.89	mg/kg	10/18	9.42	mg/kg	UCL log
Area C	Antimony	30.7	2,430	mg/kg	7/8	2,430	mg/kg	Max
	Arsenic	7.3	1,440	mg/kg	7/7	1,440	mg/kg	Max
	Beryllium	-	11.0	mg/kg	1/8	11.0	mg/kg	Max
	Cobalt	6.7	764	mg/kg	8/8	764	mg/kg	Max

Table 5D.
Contaminants of Concern at the Li Tungsten Site
Chemicals Listed Exceed a Cancer Risk of 1 x 10E-6 and/or a Hazard Quotient of 1

Scenario Timeframe: Future
Medium: All Soils
Exposure Medium: All Soils

		Concentration Detected						
Exposure Point	Chemicals of Concern	Minimum	Maximum	Units	Frequency of Detection	Exposure Point Concentration	Exposure Point Concentration Units	Statistical Measure
Area A	Arsenic	2.2	523	mg/kg	24/24	168	mg/kg	UCL log
	Benzo-a-pyrene	0.043	3.9	mg/kg	26/35	1.02	mg/kg	UCL log
	Benzo(b)fluoranthene	0.03	14	mg/kg	28/35	2.4	mg/kg	UCL log
	Di0benz(a,h)anthracene	0.065	1.3	mg/kg	10/35	0.4	mg/kg	UCL log
Area B	Antimony	1.4	416	mg/kg	10/12	416	mg/kg	Max
	Arsenic	5.5	1,790	mg/kg	12/12	1,790	mg/kg	Max
	Manganese	155	5,680	mg/kg	12/12	2,250	mg/kg	UCL log
	Nickel	5.8	28,900	mg/kg	12/12	28,900	mg/kg	Max
	Silver	0.69	103	mg/kg	7/8	103	mg/kg	Max
Areas B&C	Antimony	1.3	5,610	mg/kg	24/37	1,120	mg/kg	UCL log
	Arsenic	1.4	6,300	mg/kg	31/34	6,300	mg/kg	Max
	Manganese	57.1	90,000	mg/kg	35/35	19,900	mg/kg	UCL log
	Silver	0.33	114	mg/kg	13/15	114	mg/kg	Max
Area C	Antimony	10.2	3,490	mg/kg	14/15	3,490	mg/kg	Max
	Arsenic	7.3	2,950	mg/kg	14/14	2,950	mg/kg	Max
	Manganese	58.1	2,930	mg/kg	13/13	2,790	mg/kg	UCL log
	Beryllium	0.82	11	mg/kg	2/15	1.3	mg/kg	UCL log

Table 5E.

Contaminants of Concern at the Li Tungsten Site
Chemicals Listed Exceed 1 x 10E-6 and/or a Hazard Quotient of 1

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater - Tap Water

		Concentrations Detected						
Exposure Point	Chemicals of Concern	Minimum	Maximum	Units	Frequency of Detection	Exposure Point Concentration	Exposure Point Concentration Units	Statistical Measure
Tap Water	Arsenic	0.0099	10.9	mg/l	34/41	0.495	mg/l	UCL log
	Antimony	0.0055	11.1	mg/l	30/60	0.389	mg/l	UCL log
	Benzene	0.0009	0.54	mg/l	8/59	0.0939	mg/l	UCL log
	Cadmium	0.00043	1.16	mg/l	56/60	0.0508	mg/l	UCL log
	1,1-Dichloroethene	0.003	0.65	mg/l	4/59	0.093	mg/l	UCL log
	1,2-Dichloroethene (Total)	0.002	150	mg/l	29/59	18.6	mg/l	UCL log
	Methylene Chloride	0.0009	120	mg/l	9/59	0.692	mg/l	UCL log
	Nickel	0.0036	110	mg/l	60/60	1.87	mg/l	UCL log
	1,1,1-Trichloroethane	0.003	16	mg/l	10/59	0.908	mg/l	UCL log
	Trichloroethene	0.001	31	mg/l	26/59	3.08	mg/l	UCL log
	Tetrachloroethene	0.001	7.8	mg/l	26/59	1.45	mg/l	UCL log
	Vinyl Chloride	0.001	0.096	mg/l	10/59	0.12	mg/l	UCL log

Table 5F.

Contaminants of Concern at the Li Tungsten Site
Chemicals Listed Exceed 1 x 10E-6 and/or a Hazard Quotient of 1

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Air Particulates (Based on Air Modeling of Soil Data)

		Concentrations Detected						
Exposure Point	Chemicals of Concern	Minimum	Maximum	Units	Frequency of Detection	Exposure Point Concentration	Exposure Point Concentration Units	Statistical Measure
Off-site Resident	Cobalt					5.2 E-05	mg/cubic meter	Modeled
	Manganese					8.2 E-04	mg/cubic meter	Modeled
Area A	Arsenic					2.3 E-04	mg/cubic meter	Modeled
	Cobalt					2.1 E-04	mg/cubic meter	Modeled
Area B	Arsenic					2.4 E-03	mg/cubic meter	Modeled
	Cobalt					6.2 E-03	mg/cubic meter	Modeled
	Manganese					3.0 E-03	mg/cubic meter	Modeled
	Silver					1.4 E-04	mg/cubic meter	Modeled
Areas B&C	Cobalt					1.4 E-03	mg/cubic meter	Modeled
	Manganese					2.7 E-02	mg/cubic meter	Modeled
	Silver					1.5 E-04	mg/cubic meter	Modeled
Area C	Cobalt					1.0 E-03	mg/cubic meter	Modeled
	Manganese					3.7 E-03	mg/cubic meter	Modeled
	Silver					1.5 E-04	mg/cubic meter	Modeled

Table 6A.

Contaminants of Concern for the Captain's Cove Facility
Chemicals Exceeding a Cancer Risk of 1 x 10E-6 or a Hazard Quotient of 1 Are Listed

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Surface Soil

		Concentrations Detected						
Exposure Point	Chemicals of Concern	Minimum	Maximum	Units	Frequency of Detection	Exposure Point Concentration	Exposure Point Concentration Units	Statistical Measure
Area A	Antimony	23	216	mg/kg	2/3	216	mg/kg	Max
	Arsenic	3.2	83.9	mg/kg	3/3	83.9	mg/kg	Max
	Cadmium	0.26	4	mg/kg	3/3	4	mg/kg	Max
	Cobalt	4.2	22.2	mg/kg	3/3	22.2	mg/kg	Max
	Iron	8,620	63,000	mg/kg	3/3	63,000	mg/kg	Max
	Manganese	194	1850	mg/kg	3/3	1850	mg/kg	Max
	PCBs	0.081	505	mg/kg	2/3	505	mg/kg	Max

Table 6B.

Contaminants of Concern for the Captain's Cove Facility
Chemicals Exceeding a Cancer Risk of 1 x 10E-6 or a Hazard Quotient of 1 Are Listed

Scenario Timeframe: Current
Medium: Sediment
Exposure Medium: Sediment

		Concentrations Detected						
Exposure Point	Chemicals of Concern	Minimum	Maximum	Units	Frequency of Detection	Exposure Point Concentration	Exposure Point Concentration Units	Statistical Measure
Sediment	Arsenic	0.96	17.8	mg/kg	2/2	17.8	mg/kg	Max

Table 6C.

Contaminants of Concern at the Captain's Cove Facility
Chemicals Listed Exceed a Cancer Risk of 1 x 10E-6 and/or a Hazard Quotient of 1

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Surface Soil

		Concentrations Detected						
Exposure Point	Chemicals of Concern	Minimum	Maximum	Units	Frequency of Detection	Exposure Point Concentration	Exposure Point Concentration Units	Statistical Measure
Area A	PCBs total	0.081	5.5	mg/kg	2/3	5.5	mg/kg	Max
	Arsenic	3.2	83.9	Mg/kg	3/3	0.84	mg/kg	Max.

Table 6D.

Contaminants of Concern at the Captain's Cove Facility
Chemicals Listed Exceed a Cancer Risk of 1 x 10E-6 and/or a Hazard Quotient of 1

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater

		Concentrations Detected						
Exposure Point	Chemicals of Concern	Minimum	Maximum	Units	Frequency of Detection	Exposure Point Concentration	Exposure Point Concentration Units	Statistical Measure
Groundwater	Arsenic	0.0105	11.4	mg/l	3/10	11	mg/l	Max
	Antimony	0.0155	0.0566	mg/l	3/10	0.04	mg/l	UCL-T
	Benzene	0.0084	0.013	mg/l	2/10	0.0076	mg/l	UCL-T
	Chloroform	0.61	0.61	mg/l	1/10	0.22	mg/l	UCL-T
	1,2-Dichloroethane	0.0042	0.0042	mg/l	1/10	0.0042	mg/l	Max
	Tetrachloroethane	0.13	0.13	mg/l	1/10	0.035	mg/l	UCL-T
	Vinyl Chloride	0.0026	0.19	mg/l	2/10	0.055	mg/l	UCL-T
	bis(2-chloroethyl) ether	0.0037	0.0037	mg/l	1/10	0.0037	mg/l	Max
	1,4-Dichlorobenzene	0.037	0.037	mg/l	1/10	0.0037	mg/l	Max
	Chlorobenzene	0.0026	0.5	mg/l	5/10	0.19	mg/l	UCL-T

Table 6E.

Contaminants of Concern at the Captain's Cove Facility
Chemicals Listed Exceed a Cancer Risk of 1 x 10E-6 and/or a Hazard Quotient of 1

Scenario Timeframe: Current/Future
Medium: All Soils
Exposure Medium: All Soils

		Concentrations Detected						
Exposure Point	Chemicals of Concern	Minimum	Maximum	Units	Frequency of Detection	Exposure Point Concentration	Exposure Point Concentration Units	Statistical Measure
Area A	Arsenic	3	2,760	mg/kg	19/19	2,800	mg/kg	Max.
	PCBs Total	0.021	5.5	mg/kg	10/19	1.4	mg/kg	UCL-T
	Benzo(a) anthracene	0.055	2.7	mg/kg	11/19	1.3	mg/kg	UCL-T
	Benzo(b)fluoranthene	0.074	5.6	mg/kg	12/19	2.2	mg/kg	UCL-T
	Benzo(a)pyrene	0.051	3.2	mg/kg	10/19	1.8	mg/kg	UCL-T
	Dibenzo(a,h) anthracene	0.054	0.31	mg/kg	2/19	0.31	mg/kg	Max
	Antimony	0.9	1,160	mg/kg	17/19	1,200	mg/kg	Max
	Cobalt	2.1	379	mg/kg	19/19	380	mg/kg	Max.
	Manganese	115	30,900	mg/kg	19/19	21,000	mg/kg	UCL-T
	Copper	16.5	11,300	mg/kg	19/19	10,000	mg/kg	UCL-T
	Cadmium	0.26	174	mg/kg	19/19	170	mg/kg	Max
	Iron	5,850	203,000	mg/kg	19/19	120,000	mg/kg	UCL-T

Table 6E- Page 2								
		Concentrations Detected						
Exposure Point	Chemicals of Concern	Minimum	Maximum	Units	Frequency of Detection	Exposure Point Concentration	Exposure Point Concentration Units	Statistical Measure
Area G	Arsenic	3.9	341		10/10	340	mg/kg	Max
	Benzo(a)anthracene	0.54	4		6/10	4	mg/kg	UCL-T
	Benzo(b)fluoranthene	0.19	3.7		6/10	3.6	mg/kg	Max.
	PCBs	0.152	12		6/10	9.6	mg/kg	UCL-T
	Benzo(a)pyrene	0.1	1.6		6/10	1.6	mg/kg	Max
	Manganese	269	215,000		10/10	220,000	mg/kg	Max
	Antimony	2.1	201		6/10	200	mg/kg	UCL-T
	Iron	10,500	132,000		10/10	130,000	mg/kg	Max.
	PCBs (total)	0.152	12		6/10	9.6	mg/kg	UCL-T

Table 6F.

Contaminants of Concern at the Captain's Cove Facility
Chemicals Listed Exceed a Cancer Risk of 1 x 10E-6 and/or a Hazard Quotient of 1

Scenario Timeframe: Current/Future
Medium: Air Particulates
Exposure Medium: Air Particulates

		Concentrations Detected						
Exposure Point	Chemicals of Concern	Minimum	Maximum	Units	Frequency of Detection	Exposure Point Concentration	Exposure Point Concentration Units	Statistical Measure
Area A	Arsenic	3	2,760	mg/kg	19/19	2,800	mg/kg	Max.
	Cobalt	2.1	379	mg/kg	19/19	380	mg/kg	Max
	Manganese	115	30,900	mg/kg	19/19	21,000	mg/kg	UCL-T

Table 6G.

Contaminants of Concern at the Captain's Cove Facility
Chemicals Listed Exceed a Cancer Risk of 1 x 10E-6 and/or a Hazard Quotient of 1

Scenario Timeframe: Current/Future
Medium: Volatilized Chemicals During Showering (Modeled Concentrations)
Exposure Medium: Volatilized Chemicals During Showering (Modeled Concentrations)

		Concentrations Detected						
Exposure Point	Chemicals of Concern	Minimum	Maximum	Units	Frequency of Detection	Exposure Point Concentration	Exposure Point Concentration Units	Statistical Measure
Groundwater	Benzene					0.03	mg/cubic meter	Model Result
	Chloroform					0.88	mg/cubic meter	Model Result
	Tetrachloroethane					0.12	mg/cubic meter	Model Result
	Vinyl Chloride					0.054	mg/cubic meter	Model Result
	1,2-Dichloroethane					0.019	mg/cubic meter	Model Result
	Chlorobenzene					0.685	mg/cubic meter	Model Result

TABLE 7

SUMMARY OF COMPLETE EXPOSURE PATHWAYS:
CHEMICAL RISK ASSESSMENT
LI TUNGSTEN SITE

Potentially Exposed Population	Exposure Route, Medium, and Exposure Point	Pathway Selected for Evaluation?	Location	Reason for Selection or Exclusion
Current Land Use				
Site Workers	Ingestion of chemicals in surface soil. Dermal contact with chemicals in surface soil.	No	Areas A, B, B&C, C	Site is not currently used.
Trespassers	Ingestion of chemicals in surface soil. Dermal contact with chemicals in surface soil.	No	Area A	Parcel A is currently paved.
Trespassers	Ingestion of chemicals in surface soil. Dermal contact with chemicals in surface soil.	Yes	Areas B, B&C, C	Contaminated surface soil may be encountered by trespassers.
Trespassers	Dermal contact with chemicals in surface water.	Yes	Parcels B, C	Contaminated surface water may be encountered by trespassers.
Trespassers	Ingestion of chemicals in sediment. Dermal contact with chemicals in sediment.	Yes	Parcels B, C	Contaminated sediment may be encountered by trespassers.
Off-Site Residents	Inhalation of chemicals on respirable particulate.	Yes	Off-site	Contaminated soil particles may become airborne.

TABLE 7 (Continued)

SUMMARY OF COMPLETE EXPOSURE PATHWAYS:
CHEMICAL RISK ASSESSMENT
LI TUNGSTEN SITE

Potentially Exposed Population	Exposure Route, Medium, and Exposure Point	Pathway Selected for Evaluation?	Location	Reason for Selection or Exclusion
Future Land Use				
Trespassers	Ingestion of chemicals in surface soil. Dermal contact with chemicals in surface soil.	Yes	Aeas A, B, B&C, C	Contaminated surface soil may be encountered by trespassers.
Trespassers	Dermal contact with chemicals in surface water.	Yes	Parcel B, C	Contaminated surface water may be encountered by trespassers.
Trespassers	Ingestion of chemicals in sediment. Dermal contact with chemicals in sediment.	Yes	Parcel B, C	Contaminated sediment may be encountered by trespassers.
Site Workers	Ingestion of chemicals in surface soil. Dermal contact with chemicals in surface soil.	Yes	Areas A, B, B&C, C	Contaminated surface soil may be encountered by site workers.
Construction Workers	Ingestion of chemicals in soil. Dermal contact with chemicals in soil. Inhalation of chemicals on respirable particulates.	Yes	Areas A, B, B&C, C	Contaminated soil may be encountered by construction workers during construction activities. Contaminated soil particles may become airborne if disturbed during construction activities.

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TABLE 7 (Continued)

SUMMARY OF COMPLETE EXPOSURE PATHWAYS:
CHEMICAL RISK ASSESSMENT
LI TUNGSTEN SITE

Potentially Exposed Population	Exposure Route, Medium, and Exposure Point	Pathway Selected for Evaluation?	Location	Reason for Selection or Exclusion
On-Site Residents	Ingestion of chemicals in soil. Dermal contact with chemicals in soil.	Yes	Areas A,. B, B&C, C	Contaminated surface soil may be encountered by residents.
On-Site Residents	Ingestion of chemicals in groundwater. Dermal contact with chemicals in groundwater. Inhalation of chemicals volatilized from groundwater.	Yes		The possibility of future potable use of the groundwater exists.
Site Workers	Ingestion of chemicals in groundwater. Dermal contact with chemicals in groundwater.	Yes		The possibility of future potable use of the groundwater exists.

TABLE 8

SELECTION OF EXPOSURE PATHWAYS

CAPTAIN'S COVE

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	On-Site/ Off-Site	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
Current	Surface Soil	Surface Soil	Area A and Area G	Trespasser	Adolescent	Ingestion	On-Site	Quant	Contaminated soil may be encountered by trespassers while on-site
						Dermal Contact	On-Site	Quant	Contaminated soil may be encountered by trespassers while on-site
		Air				Inhalation	On-Site	None	There are no volatile COPCs in soil
				Site Worker	Adult	Ingestion	On-Site	None	Site is currently abandoned
						Dermal Contact	On-Site	None	Site is currently abandoned
		Air				Inhalation	On-Site	None	There are no volatile COPCs in soil
		Particulates	Area A and Area G	Trespasser	Adolescent	Inhalation	On-Site	None	Vegetation hinders the resuspension of contaminated particles
				Site Worker	Adult	Inhalation	On-Site	None	Vegetation hinders the resuspension of contaminated particles
				Off-site Resident	Adult	Inhalation	Off-Site	None	There are no adjacent residents in the vicinity of the Site
					Child	Inhalation	Off-Site	None	There are no adjacent residents in the vicinity of the Site
	Sediment	Sediment	Retention Ponds and Wetland area	Trespasser	Adolescent	Ingestion	On-Site	Quant	Contaminated sediment may be encountered by trespassers while on-site
						Dermal Contact	On-Site	Quant	Contaminated sediment may be encountered by trespassers while on-site
	Surface Water	Surface Water	Retention Ponds and low area	Trespasser	Adolescent	Dermal Contact	On-Site	Quant	Contaminated surface water may be encountered by trespassers while on-site

TABLE 8

SELECTION OF EXPOSURE PATHWAYS

CAPTAIN'S COVE

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	On-Site/ Off-Site	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
Future	Surface Soil	Surface Soil	Area A and Area G	Trespasser	Adolescent	Ingestion	On-Site	Quant	Contaminated soil may be encountered by trespassers while on-site
						Dermal	On-Site	Quant	Contaminated soil may be encountered by trespassers while on-site
		Air				Inhalation	On-Site	None	There are no volatile COPCs in soil
				Site Worker	Adult	Ingestion	On-Site	Quant	Contaminated soil may be encountered by site workers while on-site
						Dermal	On-Site	Quant	Contaminated soil may be encountered by site workers while on-site
		Air				Inhalation	On-Site	None	There are no volatile COPCs in soil
		Particulates	Area A	Visitor	Adult	Inhalation	On-Site	None	Exposure would be infrequent
	All Soil	All Soil	Area A and Area G	Construction Worker	Adult	Ingestion	On-Site	Quant	Contaminated soil may be encountered by construction workers during construction activities
						Dermal	On-Site	Quant	Contaminated soil may be encountered by construction workers during construction activities
		Air				Inhalation	On-Site	None	There are no volatile COPCs in soil
				Resident	Adult	Ingestion	On-Site	Quant	Residential development is possible
						Dermal	On-Site	Quant	Residential development is possible
		Air				Inhalation	On-Site	None	There are no volatile COPCs in soil
					Child	Ingestion	On-Site	Quant	Residential development is possible
						Dermal	On-Site	Quant	Residential development is possible
		Air				Inhalation	On-Site	None	There are no volatile COPCs in soil
		Particulates	Area and Area G	Construction Worker	Adult	Inhalation	On-Site	Quant	Contaminated particles may become airborne during excavation activities
				Trespasser	Adolescent	Inhalation	On-Site	None	Vegetation and pavement or buildings would hinder the resuspension of contaminated respirable particulates
				Site Worker	Adult	Inhalation	On-Site	None	Vegetation and pavement or buildings would hinder the resuspension of contaminated respirable particulates
				Resident	Adult	Inhalation	Off-Site	None	Vegetation and pavement or buildings would hinder the resuspension of contaminated respirable particulates
					Child	Inhalation	Off-Site	None	Vegetation and pavement or buildings would hinder the resuspension of contaminated respirable particulates
	Surface Water	Surface Water	Retention Ponds and low area	Trespasser	Adolescent	Dermal	On-Site	Quant	Contaminated surface water may be encountered by trespassers while on-site
	Sediment	Sediment	Retention Ponds	Trespasser	Adolescent	Ingestion	On-Site	Quant	Contaminated sediment may be encountered by trespassers while on-site
						Dermal	On-Site	Quant	Contaminated sediment may be encountered by trespassers while on-site
	Groundwater	Groundwater	Upper Glacial Aquifer - Tap Water	Site Worker	Adult	Ingestion	On-Site	Quant	Potable use of the groundwater is possible
						Dermal	On-Site	Quant	Potable use of the groundwater is possible
				Resident	Adult	Ingestion	On-Site	Quant	Potable use of the groundwater is possible
						Dermal	On-Site	Quant	Potable use of the groundwater is possible
		Air	Upper Glacial Aquifer - Water vapors at showerhead			Inhalation	On-Site	Quant	Potable use of the groundwater is possible
					Child	Ingestion	On-Site	Quant	Potable use of the groundwater is possible
						Dermal	On-Site	Quant	Potable use of the groundwater is possible
		Air	Upper Glacial Aquifer - Water vapors at showerhead			Inhalation	On-Site	Quant	Potable use of the groundwater is possible

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TABLE 10C
CANCER TOXICITY DATA -- ORAL/DERMAL
CAPTAIN'S COVE

Chemical of Potential Concern	Oral Cancer Slope Factor	Oral to Dermal Adjustment Factor	Adjusted Dermal Cancer Slope Factor (1)	Units	Weight of Evidence/ Cancer Guideline Description	Source	Date (2) (MM/DD/YY)
Benzene	2.9E-02	100%	2.9E-02	(mg/kg-day)$^{-1}$	A	IRIS	10/16/98
Chlorobenzene	NA	N/A	N/A	N/A	D	IRIS; HEAST	--
Chloroform	6.1E-03	100%	6.1E-03	(mg/kg-day)$^{-1}$	B2	IRIS	04/01/97
1,2-Dichloroethane	9.1E-02	100%	9.1E-02	(mg/kg-day)$^{-1}$	B2	IRIS	03/01/97
cis-1,2-Dichloroethene	NA	N/A	N/A	N/A	D	IRIS; HEAST	--
trans-1,2-Dichloroethene	NA	N/A	N/A	N/A	NA	IRIS; HEAST	--
1,2-Dichloroethene(total)	NA	N/A	N/A	N/A	NA	IRIS; HEAST	--
Methylene chloride	7.5E-03	100%	7.5E-03	(mg/kg-day)$^{-1}$	B2	IRIS	04/01/97
Tetrachloroethene	5.2E-02	100%	5.2E-02	(mg/kg-day)$^{-1}$	NA	NCEA	04/01/97
Toluene	NA	N/A	N/A	N/A	D	IRIS; HEAST	--
Trichloroethene	1.1E-02	100%	1.1E-02	(mg/kg-day)$^{-1}$	NA	NCEA	07/02/97
Vinyl chloride	1.9E+00	100%	1.9E+00	(mg/kg-day)$^{-1}$	A	HEAST	7/1/97
Acenaphthylene	NA	N/A	N/A	N/A	D	IRIS; HEAST	--
Benzo[g,h,i]perylene	NA	N/A	N/A	N/A	D	IRIS; HEAST	--
Phenanthrene	NA	N/A	N/A	N/A	D	IRIS; HEAST	--
Benzo[a]anthracene	7.3E-01	100%	7.3E-01	(mg/kg-day)$^{-1}$	B2	IRIS	04/01/97
Benzo[a]pyrene	7.3E+00	100%	7.3E+00	(mg/kg-day)$^{-1}$	B2	IRIS	03/01/97
Benzo[b]fluoranthene	7.3E-01	100%	7.3E-01	(mg/kg-day)$^{-1}$	B2	IRIS	03/01/97
Dibenz[a,h]anthracene	7.3E+00	100%	7.3E+00	(mg/kg-day)$^{-1}$	B2	IRIS	03/01/97
Indeno[1,2,3-cd]pyrene	7.3E-01	100%	7.3E-01	(mg/kg-day)$^{-1}$	B2	IRIS	03/01/97
bis(2-Chloroethyl)ether	1.1E+00	100%	1.1E+00	(mg/kg-day)$^{-1}$	B2	IRIS	03/01/97
1,4-Dichlorobenzene	2.4E-02	100%	2.4E-02	(mg/kg-day)$^{-1}$	C	HEAST	07/01/97
4-Methylphenol	NA	N/A	N/A	N/A	NA	IRIS; HEAST	--
Polychlorinated biphenyls	2.0E+00	100%	2.0E+00	(mg/kg-day)$^{-1}$	B2	IRIS	06/01/97
Aroclor 1016	NA	N/A	N/A	N/A	NA	IRIS; HEAST	--

TABLE 1~~8~~C 1A

CANCER TOXICITY DATA -- ORAL/DERMAL

CAPTAIN'S COVE

Chemical of Potential Concern	Oral Cancer Slope Factor	Oral to Dermal Adjustment Factor	Adjusted Dermal Cancer Slope Factor (1)	Units	Weight of Evidence/ Cancer Guideline Description	Source	Date (2) (MM/DD/YY)
Aroclor 1248	NA	N/A	N/A	N/A	NA	IRIS; HEAST	--
Aroclor 1254	NA	N/A	N/A	N/A	NA	IRIS; HEAST	--
Endosulfan sulfate	NA	N/A	N/A	N/A	NA	IRIS; HEAST	--
Endrin aldehyde	NA	N/A	N/A	N/A	NA	IRIS; HEAST	--
Endrin ketone	NA	N/A	N/A	N/A	NA	IRIS; HEAST	--
Aluminum	NA	1%	N/A	N/A	D	IRIS; HEAST	--
Antimony	NA	10%	N/A	N/A	B1	IRIS; HEAST	--
Arsenic	1.5E+00	80%	1.9E+00	(mg/kg-day)	A	IRIS	04/10/98
Barium	NA	N/A	N/A	N/A	NA	IRIS; HEAST	--
Cadmium (water)	NA	N/A	N/A	N/A	B1	IRIS; HEAST	--
Cadmium (food)	NA	N/A	N/A	N/A	B1	IRIS; HEAST	--
Cobalt	NA	N/A	N/A	N/A	ND	IRIS; HEAST	--
Copper	NA	N/A	N/A	N/A	D	IRIS; HEAST	--
Iron	NA	N/A	N/A	N/A	NA	IRIS; HEAST	--
Lead	NA	N/A	N/A	N/A	B2	IRIS; HEAST	--
Manganese	NA	N/A	N/A	N/A	D	IRIS; HEAST	--
Magnesium	NA	N/A	N/A	N/A	NA	IRIS; HEAST	--
Nickel (soluble salts)	NA	N/A	N/A	N/A	NA	IRIS; HEAST	--
Silver	NA	N/A	N/A	N/A	D	IRIS; HEAST	--
Vanadium	NA	N/A	N/A	N/A	ND	IRIS; HEAST	--
Zinc	NA	N/A	N/A	N/A	D	IRIS; HEAST	--

IRIS = Integrated Risk Information System

HEAST= Health Effects Assessment Summary Tables

NCEA = National Center for Environmental Assessment

NA = Not Available

N/A = Not Applicable

(1) Oral Slope Factor / Oral to Dermal Adjustment Factor = Adjusted Dermal Cancer Slope Factor

(2) IRIS searched 10/8/98

EPA Group:

A - Human carcinogen

B1 - Probable human carcinogen - indicates that limited human data are available

B2 - Probable human carcinogen - indicates sufficient evidence in animals and inadequate or no evidence in humans

C - Possible human carcinogen

D - Not classifiable as a human carcinogen

E - Evidence of noncarcinogenicity

Weight of Evidence:

Known/Likely

Cannot be Determined

Not Likely

TABLE 98

CANCER TOXICITY DATA -- INHALATION

CAPTAIN'S COVE

Chemical of Potential Concern	Unit Risk	Units	Adjustment	Inhalation Cancer Slope Factor	Units	Weight of Evidence/ Cancer Guideline Description	Source	Date (1) (MM/DD/YY)
Benzene	7.8E-06	ug/m^3	(2)	2.7E-02	$(mg/kg\text{-}day)^{-1}$	A	IRIS	10/16/98
Chlorobenzene	NA	NA	(2)	N/A	N/A	D	IRIS; HEAST	--
Chloroform	2.3E-05	ug/m^3	(2)	8.1E-02	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	04/01/97
1,2-Dichloroethane	2.6E-05	ug/m^3	(2)	9.1E-02	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	03/01/97
cis-1,2-Dichloroethene	NA	NA	(2)	N/A	N/A	D	IRIS; HEAST	--
trans-1,2-Dichloroethene	NA	NA	(2)	N/A	N/A	NA	IRIS; HEAST	--
1,2-Dichloroethene(total)	NA	NA	(2)	N/A	N/A	NA	IRIS; HEAST	--
Methylene chloride	4.7E-07	ug/m^3	(2)	1.6E-03	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	04/01/97
Tetrachloroethene	5.8E-07	ug/m^3	(2)	2.0E-03	$(mg/kg\text{-}day)^{-1}$	NA	NCEA	04/01/97
Toluene	NA	NA	(2)	N/A	N/A	D	IRIS; HEAST	--
Trichloroethene	1.7E-06	ug/m^3	(2)	6.0E-03	$(mg/kg\text{-}day)^{-1}$	NA	NCEA	07/02/97
Vinyl chloride	8.4E-05	ug/m^3	(2)	3.0E-01	$(mg/kg\text{-}day)^{-1}$	A	HEAST	7/1/97
Acenaphthylene	NA	NA	(2)	N/A	N/A	D	IRIS; HEAST	--
Benzo[g,h,i]perylene	NA	NA	(2)	N/A	N/A	D	IRIS; HEAST	--
Phenanthrene	NA	NA	(2)	N/A	N/A	D	IRIS; HEAST	--
Benzo[a]anthracene	NA	NA	(2)	N/A	N/A	B2	IRIS; HEAST	--
Benzo[a]pyrene	NA	NA	(2)	N/A	N/A	B2	IRIS; HEAST	--
Benzo[b]fluoranthene	NA	NA	(2)	N/A	N/A	B2	IRIS; HEAST	--
Dibenz[a,h]anthracene	NA	NA	(2)	N/A	N/A	B2	IRIS; HEAST	--
Indeno[1,2,3-cd]pyrene	NA	NA	(2)	N/A	N/A	B2	IRIS; HEAST	--
bis(2-Chloroethyl)ether	3.3E-04	ug/m^3	(2)	1.2E+00	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	03/01/97
1,4-Dichlorobenzene	NA	NA	(2)	2.2E-02	$(mg/kg\text{-}day)^{-1}$	C	NCEA	03/01/97
4-Methylphenol	NA	NA	(2)	N/A	N/A	NA	IRIS; HEAST	--
Polychlorinated biphenyls	NA	NA	(2)	2.0E+00	$(mg/kg\text{-}day)^{-1}$	B2	IRIS; HEAST	--
Aroclor 1016	NA	NA	(2)	N/A	N/A	NA	IRIS; HEAST	--

TABLE 16

CANCER TOXICITY DATA -- INHALATION

CAPTAIN'S COVE

Chemical of Potential Concern	Unit Risk	Units	Adjustment	Inhalation Cancer Slope Factor	Units	Weight of Evidence/ Cancer Guideline Description	Source	Date (1) (MM/DD/YY)
Aroclor 1248	NA	NA	(2)	N/A	N/A	NA	IRIS; HEAST	--
Aroclor 1254	NA	NA	(2)	N/A	N/A	NA	IRIS; HEAST	--
Endosulfan sulfate	NA	NA	(2)	N/A	N/A	NA	IRIS; HEAST	--
Endrin aldehyde	NA	NA	(2)	N/A	N/A	NA	IRIS; HEAST	--
Endrin ketone	NA	NA	(2)	N/A	N/A	NA	IRIS; HEAST	--
Aluminum	NA	NA	(2)	N/A	N/A	D	IRIS; HEAST	--
Antimony	NA	NA	(2)	N/A	N/A	B1	IRIS; HEAST	--
Arsenic	4.3E-03	ug/m^3	(2)	1.5E+01	$(mg/kg\text{-}day)^{-1}$	A	IRIS	04/10/98
Barium	NA	NA	(2)	N/A	N/A	NA	IRIS; HEAST	--
Cadmium (water)	1.8E-03	ug/m^3	(2)	6.3E+00	$(mg/kg\text{-}day)^{-1}$	B1	IRIS	04/01/97
Cadmium (food)	1.8E-03	ug/m^3	(2)	6.3E+00	(mg/kg-day)	B1	IRIS	04/01/97
Cobalt	NA	NA	(2)	N/A	N/A	ND	IRIS; HEAST	--
Copper	NA	NA	(2)	N/A	N/A	D	IRIS; HEAST	--
Iron	NA	NA	(2)	N/A	N/A	NA	IRIS; HEAST	--
Lead	NA	NA	(2)	N/A	N/A	B2	IRIS; HEAST	--
Manganese	NA	NA	(2)	N/A	N/A	D	IRIS; HEAST	--
Magnesium	NA	NA	(2)	N/A	N/A	NA	IRIS; HEAST	--
Nickel (soluble salts)	NA	NA	(2)	N/A	N/A	NA	IRIS; HEAST	--
Silver	NA	NA	(2)	N/A	N/A	D	IRIS; HEAST	--
Vanadium	NA	NA	(2)	N/A	N/A	ND	IRIS; HEAST	--
Zinc	NA	NA	(2)	N/A	N/A	D	IRIS; HEAST	--

IRIS = Integrated Risk Information System

HEAST= Health Effects Assessment Summary Tables

NCEA = National Center for Environmental Assessment

NA = Not Available

N/A = Not Applicable

(1) IRIS searched 10/8/98

(2) 70kg x $1/20m^3$/day x 1000ug/mg

EPA Group:

A - Human carcinogen

B1 - Probable human carcinogen - indicates that limited human data are available

B2 - Probable human carcinogen - indicates sufficient evidence in animals and inadequate or no evidence in humans

C - Possible human carcinogen

D - Not classifiable as a human carcinogen

E - Evidence of noncarcinogenicity

Weight of Evidence:

Known/Likely

Cannot be Determined

Not Likely

TABLE10A
NON-CANCER TOXICITY DATA -- ORAL/DERMAL
CAPTAIN'S COVE

Chemical of Potential Concern	Chronic/ Subchronic	Oral RfD Value	Oral RfD Units	Oral to Dermal Adjustment Factor (1)	Adjusted Dermal RfD (2)	Units	Primary Target Organ	Combined Uncertainty/Modifying Factors	Sources of RfD: Target Organ	Dates of RfD: Target Organ (3) (MM/DD/YY)
Benzene	Chronic	NA	NA	N/A	N/A	N/A	NA	NA	IRIS; HEAST	--
Chlorobenzene	Chronic	2E-02	mg/kg-day	100%	2E-02	mg/kg-day	Liver	1000	IRIS	04/01/97
Chloroform	Chronic	1E-02	mg/kg-day	100%	1E-02	mg/kg-day	Liver	1000	IRIS	04/01/97
1,2-Dichloroethane	Chronic	3E-02	mg/kg-day	100%	3E-02	mg/kg-day	Lung	1000	NCEA	03/01/97
cis-1,2-Dichloroethene	Chronic	1E-02	mg/kg-day	100%	1E-02	mg/kg-day	Hematopoietic	3000	HEAST	07/01/97
trans-1,2-Dichloroethene	Chronic	2E-02	mg/kg-day	100%	2E-02	mg/kg-day	Liver	1000	IRIS	03/01/97
1,2-Dichloroethene(total)	Chronic	9E-03	mg/kg-day	100%	9E-03	mg/kg-day	Liver	1000	HEAST	07/01/97
Methylene chloride	Chronic	6E-02	mg/kg-day	100%	6E-02	mg/kg-day	Liver	100	IRIS	04/01/97
Tetrachloroethene	Chronic	1E-02	mg/kg-day	100%	1E-02	mg/kg-day	Liver	NA	IRIS	04/01/97
Toluene	Chronic	2E-01	mg/kg-day	100%	2E-01	mg/kg-day	Liver and Kidney	1000	IRIS	03/01/97
Trichloroethene	Chronic	6E-03	mg/kg-day	100%	6E-03	mg/kg-day	Liver and Kidney	3000	NCEA	07/02/97
Vinyl chloride	Chronic	NA	NA	N/A	N/A	N/A	NA	NA	IRIS; HEAST	--
Acenaphthylene	Chronic	NA	NA	N/A	N/A	N/A	NA	NA	IRIS; HEAST	--
Benzo[g,h,i]perylene	Chronic	NA	NA	N/A	N/A	N/A	NA	NA	IRIS; HEAST	--
Phenanthrene	Chronic	NA	NA	N/A	N/A	N/A	NA	NA	IRIS; HEAST	--
Benzo[a]anthracene	Chronic	NA	NA	N/A	N/A	N/A	NA	NA	IRIS; HEAST	--
Benzo[a]pyrene	Chronic	NA	NA	N/A	N/A	N/A	NA	NA	IRIS; HEAST	--
Benzo[b]fluoranthene	Chronic	NA	NA	N/A	N/A	N/A	NA	NA	IRIS; HEAST	--
Dibenz[a,h]anthracene	Chronic	NA	NA	N/A	N/A	N/A	NA	NA	IRIS; HEAST	--
Indeno[1,2,3-cd]pyrene	Chronic	NA	NA	N/A	N/A	N/A	NA	NA	IRIS; HEAST	--
bis(2-Chloroethyl)ether	Chronic	NA	NA	N/A	N/A	N/A	NA	NA	IRIS; HEAST	--
1,4-Dichlorobenzene	Chronic	3E-02	mg/kg-day	100%	3E-02	mg/kg-day	Liver and Kidney	1000	NCEA	03/01/97
4-Methylphenol	Chronic	NA	NA	N/A	N/A	N/A	NA	NA	IRIS; HEAST	--
Polychlorinated biphenyls	Chronic	NA	NA	N/A	N/A	N/A	NA	NA	IRIS; HEAST	--
Aroclor 1016	Chronic	7E-05	mg/kg-day	100%	7E-05	mg/kg-day	Developmental	81	IRIS	03/01/97
Aroclor 1248	Chronic	NA	NA	N/A	N/A	N/A	NA	NA	IRIS; HEAST	--
Aroclor 1254	Chronic	2E-05	mg/kg-day	100%	2E-05	mg/kg-day	Immune	300	IRIS	03/01/97
Endosulfan sulfate	Chronic	NA	NA	N/A	N/A	N/A	NA	NA	IRIS; HEAST	--
Endrin aldehyde	Chronic	NA	NA	N/A	N/A	N/A	NA	NA	IRIS; HEAST	--
Endrin ketone	Chronic	NA	NA	N/A	N/A	N/A	NA	NA	IRIS; HEAST	--

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TABLE10A

NON-CANCER TOXICITY DATA -- ORAL/DERMAL

CAPTAIN'S COVE

Chemical of Potential Concern	Chronic/ Subchronic	Oral RfD Value	Oral RfD Units	Oral to Dermal Adjustment Factor (1)	Adjusted Dermal RfD (2)	Units	Primary Target Organ	Combined Uncertainty/Modifying Factors	Sources of RfD: Target Organ	Dates of RfD: Target Organ (3) (MM/DD/YY)
Aluminum	Chronic	1E+00	mg/kg-day	1%	5E-03	mg/kg-day	CNS	100	NCEA	09/01/94
Antimony	Chronic	4E-04	mg/kg-day	10%	4E-05	mg/kg-day	Hematopoietic	1000	IRIS	03/01/97
Arsenic	Chronic	3E-04	mg/kg-day	80%	2E-04	mg/kg-day	Skin	3	IRIS	04/10/98
Barium	Chronic	7E-02	mg/kg-day	5%	4E-03	mg/kg-day	Developmental, hematopoietic	3	IRIS	03/30/98
Cadmium (water)	Chronic	5E-04	mg/kg-day	5%	3E-05	mg/kg-day	Kidney	10	IRIS	04/01/97
Cadmium (food)	Chronic	1E-03	mg/kg-day	5%	5E-05	mg/kg-day	Kidney	10	IRIS	04/01/97
Cobalt	Chronic	6E-02	mg/kg-day	80%	5E-02	mg/kg-day	Hematopoietic	NA	NCEA	12/01/94
Copper	Chronic	3.7E-02	mg/kg-day	50%	2E-02	mg/kg-day	Gastrointestinal Tract	NA	HEAST	07/01/97
Iron	Chronic	3E-01	mg/kg-day	NA	3E-01	mg/kg-day	Liver	1E+00	NCEA	11/26/96
Lead	Chronic	NA	NA	N/A	N/A	N/A	NA	NA	IRIS; HEAST	--
Manganese	Chronic	2E-02	mg/kg-day	5%	1E-03	mg/kg-day	CNS	1	IRIS	4E+04
Magnesium	Chronic	NA	NA	N/A	N/A	N/A	NA	NA	IRIS; HEAST	--
Nickel (soluble salts)	Chronic	2E-02	mg/kg-day	10%	2E-03	mg/kg-day	Developmental	300	IRIS	04/01/97
Silver	Chronic	5E-03	mg/kg-day	10%	5E-04	mg/kg-day	Skin	3	IRIS	03/01/97
Vanadium	Chronic	7E-03	mg/kg-day	NA	7E-03	mg/kg-day	NA	100	HEAST	08/15/91
Zinc	Chronic	3E-01	mg/kg-day	40%	1E-01	mg/kg-day	Hematopoietic	3	IRIS	03/01/97

IRIS = Integrated Risk Information System

HEAST= Health Effects Assessment Summary Tables

NCEA = National Center for Environmental Assessment

NA = Not Available

N/A = Not Applicable

NOAEL = No Observed Adverse Effects Level

(1) USEPA, 1989. Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual, Part A, Interim Final. EPA/540/1-89/002, Office of Emergency and Remedial Response, Washington, DC.

(2) Oral RfD x Oral to Dermal Adjustment Factor = Adjusted Dermal RfD

TABLE 10B
NON-CANCER TOXICITY DATA -- INHALATION
CAPTAIN'S COVE

Chemical of Potential Concern	Chronic/ Subchronic	Value Inhalation RfC	Units	Adjusted Inhalation RfD	Units	Primary Target Organ	Combined Uncertainty/Modifying Factors	Sources of RfC:RfD: Target Organ	Dates (1) (MM/DD/YY)
Benzene	Chronic	NA	NA	N/A	N/A	N/A	NA	IRIS; HEAST	--
Chlorobenzene	Chronic	2.0E-02	mg/m^3	5.7E-03	mg/kg-day	Liver and Kidney	10000	HEAST	7/1/97
Chloroform	Chronic	3.0E-04	mg/m^3	8.6E-05	mg/kg-day	Liver and Kidney	10 for C	NCEA	4/1/97
1,2-Dichloroethane	Chronic	5.0E-03	mg/m^3	1.4E-03	mg/kg-day	Gastrointestinal tract, liver and kidney	3000 for H,C,O	NCEA	3/1/97
cis-1,2-Dichloroethene	Chronic	NA	NA	N/A	N/A	N/A	NA	IRIS; HEAST	--
trans-1,2-Dichloroethene	Chronic	NA	NA	N/A	N/A	N/A	NA	IRIS; HEAST	--
1,2-Dichloroethene(total)	Chronic	NA	NA	N/A	N/A	N/A	NA	IRIS; HEAST	--
Methylene chloride	Chronic	3.0E+00	mg/m^3	8.6E-01	mg/kg-day	Liver	100	HEAST	7/1/97
Tetrachloroethene	Chronic	4.0E-01	mg/m^3	1.1E-01	mg/kg-day	Liver, kidney, and CNS	300 for H,A,S	NCEA	4/1/97
Toluene	Chronic	4.0E-01	mg/m^3	1.1E-01	mg/kg-day	CNS	300 for H,S,O	IRIS	3/1/97
Trichloroethene	Chronic	NA	NA	N/A	N/A	N/A	NA	IRIS; HEAST	--
Vinyl chloride	Chronic	NA	NA	N/A	N/A	N/A	NA	IRIS; HEAST	--
Acenaphthylene	Chronic	NA	NA	N/A	N/A	N/A	NA	IRIS; HEAST	--
Benzo[g,h,i]perylene	Chronic	NA	NA	N/A	N/A	N/A	NA	IRIS; HEAST	--
Phenanthrene	Chronic	NA	NA	N/A	N/A	N/A	NA	IRIS; HEAST	--
Benzo[a]anthracene	Chronic	NA	NA	N/A	N/A	N/A	NA	IRIS; HEAST	--
Benzo[a]pyrene	Chronic	NA	NA	N/A	N/A	N/A	NA	IRIS; HEAST	--
Benzo[b]fluoranthene	Chronic	NA	NA	N/A	N/A	N/A	NA	IRIS; HEAST	--
Dibenz[a,h]anthracene	Chronic	NA	NA	N/A	N/A	N/A	NA	IRIS; HEAST	--
Indeno[1,2,3-cd]pyrene	Chronic	NA	NA	N/A	N/A	N/A	NA	IRIS; HEAST	--
bis(2-Chloroethyl)ether	Chronic	NA	NA	N/A	N/A	N/A	NA	IRIS; HEAST	--
1,4-Dichlorobenzene	Chronic	8.0E-01	mg/m^3	2.3E-01	mg/kg-day	Liver	100 for H,A,C	IRIS	3/1/97
4-Methylphenol	Chronic	NA	NA	N/A	N/A	N/A	NA	IRIS; HEAST	--
Polychlorinated biphenyls	Chronic	NA	NA	N/A	N/A	N/A	NA	IRIS; HEAST	--
Aroclor 1016	Chronic	NA	NA	N/A	N/A	N/A	NA	IRIS; HEAST	--

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TABLE 10B
NON-CANCER TOXICITY DATA -- INHALATION
CAPTAIN'S COVE

Chemical of Potential Concern	Chronic/ Subchronic	Value Inhalation RfC	Units	Adjusted Inhalation RfD	Units	Primary Target Organ	Combined Uncertainty/Modifying Factors	Sources of RfC:RfD: Target Organ	Dates (1) (MM/DD/YY)
Aroclor 1248	Chronic	NA	NA	N/A	N/A	N/A	NA	IRIS; HEAST	--
Aroclor 1254	Chronic	NA	NA	N/A	N/A	N/A	NA	IRIS; HEAST	--
Endosulfan sulfate	Chronic	NA	NA	N/A	N/A	N/A	NA	IRIS; HEAST	--
Endrin aldehyde	Chronic	NA	NA	N/A	N/A	N/A	NA	IRIS; HEAST	--
Endrin ketone	Chronic	NA	NA	N/A	N/A	N/A	NA	IRIS; HEAST	--
Aluminum	Chronic	5.0E-03	mg/m^3	1.4E-03	mg/kg-day	CNS, lung	300 for H, S,O	NCEA	9/1/94
Antimony	Chronic	NA	NA	N/A	N/A	N/A	NA	IRIS; HEAST	--
Arsenic	Chronic	NA	NA	N/A	N/A	N/A	NA	IRIS; HEAST	--
Barium	Chronic	5.0E-04	mg/m^3	1.4E-04	mg/kg-day	Developmental	1000	HEAST	7/1/97
Cadmium (water)	Chronic	NA	NA	N/A	N/A	N/A	NA	IRIS; HEAST	--
Cadmium (food)	Chronic	NA	NA	N/A	N/A	N/A	NA	IRIS; HEAST	--
Cobalt	Chronic	2.0E-05	mg/m^3	5.7E-06	mg/kg-day	NOAEL	NA	NCEA	12/1/94
Copper	Chronic	NA	NA	N/A	N/A	N/A	NA	IRIS; HEAST	--
Iron	Chronic	NA	NA	N/A	N/A	N/A	NA	IRIS; HEAST	--
Lead	Chronic	NA	NA	N/A	N/A	N/A	NA	IRIS; HEAST	--
Manganese	Chronic	5.0E-05	mg/m^3	1.4E-05	mg/kg-day	CNS	1000 for H,S,O	IRIS	3/1/97
Magnesium	Chronic	NA	NA	N/A	N/A	N/A	NA	IRIS; HEAST	--
Nickel (soluble salts)	Chronic	NA	NA	N/A	N/A	N/A	NA	IRIS; HEAST	--
Silver	Chronic	NA	NA	N/A	N/A	N/A	NA	IRIS; HEAST	--
Vanadium	Chronic	NA	NA	N/A	N/A	N/A	NA	IRIS; HEAST	--
Zinc	Chronic	NA	NA	N/A	N/A	N/A	NA	IRIS; HEAST	--

IRIS = Integrated Risk Information System
HEAST= Health Effects Assessment Summary Tables
NCEA = National Center for Environmental Assessment
NA = Not Available
N/A = Not Applicable
(1) IRIS searched 10/8/98

Table 11A.

Cancer Risks at the Li Tungsten Site
(Chemicals of Concern Listed Exceed Risk of 1 x 10E-6).

Scenario Timeframe: Current
Receptor Population: Off-Site Resident
Receptor Age: Adult

				Carcinogenic Risk				
Medium	Exposure Medium	Exposure Point	Chemical of Concern	Ingestion	Inhalation	Dermal	External Radiation	Exposure Routes Total
Soil	Air - Inhalation of Particulates	Off-site -	Arsenic		1 E-04			1 E-04
			Uranium 238				8 E-06	8 E-06
			Uranium 234				9 E-06	9 E-06
			Thorium 230				7 E-06	7 E-06
			Thorium 232				3 E-06	3 E-06
			Thorium 228				5 E-05	5 E-05
						Total Risk for Inhalation of Soil Particulates to Off-Site Residents		2 E-04

Table 11A - Page 2..

Cancer Risks at the Li Tungsten Site
(Chemicals of Concern Listed Exceed Risk of 1 x 10E-6).

Scenario Timeframe: Current
Receptor Population: Off-Site Resident
Receptor Age: Child

				Carcinogenic Risk				
Medium	Exposure Medium	Exposure Point	Chemical of Concern	Ingestion	Inhalation	Dermal	External Radiation	Exposure Routes Total
Soil	Air - Inhalation of Particulates	Off-site -	Arsenic		1 E-04			1 E-04
			Uranium 238				2 E-06	2 E-06
			Thorium 230				1 E-06	1 E-06
						Total Risk for Inhalation of Soil Particulates for Off-Site Resident		1 E-04

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Table 11B.

Cancer Risks a the Li Tungsten Site
(Chemicals Listed Exceed Risks of 1 x 10E-6).

Scenario Timeframe: Current/Future
Receptor Population: Trespasser
Receptor Age: Adolescent (12 to 18 Years)

				Carcinogenic Risk				
Medium	Exposure Medium	Exposure Point	Chemical of Concern	Ingestion	Inhalation	Dermal	Ingestion and External Penetrating Radiation	Exposure Routes Total
Soil Surface	Soil Surface	Area A	Arsenic	3 E-05		2 E-05		5 E-05
			Radium 226				8 E-06	8 E-06
			Radium 228				8 E-05	8 E-05
			Thorium 228				2 E-04	2 E-04
					Total Risks - Surface Soil Area A			3 E-04
Soil - Surface	Soil - Surface	Area B	Arsenic	1 E-04		1 E-04		2 E-04
			Radium 226				3 E-06	3 E-06
			Radium 228				1 E-05	1 E-05
			Thorium 228				2 E-05	2 E-05
					Total Risks - Area B			2 E-04

Table 11B. Continued (Page 2)
Adolescent Trespasser (12 to 18 Years Old)

				Carcinogenic Risk				
Medium	Exposure Medium	Exposure Point	Chemical of Concern	Ingestion	Inhalation	Dermal	Ingestion and External Penetrating Radiation	Exposure Routes Total
Soil - Surface	Soil - Surface	Areas B&C	Arsenic	5 E-04		3 E-04		8 E-04
			Uranium 238				5 E-06	5 E-06
			Radium 226				9 E-05	9 E-05
			Lead 210				6 E-06	6 E-06
			Radium 228				1 E-04	1 E-04
			Thorium 228				2 E-04	2 E-04
					Total Risks - Areas B&C			1 E-03
Soil - Surface	Soil - Surface	Area C	Arsenic	1 E-04		8 E-05		2 E-04
			Beryllium	2 E-06				2 E-06
			Radium 226				7 E-06	7 E-06
			Radium 228				8 E-06	8 E-06
			Thorium 228				2 E-05	2 E-05
					Total Risks - Area C			2 E-04
Sediment	Sediment	Parcel B	Arsenic	2 E-06		2 E-06		4 E-06
			Radium 226				1 E-06	1 E-06
			Thorium 228				1 E-06	1 E-06
Surface Water	Surface Water	Parcel B	Arsenic			3 E-05		3 E-05
					Total Risks - Parcel B			4 E-05

Table 11B. Continued (Page 3)
Adolescent Trespasser (12 to 18 Years Old)

				Carcinogenic Risk				
Medium	Exposure Medium	Exposure Point	Chemical of Concern	Ingestion	Inhalation	Dermal	Ingestion and External Penetrating Radiation	Exposure Routes Total
Surface Water	Surface Water	Parcel C	Arsenic			5 E-06		5 E-06
Sediment	Sediment	Parcel C	Arsenic	2 E-04		1 E-04		3 E-04
			Radium 226				2 E-06	2 E-06
			Thorium 228				2 E-06	2 E-06
					Total Risk - Parcel C			3 E-04

Table 11C.
Cancer Risks at the Li Tungsten Site. (Chemicals Listed Exceed Risks of 1 x 10E-6).

Scenario Timeframe: Future
Receptor Population: Site Worker
Receptor Age: Adult

				Carcinogenic Risk				
Medium	Exposure Medium	Exposure Point	Chemical of Concern	Ingestion	Inhalation	Dermal	Ingestion and External Penetrating Radiation	Exposure Routes Total
Soil - Surface	Soil - Surface	Area A	Arsenic	1 E-04		2 E-04		3 E-04
Soil - Surface	Soil - Surface	Area A	Benzo-a-pyrene	2 E-06				2 E-06
			Uranium 238				3 E-06	3 E-06
			Lead 210				3 E-06	3 E-06
			Radium 226				2 E-04	2 E-04
			Radium 228				3 E-03	3 E-03
			Thorium 228				5 E-03	5 E-03
					Total Risks - Surface Soil Area A			9 E-03
Groundwater	Groundwater - Tap Water	Site-Wide	Arsenic	3 E-03		1 E-06		3 E-03
			Benzene	1 E-05		6 E-08		1 E-05
			1,1-dichloroethene	2 E-04		1 E-06		2 E-04
			Methylene Chloride	2 E-05		3 E-08		2 E-05
			Trichloroethene	1 E-04		6 E-07		1 E-04
			Tetrachloroethene	3 E-04		4 E-06		3 E-04
			Vinyl Chloride	8 E-04		2 E-06		8 E-04
					Total Risks - Groundwater Site Wide			4 E-03
					Total Risks - Area A			1 E-02

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Table 11C - Continued. (Page 2) - Future Adult Site Worker								
				Carcinogenic Risk				
Medium	Exposure Medium	Exposure Point	Chemicals of Concern	Ingestion	Inhalation	Dermal	Ingestion and External Penetrating Radiation	Exposure Routes Total
Soil - Surface	Soil - Surface	Area B	Arsenic	5 E-04		9 E-04		1 E-03
			Lead 234				1E-06	1E-06
			Radium 226				1 E-04	1 E-04
			Radium 228				3 E-04	3 E-04
			Thorium 228				6 E-04	6 E-04
					Total Risks - Surface Soil - Area B			2 E-03
Groundwater	Groundwater - Tap Water	Site - Wide	Arsenic	3 E-03		1 E-06		3 E-03
			Benzene	1 E-05		6 E-08		1 E-05
			1,1-dichloroethene	2 E-04		1 E-06		2 E-04
			Methylene Chloride	2 E-05		3 E-08		2 E-05
			Trichloroethene	1 E-04		6 E-07		1 E-04
			Tetrachloroethene	3 E-04		4 E-06		3 E-04
			Vinyl Chloride	8 E-04		2 E-06		8 E-04
			Uranium 238				3 E-06	3 E-06
			Uranium 234				1 E-06	1 E-06
			Radium 226				7 E-06	7 E-06
			Lead 210				3 E-05	3 E-05
			Radium 228				4 E-06	4 E-06
			Thorium 228				2 E-06	2 E-06
					Total Risks - Site-Wide Groundwater			4 E-03
					Total Risks - Area B			6 E-03

Table 11C - Continued. (Page 3) - Future Adult Site Worker								
				Carcinogenic Risk				
Medium	Exposure Medium	Exposure Point	Chemicals of Concern	Ingestion	Inhalation	Dermal	Ingestion and External Penetrating Radiation	Exposure Routes Total
Soil - Surface	Soil - Surface	Areas B&C	Arsenic	2 E-03		3 E-03		5 E-03
			PCBs (total)	3 E-06		2 E-05		2 E-05
			Uranium 238				1 E-04	1 E-04
			Uranium 234				4 E-06	4 E-06
			Thorium 230				3 E-06	3 E-06
			Radium 226				3 E-03	3 E-03
			Lead 210				3 E-05	3 E-05
			Radium 228				4 E-03	4 E-03
			Thorium 228				8 E-03	8 E-03
					Total Risk - Surface Soil Areas B&C			2 E-02

Table 11C - Continued. (Page 4) - Future Adult Site Worker								
				Carcinogenic Risk				
Medium	Exposure Medium	Exposure Point	Chemicals of Concern	Ingestion	Inhalation	Dermal	Ingestion and External Penetrating Radiation	Exposure Routes Total
Groundwater	Groundwater - Tap Water	Areas B&C	Arsenic	3 E-03		1 E-06		3 E-03
			Benzene	1 E-05		6 E-08		1 E-05
			1,1-dichloroethene	2 E-04		1 E-06		2 E-04
			Methylene Chloride	2 E-05		3 E-08		2 E-05
			Trichloroethene	1 E-04		6 E-07		1 E-04
			Tetrachloroethene	3 E-04		4 E-06		3 E-04
			Vinyl Chloride	8 E-04		2 E-06		8 E-04
			Uranium 238				3 E-06	3 E-06
			Uranium 234				1 E-06	1 E-06
			Radium 226				7 E-06	7 E-06
			Lead 210				3 E-05	3 E-05
			Radium 228				4 E-06	4 E-06
			Thorium 228				2 E-06	2 E-06
					Total Risk - Groundwater Site Wide			4 E-03
					Total Risks - Areas B & C			2 E-02

Table 11C - Continued.(Page 5) - Future Adult - Site Worker								
				Carcinogenic Risk				
Medium	Exposure Medium	Exposure Point	Chemical of Concern	Ingestion	Inhalation	Dermal	Ingestion and External Penetrating Radiation	Exposure Routes Total
Soil - Surface	Soil - Surface	Area C	Arsenic	4 E-04		7 E-04		1 E-03
			Beryllium	8 E-06				8 E-06
			PCBs (total)	1 E-06		7 E-06		8 E-06
			Lead 210				2 E-06	2 E-06
			Radium 228				1 E-06	1 E-06
			Uranium 238				9 E-06	9 E-06
			Radium 226				2 E-4	2 E-04
			Radium 228				3 E-04	3 E-04
			Thorium 228				5 E-04	5 E-04
					Total Risks - Surface Soil Area C			2 E-03

Table 11C - Continued.(Page 6) - Future Adult - Site Worker								
				Carcinogenic Risk				
Medium	Exposure Medium	Exposure Point	Chemical of Concern	Ingestion	Inhalation	Dermal	Ingestion and External Penetrating Radiation	Exposure Routes Total
Groundwater	Groundwater - Tap Water	Area C	Arsenic	3 E-03		1 E-06		3 E-03
			Benzene	1 E-05		6 E-08		1 E-05
			1,1-dichloroethene	2 E-04		1 E-06		2 E-04
			Methylene Chloride	2 E-05		3 E-08		2 E-05
			Trichloroethene	1 E-04		6 E-07		1 E-04
			Tetrachloroethene	3 E-04		4 E-06		3 E-04
			Vinyl Chloride	8 E-04		2 E-06		8 E-04
			Uranium 238				3 E-06	3 E-06
			Uranium 234				1 E-06	1 E-06
			Radium 226				7 E-06	7 E-06
			Lead 210				3 E-05	3 E-05
			Radium 228				4 E-06	4 E-06
			Thorium 228				2 E-06	2 E-06
					Total Risks - Groundwater Site Wide			4 E-03
					Total Risks - Area C			6 E-03

Table 11D.

Cancer Risks at the Li Tungsten Site
(Chemicals Listed Exceed Cancer Risks of 1 x 10E-6).

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

				Carcinogenic Risk				
Medium	Exposure Medium	Exposure Point	Chemical of Concern	Ingestion	Inhalation	Dermal	External Radiation	Exposure Routes Total
All Soils	All Soils	Area A	Arsenic	4 E-06	2 E-06	8 E-07		7 E-06
			Radium 226				1 E-06	1 E-06
			Radium 228				4 E-06	4 E-06
			Thorium 228				1 E-05	1 E-05
				Total Risks - Area A				2 E-05
All Soils	All Soils	Area B	Arsenic	4 E-05	2 E-05	9 E-06		7 E-05
			Radium 228				1 E-06	1 E-06
			Thorium 228				2 E-06	2 E-06
				Total Risks - Area B				7 E-05
All Soils	All Soils	Area B&C	Arsenic	2 E-04	8 E-05	3 E-05		3 E-04
			Radium 226				7 E-06	7 E-06
			Radium 228				7 E-06	7 E-06
			Thorium 228				2 E-05	2 E-05
				Total Risks - Areas B & C				3 E-04

Table 11D. - Continued (Page 2). Risks to Future Adult Construction Worker								
				Carcinogenic Risk				
Medium	Exposure Medium	Exposure Point	Chemical of Concern	Ingestion	Inhalation	Dermal	External Radiation	Exposure Routes Total
All Soils	All Soils	Area C	Arsenic	7 E-05	4 E-05	1 E-05		1 E-04
			Radium 226				1 E-06	1 E-06
			Thorium 228				1 E-06	1 E-06
				Total Risks - Area C				1 E-04

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Table 11E.

Cancer Risks for the Li Tungsten Site
(Only Chemicals with Risks Above 1 x 10E-6 are Included).

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

				Carcinogenic Risk				
Medium	Exposure Medium	Exposure Point	Chemical of Concern	Ingestion	Inhalation	Dermal	External Radiation	Exposure Routes Total
All Soils	All Soils	Area A	Arsenic	1 E-04		1 E-04		2 E-04
			Benzo-a-pyrene	3 E-06				3 E-06
			Di-benzo-a,h anthracene	2 E-06				2 E-06
			Uranium 238				4 E-06	4 E-06
			Radium 226				5 E-05	5 E-05
			Lead 210				4 E-06	4 E-06
			Radium 228				2 E-03	2 E-03
			Throium 228				3 E-03	3 E-03
						Total - All Soils		5 E-03

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Table 11E - Continued (Page 2). Risks to Future Adult Resident								
				Carcinogenic Risk				
Medium	Exposure Medium	Exposure Point	Chemical of Concern	Ingestion	Inhalation	Dermal	External Radiation	Exposure Routes Total
Groundwater	Groundwater	Site-wide	Benzene	3 E-05	8 E-06	8 E-07		4 E-05
			1,1-dichloroethene	7 E-04	3 E-04	1 E-05		1 E-03
			Methylene Chloride	6 E-05	4 E-06	3 E-07		6 E-05
			Trichloroethylene	4 E-04	5 E-05	7 E-06		5 E-04
			Tetrachloroethene	4 E-04	7 E-06	5 E-05		5 E-04
			Vinyl Chloride	3 E-03	3 E-05	2 E-05		3 E-03
			Arsenic	9 E-03		2 E-05		9 E-03
			Uranium 238				1 E-05	1 E-05
			Uranium 234				4 E-06	4 E-06
			Radium 226				3 E-05	3 E-05
			Lead 210				1 E-04	1 E-04
			Radium 228				1 E-05	1 E-05
			Thorium 228				8 E-06	8 E-06
						Total - Groundwater Site Wide		2 E-02
						Total - All Soils and Groundwater		2 E-02

Table 11E - Continued.(Page 3). Future Adult Resident								
				Carcinogenic Risk				
Medium	Exposure Medium	Exposure Point	Chemical of Concern	Ingestion	Inhalation	Dermal	External Radiation	Exposure Routes Total
All Soils	All Soils	Area B	Arsenic	1 E-03		1 E-03		2 E-03
			Lead 210				9 E-06	9 E-06
			Uranium 238				2 E-06	2 E-06
			Radium 228				2 E-06	2 E-06
			Radium 226				3 E-04	3 E-04
			Thorium 228				2 E-06	2 E-06
			Radium 228				4 E-04	4 E-04
			Thorium 228				7 E-04	7 E-04
					Total Risks - All Soils Area B			3 E-03

Table 11E - Continued.(Page 4). Future Adult Resident								
				Carcinogenic Risk				
Medium	Exposure Medium	Exposure Point	Chemical of Concern	Ingestion	Inhalation	Dermal	External Radiation	Exposure Routes Total
Groundwater	Groundwater	Site-wide	Benzene	3 E-05	8 E-06	8 E-07		4 E-05
			1,1-dichloroethene	7 E-04	3 E-04	1 E-05		1 E-03
			Methylene Chloride	6 E-05	4 E-06	3 E-07		6 E-05
			Trichloroethylene	4 E-04	5 E-05	7 E-06		5 E-04
			Tetrachloroethene	4 E-04	7 E-06	5 E-05		5 E-04
			Vinyl Chloride	3 E-03	3 E-05	2 E-05		3 E-03
			Arsenic	9 E-03		2 E-05		9 E-03
			Uranium 238				1 E-05	1 E-05
			Uranium 234				4 E-06	4 E-06
			Radium 226				3 E-05	3 E-05
			Lead 210				1 E-04	1 E-04
			Radium 228				1 E-05	1 E-05
			Thorium 228				8 E-06	8 E-06
					Total Risks - Groundwater Site Wide			2 E-02
					Total Risks - Area B			2 E-02

Table 11E - Continued.(Page5). Future Adult Resident								
				Carcinogenic Risk				
Medium	Exposure Medium	Exposure Point	Chemical of Concern	Ingestion	Inhalation	Dermal	External Radiation	Exposure Routes Total
All Soils	All Soils	Areas B&C	Arsenic	4 E-03		4 E-03		8 E-03
			PCBs (Total)	1 E-06		1 E-06		2 E-06
			Beryllium	3 E-06				3 E-06
			Uranium 238				5 E-05	5 E-05
			Uranium 234				3 E-06	3 E-06
			Thorium 230				2 E-06	2 E-06
			Radium 226				2 E-03	2 E-03
			Lead 210				2 E-04	2 E-04
			Radium 228				3 E-03	3 E-03
			Thorium 228				5 E-03	5 E-03
					Total Risks - All Soils - Areas B&C			2 E-02

Table 11E - Continued.(Page 6). Future Adult Resident								
				Carcinogenic Risk				
Medium	Exposure Medium	Exposure Point	Chemical of Concern	Ingestion	Inhalation	Dermal	External Radiation	Exposure Routes Total
Groundwater	Groundwater	Site-wide	Benzene	3 E-05	8 E-06	8 E-07		4 E-05
			1,1-dichloroethene	7 E-04	3 E-04	1 E-05		1 E-03
			Methylene Chloride	6 E-05	4 E-06	3 E-07		6 E-05
			Trichloroethylene	4 E-04	5 E-05	7 E-06		5 E-04
			Tetrachloroethene	4 E-04	7 E-06	5 E-05		5 E-04
			Vinyl Chloride	3 E-03	3 E-05	2 E-05		3 E-03
			Arsenic	9 E-03		2 E-05		9 E-03
			Uranium 238				1 E-05	1 E-05
			Uranium 234				4 E-06	4 E-06
			Radium 226				3 E-05	3 E-05
			Lead 210				1 E-04	1 E-04
			Radium 228				1 E-05	1 E-05
			Thorium 228				8 E-06	8 E-06
					Total Risks - Groundwater - Site Wide			2 E-02
					Total Risks - Areas B&C			4 E-02

Table 11E - Continued. (Page 7) Future Adult Resident								
				Carcinogenic Risk				
Medium	Exposure Medium	Exposure Point	Chemical of Concern	Ingestion	Inhalation	Dermal	External Radiation	Exposure Routes Total
All Soils	All Soils	Area C	Arsenic	2 E-03		2 E-03		5 E-03
			PCBs (Total)	1 E-06		4 E-06		5 E-06
			Beryllium	3 E-06				3 E-06
			Uranium 238				8 E-06	8 E-06
			Radium 226				5 E-05	5 E-05
			Lead 210				6 E-06	6 E-06
			Radium 228				3 E-04	3 E-04
			Thorium 228				5 E-04	5 E-04
					Total Risks - All Soils Area C			6 E-03

Table 11E - Continued.(Page 8). Future Adult Resident								
				Carcinogenic Risk				
Medium	Exposure Medium	Exposure Point	Chemical of Concern	Ingestion	Inhalation	Dermal	External Radiation	Exposure Routes Total
Groundwater	Groundwater	Site-wide	Benzene	3 E-05	8 E-06	8 E-07		4 E-05
			1,1-dichloroethene	7 E-04	3 E-04	1 E-05		1 E-03
			Methylene Chloride	6 E-05	4 E-06	3 E-07		6 E-05
			Trichloroethylene	4 E-04	5 E-05	7 E-06		5 E-04
			Tetrachloroethene	4 E-04	7 E-06	5 E-05		5 E-04
			Vinyl Chloride	3 E-03	3 E-05	2 E-05		3 E-03
			Uranium 238				1 E-05	1 E-05
			Uranium 234				4 E-06	4 E-06
			Radium 226				3 E-05	3 E-05
			Lead 210				1 E-04	1 E-04
			Radium 228				1 E-05	1 E-05
			Thorium 228				8 E-06	8 E-06
			Arsenic	9 E-03		2 E-05		9 E-03
					Total Risks - Groundwater Site Wide			2 E-02
					Total Risks - Area C			3 E-02

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Table 11F.

Cancer Risks for the Li Tungsten Site
(Only Chemicals with Risks Above 1 x 10E-6 are Included).

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child (0 to 6 years old)

				Carcinogenic Risk				
Medium	Exposure Medium	Exposure Point	Chemical of Concern	Ingestion	Inhalation	Dermal	External Radiation	Exposure Routes Total
All Soils	All Soils	Area A	Arsenic	3 E-04		5 E-05		3 E-04
			Benzo-a- pyrene	8 E-06				8 E-06
			Benzo-b-fluoranthene	2 E-06				2 E-06
			Di-benzo-a,h anthracene	4 E-06				4 E-06
			Lead 210				9 E-05	9 E-05
			Radium 228				3 E-04	3 E-04
			Thorium 228				5 E-04	5 E-04
					Total - All Soils Area A			1 E-03

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Table 11F. (Page 2). Cancer Risks for the Li Tungsten Site								
				Carcinogenic Risk				
Medium	Exposure Medium	Exposure Point	Chemical of Concern	Ingestion	Inhalation	Dermal	External Radiation	Exposure Routes Total
Groundwater	Groundwater	Site-wide	Benzene	1 E-05	7 E-06	3 E-07		2 E-05
			1,1-dichloroethylene	3 E-04	3 E-04	4 E-06		6 E-04
			Methylene Chloride	3 E-05	3 E-06	1 E-07		3 E-05
			Trichloroethylene	2 E-04	5 E-05	2 E-06		2 E-04
			Tetrachloroethene	4 E-04	7 E-06	2 E-05		4 E-04
			Vinyl Chloride	1 E-03	2 E-05	8 E-06		1 E-03
			Arsenic	4 E-03		7 E-06		4 E-03
			Uranium 238				1 E-06	1 E-06
			Radium 226				3 E-06	3 E-06
			Lead 210				1 E-05	1 E-05
			Radium 228				1 E-06	1 E-06
					Total - Groundwater Site Wide			6 E-03
					Total Risks - Area A			7 E-03

Table 11F - Continued (Page 3) Future Resident Child - Under 7 Years Old								
				Carcinogenic Risk				
Medium	Exposure Medium	Exposure Point	Chemical of Concern	Ingestion	Inhalation	Dermal	External Radiation	Exposure Routes Total
All Soils	All Soils	Area B	Arsenic	3 E-03		5 E-04		4 E-03
			Radium 226				6 E-05	6 E-05
			Radium 228				8 E-05	8 E-05
			Thorium 228				1 E-04	1 E-04
					Total Risks - All Soils for Area B			4 E-03
Groundwater	Groundwater	Site-wide	Benzene	1 E-05	7 E-06	3 E-07		2 E-05
			1,1-dichloroethylene	3 E-04	3 E-04	4 E-06		6 E-04
			Methylene Chloride	3 E-05	3 E-06	1 E-07		3 E-05
			Trichloroethylene	2 E-04	5 E-05	2 E-06		2 E-04
			Tetrachloroethene	4 E-04	7 E-06	2 E-05		4 E-04
			Vinyl Chloride	1 E-03	2 E-05	8 E-06		1 E-03
			Arsenic	4 E-03		7 E-06		4 E-03
			Uranium 238				1 E-06	1 E-06
			Radium 226				3 E-06	3 E-06
			Lead 210				1 E-05	1 E-05
			Radium 228				1 E-06	1 E-06
					Total Risks - Groundwater Site Wide			6 E-03
					Total Risks - All Soils for Area B			1 E-02

Table 11F - Continued (Page4). Future Resident Child - Under 7 Years Old								
				Carcinogenic Risk				
Medium	Exposure Medium	Exposure Point	Chemical of Concern	Ingestion	Inhalation	Dermal	External Radiation	Exposure Routes Total
All Soils	All Soils	Areas B&C	Arsenic	1 E-02		2 E-03		1 E-02
			PCBs	3 E-06		2 E-06		5 E-06
			Radium 226				5 E-04	5 E-04
			Uranium 238				9 E-06	9 E-06
			Lead 210				2 E-05	2 E-05
			Radium 228				5 E-04	5 E-04
			Thorium 228				9 E-04	9 E-04
					Total Risks - All Soils Areas B&C			1 E-02
Groundwater	Groundwater	Site-wide	Benzene	1 E-05	7 E-06	3 E-07		2 E-05
			1,1-dichloroethylene	3 E-04	3 E-04	4 E-06		6 E-04
			Methylene Chloride	3 E-05	3 E-06	1 E-07		3 E-05
			Trichloroethylene	2 E-04	5 E-05	2 E-06		2 E-04
			Tetrachloroethene	4 E-04	7 E-06	2 E-05		4 E-04
			Vinyl Chloride	1 E-03	2 E-05	8 E-06		1 E-03
			Arsenic	4 E-03		7 E-06		4 E-03
			Uranium 238				1 E-06	1 E-06
			Radium 226				3 E-06	3 E-06
			Lead 210				1 E-05	1 E-05
			Radium 228				1 E-06	1 E-06
					Total Risks - Groundwater Side Wide			6 E-03
					Total Risks - Areas B&C			2 E-02

Table 11F - Continued (Page 5) Future Resident Child - Under 7 Years Old								
				Carcinogenic Risk				
Medium	Exposure Medium	Exposure Point	Chemical of Concern	Ingestion	Inhalation	Dermal	External Radiation	Exposure Routes Total
All Soils	All Soils	Area C	Arsenic	5 E-03		8 E-04		5 E-03
			PCBs (Total)	2 E-06		1 E-06		3 E-06
			Beryllium	6 E-06				6 E-06
			Lead 210				2 E-06	2 E-06
			Uranium 238				2 E-06	2 E-06
			Radium 226				9 E-05	9 E-05
			Radium 228				5 E-05	5 E-05
			Thorium 228				9 E-05	9 E-05
					Total - All Soils Area C			5 E-03
Groundwater	Groundwater	Site-wide	Benzene	1 E-05	7 E-06	3 E-07		2 E-05
			1,1-dichloroethylene	3 E-04	3 E-04	4 E-06		6 E-04
			Methylene Chloride	3 E-05	3 E-06	1 E-07		3 E-05
			Trichloroethylene	2 E-04	5 E-05	2 E-06		2 E-04
			Tetrachloroethene	4 E-04	7 E-06	2 E-05		4 E-04
			Vinyl Chloride	1 E-03	2 E-05	8 E-06		1 E-03
			Arsenic	4 E-03		7 E-06		4 E-03
			Uranium 238				1 E-06	1 E-06
			Radium 226				3 E-06	3 E-06
			Lead 210				1 E-05	1 E-05
			Radium 228				1 E-06	1 E-06
					Total Risks - Groundwater Sitewide			6 E-03
					Total Risks - All Soils Area C			1 E-02

Table 12A.

Cancer Risks for Captain's Cove Site.
(Only Chemicals with Risks Above 1 E-06 Are Included).

Scenario Timeframe: Current/Future
Receptor Population: Trespasser
Receptor Age: Adolescent (12 to 18 Years Old)

				Carcinogenic Risk				
Medium	Exposure Medium	Exposure Point	Chemical of Concern	Ingestion	Inhalation	Dermal	External Radiation	Exposure Routes Total
Surface Soil	Surface Soil	Area A	Arsenic	6 E-06		5 E-06		1 E-05
			PCBs	5 E-07		1 E-06		2 E-06
			Radium 226				5 E-06	5 E-06
			Thorium 228				2 E-06	2 E-06
					Total Risk - Area A Surface Soil			
		Area G	Radium - 226				4 E-06	4 E-06
Sediment	Sediment	Retention Ponds	Arsenic	1 E-06		1 E-06		2 E-06

* Risks from chemicals in Area G were below 1 x 10E-6. The risks from dermal contact and ingestion of surface water and sediment from Retention Ponds were below 1 x 10E-6.

Table 12B.

Cancer Risks for Captain's Cove Site.
(Only Chemicals with Risks Above 1 E-06 Are Included).

Scenario Timeframe: Future
Receptor Population: Site Worker
Receptor Age: Adults

				Carcinogenic Risk				
Medium	Exposure Medium	Exposure Point	Chemical of Concern	Ingestion	Inhalation	Dermal	External Radiation	Exposure Routes Total
Surface Soil	Surface Soil	Area A	PCBs (total)	2 E-06		1 E-05		2 E-05
			Arsenic	2 E-05		4 E-05		6 E-05
			Radium 226				2 E-04	2 E-04
			Radium 228				3 E-05	3 E-05
			Thorium 228				6 E-05	6 E-05
					Total Risks - Across Soils Area A			4 E-05
Groundwater	Upper Glacial Aquifer	Site-Wide	Arsenic	6 E-02		4 E-05		6 E-02
			Chloroform	5 E-06		3 E-08		5 E-06
			1,2-Dichloroethane	2 E-06		3 E-08		2 E-06
			Tetrachloroethane	6 E-06		4 E-08		6 E-06
			Vinyl Chloride	4 E-04		2 E-06		4 E-04
			bis(2-chloroethyl) ether	1 E-05		2 E-08		1 E-05
			1,4-dichlorobenzene	3 E-06		1 E-07		3 E-06

Table 12-B (Page 2) - Site Workers Adults - Captain's Cove Facility								
				Carcinogenic Risk				
Medium	Exposure Medium	Exposure Point	Chemical of Concern	Ingestion	Inhalation	Dermal	External Radiation	Exposure Routes Total
			Uranium 234				1 E-06	1 E-06
			Radium 228				7 E-06	7 E-06
					Total Risk - Area A (Surface Soils + Groundwater)			6 E-02
Surface Soil	Surface Soil	Area G	Arsenic	2 E-06		3 E-06		5 E-06
			Radium 226				1 E-04	1 E-04
					Total Risk - Surface Soils Area G			1 E-04
					Total Risk - Surface Soils Area G + Groundwater (site-wide)			6 E-02

Table 12C.

Cancer Risks for Captain's Cove Site.
(Only Chemicals with Risks Above 1 E-06 Are Included).

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adults

				Carcinogenic Risk				
Medium	Exposure Medium	Exposure Point	Chemical of Concern	Ingestion	Inhalation	Dermal	External Radiation	Exposure Routes Total
All Soil	All Soil	Area A	Arsenic	7 E-05	3 E-05	1 E-05		1 E-04
			Radium 226				7 E-05	2 E-04
			Radium 228				8 E-06	3 E-05
			Lead 210				6 E-06	6 E-05
			Uranium 238				3 E-06	3 E-06
			Thorium 228				9 E-06	9 E-06
			Thorium 230				5 E-06	5 E-06
			Thorium 232				2 E-06	2 E-06
					Total for Area A			5 E-04

Table 12C - Page 2. Adult Construction Workers								
				Carcinogenic Risk				
Medium	Exposure Medium	Exposure Point	Chemical of Concern	Ingestion	Inhalation	Dermal	External Radiation	Exposure Routes Total
All Soils	All Soils	Area G	Arsenic	8 E-06	4 E-06	2 E-06		1 E-05
			Uranium 238				2 E-05	2 E-05
			Radium 226				6 E-05	6 E-05
			Radium 228				6 E-06	6 E-06
			Thorium 228				1 E-05	1 E-05
			Uranium 234				2 E-05	2 E-05
			Lead 210				5 E-06	5 E-06
					Total Risk - Area G			1 E-04

Table 12D.
Cancer Risks for Captain's Cove Site.
(Only Chemicals with Risks Above 1 E-06 Are Included).

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adults

				Carcinogenic Risk				
Medium	Exposure Medium	Exposure Point	Chemical of Concern	Ingestion	Inhalation	Dermal	External Radiation	Exposure Routes Total
All Soil	All Soil	Area A	Arsenic	6 E-03	3 E-05	3 E-03		9 E-03
			PCBs (total)	4 E-06		6 E-06		1 E-05
			Benzo(b)anthracene	1 E-06				1 E-06
			Benzo(b)fluoranthene	2 E-06				2 E-06
			Benzo(a)pyrene	2 E-05				2 E-05
			Dibenzo(a,h) anthracene	4 E-06				4 E-06
			Uranium 238				2 E-04	2 E-04
			Radium 226				3 E-02	3 E-02
			Radium 228				3 E-03	3 E-03
			Thorium 228				7 E-03	7 E-03
			Lead 210				2 E-04	2 E-04
					Total Risks - All Soils Area A			4 E-02

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Table 12-D (Page 2) Future Risks to Adult Resident								
				Carcinogenic Risk				
Medium	Exposure Medium	Exposure Point	Chemical of Concern	Ingestion	Inhalation	Dermal	External Radiation	Exposure Routes Total
Groundwater	Groundwater	Site-wide	Arsenic	2 E-01		5 E-04		2 E-01
			Benzene	3 E-06	3 E-10	6 E-08		3 E-06
			Chloroform	2 E-05	3 E-08	4 E-07		5 E-06
			Tetrachloroethane	2 E-05	1 E-10	6 E-08		3 E-06
			bis(2-chloroethyl) ether	5 E-05		2 E-07		5 E-05
			1,4-dichlorobenzene	1 E-05		1 E-06		1 E-05
			Vinyl Chloride	1 E-06	7 E-09	2 E-05		2 E-05
			Radium 228				3 E-05	3 E-05
			Uranium 234				4 E-06	4 E-06
					Total Area A (Groundwater)			2 E-01
					Total Area A (All Soils and Groundwater)			2 E-01

Table 12D - Page 3. Adult Residents								
				Carcinogenic Risk				
Medium	Exposure Medium	Exposure Point	Chemical of Concern	Ingestion	Inhalation	Dermal	External Radiation	Exposure Routes Total
All Soils	All Soils	Area G	Arsenic	8 E-04	4 E-06	3 E-04		1 E-03
			Benzo(a)anthracene	5 E-06				5 E-06
			Benzo(b)fluoranthene	4 E-06				4 E-06
			PCBs (total)	3 E-05		4 E-05		7 E-05
			Benzo(a)pyrene	2 E-05				2 E-05
			Uranium 234				5 E-05	5 E-05
			Uranium 238				1 E-03	1 E-03
			Radium 226				2 E-02	2 E-02
			Radium 228				2 E-03	2 E-03
			Thorium 228				5 E-03	5 E-03
			Thorium 230				6 E-06	6 E-06
			Lead 210				2 E-04	2 E-04
					Risk - Area G All Soils			3 E-02

Table 12D - Page 4. Adult Residents								
				Carcinogenic Risk				
Medium	Exposure Medium	Exposure Point	Chemical of Concern	Ingestion	Inhalation	Dermal	External Radiation	Exposure Routes Total
Groundwater	Groundwater	Site-wide	Arsenic	2 E-01		5 E-04		2 E-01
			Benzene	3 E-06	3 E-10	6 E-08		3 E-06
			Chloroform	2 E-05	3 E-08	4 E-07		5 E-06
			Tetrachloroethane	2 E-05	1 E-10	6 E-08		3 E-06
			bis(2-chloroethyl) ether	5 E-05		2 E-07		5 E-05
			1,4-dichlorobenzene	1 E-05		1 E-06		1 E-05
			Vinyl Chloride	1 E-06	7 E-09	2 E-05		2 E-05
			Radium 228				3 E-05	3 E-05
			Uranium 234				4 E-06	4 E-06
					Total Area A (Groundwater)			2 E-01
					Total Risk - Area G (Soils and Groundwater)			2 E-01

Table 12E.

Cancer Risks for Captain's Cove Site.
(Only Chemicals with Risks Above 1 E-06 Are Included).

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

				Carcinogenic Risk				
Medium	Exposure Medium	Exposure Point	Chemical of Concern	Ingestion	Inhalation	Dermal	External Radiation	Exposure Routes Total
All Soil	All Soil	Area A	Arsenic	5 E-03		7 E-04		5 E-03
			Benzo(a)anthracene	1 E-06				1 E-06
			Benzo(b)fluoranthene	2 E-06				2 E-06
			Benzo(a)pyrene	1 E-05				1 E-05
			Dibenz(ah)anthracene	2 E-06				2 E-06
			PCBs (total)	3 E-06		2 E-06		5 E-06
			Radium 226				2 E-05	2 E-05
			Radium 228				1 E-05	1 E-05
			Thorium 228				2 E-05	2 E-05
			Lead 210				1 E-05	1 E-05
					Risk All Soil - Area A			5 E-03

Table 12E - Page 2. Child Residents (0 to 6 years old)								
				Carcinogenic Risk				
Medium	Exposure Medium	Exposure Point	Chemical of Concern	Ingestion	Inhalation	Dermal	External Radiation	Exposure Routes Total
Groundwater	Groundwater	Site-wide	Arsenic	9 E-02		2 E-04		9 E-02
			Benzene	1 E-06	3 E-10	2 E-08		1 E-06
			Chloroform	7 E-06	3 E-08	1 E-07		8 E-06
			1,2-Dichloroethane	2 E-06	7 E-10	4 E-08		2 E-06
			Tetrachloroethane	1 E-05	1 E-10	2 E-07		1 E-05
			Vinyl Chloride	6 E-04	6 E-09	1 E-05		6 E-04
			bis(2-chloroethyl) ether	2 E-05		7 E-08		2 E-05
			1,4-dichlorobenzene	5 E-06		4 E-07		5 E-06
			Radium 228				2 E-06	2 E-06
					Risk from Groundwater - Site-wide			9 E-02
					Risk for Groundwater and Soil - Area A			9 E-02

Table 12.E - Page 3. Risks for Children (0 - 6 years old)								
				Carcinogenic Risk				
Medium	Exposure Medium	Exposure Point	Chemical of Concern	Ingestion	Inhalation	Dermal	External Radiation	Exposure Routes Total
All Soils	All Soils	Area G	Arsenic	6 E-4		9 E-05		7 E-4
			Benzo(a)anthracene	3 E-06				3 E-06
			Benzo(b)fluoranthene	3 E-06				3 E-06
			PCBs (total)	2 E-05		1 E-05		3 E-05
			Benzo(a)pyrene	1 E-05				1 E-05
					Risk from All Soils - Area G			7 E-04
Groundwater	Groundwater	Site-wide	Arsenic	9 E-02		2 E-04		9 E-02
			Benzene	1 E-06	3 E-10	2 E-08		1 E-06
			Chloroform	7 E-06	3 E-08	1 E-07		8 E-06
			1,2-Dichloroethane	2 E-06	7 E-10	4 E-08		2 E-06
			Tetrachloroethane	1 E-05	1 E-10	2 E-07		1 E-05
			Vinyl Chloride	6 E-04	6 E-09	1 E-05		6 E-04
			bis(2-chloroethyl) ether	2 E-05		7 E-08		2 E-05
			1,4-dichlorobenzene	5 E-06		4 E-07		5 E-06
			Radium 228				2 E-06	2 E-06
					Risk from Groundwater - Site-wide			9 E-02
					Total Risks from Groundwater and Area G Soils			9 E-02

Table 13A.

Non-Cancer Hazards at the Li Tungsten Site
(Only Chemicals with Hazard Quotients Above 1 are Included).

Scenario Timeframe: Current
Receptor Population: Off-Site Resident
Receptor Age: Adult

					Non-Carcinogenic Hazard			
Medium	Exposure Medium	Exposure Point	Chemical of Concern	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soils	Air - Particles	Off-site	Manganese	CNS		20		20
			Cobalt	NOAEL		3		3

Scenario Timeframe: Current
Receptor Population: Off-Site Resident
Receptor Age: Child

					Non-Carcinogenic Hazard			
Medium	Exposure Medium	Exposure Point	Chemical of Concern	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soils	Air - Particles	Off-site	Manganese	CNS		80		80
			Cobalt	NOAEL		10		10

Table 13B.

Non-Cancer Hazards for the Li Tungsten Site
(Only Chemicals with Hazard Quotients Above 1 are Included).

Scenario Timeframe: Current
Receptor Population: Trespasser
Receptor Age: Adolescent (12 to 18 Years Old)

					Non-Carcinogenic Hazard			
Medium	Exposure Medium	Exposure Point	Chemical of Concern	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soils	Surface Soil	Area B	Arsenic	Skin	3		3	6
								2
Soils	Surface Soil	Areas B&C	Antimony	Circulatory	6			6
			Arsenic	Skin	10		9	19
			Manganese	CNS	2			2
Soils	Surface Soil	Area C	Antimony	Circulatory	3			3
			Arsenic	Skin	3		2	5
Sediment	Sediment	Parcel C	Arsenic	Skin	4		3	4

Table 13C.

Non-Cancer Hazards for the Li Tungsten Site
(Only Chemicals with Hazard Quotients Above 1 are Included)

Scenario Timeframe: Future
Receptor Population: Site Worker
Receptor Age: Adult

					Non-Carcinogenic Hazard			
Medium	Exposure Medium	Exposure Point	Chemical of Concern	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	Area B	Arsenic	Skin	3		3	9
Groundwater	Groundwater - At Tap	Site-Wide	1,2-dichloroethene (Total)	Liver	20		0.06	20
			Trichloroethene	Liver	5		0.02	5
			Antimony	Circulatory	10		0.05	10
			Arsenic	Skin	20		0.02	20
						Total Hazard - Skin		29
						Total Hazard - Liver		25
						Total Hazard -Circulatory		10
Surface Soil	Surface Soil	Areas B&C	Antimony	Circulatory	5			5
			Arsenic	Skin	10		20	30
			Manganese	CNS	2			2
Groundwater	Groundwater - At Tap	Site-Wide	1,2-dichloroethene (Total)	Liver	20		0.06	20
			Trichloroethene	Liver	5		0.02	5
			Antimony	Circulatory	10		0.05	10
			Arsenic	Skin	20		0.02	20
					Total Hazard - Circulatory			15
					Total Hazard - Liver			25
					Total Hazard - Skin			50
					Total Hazard - CNS			2

500180

Table 13-C. Page 2. Adult Site Worker								
					Non-Carcinogenic Hazard			
Medium	Exposure Medium	Exposure Point	Chemical of Concern	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	Area C	Antimony	Circulatory	3			3
			Arsenic	Skin	2		5	7
Groundwater	Groundwater - At Tap	Site Wide	1,2-dichloroethene (Total)	Liver	20		0.06	20
			Trichloroethylene	Liver	5		0.02	5
			Antimony	Circulatory	10		0.05	10
			Arsenic	Skin	20		0.02	20
					Total Hazard - Circulatory			13
					Total Hazard - Liver			25
					Total Hazard - Sklin			27

Table 13-C. Page 3. Adult Site Worker								
					Non-Carcinogenic Hazard			
Medium	Exposure Medium	Exposure Point	Chemical of Concern	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Sediment	Sediment	Parcel C	Arsenic	Skin	4		3	4
Groundwater	Groundwater - At Tap	Site Wide	1,2-dichloroethene (Total)	Liver	20		0.06	20
			Trichloroethylene	Liver	5		0.02	5
			Antimony	Circulatory	10		0.05	10
			Arsenic	Skin	20		0.02	20
					Total Hazard - Skin			24
					Total Hazard - Liver			25
					Total Hazard - Circulatory			10

Table 13D.

Non-Cancer Hazards for the Li Tungsten Site
(Only Chemicals with Hazard Quotients Above 1 are Included).

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

					Non-Carcinogenic Hazard			
Medium	Exposure Medium	Exposure Point	Chemical of Concern	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
All Soils	Air (Modeled)	Area A	Cobalt	NOAEL		2		2
All Soils	All Soils	Area B	Arsenic	Skin	7			7
All Soils	All Soils	Area B	Nickel	Developmental	2			2
All Soils	Air (Modeled)	Area B	Cobalt	NOAEL		50		50
		Area B	Manganese	CNS		9		9
		Area B	Silver	Skin		2		2
				Total Hazard - Skin				9
				Total Hazard - NOAEL				50
				Total Hazard - CNS				9
				Total Hazard - Developmental				2

Table 13D- Page 2. Non-Cancer Hazards for Adult Construction Worker								
					Non-Carcinogenic Hazard			
Medium	Exposure Medium	Exposure Point	Chemical of Concern	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
All Soils	Soils	Area B&C	Antimony	Circulatory	3			3
			Arsenic	Skin	20		5	25
All Soils	Air (Modeled)	Area B&C	Cobalt	NOAEL	10			10
			Manganese	CNS	80			80
			Silver	Skin	2			2
					Total Hazard - Circulatory			3
					Total Hazard Skin			27
					Total Hazard - NOAEL			10

Table 13D- Page 3. Non-Cancer Hazards for Adult Construction Worker								
					Non-Carcinogenic Hazard			
Medium	Exposure Medium	Exposure Point	Chemical of Concern	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
All Soils	All Soils	Area C	Antimony	Circulatory	10			10
			Arsenic	Skin	10		2	12
	Air (Modeled)	Area C	Cobalt	NOAEL		8		8
			Manganese	CNS		10		10
			Silver	Skin		2		2
					Total Hazard Circulatory			10
					Total Hazard Skin			14
					Total Hazard NOAEL			8
					Total Hazard - CNS			10
Surface Soil	Surface Soil	Areas B&C	Antimony	Circulatory	5			5
			Arsenic	Skin	10		20	30
			Manganese	CNS	2			2
			PCBs	Immune			2	2
					Total Hazard Circulatory			5
					Total Hazard Skin			30
					Total Hazard Immune			2
					Total Hazard - CNS			2

Table 13D- Page 4. Non-Cancer Hazards for Adult Construction Worker								
					Non-Carcinogenic Hazard			
Medium	Exposure Medium	Exposure Point	Chemical of Concern	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	Area C	Antimony	Circulatory	3			3
Surface Soil	Surface Soil	Area C	Arsenic	Skin	2		5	7
					Total Hazard - Circulatory			
					Total Hazard - Skin			3
Sediment	Sediment	Parcel C	Arsenic	Skin	4		3	7
					Total Hazard - Skin			7

Table 13E.

Non-Cancer Hazards for the Li Tungsten Site
(Only Chemicals with Hazard Quotients Above 1 are Included).

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

					Non-Carcinogenic Hazard			
Medium	Exposure Medium	Exposure Point	Chemical of Concern	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
All Soils	All Soils	Area B	Arsenic	Skin	8		7	15
		Area B	Nickel	Decreased organ and body weight	2			2
Groundwater	Groundwater - at tap	Site-wide	Antimony	Circulatory	30			30
			Arsenic	Skin	50			50
			Cadmium	Proteinuria	3			3
			Copper	GI irritation	3			3
			Nickel	Decreased body and organ weight	3			3
					Total Hazard - Skin			65
					Total Hazard - Decreased body weight			5
					Total Hazard - Circulatory			30
					Total Hazard - Kidney (Proteinuria)			3
					Total Hazard - GI Irritation			3

Table 13E - Page 2. Non-Cancer Hazards to Adult Residents.

					Non-Carcinogenic Hazard			
Medium	Exposure Medium	Exposure Point	Chemical of Concern	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
All Soils	All Soils	Areas B&C	Arsenic	Skin	30		30	60
		Areas B&C	Antimony	Circulatory	4			4
Groundwater	Groundwater - at tap	Site-wide	Antimony	Circulatory	30			30
			Arsenic	Skin	50			50
			Cadmium	Proteinuria	3			3
			Copper	GI irritation	3			3
			Nickel	Decreased body and organ weight	3			3
					Total Hazard - Skin			110
					Total Hazard - Decreased body weight			3
					Total Hazard - Circulatory			34
					Total Hazard - Kidney (Proteinuria)			3
					Total Hazard - GI Irritation			3

Table 13E - Page 3. Non-Cancer Hazards to Adult Residents.								
					Non-Carcinogenic Hazard			
Medium	Exposure Medium	Exposure Point	Chemical of Concern	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
All Soils	All Soils	Area C	Antimony	Cholesterol	10			10
		Area C	Arsenic	Skin	10	10		20
Groundwater	Groundwater - at tap	Site-wide	Antimony	Circulatory	30			30
			Arsenic	Skin	50			50
			Cadmium	Proteinuria	3			3
			Copper	GI irritation	3			3
			Nickel	Decreased body and organ weight	3			3
					Total Hazard - Skin			70
					Total Hazard - Decreased body weight			3
					Total Hazard - Circulatory			30
					Total Hazard - Kidney (Proteinuria)			3
					Total Hazard - GI Irritation			3

500189

Table 13F.
Non-Cancer Hazards for the Li Tungsten Site
(Only Chemicals with Hazard Quotients Above 1 are Included).

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

					Non-Carcinogenic Hazard			
Medium	Exposure Medium	Exposure Point	Chemical of Concern	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
All Soils	All Soils	Area A	Arsenic	Skin	7		1	8
Groundwater	Groundwater at Tap	Site-wide	Antimony	Circulatory	60			60
			Arsenic	Skin	100			100
			Copper	GI Irritation	6			6
			Cadmium	Proteinuria	6			6
			1,2-Dichloroethene (Total)	Liver	100			100
			Tetrachloroethene	NOAEL	9			9
			1,1,1-Trichloroethane	CNS	3			3
			Trichloroethene	Liver	30			30
			Nickel	Decreased body weight and organ weights	6			6
	Volatilization while showering	Site-wide	Benzene	Hematotoxicity & immunotoxicity	2	2		4

500190

Table 13F - Page 2. Non-Cancer Hazards to Future Child Resident (0 to 6 years old).								
					Non-Carcinogenic Hazard			
Medium	Exposure Medium	Exposure Point	Chemical of Concern	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
					Total Hazard - Skin			108
					Total Hazard - GI Irritation			6
					Total Hazard - Decreased body weight			6
					Total Hazard - Circulatory			60
					Total Hazard - Kidney (Proteinuria)			6
					Total Hazard - Liver			130
					Total Hazard - NOAEL			9
					Total Hazard - CNS			3
					Total Hazard - Hemotoxicity and immunotoxicity			2

Table 13F- Page 2. Non-Cancer Hazards for Child Residents								
					Non-Carcinogenic Hazard			
Medium	Exposure Medium	Exposure Point	Chemical of Concern	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
All Soils	All Soils	Area B	Antimony	Circulatory	10			10
			Arsenic	Skin	80		10	90
			Nickel	Decreased body weights and organ weights	20			20
Groundwa ter	Groundwa ter at Tap	Site-wide	Antimony	Circulatory	60			60
			Arsenic	Skin	100			100
			Copper	GI Irritation	6			6
			Cadmium	Proteinuria	6			6
			1,2-Dichloroethene (Total)	Liver	100			100
			Tetrachloroethene	NOAEL	9			9
			1,1,1-Trichloroethane	CNS	3			3
			Trichloroethene	Liver	30			30
			Nickel	Decreased body weight and organ weights	6			6
	Volatilizat ion while showering	Site-wide	Benzene	Hematotoxicity & immunotoxicity	2	2		4
Total Hazard - NOAEL			9	Total Hazard - Skin				190
Total Hazard - CNS			3	Total Hazard - GI Irritation				6
Total Hazard - Hemotoxicity and immunotoxicity			2	Total Hazard - Decreased body weight				26
Total Hazard - Liver			130	Total Hazard - Circulatory				70
				Total Hazard - Kidney (Proteinuria)				6

500192

Table 13F- Page 3. Non-Cancer Hazards for Child Residents

					Non-Carcinogenic Hazard			
Medium	Exposure Medium	Exposure Point	Chemical of Concern	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
All Soils	Soils	Area B&C	Antimony	Circulatory	40		40	80
			Arsenic	Skin	300			300
			Copper	GI irritation	2			2
			Iron	NOAEL	4			4
			Manganese	CNS	10			10
Groundwater	Groundwater at Tap	Site-wide	Antimony	Circulatory	60			60
			Arsenic	Skin	100			100
			Copper	GI Irritation	6			6
			Cadmium	Proteinuria	6			6
			1,2-Dichloroethene (Total)	Liver	100			100
			Tetrachloroethene	NOAEL	9			9
			1,1,1-Trichloroethane	CNS	3			3
			Trichloroethene	Liver	30			30
			Nickel	Decreased body weight and organ weights	6			6
	Volatilization while showering	Site-wide	Benzene	Hematotoxicity & immunotoxicity	2	2		4

Table 13F- Page 4. Non-Cancer Hazards for Child Residents								
					Non-Carcinogenic Hazard			
Medium	Exposure Medium	Exposure Point	Chemical of Concern	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
		Area B and C and Groundwater		Total Hazard - Skin				400
				Total Hazard - GI Irritation				8
				Total Hazard - Decreased body weight				6
				Total Hazard - Circulatory				140
				Total Hazard - NOAEL				13
				Total Hazard - CNS				13
				Total Hazard - Hemotoxicity and immunotoxicity				4
				Total Hazard - Liver				130
				Total Hazard - Kidney (Proteinuria)				6

Table 13F- Page 5. Non-Cancer Hazards for Child Residents								
					Non-Carcinogenic Hazard			
Medium	Exposure Medium	Exposure Point	Chemical of Concern	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
All Soils	All Soils	Area C	Antimony	Circulatory	100			100
			Arsenic	Skin	100		20	120
			Copper	GI irritation	2			2
			Iron	NOAEL	3			3
			Manganese	CNS	2			2
Groundwa ter	Groundwa ter at Tap	Site-wide	Antimony	Circulatory	60			60
			Arsenic	Skin	100			100
			Copper	GI Irritation	6			6
			Cadmium	Proteinuria	6			6
			1,2-Dichloroethene (Total)	Liver	100			100
			Tetrachloroethene	NOAEL	9			9
			1,1,1-Trichloroethane	CNS	3			3
			Trichloroethene	Liver	30			30
			Nickel	Decreased body weight and organ weights	6			6
	Volatilizat ion while showering	Site-wide	Benzene	Hematotoxicity & immunotoxicity	2	2		4

Table 13F- Page 6. Non-Cancer Hazards for Child Residents								
					Non-Carcinogenic Hazard			
Medium	Exposure Medium	Exposure Point	Chemical of Concern	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
		Area B and C and Groundwater		Total Hazard - Skin				220
				Total Hazard - GI Irritation				6
				Total Hazard - Decreased body weight				6
				Total Hazard - Circulatory				160
				Total Hazard - NOAEL				12
				Total Hazard - CNS				5
				Total Hazard - Hemotoxicity and immunotoxicity				4
				Total Hazard - Liver				130
				Total Hazard - Kidney (Proteinuria)				6

Table 14A.

Non-Cancer Hazards for the Captain's Cove Facility
(Only Chemicals with Hazard Quotients Above 1 are Included).

Scenario Timeframe: Future
Receptor Population: Site Worker
Receptor Age: Adult

					Non-Carcinogenic Hazard			
Medium	Exposure Medium	Exposure Point	Chemical of Concern	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	Site-side	Arsenic	Skin	4 E+02			4 E+02

Table 14B.

Non-Cancer Hazards for the Captain's Cove Facility
(Only Chemicals with Hazard Quotients Above 1 are Included).

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

					Non-Carcinogenic Hazard			
Medium	Exposure Medium	Exposure Point	Chemical of Concern	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
All Soils	All Soils	Area A	Antimony	Circulatory	3			3
			Arsenic	Skin	10		2	12
			Cobalt	Hematopoietic	0.003	4		4
			Manganese	CNS	1	90		91
					Total Hazard for Circulatory Total Hazard Skin Total Hazard Hematopoietic Total Hazard CNS			3 12 4 91
All Soils	All Soils	Area G	Manganese	CNS	10	900		910
			Arsenic	Skin	2			2
					Total Hazard for CNS Total Hazard for Skin			910 2

Table 14C.

Non-Cancer Hazards for the Captain's Cove Facility
(Only Chemicals with Hazard Quotients Above 1 are Included).

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

					Non-Carcinogenic Hazard			
Medium	Exposure Medium	Exposure Point	Chemical of Concern	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
All Soils	All Soils	Area A	Antimony	Circulatory	4			4
			Arsenic	Skin	10		10	20
					Total Risks - Area A (Soil)			24
Groundwater	Groundwater	Site-wide	Chloroform	Liver		40		40
			Antimony	Circulatory	3			3
			Arsenic	Skin	1,000		3	1,003
					Total Hazard for Circulatory Total Hazard Skin Total Hazard Liver			7 1,0.23 40
All Soils	All Soils	Area G	Manganese	CNS	10			10
			PCBs (total)	Developmental	0.7		2	3
			Arsenic	Skin	2		1	3
					Total Risks - Area G (soil)			16

500199

Table 14C - Page 2. Non-Cancer Hazards Adult Resident								
					Non-Carcinogenic Hazard			
Medium	Exposure Medium	Exposure Point	Chemical of Concern	Primary Target Organ	Ingestion	Inhalation	Dermal	Total Non-Cancer Hazards
Groundwater	Groundwater	Site-wide	Chloroform	Liver		40 (shower)		40
			Antimony	Circulatory	3			3
			Arsenic	Skin	1,000		3	1,003
					Total Hazard for CNS Total Hazard for Skin Total Hazard for Circulatory Total Hazard for Liver			900 1,000 3 40

500200

Table 14D.

Non-Cancer Hazards for the Captain's Cove Facility
(Only Chemicals with Hazard Quotients Above 1 are Included).

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

					Non-Carcinogenic Hazard			
Medium	Exposure Medium	Exposure Point	Chemical of Concern	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
All Soils	All Soils	Area A	Antimony	Circulatory	40			40
			Arsenic	Skin	100		20	120
			Copper	GI tract	3			3
			Cadmium	Kidney	2		2	4
			Iron	Liver	5			5
			Manganese	CNS	10			10
Groundwater	Groundwater	Site-wide	Chloroform	Liver	1	200		200
			Chlorobenzene	Liver	0.6	2	0.01	3
			Antimony	Circulatory	6			6
			Arsenic	Skin	2,000		4	2,004
					Total Hazard for Circulatory Total Hazard Skin Total Hazard Liver Total Hazard CNS Total Hazard GI Tract Total Hazard Kidney			46 2,124 208 10 3 4

500201

Table 14.D (Page 2). Non-Cancer Hazards to Children 0 to 6 years old.								
					Non-Carcinogenic Hazard			
Medium	Exposure Medium	Exposure Point	Chemical of Concern	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
All Soils	All Soils	Area G	Manganese	CNS	100			100
			Antimony	Hematopoietic	6			6
			Iron	Liver	6			6
			Arsenic	Skin	10		2	12
			PCBs (total)	Developmental	6		4	10
Groundwater	Groundwater	Site-wide	Chloroform	Liver	1	200		200
			Chlorobenzene	Liver	0.6	2	0.01	3
			Antimony	Circulatory	6			6
			Arsenic	Skin	2,000		4	2,004
					Total Hazard for Circulatory Total Hazard Skin Total Hazard Liver Total Hazard CNS			6 2,016 209 100

TABLE 15

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 16

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 17

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 18

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.

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.

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.

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.

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.

APPENDIX IV

STATE LETTER OF CONCURRENCE

New York State Departmei
Division of Environmental Rem
50 Wolf Road, Albany, New York 122
Phone: (518) 457-5861 • FAX: (518) 4
Website: www.dec.state.ny.us

Post-it® Fax Note 7671	Date 9/30	# of pages ▷ 1
To: Rich Caspe	From Tom Quinn	
Co./Dept. EPA	Co. NYSDEC	
Phone #	Phone #	
Fax #	Fax #	

John P. Cahill
Commissioner

SEP 30 1999

Mr. Richard Caspe
Director
Emergency and Remedial Response Division
U.S. Environmental Protection Agency
Region II
290 Broadway
New York, NY 10007-1866

Dear Mr. Caspe:

Re: Draft Final Record of Decision
Li Tungsten Site # 130046
Glen Cove (C), Nassau (Co.)

The NYS Department of Environmental Conservation has reviewed the draft final Record of Decision (ROD) for the Li Tungsten site. The Department concurs with the selected remedy of Alternatives LS-4, CS-4 for soils and Alternative LW-1 for groundwater, as it is detailed in the above referenced document.

If you have any questions, please call Mr. Marsden Chen, of my staff, at (518) 457-3976.

Sincerely,

for Michael J. O'Toole, Jr.
Director
Division of Environmental Remediation

U.S. EPA, REGION II
EMER. & REM. RES. DIV.
1999 SEP 30 PM 2:23
DIRECTOR'S OFFICE

APPENDIX V

RESPONSIVENESS SUMMARY

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 regulations promulgated under the Superfund statute. It provides a summary of citizens' comments and concerns received during the public comment period, as well as the responses of the United States Environmental Protection Agency (EPA) to those comments and concerns. All comments summarized in this document have been considered in EPA's final decision involving selection of a remedy for the Li Tungsten Superfund site. EPA is addressing the cleanup of the site in two remedial phases or operable units. Operable Unit 1 includes the former Li Tungsten facility. Operable Unit 2 consists of portions of the nearby Captain's Cove property. EPA's final decision regarding the site remedy incorporates 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 information repositories maintained at the EPA Region II Docket Room in located at 290 Broadway, New York, 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 the more than 150 citizens and other 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, FFS 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 the remediation process for the site 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 share data and information with the Task Force as it becomes available, in order to obtain early and frequent input from the community concerning EPA's activities. 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, EPA subsequently received over 700 identical (form) letters asking that EPA change the proposed alternatives for soil remediation from Alternatives LS-4 and CS-4 (which

include soil separation to reduce the volume of radiologically-contaminated soil) to Alternatives LS-2 and CS-2 (which do not include volume reduction). 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 over 700 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
   ii radionuclide separation
D. Remedy Implementation Issues
E. General Enforcement Issues
F. General Site Issues

A summary of the comments and concerns and EPA responses thereto are provided below:

A. Public Concerns Stated in a Form Letter of Which EPA Received Over 700 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., Alternatives LS-4 and CS-4 and Alternatives LS-2 and CS-2, call for the excavation, transportation 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 the Proposed Plan and described in the Record of Decision, EPA has determined that volume reduction measures would be employed, but has not specified the use of a particular volume reduction technology. However, in the event that separation of radionuclide-contaminated soil from nonradionuclide soil contaminated with heavy metals cannot be accomplished in a cost-effective manner, the excavated soils will be disposed at appropriately licensed facilities as described in Alternatives LS-2 and CS-2 in the Decision Summary of this Record of Decision.

One of the key benefits of soil volume reduction is the lowering of disposal costs, which represent a significant portion of project costs. Some of the soil separation methods include surgical-type excavation techniques and ex-situ physical separation processes, e.g., the SGS or segmented gate system, to separate the radiologically-contaminated soils from other soils. As the transportation and disposal of these materials are very costly, any large reduction in the quantity of radiologically-contaminated would significantly reduce remediation costs at the site. The Superfund law does require EPA to implement remedies in a cost-effective manner.

During design, EPA will 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 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 included 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 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 to measure dusts and radionuclides will be established at the perimeter of the site; 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 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 developing 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 address their concerns. 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 Orange, 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 radiological dust off-site, including air monitoring procedures.

Response #3: As noted above, the details of the air monitoring program will be developed during the design 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 remedy 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, cleanup criteria are determined for the appropriate chemicals of concern identified in the risk assessment using risk assessment procedures. The cleanup 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 (ARARs). 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 of 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 CS-4 may include an insignificant increase in fugitive dust compared with

Alternatives LS-2 and CS-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 CS-2 would have more potential to negatively impact the community because the potential for accidents would increase. Please 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 been 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 zero, since humans cannot tolerate any exposure.

Response #5: EPA disagrees with this statement. Project-related increases to background level of airborne uranium are expected to be minimal. Review of the Agency for Toxic Substances and Disease Registry Toxicological Profile for Uranium (September 1997) indicates, 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 "The 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, this is not known 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 New York State Department of Health (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. This ten-year time frame was chosen because in 1989 when the study was begun, cancer reporting was considered complete for analysis within small geographic areas through 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: According to NYSDOH, its Cancer Surveillance Program completed in 1990 an investigation of cancer incidence for zip code 11542 (Glen Cove). In summary, a statistically significant deficit of cancer cases overall was observed for females. No significant differences were observed among males overall. Within specific anatomic sites of cancer, a statistically significant deficit of female breast cancer cases was observed. A statistically significant excess of malignant melanoma was observed among males in the study area. No other sites among males or females were found to demonstrate excess or deficit of cases.

With respect to former employees at Li Tungsten, in 1989-90 the New York State University at Stony Brook's Division of Occupational Medicine conducted a preliminary medical surveillance program in response to public concerns that former employees might have increased risk of health effects due to exposures from on-site contaminants. They concluded that workers are not at an increased risk for adverse health effects due to their work exposures at the Li Tungsten facility.

Cancer incidence data are generally available for the county level. The NYSDOH is currently developing statewide cancer information for areas smaller than counties. This is part of the Cancer Surveillance Improvement Initiative, also known as the cancer mapping project. These sub-county maps will provide

communities with easy access to basic information about cancer incidence in their geographic area. Anyone with concerns about cancer near the Li Tungsten site can contact the NYSDOH Center for Environmental Health at 1-800-458-1158 to discuss their specific concerns.

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

Response #8: The model used to estimate risk from airborne transport of dust predicted that residents along the northeastern portion of the Li Tungsten property line could be at risk. 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 EPA-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 them?

Response #9: The current 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 at the upper bound of EPA's acceptable risk range.

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

In considering the results of the risk assessment, it is important to note 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 "unlimited 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 life spans of potentially thousands of people in the community, because it takes only one 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 (EPA 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) and frequency and duration of exposure, EPA calculates specific risk levels and compares these with 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 as well as the nature of the waste and the controls to be exercised at this 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 as well as site workers. The standards that will be used include the appropriate air regulations promulgated under the Clean Air Act for radioactive elements (40 CFR Part 61) and appropriate worker regulations. These standards are developed at the national level to be protective of sensitive populations including children and adults.

Comment #11: 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 hypothesis 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 #11: It is important to note that the risk assessment has indicated potential risks under future site use scenarios in <u>excess</u> 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. Additionally, the presence of powdered ore residuals is not uncommon as 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.

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 these 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, 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 EPA 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 are 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 #12: 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 #12: It is true that the commercial use based cleanup level developed for arsenic (24 ppm) at the site is close to a level which might be acceptable for residential use. 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 24 ppm could possibly be considered marginally acceptable as a residential cleanup number.

Comment #13: The radionuclide data set is highly biased, and skewed towards higher concentrations; the use of maximum measured radionuclide concentrations thus leads to an 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 #13: 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 to account for uncertainties and unknown subsurface concentrations that might be higher than the measured radionuclides concentrations.

Comment #14: 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 #14: The radionuclide risk assessment did consider radionuclide depth/distribution profiles when deriving exposure point concentrations. The soil pathway 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 #15: In the FFS, the exposure point concentrations (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 #15: 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 EPCs used to estimate external gamma radiation exposure were appropriately calculated based on the measured radionuclide concentration data.

Comment #16: 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 #16: 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 #17: 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 #17: 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 #18: The risk assessment evaluates a groundwater pathway where none exists. The groundwater pathway should be eliminated from the risk assessment.

Response #18: 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 which New York State has classified as IA. 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 #19: 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 #19: The values used in calculating the EPCs represent a range of values including maximums and 95% UCLs 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 cannot 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 #20: 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) modeling 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 #20: Currently, EPA 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 that site, it would be necessary to conduct studies on several different samples from the Li Tungsten 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 cost $100,000 or more for each chemical and animal species in addition 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 #21: 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 noncancer 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 two-foot protective soil cover.

Response #21: 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 (IRIS) 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 cleanup goals based on both cancer and noncancer toxicity. The suggestion of calculating only a noncancer cleanup goal is inconsistent with EPA'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. Therefore, an industrial cleanup 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 maximum contaminant level (MCL) for arsenic. The rationale for not selecting a groundwater remedy at the site included the assumption that remediating the soils to the proposed cleanup numbers would thereby eliminate the continuing source of contamination, and significantly improve the groundwater quality at the site.

Comment #22: 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-containing minerals such as those found at the site.

Response #22: As described above, the 400 mg/kg screening level is based on running the Integrated Environmental Uptake and Biokinetic (IEUBK) Model in default mode and is not based on the presence of 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 level is used at Superfund sites for screening for residential exposure to soil. Since the potential development of this site is commercial future use (ferry terminals, museums, restaurants etc.), where children may be exposed to lead in the soil, this concentration was selected to be protective of these younger children.

Comment #23: 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 #23: It is unclear how the 1,700 mg/kg value identified by the Commentors was developed since a reference is not identified. If the Adult Lead Model methodology were used in developing this cleanup value, the comment only lists the highest value. The adult lead model usually considers a range of values from 750 to 1,750 mg/kg and does not default to the maximum concentration as suggested in the comment. In view of the anticipated use of the property as commercial where children under the age 7 may be exposed, the use of the interim screening level for lead is not inappropriate.

Comment #24: The risk assessment assumed residential exposures in setting some cleanup criteria, which is inconsistent with the site development plan.

Response #24: The risk assessment cleanup 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 #25: In developing chemical cleanup criteria for the site, realistic default assumptions were not used for the exposure scenarios or for developing the 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 #25: The risk assessment was performed using appropriate exposure variables identified in EPA's 1992 guidance on default exposure assumptions that represent Reasonable Maximum Exposure. The issues identified in the comment have been responded to previously in EPA's responses to other comments in this section of the Responsiveness Summary.

C. Remedy Selection Issues

i) General Issues

Comment #26: 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 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 #26: 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 waste streams 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 separation processes are insignificant relative to the emissions resulting from excavation and loading activities required for these alternatives mentioned in the comment. In the event that separation of radionuclide-contaminated soil from nonradionuclide soil contaminated with heavy metals cannot be accomplished in a cost-effective manner, the excavated soils will be disposed at appropriately licensed facilities as described in Alternatives LS-2 and CS-2 in the Decision Summary of this Record of Decision.

Comment #27: There's an absolute need to place the health and safety of the people of Glen Cove above monetary and all other considerations.

Response #27: 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 a 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 #28: Since semi-volatile compounds were found at dangerous levels in at least one location on the site, semi-volatiles should be addressed as part of the cleanup plan.

Response #28: While semi-volatiles, specifically a group of semi-volatiles known as polyaromatic hydrocarbons (PAHs),were found at relatively 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 ste 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 would not present a risk under a commercial land use scenario.

Comment #29: If the cleanup numbers are already pretty low, then why wouldn't you clean up the site to a pristine level?

Response #29: 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 #30: Is Glen Cove Creek involved in the cleanup plan?

Response #30: No, however, EPA has been monitoring the sediments and water column of Glen Cove Creek; monitoring will continue on an annual basis as part of the long-term response action at the Mattiace Superfund site. 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 New York State Department of Environmental Conservation (NYSDEC or 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 will be utilized by EPA and DEC to evaluate whether the monitoring program should be expanded to include ecological monitoring or toxicity testing.

Comment #31: If Alternative LS-2 had been cheaper than Alternative LS-4, would that have been the preferred alternative?

Response #31: Yes, obviously the additional time and effort required to achieve some separation of waste streams would not be desirable unless it achieved a reduction in cost. In the event that separation of radionuclide-contaminated soil from nonradionuclide soil contaminated with heavy metals cannot be accomplished in a cost-effective manner, the excavated soils will be disposed at appropriately licensed facilities as described in Alternatives LS-2 and CS-2 in the Decision Summary of this Record of Decision.

Comment #32: A hydro-mechanical mining technique similar to dredging might be employed for soil removal, especially for the deeper contamination at 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 #32: 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 dry 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 #33: 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 #33: EPA agrees that the relatively small portion of the Upper Glacial Aquifer that is impacted by the site does not 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 #34: 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 #34: The cost of groundwater remediation is low relative to the overall site remedy, however, EPA believes that

groundwater remedial action is unwarranted at this time. 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 #35: Why can't the building(s) be knocked down?

Response #35: 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 #36: Limiting access, by means of security, warning signs, fencing, etc. is not an effective way to overcome the dangers posed by the site.

Response #36: EPA agrees that restricting access is not a long-term protective solution given the expected commercial future use of the site and therefore has selected a remedial action involving excavation, radionuclide separation, and off-site disposal of the various wastes contaminating the soil. Warning signs and limited access to the site, however, will remain in effect on part of the site until the remedial actions are completed, which is presently anticipated in the year 2002.

Comment #37: 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 #37: Please refer to EPA's responses to Comments #26 and 34.

Comment #38: 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 #38: The Proposed Plan's costs for soil alternatives involving off-site disposal of radionuclide wastes were based on

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 actual facility and mode of transportation will be selected at the time of radionuclide waste disposal.

Comment #39: 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 #39: EPA has noted in the ROD that deed restrictions on the site property would likely include controls to ensure the protection of public health through restrictions on groundwater withdrawals for any purpose that could lead to human exposure, e.g., drinking water, irrigation, fountains, etc. until the groundwater beneath the site has reached cleanup levels. These restrictions would also likely require that any new construction at the site adhere to relevant building codes for radon/thoron gases.

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. This settlement, referred to as a "Prospective Purchaser Agreement," reserves for EPA the right to require that restrictions known as "institutional controls" (which could include deed restrictions, easements, and/or zoning ordinances) be established on the future use of the site. This reservation will also apply to successors in title to the Industrial Development Agency.

Comment #40: 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 #40: The NY State TAGMs are soil cleanup objectives which are not ARARs, but rather are "to be considered" (or TBCs) 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 #41: The Agency has indicated that the final remedy would include radon testing in all buildings constructed on the Li Tungsten property. However, this was not noted in the Proposed Plan.

Response #41: To mitigate future impacts of radon and/or thoron, any new construction on this site would need to adhere to relevant building codes pertaining to radon. The selected remedy section of the ROD describes institutional controls requiring radon code compliance.

Comment #42: 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 #42: 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.

Comment #43: 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 #43: 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 achieve effective separation even faster and cheaper. These would have to be evaluated by EPA for safety and effectiveness during remedial design.

Comment #44: Targeted removal of select "hot spots" and construction of protective covers, which are integrated into the overall site development plan, provides similar protection 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 #44: 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 the 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 Commentors 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 Commentors'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 were evaluated by EPA but not selected. Additionally, please see the response to Comment #78 concerning the applicability of the Long Island Landfill Law.

Comment #45: 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 #45: 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 disposal options will be investigated in order to find an appropriate facility.

Comment #46: 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 associated with Alternatives LS-3 and CS-3.

Response #46: Comment noted. EPA expects that all necessary testing needed to implement the selected remedy will be completed during remedial design activities. In the event that separation of radionuclide-contaminated soil from nonradionuclide soil contaminated with heavy metals cannot be accomplished in a cost-effective manner, the excavated soils will be disposed at appropriately licensed facilities as described in Alternatives LS-2 and CS-2 in the Decision Summary of this Record of Decision.

ii) *Cleanup levels/ARARs*

Comment #47: What's the difference in terms of numerical standards between a commercial cleanup and a residential cleanup, based on other Superfund sites?

Response #47: 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 may 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. However, 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 is applied at a site, it would result in the same cleanup number regardless of future use). In any event, care and thorough evaluation should be used when comparing the cleanup levels at different Superfund sites.

Comment #48: The principle of reducing radiation exposures "as low as reasonably achievable" should prevail.

Response #48: The principle 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" principle.

Comment #49: 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 #49: 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. 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. The actual TAGM value for arsenic is 7.5 mg/kg or site background. 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 7.5 mg/kg. 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 amount 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 of soil, however, should be much less than $1 million and would not begin to approach tens of millions of dollars.

Comment #50: 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 #50: Please see EPA's Response to Comment #47 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 #51: EPA's use of residential cleanup criteria is clearly inappropriate and inconsistent with OSWER Directive #9355.7-04.

Response #51: 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. EPA's use of 400 mg/kg for lead is not inconsistent with the OSWER directives. The 400 mg/kg level is used at Superfund sites for screening for residential exposure to soil. Since the potential development of this site is commercial future use (ferry terminal, museums, restaurants etc.), where children may be exposed to lead in the soil, this concentration was selected to be protective of these younger children.

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 #52: 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 #52: 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.

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 Brownfield 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.

New York State regulation 6 NYCRR Part 380 does not specifically require the removal of NORM to meet State standards for protection against gamma radiation. However, in order to limit total radiation doses to individual members of the public, Part 380 establishes such standards for gamma radiation exposure that may result from the disposal and discharge of certain radioactive material to the environment. Such material would include NORM resulting from processing or concentrating ores; the NORM found at the Li Tungsten site resulted from processing and concentrating ores, and therefore EPA believes that Part 380 was appropriately applied in evaluating the selected remedy.

Comment #53: 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 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 #53: As noted in the comment, background levels can be found that exceed the selected radionuclide cleanup levels. The two important considerations are risk, and the immediate background concentration of the radionuclide. The cleanup levels for radionuclides were derived from a site-specific risk assessment. Furthermore, 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. Consequently, the selected remedy is considered appropriate and protective by EPA.

The FS correctly identified 40 CFR 192 as a potential applicable or relevant and appropriate requirement. EPA subsequently determined that the standards set forth in this regulation were standards "to be considered" (or TBCs) but not ARARs, because the site was not sufficiently similar to the uranium mill tailing sites that regulation addresses. Even if 40 CFR 192 had been identified as an ARAR for the site, EPA guidance directs that the non-health based at-depth standard of 15 pCi/g is not an applicable or relevant and appropriate standard at sites such as Li Tungsten (see OSWER Directive No. 9200.4-25 "Use of Soil Cleanup Criteria in 40 CFR Part 192 as Remediation Goals for CERCLA Sites"). Nonetheless, using 40 CFR 192 as a TBC, EPA's site-specific risk assessment found that the standard of 5 pCi/g in 40 CFR 192 for surficial soils was protective, while the 15 pCi/g standard in that regulation for soils at-depth was not.

Comment #54: 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 #54: 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 #55: 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 cannot 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 #55: 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 discussed 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 #112). 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 #56: Additional sampling data obtained 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 #56: While the report from the March 1999 sampling event

was included in the FS (Volume I, Appendix B), 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 #57: 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 #57: 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 #58: 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 #58: 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 #59: 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 #59: 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 commentor 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 #60: 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 #60: 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 #61: 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 #61: For a residential exposure scenario, a total of approximately 9,000 cubic yards of additional 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 this figure to approximately $2 million. Hence, an additional $2 million would be required to upgrade the SVOA cleanup from a commercial level to a residential level.

Comment #62: If groundwater isn't cleaned now, and EPA decides 5 years from now, after performing the rest of the remediation that an active groundwater remedy is necessary, would the groundwater alternatives cost significantly more?

Response #62: 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 #63: 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 #63: 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 as construction proceeds.

Comment #64: 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 #64: 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. More refined cost estimates will be developed during the design.

Comment #65: 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 #65: 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 #66: 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 #66: 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. In the event that separation of radionuclide-contaminated soil from nonradionuclide soil contaminated with heavy metals cannot be accomplished in a cost-

effective manner, the excavated soils will be disposed at appropriately licensed facilities as described in Alternatives LS-2 and CS-2 in the Decision Summary of this Record of Decision.

Comment #67: 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 #67: 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 were included in Alternatives LS-2/CS-2 and Alternatives LS-4/CS-4.

Comment #68: No costs for backfill were included, which could range from $750,000 to $1.1 million.

Response #68: 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 #69: 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 to 28 million. If the volumes are underestimated, then disposal costs are underestimated by $12 million to $42 million.

Response #69: The unit costs for disposal of radiologically-contaminated material were based on an actual contract rate that has been established between EPA Region II and the Corps of Engineers, and EnviroCare of Utah, Inc. While EPA's cost estimate does represent the cost of an EPA-lead cleanup, we believe that similar costs could be achieved even if the cleanup

were conducted by the PRPs.

Comment #70: 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 #70: 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 #71: 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, medical 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 #71: 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 #72: 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 #72: 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 it would not consider this material as mixed waste. Therefore, no disposal costs for mixed waste were included in the FS report.

Comment #73: 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 #73: 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 Alternative CS-3.

Comment #74: 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, or a total of $325,000 to $500,000 for the entire site.

Response #74: The processing cost has been found to vary significantly with the volume of soil scheduled to be processed. It is EPA's understanding that some of the costs mentioned in DOE Reports on SGS technology were higher than might be expected as a result of firm fixed price contracts to process a specific amount

of material which, at the time of actual operation, turned out to be a lesser amount of material to be processed. The subsequently calculated unit prices for this lesser amount of material was still based on the original firm fixed contract price, thereby resulting in higher unit costs than what was originally envisioned under the contract. During other trials of the SGS, the primary purpose was data collection, so that efficiencies of time and cost were not being optimized, again resulting in high unit cost.

Based on 12 deployments of the SGS, the mobilization/demobilization costs have ranged from $85,000 to $135,000. 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, EPA does not believe that there will be enough oversize material to significantly increase the true cost of separation.

v) On-site containment

Comment #75: The long-term effectiveness of an on-site containment cell is questionable.

Response #75: 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 #76: 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 nine criteria would be satisfied.

Response #76: While the on-site containment of nonradioactive wastes may be 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 #77: 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 #77: 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 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 #78: It was 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 containment 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 containment would satisfy these objectives.

Response #78: EPA understands the perspective that the Long Island Landfill Law might not be an ARAR for containment of radioactive wastes in a situation where the remedy relies exclusively on containment (i.e., capping in place only). However, practically speaking, given the areal extent of contamination, the hilly terrain on Parcels B and C, the presence of remaining structures and foundations, and redevelopment plans (and required infrastructure), EPA believes that a capping in place remedy could not be implemented without significant excavation and subsequent placement of contaminated materials occurring. It is clear that the placement of contaminated materials would trigger the Long Island Landfill Law's "prohibition" against landfilling activities. Therefore, 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 6 NYCRR Part 380, specifically address the containment of radioactive waste and put 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 EPA's response to Comment #77.

EPA agrees with the comment 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.

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 populated area like the City of Glen Cove. Finally, EPA feels that it simply would not have been implementable in the face of potential community and State opposition. EPA has received more than 700 petitions from citizens who are concerned about temporary fugitive radioactive dust emissions from this site. EPA believes this response would have been greatly magnified, had the first radioactive containment remedy in Region II been proposed for the site.

vi) Radionuclide Separation

Comment #79: 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 #79: 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, New Jersey and West Valley, New York) 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 #80: 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 #80: 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. In the event that separation of radionuclide-contaminated soil from nonradionuclide soil contaminated with heavy metals cannot be accomplished in a cost-effective manner, the excavated soils will be disposed at appropriately licensed facilities as described in Alternatives LS-2 and CS-2 in the Decision Summary of this Record of Decision.

Comment #81: 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 #81: 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 which operated in the early 1900's 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. The procedures and controls utilized to ensure the safe implementation of separation technologies would be the same as those described above for excavation and materials handling. Also, please see EPA's response to Comment #79.

Lastly, EPA will undertake testing of various separation techniques during design. The Agency will not implement a separation technology such as SGS unless the testing indicates it will be effective. In the event that separation of radionuclide-contaminated soil from nonradionuclide soil contaminated with heavy metals cannot be accomplished in a cost-effective manner, the excavated soils will be disposed at appropriately licensed facilities as described in Alternatives LS-2 and CS-2 in the Decision Summary of this Record of Decision.

Comment #82: 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 #82: 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 #83: 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 #83: 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, New Jersey 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. Again, EPA plans to evaluate SGS and other separation methods during design. In the event that separation of radionuclide-contaminated soil from nonradionuclide soil contaminated with heavy metals cannot be accomplished in a cost-effective manner, the excavated soils will be disposed at appropriately licensed facilities as described in Alternatives LS-2 and CS-2 in the Decision Summary of this Record of Decision.

Comment #84: 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 #84: The published reports documented the material handling challenges that were unique at each site and how these challenges 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. As noted above, EPA intends to evaluate SGS and other separation methods during design.

Comment #85: The SGS cannot process oversize or wet material. Neither limitation was factored into EPA's costs or schedule for implementing the remedy.

Response #85: 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 consider it above criteria and dispose of it 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 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 #86: 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 #86: 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 Region II can also seek support from ORIA in developing or reviewing any monitoring program that is implemented.

Comment #87: 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 #87: 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 #88: What procedures will EPA incorporate into its cleanup plan to prevent trucks and other vehicles from tracking radioactive dirt throughout Glen Cove?

Response #88: Prior to leaving the site, all trucks that are transporting waste or which have entered a hazardous zone will be 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. As indicated previously, EPA has extensive experience relative to the trucking of radiological and other waste materials.

Comment #89: Will additional intrusive work be done to better define the extent of excavation required?

Response #89: 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 #90: 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 #90: 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 radiological waste during Phase I will be particularly significant.

E. General Enforcement Issues

Comment #91: Who is responsible for the cleanup?

Response #91: Under the Federal Superfund law, several categories of parties may be held responsible for the cleanup, including the current owners and operators of the site, parties that owned or operated the site at the time of disposal of hazardous substances, and parties that arranged for the treatment or disposal of hazardous substances that came to be disposed of at the site. EPA generally attempts to identify as many of these parties as possible. At those sites where no viable potentially responsible parties can be found, EPA is authorized to use Superfund money to remediate the risks posed by the site. At this site, however, viable PRPs have been identified.

Comment #92: How many potentially responsible parties are there, and what are their names?

Response #92: 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 #93: What is the City's financial liability as a PRP for Captain's Cove? When will a figure be assessed?

Response #93: 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. Nonetheless, a final figure for the City's liability may not be known for some time, since it depends on such factors as the City's allocated share of the ultimate cost to complete the cleanup several years hence.

Comment #94: Has EPA begun to "go after" the PRPs?

Response #94: EPA has sought information about the relationship of hundreds of parties to the site, and has sent notices of potential liability to 33 PRPs, which informs them of their status as PRPs. EPA has also held several informal meetings with PRPS in an effort to acquaint them with site activities, as well as to discuss their potential liability.

Comment #95: 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 #95: 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 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 #96: Is EPA still in the process of identifying PRPs?

Response #96: 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 #97: Will EPA seek to recoup the $10,000,000 in Superfund money already spent at the Li Tungsten site?

Response #97: 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 cost recovery provisions of the Superfund statute.

Comment #98: 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 Captain's Cove shouldn't be saddled with cleanup costs of Captain's Cove.

Response #98: 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 #99: For those who may be compelled to fund or implement remedial action at Superfund sites, cost minimization is an important goal.

Response #99: 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 CS-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 and the environment and comply with ARARs.

F. General Site Issues

Comment #100: How much of the estimated $29,000,000 cost to clean up the Li Tungsten site will be provided by EPA?

Response #100: 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; 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 I 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 million. 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 by the PRPs, subject to their willingness to sign a consent a consent decree, comply with an administrative order for the work, or to fund EPA's performance of the work. If fund money is eventually 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 #101: *What is the project schedule, including enforcement steps?*

Response #101: Concerning the Phase I cleanup referenced in the preceding response, EPA hopes to secure funding and begin Phase I of the 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 #102: 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 #102: 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, funding for remedial actions, that is, the actual work needed to carry out the remedy prescribed in RODs, is subject to prioritization by a panel of representatives from EPA Headquarters, and the Regions 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 position on the prioritization list.

Comment #103: 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?

Response #103: 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 #104: Who are being supplied by the industrial wells mentioned in the Proposed Plan?

Response #104: At the present time, the one and only 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 #105: 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 #105: 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 how decisions are made.

Comment #106: Why wasn't the map showing active and inactive wells on or near the sites included in the Proposed Plan?

Response #106: 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 the Li Tungsten site, 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 #107: 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 #107: 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 remove 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 #108: Why hasn't the environmental problem at the Li Tungsten facility been cleaned up by now? When is it going to be cleaned up?

Response #108: Significant cleanup has been completed through two removal actions at the Li Tungsten facility (one implemented by EPA and one implemented by the owner under EPA supervision) 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 could be completed by the year 2002.

Comment #109: 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 #109: Although EPA was aware that the City and the U.S. Army Corps of Engineers 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 or 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 #110: The City, EPA, DEC, and U.S. Army 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 #110: EPA agrees with the comment. EPA and DEC will coordinate scheduling, as well as proper management techniques concerning the sediment storage/drying (e.g. control of run-off, fugitive dust, water discharges, etc.) with the Army of Corps of Engineers and the City.

Comment #111: 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 #111: Comment noted.

Comment #112: 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 #112: 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 #113: 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 #113: 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 in an August 19, 1999 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 of Engineers 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 #114: There is insufficient information to link the radioactivity at the Captain's Cove property 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 property. 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 #114: There is a significant amount of information regarding the constituents of other wastes that have been placed at the Captain's Cove property 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 1996, describes the findings of that investigation. There is also much anecdotal evidence of how 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 substantially similar so that, together with the anecdotal evidence of dumping from the Li Tungsten facility, the linkage between the two properties was made. Analytical data obtained during the RI confirms this linkage.

Appendix A

Proposed Plan

Li Tungsten Corporation Site

City of Glen Cove, Nassau County, New York

EPA
Region 2

July 1999

MARK YOUR CALENDAR

July 28, 1999 through August 27, 1999: Public comment period on the Proposed Plan.

Monday, August 16, 1999 at 7:00 PM: Public meeting at the Glen Cove City Hall, 9 Glen Street, Glen Cove, New York (516) 676-2000.

COMMUNITY ROLE IN SELECTION PROCESS

EPA and NYSDEC rely on public input to ensure that the concerns of the community are considered in selecting an effective remedy for each Superfund site. To this end, the Li Tungsten RI/FS and the Captain's Cove FFS reports, and this Proposed Plan have been made available to the public for a public comment period which begins on July 28, 1999 and concludes on August 27, 1999.

A public meeting will be held during the public comment period at the Glen Cove City Hall on August 16, 1999 at 7:00 PM to present the conclusions of the RI/FS and FFS, to further elaborate on the reasons for recommending the preferred remedy, and to receive public comments.

Comments received at the public meeting, as well as written comments, will be documented in the Responsiveness Summary section of the Record of Decision (ROD), the document which formalizes the selection of the remedy for the Li Tungsten Site.

PURPOSE OF PROPOSED PLAN

This Proposed Plan describes the remedial alternatives considered for contaminated media at the Li Tungsten Corporation Superfund Site (the Site), and identifies the preferred remedial alternative with the rationale for this preference. The Proposed Plan was developed by the U.S. Environmental Protection Agency (EPA) in consultation with the New York State Department of Environmental Conservation (NYSDEC). The alternatives summarized below are more fully described in the Feasibility Study (FS) report for the Site.

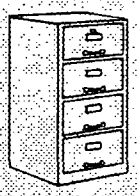
This Proposed Plan is being provided as a supplement to the Site Remedial Investigation and Feasibility Study (RI/FS) and Focused Feasibility Study (FFS) reports to inform the public of EPA and NYSDEC's preferred remedy and to solicit public comments pertaining to all the remedial alternatives evaluated, including the preferred alternative. Section 117(a) of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) of 1980, as amended, and Section 300.430(f) of the National Contingency Plan (NCP) require EPA to solicit public comments on Proposed Plans.

EPA's preferred remedial alternative would involve the excavation of all soils exceeding cleanup goals, segregation of radioactive and nonradioactive components of the excavated soils, and disposal of all contaminated soils and ore residues at appropriate off-Site disposal facilities. For groundwater, EPA's preferred remedial alternative is no action, because the groundwater contamination related to the Site is limited in extent and is expected to improve significantly upon excavation of contaminated soils. However, institutional controls in the form of deed restrictions would be sought on the two tracts of real property which make up the Site to prevent the potable use of contaminated groundwater that underlies the Site.

Secondary components of the Proposed Plan relating in particular to the Li Tungsten facility property include the cleanout of storm sewers, remediation of contaminated ponded water and sediments, removal of buildings that pose risk from structural collapse or contaminant release, and decommissioning of an industrial water supply well.

The remedy described in this Proposed Plan is the *preferred* remedy for the Site. Changes to the preferred remedy or a change from the preferred remedy to another remedy may be made if public comments or additional data indicate that such a change will result in a more appropriate remedial action. The final decision regarding the selected remedy will be made after EPA has taken into consideration all public comments. EPA is soliciting public comment on all of the alternatives considered in the detailed analysis of the RI/FS reports because EPA and NYSDEC may select a remedy other than the preferred remedy.

The administrative record file, which contains the information upon which the selection of the response action will be based, is available at the following locations:



Glen Cove Public Library
4 Glen Cove Ave.
Glen Cove, NY 11542
(516) 676-2130
Contact: Reference Desk

Hours:	Monday-Thursday	9 am - 9 pm
	Friday	9 am - 5 pm
	Saturday	9 am - 1 pm
	Sunday	Closed

USEPA-Region II
Superfund Records Center
290 Broadway, 18th Floor
New York, NY 10007-1866
(212) 637-4308
Hours: Monday-Friday, 9:00 am - 5:00 pm

Written comments on this Proposed Plan should be addressed to:

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Project Manager
Eastern New York Remediation Section
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SCOPE AND ROLE OF 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 (OU1) - the Li Tungsten Facility
Operable Unit 2 (OU 2) - the Captain's Cove Property

The primary objectives of the comprehensive remedial action described in this Proposed Plan are 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.

SITE BACKGROUND

Site Description

The 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 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 Figure 1, are located on Parcel C. A 500,000-gallon aboveground fuel oil tank and two other storage tanks were removed from this Parcel during the recently completed removal action. 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 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 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 and 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, and beaches. Garvies Point Preserve is located directly north of the Captain's Cove property (across Garvies Point Road). The Li Tungsten property is presently zoned industrial, while Captain's Cove is zoned residential.

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 signifcant 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 antimony, arsenic, barium, bismuth, copper, cobalt, chromium, lead, manganese, mercury, nickel, vanadium, and zinc.

Some radioactive ore residuals from the Li Tungsten facility were disposed of at Captain's Cove. In addition, radioactive ore residuals and other wastes from the processing of the tungsten material wastes were buried 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 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 from addressing the cleanup of radioactive wastes, requested that EPA address the radioactive contamination at Captain's Cove, while the State 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 waste 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.

Also located on the north side of Glen Cove Creek are other hazardous waste sites including two State Superfund sites, namely, the Konica Imaging, USA, Inc., property (formerly known as both the Powers Chemco and the Columbia Ribbon and Carbon Company property), and the Crown Dykman Site, as well as the Mattiace Petrochemical Federal Superfund Site (Mattiace Site), which adjoins the Li Tungsten facility to the west. EPA's remedial efforts at the Mattiace Site included an RI/FS which addressed Glen Cove Creek as a potential receptor. 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 and the sediments and water in Glen Cove Creek for the estimated 30 years of operation of the treatment system at the Mattiace Site.

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. In the vicinity of the Li Tungsten site, groundwater movement in the Upper Glacial Aquifer is generally to the south, with shallow discharge to Glen Cove Creek.

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 to the east of the Creek. The potable water supply drawn from these wells is tested in accordance with State law on a regular basis.

From July 1989 to July 1990, EPA ordered and supervised a removal action at the Li Tungsten facility that was conducted by the current owner of the property, the Glen Cove Development Company (GCDC). The most serious chemical/radiological hazards at the facility were identified and removed off-Site for treatment/disposal. An inventory of materials, including the contents of the 271 tanks at the facility, was also conducted.

In addition to the EPA-ordered removal action undertaken by GCDC, interim remedial activities were performed in 1995/1996 by EPA, in order to temporarily relocate ore materials to the Dickson Warehouse (Parcel C) to facilitate performance of EPA's RI. A subsequent EPA removal action was performed from October 1996 to October 1998 at the Li Tungsten facility, primarily to address the hazards associated with the remaining tank wastes. This 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 on-Site. 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.

EPA developed a workplan for field investigation of the radioactive ore residuals at Captain's Cove in April 1997 as part of the OU 2 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 investigate 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 its 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.

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 will 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.

REMEDIAL INVESTIGATION SUMMARY

During the RI for the Li Tungsten facility and the FFS for the Captain's Cove property, surface and subsurface soils, ponded water and wetlands sediments, storm sewers, and surface and groundwater were sampled and analyzed. The results from these sampling events are summarized below.

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 one soil boring reporting total PCBs at 15,890 µg/kg. Pesticides were detected in only a few samples, with endrin reported at 70 µg/kg 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 on the Site 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 Site 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 the Mattiace Site 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 and that the plume may no longer be recharged by a source. 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.

Sediments

Seven 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.

Four storm sewer sediment samples were 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, Site-wide 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 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 objective identified in the Technical and Administrative Guidance Memorandum (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 the soil cleanup objective in 23 samples, with the highest measured concentration at 2,760 mg/kg in Area A.

Area A - Radionuclides

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.

Area G - Radionuclides

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 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 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 Site, 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. Many inorganic compounds were detected in significant amounts, such as arsenic, antimony, selenium, iron, and manganese.

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, 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.

SUMMARY OF SITE RISK

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 were 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 the future use of the Li Tungsten Site is most likely to be commercial. 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 noncarcinogenic effects for a human receptor) equal to 1.0. An HI greater than 1.0 indicates a potential of 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 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, amount ingested, 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; namely, Areas A, B, B + C, and C. Subdivision of the relatively large Li Tungsten property was performed 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 midlle/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 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 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. 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. Hypothetically, 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.

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 $1.4x10^{-2}$ (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 $1.9 x10^{-3}$ (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.

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 an unacceptable hazard index or cancer risks which exceed the risk range. 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.

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 is $2.5X10^{-4}$ (or a risk of approximately 25 in 10,000), while the cancer risk in Area G is $1.1 X10^{-4}$ (or a risk of approximately 25 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.

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 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 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 technology to remediate soil and groundwater.

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. 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 NYS TAGMs. Site-wide cleanup levels developed for metals and radionuclides are presented in Table 1; 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 1 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, and 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 NYS TAGMs. Cleanup levels for contaminated sediments will include arsenic at 6 mg/kg and lead at 31 mg/kg, based on NYS 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.

Table 1

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.

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.

The Proposed Plan evaluates, in detail, both soil and groundwater alternatives for the Li Tungsten Site. The soil alternatives address both contaminated soil and sediments. Soil alternatives evaluated in the Plan 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 have been addressed under NYSDEC's March 1999 ROD. Similarly, alternatives for groundwater remediation were not evaluated for the Captain's Cove property because radionuclides exceeded remediation goals (and only slightly) 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 to protect future generations, were considered not protective. In addition, the Long Island Landfill Law (NYS Environmental Conservation Law 27-0704) prohibits siting of new landfills or expansion of existing landfills in Nassau and Suffolk Counties. Thus, in developing the alternatives for soil remediation, on-Site containment of radioactive wastes was not included.

SUMMARY OF 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, will 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.

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 deed restrictions be placed on the Li Tungsten Property to prevent the Property from being used for residential purposes and 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/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/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/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.

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 cubic yards 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 deed restrictions be placed on the Captain's Cove Property both to prevent the Property from being used for residential purposes and to prevent 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:	11months
30-Year Present Worth:	$11,787,000

This alternative is different from Alternative CS-2 in that a radioactive materials separation technology/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/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/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.

SUMMARY OF GROUNDWATER REMEDIAL 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 20 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 metals 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).

All excavation alternatives will utilize New York State's Air Guide -1 to ensure that there are no adverse air/particulate impacts to the surrounding community as a result of excavation and handling of contaminated soils.

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 permanently protect 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 similarly provide for long-term effectiveness and permanence through a properly designed on-Site containment cell which would require institutional controls and long-term maintenance to provide permanent 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 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 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. 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 fixation of the metals-contaminated wastes and their disposition in the on-site cell. 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 construction, and soil handling procedures would minimize the short-term risks to workers and the surrounding community.

Implementability

The implementability of Alternatives LS-2 and CS-2, LS-3 and CS-3 and LS-4 and CS-4 would likely be a function of the acceptability of transportation of low-level radioactive wastes to an off-Site disposal location. These wastes would be securely loaded and trucked to an appropriate rail spur, where the wastes would then be shipped by rail to the ultimate disposal location. The implementability of Alternatives LS-3 and CS-3, and LS-4 and CS-4 would also depend on the efficiency of the separation technology/strategy selected for separation of radionuclide-contaminated soil from other excavated soils. Institutional controls through deed restrictions on the residential development of both Li Tungsten and Captain's Cove required for all the action alternatives should be readily implementable.

Cost

Table 2 describes the capital costs/operation and maintenance costs associated with the soil alternatives. The costs of the comparable alternatives for the Li Tungsten Facility and the Captain's Cove Property are combined in the following summary table:

TABLE 2

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

State Acceptance

The State of New York, which has coordinated with EPA during the development of the Proposed Plan, is presently reviewing the Plan for potential concurrence.

Community Acceptance

Community acceptance of the Preferred Alternative will be assessed in the ROD following review of the public comments received on the RI/FS report and the Proposed Plan.

COMPARATIVE ANALYSIS OF GROUNDWATER REMEDIAL ALTERNATIVES

Overall Protection of Human Health and the Environment

The Alternative LW-1, No-Action, would not provide any protection of human health and the environment as no active remedial measures or institutional controls are included in this alternative. It should be noted that remediation of contaminated soil is expected to greatly decrease the degree of leaching of contaminants from the soil into the groundwater, and would therefore significantly reduce the magnitude and duration of any potential impacts on human health and the environment from groundwater. Alternatives LW-2, LW-3 and LW-4 would protect human health and the environment because the groundwater contaminated with inorganics on the Li Tungsten Facility would be intercepted and prevented from discharging to Glen Cove Creek. The remedial goal of these alternatives is to restore groundwater quality in order to meet State and Federal 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 are a remote 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 availability of the City public water supply.

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.

Alternatives LW-2, LW-3, and LW-4 all use treatment technologies capable of removing the inorganics of concern to the standards.

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 contaminated levels and would eventually flush the inorganics into Glen Cove Creek, where they would continue to be dispersed. Given the relatively sporadic inorganic contamination that currently exists in the aquifer, it is anticipated that this mechanism when combined with the soil remediation should effectively provide long term protection from groundwater contamination. The monitoring program will be designed to determine if LW-1 is effective.

Alternatives LW-1, 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.

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 alternatives.

Cost

Table 3 describes the capital costs/operation and maintenance costs associated with the groundwater alternatives for this Site:

TABLE 3

Groundwater Alternative	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

State Acceptance

The State of New York, which has coordinated with EPA during the development of the Proposed Plan, is presently reviewing the Plan for potential concurrence.

Community Acceptance

Community acceptance of the preferred alternative will be assessed in the ROD following review of the public comments received on the RI/FS report and the Proposed Plan.

PREFERRED ALTERNATIVE

Soils, Sediments and Debris

Based upon an evaluation of the various alternatives, EPA and NYSDEC recommend **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 preferred alternatives at both Li Tungsten and Captain's Cove would 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 would be excavated in the various contaminated areas of the Site. Approximately 18,281 cy and 13,200 cy of radioactive ex situ wastes are estimated at the Li Tungsten facility and Captain's Cove property, respectively. Approximately 17,300 cy and 20,550 cy of nonradioactive, metals-contaminated ex situ wastes are estimated at the Li Tungsten facility and Captain's Cove property, respectively. The remedial action cleanup levels for these wastes were provided earlier in Table 1.

There are multiple areas requiring excavation on all three parcels of the Li Tungsten facility and there are two large areas requiring excavation at Captain's Cove. At the Li Tungsten facility, radioactive wastes require excavation to an average depth of four feet (estimated depth of six feet, on Parcel C). Heavy metals-contaminated soils, while typically co-located with the radioactive wastes, would 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 would be required in a few areas of Parcel C in order to achieve the chemical cleanup levels for these contaminated soils.

At Captain's Cove, where the radioactive wastes were buried deeper, wastes would require excavation to an average depth of eight feet in Area A, and twelve feet in Area G. Excavated wastes would be treated via a volume reduction technology/strategy in order to minimize the volume of the radioactive wastes that would require off-Site disposal at a costly disposal facility licensed to manage this type of material. Treatability tests would be required to determine the efficiency of any volume reduction technology employed. 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 non-radioactive wastes are anticipated to contain other contaminants, such as heavy metals. These wastes would 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 would be disposed of at a RCRA Subtitle C facility. Post-excavation sampling would 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 would then be used to complete the backfilling to match the surrounding grade.

The existing storm sewers would also be pressure-washed and the effluent and sediments collected for off-Site disposal.

The preferred alternative would 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 would 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, EPA and NYSDEC recommend **Alternative LW-1: No Action** for contaminated groundwater at the Li Tungsten Facility.

The preferred alternative at Li Tungsten would 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. 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 beneath the Site is expected to improve after excavation is completed. A groundwater monitoring program would be initiated as part of the preferred alternative to monitor the quality of the aquifer beneath the Site. Additional monitoring wells would 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 would 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.

To complete the proposed remedial action, EPA recommends that deed restrictions be placed on the Li

Tungsten Site to prevent the Site from being used for residential purposes. The deed restriction would also include controls to ensure the protection of public health until the groundwater beneath the Site has reached cleanup levels. During implementation of the Preferred Alternative, best management practices at the Site would 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 preferred alternatives would result in an effective long term permanent remedy because all soils with radioactivity greater than the radionuclide cleanup levels would be disposed of in a licensed radiological waste disposal facility. Implementation of the preferred alternative would 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. 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.

The preferred alternatives would provide the best balance of trade-offs among alternatives with respect to the evaluating criteria. EPA and NYSDEC believe that the Preferred Alternative would 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.

Appendix B

Public Notice

NEWSDAY

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STATE OF NEW YORK)
:SS.:
COUNTY OF SUFFOLK)

Madeline Johansen

of Newsday, Inc., Suffolk County, N.Y., being duly sworn, says that such person is, and at the time of publication of the annexed Notice was a duly authorized custodian of records of Newsday, Inc., the publisher of NEWSDAY, a newspaper published in the County of Suffolk, County of Nassau, County of Queens, and elsewhere in the State of New York and other places, and that the Notice of which the annexed is a true copy, was published in the following editions/ counties of said newspaper on the following dates:

July 28, 1999 QUEENS July 28, 1999 NASSAU July 28, 1999 SUFFOLK

Sworn To Before Me This
28 day of July 1999
Notary Public

CATHERINE PIZZO
Notary Public, State of New York
No. 5004975
Qualified in Nassau County
Commission Expires November 30, 2000

500297

PUBLIC NOTICE
U.S. Environmental Protection Agency
Announces Public Meeting and Comment Period on the Proposed Plan for the
LI TUNGSTEN SUPERFUND SITE
Glen Cove, New York

The U.S. EPA has recently completed a feasibility study for the Li Tungsten Superfund Site, during which cleanup alternatives were evaluated for soil and groundwater contamination. EPA has prepared a final Feasibility Study (FS) Report as well as a Proposed Plan for the Site that summarizes various cleanup alternatives and identifies EPA's preferred alternative. Before selecting a final remedy, EPA will hold an informational public meeting and will consider written and oral comments on all the alternatives.

The public comment period will be from July 28, 1999 to August 27, 1999. During the comment period, the public is invited to review the Proposed Plan, the Feasibility Study Report, or other documents comprising the Administrative Record, which are available at the information repositories listed below, and to offer written or oral comments on these documents. EPA's public meeting will be held on Monday, August 16, 1999 at 7:00 p.m. in the City Council chamber of Glen Cove City Hall (9 Glen Street). The meeting will be transcribed and a copy of the transcript will also be made available at the information repositories shortly after the public meeting.

EPA evaluated the following alternatives for the Site:

Soil Remedial Alternatives
LS-1/CS-1: No Action
LS-2/CS-2: Excavation and Off-Site Disposal of Radioactive and Nonradioactive Metals-Contaminated Soils
LS-3/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
LS-4/CS-4: Excavation with Radioactive Waste Volume Reduction, Off-Site Radioactive Waste Disposal and Off-Site Disposal of Other Nonradioactive Metals-Contaminated Soils

Groundwater Remedial Alternatives
LW-1: No Action
LW-2: Interceptor Trench/Extraction Wells with On-Site Treatment and Disposal
LW-3: Interceptor Trench/Extraction Wells with Off-Site Treatment and Reinjection at the Nearby Mattiace Superfund Site Treatment Facility
LW-4: Reactive Walls with Slurry Walls and In-Well Adsorption Treatment

EPA's preferred alternatives are LS-4/CS-4 for soil and LW-1 for groundwater. The preferred alternative for soil involves excavation of soils, ore residuals, and sediments contaminated with radionuclides and heavy metals, separation of radionuclide-contaminated wastes, and disposal of all contaminated wastes at appropriate offsite facilities. The preferred alternative for

groundwater involves no remedial action, with long-term monitoring to evaluate improvement of groundwater quality.

The Proposed Plan, the RI and FS Reports, and other documents used by EPA in the decision-making process for the Site are available for public review during the public comment period at the following locations:

Glen Cove Public Library
4 Glen Cove Ave.
Glen Cove, NY 11542
(516) 676-2130

USEPA-Region II
Superfund Records Center
290 Broadway, 18th Floor
New York, NY 10007-1866
(212) 637-4308

If you would like to comment in writing on the Proposed Plan, please mail your comments (postmarked no later than August 27,1999) to:

Edward Als, Project Manager
U.S. Environmental Protection Agency
290 Broadway, 20th Floor
New York, NY 10007-1866
(212) 637-4272

Appendix C

August 16, 199 Public Meeting Attendance Sheet

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 2
290 BROADWAY
NEW YORK, NY 10007-1866

Public Meeting
Li Tungsten Superfund Site
Glen Cove, New York

AGENDA

Monday, August 16, 1999
7:00 P.M.

I. Welcome and Introduction
Cecilia Echols
Community Involvement Coordinator
Public Outreach Branch

II. Superfund Process
Doug Garbarini, Chief
Eastern New York Remediation Section

III. Site Background
Ed Als
Project Manager

IV. Remedial Investigation/Feasibility Study
Ed Als

V. Preferred Remedy
Ed Als

VI. Questions & Answers
Cecilia Echols

VII. Closing

Other EPA Representatives
Marian Olsen, Risk Assessor
Carl Garvey, Regional Counsel
Jim Doyle, Regional Counsel

500301

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION II
Public Meeting @ City Council Chamber
Li Tungsten Superfund site
Glen Cove, New York

Monday, August 16, 1999
ATTENDESS

(Please Print Clearly)

NAME	STREET	CITY	ZIP	PHONE	REPRESENTING
Edwin Morales	12 Ellwood St	G.C.		759-0347	Cub Scouts
Tommy Morales	"			"	Cub Scouts
Lisa Morales	"			"	Girl Scouts
Lauren Morales	"			"	"
Joseph Guerrier	Milton Place			(914)641-2677	MPI
Richard NESDAN	41 Kirkwood	Dr G.C.		571 5534	
Tom MAHER	D&B Consulting Engineers			516 364 9550	City of Glen Cove
Jean McCarroll	2 Wall St.,	NY, NY		212-732-3260	Bicar
Pat Patterson	G C			none	
Brenda Heck	37 TOWN PATH	GC		676-0986	Boy Scouts
SAL ERVOLINA	50 WOLF ROAD	ALBANY		518-457-9349	NYSDEC
ROBERT CAMMARATA	36 NASSAU AVE			671 2219	
LEO F. URSINI	6 DOUGLAS DR.	G.C.	11542	671-1467	
Joseph Finke	3 LAUREL PLACE	Bayville	11709		Fisherman
JACK CHALE	29 JULY AVE	BAYVILLE	11709		Fisherman
Annie Dunne	32 Pearsall	Dr	G.C.	11542	Sierra

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION II
Public Meeting @ City Council Chamber
Li Tungsten Superfund site
Glen Cove, New York

Monday, August 16, 1999
ATTENDESS

(Please Print Clearly)

NAME	STREET	CITY	ZIP	PHONE	REPRESENTING
L. V. FABIANO	43 Jerome Dr.	Glen Cove		676-7684	
Linda VanVelson	10 Taylor Dr	Glen Cove		676-3246	
David VanVelson	"	"		"	
G M Sosa	117 Littleworth Lane	Sea Cliff NY		671 5564	
Pat Parmelee	9 Henry Dr	Glen Cove		676-2508	
Corin Dunne	9 High Elms La.	Glen Cove		759-1480	
Nancy Hatter	11 Marietta Rd	Glen Cove		676-3054	
Kaylin Loveland	46 W Broadway #116 SLC, UT 84101			801-532-1330	Environcare of Utah
RON E. JAGER	DL ROTHBERG & ASSOCIATES 230 PARK AVE. SUITE 615	NY, NY	10169	(212)490-2220	
John Stes	10 Sands Pt Rd	Glen Cove	NY 11542	674-09[illegible]	
FRANK O'REGAN	24 Kellin Drive	Glen Cove			
DAVID ZATLIN	20 Hemmericl Ave	Glen Cove			
Rosemary Olsen	9 Glen Street	Glen Cove	NY	676-7362	City of Glen Cove
Myrna Machol	9 Glen ST	Glen Cove	NY	676-7625	CDA
PAUL ANGELILLO	2200 Cottontail Lane Somerset, NJ		08873	8004451588	IT Corp.

500303

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION II
Public Meeting @ City Council Chamber
Li Tungsten Superfund site
Glen Cove, New York

Monday, August 16, 1999
ATTENDESS

(Please Print Clearly)

NAME	STREET	CITY	ZIP	PHONE	REPRESENTING
Len B. Cooke	95 Dosoris Ln	GC		671-1235	
Robert Foster	225 A Main St.	Farmingdale	11735	390-7150	Citizens Campaign for the Env.
Ann Famiglietti	11 Fairmont Pl	GC	11542	671-2644	
Philip G. Hauck	105 Sitore Rd.	G.C.	11542	676-3142	
Janice Simon	37 Willis Rd	GC		6717753	
Peter O'Connor	10 George Dr.	G.C.		759-1295	
Cath. Gulbransen	38 Eastland Dr.	Glen Cove		674-0257	
Robert Bixler	1 Whitney Circle	Glen Cove		676 0621	
Jan Marin	72 Coles	Glen Cove	11542	6710559	Troop 184
Andrew Melillo	37 McLaughlin St	Glen Cove	11542	6703199	
Raymond Breneliz	30 [illegible] Rd	GC	671-0383		Troop 184
Anita Dippolito	71 Valentine Ave	G.C.		676 0519	
Lisa Lyons	38 Valentine Ave	GC		676-1516	
Dr. Diane Romeo	100 Carney St.	Glen Cove		674-24	
Patricia A. Tropton	134 Janet Lane	Glen Cove			SPTA Li Tungsten Task Force

500304

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION II
Public Meeting @ City Council Chamber
Li Tungsten Superfund site
Glen Cove, New York

Monday, August 16, 1999
ATTENDESS

(Please Print Clearly)

NAME	STREET	CITY	ZIP	PHONE	REPRESENTING
William Gilday	547 River St	Troy	12180	518-402-7880	NYS DOH
Joseph DeFranco	240 Old Country Rd	Mineola		571-3315	Nass Co. Health
JOAN MEEHAN	5 RAYNHAM RD.	GLEN COVE, NY	11542		GLEN COVE CITY COUNCIL
Jill Jessen	8 Midwood Place	Glen Cove, NY	11542	671-[illegible]	member LI Tungsten Task Force
Steve Lanzalotto	6 The Outlook	Glen Cove,			Member, LI Tungsten Task Force
DAVE NIERI	8 HARWOOD DR. W.	GLEN COVE	11542	674-3626	LI TUNGSTEN TASK FORCE
Normandia	47 BUCKEYE RD	GC.		671-4359	North Shore Audubon
Venturino M.	26 WOLFLE ST.			671-3852	WOLFLE / LI Tungsten

500305

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION II
Public Meeting @ City Council Chamber
Li Tungsten Superfund site
Glen Cove, New York

Monday, August 16, 1999
ATTENDESS

(Please Print Clearly)

NAME	STREET	CITY	ZIP	PHONE	REPRESENTING
Mike Tomas	8 Silliman Rd	Glen Cove	11542	(516)676-7431	Boy scouts
Matt Venturino	26 Wolfe St.	Glen cove	11542	(516)671-3852	Boy Scouts
Charles McCann	6 Forest Ave,	Glen Cove	NY	11542	
Mary Ann Holzkamp	17 Franklin Ave.	Glen Cove	N.Y.		City Council

500306

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION II
Public Meeting @ City Council Chamber
Li Tungsten Superfund site
Glen Cove, New York

Monday, August 16, 1999
ATTENDESS

(Please Print Clearly)

NAME	STREET	CITY	ZIP	PHONE	REPRESENTING
Andrew Vanes					Glen Cove Creek Reclam Comm
Robert Nakamura					
JOHN ENGLERT					KIRKPATRICK & LOCKHART
LEONARD WARNER					MALCOLM PIRNIE, INC.
MARCO BANÉ					NEWSDAY
Cara Anzel					Consultant
Eleanor Rapelje					citizen
Peter W. Rapelje					Li Tungsten Task Force
Joseph M. Weiss					interested citizen
Carla Santella					Record Pilot
Nidal Azzam					Malcolm Pirnie, Inc.
MAGGIE POLK					CITIZEN
Dr. Roy Spiegel					citizen
Tom Gulbransen					Citizen
TERESA FOSTER					NYSDOH

500307

Appendix D

Letters Submitted During the Public Comment Period

September 7, 1999

SAMPLE

Mr. Ed Als, Project Manager
US Environmental Protection Agency
Emergency and Remedial Response Division
290 Broadway, 20th Floor
New York, NY 10007-1866

Dear Mr. Als:

As a resident of the Glen Cove area, I am extremely concerned and alarmed at the choice of clean-up options that the EPA has selected for the Li Tungsten toxic superfund site.

First I am concerned about the fact that the EPA chose options LS-4 and CS-4 which involves separation of radioactive from "non-radioactive" dirt. There are several problems that I find extremely hazardous and dangerous about this clean-up method. The excavation itself will involve moving a lot of radioactive dirt around and creating dust. By adding the separation process, you will create more radioactive dust that can migrate offsite. You plan to control the dust by wetting it down, however, this would interfere with the separation process. This is contradictory and makes the separation process less cost effective.. The additional dirt separation is an unacceptable risk since it takes only one inhalation or ingestion of a radioactive dust particle to create cancer and would shorten the life spans of potentially thousands of people in the community. The safety procedures outlined in your plan do not assure us that you can protect us completely from any migrating dust; therefore, we insist that you minimize the amount of radioactive dust generated and strongly urge the EPA to select options LS-2 and CS-2 rather than LS-4 and CS-4.

Next, the procedures for containment of the dust that are outlined in your clean-up plan are inadequate, and we insist that the EPA include in its clean-up plan details of a mobile containment or "sprung structure" to be utilized around all excavation activity to prevent any radioactive dust from migrating offsite.

Third, we request that the EPA set up radioactive monitoring stations around the clean-up site and at strategic points throughout Glen Cove and the surrounding communities to assure us that no radioactive dust has migrated offsite. If there is any detection of radioactive dust offsite, we want the EPA to have a plan to immediately alert the entire community, and then cease all excavation activities until all radioactive dust can be completely contained.

The health and safety of the people Glen Cove and surrounding communities should be the primary concern, not cost. Therefore, we request a further Risk Assessment Analysis of the various clean-up options proposed coupled with a public education effort resulting in a better understanding of the risks associated with the various clean-up options. The clean-up of Li Tungsten must be performed in a manner that absolutely guarantees that there will never be any future health impacts on the residents of Glen Cove or the surrounding communities. Therefore, the EPA's Final Record of Decision should (1) select options LS-2 and CS-2, (2) specify that all excavation operations must be performed inside a containment structure so that absolutely no "Fugitive Dust" can migrate offsite, and (3) include a comprehensive and detailed safety and monitoring plan incorporated into the Li Tungsten Final Record of Decision.

Submitted by: _____

Address: _____

_____

LI TUNGSTEN COMMUNITY TASK FORCE
48 Circle Drive
Glen Cove, NY 11452

September 15, 1999

Edward Als
Project Manager
Eastern New York Remediation Section
Emergency and Remedial Response Division
United States Environmental Protection Agency
290 Broadway
New York, NY 10007-1866

Subject: Comments to EPA's Proposed Plan, dated July 1999

Dear Ed:

The Li Tungsten Community Task Force has been meeting with you and other representatives from the EPA and their contractors on a monthly basis for more than five years. We have hired a technical advisor, Disposal Safety Inc. to help us interpret the technical details of the remediation process and documents. We consider our group to be well-informed citizens who represent the citizens of Glen Cove. We feel that the majority of the citizens of Glen Cove, if as well informed as our group, would take a similar position to ours pertaining to the Proposed Plan and the subsequent remediation steps to be taken by EPA.

The task force has reviewed the EPA's Proposed Plan and Final Feasibility Study Report (FS). We are pleased to see that the EPA has selected an alternative that would result in the removal of most contaminated material from the site. We have, however, found several items that we consider to be serious flaws or omiissions. Our concern is with the proposal to use the soil remediation alternatives LS-4 and CS-4, which require volume reduction by means of separation of radioactive contaminated soil from other soil. We feel that soil separation will result in added risk to the population in order to realize a questionable, and at best minimal, saving of cost.

The EPA has not provided any risk analysis for the several remediation alternatives. There is no comparison of the relative risk associated with method LS-2 & CS-2 vs. LS-4 & CS-4. It is obvious, however, that the additional handling, shaking and conveying associated with the proposed soil separation process will cause the generation of additional airborne dust beyond what will be generated during excavation. A member of our committee, Cazimir Swier, worked at Li Tungsten Co. for 39 years as head of the Research Department. He stated that as part of the process the ore was ground to less than 200 mesh, which is approximately the consistency of talcum powder. This very fine

contaminated material, when dry, will be the source of airborne particulate contamination during both the excavation and separation processes.

The EPA's Proposed Plan states on page 17: "Potential short time impacts would be associated with Alternatives LS-2 & CS-2, LS-3 & CS-3, and LS-4 & CS-4 due to the direct contact with soil by workers and through the potential for generation of dust during construction." Also "Alternatives LS-3 & CS-3 and LS-4 & CS-4 would involve additional handling during on-site radioactive material separation." The EPA, therefore, recognizes that there is additional risk associated with the separation process proposed in Alternate LS-4 & CS-4. It should also be recognized that, because the separation process will not be perfect, the implementation of alternate LS-4 & CS-4 will result in a higher level of contamination being left in the soil after remediation than if complete removal is accomplished in accordance with alternate LS-2 & CS-2.

Since a single incident of either inhalation or ingestion of radioactive materials could cause cancer in humans, there is no safe level nor any maximum allowable level defined for airborne radionuclides. Uranium, and other radionuclides of uranium, thorium, and radium emit gamma, beta and alpha radiation. If this type of radioactivity enters the body, either through inhalation or ingestion, it can damage the bone marrow. If gamma or beta particles are deposited in the lungs, it has the potential to increase the incidence of lung cancers among Glen Cove's residents. The biological effects of this type of radiation in the body, <u>even one exposure</u>, could cause mutations, and in pregnant women, birth defects or death of a fetus. Radioactive particles small enough to become airborne, defy many of the dose model (RESRAD & RAGS) risk estimates in use by the health risk assessment community. Therefore, risk assessments can be skewed too low for inhalation as well as for ingestion. This hypothesis is supported by experimental and epidemiological evidence from the examination of radiation effects of particulate alpha-emitters deposited in the lung.

We also believe that there is additional risk from the probability that airborne dust will contain arsenic, which is a well known carcinogenic.

Therefore, we believe that the risks associated with the transport of airborne radioactive particles off-site resulting from repeated handling of the soil (excavation and separation) have been under-estimated by the EPA. We cannot be too careful when removing the radioactive material from these sites. Option LS-4 & CS-4 would generate additional dust that would become airborne and increase the level of danger to the community's health.

Furthermore, the percentage of superfund sites that involve radioactive materials is quite small. Of these, only a few have proceeded to the remediation phase. Therefore EPA's experience with this type of remediation is limited. The fact that tungsten ore was processed to a very fine consistency at the Li

Tungsten facility may make this site unique. We believe that the EPA does not have enough experience with soil separation to assure the community that the selection of a less costly alternative will pose no additional health risk.

It is our feeling that the LS-4 & CS-4 separation process could end up being more costly than the LS-2 & CS-2 removal alternative. The EPA has stated in the Proposed Plan, page 17, "Alternatives LS-4 & CS-4 may reduce the volume of the radioactive materials through the use of separation technology; however the percent volume reduction is uncertain and would be the result of a physical separation process rather than a treatment". If, after the engineering design, fabrication and testing of a pilot operation the yield of separated material is not sufficient, or the removal of radioactive materials to criterion levels has not been achieved, the costs to redesign or add new filtering techniques may quickly obliterate any projected cost savings of the separation alternative. The separation alternative LS-4 & CS-4 is an unacceptable option to the Task Force. The principle of reducing radiation exposures "as low as reasonably achievable" should prevail. Since no one really knows whether the sorting will save any money, there is no clear benefit.

Cazimir Swier has suggested that due to the fact that the radioactive material has been processed to a very fine consistency, a hydro-mechanical mining technique similar to dredging might be employed for soil removal, especially for the deeper contamination located on the Captains Cove property. This process would involve, after excavating the surface uncontaminated soil, saturating the contaminated soil with water until slurry is formed. This slurry would then be pumped out of the hole into tanker trucks or drums thereby minimizing the probability of airborne contaminants.

The methods selected during the design phase and implemented during the construction phase will be critical. Our committee wants to be involved so that there is a community input to these phases. We want to insure that all possible safeguards are specified and implemented. We want to see plans for dust containment structures to be used during removal and procedures for decontamination of trucks including the washing of tires to prevent transportation of dust throughout the community. We also want to see an airborne dust monitoring system that will include sensors and alarms to warn workers and nearby residents if any airborne dust is escaping from the site.

With regard to the remediation of soils that do not contain radioactive material, the final Feasibility Study (FS) changes the cleanup target for arsenic in soil from 7 to 27 parts per million. This nearly fourfold increase over the New York State limits will cause deed restrictions to be placed on the site. This is not a desirable situation, but if the state limits were employed for the remediation target, we recognize that this would increase the cost to an unacceptable level. This would result in pressure to implement Alternative LS-3 & CS-3, encapsulating the contaminated material on site. This would be unacceptable.

We feel that the deed restrictions are the lesser of two evils. We recommend that the record of decision should specify that the deed restrictions include mandatory radon detectors in all new buildings erected on the site. Our technical advisor, Disposal Safety Inc. has provided additional details concerning this concern. Their report is attached.

The health and safety of the people of Glen Cove and surrounding communities should be the primary concern and not dubious cost savings. Therefore, we request a reassessment of the various clean-up alternatives, coupled with a public education effort resulting in a better understanding of the risks associated with the various alternatives. The clean-up of Li Tungsten must be performed in a manner that absolutely guarantees that there will never be any future health impacts on the residents of Glen Cove or the surrounding communities.

There is another issue that we believe requires further attention by the EPA and the Department of Health. One of our members who resides very close to the Li Tungsten site, another member who works in a building close to the site and a third member who worked at the site, have all contracted cancer. In addition, the member who lives near the facility reports that there is apparently an inordinate number of residents who live near the site that have contracted cancer. To the best of our knowledge there was a cancer survey done on former Li Tungsten employees in 1991, but the results have not been published. A cancer survey was conducted for all of Glen Cove, but this just measured the incidence of cancer in Glen Cove compared to other communities. The people who live or work, or have lived or worked at, or in the immediate vicinity, of the site need to know whether they have been, or are being, affected by the contamination at the site. We request that a new cancer survey be implemented which includes those who are or have lived or worked within a one half-mile radius of the site.

We believe the EPA's Final Record of Decision should:

(1) Select options LS-2 and CS-2.

(2) Calls for a comprehensive and detailed safety and monitoring plan which specifies that:

(a) Specifies that all excavation operations must be performed inside a containment structure or incorporate hydro-mechanical mining techniques so that absolutely no 'Fugitive Dust' can migrate offsite;

(b) Includes the requirement to clean the tires of any trucks before leaving the site to minimize the possibility of contaminated particles being dropped along the route out of town.

(c) Includes the requirement for an airborne dust monitoring and alarm system.

(3) Includes the requirement for deed restrictions to require radon detectors in all buildings erected on the site.
(4) Require a new cancer survey for the immediate area of the site.

Sincerely,

Peter W. Rapelje

Peter W. Rapelje,
Task Force Co-Chair

Disposal
Safety
Incorporated

To: Peter Rapelje

From: Ben Ross & Steve Amter

Date: September 15, 1999

Subject: Comments on Proposed Remedial Action Plan and final Feasibility Study for Li Tungsten

> Notice: This report has been prepared solely for the guidance of the Glen Cove Creek Reclamation Committee in interpreting information available to them. Other users should satisfy themselves *independently* as to facts and conclusions contained herein. In particular, such users should refer to original sources of information rather than to this report. This report is not intended for use in any real estate or other transaction, and should not be used or relied upon for such purposes. Decisions involving public or individual health should be made after *independent* consultation with physicians and public health officials.

A key decision in the Proposed Remedial Action Plan is that EPA will dispose of all contaminated soils off-site. Of all the alternative studied, off-site disposal is most protective of the local community.

In reviewing the PRAP, we identified two other significant issues of concern. These are the clean-up target for arsenic in soil and the quality of radiation analyses. We also had some other specific concerns that EPA should address in the Record of Decision.

Arsenic clean-up standard

The PRAP selects 27 parts per million as the clean-up target for arsenic in soil. That is, soil with more than 27 ppm of arsenic will be removed from the site. This is a change from the value proposed in the draft FS, 7 ppm.

EPA regulations call for setting clean-up targets so the cancer risk to a person who lives or works on the site after the clean-up lies in the range between 10^{-4} and 10^{-6}. (That is, the chances that a given individual will die from cancer caused by the remaining contamination is between one in ten thousand and one in ten million.) In the case of arsenic, the concentration that would yield a risk of one in a million is below the naturally occurring

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background level of arsenic in soil. The clean-up target must be set somewhere higher in the range. Exactly where to set it is a judgement call.

The draft FS's value of 7 ppm is the limit set by New York State regulations (called TAGMs) for arsenic in soil in residential areas. In order to make the remedy consistent with the TAGMs (which, under the law, must be done unless EPA grants itself a waiver), EPA proposes to impose deed restrictions that would forbid future use of the land for residential construction. By raising the arsenic limit, the amount of soil that must be disposed of is reduced. This cuts the cost of off-site soil disposal by tens of millions of dollars.

Whether the deed restrictions will really prevent residential construction on the site over the long term is dubious. Research on past cases and on the laws governing deed restrictions shows that deed restrictions are often ineffective and require active enforcement. A memo we previously prepared on this subject is attached. Circumstances at the Li Tungsten site, especially the plans for active redevelopment, are relatively unfavorable for success in enforcing deed restrictions.

If the deed restrictions fail, and residences are built on the site, consequences are not catastrophic. The target level of 27 ppm lies within EPA's risk range of 10^{-4} to 10^{-6}. At Superfund sites in other states, EPA has allowed as much as 20 ppm of arsenic to remain in soil in residential areas.

Because off-site disposal of contaminated soil is very expensive, tightening the clean-up target to 7 ppm would push EPA toward on-site disposal. The arsenic-contaminated soil would be buried in an on-site landfill and covered with a multi-layer cap several feet thick.

Just as deed restrictions require active enforcement to make them effective, landfill caps require active maintenance and control to keep what is buried beneath them out of the environment. Moreover, like all engineered structures landfill caps have finite lifespans; these are often less than 100 years. For the same reasons that it is difficult to guarantee long-term enforcement of deed restrictions, it is difficult to guarantee long-term maintenance and integrity of a landfill cap.

The potential consequences of failure of a landfill cap are much worse than the consequences of failure of institutional controls, because the landfill would contain soil with as much as several thousand parts per million of arsenic.

Thus, even recognizing that there is a substantial possibility that land-use restrictions will not succeed, the combination of a relaxed arsenic clean-up standard with off-site disposal is preferable to a stricter arsenic clean-up standard with on-site disposal. From the community's point of view, the best remedy would be the strict arsenic standard with off-site disposal, but this clean-up would be exorbitantly expensive.

Radiation analysis

Dr. Stanislav Grashchenko of the V.G. Khlopin Radium Institute has reviewed the radiation analysis in detail. Dr. Grashchenko has decades of experience in dealing with Po-210 and other naturally occurring radionuclides that become concentrated in wastes generated by the production of non-ferrous metals.

In our earlier comments, we raised the question of whether elevated levels of polonium, a radioisotope that is difficult to detect, might be present in soil that did not have high levels of any other radioactive isotope. The final FS presented the first laboratory analyses for polonium. While somewhat limited in number, these analyses report that polonium is present only in soils that are also contaminated with other radioactive contaminants. If this conclusion is correct, a clean-up that removes soils contaminated with uranium, thorium, or radium will also remove soils that are contaminated with polonium.

Dr. Grashchenko found that the laboratory work was sloppy and the results were not evaluated well. Nevertheless, he does conclude that in the soil samples that were analyzed, elevated levels of polonium were not present except in association with other, more easily detectable, radioisotopes. Dr. Grashchenko does not think there is a need for additional sampling as part of site characterization.

Dr. Grashchenko's detailed comments are attached.

Other comments

In its response to our earlier comments, EPA said that the final remedy would include radon testing at all buildings that will be constructed on the site. This is missing from the PRAP and should be added.

The deed restriction should be matched to the nature of the hazard from arsenic in soil. The largest route of exposure is through children getting contaminated soil on their hands and into their mouths. Inhalation is a significant, but lesser, means of exposure. Therefore, senior citizens housing, although a residential use, would be more acceptable than a day-care center or school, which are ordinarily allowed on commercially zoned land. Any deed restriction should therefore be aimed at day-care centers, schools, and similar child-oriented uses.

5 Nassau Road
Locust Valley, N.Y.
~~15~~ 60
Sept. 3, 1999

Dear Sir:

The city of Glen Cove should have been notified about the Li Tungsten Plant Closing, permanently.

And, if they were notified, why wasn't, an inspector sent to the premises, to speak with the owner, and the president, about the tanks that were there, full of chemicals?

Who knew about these dangerous hazardous problems?

Rather late, when they discovered and found out, the hazardous chemicals were leaking from the tanks, contaminating the ground.

What I do not understand, is why, hasn't this hazardous site been cleaned up, by now?

Wasn't there money, given to clean the toxic waste and, ground? Seems to me, some fat addagung

500318

or eyes are overlooking, what has happened.

Why was there an article written in the local paper, asking for some volunteers, to clean it up?

There have been guards on shifts, to keep people out of there.

Also, yellow, plastic ribbon around, saying it was dangerous.

It's not a safeway, to overcome this danger.

Many who worked in the plants were ill, and, many died from cancer.

A school had to close down.

Water was contaminated: Bottled water had to be brought in. Kids were sanguine, and, had diarrhea.

All these years, and the mess is still there. Why?

Doesn't your agency inspect? Talk to city officials? Fine them? When is it ever going to be cleaned up?

Can't that building come down? Can't the soil be taken away?

500319

What is the Environmental Agency, been doing all this time?

How much longer, is it going to take?

I'd hoped, that responsible, Caring officials, would have taken Care of the mess. It's their job, to keep the peoples environment, healthy and Clean, and, breathable.

I'd like an explanation of what has been going on? What will, and Can be done?

Who's responsible for it?

I should think Li Tungsten, built there! Manufactured there! Left a very dangerous, deposit! And told no one.

Why aren't they made liable to pay the cost of all the Contaminating waste that's there?

It's not fair for residents to suffer, because of someone's lack, of getting rid of this waste.

The mayor, should have gotten to that president, and discussed the

500320

dangerous, problems, his industry made.

Please let me know, what is going on, with this problem, as soon as possible.

It should have been cleaned up, years ago.

Is anything going to be done? Who's going to pay for it?

I lived in Glen Cove, many friends worked there. Died!

So, how much longer, will it be?

What can be done? Tell the people, the truth. They are entitled to know.

I hope a solution is found quickly. Time is running out!

Thank you.

Sincerely,
Harriet Flynn.

500321

THOMAS S. GULOTTA
COUNTY EXECUTIVE

KATHLEEN A. GAFFNEY, M.D., M.P.H.
COMMISSIONER

COUNTY OF NASSAU
DEPARTMENT OF HEALTH
240 OLD COUNTRY ROAD
MINEOLA, N.Y. 11501-4250

September 15, 1999

Edward Als, Project Manager
USEPA, Region II
Emergency and Remedial Response Division
Eastern New York Remedial Section
290 Broadway
New York, N.Y. 10007-1866

Re: Proposed Remedial Action Plan
Li Tungsten Site, Glen Cove, N.Y.

Dear Ed:

Based on a review of the above referenced plan, I am offering the following comments:

The mention of 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".

This is necessary for two reasons. The Nassau County Public Health Ordinance (NCPHO) already prohibits the potable use of groundwater in areas serviced by municipal water. In addition to NCPHO regulations, site related groundwater contaminants could be inadvertently spread to other uncontaminated media if controls were not in place to prohibit other potential uses of groundwater (e.g., irrigation, cooling, etc . . .).

If you have any questions regarding the above, please do not hesitate to contact me.

Very truly yours,

Joseph DeFranco
Bureau of Environmental Management

JD:sb
cc:William Gilday, NYSDOH
Jeff McCullough, NYSDEC
1867Q

500322

Jill Jessen

24 Garvies Point Road
Glen Cove, NY 11542
516-656-9100 ext 202 (work)
516-676-8522 (home)

September 14, 1999

Mr. Ed Als, Project Manager
US Environmental Protection Agency
Emergency and Remedial Response Division
290 Broadway , 20th Floor
New York, NY 10007-1866
212-637-4272 212-637-3966 (fax)

Re: Li Tungsten and Captains Cove
Dear Mr. Als:

As per our conversation this morning, I have tried to make you aware of my concern regarding the proposed plan of cleanup of the three sites, parcels A, B and C. I have made note that the document "Superfund Proposed Plan " of July 1999 which was distributed to the public makes no mention of two radioactive elements, Polonium 210 and Lead 210. In an earlier study, "Review of draft Feasibility Study Li Tungsten Superfund Site" (report # 48) dated January 22, 1999, prepared by Steven Amter and Benjamin Ross, it is stated that there is a possibility of the presence of these two contaminants. If Polonium 210 and Lead 210 are present, the proposed plan of cleanup, "Radioactive Waste Volume Reduction" would not be effective as they are not detectable in the same manner as the other radioactive materials. This would create the possible risk that these two "non-gamma emitters" would be left behind in the soil along with the arsenic. If the EPA is uncertain of the levels or presence of these contaminants, I feel it is unwise to make a decision on how to proceed in the cleanup process without consideration of how these substances must be handled. I request that we, (the public) are advised of the analyses done in relation to these substances, and if there is any uncertainty, evaluation must be completed before any plan of action is taken. 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.

I have also requested a copy of the map showing active and inactive wells on and near the sites, and question why this map was not included in the "Proposed Plan" distributed to the public at the meeting August 16th, 1999.

Please respond and resolve these requests and concerns before you make your final decision.

Thanking you for your attention to these matters, I look forward to hearing from you soon.

Sincerely,

CWR, Environmental Protection Products, Inc.
100 CARNEY STREET, GLEN COVE, NY 11542 * TEL.: (516) 674-2441 * FAX: (516) 674-3788
WEBSITE: www.cwrenviro.com * EMAIL: cwrenviro@worldnet.att.net

September 16, 1999

Mr. Ed Als, Project Manager
US Environmental Protection Agency
Emergency and Remedial Response Division
290 Broadway, 20th Floor
New York, NY 10007-1866

Dear Mr. Als:

After reviewing the Proposed Plan and RIFS, there are serious issues and flaws in the Plan that need to be addressed and resolved before the EPA completes its Record of Decision. The areas of concern involve the EPA's choice of options LS4 and CS4 rather than LS2 and CS2. The EPA has not evaluated nor offered the public a Risk Assessment of each option in regard to health impacts on the surrounding communities. Also, there are strong concerns raised that the entire clean-up process is unsafe in regard to controlling the migration of radioactive dust, and the possibility of "Fugitive Dust" creating catastrophic radiation illness and increased morbidity on the local population. Finally, the EPA needs to include a detailed monitoring, alert and evacuation plan in the event of radioactive fallout. Without addressing these safety issues, the plan is not acceptable to the community, and does not satisfy the criteria of Protection of Human Health and Environment.

Issue: The EPA must select the safest cleanup option, LS-2, rather than LS-4 for remedial cleanup of the Li Tungsten and Captain Cove sites.

The EPA must utilize maximum safety procedures and monitoring to prevent any offsite migration of radioactive dust called "Fugitive Dust." The highly hazardous nature of the radioactive waste requires the EPA to monitor and control dust migration to absolutely zero to protect the community from adverse health impacts associated with the remedial actions. The community cannot tolerate any migration of radioactive uranium, thorium, or radium fallout offsite that might be inhaled or ingested.

Since one incident of either inhalation or ingestion of radioactive uranium would cause cancer, there are no safe levels or any maximum allowable level for airborne uranium. Uranium and the radionuclides of uranium, thorium and radium present on the Li Tungsten site emit gamma, beta and alpha radiation. The biological effects of this type of radiation in the body, <u>even one exposure</u>, will cause mutations, and in pregnant women cause birth defects or death of a fetus. If this type of radioactivity enters the body, either through inhalation or ingestion, it can damage the bone marrow. If radioactive gammas or betas are deposited in the lung, it will increase lung cancers and cause thousands of premature deaths.

500324

Issue: The EPA needs to perform a Risk Assessment on options LS2 & 4, and CS2 & 4 before selecting the safest clean-up option.

Highly radioactive particles made up of fission products, and being small enough to become airborne, defy many of the dose models (RESRAD & RAGS) risk estimates in use by the health risk assessments physics community. Therefore, risk assessments can be skewed very low for inhalation as well as for ingestion. This hypothesis is also supported by experimental and epidemiological evidence from the examination of the radiation effects of particulate alpha-emitters deposited in the lung.

Option LS4 would generate additional dust that would become airborne and increase the danger to the community's health. Any excavation activities are going to generate dust, and all radioactive particles need to be contained onsite. If separation technology is utilized by the EPA to separate radioactive from non-radioactive dust, as proposed in option LS4, there would be additional radioactive dust generated that would increase the short and long term adverse risks and health impacts associated with the separation option.

Under Section 4.2.4.2, Heading Assessment Section Reduction of Toxicity, Mobility, or Volume of the RIFS, the EPA's consultants point out the risks, flaws, and dangers posed by using volume reduction technology. "The percentage of volume reduction that can be achieved is uncertain *until* testing can be performed during remedial design."

In the next section - Short Term Effectiveness, it states "Potential short term impacts are associated with this alternative (LS2 & 4) due to direct contact with the soil by workers and through the potential for the generation of dust during construction. It requires monitoring and control to protect the community and workers from the potential short-term adverse risks associated with the remedial actions."

"Potential risks to the community include exposure to dust and radionuclides emitted from excavation areas and stockpiled soils awaiting transportation." Also "a short term risk is associated with transportation of radioactive soils from the source location to the offsite facility." What procedures will the EPA incorporate into its clean-up plan to prevent trucks and other vehicles from tracking radioactive dirt throughout Glen Cove. The EPA needs to spell out the details of how they are going to prevent the spread of radioactivity by these vehicles.

The adverse health impacts resulting from dust migration are unacceptably high for option LS4 because it will involve increased generation of dust due to the handling and movement of the excavated dirt during the separation process. Furthermore, there is uncertainty that the separation technology is safe or effective and may not be any more cost effective. Therefore, option LS2 is more acceptable than option LS4.

Issue: Safety procedures to protect the community's health from radioactive dust outlined in the RIFS are not adequate or well defined. The EPA needs to include an entire temporary enclosure structure wherein all excavation activities should occur to minimize generation and prevent any off-site migration of radioactive dust.

The EPA must provide details of all safety control measures that will be utilized to prevent any migration of radioactive dust offsite including air monitoring procedures. Air monitoring is required to evaluate the effectiveness of safety procedures that are used to contain radioactive dust onsite. The community requests 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).

ERAMS should provide a means of measuring levels of radioactive pollutants on the site, around the site and at numerous monitoring stations around Glen Cove for the purpose of detecting any offsite migration of radioactive "Fugitive Dust." If any dust migrates offsite and is detected, the community should be immediately alerted. To protect the Glen Cove population from radioactive fallout, the EPA should provide radioactive accident assessment capability, and provide all possible measures that will assure the community that there will be no exposure of the population to radiation or radioactive dust.

The monitoring of the Li Tungsten superfund site is in keeping with the EPA's mission of ensuring public health and environmental quality.

Finally, we request a Risk Assessment Analysis of the proposed clean-up options coupled with a public education effort resulting in a better understanding of the risks associated with the various clean-up options. The clean-up of Li Tungsten must be performed in a manner that absolutely guarantees that there will never be any future adverse health impacts on the residents of Glen Cove or the surrounding communities. Therefore, the EPA's Final Record of Decision should (1) select options LS-2 and CS-2, (2) specify that all excavation operations must be performed inside a containment structure so that absolutely no "Fugitive Dust" migrates offsite, (3) include a comprehensive and detailed safety and monitoring plan, and (4) include a Risk Assessment of the proposed clean-up options before making a final decision on the clean-up methods.

I respectfully request that the EPA respond to and resolve the aforementioned issues and concerns before making a final decision on the clean-up option you are going to select for the Li Tungsten remediation in your Record of Decision. Finally, the safety of the people of Glen Cove and surrounding communities should be the highest priority, and not cost.

Sincerely,

Dr. Roy M. Speiser

RMS:cd

...AllWork\Dr. Speiser\Response to EPA-Letter

JOHN L. MACCARONE
Attorney at Law
48 Forest Avenue
Glen Cove, NY 11542

Tel: 516-674-6782 Fax: 516-671-0740

September 12, 1999

Mr. Edward Als
Project Manager
Eastern New York Remediation Section
United States EPA
290 Broadway
New York, New York 10007-1866

Re: Li Tungsten Superfund Site

Dear Mr. Als:

Please included these written commments on the Proposed Plan with my comments at the public hearing of August 16, 1999, concerning the remediation of the Li Tungsten Superfund Site. Having been involved in City Government from the time that the EPA became involved in the site I am happy to see that the process has gotten to this point. However I firmly believe that if we are going to clean this site up properly, the current proposed plan should be modified to reflect the choice of LS2/CS2 for the soil and LW-3 for the ground water. While these methods are more costly, the added cost when divided between those responsible is insignificant and will insure that the sites are fully cleaned up. In addition the surrounding areas will be impacted significantly less by using these proposed methods of remediation.

I would like to thank you for all your efforts on this project and I look forward to working with you and seeing it completed.

Very truly yours,

JOHN L. MACCARONE

500327

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Bernard L. Bermant
(1908-1995)

September 16, 1999

United States Environmental Protection Agency
290 Broadway, 20th Floor
New York, NY 10007

Attn: Mr. Ed Als
Regional Project Manager By Fax to 212-637-3966

Re: City of Glen Cove v. 10 Garvies Point Road Corp.

Dear Mr. Als:

We have reviewed the documents that were distributed at the meeting which the EPA held in August. We have also reviewed the documents released by the Army Corps of Engineers in connection with the dredging of the creek.

I presume that you have a copy of the creek dredging plans, and I assume that you have far more detail than appears on the annexed sheets made available by the Corps of Engineers.

However, the Army Corps of Engineers plans to use the area immediately adjacent to my client's for the purposes of placing the contaminated spoil from the dredging operation on two acres of the parcel "A" which the EPA plans to decontaminate.

We have further been advised that the total amount of material to be dredged from the canal is approximately 30,000 cubic yards of material. We understand that no dredging has taken place in the area of the creek abutting the Tungsten property or anywhere along the canal between the existing park and the marina because the Department of Environmental Conservation of New York State will not permit ocean disposal of the waste material because of its contaminated nature.

Accordingly, the only way that the area can be completely cleaned up is if there is a coordination between the Corps of Engineers, the EPA, and the New York State DEC in remedying the situation. The dredging, de-watering of the spoil material, and hauling of the de-watered material must be considered, as it involves not only the upland which the EPA is concerned, but also with the canal that is under the jurisdiction of the Corps of Engineers and also the DEC.

Moreover, DEC apparently considers the spoil material from the canal dredging to be contaminated, but we do not know the nature of the contamination. Please advise if EPA has any studies as to the nature of the materials beneath Glen Cove creek, and how the proposed dredging will affect your efforts ro remove radioactive waste on the spoil area.

We understand that the current regulations require that the host municipality cooperate by taking some of the spoilage from the dredging operation. We understand that that is why the City of Glen Cove has agreed to permit the use of its two acre parcel land adjacent to my client's property for the purposes of de-watering the contaminated canal material.

The situation is compounded by the fact that the two acre site is insufficient to maintain a de-watering operation for 30,000 cubic yards of contaminated fill. We understand that the use of the two acre site would require a series of dredging operations followed by 18 months to two years hiatuses while the dredged material is de-watered and is then physically removed from the former Tungsten site.

As a result, the City is nowhere near the point of converting this brown fields area into a park. The canal dredging and de-watering operation, as outlined by the Corps, will take at least five to six years, and must be coordinated with the EPA so that the area cleaned up by the EPA is not recontaminated by the Corps. DEC has not as yet approved anything concerning the dredging, and I do not know if the city has considered the problem. However, It does not appear to me that the problems outlined in this letter have been presented to the EPA. They are not considered in its report.

For the protection of my client's rights, not to mention the health, safety, and welfare of the community, I respectfully submit that it is essential that the City, the EPA, the DEC, and the Corps of Engineers coordinate their efforts so that your time estimates may be revised in light of whatever the ultimate agreements are among the DEC, the Corps, the City, and the EPA, all with the view to properly informing and protecting the people of Glen Cove.

Please advise.

With appreciation for your continuing courtesy and cooperation,

Very truly yours,

Jon N. Santemma

JNS/jd

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Public Notice

US Army Corps
of Engineers
New York District
26 Federal Plaza
New York, N.Y. 10278
ATTN: CENANOP-ST

In replying refer to:
Public Notice No. GLEN COVE - 1999
Published: JULY 7 Expires: AUGUST 6, 1999

GLEN COVE CREEK, NEW YORK
FEDERAL NAVIGATION PROJECT
MAINTENANCE DREDGING

To Whom It May Concern:

Pursuant to Section 404 (33 U.S.C. 1344) of the Federal Water Pollution Control Act (amended in 1977 and commonly referred to as the Clean Water Act), notice is hereby given that the U.S. Army Engineer District, New York proposes to perform maintenance dredging in Glen Cove Creek, New York. It is anticipated that approximately 35,000 cubic yards of sediment will be dredged and placed on an upland temporary storage area, which will be removed later for beneficial use, if feasible, and/or final disposal at an approved upland disposal site.

FEDERAL PROJECT AUTHORIZATION:

The Glen Cove Creek Federal Navigation Project was authorized by the Rivers and Harbors Act of 3 March 1925.

FEDERAL PROJECT DESCRIPTION:

The existing navigation project authorized a channel 8 feet deep and 100 feet wide, from deep water in Hempstead Harbor to the head of navigation at the city of Glen Cove. The total length of the project is approximately 1.0 mile. The constructed project provided a channel 100 feet in width from deep water in Hempstead Harbor for a distance of 3,470 feet thence gradually decreasing to 50 feet in width for a distance of 180 feet, and 50 feet in width for a distance of about 1450 feet to the head of the improvement.

DESCRIPTION OF PLANNED ACTION:

The U. S. Army Engineer District, New York proposes to perform maintenance dredging, as required, of the Glen Cove Creek from mile 0.3 to 1.0. Approximately 35,000 cubic yards of material will be dredged by hydraulic dredge or similar plant. The outer portion (mile 0.0 to 0.3) of the creek was dredged in 1996 with the removal of approximately 12,000 cubic yards of sediment.

The proposed maintenance dredging will restore project depth and provide safe navigation for barges and other vessels.

ENVIRONMENTAL IMPACT STATEMENT:

An Environmental Assessment (EA) was prepared by the New York District in 1996 which updated an Environmental Assessment prepared in June 1977, for maintenance dredging in Glen Cove Creek Federal Navigation Channel. It has been determined that maintenance dredging in Glen Cove Creek

with placement of the dredged material on the upland will have no significant adverse environmental impacts on water quality, marine resources, wildlife, recreation, aesthetics and flood protection. An update of the 1996 Environmental Assessment and a 404(b) evaluation as required by the Clean Water Act 40 CFR 230 will be prepared prior to the implementation of the proposed work.

TEMPORARY STORAGE SITE:

The dredged material will be transported by pipeline and placed at the former Li Tungsten site for de-watering and temporary storage. After de-watering (usually 12 to 18 months), the dredged material would be removed from the site by the City of Glen Cove and put to beneficial use, if feasible. If not, the dredged material would be transported to an approved upland disposal site by the City of Glen Cove. The New York District will be working closely with the United States Environmental Protection Agency (USEPA) and New York State Department of Environmental Conservation (NYSDEC) in the design and management of the temporary storage site in order to minimize impacts to the environment.

GRAIN SIZE ANALYSIS:

The general characteristics of the sediment based on averaging of 6 surface samples are 53% sand, 21% silt, 21% clay and 5% coarse material.

ALTERNATIVES TO THE PROPOSED ACTION:

Dredging The only alternative to dredging is the no dredge alternative. Continued shoaling of the existing channel has resulted in reduction in the carrying capacity of the scows/barges and consequent lost of accessibility to those activities which depend upon water transportation. The safety of the boaters, water front properties and the environment may be at risk. This would hamper the regional revitalization program.

Placement Options The New York District has evaluated the practicability of potential disposal alternatives in a report entitled "Dredged Material Disposal within the New York District." The alternatives considered include land disposal, use as sanitary landfill cover, disposal in subaqueous borrow pits (and possible capping with clean material), creation of islands and/or wetlands, disposal on beaches or wetlands, placement in deep mines, and incineration. At the present time, the placement of the dredged material for this project is being considered for temporary storage at the former Li Tungsten site. After de-watering, the material will be removed from the site and put to beneficial use, and/or disposal at an approved upland disposal site.

COORDINATION:

The proposed work is being coordinated with the following Federal, State and Local agencies:

U.S. Department of Environmental Protection
U.S. Department of Commerce, National Marine Fisheries Service
U.S. Department of the Interior, Fish and Wildlife Service

U.S. Coast Guard, Third Coast Guard District
New York State, Department of Environmental Conservation
New York State, Department of State

Pursuant to Section 7 of the Endangered Species Act (16 U.S.C. 1531) and based on review of the latest published version of the threatened or endangered species listing, a preliminary determination is that the activity under consideration will not affect those species listed or their critical habitat.

Based on a review of the latest published version of the National Register of Historic Places, there are no known sites eligible for or included in the Register within the surrounding area.

Reviews of activities pursuant to section 404 of the Clean Water Act will include application of the guidelines promulgated by the Administrator, U.S. Environmental Protection Agency, under authority of section 404(b) of the Clean Water Act. A water quality certificate or waiver from New York State Department of Environmental Conservation will be obtained in accordance with section 401 of the Clean Water Act prior to authorization of the proposed action.

Pursuant to section 307(c) of the Coastal Zone Management Act of 1972 as amended (16 U.S.C.1456(c)), for activities under consideration that are located within the coastal zone of a state which has a federally approved coastal zone management program, application has been made to the New York State Department of State for certification that the proposed action will be conducted in a manner that is consistent with the approved State coastal zone management program.

Any comments or criticisms regarding the proposed work should be prepared in writing and mailed to reach this office prior to the expiration date of this public notice; otherwise it will be presumed that there are no objections.

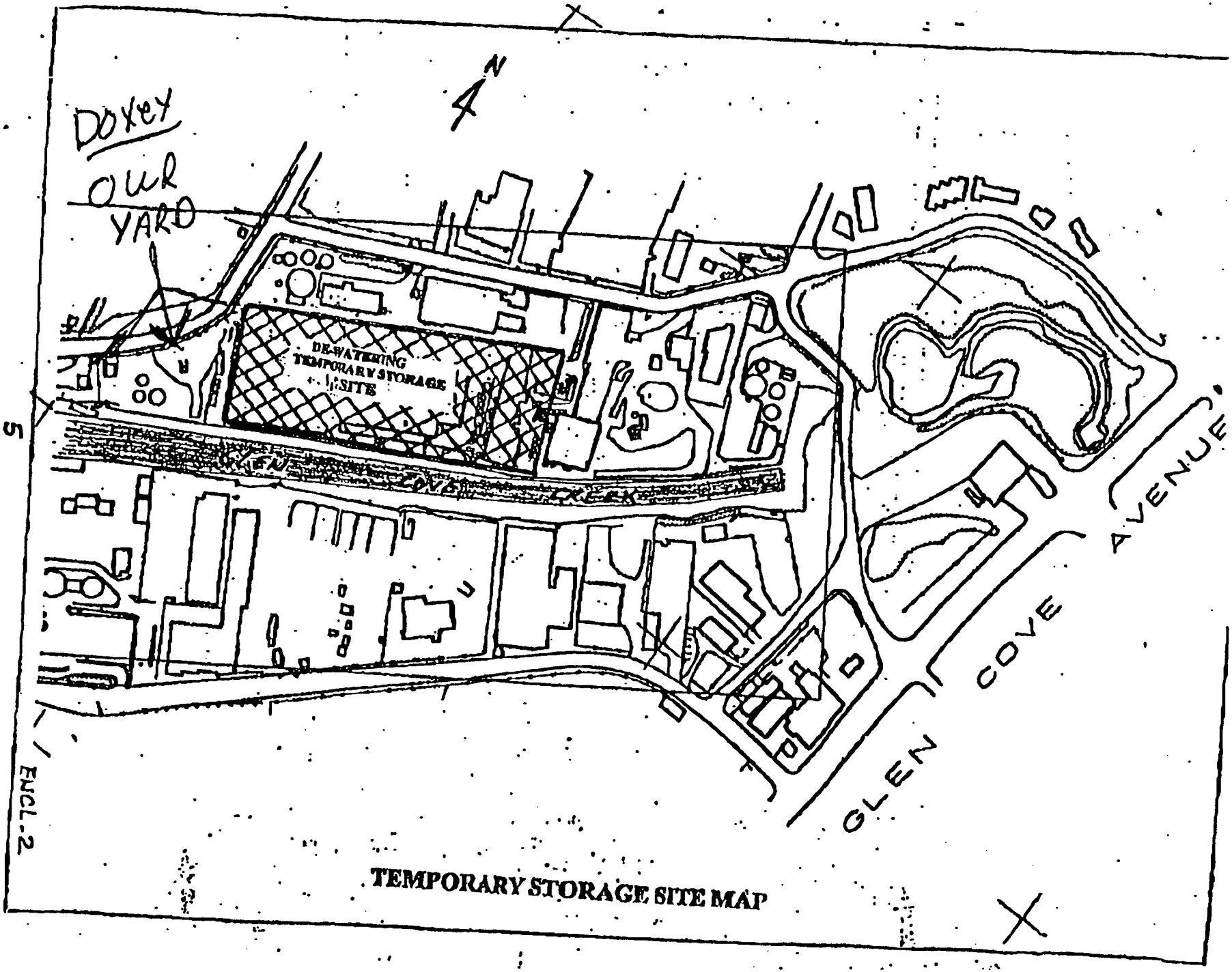
Any person may request, in writing, within the comment period specified in this notice, that a public hearing be held to consider the proposed project. Requests for a public hearing shall state, with particularity, the reasons for holding a public hearing.

It is requested that you communicate the foregoing information concerning the proposed work to any persons known by you to be interested and who did not receive a copy of this notice.

If you have any questions concerning this application you may contact Mr. Soon Lew of this office, at (212) 264-0199.

John R. Hartmann
Chief, Operations Division

Enclosures
Dredging map
Temporary Storage Site Map



TEMPORARY STORAGE SITE MAP

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September 17, 1999

VIA FEDERAL EXPRESS
AND E-MAIL

Mr. Edward Als, Project Manager
Eastern New York Remediation Section
Emergency and Remedial Response Division
U.S. Environmental Protection Agency
290 Broadway
New York, NY 10007-1866

Re: Li Tungsten Superfund Site
Comments On Proposed Plan

Dear Ed:

The attached comments on the Proposed Plan for the Li Tungsten Superfund site and the Captain's Cove adjunct site are being submitted on behalf of Teledyne, Inc. ("Teledyne"). These comments were prepared with assistance from Dames & Moore, an environmental consulting firm with considerable expertise and experience with remediating sites contaminated with hazardous and radioactive substances. Specific individuals involved in reviewing and commenting on the Proposed Plan and supporting documentation are:

Vern Rogers, Ph.D., P.E., C.H.P.
Robert Berlin, Dr. P.H., P.E.
William P. Duggan, Ph.D., P.E., C.H.P.
Rob Shuman, M.S.

Resumes of these individuals are also included as Attachment 2.

Teledyne retained these experts to provide EPA with comments that are technically sound and consistent with remediation approaches utilized at other Superfund sites as well as sites regulated by the Department of Energy, the Nuclear Regulatory Commission and

state agencies. We hope that EPA will give these comments due consideration when preparing its Record of Decision for the Li Tungsten site.

Very truly yours,

John Pleyblat for

John E. Beard III

JPE:dmz

Attachments

cc (w/att.): J. Tishok
L. McAndrews

ATTACHMENT 1

Teledyne, Inc.'s Comments
on the
Li Tungsten Superfund Site Proposed Plan

1. Remedial Alternatives Involving Onsite Containment Of Radioactive Materials Were Improperly Eliminated From Consideration In The Proposed Plan And Its Supporting Studies

Without any evaluation, the Proposed Plan rejects from consideration any remedial alternative involving onsite containment of radioactive materials. It explains that such alternatives are: (1) not protective, and (2) prohibited by the Long Island Landfill Law, ECL § 27-0704. These explanations are without foundation. Moreover, not evaluating these alternatives is improper because it ignores the statutory mandate that remedial actions be cost-effective and the statutory preference for onsite remedies that significantly reduce the volume, toxicity or mobility of the hazardous substances.

A. Remedial Alternatives Involving Onsite Containment Of Radioactive Materials Are Protective

Proven technology exists to stabilize and/or contain radioactive wastes on-site in a manner that is protective of future generations, yet without any evaluation the Proposed Plan rejects such alternatives as unprotective. The Proposed Plan provides the following explanation why onsite containment of radioactive materials are not protective.

> 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 to protect future generations, were considered not protective.

Proposed Plan at 12.

The conclusion that onsite containment of radioactive material is not protective is contradicted by the fact that EPA has determined that onsite containment is protective at similar Superfund sites. For example, the ROD prepared by EPA Region 8 for the Denver Radium Site Operable Unit VIII selects and supports a remedy involving on-site stabilization of the waste (soil) in cement with the emplacement of a cap over the stabilized monolith.[1] The waste material at the Denver Radium site was generated from the processing of ores and ore concentrates which produced a waste containing radionuclides and non-radioactive constituents similar to those at the Li Tungsten site. The site is also in a mixed industrial and residential area of Denver. EPA Region 8 evaluated similar off-site disposal alternatives as are being considered for the Li Tungsten and Captain's Cove sites, but determined that the on-site stabilization/containment alternative was the preferred remedy and that it was "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." EPA Region 2 should consider the Denver Radium site and other precedents for on-site containment of comparable wastes in similar settings as a basis for at least evaluating alternatives involving on-site containment of some or all of the radioactive Li Tungsten wastes.

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[1] USEPA Region 8/Colorado Department of Health, "Record of Decision-Denver Radium Site Operable Unit No. VIII, Denver, Colorado, January 28, 1992.

The contention that the sole source aquifer designation for Long Island is a basis for not considering on-site containment of radioactive wastes is also meritless. The sole source aquifer designation does not preclude onsite containment of any waste materials, it only precludes federal financial assistance for projects which EPA determines may contaminate the aquifer. Safe Drinking Water Act § 1424(e). Moreover, the sole source aquifer provisions are not identified as ARARs in either the Proposed Plan or its supporting studies, and even if they were, it would still not justify eliminating onsite containment alternatives without evaluation.[2]

The Proposed Plan also explains that onsite containment of radioactive materials was not evaluated because the Long Island Landfill Law, ECL § 27-0704, prohibits siting of new landfills or expansion of existing landfills in Nassau and Suffolk Counties. This law does not preclude onsite containment of materials at CERCLA sites and is not sufficient reason to reject onsite containment of radioactive materials for the following reasons.

- First, the Landfill Law was not identified as an ARAR in the Proposed Plan, the FS, the FFS or the draft FS. If the Landfill Law is not an ARAR, then it should not be used to reject alternatives.
- Second, the Landfill Law does not apply to CERCLA remedial actions. The use of the Li Tungsten 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. Furthermore, if the Landfill Law prohibited on-site containment of radioactive waste,

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[2] See CERCLA Compliance With Other Laws Manual, EPA/540/G-89/006, August, 1988 at pp. 4-16. "As a general matter CERCLA activities would not in and of themselves increase preexisting contamination of sole source aquifers. Therefore, it is unlikely that CERCLA activities would be subject to restrictions on [f]ederal financial assistance."

by the same rationale it would prohibit the on-site containment of hazardous waste and other wastes--an option that was evaluated for the Li Tungsten site. Indeed, onsite containment of certain solid wastes is the option selected by NYSDEC for the remediation of nonradioactive materials at the Captain's Cove site.

- Finally, even if the Landfill Law was applicable, it does not absolutely prohibit onsite containment, as the law contains several exemptions which might apply to onsite containment options.

B. Rejecting Onsite Containment of Radioactive Materials Without Evaluation Was Improper Because It Ignores CERCLA's Statutory Mandate that EPA Select Cost Effective Remedial Alternatives

CERCLA requires EPA to select a remedial action that is protective of human health and the environment, that is cost effective and that utilizes permanent solutions or alternative treatment technologies to the maximum extent practicable. CERCLA § 121(b)(1). The Proposed Plan ignores this mandate by rejecting without any evaluation those alternatives involving onsite containment of radioactivity. EPA has determined that such alternatives are protective at other Superfund sites having similar contamination as the Li Tungsten site, and where these alternatives were found to be protective, they were also cost effective (e.g., Denver Radium, OU VIII).

The Li Tungsten Proposed Plan does not evaluate the protectiveness of remedial alternatives involving onsite containment of radioactive materials but simply declares them unprotective and rejects them from further consideration. The Proposed Plan does, however, evaluate protectiveness for onsite containment of metal contaminants and concludes that alternatives LS-3 and CS-3 would achieve protectiveness from the metals contaminants by stabilizing and containing them onsite, thereby reducing or eliminating various exposure pathways and potential for cross-media impacts to groundwater. Proposed Plan at 17. The Proposed Plan

ignores the fact that, like other metal contaminants, onsite stabilization and containment of radioactive materials can be done using existing technologies that have been proven to be effective for reducing the mobility of the radioactive constituents and reducing or eliminating exposure pathways and potential cross-media impacts. Furthermore, onsite stabilization and containment can be done at far less cost and with greater cost certainty because these methods are not as cost-sensitive to volumes of material as alternatives involving offsite transportation and disposal.

Thus, the Proposed Plan fails to evaluate remedial alternatives that can be equally protective to human health and the environment as the alternatives that were evaluated and at a much lower cost.

C. Rejecting Onsite Containment of Radioactive Materials Without Evaluation Was Improper Because It Ignores CERCLA's Statutory Preference for Onsite Treatment Alternatives

The section of CERCLA that establishes cleanup standards also expresses a preference for remedial actions involving onsite treatment of hazardous substances. The statute states

> Remedial actions in which treatment which permanently and significantly reduces the volume, toxicity or mobility of the hazardous substances, pollutants, and contaminants is a principal element, are to be preferred over remedial actions not involving such treatment. The offsite transport and disposal of hazardous substances or contaminated materials without such treatment should be the least favored alternative remedial action where practicable treatment technologies are available.

CERCLA § 121(b)(1).

The preferred alternative involves excavation and removal of impacted soils and does nothing to reduce the toxicity or mobility of these materials, and in fact will increase the volume of materials to be handled. The preferred alternative does include using a segmented gate system or other technology to separate radioactive soils from nonradioactive soils, but the Proposed Plan acknowledges that this is not treatment (Proposed Plan at 17) and the effectiveness of this approach is highly variable and dependent upon the materials to be processed. Furthermore, these methods have not been tested using the Li Tungsten and Captain's Cove materials, so the assumed volume reductions may not be realized and the cost effectiveness of this alternative may not be achieved.

Conversely, EPA has determined at sites similar to the Li Tungsten and Captain's Cove sites that a remedy involving onsite stabilization and containment of radioactive materials utilized permanent solutions and alternative treatment technologies to the maximum extent practicable and it satisfied the statutory preference for remedies that employ treatment to reduce toxicity, mobility or volume, as a principal element.[3]

2. The Radiological Clean-up Levels Established for the Site Are Unduly Conservative

The Proposed Plan uses site wide radiological clean-up standards of 5 pCi/g for thorium-232 and radium-226. According to the FS, these standards are based on the clean-up standards promulgated by EPA for clean-up of uranium mill tailings sites pursuant to the Uranium Mill

[3] See: Denver Radium ROD for OU-VIII.

Tailings Radiation Control Act ("UMTRCA"). FS at Table 2-8. These standards are unduly conservative for the following reasons.

A. The Proposed Plan Inexplicably Ignores The Higher Clean-up Standard For Soils At Depths Below 15 cm.

The UMTRCA standards are promulgated at 40 CFR 192 and include both the 5 pCi/g standard, which is the concentration averaged over the first 15 cm. of soil, and a 15 pCi/g standard which is averaged over 15 cm. thick layers of soil more than 15 cm. below the surface. The FS states that since the Li Tungsten residues are similar to uranium mill tailings, the 5 pCi/g and 15 pCi/g radium standards are appropriate and relevant for use at the Li Tungsten site. FS at p. 2-9. The Proposed Plan, however, only uses the 5 pCi/g standard and does not explain why the 15 pCi/g standard was not used. The 15 pCi/g standard would reduce clean-up costs by reducing the analytical costs associated with measuring contamination at lower concentrations and would possibly reduce the amount of soil that would require remediation.

B. The Clean Up Standard Is Unduly Conservative for the Projected Future Use of the Site

In addition to the UMTRCA cleanup standards, EPA also uses a dose-based clean-up standard of 15 mrem/yr. effective dose equivalent ("EDE"). This dose equates to a 3×10^{-4} increased life time risk, which is consistent with levels considered protective in other governmental actions and other EPA radiation control programs.[4] The UMTRCA standards are

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[4] OSWER Directive 9200.4-18 Establishment of Clean up Levels For CERCLA Sites with Radioactive Contamination. USEPA 1999.

based on future residential use of the site, whereas the 15 mrem/yr. EDE standard factors in other land use scenarios.

EPA compared the 15 mrem/yr. EDE standard to the UMTRCA standards and concluded:

> [A]nalysis indicates that the cleanup of the UMTRCA site is consistent with the minimally acceptable dose limit of 15 mrem/yr EDE <u>under a residential exposure scenario</u> for radium-226, radium-228, and thorium-232, and is much more stringent for thorium-230. <u>For land uses other than residential (e.g., commercial/industrial, recreational) the UMTRCA cleanup standards are more stringent for all four radionuclides</u>.

OSWER Directive 9200.4-18 at Attachment B, p. 5. (emphasis added).

The Proposed Plan indicates that the Li Tungsten and Captain's Cove sites are part of a Brownfields demonstration program and that future site use will be commercial. Proposed Plan at 5, 8. Thus, EPA itself has concluded that the UMTRCA cleanup standards (5/15 pCi/g) are more stringent than the 15 mrem/yr. EDE standard for residential land use scenarios and are more stringent yet for commercial scenarios such as those anticipated for the remediated Li Tungsten and Captain's Cove sites. Add to this the increased conservatism caused by dropping the 15 pCi/g standard for soils below 15 cm., and the only conclusions possible are that the proposed cleanup standard: (1) is entirely too conservative and goes beyond what is required under CERCLA; and (2) will result in a more costly cleanup than is required to meet CERCLA's post-remediation risk levels.

C. The Proposed Clean-up Standard Is Too Conservative in Light of Naturally Occurring Radiation on Long Island

The Proposed Plan cleanup standards of 5 pCi/g for radium-226 and thorium-232 are significantly lower than levels of naturally occurring radioactivity on Long Island. For example, black sands collected from 18 different beaches on Long Island contain thorium in concentrations ranging from 30-1500 ppm (6.6-330 pCi/g) and uranium ranging from 5 to 50 ppm (3.6-355 pCi/g); and granite rocks found along the Ronkonkoma and Harbor Hill ridges running east-west across the middle of Long Island contain an average 94 ppm thorium (21 pCi/g) and 11 ppm uranium (8 pCi/g).[5] The expense for removing soils containing radioactivity greater than 5 pCi/g from the Li Tungsten and Captain's Cove sites cannot be justified when individuals need only drive a few miles to be exposed to significantly higher levels of these same naturally occurring radionuclides.

3. The Alternatives Set Forth In The Proposed Plan Incorrectly Presume That All Radioactive Materials Must Be Disposed Of At A Licensed Radiological Disposal Facility

Based on the radionuclides of concern at the Li Tungsten and Captain's Cove sites and their presumed origin, the material is properly classified as Naturally Occurring Radioactive Material ("NORM"). The concentrations are below the standards for licensing as Source Material (10 CFR 40) and are not regulated under the Atomic Energy Act. It is therefore possible, and plausible, that all or most of this material would be acceptable for disposal at a RCRA Subtitle D landfill. Recent experience has shown that it is feasible to obtain clearance to dispose of soils with above background but low radioactivity levels of NORM in Subtitle D landfills.

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[5] New York Times, April 2, 1989 "Radioactive Sand Is Detected In Abundance."

In practice, significant cost savings can be achieved by removal and disposal of radioactive "hot spots" at a radioactive waste disposal facility, with the lower activity soils being disposed of at certain Subtitle D facilities. Actual disposal costs at a Subtitle D landfill in the region were $30 per ton in the last year, a figure that is well below the $78.89 value used in the FS and which compares very favorably to the $166/yd^3 value for disposal of low-level radioactive waste. This alternative should be considered for the ROD.

4. Neither The Proposed Plan Nor Its Supporting Documents Provide Sufficient Information To Link All Of The Radioactive Contamination At The Captain's Cove Site To The Li Tungsten Site

A. There Is Insufficient Information to Link the Radioactivity at the Captain's Cove Site to the Li Tungsten Site

The Proposed Plan indicates that EPA 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 waste profile matched that at the Li Tungsten Facility. Proposed Plan at 4. However, the presence of the uranium and thorium series nuclides at the range of concentrations measured in the limited subsurface sampling at the Captain's Cove site, together with some of the other inorganic constituents typically present in the Li Tungsten ore concentrates do not constitute a definitive basis for relating the material to the Li Tungsten site. The same constituents are present in other metal ores and their tailings, and while "some inorganics in the soil are similar to accessory metals found in Tungsten ore" (Draft FS at p. 6-2), others are not representative of tungsten ore (e.g., iron found in elevated concentrations in some samples). Moreover, the 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.

B. The Proposed Plan and Its Supporting Documents Do Not Evaluate Other Potential Sources of Radiological Contamination at the Captain's Cove Site

It is important to know what industrial wastes (other than from the Li Tungsten facility) were emplaced at the Captain's Cove site since waste streams from these other operations could readily contain organic and inorganic constituents (including radionuclides) similar in content and concentration to these from the Li Tungsten facility. The Proposed Plan and its supporting documents all indicate that the Captain's Cove site contains incinerator ash, sewage sludge (and/or wastewater treatment sludge), dredged sediments, and industrial wastes. Examination of the drilling logs contained in the FFS also reveals the presence of regions containing asphalt, clay, and glass fragments. All of these waste streams potentially are sources of hazardous and/or radioactive constituents. Sewage and wastewater treatment sludges, ash (particularly wastewater sludge incinerator and coal ash), and dredged sediments are recognized sources of elevated levels of radionuclides and other inorganic constituents in landfills. NORM is present in these waste streams and may be concentrated (technologically enhanced) to increase the levels of uranium, thorium, and radium. The following are representative concentrations of NORM radionuclides present in wastes identified at the Captain's Cove site:

Wastewater Treatment sludge - A national study of sludge from wastewater treatment plants indicates that U-238 concentrations in such wastes range from 0.3 to 2.1 pCi/g, and Th-232 concentrations varies from 0.3 to 1.4

pCi/g. Incinerator ash produced from the sludge would further increase the U-238 and Th-232 concentrations as a function of the volume reduction factor.[6]

Coal ash (as a likely component of incinerator ash or other industrial waste) - Representative concentrations of 3.30 pCi/g for U-238, 2.30 pCi/g for Th-230, 3.70 pCi/g for Ra-226, and 2.10 pCi/g for Th-232 have been reported for coal ash.[7]

Bricks and clay - Results of a number of studies have shown Ra-226 concentrations to vary from 1.4 to 2.6 pCi/g and Th-232 concentrations to vary from 1.0 to 3.4 pCi/g.[8]

Fertilizers - While not specifically identified at the Captain's Cove site, landfills will typically contain phosphate fertilizers. Representative concentrations in phosphate fertilizer have been reported as 20.1 pCi/g U-238, 21.3 pCi/g Ra-226, 18.0 pCi/g th-230, and 0.6 pCi/g th-232.[9]

Dredge Spoils - As described in comment 2.C. above, there are naturally occurring sand and rock deposits on Long Island that have significant concentrations of NORM. Such materials may be present in the dredge spoils that were deposited on the Captain's Cove site at various times from 1933 to 1965.

In addition, ingrowth of the daughter products of U-238 and Th-232 (e.g., Ra 226 and 228) in these wastes would result in further increases in concentrations of these nuclides since the time of emplacement of the waste in the landfill.

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[6] Forr, Keith, et al. "Multi-element and Chlorinated Hydrocarbon Analysis of Municipal Sewage Sludges of American Cities," Environment Science and Technology, Volume 10, Number 7, June, 1976.

[7] USEPA, Office of Radiation Programs, "Diffuse NORM Wastes - Waste Characterization Risk Assessment, May, 1991.

[8] United Nations Scientific Committee on the Effects of Atomic Radiation "Sources and Effects of Ionizing Radiation," 1977.

[9] Guimond, R.J. and Mills, W. A. of USEPA Office of Radiation Programs "The Development of Radiation Protection Guidelines for Phosphate Related Lands," 1978.

The cumulative effect of the presence of the elevated radioactivity in these NORM wastes and from the undescribed "industrial wastes" would be to increase the concentration of the radionuclides to well above background, with the potential for exceeding the 5 pCi/g cleanup level being used for the thorium and uranium series. While the cumulative radioactivity from the NORM wastes would obviously not account for the localized high concentrations found in subsurface samples in areas A & G at Captain's Cove, it could account for the majority of measurements at or slightly above the 5pCi/g level.

5. Site Characterization Data Are Insufficient To Accurately Estimate Waste Volumes And Remediation Costs And Skew The Comparison Of Alternatives

A. The Characterization Data Are Insufficient to Estimate Waste Volumes

The field investigations conducted at the Li Tungsten and Captain's Cove sites (surveys, borings, wells) may be sufficient to identify the existence of elevated levels of hazardous and radioactive materials in surface and subsurface soils, but the available data are not sufficient to accurately assess the volumes of soil in each parcel requiring remediation.

For example, at the Li Tungsten site, the Proposed Plan states "The highest concentrations of U-238 (470 pCi/g) and Ra-226 (250 pCi/g) were found on the upper portion of Parcel C, while Th-232 was found at 220 pCi/g in the middle of Parcel C." Proposed Plan at 6. It is not clear from examination of the data in the FS whether the quoted concentrations are single hot spots or representative of a pattern of concentrations at these levels. The FS (Section 1.2.1.3) primarily focuses on radionuclide concentrations in the range of 1.5 to 6.0 times background levels with

only a single mention (as above) of concentrations exceeding these values, the implication being that it is a hot spot. If this is the case, selective removal of the hot spots would be justified, without removal of material that is only slightly elevated above background (1.5 x background is hardly a basis for considering the concentrations to be elevated).

At the Captain's Cove site, section 1.2.2.3 of the FS states "The NYSDEC surface radiological survey identified two principal areas with elevated surface exposure sites (Area A & Area G) and several smaller areas (Areas, B, C, D, E and F)." The surface survey would not have detected radioactivity at depths below the upper soil layer, certainly not at the concentrations at or below the 5pCi/g cleanup level. Nor would the limited amount of subsurface soil investigation conducted during Phases I & II fully characterize the radiological contents of the site.

B. Inaccurate Waste Volumes Preclude Accurate Cost Estimates and Skew the Analysis of Alternatives

The capital costs developed for the remedial alternatives are based on estimated volumes of contaminated soil requiring remediation which were approximated from the concentrations measured during the surface and subsurface investigations. The concentration data are limited and do not provide sufficient data points to accurately project contaminated soil volumes for either the Li Tungsten or Captain's Cove sites. Experience has shown at other sites that the reliance on this type of limited data base has resulted in highly inaccurate estimates of contaminated soil volumes.

Since the projected capital costs for each alternative are primarily dependent on these volume estimates, their accuracy is in question, as is the evaluation of cost-effectiveness for each alternative evaluated. 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, similar alternatives (i.e., excavation, no segregation, and offsite disposal) were estimated to cost $70,211,000 in the Draft FS but only $32,219,000 in the Final FS.[10] With costs so dependent on volumes, any underestimation of volume would make those alternatives involving offsite disposal appear to be more cost effective than might be reasonably achievable in the actual remediation. Because the volume of contaminated material may be significantly underestimated, the evaluation of alternatives is skewed in favor of the preferred alternative and other offsite disposal alternatives.

6. The Risk Assessment Overestimates The Risks Posed By The Sites And Does Not Support The Analysis Of Alternatives

A. The Baseline Risk Assessment Overestimates the Risks Posed by the Unremediated Sites

The Baseline Risk Assessment overestimates the risks posed by the unremediated sites in three ways. These are: (1) failing to distinguish the incremental risk posed by the sites from background; (2) using biased sampling to estimate potential sources of exposure; and (3) evaluating a groundwater pathway where none exists.

[10] The description of alternatives changed between the Draft FS and the Final FS. The only alternative involving excavation and offsite disposal of contaminated soils that remained comparable between the two versions was LS-2 and CS-2.

Separating Background from Site Related Risks

The cancer risk from radionuclides for future Captain's Cove site workers in Area A is stated to be 2.5×10^{-4}, and for Area G to be 1.1×10^{-4}. Proposed Plan at 11. In the FS these values correspond to the gross risks calculated for the individual, which include the background risk. When the risk associated with background radioactivity is removed, the Site Worker's incremental risk in Area A is 1.7×10^{-4}, and in Area G it is 3.2×10^{-5}. For Area G, this is within the stated acceptable range, and is only slightly above the "acceptable" level for Area A.

Biased Sampling

In calculating the baseline risks, among the numerous assumptions made was the use of biased soil sample location where elevated (maximum) concentrations of contaminants occurred. It is explained that "the values calculated on those data sets are a conservative estimate of the RME." Proposed Plan at 9. These risk values are overly conservative since they presume individual exposure to only those maximal concentration regions and result in unrealistic assessments of risk for both chemical and radiological risks.

For example, in the chemical risk assessment, the maximum concentration of arsenic in each medium was used in all of the assessments. The rational given is that either there were fewer than ten samples obtained for the medium or that the concentrations did not follow a normal distribution. For reasonable exposure scenarios, the population at risk would be moving around the contaminated area to a degree, so that it would be highly unlikely that they would be

chronically exposed to the maximum concentration of arsenic. The differences between the risks from the maximum concentration and the mean concentration are about a factor of four, small enough not to affect the choice among the evaluated alternatives. However, other plausible alternatives have not been considered where such differences may be significant. While the guidance for performing CERCLA risk assessment directs the use of a 95 percent upper confidence limit ("UCL") for the concentration, not the mean concentration, the use of biased sampling distorts the distribution and artificially raises the calculated 95% UCL.

In the radiological risk assessment, the baseline risk assessment used the maximum measured radionuclide concentrations as the basis for estimating intake for surface soils. The potential that the use of maximum concentrations has for significantly overstating risk may be estimated using the ratio of maximum concentrations to their respective arithmetic means. For example, at the Captain's Cove site, Area A, the ratios of the maximum and mean radionuclide concentrations in "surface soils" range from 2.0 to 2.8. The risks attributed to radionuclides in "surface soils" are estimated for the trespasser and a site worker. The risks projected for the trespasser are concluded to fall within the acceptable risk range, so the use of maximum concentration data will not affect the conclusions of the risk assessment for this receptor. However, the projected risk for the site worker (1.7×10^{-4}) slightly exceeds the 10^{-4} to 10^{-6} risk range, and is dominated by external radiation from Ra-226. The ratio of maximum to mean soil concentration for Ra-226 is 2.8. Therefore, the use of the maximum measured concentration could overestimate risk from this radionuclide by almost three times the risk from mean-value concentrations.

For Area G, the risk assessment for "all soils" used maximum concentrations for five out of eight radionuclides. The maximum concentrations of U-234 and U-238 in "all soil" at Area G are 8.2 times the arithmetic means, while ratios of maximum to mean concentrations for Ra-226, Th-230, and Pb-210 are about 3.9. Concentrations of the other radionuclides included in the exposure assessment were based on 95% UCLs. The risk projected for the construction worker at Area G, based on exposures to "all soils," slightly exceeds the acceptable risk range. The radionuclide making the greatest contribution to the projected risk is Ra-226. Using the maximum concentration instead of the mean overestimates the risk from this radionuclide by about four times. Making this adjustment would lower the risk so it would fall within the acceptable risk range for the construction worker.

Evaluating Nonexistent Groundwater Pathways

The Proposed Plan presents risk estimates for future users of the sites. Proposed Plan at 9, 10. These values were developed in the risk assessments done for the FS and FFS, and include risks associated with groundwater exposure pathways. (See, e.g., FS at p. 1-22; FFS at Table 5-5). Including risks from groundwater exposure overstates the risks because there are no credible groundwater pathways at these sites. The groundwater pathway should be eliminated from the risk assessment because:

- Nassau County Public Health Ordinance Article # 4 prohibits the installation of new private potable water systems in areas served by a public water supply, as is the case

for the Site. Proposed Plan at 20. Deed restrictions could also be used to reinforce this prohibition.

- Site related contamination is limited to the Upper Glacial Aquifer, whereas local water suppliers draw from the Lloyd Aquifer (FFS at p. 3-6).

- The Upper Glacial Aquifer is not useful for potable water because of the high level of dissolved solids in the aquifer from saltwater intrusion (FS at p. 4-31) and "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." FFS at p. 306.

- At the site itself, the groundwater may be locally perched on low-permeability peat or clay units, further isolating the contamination and minimizing its potential use.

Thus, EPA concedes that ". . . even without deed restrictions or other institutional controls, human health impacts through potable water consumption would continue to be a remote hypothetical risk. . . ." FS at p. 4-31.

B. The Risk Assessment Does Not Support the Analysis of Remedial Alternatives

The risk assessment performed for the remedial alternatives evaluated in the Proposed Plan does not evaluate the risks associated with activities implementing the alternatives. No risk assessments were conducted for the excavation, loading, or routine transport of the wastes to disposal sites, or for effects of potential accidental releases. These risk assessments should have been performed and used as a basis for comparison of human health risks and ecological risks among the various remedial alternatives. Because these risks were not evaluated, the risks for alternatives involving significant handling and transportation of contaminated materials are understated, thereby making such alternatives appear more acceptable than other alternatives involving less material handling and transportation.

For example, short-term impacts to residents and workers in adjacent facilities would result from soil excavation and on-site movement in the form of exposure to airborne particulates and radon gas. Soil excavation will result in rapid release of radon entrapped in the voids in the soil. In addition, the truck transport of the radioactive and hazardous material off-site potentially exposes residents along the transport route to increased exposure to airborne particulate and gaseous releases. The potential for elevated airborne radioactivity releases is also increased by the proposed multi-step process of truck loading, truck transport, transfer from truck to rail, rail transport, and unloading at the disposal facility. Releases will be further increased if off-site treatment to stabilize (or remove) hazardous constituents is required prior to shipment to the disposal facility. The multi-step process also increases the possibility of release of significant quantities of material under accident conditions. This is in addition to the safety risks from operations and transportation.

Without considering the risks of these activities, it is not possible to compare the risks posed by the various remedial alternatives evaluated, as well as other alternatives that should have been evaluated (e.g., onsite containment).

7. The Cost Estimates For The Remedial Alternatives Evaluated In The Proposed Plan Omit Significant Elements

Cost estimates for each of the alternatives identified in the Proposed Plan are provided in the Appendix to the FS. These estimates do not address the following tasks:

- Construction of truck loading facilities (roadways, ramps, monitoring station, truck wash facilities) at the Li Tungsten and Captain's Cove sites; decontamination and

demolition of these facilities upon completion of waste transport; and possibly decontamination of facilities at the truck to rail transfer station.

- Backfilling, regrading, and reclamation of the site upon completion of remediation.

- Health physics and material sampling program, including training, personnel and equipment monitoring, effluent and environmental monitoring, medical checks, site access control, sample collection and control, etc. In addition, the controlled excavation of wastes above the cleanup levels (e.g., 5pCi/g for rad wastes) will require either on-site laboratory facilities or a program with an off-site laboratory to support continual surveying and collection of soil samples for rapid analysis of concentration levels.

- Administrative and Management Costs. The implementation of the health physics and sampling programs will increase the construction times for the off-site disposal alternative which are unrealistically short. Recent experience at comparable sites has shown, for example, that implementation of the preferred alternative (LS-4 and CS-4) would require 12-15 months and would thus increase the projected administrative and management costs accordingly.

- On-site administrative offices, sample storage facilities, wash facilities. Independent of whether laboratory facilities are established, these on-site facilities will be required.

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

- Development and implementation of a public awareness and education program. While this is discussed for the No Action alternative it is also necessary as part of the other alternatives.

- Under alternatives LS-2, LS-3, and LS-4 it is intended that all structures (including the Dickson Warehouse) be demolished and disposed of in a Subtitle D Landfill. If contamination levels are excessive, a surface decontamination program will have to be conducted before the Subtitle D Landfill will accept the material.

For alternatives LS-2 and CS-2 the following additional comments apply:

- Remediation may have to deal with substantial quantities of mixed wastes. These mixed wastes may require treatment on-site and/or at an offsite facility (if feasible) before the materials can be disposed. There are no volume estimates of mixed wastes, and no cost estimates for stabilization of these mixed wastes.

For alternatives LS-3 and CS-3, the following additional comments apply:

- Treatability Studies - There has been no prior test program conducted on the material from the Li or Captain's Cove sites to establish the effectiveness and separation efficiency of either radiological separation technology or the stabilization technique for the nonradioactive metals-contaminated soil discussed in this section. Nor is one included in the cost breakdown or reflected in the schedules. Since recent work at other sites has shown that the effectiveness and efficiency of such separation techniques varies significantly with the characteristics of the material, it would be essential that a test program be conducted to establish these parameters (or whether the use of such separation techniques is feasible).

- Construction of the onsite containment cell - There is no cost component in the Appendix for the construction of an on-site containment cell (to EPA standards), though costs for a RCRA capping system are estimated. As noted earlier, such a cell with multi-barrier construction, would also be effective in containing the radioactive wastes. Further containment capability would be achieved by stabilizing the radioactive waste with cement (a proven technology).

The cumulative effect of omitting these various activities and elements from the cost estimates is that the estimated costs for certain alternatives may be significantly underestimated. Many of the omitted costs are either associated only with alternatives involving offsite disposal, or are costs that would be greatly increased for such alternatives. Therefore, the cost estimates for offsite disposal alternatives may be significantly underestimated with respect to other alternatives such as onsite containment or limited removal of materials. Thus, the analysis of alternatives is skewed in favor of the preferred alternative and other offsite disposal alternatives.

ATTACHMENT 2

ROBERT E. BERLIN

TITLE	Consultant
EXPERTISE	Site Decommissioning Radiological Assessment Waste Management
EXPERIENCE	35 Years

Dr. Berlin has over 35 years of engineering, health physics, industrial safety, radiological assessment, and waste management experience. He has extensive experience at CERCLA designated sites such as an operable unit of the Denver Radium Site, other radium and thorium-contaminated sites, a former nuclear fuel fabrication facility, LLW burial sites, and numerous uranium mining, milling, and processing facilities. He has prepared and/or consulted on the preparation of numerous radioactive materials licenses, environmental assessment, environmental reports, decommissioning plans, feasibility studies, health and safety plans, quality assurance plans, operating manuals, and technology assessments. He also has had extensive experience working with the Nuclear Regulatory Commission, the Environmental Protection Agency, the Department of Energy, and various state agencies charged with regulating both radioactive and hazardous waste. Dr. Berlin is a retired Professor at Manhattan College where he coordinated and taught undergraduate and graduate classes in hazardous and radioactive waste management/facility restoration. He was a licensed Senior Reactor Operator, and Radiation Safety Officer for the Manhattan College Reactor. Dr. Berlin is the author of an authoritative book on radioactive waste management.

Facility Decommissioning and Restoration

- Design and performance of interior and exterior radiological scoping and characterization programs at SDMP uranium fuel fabrication facility and thorium-contaminated sites, phosphate facility, and uranium tailings impoundments to establish the basis for the remediation program.

- Evaluation of volumetric source terms for use in modeling contaminant dispersion at uranium mills, SDMP site, CERCLA site, LLW disposal sites, and thorium-contaminated sites; and for defining quantity of material to be excavated.

- Definition of remedial/disposal alternatives for radiologically and mixed waste contaminated sites, and comparative technical, environmental, and

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health impact assessments of these alternatives. Contaminants included NORM (uranium, radium, thorium), and metals. Includes commercial LLW sites (Maxey Flats & West Valley), SDMP sites, and NORM facilities.

- Design of on-site permanent storage facility for mixed waste at a thorium contaminated site.

- Determination of cover and liner composition and thickness, and assessment of radon and gamma releases as a function of cover for rad waste cells, tailings impoundments, and the Operable Unit VIII monolith.

- Preparation of remedial action work plans under NRC guidelines for SDMP sites incorporating interior and exterior decontamination procedures and equipment, HASP, QA/QC programs, schedules, and plans for validation measurement programs to demonstrate achieving remediation objectives.

Health Physics/Industrial Safety

- Development of industrial safety and health physics programs for a variety of nuclear facilities, with primary emphasis on uranium mines and mills, remediation, and waste disposal sites. Work included definition of procedures, preparation of operating manuals, development of job descriptions and organizational responsibilities in accordance with Federal and State Regulatory Standards.

- Preparation of health and safety plans (HASPs) for facilities in NRCs Site Decommissioning Management Program (SDMP) with uranium and thorium contamination in interior buildings and exterior soils.

- Audit of personnel and effluent monitoring programs on CERCLA and SDMP facilities, NRC licensed industrial facilities, and reactor installations.

- Development of draft regulatory guides for the NRC covering personnel, effluent, and environmental monitoring programs at nuclear facilities.

- Preparation of audit manual for assessing health and safety and manual for conducting safety training at CERCLA Denver Radium site.

Environmental and Risk Assessment

- Performance of environmental impact assessments and monitoring programs, preparation of EAs and ERs, and conduct of regulatory compliance programs for some 20 uranium projects as part of licensing and compliance activities.

- Preparation of ER for a thorium contaminated site; an EA for a SDMP uranium contaminated site, ERs for a research reactor facility, and transportation section of EIS for TMI-2 accident cleanup.

- Performance of a range of programs at LLW sites, uranium facilities, and remedial action sites involving the modeling of sources, pathway dispersion, and receptor impacts through air, soil and water pathways; validation of performance objectives; determination of stabilization covers based on diffusion analysis of radon emanation and gamma levels and assessment of impacts of projected accident conditions. Programs involved comparative assessments of radiological impacts (risks) associated with the excavation, handling, storage, packaging, transportation and emplacement of waste using current NRC and EPA approved dispersion and health impact analyses.

- Development of methodology for performing impact assessments for DOE Formerly Utilized Sites Remedial Action Program (FUSRAP).

<u>Radioactive Materials Licensing</u>

- Project Manager of technical support program to NRC in generating the 10 CFR Part 61 regulation for LLW disposal.

- Preparation of license renewal applications to the NRC for a research reactor and for SNM possession, and the City of New York for nuclear material.

- Assessment of comparative licensing and permitting issues associated with the remediation of CERCLA, and SDMP sites, and industrial facilities under NRC license; liaison with NRC, EPA, and state agencies in preparation of license applications, review of submittals, response to comments, and regulatory constraints.

    - Preparation of portions of license application for nuclear facilities inclusive of projected impact assessments for normal and accident conditions; quality assurance programs; personnel, effluent, and environmental monitoring programs.

- Definition and analysis of applicability and comparative technical and cost impacts of ARARs for remedial/disposal impacts at CERCLA Denver Radium Site Operable Unit VIII (containing LLW & NORM).

Facility Operations

* Project management for the remedial operation of the Maxey Flats LLW burial site during which waste disposal cell liner and site erosion was repaired, and airborne releases of contaminated effluents eliminated.

* Reactor administrator, senior reactor operator, & RSO at teaching and research reactor in urban N.Y.C.

* Development of criteria and guidelines for LLW management practices at DOE laboratories consistent with 10 CFR61, and preparation of guidelines for the selection of DOE LLW disposal sites.

* Performance of LW management facility assessments at ORAL.

* Contractual and technical management of AEC program for installation and operation of the PM-1 and PMA portable nuclear reactors, and development and operation of the SNAP generator.

Regulatory Agency/Public Hearings

* Represent clients in public information sessions, and regulatory hearings on the health-related and environmental effects of nuclear fuel cycle facilities (uranium mills, LW burial sites), and facility restoration programs.

- Evaluation of potential PRP's radiological contribution to CERCLA-designated landfill.

* Preparation of draft regulatory guides for the NRC on monitoring program at nuclear facilities.

* Management of program to provide supporting analysis and regulatory guidelines for NRC on 10 CFR61, the LLW regulation.

1Provided expert testimony in support of reactor installation and operation to ACRS, in judicial and regulatory hearings, and at facility siting hearings.

ACADEMIC BACKGROUND	Dr. P.H., Public Health/Environmental Science Concentration, Columbia University, School of Public Health M.S., Industrial Engineering, New York University M.S., Mechanical Engineering, Rensselaer Polytechnic Institute B.S., Mechanical Engineering, City College of New York
REGISTRATIONS	Professional Engineer: New York

PROFESSIONAL AFFILIATIONS	American Nuclear Society
PUBLICATIONS	Berlin, R. and C. Stanton, 1988, Radioactive Waste Management, J. Wiley & Sons, 444 pages. Dr. Berlin has published numerous technical papers and reports on radioactive waste management, thermoelectric technology, and radiological health.

WILLIAM P. DUGGAN, Ph.D., P.E., C.H.P.

TITLE Manager, Nuclear/Environmental Services

EXPERTISE Health Physics
Environmental Remediation
Radioactive Waste Management
Nuclear Engineering

EXPERIENCE 15 Years

· Unit Manager for Dames & Moore's Nuclear/Environmental Services group, with profit and loss responsibility for unit of 40 technical staff delivering site investigation, remediation, compliance, and health & safety services. Duties include technical and administrative management of staff in six locations supporting government and commercial clients.

•Project Manager for Dames & Moore's remediation activities at the Chemical Holes Project at Brookhaven Laboratory. Responsible for development of Work Plan, Health and Safety Plan, and Project Management Plan. Dames & Moore provided waste analysis and segregation services for excavated materials. Work was predominantly done in Level B protection, and involved radioactive, hazardous, and potentially shock sensitive materials. Provided extra regulatory and technical support to BNL to address changing project circumstances.

•Project Director for Building 811 Waste Treatment and Disposal Task at BNL. As Principal in Dames & Moore, ensures availability of resources to Project Manager to allow for quality performance and completion of project.

•Radiological Lead Investigator for Due Diligence investigation of multi-site corporate transfer valued at over $1 billion. Radiological inspections were conducted of 10 active and inactive industrial and research facilities in five states and Europe.

•Lead Investigator for the due diligence related to the privatization of Nordion by the Canadian Government. Addressed radiological and conventional environmental issues at three sites involved in the handling, packaging, transportation, and use of radioisotopes for irradiation and medical diagnostics. Also included in the transfer was an experimental nuclear reactor.

· Project Manager of facility investigation and upgrade of thorium contaminated industrial site. Impact assessment of remediation alternatives included evaluation of pathways and calculation of potential dose commitments to workers and off-site public. Project required establishment and execution of field health physics program.

· Project Manager for Dames & Moore's licensing and assessment support of Illinois LLRW Disposal Facility license application by Chem-Nuclear Systems, Inc. Coordinated multi-

discipline efforts in preparation of license applications and evaluation of safety and environmental impacts for two sites.

- Technical support in preparation of license application for the North Carolina Low-Level Radioactive Waste Disposal Facility. Responsibilities include technical review of dose and performance assessments and related calculations that comprise the Safety Analysis Report.

- Project Manager of technical and management assistance contract for the New York State Energy Research and Development Authority (NYSERDA), the agency responsible for construction and operation of New York's LLRW disposal facility. Tasks include planning for interim storage needs, preparing NYSERDA's program plan, and assisting in facility design and licensing.

- Technical support of radioactive waste storage study for the New York State Energy Research and Development Authority. Managed the preparation of a Conceptual Design and Cost Estimate for Interim Low-Level Radioactive Waste Storage Facility.

- Pathways analyses, risk assessment and calculations of dose commitments for a former uranium fuel fabrication facility. Site characterization and field investigations in support of remedial planning.

- Transition team member for environmental compliance audits for Martin Marietta facilities at Oak Ridge K-25 and Portsmouth Gaseous Diffusion Plant. Responsible for radioactive waste management and health physics inspection areas.

- Evaluation of remedial alternatives for EPA Superfund site. Risk assessment and calculation of doses to public and workers from remedial operations and post-closure conditions. Use of various computer codes such as RESRAD and ISOSHIELD for pathways modeling and radiation shielding.

- Project Manager for Dames & Moore's Basic Ordering Agreement with Brookhaven National Laboratory. Management and technical responsibility for environmental services task order projects, including environmental analyses for high energy physics accelerator projects and asbestos sampling and assessment.

- Performance assessment of West Valley Demonstration Project Class B and C LLRW drum cell. Evaluated compliance with 10 CFR Part 61 objectives, particularly with respect to intruder scenarios. Prepared position paper for WVDP use.

- Project Manager and Principal Investigator for industrial facility handling material with high radium concentrations. Duties involved assessment, through analysis and sampling, of exposures to workers and the public from radon emanations and particulate dispersion.

- Technical support in development of the Environmental Assessment and Safety Analysis Report for the West Valley Demonstration Project. Principal duties include accident analyses and system hazard classification as part of the Safety and Environmental Assessment Group.

· Technical support in preparation of a generic Safety Analysis Report for a Low Level Radioactive Waste disposal facility based on below-ground vault technology. Responsibilities included development of the environmental monitoring plan and auxiliary system requirements.

· Technical support for radon investigations as part of site assessments. Responsibilities included planning sampling program, interpreting results, and identifying possible mitigating actions.

· Project Engineer in support of an application for onsite disposal of radioactive waste under 10 CFR Part 20.302. The submittal was the first under the guidance of NUREG 1101.

· Assistant Professor, Manhattan College, New York, New York. Supervisor of the College's Critical Reactor and nuclear engineering laboratory. Research in radiological environmental contamination and waste management. Instruction of undergraduate and graduate students and nuclear engineering, facility restoration, and environmental regulation, as well as basic engineering courses such as thermodynamics and heat transfer

· Engineer, Stone and Webster Engineering Corp., Boston, Mass. Technical support for design and licensing several nuclear power plants, including Millstone-3, Beaver Valley-2, and Shoreham. Principal duties included analyzing containment pressure and temperature transients due to accidents, determining non-accident radiation source term, and evaluation of shielding requirements.

ACADEMIC BACKGROUND	Ph.D., Nuclear Engineering, Rensselaer Polytechnic Institute, 1987. M.S., Nuclear Engineering, Rensselaer Polytechnic Institute, 1982. B.S., Nuclear Engineering, Rensselaer Polytechnic Institute, 1980. Minor: Public Policy Studies
PROFESSIONAL REGISTRATIONS AND AFFILIATIONS	Professional Engineer, New York State Certified Health Physicist, 1996 Senior Reactor Operator License, Manhattan College Zero Power Reactor Adjunct Assistant Professor, Rensselaer Polytechnic Institute American Nuclear Society Health Physics Society President, Greater New York Chapter 1998-99 American Society of Mechanical Engineers

PUBLICATIONS

Duggan, W. P. "Pathways Analysis to Establish Clean-up Criteria" Mixed Waste Regulation Conference, Atlanta, GA, June 17-18, 1991

Berlin, R. E., Stanton, C., and Duggan, W. P. "Developing a Graduate Program in Nuclear Waste Management/Facility Restoration" Waste Management '91, Tucson, AZ Feb 24-28, 1991

ROB SHUMAN

TITLE **Principal Scientist**

EXPERTISE **Risk Assessment**

PROFESSIONAL EXPERIENCE

Rogers and Associates Engineering Corporation, Salt Lake City, Utah, Principal Scientist, 1985 to Present

EG&G Idaho, Inc., Idaho Falls, Idaho, Scientist, 1984 to 1985

Colorado State University, Ft. Collins, Colorado, Graduate Research Assistant; Research Associate; Lab Assistant, 1977 to 1984

Colorado Division of Wildlife, **Colorado Springs, Colorado, Wildlife Technician, 1979**

EXPERIENCE SUMMARY

Rob Shuman has more than 13 years of experience in radioactive waste management. While active in a number of areas, he has focused on risk and performance assessment. Mr. Shuman has participated in and supervised several human health and ecological performance assessments for a variety of applications. He developed the inventory and conducted the dose assessment for the Los Alamos National Laboratory DOE 5820.2A performance assessment and aided in the development of the sourceterm model for the Oak Ridge National Laboratory assessment. Mr. Shuman was the primary technical contributor to CERCLA human health and ecological risk assessments performed for mixed waste disposal sites at the DOE Savannah River Site. These assessments considered potential risks to humans and the environment under baseline conditions, as well as those associated with several proposed remedial alternatives. Mr. Shuman has used performance assessments to develop release criteria for solid and liquid waste generated at DOE facilities. He conducted an ecological risk

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assessment for an oceanic radioactive waste disposal site used by the National Oceanic and Atmospheric Administration in establishing the need for site remediation. Mr. Shuman has developed computer codes for the analysis of the longterm performance of engineered barriers in LLW disposal systems. He has developed LLW inventories for the States of Texas, Maine, Vermont, and the Midwest Compact for use in licensing, construction, and assessment of LLW disposal facilities. Mr. Shuman has also been deeply involved in the review of LLW radiological performance assessments, including those prepared by the DOE Idaho National Engineering and Environmental Laboratory and the Oak Ridge National Laboratory.

PROJECT EXPERIENCE

Technical contributor to the DOE Order 5820.2A performance assessment for the Los Alamos National Laboratory low-level waste disposal facility. Developed historic and future radioactive waste inventories based on past disposal records and expectations regarding future activities at the laboratory. Conducted intruder and offsite dose assessments to demonstrate compliance with the Order's performance objectives.

Developed release criteria for radioactive waste generated at the Los Alamos National Laboratory. The criteria were based on projected exposures to disposal facility workers and members of the general public. They are proposed for use in the disposal of waste with low levels of radioactivity at a sanitary landfill.

Developed an ecological monitoring plan for two mixed waste disposal facilities at the DOE Savannah River Site. The five-year plan, developed in support of groundwater remediation efforts, monitored contaminant concentrations in surface waters, soils, and stream sediments. Biological testing was proposed to the extent warranted by the analytical results of abiotic sampling.

Participated in the review of the DOE Order 5820.2A performance assessments for the Idaho National Engineering and Environmental Laboratory. The review examined the validity of the conceptual models used in the assessments, checked for proper implementation of mathematical models, and evaluated the clarity of the written report. Additional reviews of revised portions of the assessment were conducted.

Co-authored draft Staff Technical Reports on performance assessment and the use of engineered structures in low-level waste disposal facilities for the Commonwealth of Pennsylvania. These documents discuss the complexities of these subject areas and are intended for use by prospective disposal facility license applicants and members of the general public.

Conducted sensitivity and uncertainty analyses of the pathways analyses used in the development of radiological release criteria for liquid and solid waste generated at DOE facilities in Oak Ridge, Tennessee, Paducah, Kentucky, and Portsmouth, Ohio. The analyses identified important model input parameters and

used probabilistic modeling approaches to evaluate the ranges in projected radionuclide concentration limits. The results of the analyses were used to gain greater insight into DOE's ability to manage the waste as Below Regulatory Concern.

Supervised and/or conducted human health and ecological risk assessments for hazardous waste disposal sites at the DOE Savannah River Site. The assessments were used in the derivation of Alternate Concentration Limits for the groundwater unit underlying the disposal sites.

Primary technical contributor to human health and ecological CERCLA risk assessments performed for hazardous waste disposal sites at the DOE Savannah River Site. These assessments considered potential risks to humans and the environment under baseline conditions, as well as those associated with several proposed remedial alternatives. Results of the assessments were used in establishing the need for remediation of the sites and in identifying effective remedial alternatives.

Developed and refined a pathway dose and risk assessment code, BARRIER, for EPRI to provide a reliable tool for performance assessment of engineered barriers. The code enhances current modeling capabilities in terms of predicting the onset and advancement of barrier failure and the effect said failure has on containment of radioactive wastes. Code has been applied to performance assessment of new disposal facilities and is applicable to the assessment of remedial action alternatives.

Performed dose and risk assessments in support of the Remedial Investigation/ Feasibility Study of groundwater contamination beneath the 100 Area at the Hanford Site in Washington. This preliminary evaluation documented current risks, and identified areas of uncertainty related to contaminant sources, pathways, and receptors. The assessment considers radioactive and chemical contaminants at the site, and implements EPA guidance for human risk assessment.

Assisted in the development of a computer code for EPA used in pathway analysis for recently decontaminated sites. Developed data sets and conceptual models and programmed code to include a wide range of decontamination cases. Also implemented numerous code improvements for that agency's PRESTO codes prior to their use in LLW rulemaking procedures.

Participated in radiological assessments of numerous radioactive and hazardous waste disposal sites for the Department of Energy's Savannah River Plant. Developed site and source term data sets and conceptual models for several remedial action alternatives. Radiological impacts and health risks to nearest neighbors and inadvertent intruders were projected and impacts to local ground and surface water resources were calculated.

Conducted pathways and sensitivity analyses for radionuclide movement within a DOE LLW site in order to assess the effectiveness of site surveillance activities. Develop release and transport conceptual models and collected and verified site and source term data. Results were used in the formulation of revised monitoring procedures and special site studies on nuclide migration mechanisms.

Conducted a comparative assessment of several state-of-the-art performance assessment codes used by EPA, NRC and DOE. Determined data needs, methods of calculation, and release and transport mechanisms

included in each code. Compared applicability to various low-level waste disposal cases (e.g., humid or arid sites, saturated or unsaturated flow, etc.).

Senior author of numerous technical reports or papers prepared for clients and for publication in the open literature. These reports and papers typically address issues in low-level radioactive waste and hazardous waste management, focusing on human health and ecological risk assessment.

EDUCATION M.S., Radiation Ecology, 1984; B.S., Zoology, 1979, Colorado State University

VERN ROGERS, Ph.D., C.H.P.

TITLE	Chief Scientist
EXPERTISE	Health Physics Dose and Risk Assessment Environmental Remediation Nuclear Engineering
EXPERIENCE	31 Years

Integration team member and technical reviewer of safety analysis report and license application for a new low-level waste disposal facility in North Carolina.

Technical support leader to State of California concerning licensing of a new low-level waste disposal facility in California.

Invited speaker on low-level waste characteristics for the Illinois State Low-Level Waste Disposal Task Force. Invited speaker on low-level waste disposal technologies for the New York State Low-Level Radioactive Waste Siting Commission.

Co-project manager for radon research program for the Department of Community Affairs, State of Florida. Developed models and supporting information for estimating radon entry into residential houses. Developed the draft radon control building standards, supporting economic impact analysis, and training program to implement the standard.

Project manager for development of low-level radioactive waste below-regulatory-concern limits for the Texas Low-Level Radioactive Waste Disposal Authority. Developed methodology, conducted risk and economic analyses, and proposed radionuclide specific limits for the below-regulatory-concern disposal of wastes containing short-lived radionuclides. Assessed the transport, fate, hazards, and risks of volatile organic contaminants.

For the Electric Power Research Institute (EPRI), served as project manager for low-level radioactive waste below-regulatory-concern petitions for selected nuclear utility plant wastes. Contributed to characterization of waste streams. Developed and characterized exposure scenarios and receptors for risk analyses. Directed risk analysis using the U.S. Nuclear Regulatory Commission's (NRC's) IMPACTS code.

Senior RAE technical contributor to the performance analysis of the three conceptual and the selected preliminary design for the Texas low-level waste disposal facility. Senior technical reviewer of the entire design and performance assessment effort.

Project manager for the development of the draft license application document. Responsible for directing project including the initial facility design, review of site and waste characteristics, and development of the initial performance assessment methodology. Senior technical reviewer during finalization of the licensing application document.

Project manager for an analysis of existing sites where radioactive, hazardous, and mixed waste had been disposed of. Developed the performance assessment methodology used to account for impacts due to hazardous constituents. Functioned as senior technical reviewer for all aspects of this project.

Technical contributor to studies on the transportation and storage of spent fuel. Developed a code to assess transportation risks. Characterized spent fuel and spent fuel shipping casks. Most recently, was RAE's senior technical reviewer for the U.S. Department of Energy's (DOE's) Monitored Retrievable Storage Facility study.

Project manager over technical support provided to the U.S. Environmental Protection Agency concerning its low-level waste, below-regulatory-concern, and naturally-occurring and accelerator-produced radioactive materials regulations. Project manager over the development of EPRI's Low-Level Waste Disposal Handbook. Project manager of costs and cost-effectiveness analysis for low-level waste disposal facilities for EPRI. Project manager of site selection and qualification on low-level waste disposal. Project manager for land use classification system for low-level waste disposal sites. Developed methodology for calculating low-level waste facility performance and cost-benefit analysis. Extensive additional experience in radioactive effluent transport and risk analysis for nuclear facilities.

Project manager and principal investigator for characterization of NORM (naturally occurring radioactive material) waste at oil industry facilities. Supervised field surveys and sampling. Conducted analysis of data to determine extent and severity of contamination, to determine correlations for meeting criteria, and to develop recommendations for disposal of existing waste and mitigation and prevention of future contamination.

Project manager for cleanup of radium- and uranium-contaminated properties. Project manager for remedial action, development of tailings containment systems, and engineering evaluation projects for mining companies. Project manager of Uranium Mill Tailings Cover Optimization Research Project. Developed methodology for calculating cover effectiveness and cost-benefit analysis for uranium mill tailings containment systems.

Project manager of evaluation of decontamination methods and decontamination program of the TMI-2 auxiliary building for the NRC's programmatic environmental impact statement. Project manager for nuclear safety and fuel burnup of remote high-temperature, gas-cooled reactor systems.

Principal author and instructor for course "Elements of LLW Radioactive Waste Disposal Safety" for the Illinois Department of Nuclear Safety. This multi-lesson, two-week course covered all aspects of low-level radioactive waste disposal, regulations, health effects, risk analysis, conceptual designs, etc. Authored and presented instruction on low-level radioactive waste performance and

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risk assessments and conceptual designs for low-level radioactive waste disposal facilities to both technical and policy personnel from the U.S. Department of Energy (DOE), states, regional organizations, and members of the public.

Co-authored and programmed radioactive waste performance assessment, systems performance, nuclide migration and risk codes. These codes include RAECOM, RQ/PQ, PACUTS, CINDI, RADAD-III, RADE, PATHRAE, PRESTO-BRC, RAETRAN, and RAETRAD.

Member of the DOE's Low-Level Waste Classification Working Group.

Member of the Technology Steering Committee for DOE's Mill Tailings Remedial Action Program.

Member of the DOE's High-Level Waste Site Selection Methodology Committee.

Responsible for managing of nuclear and advanced energy projects. Developed classification system for low-level waste. Project manager of mill tailings reclamation research, engineering evaluation for the Formerly Used Sites Remedial Action Plan (FUSRAP). Project manager of Phase 2 inactive uranium mill tailings projects for DOE, including precious metal extraction evaluations, remedial action design, and costing and effectiveness evaluations. Performed radiation measurements at several mill tailings and radioactive waste sites. Determined extent of radiation transport through pathways to the environment. Estimated individual and population doses from radiation. Performed health effects calculations and health benefit/cost ratios for remedial action options.

Wrote, programmed, and operated nuclide migration programs RADAD, EPRICRAC, and CALMAC. Project manager for the Nuclear Waste Disposal Classification System and Methodology. Performed calculations applying RWDCS to specific low-level waste sites (e.g., West Valley, Hanford, Barnwell, Sheffield and Maxey Flats). Keystone Conference participant on Nuclear Waste Management. Project manager for Low-Level Waste Criteria Methodology.

Project manager for DOE Inactive Uranium Mill Tailings project. Supervised field work at sites needing comprehensive radiation surveys of tailings-structures.

Project manager for FUSRAP. Supervised radiation and engineering field measurements of many structures and evaluated radiation contamination of buildings, walls, floors, drains, laboratories, and parking areas.

Project manager for radiation survey of National Lead Niagara Falls Facility. Evaluated uranium, radium, and radon contamination.

Performed criticality and shielding calculation. Work included decontamination, decommissioning, and radiation monitoring of operating nuclear power plants and fission product transport measurements in the primary loop.

Supervised and conducted projects in radium and radon transport, neutron and gamma-ray shielding, radiation monitoring of spent reactor fuel, cross-section measurements and calculations, nuclear reactor criticality and burnup calculations, and cost-benefit analysis.

Calculated health effects of radiation and pollution. Was instrumental in establishing the Nuclear Engineering Academic and Research Programs.

Taught in Nuclear Engineering program. Helped establish experimental program for measuring neutron cross sections.

Performed reactor physics, cross-section, and Doppler calculations for fast reactor environments.

PREVIOUS EXPERIENCE	Rogers & Associates Engineering Corporation, Salt Lake City, Utah, President; Chief Scientist, 1980 to 1998
	Ford, Bacon & Davis Utah, Inc., Salt Lake City, Utah, Vice President and Manager of Nuclear and Advanced Programs, 1976-80
	IRT Corporation, San Diego, California Manager, Nuclear and Applied Science Department, 1973 to 1976
	Brigham Young University, Engineering Department, Provo, Utah Associate Professor, 1969 to 1973
	Lowell Technical Institute Visiting Associate Professor, 1970 to 1971
	Argonne National Laboratory, Idaho National Engineering Laboratory, Idaho Falls, Idaho, Assistant Nuclear Engineer, 1968 to 1969
ACADEMIC BACKGROUND	Ph.D., Nuclear Engineering, 1969, Massachusetts Institute of Technology M.S., Mechanical Engineering-Nuclear, 1965 B.S., Physics, 1965, University of Utah
PROFESSIONAL REGISTRATIONS AND AFFILIATIONS	Professional Engineer, 1977 (expired) Certified Health Physicist, 1984
	American Nuclear Society Fellow, Member, Board of Directors; ANS Board Representative to ANS D&D Division American Physical Society American Chemical Society Health Physics Society

REPORT

Comments Regarding the Proposed Plan Li Tungsten Corporation Site City of Glen Cove, NY

Li Tungsten PRP Group
September 1999

BBL
BLASLAND, BOUCK & LEE, INC.
engineers & scientists

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BLASLAND, BOUCK & LEE, INC.
engineers & scientists

Transmitted Via FedEx

September 16, 1999

Mr. Edward Als
Project Manager
Eastern New York Remediation Section
Emergency and Remedial Response Division
United States Environmental Protection Agency
290 Broadway
New York, NY 10007-1866

Re: **Comments Regarding the Proposed Plan**
Li Tungsten Corporation Site
City of Glen Cove, Nassau County, New York
Project #: 03755

Dear Mr. Als:

Blasland, Bouck & Lee, Inc. (BBL) has prepared the enclosed report regarding the Proposed Plan for the Li Tungsten Corporation Site (the Site). These comments have been prepared on behalf of the Li Tungsten PRP Group. The Proposed Plan was issued on July 27, 1999 with a 30-day public comment period. EPA subsequently extended the public comment period until September 17, 1999.

As discussed in greater detail in our technical comments, BBL has identified a modification to the Proposed Plan that is equally protective of human health and the environment, can be implemented in a shorter period of time, and can be implemented at a lower cost. Targeted removal and installation of the two-foot protective cover specified in the Proposed Plan will effectively limit gamma radiation and chemical exposures.

We would also like to take this opportunity to comment on the proposed "Phase I Remediation" for the Site, which was discussed during our meeting on August 19, 1999. The proposed Phase I activities include excavation of affected materials from the southern portions of Parcels A, B and C at the Li Tungsten facility, which will then be stockpiled north of the Dickson warehouse. For the reasons set forth below, BBL and the PRP Group do not believe that the proposed Phase I Remediation is technically justified and should not be implemented. Additionally, we believe that the Phase I Remediation activities will <u>increase</u> Site risk.

- Excavation, consolidation and storage of NORM-containing soils will cause an increase in risk above current levels. RESRAD modeling by BBL and Site measurement for gamma radiation demonstrate that exposures are below 15 milliRem/yr EDE, and do not pose a risk to human health. Exposure to gamma radiation at the Site is largely controlled at the present time by the overall distribution of the

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gamma radiation at the Site is largely controlled at the present time by the overall distribution of the radiological contaminants (particularly in the subsurface). Excavation of NORM-containing soils will result in higher exposure levels than is currently the case.

- 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.

- Planned removal activities during the Phase I Remediation will add additional costs to the implementation of the Proposed Plan that are not adequately accounted for in EPA's cost estimates. The additional costs of maintaining the stockpiled materials, Site security, double handling the material after the removal activities, etc. were not considered.

- Bulk excavation of materials during the Phase I Remediation will inevitably lead to mixing of radiologically and non-radiologically contaminated soil 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.

- Once contaminated soils are excavated and removed from the original areas, management options become severely limited. Targeted removal, based on realistic risk assessment activities, is substantially similar to the activities contained in the Proposed Plan. However, once bulk excavation of soils is initiated, the benefits of targeted removal actions are lost. Integrating the protective cover and Site use restriction presented in the Proposed Plan with targeted removals results in reductions in risk which are within or below EPA's acceptable risk range in a more cost effective manner and in a shorter period of time.

BBL and the Li Tungsten PRP Group appreciate your consideration of the comments provided in this letter regarding the Proposed Plan. We believe that, with minor modifications that includes targeted removal, the Proposed Plan can provide an adequate degree of reduction in Site risks in a reasonable time frame and at a lower cost. We look forward to the opportunity to further discuss these comments.

Very truly yours,
BLASLAND, BOUCK & LEE, INC.

Michael J. Pardus, REM
Vice President

MJP/slg

attachments

cc: Mr. Robert Thomson – Buchanan Ingersoll, PC
Mr. William Gregory – Kennametal, Inc.
Mr. Jonathan Jackson – Fansteel Metals, Inc.
Mr. Mark Steger – McBride, Baker & Coles

TECHNICAL REPORT

Comments Regarding the Proposed Plan Li Tungsten Corporation Site City of Glen Cove, NY

Li Tungsten PRP Group
September 1999

BBL
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1. Introduction

Blasland, Bouck & Lee, Inc. (BBL) has prepared this summary of technical comments regarding the Proposed Plan for the Li Tungsten Corporation Site (the Site). These comments have been prepared on behalf of the Li Tungsten PRP Group. The Proposed Plan was issued on July 27, 1999 with a 30-day public comment period. EPA subsequently extended the public comment period until September 17, 1999.

The Site is comprised of two operable units (OUs). OU1 consists of the Li Tungsten Corporation processing facility (referred to as the Li Tungsten facility). OU2 consists of the Captain's Cove Condominium Development and Garvies Point dump site (referred to as Captain's Cove). The remedy presented in the Proposed Plan for both OUs consists of excavation of radiologically contaminated soils with volume reduction, off-site disposal of above-criteria soils, and off-site disposal of other non-radioactive metals-contaminated soils.

As discussed in greater detail below, BBL has identified a modification to the Proposed Plan that is equally protective of human health and the environment, can be implemented in a shorter period of time, and can be implemented at a lower cost. Targeted removal and installation of the two-foot protective cover specified in the Proposed Plan will effectively limit gamma radiation and chemical exposures.

BBL's comments were prepared based on our technical review of the Proposed Plan (EPA 1999a), the Draft Final Focused Feasibility Study (FFS) (EPA 1999b), and the Draft FFS for the Site (EPA 1998). Materials contained in the Administrative Record and Site File, as well as other relevant documentation and literature were also utilized in evaluating the Proposed Plan. Reference materials utilized in preparation of the technical comments are cited in Appendix A.

BBL and the Li Tungsten PRP Group appreciate EPA's consideration of our comments regarding the Proposed Plan. We believe that with minor modifications that include targeted removal, the Proposed Plan can provide an adequate degree of reduction in Site risks in a reasonable time frame and at a lower cost.

Respectfully submitted,
BLASLAND, BOUCK & LEE, INC.

Michael J. Pardus, REM
Vice President

2. Key Findings and Conclusions Regarding the Proposed Plan

Key findings and conclusions from our technical evaluation are presented below. Technical comments are provided in the remainder of the comment document, which further elaborate on these points.

The Site does not pose an unacceptable risk due to the presence of naturally occurring radioactive materials (NORM). Comparison of monitoring data and RESRAD modeling conducted by BBL demonstrate 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. Measured exposure rates at the Site after completion of the Removal Actions provide risk estimates that are within EPA's acceptable risk range of 10^{-4} to 10^{-6}.

The arsenic and lead cleanup criteria for the Site are inconsistent with cleanup levels established for other brownfield industrial sites having similar patterns of contamination and physical characteristics. Overly conservative and inappropriate exposure scenarios (including residential exposures) were utilized in assessing the risks due to the presence of arsenic, lead and other metals. Cleanup criteria for arsenic and lead developed in the FFS and presented in the Proposed Plan represent residential cleanup levels that are inappropriate for this type of site at which commercial and light industrial development are planned, and are inconsistent with the Superfund Redevelopment Initiative. During preparation of the FFS, realistic risk-based cleanup goals should have been developed that are consistent with the planned site development. Institutional controls and deed restrictions (no residential development; no groundwater usage) which minimize or eliminate certain exposure pathways have already been incorporated into the Proposed Plan.

The cost presented in the FFS to implement the selected remedy was underestimated by approximately $30 million to $75 million. The estimated costs in the FFS and Proposed Plan are unrealistically low, due to unsupported assumptions regarding the effectiveness of the source reduction activities and underestimated volumes of the soil that exceed the proposed cleanup criteria. Based on BBL's analysis of the Site data, we believe that the quantities of soil requiring remediation were underestimated in the FFS by at least fifty percent.

The time required to implement the selected remedy was significantly underestimated in the FFS and cannot be completed within the sixteen month period presented in the Proposed Plan. The schedule presented in the FFS did not adequately account for completing the source reduction using the Segmented Gate System (SGS). The proposed source reduction technology has significant limitations, which limit its throughput and capacity, which were not accounted for in the FFS. Also, the schedule did not consider the additional volume of soil in excess of the proposed cleanup levels, which was not accounted for in the FFS. BBL estimates that a minimum of 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.

Targeted removal of select "hot spots" and construction of protective covers, which are integrated into the overall site development plan, is substantively 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 incorporates 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.

3. Superfund Redevelopment and Future Land Use

3.1 Superfund Redevelopment Initiative

Through the Superfund Redevelopment Initiative (the Initiative), EPA has launched a coordinated national effort to return Superfund sites to productive uses. A critical component of the Initiative is the selection of remedies that are consistent with anticipated future uses of the sites (OSWER Directive #9355.7-04). As discussed in greater detail below, the City of Glen Cove has a well-developed plan for the Site, which does not include residential development. Land use restrictions in the Proposed Plan include prohibition of future residential development at the Site. Since residential development is not a reasonably anticipated future use, EPA's use of residential cleanup criteria is clearly inappropriate in this instance and is inconsistent with OSWER Directive #9355.7-04.

There are no inherent regulatory or statutory barriers that we are aware of that would specifically preclude targeted removal. Our analysis shows that there are no reasonably foreseeable future use scenarios that result in excess risk due to uncontrolled exposure to subsurface contaminants. EPA has stated that it "will take full advantage of its administrative flexibility" in implementing the Superfund Redevelopment Initiative. Therefore, in the absence of clear regulatory or statutory prohibitions, EPA has ability to consider and implement other alternatives beyond those presented in the FFS.

3.2 Planned Site Development

A well defined plan has been developed by the City of Glen Cove for the Site. The City has begun a revitalization effort involving more than 200-acres of property surrounding Glen Cove Creek. The planned development includes the Li Tungsten facility and Captain's Cove. As noted in the Proposed Plan, the Glen Cove Creek Revitalization Plan was finalized in 1998. The revitalization and development plan includes the following major elements:

- Dock facilities;
- Regional transportation center (including a high-speed ferry to Massachusetts and Connecticut);
- Maritime museum;
- Hotel complex;
- Conference center;
- Retail shopping complex;
- Boardwalks and restaurants;
- Parking areas;
- Roadways and access ramps; and
- Light industrial development.

Land use restrictions for the Site, which include no future residential development and a prohibition on the use of groundwater at the Site, were recommended in the FFS and were incorporated into the Proposed Plan. The City of Glen Cove has accepted these restrictions as part of their development plan. Based on discussions with representatives for the City, it is clear that Glen Cove has the authority, ability and resolve to implement and maintain the institutional

controls specified in the Proposed Plan. As discussed below, none of the future site uses are precluded by the recommended modification to the Proposed Plan.

3.3 Integration of Remedy and Site Development Plan

The Superfund Redevelopment Initiative anticipates situations where wastes will remain on-site. In fact, EPA acknowledges that development of buildings and structures over contamination that has been placed under a protective cover can provide more protection than originally called for in the cleanup plan.

The previous Removal Actions provided for interim storage of ores and concentrates with the highest radiological activities and highest levels of metals in the Dickson Warehouse. In this regard, the Removal Actions were effective in mitigating site-related risks. Removal of the materials from the warehouse and targeted "hot spot" removal will result in further risk reductions when performed in conjunction with the placement of protective layers as envisioned in the Proposed Plan.

Materials remaining on-site can be properly managed while adequately protecting health and the environment. The targeted removal activities are substantially similar to the Proposed Plan, except that credible risk-based cleanup criteria are applied to the cleanup process.

None of the planned site uses are precluded by the recommended modification to the Proposed Plan. The protective layers can readily be integrated into the site plan and design, and may become part of parking lots, building foundations, etc. Buildings and structures constructed over materials remaining on-site will likely require a thicker soil layer to support the building or structure foundations; resulting in an even higher level of protection. Utility trenches can be installed to facilitate future development without compromising the integrity of the covers. Also, as specified in the Proposed Plan, buildings and structures on the Site will utilize radon resistant design techniques.

3.4 Superfund Brownfields Success Stories

One of EPA's goals for the Superfund Redevelopment Initiative is to highlight success stories where Superfund sites have been returned to productive uses. To date, EPA has identified approximately 170 Superfund sites which have been recycled. This section provides a summary of several sites that have characteristics that are comparable to the Site. Information regarding these recycled Superfund sites is presented in Table 1.

The common element among the success stories presented on Table 1 was proper consideration of future site use of the site. In each instance, site development plans were considered during the selection of the site remedy. Targeted removal and protective covers were used to provide an adequate level of protection at each site and did not preclude or interfere with the planned development.

Denver Radium Site OU-9 has many parallels with the Tungsten Corporation Site. Soil and groundwater at the Denver site were impacted by the presence of radium, arsenic, lead, and other metals. Selective removal of affected soils was a component of the site remedy. A protective cap (including an asphalt parking lot) covered remaining materials, and was integrated into the design of a 130,000 square foot (sf) Home Depot. Under a Prospective Purchaser Agreement (PPA), Home Depot is responsible for maintaining the protective covers and the institutional controls (no residential development; no groundwater use).

Soil and groundwater at the Industri-Plex site were impacted by the presence of arsenic and lead, as well as other metals and organic contaminants. Sources of contamination at this site were controlled by demolishing the manufacturing buildings and constructing protective covers. The protective covers included soil, clay, concrete foundations, and asphalt parking lots that were integrated into the site development plan. Planned development includes a regional transportation center, a 200,000 sf Dayton-Hudson store, and a 750,000 sf office and hotel complex.

3.5 Other Superfund Sites in Close Proximity

Figure 1 illustrates the location of the Li Tungsten facility and Captain's Cove relative to other Federal Superfund sites. Three other federal/state Superfund sites, Crown Dykman, Powers Chemco (a.k.a. Konica Imaging USA, Inc.), and Mattiace Petro Chemicals, are immediately adjacent to the Site. In addition, there are a number of active industrial operations located along Glen Cove Creek and the Site.

Given the long history of industrial development in this area and the presence of other Superfund sites, cleanup of the Li Tungsten facility and Captain's Cove to residential criteria will create an "oasis," which is not justified. For the reasons put forth in this report, proper consideration of future land use and appropriate risk-mitigation measures support the recommended modifications to the Proposed Plan.

4. Basis of the Proposed Cleanup Criteria

Not in the Plan

4.1 Radiological Risks

The dominant radiological risk based on the evaluation presented in the FFS is external gamma radiation. Radionuclides present in sediments and groundwater were determined to be present at very low levels, which do not pose an unacceptable risk. Radon exposure does not pose unacceptable risk due to site use controls presented in the Proposed Plan that also includes radon-resistant building design. In assessing current and future risks associated with NORM, the risk assessment in the FFS did not adequately consider the effectiveness of the Removal Actions that mitigated site risks by consolidating materials exhibiting higher radiological activity in the Dickson Warehouse. As a result, radiological risks for the Site under current conditions were significantly overstated.

RESRAD modeling conducted by BBL demonstrates that Site risks due to external gamma radiation exposures attributable to NORM were overestimated by two orders of magnitude, and are within the acceptable risk range (10^{-4} to 10^{-6}). Also, the radiological risk assessment in the FFS did not consider attenuation of gamma radiation by the two-foot protective cover described in the Proposed Plan, which will further reduce Site-related risks below 10^{-6}.

Parcels B and C at the Li Tungsten facility and Areas A and G at Captain's Cove were identified in the FFS as representing the highest risk for a site worker and adult resident. For all of the reasons presented in Section 3, residential exposure scenarios are not appropriate for establishing cleanup criteria for this Site. The assessment of radiological risk presented in the FFS is significantly affected by the choice of Exposure Point Concentrations (EPCs). There are several deficiencies in the radiological risk evaluation that resulted in unrealistic estimates of exposure rates. These deficiencies include:

- The radionuclide data set is highly biased. Both the FFS and the Proposed Plan acknowledge this bias. As an example, Table 2 summarizes the radionuclide input data used in the RESRAD modeling presented in the FFS for Captain's Cove. Sample locations were selected based on field screening measurements and were intended to represent the worst conditions within each study area. Consequently, the analytical data and resultant EPCs are skewed towards higher concentrations. Use of the biased EPCs in the RESRAD modeling conducted as part of the FFS result in higher estimated radiological risks.

- The radiological risk assessment presented in the FFS did not use the radionuclide depth/distribution profile when deriving EPCs. This is an important consideration when external gamma radiation is the dominant contributor to effective dose equivalent (EDE) and evaluation of excess risk. For example, the maximum radionuclide levels detected from Areas A and G at Captain's Cove occurred at depths greater than two-feet with the majority of maximums found at depths greater than four-feet. Table 3 illustrates the impact of cover soils and depth on gamma radiation exposure rates. A 0.5-meter thick soil cover reduces the predicted exposure rates presented in the FFS by a factor of nearly 200. A one-meter thick soil cover reduces the predicted exposure rates by a factor of nearly 30,000.

- In the FFS, the EPCs used to calculate a reasonable maximum exposure (RME) grossly overestimate external gamma exposure. The EPCs are not consistent with exposure rate measurements at the Li Tungsten facility and Captain's Cove. Exposure rates for the Li Tungsten facility and Captain's Cove were calculated by BBL using the RESRAD model using default assumptions presented in the FFS and are summarized in Table 4. Significant inconsistencies were identified between the calculated and measured Site exposure rates. For those areas whose calculated risks were the highest, and formed the basis for requiring remedial action, these inconsistencies amount to at least a factor of 100 (two orders of magnitude). A factor of 100 would reduce risk estimates presented in the FFS to acceptable risk levels. The need for remedial action based on external gamma radiation risks is not justified for the Site.

EPA has established a goal of limiting gamma radiation exposures to 15 milliRem/year EDE. Targeted removal and installation of the two-foot soil cover specified in the Proposed Plan will effectively achieve this goal by reducing the estimated radiological risk presented in the FFS by a factor of at least 1,000. Based on our technical review, there is a compelling risk-based rationale that supports targeted removal of NORM.

4.2 Chemical Risk

According to FFS, the dominant contributor to chemical risk at the Site is arsenic, with lesser contributions from other metals. But in developing cleanup criteria for the site, realistic default assumptions were not used for the exposure scenarios covered by the risk assessment or for developing Site cleanup criteria. Overly conservative assumptions regarding Site exposures and dose were used that resulted in cleanup criteria that are essentially residential levels. As discussed in Section 3, residential use of the property is not a reasonably foreseeable use. Residential cleanup criteria are inappropriate in this instance.

A number of assumptions in the risk assessment in the FFS have resulted in overestimation of Site risk. These same considerations have also resulted in the development of cleanup criteria that are unnecessarily restrictive considering the planned site development. Deficiencies in the risk assessment are summarized below. The lead cleanup criterion is addressed in a subsequent portion of this section. Specific deficiencies in the FFS risk assessment include:

- The risk calculations assume that 100% of the soil ingested during every exposure event contains the highest concentration of each contaminant. This is clearly an inappropriate assumption given the high degree of variability exhibited by the Site data. Exposures do not occur at a discrete point where only the highest level of each contaminant is present, but would be distributed across the entire Site. As noted below, better use of statistical methods to evaluate the Site data and potential exposures and risks would have been more appropriate. Use of mean or median concentration, even with overly conservative default assumptions used in the FFS, yield estimated risks that are generally within or below the acceptable risk range.

- A central tendency analysis was conducted which indicated that the sampling data was highly biased. Both the FFS and the Proposed Plan acknowledge a bias in the Site data. Given the limitations of the data set, the use of statistical

methods, such as Monte Carlo analysis, would have been more appropriate to derive Site-related risk levels. Monte Carlo analysis is a statistical technique whereby the uncertainty and variability surrounding single-point risk estimates, such as those used in the FFS, can be quantitatively evaluated.

- An important factor that is not adequately considered in the FFS risk calculations is the fraction of the dose adsorbed. Default assumptions used in the FFS assume that the body adsorbs 100% of the ingested or inhaled dose. However, bioavailability of metals is a critical factor in assessing risk since inorganic metal species typically have lower adsorption rates. This is a particularly important consideration at this Site since metal-containing minerals typically exhibit the lowest bioavailability. Physiologically-based/Pharmacokinetic (PB/PK) modeling 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.

- EPA has noted that there is a "high degree of uncertainty" regarding the cancer slope factor for arsenic. It has become increasingly clear that the "dose and exposure condition for arsenic carcinogenicity is not well established" and the "scientific data upon which the carcinogenic effects due to arsenic exposure is based is questionable." There is a general lack of correlation between soil arsenic exposure, body burden, and cancer risk in the scientific literature. In addition, there is a growing body of scientific literature demonstrating a threshold effect for arsenic; that is, a dose that has no adverse effect. Given the uncertainties regarding the carcinogenic risk attributable to arsenic, risk-based cleanup criteria based on a non-cancer endpoint would be appropriate. Other EPA Regions (e.g., Regions IV and IX), where arsenic cleanup levels of up to 480 milligram/kilogram (mg/kg) have been developed for industrial sites, have accepted this approach. Arsenic cleanup criteria in this range are appropriate for this Site given the planned future development, and the land use restrictions and protective soil cover specified in the Proposed Plan.

Lead was evaluated non-quantitatively by comparing analytical results for soils to screening levels presented in OSWER Directives #9355.4-12 and #9200.4-27P. The proposed cleanup criterion for lead is clearly inappropriate for the following reasons:

- Residential lead screening levels were inappropriately utilized in the FFS to establish Site cleanup criteria. The 400 mg/kg screening level for lead is for residential exposure by children under seven years of age and is based on exposure to lead-based paint. Lead in lead-based paint exhibits a higher degree of availability relative to lead-containing minerals such as those found at the Site.

- OSWER Directives #9355.4-12 and #9200.4-27P clearly state that 400 mg/kg lead is a residential screening level and that "screening levels are not cleanup goals." EPA has further noted that "levels of contamination above the screening level would NOT automatically require a removal action, nor designate a site as contaminated."

- 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 are appropriate for this Site given the planned future development, and the land use restrictions and protective soil cover specified in the Proposed Plan.

4.3 ARARs and TBCs

Section 121(d)(2)(A) of CERCLA requires that remedial actions at Superfund sites meet any federal standards, requirements, criteria or limitations that are determined to be "applicable or relevant and appropriate" (ARAR). State ARARs must be met if they are more stringent than the corresponding federal requirement. Non-promulgated policies, advisories or guidance issued by federal or state agencies are "to be considered" (TBC), but do not have the same status as ARARs.

Certain ARARs and TBCs were identified in the FFS that were used to justify certain remedial actions, eliminate some alternatives from consideration, or establish cleanup standards. BBL has conducted an evaluation of some of these ARARs and TBCs, which is summarized in Table 5. The primary findings and conclusions from our analysis include the following:

- As discussed in Section 3, EPA policy on land use considerations in the CERCLA remedy selection process is an important issue for this Site. Remedial Action Objectives (RAOs) should reflect the planned Site usage (commercial/light industrial), which is relatively well defined in this instance. The risk assessment activities assumed residential exposures in setting some cleanup criteria, which is inconsistent with the Site development plan. Targeted removal with land use restrictions is consistent with the EPA policy.

- No specific regulatory prohibitions were identified which preclude containment in-place as part of a remedy that includes targeted removal, protective covers, and institutional controls. The Long Island Landfill Law and 6 NYCRR Part 380 are cited as reasons why on-site management options were not more fully considered. Targeted removal and placement of a protective cover over the remaining materials does not constitute new disposal and does not trigger the requirements of either regulation. Additionally, 6 NYCRR Part 380 does not specifically require removal of NORM to meet the state gamma radiation exposure limits.

- The on-site management option evaluated in the FFS addresses only metals-contaminated soils and residues. Even though none of the samples tested failed TCLP, the alternative presented in the FFS assumed that treatment or stabilization was required and that the treated materials would be placed in a RCRA minimum technology disposal cell with a RCRA cap. The Site risk reduction goals can be achieved without the use of treatment or RCRA disposal technology. Application of these criteria to the proposed alternative only had the effect of increasing costs without sufficient justification and making other alternatives appear more cost-effective. There is no specific regulatory driver that necessitates treatment, disposal in a lined cell or use of a RCRA cap.

- Regulations promulgated pursuant to the Uranium Mill Tailings Radiation Cleanup Act (UMTRCA) are intended to prevent residential exposure to radon in homes built on tailings sites, and to minimize gamma radiation exposures on tailing contaminated lands. Several EPA guidance documents (OSWER Directives) have been developed that address the use of UMTRCA regulations found at 40 CFR Part 192 in establishing cleanup criteria. Since

residential radon exposure is not an issue at the Site, the critical element in meeting the intent of the regulation or policy directives is limiting gamma radiation exposures. Acceptable risk levels and exposure limits can be achieved at the Site using targeted removal, implementation of land use restrictions, and a two-foot protective cover as specified in the Proposed Plan. NYSDEC Technical Administrative Guidance Manual (TAGM) #4003, a TBC, does not preclude the use of isolation or institution controls to meet exposure goals.

- The evaluation of ARARs and TBCs presented in 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 (AWQC) to standing water in these pits is not an appropriate use of the criteria. Additionally, use of the state sediment criteria, which are a TBC, is also inappropriately applied to residues in these pits.

- As described above, EPA policy on lead cleanup standards is inappropriately applied to the Site. Not only is the residential cleanup screening level for lead (400 mg/kg) not to be used as a cleanup standard, it is clearly not applicable for this site where future site use is commercial and light industrial development. Additionally, TAGM #4046, a TBC, establishes site background as the cleanup level for metals and are de facto residential criteria. Risk-based cleanup criteria are sufficiently protective when the anticipated future land use is considered, and realistic exposure scenarios and effective doses are used.

5. Analysis of Selected Remedy in the Proposed Plan

5.1 Definition of Areas to be Remediated

The areas designated in the FFS as requiring remediation have not been adequately delineated to support the decision-making process outlined in the Proposed Plan. Additional sampling activities conducted in March 1999 were not fully integrated into the FFS, and do not support the conclusions drawn presented in the report regarding the limits of contamination in some areas. It appears that the volume of soil above the proposed cleanup criteria were underestimated in the Draft Final FFS by at least fifty percent. This is discussed in greater detail below.

Based on our review, there remain significant gaps in the data used to estimate volumes of affected soil and residue. Additionally, the data set for NORM is highly biased. This bias has impacted identification and evaluation of remedial alternatives that are potentially applicable to this Site. For both radiological and chemical contaminants, the depth profile and distribution was not adequately considered during the remedy selection process and led to the use of overly conservative remedial actions.

Because of the deficiencies in the delineation of the impacted areas, the basis of the volume estimates used in the FFS engineering evaluation and cost estimates are not clearly documented. Even less well defined are the reasons for the significant volume differences presented in the Draft FFS and the Draft Final FFS. EPA indicated that the additional sampling activities supported further refinement in the delineations and the volume estimates.

Area G at Captain's Cove was used as a specific example of the March 1999 data being used to support reductions in the estimated volume. BBL prepared a series of cross sections for Area G to assist in our evaluation of the site data. Figure 2 shows the location of the cross-section transects. Figure 3 (the north-south section) revealed that the geoprobe samples extended only four-feet below ground surface. As indicated by the gamma logging data and analytical results for the radionuclides, the majority of radiological contamination in this area was encountered at depths greater than four-feet. Based on our cross-section, the geoprobe sample missed most of the contaminant zone. More importantly, the geoprobe sample, which represented a composite of the four-foot interval, exceeded proposed Site cleanup criteria for radium. Nonetheless, the FFS concluded that radiological contamination did not extend beneath the former condominium shells. Further examination of Figure 3 also shows that the northern limits of contamination have not been defined.

Figure 4 illustrates the radiological contaminant distribution along the west-east transect. Although the western limits of contamination appear to be somewhat defined, the eastern limits have not been delineated. No sampling data was identified which defined the eastern boundary of contamination. Therefore, the volume of contaminated soil presented in the FFS has been underestimated.

Deficiencies in the delineations presented in the FFS are further illustrated in the analysis of the radiological data for Area A at Captain's Cove. Figure 5 shows the location of cross-section transects and the limits of contamination, which

were taken from the FFS. Figures 6 and 7 present the north-south and west-east transects respectively. The figures clearly show that EPA did not adequately define the limits of contamination.

Using EPA's cleanup criteria, the limits of contamination in Area G and Area A were recalculated and are illustrated on Figures 3 and 5, respectively. Based on this analysis and similar evaluations for other Site areas, we believe that EPA has underestimated the volume of soil requiring remediation by at least fifty percent. Obviously, this has significant implications for the cost of implementing the Proposed Plan and the time to implement the selected remedy. This is discussed further in Section 5.2.

One important consideration that was not accounted for in the FFS and Proposed Plan is the presence of contaminants below the water table. As an example, Figures 3, 4, 6 and 7 indicate the position of the water table relative to radiological contaminants in soils at Captain's Cove. Clearly, some affected materials are present within the saturated zone. Nonetheless, the analysis of remedial alternatives in the FFS did not consider the impacts on cost or schedule for removal of these materials.

5.2 Engineering Evaluation

5.2.1 Targeted Removal Options

The FFS did not give adequate consideration to targeted removal alternatives that build upon the protective covers and institutional controls provided for in the Proposed Plan. The FFS incorrectly asserts that targeted removal and installation of protective covers, an element of the Proposed Plan, over the remaining material was precluded by the Long Island Landfill Law and 6 NYCRR Parts 360, 364 and 380 (refer to Section 4.3 and Table 5). As a result, targeted removal options, which are equally protective of human health and are substantially similar to the Proposed Plan, were not appropriately considered.

Where on-site management options were considered (for non-radiologically contaminated soils/residues only), the FFS assumed that a RCRA disposal cell and RCRA cap would be required. No technical basis was provided for use of a RCRA cap as opposed to other protective cover systems; e.g., soil cover, building foundations, paved parking lots, etc. Treatment was also included as a component of the on-site management option, although no rationale for treatment was provided in the FFS.

The Proposed Plan has already incorporated a two-foot protective cover into the selected remedy. As noted in Section 4, a two-foot soil cover reduces the estimated gamma radiation exposure by more than a factor of 1,000. The proposed soil cover is easily integrated into the Site development plan. Since buildings and structures will likely be built over some of the affected areas, additional soil cover may be required to support the foundations, which provides an even greater level of protection than the Proposed Plan.

5.2.2 Source Reduction using the Segmented Gate System

The selected remedy presented in the FFS and Proposed Plan includes source reduction for radiologically contaminated soils as a means of reducing the volume of material requiring off-site disposal at a landfill licensed to accept NORM and to reduce costs. ThermoNutec's Segmented Gate System (SGS) was the principal basis of the evaluation conducted in the FFS. However, there are a number of unanswered questions and unresolved technical issues regarding the potential effectiveness of the SGS at the Site.

Both EPA and the FFS acknowledge that volume reduction may not be effective in meeting the proposed 5 pCi/g separation criterion. Based on the literature reviewed by BBL, we concur that there is not a sufficiently demonstrated technical basis to conclude that the SGS will achieve the separation efficiency assumed in the FFS. The FFS assumed that a 55 percent reduction in the volume of above criteria soils could be achieved. Recent reports published by the U.S. Department of Energy (DOE) under the Accelerated Site Technology Deployment (ASTD) program (refer to DOE 1998, 1999a, 1999b, 1999c) do not support the assumed volume reduction using the proposed Site cleanup criteria for radionuclides. None of the published USDOE reports demonstrated removal of radionuclides below the proposed 5 pCi/g criteria for the Site. Reported reductions in soil volume ranged from four percent to ninety-eight percent; however, the higher soil volume reductions were achieved by the SGS using higher separation setpoints (typically over 50 pCi/g and up to 1,500 pCi/g).

The reliability of the SGS equipment appears to be an important issue and limitation. SGS targets 7 hours of processing per 10 hour operating day. Three hours of each ten-hour day are required for planned routine maintenance and service. Recent DOE reports presented information from several sites where average processing times averaged only 2.67 to 4.7 hours per day. "Unscheduled pauses" and "mechanical challenges" have been experienced which would also be expected to be encountered at the Sites. The published reports suggest that the SGS system was only operational about fifty percent of the planned operating schedules. We expect that this will result in higher costs and lower performance effectiveness than was assumed in the FFS and the Proposed Plan.

Reported unit treatment costs using the SGS were significantly higher than the $55/cubic yard (cy) cost assumed in the FFS and the Proposed Plan. Unit treatment costs presented in the DOE reports ranged from $87/cy to $236/cy, with an average cost of $145/cy. Based on the average unit processing cost of $145/cy, the cost of the volume reduction treatment of the above criteria soils will nearly triple.

The estimated time frame to implement the preferred remedy is seven months for Captain's Cove and nine months for Li Tungsten. As discussed in greater detail in Section 5.2.4, the selected remedy in the Proposed Plan cannot be completed within the anticipated time frames due, in part, to limitations of the SGS unit. Capacity of the SGS unit is limited by the geometry of the detector array and operational reliability. Additionally, the SGS unit cannot process oversized material (greater than 2-inches) or wet material. Neither limitation was factored into EPA's costs or schedule for implementing the selected remedy. Assuming seven hours of processing time per 10-hour day, SGS throughput

ranges from approximately 60 cy/day to 200 cy/day. These estimates do not include "unscheduled pauses" or "mechanical challenges."

5.2.3 Cost of Implementing the Proposed Plan

Estimated cost to implement the Proposed Plan are unrealistically low, due in part to unsupported assumptions regarding the source reduction activities and underestimated volume of soil that exceeds the proposed cleanup levels. Even assuming that the estimated soil volumes in the FFS are correct, BBL's analysis indicates that the cost of implementing the Proposed Plan was underestimated by $22 million to $52 million. Factoring in the increased soil volumes, the cost of the Proposed Plan was underestimated by approximately $30 million to $75 million. Detailed examples of the deficiencies in the cost estimates are discussed below.

The estimated costs for Site excavation are unrealistically low. Additionally, 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/cy. Actual costs for excavation, stockpiling and staging removed soils at a cleanup site in New York were $33/cy. Similarly, actual soil removal costs at the Metcoa Radiation Site in Pulaski, Pennsylvania were $55/cy. Using estimated soil volumes from the FFS, the excavation costs were underestimated by $1.7 million to $2.8 million. When the anticipated increase in soil volume is taken into consideration, the excavation costs were underestimated by $2.6 million to $4.2 million.

Estimates for the cost of the source reduction activities using SGS were unrealistically low compared to performance data presented in recent USDOE reports. Cost estimates in the FFS and Proposed Plan assumed SGS processing costs of $55/cy. This is significantly lower than the $87/cy to $236/cy cost presented in the published reports. The average SGS processing costs presented in the recent USDOE reports was $145/cy, which nearly triples the cost of the source reduction activities. Additionally, mobilization and demobilization costs, which are estimated to range from $100,000 to more than $500,000, were not included in the FFS cost estimates. As a result, the cost of the Proposed Plan has been underestimated by at least $10 million (using soil volumes from the FFS) and is likely underestimated by more than $15 million (based on the anticipated increase in soil volume).

The cost to manage over-sized material was not included in the FFS cost estimates. As previously noted, the SGS unit has specific limitations that limit the size of materials that can be processed. Typically, the over-sized materials are screened and/or crushed with some portion-requiring manual handling and cleaning. Unit costs for these activities, based on our experience at other sites, is approximately $75/ton. No reliable estimate of the volume of oversized materials could be developed from the available Site data. However, when compared to other similar sites, we would anticipate that five percent of the excavated material would exceed the size range that can be accommodated by the SGS unit. Accordingly, the estimated costs would increase by $325,000 (using soil volumes from the FFS) to $500,000 (based on the anticipated increase in soil volume).

No costs were included in FFS cost estimates for backfill material for the excavated areas or for the two-foot protective cover. Local quotations were obtained for clean fill at $7.50/ton. The increased cost to provide backfill for the Site is estimated between $750,000 (using EPA's soil volumes) and $1.1 million (based on the anticipated increase in soil volume).

No costs were included for construction dewatering during the excavation activities. As noted in Section 5.1, some contaminated soils are present below the water table. The FFS did not adequately consider management of soils/residues within the saturated zone in developing their remedial alternatives and estimated costs and schedule. Based on BBL's experience at other sites, the additional cost may range from $100,000 to more than $500,000.

The unit cost for disposal of radiologically contaminated soils is significantly lower than quotes obtained from private PRPs. Based on actual and quoted costs for disposal of radiologically contaminated soil at other sites, the unit costs for disposal used in the FFS appear to be low by a factor of two to five. The result is an increase in the cost of the radiologically impacted materials of $8 million to $28 million, assuming that estimated soil volumes in the FFS are correct. Accounting for the anticipated increase in soil volume, these disposal costs were underestimated by $12 million to $42 million. Even if unit cost for disposal presented in the FFS is extended to the private PRPs, the disposal costs for the radiologically contaminated soils was underestimated by at least $3 million based on the anticipated increased in soil volume. In addition, the disposal costs did not adequately consider transportation logistics in moving the radiologically impacted materials from the Site to rail transport facilities in Edison, New Jersey. This will add additional cost in excess of those presented above.

5.2.4 Schedule to Implement the Proposed Plan

The schedule in the FFS and Proposed Plan anticipates that the selected remedy can be implemented over a 16 month (1.3 year) time period. For the reasons detailed below, BBL has concluded that this implementation schedule cannot be met. The principal elements that impact the proposed schedule include the expected increase in soil volume that is to be removed and SGS capacity limitations. Management of affected soils beneath the water table, transportation logistics, etc. will also adversely impact the implementation schedule.

The SGS unit has a capacity of 60 to 200 cy/day based on planned operating cycles (sever hours of operation per ten-hour work day). Assuming 35 workweeks per construction cycle (year) and no increase in soil volume above the estimates contained in the FFS, it will require a minimum 1 to 3 years just to complete the source reduction activities. Based on the anticipated increase in soil volume, it will require a minimum of 1.5 to 4.5 years just to complete the source reduction activities. These time estimates assume no "unscheduled pauses" or "mechanical challenges" that reduce the average processing time below the seven hours per day target. Published reports from USDOE indicate that the average processing times may be significantly less than the target, resulting in longer implementation times and inevitably higher costs. Performance data from recent USDOE reports suggests operational uptime in the range of fifty-five to seventy percent. Assuming seventy percent uptime, source reduction activities alone will require from two to more than six years to complete. This does not include implementation of the other elements of the proposed plan.

BBL estimates that implementation of the Proposed Plan will require at least three to six years to complete. Targeted removal could be conducted in a significantly shorter time period than the activities contained in the Proposed Plan. Precision excavation can be accomplished in substantially less time and at a lower cost than the proposed source reduction activities using the SGS unit. The two-foot protective cover, an element of the Proposed Plan, can be installed in a relatively short period of time. Grading plans can be coordinated with the overall Site development plan.

5.2.5 Groundwater Protection

BBL concurs that groundwater remediation is not required for this Site. For all of the reasons set forth in this section, there is no compelling reason to require groundwater remediation even if more materials remain on-site. No scientific data is available which suggests that materials remaining on-site pose a threat to Long Island's sole source aquifer.

Groundwater use is currently limited due to widespread ambient contamination (principally volatile organic compounds) that is not attributable to operations at the Li Tungsten facility. Furthermore, salinity of the groundwater precludes its use as a source of drinking water. There are no complete current exposure pathways for groundwater at the Site.

Future use of groundwater at the Site as a source of drinking water is effectively precluded by Nassau County Public Health Ordinance #4, which prohibits installation of new private potable water systems in areas served by public water. The Site and surrounding vicinity is served by public water. Additionally, land use restrictions contained in the Proposed Plan include prohibitions on residential development and groundwater use at the Site. Therefore, there are no complete future exposure pathways for groundwater. Even in the absence of any remedial action, groundwater is not a pathway of concern at this Site.

Groundwater data from the FFS clearly indicate that groundwater at the Site is not impacted by radionuclides. Varying concentrations of metals were detected in groundwater. Exceedences of preliminary remediation goals (PRGs) for groundwater occur only in highly localized areas (for example, refer to Figure 2-3 in the FFS). Overall groundwater quality does not appear to have been significantly impacted by site-related metals. In fact, lead was detected in only one Site well on one occasion at a concentration that was marginally above the federal maximum contaminant level (MCL) for drinking water.

The Removal Actions completed at the Site by EPA should provide beneficial effects on groundwater with improved water quality for metals expected over time. Additionally, targeted removal actions and installation of protective covers, an element of the Proposed Plan, will also result in continuing improvement of groundwater quality. Targeted Removal with protective soil cover, and land use restrictions is substantially similar to the Proposed Plan, and is sufficiently protective of human health.

5.3 Phase I Remediation

EPA representatives discussed plans for "Phase I Remediation" at the Site during our meeting on August 19, 1999. The proposed Phase I activities include excavation of affected materials from the southern portions of Parcels A, B and C at the Li Tungsten facility, which will then be stockpiled north of the Dickson warehouse. For the reasons set forth below, BBL and the PRP Group do not believe that the proposed Phase I Remediation is technically justified and should not be implemented. Additionally, we believe that the Phase I Remediation activities will increase Site risk.

- Excavation, consolidation and storage of NORM-containing soils will cause an increase in risk above current levels. RESRAD modeling by BBL and Site measurement for gamma radiation demonstrate that exposures are below 15 milliRem/yr EDE, and do not pose a risk to human health. Exposure to gamma radiation at the Site is largely controlled at the present time by the overall distribution of the radiological contaminants (particularly in the subsurface). Excavation of NORM-containing soils will result in higher exposure levels than is currently the case.

- 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.

- Planned removal activities during the Phase I Remediation will add additional costs to the implementation of the Proposed Plan that are not adequately accounted for in EPA's cost estimates. The additional costs of maintaining the stockpiled materials, Site security, double handling the material after the removal activities, etc. were not considered.

- Bulk excavation of materials during the Phase I Remediation will inevitably lead to mixing of radiologically and non-radiologically contaminated soil 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.

- Once contaminated soils are excavated and removed from the original areas, management options become severely limited. Targeted removal, based on realistic risk assessment activities, is substantially similar to the activities contained in the Proposed Plan. However, once bulk excavation of soils is initiated, the benefits of targeted removal actions are lost. Integrating the protective cover and Site use restriction presented in the Proposed Plan with targeted removals results in reductions in risk which are within or below EPA's acceptable risk range in a more cost effective manner and in a shorter period of time.

6. Recommended Modification to the Proposed Plan

BBL proposes essentially minor changes to the Proposed Plan (i.e., targeted removal) that result in a comparable degree of protection to human health and the environment in a more cost-effective manner. Targeted removal is substantially similar to the Proposed Plan, and is based on scientifically defensible cleanup levels.

The first step involves performing a risk assessment to develop appropriate Site cleanup levels. The risk assessment activities will be based on the known future site uses (commercial/light industrial) and will evaluate more realistic exposure scenarios and dose equivalents. Consideration will be given to Site development activities that prevent or limit exposures or hazards.

Based on the results of the risk assessment, a more thorough data evaluation will be conducted to delineate impacted areas for targeted removal actions. Although significant data gaps were observed in the Site database, we do not believe that substantial new investigatory activities are needed to develop an appropriate plan.

Precision excavation will be used to selectively remove areas that contribute to unacceptable risk. Due to the generally low levels of NORM present, off-site disposal options will not be limited to the EnviroCare, Inc. landfill located in Utah. As specified in the Proposed Plan, a two-foot soil cover will be installed over the affected areas. Two feet of soil will effectively reduce the radiological risk estimate in the FFS by at least three orders of magnitude. The protective cover will be integrated into the overall site development plans as has been successfully accomplished at other Superfund redevelopment sites. Based on the location of buildings and structures on the Site, a thicker soil cover may be required to support the foundations, which results in even greater protection. Additionally, buildings, foundations, parking lots, etc. further serve as effective barriers between individuals visiting or using Site facilities and remaining materials. As specified in the Proposed Plan, buildings will be constructed using radon resistant designs. Utility trenches can be utilized to assure the integrity of the protective cover and will also facilitate future commercial and light industrial development at the Site.

Institutional controls have already been proposed and accepted by the City of Glen Cove as part of their development plan. There are no reasonably foreseeable Site uses that are precluded by the BBL's recommended modification to the Proposed Plan.

No infiltration controls are required based on the limited overall groundwater impacts that are attributable to Site operations (refer to Section 5.2.5). Likewise, consideration of treatment or stabilization of the remaining materials is not warranted given the limited impacts to groundwater and the generally limited availability of metals-containing minerals. Construction of an on-site RCRA cell and cap system is also not justified since subsurface migration is limited and no hazardous wastes have been identified.

Remaining materials do not constitute new disposal. Therefore, the Long Island Landfill Law and 6 NYCRR Parts 360, 364 and 380 are not applicable. BBL and the PRP Group are unaware of any specific regulatory or statutory requirements that would preclude targeted removal.

The overall result of targeted removal is substantially similar to the results achieved using the selected remedy in the Proposed Plan, and is equally protective of human health and the environment. As previously noted, precision excavation of targeted areas of contamination can be completed in significantly less time than bulk excavation and source reduction activities and at a lower cost, while providing an adequate level of protection.

Figures

BLASLAND, BOUCK & LEE, INC.
engineers & scientists

500403

REFERENCE: BASE MAP SOURCE USGS 7.5 MINUTE QUADS, SERIES ROCHESTER, NEW YORK, EAST AND WEST, 1971.

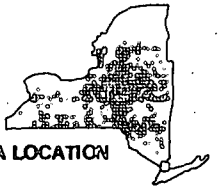
Site Name	Contaminants
Photocircuits Corporation	Primarily 1,1,1-TCA, methylene chloride and PCE
Mattiace Petro Chemicals	Chlorinated hydrocarbons and solvents
Powers Chemco (A.K.A.) Kordos Imaging USA, Inc.	Iron, toluene (solvents), ethylbenzene, and ethylbenzene
Captain's Cove	Benzene, 1,1,2-Trichloroethylene, PCE, heavy metals, and chloroform
Li Tungsten	As, Pb, Ra-226 and Th-232.
Pass and Seymour	PCE
Poll Corporation	PCE and TCE
Crown Dykman	PCE
Ronhill Cleaners	PCE
Penetrex Processing Company	PCE, TCE, and other organic solvents

NOTES:

1. Information obtained from the NYSDEC Registry of Inactive Hazardous Waste Disposal Sites in New York State, Vol. 1, April 1989.
2. All locations are approximate.

2000' 0 2000'

Approximate Scale: 1" = 2000'



AREA LOCATION

LI TUNGSTEN SITE
GLEN COVE, NEW YORK

HAZARDOUS WASTE SITES AROUND THE CITY OF GLEN COVE

BBL BLASLAND, BOUCK & LEE, INC. engineers & scientists

FIGURE 1

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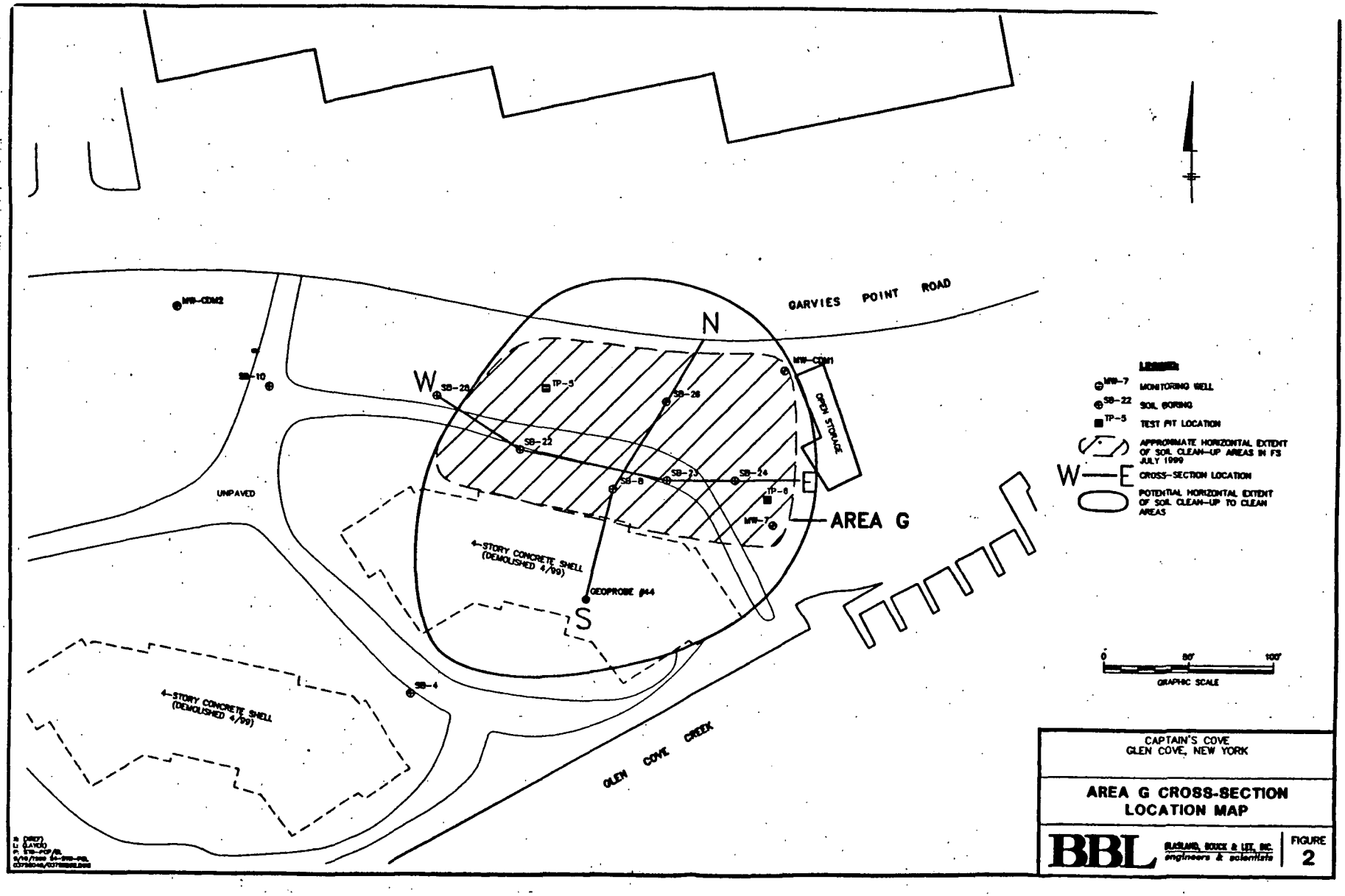
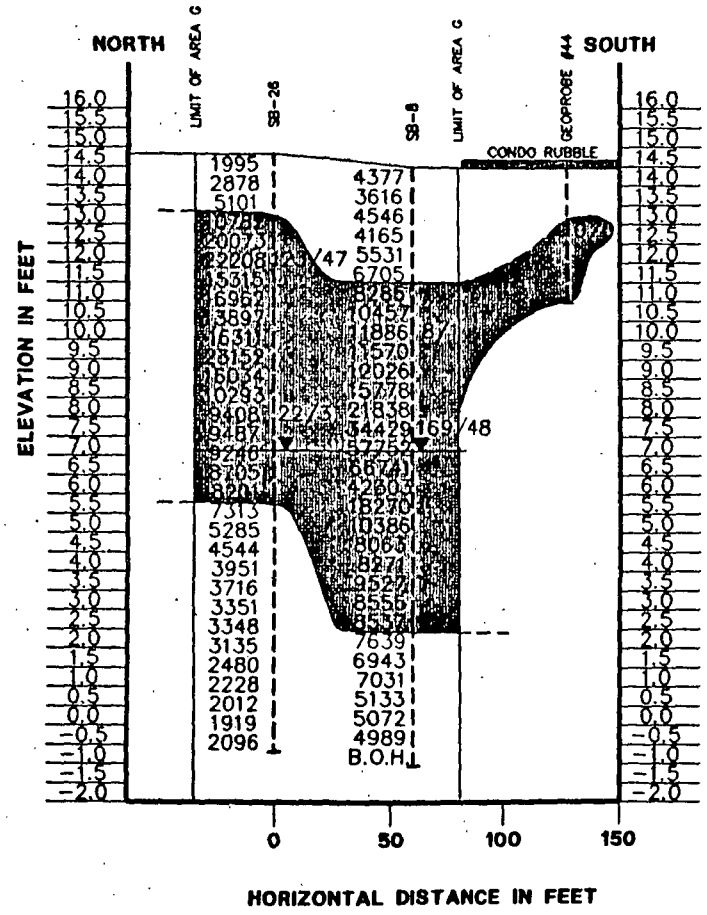

GARVIES POINT ROAD
GLEN COVE CREEK
UNPAVED
OPEN STORAGE
AREA G
N
S
W
E
MW-CDM2
MW-CDM1
SB-10
SB-20
SB-22
SB-8
SB-23
SB-24
SB-26
SB-4
TP-5
TP-6
MW-7
GEOPROBE #44
4-STORY CONCRETE SHELL (DEMOLISHED 4/99)
4-STORY CONCRETE SHELL (DEMOLISHED 4/99)
LEGEND
MW-7 MONITORING WELL
SB-22 SOIL BORING
TP-5 TEST PIT LOCATION
APPROXIMATE HORIZONTAL EXTENT OF SOIL CLEAN-UP AREAS IN FS JULY 1999
W—E CROSS-SECTION LOCATION
POTENTIAL HORIZONTAL EXTENT OF SOIL CLEAN-UP TO CLEAN AREAS
0 50' 100'
GRAPHIC SCALE
CAPTAIN'S COVE
GLEN COVE, NEW YORK
AREA G CROSS-SECTION LOCATION MAP
BBL
BLASLAND, BOUCK & LEE, INC.
engineers & scientists
FIGURE 2

500405



LEGEND

- SB-26 — BORING IDENTIFIER
- BORING
- RADIUM 226/THORIUM 232 IN PCI/g
- GROUNDWATER LEVEL (FROM FIGURE 3-1 IN THE FS)
- LIMIT OF ELEVATED RADIOACTIVITY (DASHED WHERE INFERRED)
- B.O.H. — BOTTOM OF HOLE
- AREA OF ELEVATED RADIOACTIVITY
- BOUNDARY LIMITS NOT DEFINED

VERTICAL EXAGGERATION = 10.000:1

GRAPHIC VERTICAL SCALE

GRAPHIC HORIZONTAL SCALE

NOTES:

1. GAMMA LOGS FROM TABLE 2-8 OF THE F.S IN COUNTS PER 30 SECONDS.
2. RADIUM 226 AND THORIUM 232 FROM ATTACHMENT J OF THE F.S.
3. PHYSICAL LOCATION AND ELEVATION OF GEOPROBE #44 UNKNOWN (9/7/99).

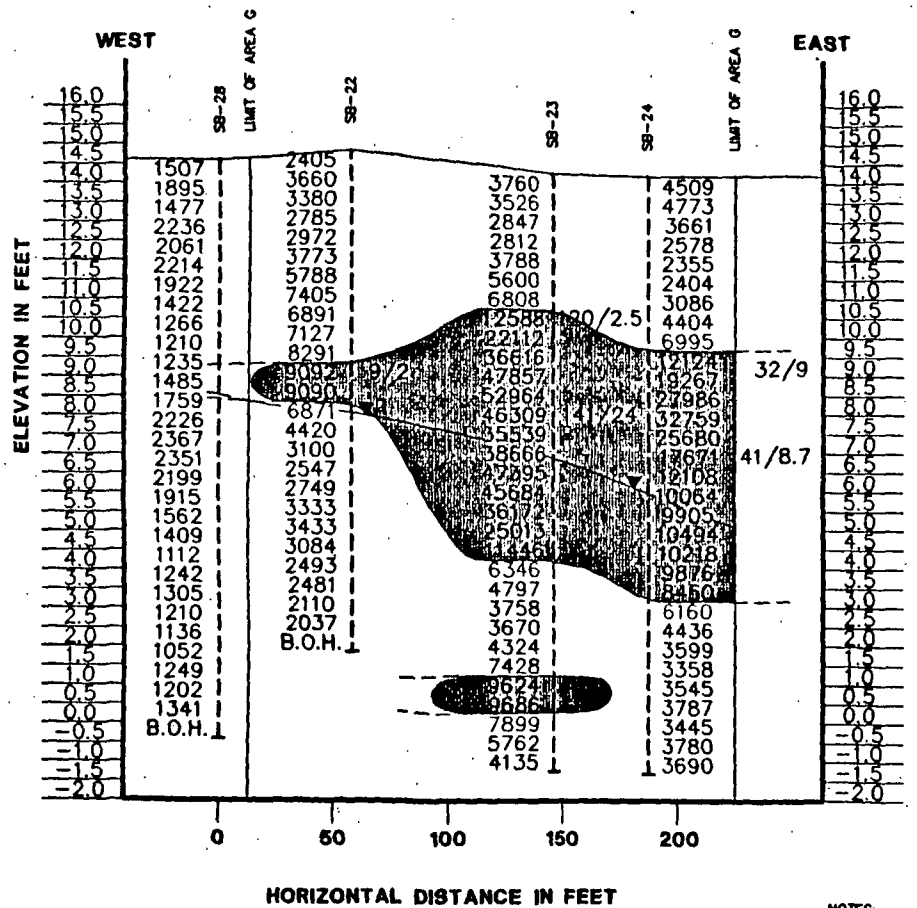
CAPTAINS COVE
GLEN COVE, NEW YORK

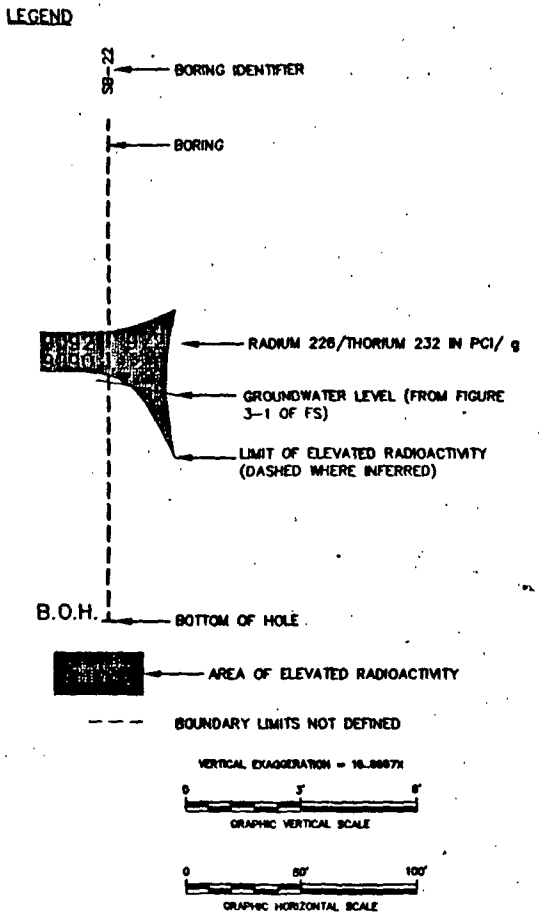
CROSS-SECTION AREA G
NORTH TO SOUTH

BBL engineers & scientists

FIGURE 3

500406





NOTES:

1. GAMMA LOGS FROM TABLE 2-8 OF THE F.S IN COUNTS PER 30 SECONDS.
2. RADIUM 226 AND THORIUM 232 FROM ATTACHMENT J OF THE F S.

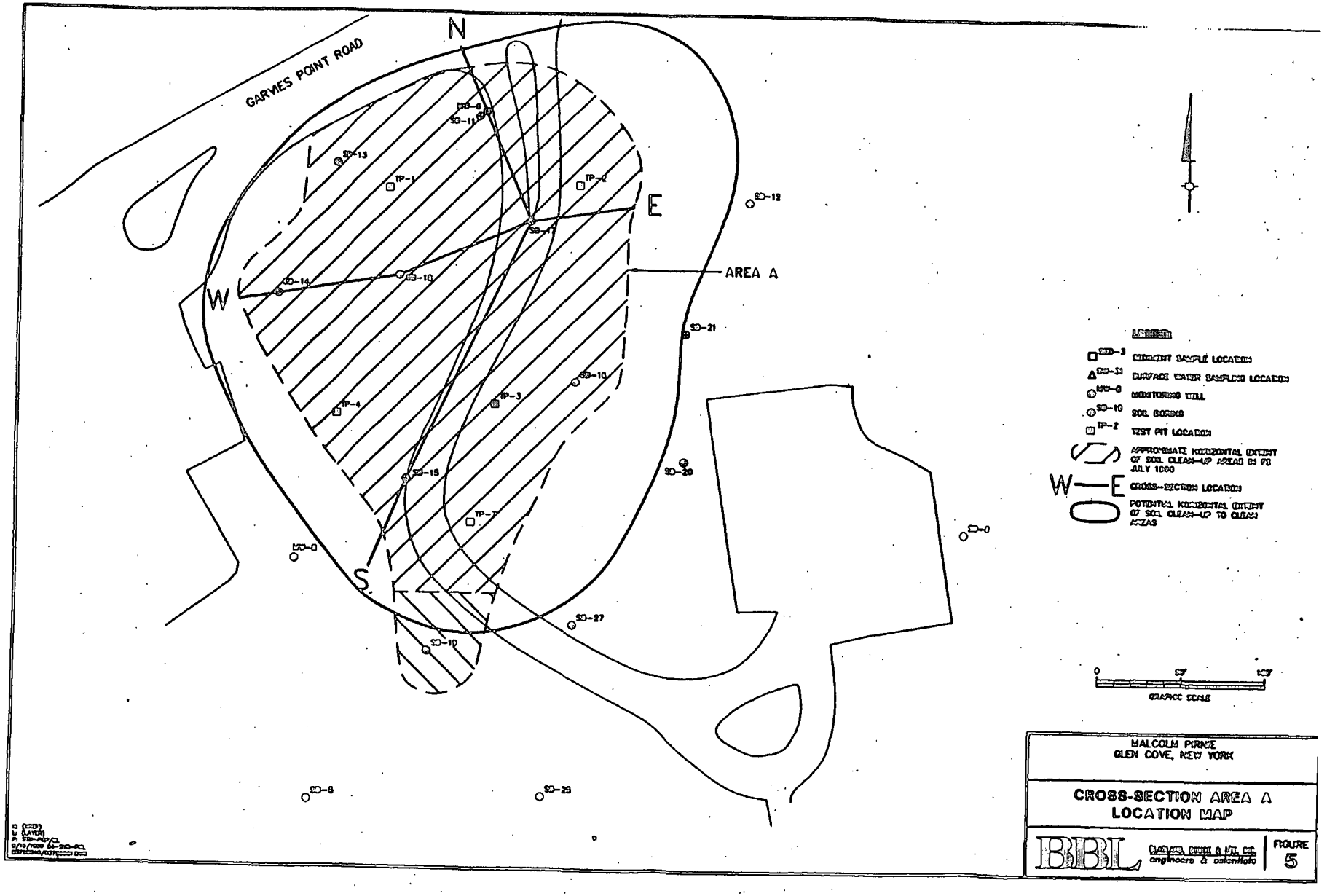
CAPTAINS COVE
GLEN COVE, NEW YORK

CROSS-SECTION AREA G WEST TO EAST

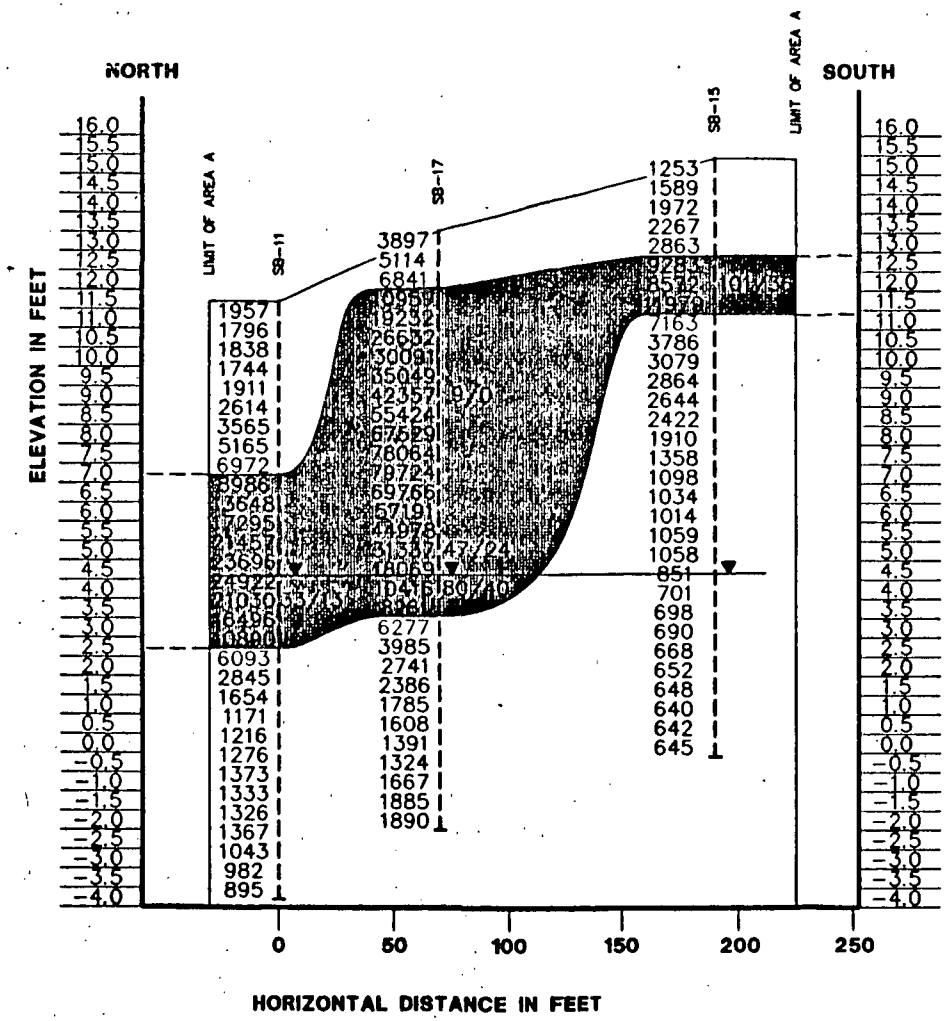
BBL BLASLAND, BOUCK & LEE, INC. engineers & scientists

FIGURE 4

500407


GARVIES POINT ROAD
N
S
E
W
AREA A
TP-1
TP-2
TP-3
TP-4
TP-7
SD-12
SD-13
SD-14
SD-19
SD-20
SD-21
SD-27
SD-29
LEGEND
SEDIMENT SAMPLE LOCATION
SURFACE WATER SAMPLING LOCATION
MONITORING WELL
SOIL BORING
TEST PIT LOCATION
APPROXIMATE HORIZONTAL EXTENT OF SOIL CLEAN-UP AREAS IN FO JULY 1990
CROSS-SECTION LOCATION
POTENTIAL HORIZONTAL EXTENT OF SOIL CLEAN-UP TO CLEAN AREAS
GRAPHIC SCALE
MALCOLM PIRNIE
GLEN COVE, NEW YORK
CROSS-SECTION AREA A
LOCATION MAP
BBL
engineers & scientists
FIGURE
5

500408



LEGEND

- SB-15 — BORING IDENTIFIER
- BORING
- RADIUM 226/THORIUM 232 IN PCI/g
- LIMIT OF ELEVATED RADIOACTIVITY (DASHED WHERE INFERRED)
- GROUNDWATER LEVEL (FROM FIGURE 3-1 IN THE FS)
- BOTTOM OF HOLE
- AREA OF ELEVATED RADIOACTIVITY
- BOUNDARY LIMITS NOT DEFINED

VERTICAL EXAGGERATION = 16.6667X

GRAPHIC VERTICAL SCALE

GRAPHIC HORIZONTAL SCALE

NOTES:

1. GAMMA LOGS FROM TABLE 2-8 OF THE F.S IN COUNTS PER 30 SECONDS.
2. RADIUM 226 AND THORIUM 232 FROM ATTACHMENT J OF THE F S.

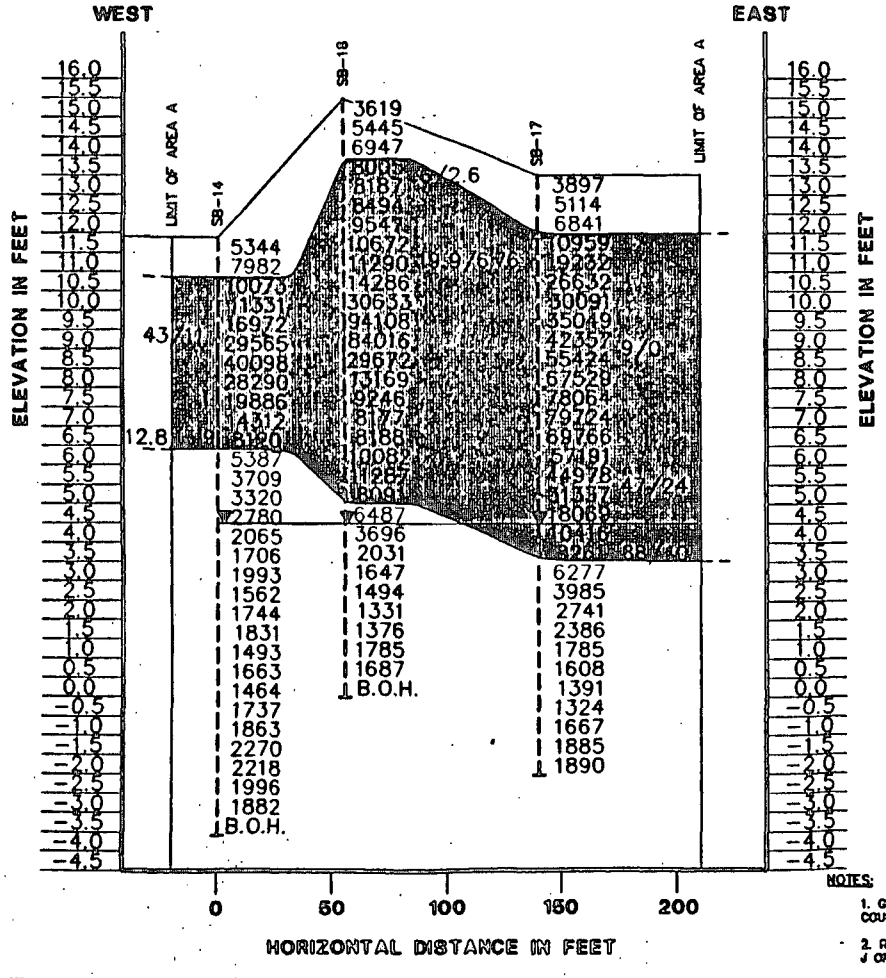
CAPTAINS COVE
GLEN COVE, NEW YORK

CROSS-SECTION AREA A NORTH TO SOUTH

BBL BLASLAND, BOUCK & LEE, INC. engineers & scientists

FIGURE 6

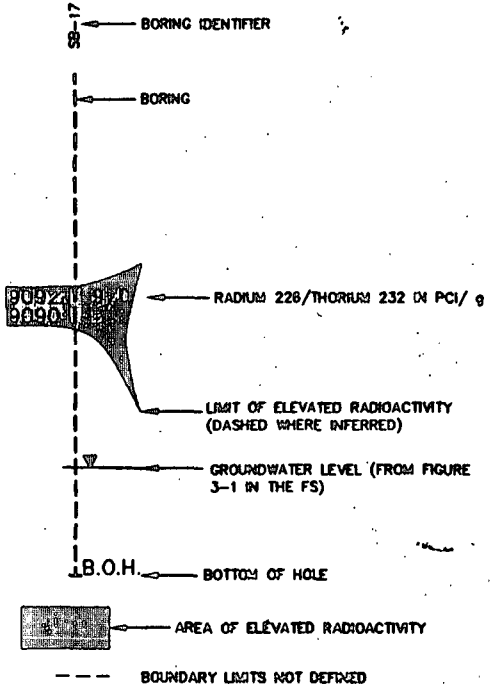
500409



NOTES:

1. GAMMA LOGS FROM TABLE 2-5 OF THE F.S IN COUNTS PER 30 SECONDS.
2. RADIUM 226 AND THORIUM 232 FROM ATTACHMENT J OF THE F.S.

LEGEND



CAPTAIN'S COVE
GLEN COVE, NEW YORK

CROSS-SECTION AREA A WEST TO EAST

BBL BLASLAND, BOUCK & LEE, INC. engineers & scientists

FIGURE 7

500410

Tables

BLASLAND, BOUCK & LEE, INC.
engineers & scientists

500411

Table 1
Returning Superfund Sites to Productive Uses
Brownfield Development Success Stories [1]
Integrating Containment / Capping Into Site Development Plans

Site and Location	Description	Contaminants [2]	Remedy and Site Development
Denver Radium Site Operable Unit 09 Denver, CO	Former radium processing site constructed in the early 1900s and operated through the 1920s. Subsequently became a brick and tile manufacturing facility. Site consists of 17 acres located south of Denver's business district in an area that is predominantly commercial and industrial with residences located several blocks to the east.	Ra^{226}, As, Pb, Zn Media: soil and groundwater	Selective removal of contaminated soil and demolition of site structures. Metal contaminated soils consolidated on-site with protective cap. Cap system was integrated into site development plan for construction of Home Depot. EPA consolidated the soil on site and Home Depot constructed the cap paving the way for construction of a 130,000 sf store. Home Depot is responsible for maintaining the cap and institution controls (no residential development; no groundwater usage).
Industri-Plex Site Woburn, MA	Former chemical manufacturing facility located on 245 acres in a dense commercial and industrial area. From 1853 until 1969, a variety of manufacturers produced chemicals, insecticides, munitions and glue products.	As, Pb, Cr, VOCs Media: soil and groundwater	Sources of contamination were controlled by demolishing buildings and constructing several protective covers (e.g., soil, clay, concrete foundations, asphalt parking lots) over portions of 110 acres of contaminated soil. Future site development plans included future site use restrictions to maintain the integrity of the caps. Development included a Regional Transportation Center, Dayton-Hudson retail development (200,000 sf), and a planned 750,000 sf office and hotel complex.

[1] Information obtained from *Superfund Redevelopment Initiative* web page www.epa.gov/programs/recycle/index.htm.
[2] Contaminants found at Li Tungsten sites indicated in bold font.

500412

Table 4
RESRAD [1] Risk Calculations
Li Tungsten Facility and Captain's Cove Property [2]

Isotope [3]	LIW_TRS [4] Parcel B&C	LIW_SW [5] Parcel B&C	CC_RES [6] Area A/AS
Pb-210+D [7]	84.9	84.9	212
Ra-226+D	84.9	84.9	212
Ra-228+D	249	249	47.5
Th-228+D	249	249	62.2
Th-230	214	214	201
Th-232	88.1	88.1	53.9
U-234	307	307	156
U-238+D	307	307	154
External Pathway (mrem/yr) [8]	122.8	971	1803
Background (mrem/yr)	0.779	6.16	17.3
Occupancy Adjustment [9]			
RESRAD Indoor Fract	0.007	0.114	0.509
RESRAD Outdoor Fract	0.021	0.114	0.170
Occupancy Factor (yr)	0.026	0.205	0.577
Area Exp Rate (uR/hr) [10]	538.6	539.4	356.6
Bkg Exp Rate (uR/hr) [11]	3.4	3.4	3.4
Exp Rate Ratio: Area/Bkg	157.6	157.6	104.2

[1] RESRAD v. 5.83
[2] Data obtained from the Final FFS and RI for the Li Tungsten Facility and Captain's Cove.
[3] Isotope concentrations in pCi/g.
[4] Li Tungsten facility Parcel B & C– trespasser exposure scenario.
[5] Li Tungsten facility Parcel B & C– site worker exposure scenario.
[6] Captain's Cove Area A (all soils) – residential exposure scenario.
[7] D = daughter products.
[8] External pathway exposures calculated using RESRAD and default values from FFS, Appendix A.
[9] Adjustment for 100% outdoor exposure.
[10] Exposure rate based on FFS input values – does not include cosmic radiation and K^{40}.
[11] Area exposure rate after Removal Action corrected for cosmic radiation and K^{40}. Site readings after Removal Action were comparable to background levels.

Table 5
Evaluation of Potential ARARs and TBCs
Li Tungsten Corporation Site

ARAR or TBC	Potential Status	Comments
Land Use in the CERCLA Remedy Selection Process OSWER Directive #9355.7-04	TBC	1. The Site is not located in an area where environmental justice issues are a concern. 2. Remedial Action Objectives (RAOs) should reflect the planned Site usage when, as in this case, future use is relatively certain. 3. Risk Assessment activities assumed residential exposures in setting some cleanup criteria, which are inconsistent with the Site development plan. 4. The policy contemplates that restricted use could be a long-term waste management area over all or part of the site. 5. Targeted removal with containment in-place and land use restrictions is consistent with the EPA policy.
Long Island Landfill Law NYS Environmental Conservation Law 27-0704	ARAR	1. Prohibits siting of new landfills in Nassau and Suffolk Counties. 2. Does not preclude containment in-place, which does not represent new disposal. 3. May preclude on-site consolidation activities such as those proposed by representatives for the City of Glen Cove. 4. May preclude EPA's proposed Phase I Remediation.
Prevention and Control of Environmental Pollution by Radioactive Materials 6 NYCRR Part 380	ARAR	1. Regulations do not preclude containment in-place. 2. Containment in-place does not constitute a new low level radioactive waste disposal site. 3. No regulatory requirement for removal of NORM.
RCRA Land Disposal Restrictions (LDRs) 40 CFR Part 268	ARAR	1. None of the in-place soils/residuals at the Site are classified as hazardous wastes. All samples tested passed TCLP. 2. LDRs are not an ARAR for non-hazardous waste. 3. No regulatory driver for treatment or stabilization of soils/residuals.
RCRA Requirements for Treatment, Storage and Disposal Facilities 40 CFR Parts 264 and 265	ARAR	1. None of the in-place soils/residuals at the Site are classified as hazardous wastes. All samples tested passed TCLP. 2. RCRA minimum technology requirements under Subtitle C are not necessary to achieve risk reduction goals. 3. No regulatory driver for use of a RCRA disposal cell for in-place containment of soil/residuals.

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able 5
Evaluation of Potential ARARs and TBCs
Li Tungsten Corporation Site

ARAR or TBC	Potential Status	Comments
Solid Waste Management Facilities 6 NYCRR Part 360	ARAR	1. Regulations do not preclude containment in-place. 2. Containment in-place does not constitute new disposal site.
Health and Environmental Standards for Uranium and Thorium Mill tailings 40 CFR Part 192	ARAR	1. Intended to prevent residential exposures to radon, and gamma radiation exposures. Residential development is not an anticipated future use of the Site. 2. Level of gamma radiation not to exceed background by more than 20 microR/hr. Site readings after Removal Action generally within the target range. Gamma radiation exposure limits under current and future site use conditions meet UMTRCA requirements. 3. Long-term stabilization and isolation is provided for in the regulations. 4. Supplemental standards may be considered where site specific factors limit hazard and exposures.
Use of Soil Cleanup Criteria in 40 CFR Part 192 as Remediation Goals for CERCLA Sites OSWER Directive #9200.4-25	TBC	1. Standards promulgated at 40 CFR Part 192 to limit risk of inhalation of radon decay products in houses built on land contaminated with tailings. 2. Limit gamma radiation exposure to people using contaminated land. Exposure limit 15 milliRem/yr EDE above background. 3. Radon exposure is not an issue at the Site. Residential development is not a reasonably anticipated future use. 4. Gamma radiation exposure limits under current and future Site use conditions meet UMTRCA requirements.
Establishment of Cleanup Levels for CERCLA Sites with Radioactive Contamination OSWER Directive #9200.4-18	TBC	1. Cleanup levels for various media that correspond to the acceptable risk level (15 milliRem/yr EDE above background) will depend in part on land use at the site. 2. The Policy anticipates site use limitations and restrictions to meet risk criteria. 3. Acceptable risk levels and exposure limits can be achieved at the Site using targeted removal, and implementation of land use restrictions and protective covers as specified in the Proposed Plan.

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Table 5
Evaluation of Potential ARARs and TBCs
Li Tungsten Corporation Site

ARAR or TBC	Potential Status	Comments
NYSDEC Technical Administrative Guidance Manual (TAGM) #4003	TBC	1. TAGM does not represent promulgated standard or regulatory requirement. 2. Goal is to reduce exposures to less than 10 milliRem/yr EDE above background. 3. Modeling (RESRAD) may be used to evaluate site exposures referenced to reasonable scenarios for current and plausible future uses of the land. 4. Does not preclude the use of containment or isolation and institutional controls to meet the 10 milliRem/yr exposure limit. 5. Acceptable exposure limits can be achieved at the Site using targeted removal, and implementation of land use restrictions and protective covers as specified in the Proposed Plan.
Surface Water and Groundwater Quality Standards and Groundwater Effluent Standards 6 NYCRR Part 703	ARAR	1. AWQC improperly applied to standing water in pits used during ore processing activities. 2. Application of the criteria appears to assume that there are discharges from the pits that result in exceedences of AWQC in Glen Cove Creek. The available data do not support such a conclusion. 3. Planned site development will likely result in filling and grading of the Mud Pond and Mud Holes. Therefore, AWQC not applicable.
Technical Guidance for Screening Contaminated Sediment NYSDEC, Division of Fish and Wildlife (1993)	TBC	1. Criteria improperly applied to ore processing pits. 2. The Mud Pond and Mud Holes do not represent unique aquatic habitats. Planned site development will likely result in filling and grading of the Mud Pond and Mud Holes. Therefore, NYDEC sediment criteria do not apply.
NYSDEC TAGM #4046	TBC	1. TAGM does not represent promulgated standard or regulatory requirement. 2. General cleanup standard for metals is site background, which does not consider actual or planned site use. 3. Site exposures to chemical contaminants can be controlled through targeted removal, and protective covers and land use restrictions as presented in the Proposed Plan.

500416

Appendix A

References

Selected References

EPA 1989	Final Draft, Preliminary Assessment, Li Tungsten, Glen Cove, New York, Rev. No. 1, October 1989.
EPA 1990	Final Draft, Site Inspection Report, Li Tungsten, Glen Cove, New York, Volumes I through V, September 1990.
EPA 1994a	Use of Monte Carlo Simulation in Risk Assessments, EPA 903-F-94-001, February 1994.
EPA 1994b	Guidance Manual for Integrated Exposure Uptake Biokinetic Model for Lead in Children, Office of Solid Waste and Emergency Response, EPA/54-/R-93/081.
EPA 1994c	Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities, OSWER Directive #9355.4-12.
EPA 1995	Land Use in the CERCLA Remedy Selection Process, OSWER Directive #9355.7-04.
EPA 1996	Technical Review Workgroup for Lead for an Interim Approach to Assessing Risk Associated with Adult Exposure to Lead in Soil.
EPA 1996/1999	Pollution Reports (POLREPS), Li Tungsten Site, Nos. 1 through 84.
EPA 1998a	Draft Final Remedial Investigation Report, Li Tungsten Superfund Site, Glen Cove, New York, Work Assignment No. 025-2L4L, Volumes I through IV, May 1998.
EPA 1998b	Draft Feasibility Study (FS) Report, Li Tungsten, Glen Cove, New York, Work Assignment No. 025-2L4L, Volumes I and II, December 1998.
EPA 1998c	Memorandum from Timothy Fields, Jr., Acting Assistant Administrator, RE: Clarification to the 1994 Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities.
EPA 1999a	Superfund Proposed Plan, Li Tungsten Corporation Site, City of Glan Cove, Nassau County, New York, July 1999.
EPA 1999b	Draft Final Feasibility Study Report, Li Tungsten, Glen Cove New York, Work Assignment No. 028-RICO-024L, Volumes I and II, July 1999.
EPA 1999c	Superfund Redevelopment Initiative, www.epa.gov/superfund/programs/recycle
DOE 1988	Technology Deployment - Segmented Gate System (SGS), U.S. Department of Energy, August 1988.
DOE 1999a	Cost and Performance Report, Thermo NUTech's Segmented Gate System, Sandia National Laboratories Environmental Restoration Site 16, Albuquerque, New Mexico, Accelerated Site Technology Deployment, U.S. Department of Energy, January 1999.

Selected References

DOE 1999b Cost and Performance Report, Thermo NUTech's Segmented Gate System, Pantex Plant, Firing Site 5, Amarillo, Texas, Accelerated Site Technology Deployment, U.S. Department of Energy, March 1999.

DOE 1999c Cost and Performance Report, Thermo NUTech's Segmented Gate System, Tonapah Test Range, Clean Slate 2, Tonapah, Nevada, Accelerated Site Technology Deployment, U.S. Department of Energy, July 1999.

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August 31, 1999

Mr. Edward Als, Project Manager
Eastern New York Remediation Section
Emergency and Remedial Response Section
U. S. Environmental Protection Agency, Region II
290 Broadway, 17th Floor
New York, NY 10007-1866

Re: **Li Tungsten Superfund Site**
General Carbide Corporation and Vista Metals, Inc.'s
Comments to EPA's Proposed Plan

Dear Mr. Als:

On behalf of General Carbide Corporation ("General Carbide") and Vista Metals, Inc. ("Vista Metals"), we are submitting comments to the Proposed Plan recently published for comment by the United States Environmental Protection Agency ("EPA") regarding the above referenced superfund site. These comments are being submitted pursuant to the provisions of Section 117(a) of CERCLA, 42 U.S.C. § 9617(a), and Section 300.430(f) of the National Contingency Plan (NCP), 40 CFR § 300.430(f). Comments were originally due by August 27, 1999. However, EPA extended the public comment period to September 17, 1999. Therefore, these comments are submitted timely.

By submitting the comments set forth herein, General Carbide and Vista Metals do not admit to any liability and hereby reserve their right to challenge any legal or factual findings, determinations or conclusions EPA has made or may make and to fully contest their liability in any proceeding instituted by EPA or any other party. Nothing set forth herein shall be deemed to be an admission of liability by General Carbide or Vista Metals, or their officers, employees, shareholders, or agents.

I. Designation of Two Operable Units

General Carbide and Vista Metals agree that it is proper to designate two operable units for the Site and to divide the remediation accordingly. To the extent that the Captain's Cove

Property (designated as Operable Unit 2) is being considered part of the Li Tungsten Superfund Site solely or primarily because radioactive wastes originally located or generated at the Li Tungsten Site (Operable Unit 1) were removed to or disposed at the Captain's Cove Property, it is appropriate to develop the remediation as a separate operable unit. Companies such as General Carbide and Vista Metals who have been identified as potentially responsible parties ("PRPs") based on the sale of tungsten carbide materials to Li Tungsten for the processing of tungsten carbide and other metals but who did not send tungsten ores, slags or other radionuclide-containing materials to Li Tungsten should not be compelled to contribute to the investigation or remediation of the Captain's Cove Property. Similarly, PRPs who did not own, operate or control the disposition of byproducts or wastes produced by Li Tungsten and removed to Captain's Cove should not be saddled with any cleanup costs relating to the Captain's Cove Property. Since there is no legal justification to impose any obligations on General Carbide or Vista Metals (or similarly situated PRPs) regarding remediation of the Captain's Cove Property, dividing the cleanup into distinct operable units should facilitate the cleanup, minimize costs and reduce third party contribution litigation, thereby promoting the "implementability" of the overall remedy, an important evaluation criterion under the NCP.

II. Selection of Remedial Alternatives LS-4 and CS-4

General Carbide and Vista Metals do not agree with EPA's recommendation of Remedial Alternative LS-4 and believe, instead, that Remedial Alterative LS-3 would be preferable in view of its lower capital costs. Offsite disposal of nonradioactive metals-contaminated soils is unnecessary and would not provide significant additional overall protection of human health and the environment if the onsite treatment and containment system was properly designed, constructed and operated. It is likely that the Li Tungsten site would be utilized for future nonresidential uses as opposed to residential uses. Proper containment of nonradioactive metals-contaminated soils would adequately protect such future nonresidential uses, and would satisfy the NCP evaluation criteria, including overall protection of human health and the environment; compliance with ARARs; long-term effectiveness and permanence; reduction of toxicity, mobility and volume; implementability; cost, etc.

Since General Carbide and Vista Metals do not believe they have any potential liability for the remediation of any radioactive contamination, they offer no comments on EPA's recommendation of CS-4 or any other remedial alternative for the Captain's Cove Property (OU-2).

III. Selection of Remedial Alternative LW-1

General Carbide and Vista Metals concur with EPA's recommendation of Remedial Alternative LW-1: No Action. In view of the sporadic and low levels of inorganic

non-use of the aquifer, and availability of a public water supply, it is unnecessary and would be unduly costly to design and construct any active remediation or treatment systems. Deed restrictions should be adequate to assure future non-use of the aquifer at least until such time as groundwater quality may improve after completion of the remedy and annual monitoring. General Carbide and Vista Metals commend EPA for recommending a "no action" alternative and urge EPA not to be swayed by any public comments criticizing the no action alternative. For PRPs who may be compelled to fund or implement remedial action at superfund sites, minimization of costs is an important goal and the dispositive consideration among the NCP evaluation criteria where, as in this case, any additional protections of human health or environment do not justify the capital costs.

General Carbide and Vista Metals appreciate EPA's careful consideration of these comments to the Proposed Plan.

Very truly yours,

Stephen C. Smith

Stephen C. Smith