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EPA Superfund
Record of Decision:

LI TUNGSTEN CORP.
EPA ID: NYD986882660
OU 04
GLEN COVE, NY
03/30/2005

RECORD OF DECISION

Li Tungsten Corporation Superfund Site
Operable Unit Four - Glen Cove Creek

City of Glen Cove
Nassau County, New York

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 Superfund 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 this remedy for the 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 file for this Site. The index for the administrative record file is attached to this document (APPENDIX III).

ASSESSMENT OF THE SITE

Actual or threatened releases of hazardous substances from the Li Tungsten Superfund Site, if not addressed by implementing the response action 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 has been designated as operable unit (OU) 4 by the U.S. Environmental Protection Agency, and addresses radioactive slag fragments deposited in Glen Cove Creek as a result of the operations of the former Li Tungsten manufacturing facility. The Site includes the former Li Tungsten facility property, the radiologically-contaminated portions of the Captain's Cove property, and nearby areas where radiologically-and/or metals-contaminated materials associated with. the former Li Tungsten facility came to be located, including portions of Glen Cove Creek. Decision documents have addressed contaminated soils and groundwater at the former Li Tungsten manufacturing facility and the Captain's Cove property. No additional OU's are planned for the Site.

Selected Remedy

The major components of the selected remedy for OU 4 include:

- Construction of a dewatering facility on the Li Tungsten property;
- Two phases of Creek dredging to remove radioactive slag materials;
- Dewatering of the dredged sediment followed by segregation of slag from the dewatered sediment; and

- Off-site transportation and disposal of the radioactive slag at an appropriately licensed facility.

The Remedial Action Objectives for Creek remediation are to reduce or eliminate any direct contact, ingestion, or external radiation threat to public health and the environment associated with radioactive slag in the Creek project area and to reduce or eliminate any direct contact, ingestion, inhalation or external radiation threat to public health and the environment associated with radioactive slag in dewatered sediments placed in upland disposal areas.

DECLARATION OF STATUTORY DETERMINATIONS

The selected remedy meets the requirements for remedial actions set forth in Section 121 of CERCLA, 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 it satisfies the statutory preference for remedies that employ treatment that reduces toxicity, mobility, or volume of contaminants as their principal element.

Upon completion of the remedial activities for this OU, no Site-related hazardous substances are expected to remain in Glen Cove Creek above levels that prevent unlimited use and unrestricted exposure. After the remedial dredging activities have been completed, a survey will be conducted to confirm that no Site-related hazardous substances remain in the Glen Cove Creek. Assuming that this is the case, pursuant to Section 121 (c) of CERCLA, five-year reviews of this action will not be required. There will be hazardous substances remaining at this Site as a result of other OUs which will require five-year reviews.

William J. McCabe
Acting Director, Emergency and
Remedial Response Division

3/30/05
Date

United States Environmental Protection Agency
Region II
New York, New York
March 2005

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SITE NAME, LOCATION AND DESCRIPTION

The Li Tungsten Superfund site (EPA identification # NYD986882660), located in Nassau County, Long Island, New York, includes the former Li Tungsten facility property, the radiologically-contaminated portions of the Captain's Cove property, and nearby areas where radiologically- and/or metals-contaminated materials associated with the former Li Tungsten facility came to be located, including portions of Glen Cove Creek (**Figure 1**) . The former facility is located at 63 Herbhill Road in the City of Glen Cove, while the Captain's Cove property is located one-half mile west of the former facility on Garvies Point Road. These two properties lie along the northern edge of Glen Cove Creek (**Figure 2**).

The 26-acre former facility consists of four parcels that were designated by the U.S. Environmental Protection Agency (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 was the primary operating area and contained the majority of buildings, including the Dice complex, as well as storage and processing tanks. Parcel B, a six-acre tract north of Parcel A, is undeveloped land that was used for parking during facility operations and includes a small pond, an intermittent stream and a small wetland. Parcel C, approximately ten acres in size, is north of Parcel A and west of Parcel B. The Dickson Warehouse and the Benbow Building are located on Parcel C. Parcel C', an undeveloped four-acre tract adjacent to Parcel C, was not utilized as part of the facility during active operations.

The 23-acre Captain's Cove property is generally bounded by Hempstead Harbor to the west, Garvies Point Preserve to the north, the Glen Cove Anglers' Club to the east, and Glen Cove Creek to the south. A four-acre wetland makes up a portion of the property's southern boundary with the Creek. The portions of the Captain's Cove property and property adjacent thereto which are part of the Li Tungsten Superfund site consist of the areas designated as Areas A, A' , G, and G' , where radioactive ore residuals and related contaminants from the former facility were periodically deposited during the time that the facility operated or have otherwise come to be located.

Glen Cove Creek is located in the City of Glen Cove on the north shore of Long Island and is tidally influenced along its entire length. The Creek has been' channelized to serve as a 1.0 mile federal navigation channel and is maintained by the United States Army Corps of Engineers (USACE) , extending from Hempstead Harbor easterly to the head of navigation at Charles Street near the municipal center of Glen Cove.

The former facility and Captain's Cove property are located in a mostly commercial area along the north side of Glen Cove Creek. The immediate area along both sides of the Creek includes light and heavy industry, commercial businesses, the City's sewage treatment plant, a Nassau County public works facility, and several 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 former facility and within 1,000 feet of the Captain's Cove property. Other area land uses include marinas, yacht clubs, and beaches. The Garvies Point County Preserve is located directly north of the Captain's Cove property. The former facility has recently been re-zoned by the City for residential use, and the Captain's Cove property is also zoned for residential use.

SITE HISTORY AND ENFORCEMENT ACTIVITIES

<u>General Site History</u>

The processing of tungsten and other metals at the former facility began in 1942 and ended in 1985. The former 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 former facility processed significant amounts of ore concentrates to produce 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.

As early as the 1950's, evidence suggests that the Captain's Cove property was a dump site for the disposal of incinerator ash, sewage sludge, rubbish, household debris, Glen Cove Creek sediments, and industrial wastes. The property was purchased by Village Green Realty in 1983 with plans to construct a condominium development. Redevelopment efforts were abandoned in the mid-1980's when contamination was revealed and the New York State Department of Environmental Conservation (NYSDEC) designated the property as a State Superfund site. The NYSDEC requested that EPA address the radioactive contamination found at the Captain's Cove property, while the State addressed the non-radioactive contamination under the State Superfund program. EPA subsequently included those portions of the Captain's Cove Property where radioactive material and related process wastes were disposed of as part of the Site, after sampling indicated that the wastes originated from the former facility.

EPA's remedial investigation (RI) of the Site (1993-1998) documented some organic contaminants in soil, as well as heavy metals and radionuclide contamination. Sampling of Glen Cove Creek did not reveal that radioactive substances from the former facility were present in the Creek. EPA signed a Record of Decision for the Site in September 1999 ("1999 ROD") which selected excavation and off-site disposal of an estimated 67,000 cubic yards (cy) of radionuclide and heavy metals-contaminated wastes.

In addition to the Site, other hazardous waste sites located in the vicinity on the north side of Glen Cove Creek include two State Superfund sites, namely the Konica Imaging, Inc. property (formerly known as Powers Chemco) and the Crown Dykman Site, as well as the Mattiace Petrochemical Federal Superfund site, which adjoins Parcel C' of the former facility. EPA's remedial efforts at the Mattiace site included a remedial investigation and feasibility study (RI/FS) which contained an evaluation of Glen Cove Creek as a potential receptor of contamination. The selected remedy at Mattiace involved removal and off-site disposal of chemical storage tanks and heavily-contaminated soils; extraction and treatment of contaminated soil gases and groundwater; and monitoring of groundwater and Glen Cove Creek for the estimated 30 years of operation of the treatment facilities.

The City of Glen Cove is involved in an ongoing revitalization effort involving over 200 acres surrounding the Creek. The City's 1998 Glen Cove Creek Revitalization Plan is being revised to include a residential future use component for the Site. EPA has reviewed the changes in land use and is re-evaluating the remedy selected in the 1999 ROD. The proposed change in anticipated future use of the Site is the subject of an Explanation of Significant Differences (ESD), presently being prepared by the EPA for public distribution.

Enforcement Site History

After issuance of the 1999 ROD, EPA sent general notice letters to potentially responsible parties (PRPs), providing them with the opportunity to perform the remedial design (RD) for a portion of the Site. In March

2000, EPA sent special notice letters for implementation of the remedial action (RA).

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

EPA has performed all of the required remedial excavation work at the Captain's Cove property and part of the excavation work at the former facility. Some of these excavated wastes have been disposed off-site by EPA and by PRPs. Presently, an estimated 108,000 tons of excavated wastes are staged at the Captain's Cove property for off-site disposal at appropriately licensed facilities. The northern half of the former facility still requires remediation. In July 2004, EPA, the federal PRPs and TDY executed an interim settlement agreement which resulted in an interim contribution of $21.9 million to EPA to continue remedial work at the Li Tungsten Superfund site.

Creek History

The USACE constructed the Glen Cove Creek navigational channel in 1935. USACE proceeded to perform maintenance dredging of the outer portions of the channel in 1948, 1960, 1965, and 1996 under the authority of the River and Harbor Act of 1925. The channel is intended to be maintained at a depth of eight feet at mean low water. In recent years, however, the depth of the inner portion (i.e., the eastern end), has been reduced to zero feet at mean low water from years of siltation without maintenance dredging.

In 1996, the USACE dredged 12,000 cy of sand from the outer (western) half of the channel, and the dredged materials were dewatered and reused in accordance with a New York State beneficial use determination, or BUD. Prior to this work, the City and the NYSDEC undertook a sampling program to characterize the sediments in the Creek to a depth of 10 feet below mean low water to determine the suitability of the dredged material for various BUD options. The NYSDEC used its Interim Guidance: Freshwater Navigational Dredging to conclude that the sediments at the western end of the Creek (Stations 14-17, Captain's Cove to Hempstead Harbor) could be used for unrestricted use/disposal, including beach nourishment. Based on the sampling program, which did not detect any elevated radioactive materials in the sediment, the NYSDEC also concluded that all the remaining sediments in Glen Cove Creek could be used as fill on commercial/industrial or recreational properties (provided that clean cover is used over the fill), as aggregate in the manufacture of asphalt, or as landfill contour grading material or daily cover at a lined landfill.

In September 2000, the USACE initiated navigational dredging for the inner half of Glen Cove Creek, using the recently remediated Parcel A of the former facility as a temporary dewatering area. The dredging was subsequently halted at the eastern end of Parcel A upon the discovery of petroleum-laden sediments. The dredging program to that point had yielded about 24,000 cy of the estimated 45,000 cy of material to be dredged. In May 2001, EPA determined that the dredged spoils which had been placed on Parcel A were contaminated with chunks of radioactive slag ranging from about one inch to six inches in diameter. EPA determined that the contaminated spoils on Parcel A qualified for a Superfund removal action. EPA subsequently issued a third UAO in August 2001 directing certain PRPs to remediate the contaminated sediments. Pursuant to that UAO, the sediments on Parcel A were remediated in Summer 2002. The remediation was performed by methodically spreading and instrument-screening batches of dewatered sediments, followed by manual removal of any materials exhibiting radiation greater than the specified criteria. Afterwards, the City disposed of the remaining non-radioactive sediment at the North Hempstead Landfill for use as grading material, and the segregated radioactive materials were secured in the Dickson Warehouse on Parcel C for eventual disposal.

As a result of the discovery of the radioactive slag in the dredged spoils, the USACE retained Cabrera Services, Inc. to perform an underwater gamma survey and sampling of Creek sediments. This occurred within the dredging project area in October 2001 to assess the level of radioactive contamination remaining in the Creek. The USACE/Cabrera issued a report in March 2002 which described several localized areas with above-background radiation levels remaining in the Creek. The most elevated levels were detected around the location of the former facility's loading dock on Parcel A. Based on the predominance of thorium chain radionuclides in the slag and the general location in which they were found, EPA has determined that the slag found in the Creek was a result of operations at the former facility which subsequently came to be located in the Creek. The slag apparently was produced through heat treatment based on its physical appearance. The slag also possesses generally higher levels of radiation than processed ore residuals that were disposed of on the former facility and the Captain's Cove property.

EPA subsequently completed a baseline radiological risk assessment in July 2003, from which EPA determined that the levels of radiation in the Creek were likely to pose significant risks to human health and the environment. The radionuclides of potential concern (ROPC) are those of the uranium-238 and thorium-232 decay series. EPA then completed a focused feasibility study (FFS) in which remedial alternatives were developed and evaluated. These documents form the primary basis for this remedy.

HIGHLIGHTS OF COMMUNITY PARTICIPATION

The FFS report and the Proposed Plan for Glen Cove Creek were released to. the public for comment on October 14, 2004. These documents, as well as other documents in the administrative record file (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 a public meeting on the Proposed Plan as well as the availability of the above-referenced documents was published in the Glen Cove Record Pilot on October 14, 2004. The public notice established a thirty-day comment period. EPA subsequently received a request for an extension of the public comment period and extended it through December 16, 2004. The Agency's decision to extend the comment period was publicized through mailings to the Site's mailing list of interested parties.

A public meeting was held on Wednesday, October 20, 2004 at Glen Cove City Hall, located at 9 Glen Street, Glen Cove, New York, to present the Proposed Plan to the public and to address questions concerning the Plan and supporting documentation. 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 (**APPENDIX V**).

In the early 1990's, EPA entered into a cooperative agreement for Superfund pilot studies with Clean Sites, Inc., and included the Li Tungsten site as a "pilot" Superfund site for the application of Clean Sites's Superfund improvement concepts, e.g., early stakeholder involvement and early identification of the most realistic future use of a site. Clean Sites organized a group of interested community representatives called the Li Tungsten Task Force in March 1994. During the course of EPA's response actions at the Site, the Task Force has continued to conduct periodic meetings with EPA to facilitate information transfer and feedback. The Task Force also applied for and received a technical assistance grant (TAG) from EPA in September 1995.

SCOPE AND ROLE OF RESPONSE ACTION

EPA is addressing the release of radionuclides into the Creek as part of its response action at the Site, pursuant to the Comprehensive Environmental Response, Compensation and Liability Act, as amended (CERCLA);

Site remediation activities are sometimes segregated into different phases, or operable units (OUs), so that remediation of different environmental media or areas of a site can proceed in more organized fashion, resulting in more efficient remediation of an entire site. EPA has designated four OUs at the Site, as follows:

OU 1: Contaminated soils and groundwater at the former facility

Status: This OU was a subject of the EPA's 1999 ROD for this Site. The soils on the southern half of the former facility have been remediated in accordance with the ROD, including disposal of all radioactive waste staged in Dickson Warehouse. Soils on the northern half, although . partially remediated, still require substantial excavation, segregation and disposal to complete this OU.

OU 2: Contaminated soils and groundwater at the Captain's Cove property where Li Tungsten ore residuals were disposed of

Status: This OU was also a subject of the EPA's 1999 Record of Decision. All contaminated soils have been excavated and are staged for off-site disposal. Disposal activities are now commencing which, when finished, will effectively complete this OU.

The ROD groundwater remedy for OUs 1 and 2 was no action, other than a long-term groundwater monitoring program to assess the residual contamination of the Upper Glacial Aquifer after the soil remedy is implemented.

OU 3: Radiological survey of Dice Complex at the former Li Tungsten facility

Status: This OU was discontinued as a result of EPA's decision to raze the Dice Complex after it was damaged by fire.

OU 4: Radioactive slag in Glen Cove Creek

Status: This is the subject of this ROD.

The primary objective of the OU 4 remedial action described in this ROD is to address the present and future health and environmental risks related to the radioactive slag in Glen Cove Creek, deposited as a result of the former facility's operation.

SUMMARY OF FIELD INVESTIGATIONS

Available sediment data for Glen Cove Creek includes the following data sources:

- Hart Environmental Management sediment sampling

The first removal action at Site was performed in 1989 by the Site owner at that time, i.e., Glen Cove Development Corp., under EPA direction. As part of this action, Hart Environmental Management Corp. obtained sediment samples from four Creek locations (including three adjacent to the former facility) and analyzed them by gamma spectroscopy. These results all showed background or just above background concentrations of uranium, thorium and radium radionuclides.

- Mattiace Petrochemical Superfund Site Creek monitoring

Pursuant to the June 1991 remedy selected for the Mattiace site, routine sampling of the Creek, which included screening sediment samples with a radiation meter, was conducted in June 1995, May 1998, and April 2000 by Foster Wheeler Environmental Corp., an EPA contractor. No elevated gamma readings were detected in any of these sediment samples.

- USACE/Dvirka and Bartilucci sediment samples

Sediment sampling was performed by the USACE in October 1995 and by Dvirka and Bartilucci in March 1996 prior to the 1996 Creek dredging. These sampling events included sediment corings to the dredging project depth. The USACE composited samples from 10 locations in the Creek into a total of 3 samples for analysis. Dvirka and Bartilucci subsequently took samples from 17 locations in the Creek which yielded a total of 29 samples for analysis. The Dvirka and Bartilucci samples were intended to characterize the sediments in the Creek in support of upland disposal of dredged material in accordance with NYSDEC policies. The samples were analyzed for volatile and semi-volatile organics, inorganics, pesticides, polychlorinated biphenyls (PCBs), and radionuclides. Radionuclides measured by gamma spectroscopy were all at background levels (maximum activities of 1.1 picocuries/gram (pCi/g) for the thorium-232 series and uranium-238 series).

- Li Tungsten RI sediment samples

Five sediment samples were collected from the large wetland area on the southern border of the Captain's Cove property, contiguous to the Creek. The concentrations of radionuclides in all sediment samples were within the range of background concentrations.

- Cabrera sediment gamma survey/sampling

As a result of the May 2001 discovery of radioactive slag mixed with the dredged sediments from the USACE 2000/2001 dredging activities, a radiation survey of the entire Creek bottom was completed in November 2001 by Cabrera Services Inc., a contractor for the USACE. Cabrera also collected sediment samples for radiological analysis as part of this effort. The radiation survey showed that the majority of the Creek bottom had background or slightly above background levels of gamma radiation. However, there were more than 30 small locations with significant gamma radiation readings, with the'-: area of most elevated gamma radiation located adjacent to the bulkhead at Li Tungsten-Parcel A, near the former location of the old loading dock.

As a result of debris along the Creek bottom, Cabrera was only able to collect 25 sediment samples; of those, only one showed elevated levels of radionuclide contamination. This sample had maximum concentrations of uranium-238 of 3.2 pCi/g, thorium-232 of 6.6 pCi/g, and radium-226 of 1.3 pCi/g (Cabrera Services, Inc. 2002a).

In addition to the Creek sediment sampling, Cabrera obtained samples of the dredged sediment that had been temporarily stored on Parcel A of the Li Tungsten property. The gamma radiation survey of the dredged sediment indicated that discrete chunks of processed material (believed to be precipitate from reactors at the former tungsten facility) ranged from a quarter inch to six inches in diameter. Cabrera isolated two of the chunks with the highest gamma radiation levels from the sediment and analyzed them by gamma spectroscopy, as well as alpha spectroscopy for uranium and thorium isotopes. The chunks showed high concentrations of thorium-232 (1,200 pCi/g) and thorium-230 (680 pCi/g), and elevated concentrations of radium-226 (12 pCi/g), uranium-238 (4.5 pCi/g), and uranium-234 (5.3 pCi/g).

- Earth Sciences Consultants/Envirocare Drum characterization sampling

In order to fulfill the requirements of EPA's removal order directing the PRPs to address the dredge spoils, the radioactive chunks of slag segregated from the dredged sediments were sampled. Resulting analyses indicated average concentrations of 90 pCi/g and 40 pCi/g of thorium-232 and radium-226, respectively. Maximum concentrations included 450 pCi/g for thorium-232 and 200 pCi/g for radium-226.

SUMMARY OF SITE RISKS

Based upon the results of previous field investigations, baseline human health and ecological risk assessments were conducted to estimate risks associated with current and future scenarios.

A Superfund baseline human health risk assessment is an analysis of the potential adverse health effects caused by hazardous substance releases from a site in the absence of any actions to control or mitigate these under current and future land uses. The risk assessments for OU 4 were developed consistent with appropriate Agency guidelines, guidance and policies.

Screening-level human health risk assessment for chemicals was conducted by comparing the maximum detected concentrations of chemicals to residential soil criteria and calculating associated cancer risks and noncancer health hazards. The results of this analysis indicated that the risks which are due to chemicals were within EPA criteria. A quantitative radiological risk assessment for human health was then performed.

A four-step process is utilized for assessing quantitative human health risks for reasonable maximum exposure (RME) scenarios, which portray the highest level of human exposure that could reasonably be expected to occur. The methodology is presented below:

> *Data Collection and Analysis*: In this step, the contaminants of concern at the site in various media (i.e., soil, groundwater, surface water, and air) are identified based on such factors as toxicity, frequency of occurrence, and fate and transport of the contaminants in the environment, concentrations of the contaminants in specific media, mobility, persistence, and bioaccumulation. **Table 1** and **Table 2** identify the radionuclides of potential concern (ROPC). The ROPCs evaluated in this risk assessment are radionuclides of the thorium-232 and uranium-238 decay series.
>
> *Exposure Assessment*: The different exposure pathways through which people might be exposed to the contaminants identified in the previous step are evaluated. Examples of exposure pathways include incidental ingestion of and dermal contact with contaminated soil. Factors relating to the exposure assessment include, but are not limited to, the concentrations that people might be exposed to and the potential frequency and duration of exposure. Using these factors, an RME scenario is calculated. This exposure assessment evaluated current/future construction workers in the Creek; future dredging workers in the Creek; future workers at off-site locations where dredged material is deposited as soil; and future residents at off-site locations where dredged material is deposited as soil. Standard default exposure assumptions were used in the calculations of cancer risks and noncancer health hazards based on receptor activities. **Table 3** provides the rationale for inclusion or exclusion of pathways.
>
> *Toxicity Assessment*: The types of adverse health effects associated with chemical exposures, and the relationship between magnitude of exposure (dose) and severity of adverse effects (response) are

determined. Potential health effects are chemical-specific and may include the risk of developing cancer over a lifetime or other noncancer health effects, such as changes in the normal functions of organs within the body (e.g., changes in the effectiveness of the immune system). Some chemicals are capable of causing both cancer and noncancer health effects. The Human Health Risk Assessment used the current consensus toxicity values for chemicals and radionuclides from the Integrated Risk Information System (IRIS) in evaluating cancer risks and noncancer health effects (see **Table 4** and **Table 5**). In addition, **Tables 6, 7, 8** and **9** provide cancer toxicity values for radionuclides. The toxicity values were obtained from the Radionuclide Health Effects Assessment Summary Tables (April 2001).

Risk Characterization: This step summarizes and combines exposure information and toxicity assessments to provide a quantitative assessment of site risks. Exposures are evaluated based on the potential risk of developing cancer and the potential for noncancer health hazards. The likelihood of an individual developing cancer is expressed as a probability. For example, a 10^{-4} cancer risk means a "one-in-ten-thousand excess cancer risk"; or one additional cancer may be seen in a population of 10,000 people as a result of exposure to site contaminants under the conditions explained in the Exposure Assessment. Current Superfund guidelines for exposures are an individual lifetime excess cancer risk in the range of 10^{-4} to 10^{-6} (corresponding to a one-in-ten-thousand to a one-in-a-million excess cancer risk). For noncancer health effects, a "hazard index" (HI) is calculated. An HI represents the sum of the individual exposure levels compared to their corresponding Reference Dose (RfD). The key concept for a noncancer HI is that a "threshold level" (measured as an HI of less than 1) exists below which noncancer health effects are not expected to occur. An HI value greater than 1 does not predict disease.

For human health, risks from radiation exposure were estimated for current and future receptors. Specifically, human cancer risks and noncancer health hazards associated with exposure to the ROPCs were evaluated.

<u>Quantitative Radiological Risk to Human Health</u>

- Current/future recreational users of the Creek

Risks associated with several exposure pathways at the Creek were estimated for adults, adolescents (12-18 years) and children (0-6 years), based on incidental ingestion and external exposure to sediment, incidental ingestion of surface water, and ingestion of fish/crustacea. Total excess lifetime cancer risk for adult recreational users was approximately one in one hundred (9.6E-03) for the RME scenario, primarily from exposure to sediment containing thorium-228, radium-228, and radium-226. This risk significantly exceeds EPA's target risk range. Total excess lifetime cancer risks for adolescent and child recreational users were approximately two in one thousand (2E-03) and five in ten thousand (4.5E-04), respectively, which also exceed EPA's target risk range. His were below the threshold of one for noncancer effects for adult, adolescent and child receptors. **Tables 10, 11** and **12** summarize the cancer risks and noncancer health hazards for these receptors.

- Current/future construction workers at the Creek

Risks associated with construction work in the Creek were estimated, assuming exposure would occur while constructing or repairing bulkheads in the Creek. Construction workers could be exposed to radionuclides in sediment via incidental ingestion and external exposure, and surface water via incidental ingestion. Total RME excess lifetime cancer risk for construction workers was one in one thousand (1E-03), which exceeds EPA's target risk range. were below the threshold of one for noncancer effects for this category of receptor. Table 13 summarizes the cancer risks and noncancer health hazards for the adult construction worker.

- Future dredging workers at the Creek

Potential future risks associated with dredging the Creek were estimated, assuming exposure to radionuclides in sediment via incidental ingestion and external exposure and surface water via incidental ingestion. Total RME excess lifetime cancer risk for dredging workers was approximately nine in ten thousand (8.6E-04), which exceeds EPA's target risk range. HIs were below the threshold of one for noncancer effects for this category of receptor. **Table 14** summarizes the cancer risks and noncancer health hazards for adult dredging workers.

- Future workers at sites where dredged material is deposited as soil

Potential future risks were estimated for commercial or industrial workers at a site where dredged sediment would be deposited as surface soil. These future workers could be exposed to radionuclides in soil via incidental ingestion, inhalation and external exposure. If radionuclides migrate from the deposited sediment into groundwater, workers would also be exposed via groundwater ingestion. Total RME excess lifetime cancer risk for future site workers was approximately six in one hundred (5.7E-02), well above EPA's target risk range. HIs were below the threshold of one for noncancer effects for this category of receptor. **Table 15** summarizes the cancer risks and noncancer health hazards to the future workers at sites where dredged material is deposited as soil.

- Future residents at sites where dredged material is deposited as soil

Potential future risks were estimated for adult and child residents at a site where dredged sediment would be used as surface soil. These future residents could be exposed to radionuclides in soil via incidental ingestion, inhalation, and external exposure. If radionuclides migrate from the deposited sediment into groundwater, residents could also be exposed via groundwater ingestion. Total RME excess lifetime cancer risk for future residents was approximately one in ten (1E-01) for adults, three in one hundred (2.7E-02) for children, and one in ten (1.4E-01) for combined adult/child residential exposure. All of these risks are well above EPA's target risk range. HIs were below the threshold of one for noncancer effects for adult, adolescent and child receptors. **Table 16** and **Table 17** summarize the cancer risks and noncancer health hazards to future residents at sites where dredged material is deposited as soil.

The above risk estimates were generated by a risk assessment process employed at all federal Superfund sites, and are more fully described in the Final Human Health Risk Assessment Report (CDM July 2003) for OU 4. Contaminants of potential concern were selected based on criteria outlined in the Risk Assessment Guidelines for Superfund (RAGS-EPA 1989), primarily through comparison to risk-based screening levels. The chemicals of potential concern evaluated in this risk assessment were radionuclides of the thorium-232 and uranium-238 decay series.

Screening Level Chemical (Nonradiological) Risk to Human Health

The chemical risk assessment evaluated future potential exposure pathways if the dredged material were used as surface soil around a residence (see Appendix D of the Final Human Health Risk Assessment Report). The comparison of the maximum concentration to residential soil screening levels included current EPA toxicity values and standard default exposure assumptions for residential exposures. The resulting analysis indicated that the noncancer HIs for cadmium (1.4) and iron (1.3) were equivalent to 1 when expressed as one significant figure, in accordance with EPA policy. The cancer risks were within the risk range.

Screening Level Ecological Risk Assessment

The Screening Level Ecological Risk Assessment Report found that there is potential for ecological risks to aquatic ecological receptors, such as saltwater invertebrates, molluscs, crustaceans and fish, as well as to riparian receptors such as mammals. The limiting receptor organisms selected for the ecological risk assessment were the freshwater mollusc (aquatic) and the raccoon (riparian).

The total calculated sediment radiation dose is 13 times greater than the target dose for aquatic organisms, and 130 times greater than the target dose for riparian organisms. Likewise, total calculated surface water radiation doses exceed the target total dose for both classes of organisms.

Chemical (i.e., nonradiological) contaminants present in the Creek sediment were only qualitatively evaluated; based on the evaluation, these contaminants may add additional ecological stress to the health of the Creek's ecological community.

Discussion of Uncertainties in Risk Assessment

The procedure and inputs used to assess risks in this evaluation, as in all such assessments, include 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 sample data sets to represent the RME to various current receptors in the vicinity of Glen Cove Creek as well as off-site populations where contaminated dredged material could be disposed of. The analyses of slag radionuclides was an inherently biased process when evaluating risk, such that slag, either in the Creek or in dredged sediments, presents a highly variable "all or nothing" exposure scenario, since it is scattered and not uniformly distributed in the affected media. Therefore, the UCL values calculated on those data sets can be considered a very conservative estimate of the RME. Uncertainty associated with sample laboratory analysis and data evaluation is considered low as a result of a 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 data. The uncertainty associated with the selected pathways for these scenarios is low because Site conditions support the conceptual model.

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 in this risk assessment. Use of these data to predict excess cancer risk from low-level radiation exposure requires extrapolation based upon somewhat uncertain dose-response assumptions. However, the risk estimators used in this assessment are generally accepted by the scientific community as representing reasonable projections of the cancer risks and noncancer health hazards associated with exposure to the various ROPCs.

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) as well as site-specific risk-based contaminant levels, which in turn are based on reasonably anticipated current and future uses of the Site, e.g., human exposure to contaminants after periodic maintenance dredging followed by upland disposal of dredged sediments.

The anticipated project area for this analysis of alternatives is those portions of the Creek in which EPA has determined a potential exists for radionuclide contamination to be present at levels exceeding the cleanup goals. This determination is based on the results of radiation surveying, consideration of the physical mobility of the slag materials, the dynamic forces at work in the Creek, as well as Site history and geography. The project area is currently defined to generally include the area from the western mouth of the Creek to the eastern end of Parcel A on the Li Tungsten property, and it conforms to the width of the Creek from bulkhead to bulkhead. The project area currently does not include the private marinas south of the navigation channel nor the eastern portion of the Creek beyond Parcel A where the petroleum-laden sediments were encountered, but EPA can subsequently expand the project area should radiological surveys during design and remediation detect slag outside the current project area.

The following RAOs were established for OU 4 of the Site:

1) Reduce or eliminate any direct contact, ingestion, or external radiation threat to public health and the environment associated with ROPC-contaminated slag in the Creek project area

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

In order to meet the first RAO, EPA concluded that radiation hot spots in the Creek must be remediated to a level consistent with the safe future use of the Creek by recreational users, construction and dredging workers, etc. Because of the inherent difficulty in trying to secure underwater samples of slag buried in sediment, EPA believes that concentration criteria are not practical, and that the only measurable cleanup criteria will be gamma radiation levels. Also, removal of the radionuclide-contaminated slag through dredging should result in a reduction of radiation to background (or near background) levels. Therefore, EPA's cleanup criteria for the ROPCs in the Creek will be gamma radiation levels not to exceed twice the background level.

Based on available data and information, the radium or thorium contamination existing in the slag is typically above 30 pCi/g, while the surrounding sediments (i.e., future soils) produce normal, or background radiation. This profile is consistent with identifying portions of EPA's regulations set forth at 40 CFR 192, which were developed pursuant to the Uranium Mill Tailings Radiation Control Act of 1978, as relevant and appropriate requirements for fulfilling the second RAO, as further described in EPA's OSWER Directive 9200.4-25. This directive describes the correct use of the cleanup criteria from Subparts B and E of the 40 CFR 192 standards for radium and thorium cleanups. The portions of 40 CFR 192 that are relevant and appropriate are 40 CFR 192.12 (a) (1), 40 CFR. 12(b) (2) and 40 CFR 192.41(c).

In the Proposed Plan the criteria for achieving the second RAO were identified as follows:

Ra-226	+	Ra-228	-	sum not to exceed 5 pCi/g + background
Th-230	+	Th-232	-	sum not to exceed 5 pCi/g + background

EPA anticipates that the use of these soil cleanup criteria will eliminate the slag in dredged sediments, and thereby reduce or eliminate the threat associated with ROPC-contaminated slag to any future upland disposal locations.

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 FFS performed for OU 4 provides a detailed evaluation of possible alternatives to address the radioactive slag contamination in the Creek. The implementation time for each alternative reflects the time required to design and implement the remedy, not including any time required to negotiate its performance by parties potentially responsible for the contamination.

Because of the lengthy half-lives of the ROPCs, e.g., thorium-232 has a half-life exceeding 1 billion years, remedies that would not permanently remove the slag containing the thorium and the uranium series radionuclides from the Creek were not considered protective for future generations. Also, in order to insure that future maintenance dredging does not result in radiation exposures to workers or potential off-site residents, EPA developed remedial alternatives using the maintenance dredging depth as a guideline.

EPA believes that periodic maintenance dredging of the navigation channel by the USACE will be necessary in the future to maintain the viability of the Creek area, particularly in light of the City's ongoing efforts to revitalize its waterfront.

Alternative 1: No Further Action

Capital Cost:	$0
Annual Operation and Maintenance (O&M) Cost:	N/A
Implementation Time:	N/A

Consideration of the no action alternative is required by the NCP and CERCLA as a baseline for comparison with the other alternatives under consideration. The no further action alternative involves continuation of existing conditions and does not include any new remedial measures that would address the problem of contamination in the Creek. The no further action alternative for OU 4-Glen Cove Creek would, by default, involve permanently discontinuing periodic maintenance dredging of the Glen Cove Creek federal navigation channel by the USACE, since it has determined that its existing dredging authority does not include the dredging of sediments contaminated with radioactive material. The discontinuation of dredging the navigation channel would effectively act as an institutional control to limit exposure to future dredging workers to radioactively contaminated sediment; that is, by not dredging, exposure to radioactive materials through the process of dredging, dewatering, and otherwise handling dewatered sediments would not occur. However, this alternative would not provide any controls to prevent human exposure through other pathways, e.g., recreational uses of the Creek, nor would it mitigate existing environmental exposures. Because waste materials would be left on-site under this alternative, EPA would perform 5-year reviews as required by Section 121 of CERCLA, to periodically evaluate the residual exposures to potentially affected populations and the effectiveness of any engineering or institutional controls. A report summarizing the review would be prepared at the completion of each review.

Alternative 2: Remedial Dredging

Capital Cost:	$2,979,269
Annual O&M Cost:	0
Implementation Time:	18 months

This alternative involves construction of a bermed dewatering facility followed by clamshell dredging of those portions of the Creek navigation channel which fall within the project area to the navigational maintenance depth of eight feet (with two feet allowable overdepth i.e., a contractual allowance). After dredging to eight feet of depth, a second phase of dredging would be performed to detect and remove radionuclide "hot spots" which have been identified in the project area. This two-phased approach would target the present risk associated with elevated radiation in the Creek by removing radionuclide hot spots, as well as addressing the risk to future dredging workers and upland disposal receptors by remedially dredging all sediments and radionuclide contaminants above the navigation depth. Approximately 20,000 cy of sediment is the volume that is estimated would be removed during the first phase of dredging, followed by removal of approximately 500 cy of material during the second phase of dredging the hot spots. Subsequently, a post-dredging radiation survey to confirm removal of radiation sources would be performed. Dredged material would be dewatered and then processed to separate material containing radionuclides above the cleanup criteria.

Specifically, this alternative involves the construction of a bermed dewatering facility on Parcel A of the former facility (or any other appropriate location) capable of holding 20,500 cy of wet sediment, including a sorting pad for laying out dried material in six-inch deep layers, or "lifts", for use during the subsequent separation process.

Clamshell dredging of that portion of the project area in the navigation channel, as described above, would be performed to a depth of eight feet. Thereafter, the dredging of radiation hot spots would be performed. All of the dredged material would then be placed within the bermed area on Parcel A for dewatering. When sufficiently dewatered, the dredged material would be sorted into batches and then spread into six-inch lifts, followed by radiation screening of each lift, followed by confirmatory sampling (as was previously performed in Summer 2002 to remediate radioactive slag in dredged sediment on Parcel A). EPA estimates that approximately six cy of radioactive material would be segregated in this. manner. Liquid from the dewatered sediment would be sampled and treated, if necessary, prior to discharge to the Creek.

Radionuclide-contaminated slag/material would be disposed of at an appropriately-licensed disposal facility. It is anticipated that the remaining non-radioactive sediment would be used beneficially in accordance with a State BUD or, if no such determination is possible, properly disposed of at an off-site landfill.

After both phases of dredging are completed, a post-remediation survey would be performed in the Creek to confirm removal of radioactive sources. This survey would be designed to detect, at a minimum, the ROPCs thorium-232 and radium-226. A post-remediation hydrographic survey would also be performed to confirm the dredged depth of the Creek.

Alternative 3: Remedial Over-dredging

Capital Cost:	$3,443,134
Annual O&M Cost:	0
Implementation Time:	21 months

This alternative involves construction of a bermed dewatering facility followed by clamshell dredging of those portions of the Creek navigation channel which fall within the project area to a navigational maintenance depth of nine feet (with two feet allowable overdepth i.e., a contractual allowance). After dredging to nine feet of depth, a second phase of dredging would be performed to detect and remove radionuclide hot spots which have been identified in the project area. This two-phased approach would target the present risk associated with elevated radiation in the Creek by removing radionuclide hot spots, as well as addressing the risk to future dredging workers and off-site receptors by remedially dredging all sediments and radionuclide contaminants above one foot below the navigation depth. Approximately 30,000 cy of sediment is the volume that is estimated would be removed during the first phase of dredging, followed by removal of approximately 50 cy of material during the second phase of dredging the hot spots. Subsequently, a post-remediation radiation survey to confirm removal of radiation sources would be performed. Dredged material would be dewatered and then processed to separate material containing radionuclides above the cleanup criteria.

Specifically, this alternative involves the construction of a bermed dewatering facility on Parcel A of the former facility (or any other appropriate location) capable of holding 30,050 cy of wet sediment, including a sorting pad for laying out dried material in six-inch lifts for use during the subsequent separation process.

Clamshell dredging of that portion of the project area in the navigation channel, as described above, would be performed to a depth of nine feet. Thereafter, the dredging of radiation hot spots would be performed. All of the dredged material would then be placed within the bermed area on Parcel A for dewatering. When sufficiently dewatered, the dredged material would be sorted into batches and then spread into 6-inch lifts, followed by radiation screening of each lift, followed by confirmatory sampling (as was previously performed in Summer 2002 to remediate radioactive slag in dredged sediment on Parcel A). EPA estimates that approximately seven cy of radioactive material would be segregated in this manner. Liquid from the dewatered sediment would be sampled and treated, if necessary, prior to discharge to the Creek.

Radionuclide-contaminated slag/material would be disposed of at an appropriately-licensed disposal facility. It is anticipated that the remaining non-radioactive sediment would be used beneficially in accordance with a State BUD or, if no such determination is possible, properly disposed of at an off-site landfill.

After both phases of dredging are completed, a post-remediation survey would be performed in the Creek to confirm removal of radioactive sources. This survey would be designed to detect, at a minimum, the ROPCs thorium-232 and radium-226. A post-remediation hydrographic survey would also be performed to confirm the dredged depth of the Creek.

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 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 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 FFS report.

Comparative Analysis of Remedial Alternatives

Overall Protection of Human Health and the Environment

Both Alternative 2 and Alternative 3 are protective of human health and the environment. Alternative 2 would provide an acceptable level of protection of human health and the environment from radiation exposure by removing gamma-detectable sources in the Creek as well as from dredged sediments that may be used for upland fill. Alternative 2 also would provide reasonable certainty that any future maintenance dredging for navigational purposes would not result in the dredging of radioactive materials from above the maintenance depth. Alternative 3 would provide a similar level of protection of human health and the environment from radiation exposure, but would provide more certainty that any future maintenance dredging for navigational purposes would not dredge radioactive materials from above the maintenance depth through the performance of an extra measure of dredging (i.e, dredging to a one foot greater depth). This additional sediment removal would remove hot spot material in the second phase of dredging with greater certainty by removing an additional foot of sediment that might be shielding radioactive materials (should they exist) at greater depths. Under Alternative 1, it is probable that no future dredging of the federal navigational channel would be permitted or performed, and therefore there would be no off-site exposures. However, all potential exposures to radiation in and around the Creek would remain unremediated.

Compliance with ARARs

The two action alternatives, Alternative 2 and Alternative 3, would comply with all the ARARs that pertain to each alternative. Examples of ARARs for this project include 40 CFR Part 192, which would provide radionuclide cleanup criteria as discussed earlier; 40 CFR Part 50, 6 NYCRR Parts 200, 201, 211, and 257, all of which would be appropriate to regulate ambient air quality standards during remediation (i.e., segregation of radionuclide-bearing material from dewatered sediment); 40 CFR Part 61, which provides limits on radiation exposure to the public during remediation; as well as location-specific ARARs like the Coastal Zone Management Act, Executive Order 11988 for floodplains assessment, Section 10-River and Harbor Act of 1925, and 6 NYCRR 608-Water Quality Certification, which includes specific State permitting provisions for dredging. All of these requirements would be met by either Alternative 2 or Alternative 3 through proper implementation of the remedial action.

Long-Term Effectiveness and Permanence

Alternatives 2 and 3 would provide equal measures of long-term effectiveness and permanence in that they are both designed to remove all radioactive materials that are detectable at the normal navigational dredging depth. However, Alternative 3 offers a greater level of certainty that the remedy would indeed be permanent and therefore effective in the long-term by dredging one foot deeper and thereby providing the opportunity to detect more deeply buried slag. Alternative 1 would leave radioactive materials behind in the Creek in an uncontrolled manner, and therefore would not afford an effective nor permanent solution to the risks associated with the radionuclide contamination in the Creek. Under this alternative, EPA would be required to conduct five-year reviews to periodically ascertain the condition of the materials and any changes in the threat they may pose to public health and the environment, as well as monitor the institutional control (i.e., the suspension of dredging the navigational channel).

Reduction of Toxicity, Mobility, or Volume Through Treatment

None of the alternatives would reduce the toxicity, mobility, or volume of the radionuclides through treatment; however, Alternatives 2 and 3 would effectively reduce these parameters through removing the radionuclides from the Creek and disposing of them off-site in an appropriate facility. Alternative 1 would not affect the toxicity, mobility, and volume of the radionuclide contamination.

Short-Term Effectiveness

Alternative 1 would create no short-term construction impacts, but it would also not result in meeting RAOs in the short-term, either. Alternative 2 would create the least amount of construction impacts of the two dredging alternatives, and it would also meet RAOs in a relatively short time frame. Alternatives 2 and 3 would have easily mitigable worker health and safety radiation issues involving the dredging and subsequent screening out of radioactive slag upland. Alternative 3 could have the greatest short-term impacts in terms of radiation exposure and could possibly also involve bulkhead stability issues, since this alternative involves the removal of the greatest amount of sediment, which could create bulkhead instability through removal of sediments from adjacent side slopes. Bulkhead stability-related impacts could be effectively mitigated through proper precautions, but those precautions could result in significant additional cost. Alternative 3 would take slightly longer to achieve RAOs than Alternative 2.

Implementability

EPA believes that all the alternatives are technically and administratively implementable and that none of the alternatives have a clear advantage over the others in this regard. Alternative 1 would obviously be the easiest and quickest to implement. Both dredging alternatives would require the following: remedial design testing and specifications; contractor procurement; and the time needed to prepare a dewatering and separation area, to dredge the project area, to dewater and segregate the dredged sediments, and finally to dispose of the radioactive slag. Alternative 3 would take longer to implement than Alternative 2 because of the larger volume of sediment to be dredged, dewatered, segregated and eventually disposed of. The difference in the time to implement Alternative 2 and Alternative 3 is estimated to be three months.

Cost

The capital costs to perform Alternative 2 is estimated at $2.98 million, compared to $3.44 million to perform Alternative 3. It is anticipated that some portion of this cost will be borne by the USACE which, while necessary to find the slag, nevertheless is an intrinsic part of the Army's navigational dredging program. The above cost estimates also do not include any disposal of the remaining non-radioactive sediment for Alternatives 2 or 3, since disposal of this material is considered to be outside the scope of this CERCLA project.

Alternative 1 has no capital costs associated with it.

State Acceptance

The State of New York, which has coordinated with EPA during the development of the Proposed Plan, concurs with the EPA's selected remedy. The State's 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. There were two general issues raised by commenters that were particularly significant: the first, which was raised by several commenters, was that EPA's 9-criteria analysis of Alternatives 2 and 3 justifies the selection of Alternative 3 more than it does Alternative 2; and the second, raised by a PRP at the Site, was that EPA's Proposed Plan should not be issued until the supporting risk assessments are re-evaluated and rewritten to correct many technical errors. Based on the comments received, the community in and about Glen Cove supports the removal of radioactive slag from the Creek.

EPA believes that the responsiveness summary (**APPENDIX V**) adequately responds to these comments noted above, as well as to other issues that were raised regarding the Proposed Plan.

SELECTED REMEDY

Based upon an evaluation of the various alternatives, EPA and the State of New York have selected Alternative 2 -Remedial Dredging for the contaminated sediments in Glen Cove Creek. The selected remedy will include dredging of those portions of the Creek's navigation channel which fall within the project area to the maintenance depth of eight feet, with two feet allowable overdepth, followed by dredging radionuclide hot spots in the project area which are detected beyond the USACE's maintenance specification for the channel, followed by segregation and off-site disposal of radioactive material from the dewatered dredged sediments.

After the development of plans and specifications, the initial implementation of the remedy will involve the construction of a bermed dewatering facility on Parcel A of the former facility (or any other appropriate location) capable of holding 20,500 cy of wet sediment, including a sorting pad for laying out dried material in six-inch deep layers, or "lifts," for use during the subsequent separation process.

The first phase of dredging, which includes the navigational dredging component in the project area, was incorporated into the selected remedy to satisfy RAOs relating to unacceptable radiation risks associated with future navigational dredging activities, as explained earlier in this ROD. It is anticipated that the USACE will provide a portion of the funding for the necessary and overdue dredging that it would otherwise have performed as part of its periodic dredging of the navigational channel.

After the navigational dredging phase is completed, radionuclide hot spots will be dredged until cleanup criteria are reached in the Creek. All dredged material will then be dewatered on Parcel A of the former facility (or any other appropriate location), followed by segregation of radioactively-contaminated materials from the dredged sediment. Approximately 20,000 cy of sediment is estimated to be the volume which will be dredged from the project area during the first phase of dredging, followed by an estimated 500 cy during the second phase of dredging the radionuclide hot spots. After the dewatering of this dredged material, EPA estimates that approximately six cy of radioactively-contaminated waste will be segregated from the dredged material.

After the segregation of radioactively contaminated waste is completed, the radioactive waste will be disposed of at an appropriate off-site disposal facility. It is anticipated that the City will then either re-use the remaining non-radioactive sediments in accordance with a State BUD or dispose of the sediment at a landfill.

To complete the remedial action, EPA will perform a radiation survey in the Creek to confirm removal of hot spots above cleanup levels. This survey will be designed to detect, at a minimum, the ROPCs. A post-remediation hydrographic survey will also be performed to confirm the dredged depth of the Creek.

The selected remedy will result in a safe, effective, long-term, permanent remedy because all slag with radioactivity greater than the radionuclide cleanup levels will be dredged, separated out, and disposed of in a licensed radiological waste disposal facility. Implementation of the selected remedy will also promote the City's waterfront revitalization by allowing the full navigational potential of the Creek to be realized. The selected remedy will provide the best balance of trade-offs among the alternatives with respect to the evaluating criteria. EPA and NYSDEC believe that the selected remedy will be protective of human health and the environment, will comply with ARARs, will be cost-effective, and will utilize permanent solutions to the maximum extent practicable, as discussed below.

Monitoring of the sediments and water column of Glen Cove Creek, now ongoing as part of the Mattiace Superfund long-term response action, will also continue on an annual basis. The results of this monitoring will be integrated with the Li Tungsten OU 1/OU 2 groundwater monitoring program from the 1999 ROD to provide a comprehensive analysis of the contaminant profile in groundwater and in the Creek, and to identify any discernible interrelationships or trends.

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.

<u>Protection of Human Health and the Environment</u>

The selected remedy is protective of human health and the environment. The selected cleanup levels include two radionuclide parameters associated with the slag to ensure that the two phases of dredging remove unacceptable radioactive sources from the Creek, and that the subsequent segregation of slag from the dewatered sediment likewise removes unacceptable radioactive sources from potential off-site fill material. The cleanup levels are sufficiently protective from the standpoint of carcinogenic risk and noncarcinogenic hazard for all current and future potentially affected receptors.

<u>Compliance with ARARS</u>

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

Action-Specific ARARs:

- 40 CFR Part 192 - Standards for the disposal and control of uranium and thorium tailings
- 40 CFR Part 50 - Standards for ambient air quality during remediation
- 40 CFR Part 61 - Standards for radiation exposure to maximally exposed members of public
- 49 CFR Part 173- Requirements for the transportation of hazardous and radioactive materials
- 6 NYCRR Part 200, 201, 211, and 257 - State ambient air quality standards

- 6 NYCRR Parts 360 and 364 - State standards for handling, transportation and disposal of solid and hazardous waste

Chemical-Specific ARARs:

- 40 CFR Part 263 - Standards applicable to transporters of hazardous waste

Location-Specific ARARs:

- River and Harbor Act of 1925 - Regulates dredging, filling or modifying water bodies
- Executive Order 11990 - wetlands assessment and impacts mitigation
- U. S. Coastal Zone Management Act - Provides evaluation criteria for actions taken in coastal zone
- New York State Water Quality Certificate - Water quality and dredging requirements
- Fish and Wildlife Conservation Act of 1980
- Fish and Wildlife Improvement Act of 1978
- Migratory Bird Treaty Act of 1972
- Clean Water Act - Section 404 on Wetlands Protection

To-Be-Considered:

- New York State Air Guide- 1 - State guidelines for ambient air concentrations of individual chemicals

Cost-Effectiveness

EPA believes that the selected remedy satisfies the remedial action objectives of this project, as well as doing so more cost-effectively than Alternative 3. EPA does not believe that the greater level of certainty afforded by Alternative 3 in uniformly dredging one foot below the maintenance depth justifies the additional cost of approximately $460,000. EPA further believes that any slag below the maintenance depth that is not detectable in phase two of the selected remedy would be deep enough in the sediment to not pose any unacceptable radiation risk in the Creek, nor to be disturbed during future maintenance dredging. As part of the selected remedy, EPA will dredge as many feet below the maintenance depth as necessary during phase two to remove any slag "hot spots" that are able to be detected during the second phase.

The City's costs related to the disposal of the sediment are not considered to be within the scope of this Superfund project, and are not reflected in this ROD. An incidental factor is that the additional dredging required in Alternative 3 would require the City to dispose of approximately 50% more remediated dredge material, i.e., 10,000 more cy which, depending on the disposal options available, would further increase the City's anticipated expenditures to dispose of remediated sediment under the selected remedy.

The selected remedy will achieve the goals of the response actions and is cost-effective because it would 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 radionuclide contamination in the Creek. Radionuclide separation techniques will be employed to reduce the volume of radionuclide-contaminated material for off-Site disposal. The contamination, which presents an obstacle to periodic maintenance dredging of the Creek by the USACE, will eventually interfere with recreational usage of the Creek as sedimentation becomes worse. The future anticipated use of the Creek area, and associated upland areas, is inconsistent with taking no action on dredging the Creek. This is evidenced by the fact that the Glen Cove Industrial Development Agency (IDA) currently has plans for revitalizing the area around the Creek which would be seriously impacted if future maintenance dredging does not occur. EPA believes that the selected remedy is compatible with the IDA's revitalization plans. The selected remedy represents the most appropriate solution to radioactive slag presently in the Creek because it provides the best balance of trade-offs among the alternatives with respect to the nine evaluation criteria.

Preference for Treatment as a Principal Element

The statutory preference for remedies that employ treatment as a principal element is satisfied through the use of segregation measures to reduce the volume of radioactive material requiring specialized off-Site disposal.

DOCUMENTATION OF SIGNIFICANT CHANGES

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

APPENDIX I

FIGURES

TITLE: SITE LOCATION MAP

DATE: MAY 1998

FIGURE NO.: FIGURE 1

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

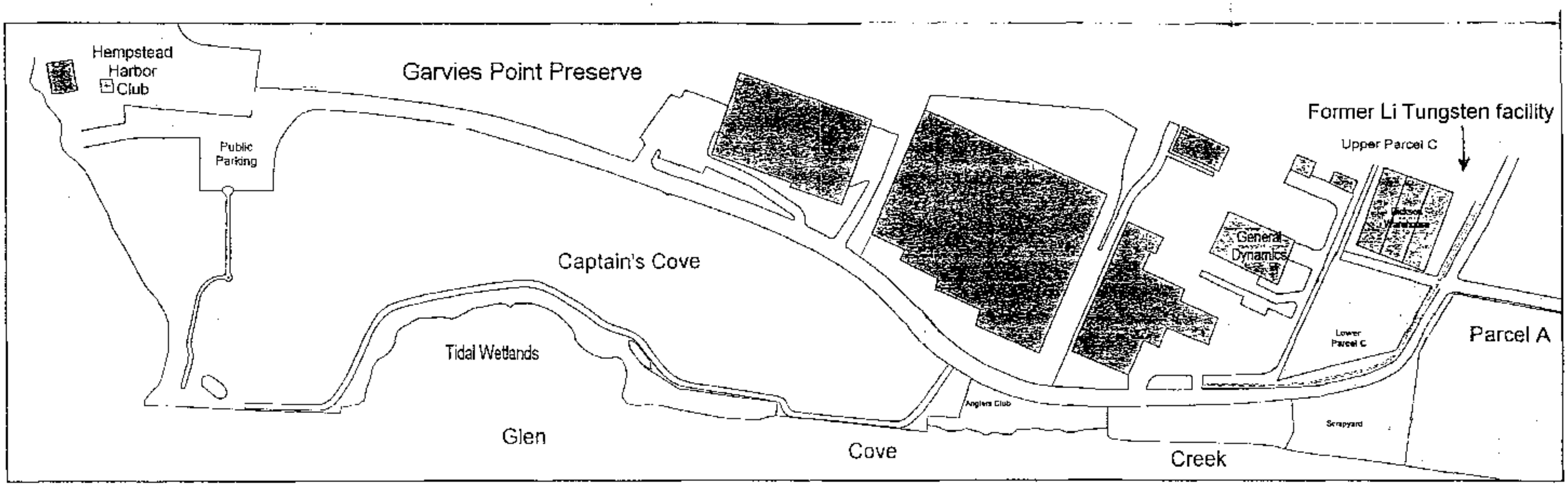

FIGURE 2

Glen Cove Creek Location Map

APPENDIX II

TABLES

Table 1

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
Glen Cove Creek - Glen Cove, NY

Scenario Timeframe:	Current/Future
Medium:	Sediment
Exposure Medium:	Sediment

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Background Value (2)	Screening Toxicity Value (3)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag (Y/N)	Rationale for Selection or Deletion (4)
Creek		RADIONUCLIDES													
Sediment	7440-61-1	Uranium-238	1.32	3.51	pCi/g	HS	8 / 8	0.1 - 3.27	3.5E+00	NA	7.42E-01	NA	NA	YES	TOX
	13966-29-5	Uranium-234	1	5.21	pCi/g	HS	6 / 6	0.09 - 1.69	5.2E+00	NA	4.01E+00	NA	NA	YES	TOX
	15117-96-1	Uranium-235	0.06	0.675	pCi/g	HS	6 / 6	0.1 - 1.27	6.8E-01	NA	1.95E-01	NA	NA	YES	TOX
	14269-63-7	Thorium-230	0.526	484.65	pCi/g	HS	8 / 8	0.11 - 170	4.8E+02	NA	3.49E+00	NA	NA	YES	TOX
	13982-63-3	Radium-226	0.526	53.05	pCi/g	HS	32 / 32	0.09 - 127	5.3E+01	NA	1.24E-02	NA	NA	YES	TOX
	14255-04-0	Lead-210 *	0.526	53.05	pCi/g	HS	0 / 0	0.09 - 127	5.3E+01	NA	1.50E-01	NA	NA	YES	TOX
	7440-29-1	Thorium-232	0.334	1069.7	pCi/g	HS	8 / 8	0.13 - 161	1.1E+03	NA	3.10E+00	NA	NA	YES	TOX
	15262-20-1	Radium-228	0.334	1022	pCi/g	HS	32 / 32	0.06 - 359	1.0E+03	NA	6.77E-02	NA	NA	YES	TOX
	14274-82-9	Thorium-228	0.334	1022	pCi/g	HS	8 / 8	0.14 - 177	1.0E+03	NA	1.54E-01	NA	NA	YES	TOX

A total of 32 samples were used to estimate average: 2 hotspot samples (HS), 6 "clean" (Rad-03S, Rad-23B, 1B, 2B, 3, 4) samples, and 24 "lift" (LTSOIL) samples.

*Samples were not analyzed for lead-210, used radium-226 results to estimate lead-210.

(1) Maximum detected concentration used for screening.
(2) NA = Not Available. No background samples were collected.
(3) Screened against EPA Radionuclide Preliminary Remediation Goals (PRGs) for residential soil
http://epa-prgs.ornl.gov/radionuclides/download.shtml

(4) Rationale Codes:
Selection Reason: ASL = Above Screening Level
TOX = Toxicity: radionuclide is an A carcinogen

Definitions: NA = Not Available
COPC = Chemical of Potential Concern
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/To Be Considered
-av = Maximum value presented is based the average of duplicate samples collected from this location.

Table 2

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
Glen Cove Creek - Glen Cove, NY

Scenario Timeframe:	Current/Future
Medium:	Surface Soil (dredged sediment)
Exposure Medium:	Surface Soil (dredged sediment)

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Background Value (2)	Screening Toxicity Value (3)	Potential ARAR/TBC Value	Potential ARAR/TBC Source (4)	COPC Flag (Y/N)	Rationale for Selection or Deletion (5)
Surface Soil		RADIONUCLIDES													
	7440-61-1	Uranium-238	1.32	3.51	pCi/g	HS	8 / 8	0.1 - 3.27	3.5E+00	NA	7.42E-01	5.0E+00	EPA RG	YES	TOX
	13966-29-5	Uranium-234	1	5.21	pCi/g	HS	6 / 6	0.1 - 1.69	5.2E+00	NA	4.01E+00	5.0E+00	EPA RG	YES	TOX
	15117-96-1	Uranium-235	0.06	0.675	pCi/g	HS	6 / 6	0.1 - 1.27	6.8E-01	NA	1.95E-01	NA	NA	YES	TOX
	14269-63-7	Thorium-230	0.526	484.65	pCi/g	HS	8 / 8	0.1 - 170	4.8E+02	NA	3.49E+00	5.0E+00	EPA RG	YES	TOX
	13982-63-3	Radium-226	0.526	53.05	pCi/g	HS	32 / 32	0.1 - 127	5.3E+01	NA	1.24E-02	5.0E+00	EPA RG	YES	TOX
	14255-04-0	Lead-210	0.526	53.05	pCi/g	HS	0 / 0	0.1 - 127	5.3E+01	NA	1.50E-01	NA	NA	YES	TOX
	7440-29-1	Thorium-232	0.334	1069.7	pCi/g	HS	8 / 8	0.1 - 161	1.1E+03	NA	3.10E+00	5.0E+00	EPA RG	YES	TOX
	15262-20-1	Radium-228	0.334	1022	pCi/g	HS	32 / 32	0.1 - 359	1.0E+03	NA	6.77E-02	5.0E+00	EPA RG	YES	TOX
	14274-82-9	Thorium-228	0.334	1022	pCi/g	HS	8 / 8	0.1 - 177	1.0E+03	NA	1.54E-01	5.0E+00	EPA RG	YES	TOX

(1) Maximum detected concentration used for screening.
(2) NA = Not Available. No background samples were collected.
(3) Screened against EPA Radionuclide Preliminary Remediation Goals (PRGs) for residential soil
http://epa-prgs.ornl.gov/radionuclides/download.shtml
(4) EPA. 2000. Remediation Goals for Radioactively Contaminated CERCLA Sites Using the Benchmark Dose Cleanup Criteria in 10 CFR Part 40 Appendix A, I, Criterion 6(6). OSWER Directive 9200.4-35P.
(5) Rationale Codes:
Selection Reason: ASL = Above Screening Level
TOX = Toxicity: radionuclide is an A carcinogen

Definitions: NA = Not Available
COPC = Chemical of Potential Concern
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/To Be Considered
-av = Maximum value presented is based the average of duplicate samples collected from this location.
EPA RG = EPA Remediation Goal (applies to combined level of radionuclides listed)

Table 3

SELECTION OF EXPOSURE PATHWAYS
Glen Cove Creek - Glen Cove, NY

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
Current / Future	Sediment [1]	Sediment [1]	Glen Cove Creek	Recreational	Adult	Ingestion	Quant	Waders may incidentally ingest sediment
						External	Quant	Waders may have external exposure to radiation from sediment
					Adolescent	Ingestion	Quant	Waders may incidentally ingest sediment
						External	Quant	Waders may have external exposure to radiation from sediment
					Child	Ingestion	Quant	Waders may incidentally ingest sediment
						External	Quant	Waders may have external exposure to radiation from sediment
				Construction Worker	Adult	Ingestion	Quant	Workers building/removing docks may incidentally ingest sediment
						External	Quant	Workers building/removing docks may have external exposure to radiation from sediment
	Surface Water [1]	Surface Water [1]	Glen Cove Creek	Recreational	Adult	Ingestion	Quant	Waders may incidentally ingest surface water
						External	None	External exposure to radiation from surface water is expected to be extremely limited. External exposures will be quantified for sediment.
					Adolescent	Ingestion	Quant	Waders may incidentally ingest surface water
						External	None	External exposure to radiation from surface water is expected to be extremely limited. External exposures will be quantified for sediment.
					Child	Ingestion	Quant	Waders may incidentally ingest surface water
						External	None	External exposure to radiation from surface water is expected to be extremely limited. External exposures will be quantified for sediment.
				Construction Worker	Adult	Ingestion	Quant	Workers building/removing docks may incidentally ingest surface water
						External	None	External exposure to radiation from surface water is expected to be extremely limited. External exposures will be quantified for sediment.
	Fish/Crustacea	Fish/Crustacea	Glen Cove Creek	Recreational	Adult	Ingestion	Quant	Recreational users may catch and eat fish from the creek
					Adolescent	Ingestion	Quant	Recreational users may catch and eat fish from the creek
					Child	Ingestion	Quant	Recreational users may catch and eat fish from the creek
Future	Sediment	Sediment	Glen Cove Creek	Dredging Worker	Adult	Ingestion	Quant	Workers dredging the creek may incidentally ingest sediment
						External	Quant	Workers dredging the creek may have external exposure to radiation from sediment
	Surface Water	Surface Water	Glen Cove Creek	Dredging Worker	Adult	Ingestion	Quant	Workers dredging the creek may incidentally ingest surface water
						External	None	External exposure to radiation from surface water is expected to be extremely limited. External exposures will be quantified for sediment.
	Surface Soil (dredged sed.)	Surface Soil	Surface Soil	Worker	Adult	Ingestion	Quant	Workers may incidentally ingest dredged sediment used as surface soil
						External	Quant	Workers may have external exposure to radiation from dredged sediment used as surface soil in a commercial/industrial area, including golf course or landfill.
				Resident	Adult	Ingestion	Quant	Residents may incidentally ingest dredged sediment used as surface soil
						External	Quant	Residents may have external exposure to radiation from dredged sediment used as surface soil in a residential area.
					Child	Ingestion	Quant	Residents may incidentally ingest dredged sediment used as surface soil
						External	Quant	Residents may have external exposure to radiation from dredged sediment used as surface soil in a residential area.

Table 3
Cont'd
SELECTION OF EXPOSURE PATHWAYS
Glen Cove Creek - Glen Cove, NY

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
	Surface Soil (dredged sed.) continued	Outdoor Air	Outdoor Air	Worker	Adult	Inhalation	Quant	Workers may inhale fugitive dust from dredged sediment used as surface soil
				Resident	Adult	Inhalation	Quant	Residents may inhale fugitive dust from dredged sediment used as surface soil
					Child	Inhalation	Quant	Residents may inhale fugitive dust from dredged sediment used as surface soil
	Groundwater	Groundwater	Tap water	Worker	Adult	Ingestion	Quant	Assumes migration of radionuclides from dredged sediment to groundwater.
						External	None	External exposure to radiation from groundwater is expected to be extremely limited. External exposures will be quantified for soil.
				Resident	Adult	Ingestion	Quant	Assumes migration of radionuclides from dredged sediment to groundwater.
						External	None	External exposure to radiation from groundwater is expected to be extremely limited. External exposures will be quantified for soil.
					Child	Ingestion	Quant	Assumes migration of radionuclides from dredged sediment to groundwater.
						External	None	External exposure to radiation from groundwater is expected to be extremely limited. External exposures will be quantified for soil.

1 Surface water and sediment exposure scenarios are for waders.

Table 4

NON-CANCER TOXICITY DATA -- ORAL/DERMAL
Glen Cove Creek - Glen Cove, NY

Chemical of Potential Concern	Chronic/ Subchronic	Oral RfD		Oral Absorption Efficiency for for Dermal (1)	Absorbed RfD for Dermal (1)		Primary Target Organ(s)	Combined Uncertainty/Modifying Factors	RfD: Target Organ(s)	
		Value	Units		Value	Units			Source(s)	Date(s) (2) (MM/DD/YYYY)
RADIONUCLIDES										
* Uranium-238	Chronic	3.0E-03	mg/kg-day	--	3.0E-03	mg/kg-day	Body weight/Kidney	1000	IRIS	06/06/02
* Uranium-234	Chronic	3.0E-03	mg/kg-day	--	3.0E-03	mg/kg-day	Body weight/Kidney	1000	IRIS	06/06/02
* Uranium-235	Chronic	3.0E-03	mg/kg-day	--	3.0E-03	mg/kg-day	Body weight/Kidney	1000	IRIS	06/06/02
Thorium-230	NA	NA	NA	--	NA	NA	NA	NA	NA	NA
Radium-226	NA	NA	NA	--	NA	NA	NA	NA	NA	NA
Lead-210 *	NA	NA	NA	--	NA	NA	NA	NA	NA	NA
Thorium-232	NA	NA	NA	--	NA	NA	NA	NA	NA	NA
Radium-228	NA	NA	NA	--	NA	NA	NA	NA	NA	NA
Thorium-228	NA	NA	NA	--	NA	NA	NA	NA	NA	NA

IRIS = Integrated Risk Information System; July 2002
RfD = Reference dose

* Based on the RfD for Uranium, soluble salts.

Table 5

NON-CANCER TOXICITY DATA -- INHALATION
Glen Cove Creek - Glen Cove, NY

Chemical of Potential Concern	Chronic/ Subchronic	Inhalation RfC		Extrapolated RfD (1)		Primary Target Organ(s)	Combined Uncertainty/ Modifying Factors	RfC Target Organ(s)	
		Value	Units	Value	Units			Source(s)	Date(s) (2) (MM/DD/YYYY)
RADIONUCLIDES									
Uranium-238	NA	NA	NA	NA	NA	NA	NA	NA	NA
Uranium-234	NA	NA	NA	NA	NA	NA	NA	NA	NA
Uranium-235	NA	NA	NA	NA	NA	NA	NA	NA	NA
Thorium-230	NA	NA	NA	NA	NA	NA	NA	NA	NA
Radium-226	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lead-210 *	NA	NA	NA	NA	NA	NA	NA	NA	NA
Thorium-232	NA	NA	NA	NA	NA	NA	NA	NA	NA
Radium-228	NA	NA	NA	NA	NA	NA	NA	NA	NA
Thorium-228	NA	NA	NA	NA	NA	NA	NA	NA	NA

NA = Not available

RfC = Reference concentration

RfD = Reference dose

Table 6

CANCER TOXICITY DATA -- ORAL/DERMAL - Soil/Sediment
Glen Cove Creek - Glen Cove, NY

Chemical of Potential Concern	Oral Cancer Slope Factor for Soil Ingestion		Oral Absorption Efficiency for Dermal (1)	Absorbed Cancer Slope Factor for Dermal (1)		Weight of Evidence/ Cancer Guideline Description	Oral CSF	
	Value	Units		Value	Units		Source(s)	Date(s) (2) (MM/DD/YYYY)
RADIONUCLIDES								
U-238 + D	2.10E-10	$(pCi)^{-1}$	NA	NA	NA	A	R-HEAST	04/16/01
U-234	1.58E-10	$(pCi)^{-1}$	NA	NA	NA	A	R-HEAST	04/16/01
U-235+D	1.63E-10	$(pCi)^{-1}$	NA	NA	NA	A	R-HEAST	04/16/01
Th-230	2.02E-10	$(pCi)^{-1}$	NA	NA	NA	A	R-HEAST	04/16/01
Ra-226 + D	7.30E-10	$(pCi)^{-1}$	NA	NA	NA	A	R-HEAST	04/16/01
Lead-210 *	2.66E-09	$(pCi)^{-1}$	NA	NA	NA	A	R-HEAST	04/16/01
Thorium-232	2.31E-10	$(pCi)^{-1}$	NA	NA	NA	A	R-HEAST	04/16/01
Ra-228 + D	2.29E-09	$(pCi)^{-1}$	NA	NA	NA	A	R-HEAST	04/16/01
Th-228 + D	8.09E-10	$(pCi)^{-1}$	NA	NA	NA	A	R-HEAST	04/16/01

R-HEAST = Radionuclide Health Effects Assessment Summary Tables; April 2001

CSF = Cancer slope factor

+ D = principal radionuclide with associated decay chain; see Table B-6.5

(1) The dermal Cancer Slope Factor was assumed to equal the oral Cancer Slope Factor.
No adjustment factor was applied, as directed by R-HEAST.

EPA Weight of Evidence:

A - Human Carcinogen

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

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

C - Possible human carcinogen

D - Not classifiable as human carcinogen

E - Evidence of noncarcinogenicity

Table 7.

CANCER TOXICITY DATA -- ORAL/DERMAL - Water
Glen Cove Creek - Glen Cove, NY

Chemical of Potential Concern	Oral Cancer Slope Factor for Water Ingestion		Oral Absorption Efficiency for Dermal (1)	Absorbed Cancer Slope Factor for Dermal (1)		Weight of Evidence/ Cancer Guideline Description	Oral CSF	
	Value	Units		Value	Units		Source(s)	Date(s) (2) (MM/DD/YYYY)
RADIONUCLIDES								
U-238 + D	8.71E-11	$(pCi)^{-1}$	NA	NA	NA	A	R-HEAST	04/16/01
U-234	7.07E-11	$(pCi)^{-1}$	NA	NA	NA	A	R-HEAST	04/16/01
U-235+D	7.18E-11	$(pCi)^{-1}$	NA	NA	NA	A	R-HEAST	04/16/01
Th-230	9.10E-11	$(pCi)^{-1}$	NA	NA	NA	A	R-HEAST	04/16/01
Ra-226 + D	3.86E-10	$(pCi)^{-1}$	NA	NA	NA	A	R-HEAST	04/16/01
Lead-210 *	1.27E-09	$(pCi)^{-1}$	NA	NA	NA	A	R-HEAST	04/16/01
Thorium-232	1.01E-10	$(pCi)^{-1}$	NA	NA	NA	A	R-HEAST	04/16/01
Ra-228 + D	1.04E-09	$(pCi)^{-1}$	NA	NA	NA	A	R-HEAST	04/16/01
Th-228 + D	3.00E-10	$(pCi)^{-1}$	NA	NA	NA	A	R-HEAST	04/16/01

R-HEAST = Radionuclide Health Effects Assessment Summary Tables; April 2001

CSF = Cancer slope factor

+ D = principal radionuclide with associated decay chain; see Table B-6.5

(1) The dermal Cancer Slope Factor was assumed to equal the oral Cancer Slope Factor. No adjustment factor was applied, as directed by R-HEAST.

EPA Weight of Evidence:

A - Human Carcinogen

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

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

C - Possible human carcinogen

D - Not classifiable as human carcinogen

E - Evidence of noncarcinogenicity

Table 8

CANCER TOXICITY DATA -- INHALATION
Glen Cove Creek - Glen Cove, NY

Chemical of Potential Concern	Unit Risk		Inhalation Cancer Slope Factor		Weight of Evidence/ Cancer Guideline Description	Unit Risk: Inhalation CSF	
	Value	Units	Value	Units		Source(s)	Date(s) (2) (MM/DD/YYYY)
RADIONUCLIDES							
U-238 + D	NA	NA	9.35E-09	(pCi)-1	A	R-HEAST	04/16/01
U-234	NA	NA	1.14E-08	(pCi)-1	A	R-HEAST	04/16/01
U-235 + D	NA	NA	1.01E-08	(pCi)-1	A	R-HEAST	04/16/01
Th-230	NA	NA	2.85E-08	(pCi)-1	A	R-HEAST	04/16/01
Ra-226 + D	NA	NA	1.16E-08	(pCi)-1	A	R-HEAST	04/16/01
Lead-210 *	NA	NA	1.39E-08	(pCi)-1	A	R-HEAST	04/16/01
Thorium-232	NA	NA	4.33E-08	(pCi)-1	A	R-HEAST	04/16/01
Ra-228 + D	NA	NA	5.23E-09	(pCi)-1	A	R-HEAST	04/16/01
Th-228 + D	NA	NA	1.43E-07	(pCi)-1	A	R-HEAST	04/16/01

R-HEAST = Radionuclide Health Effects Assessment Summary Tables; April 2001
+ D = principal radionuclide with associated decay chain; see Table B-6.5

EPA Weight of Evidence:
A - Human Carcinogen
B1 - Probable human carcinogen - indicates that limited human data are availab
B2 - Probable human carcinogen - indicates sufficient evidence in animals and inadequate or no evidence in humans.
C - Possible human carcinogen
D - Not classifiable as human carcinogen
E - Evidence of noncarcinogenicity

Table 9

CANCER TOXICITY DATA -- EXTERNAL (RADIATION)
Glen Cove Creek - Glen Cove, NY

Chemical of Potential Concern	Cancer Slope Factor		Source(s)	Date(s) (2) (MM/DD/YYYY)
	Value	Units		
RADIONUCLIDES				
U-238 + D	1.14E-07	g/(pCi-yr)	R-HEAST	04/16/01
U-234	2.52E-10	g/(pCi-yr)	R-HEAST	04/16/01
U-235 + D	5.43E-07	g/(pCi-yr)	R-HEAST	04/16/01
Th-230	8.19E-10	g/(pCi-yr)	R-HEAST	04/16/01
Ra-226 + D	8.49E-06	g/(pCi-yr)	R-HEAST	04/16/01
Lead-210 *	4.21E-09	g/(pCi-yr)	R-HEAST	04/16/01
Thorium-232	3.42E-10	g/(pCi-yr)	R-HEAST	04/16/01
Ra-228 + D	4.53E-06	g/(pCi-yr)	R-HEAST	04/16/01
Th-228 + D	7.76E-06	g/(pCi-yr)	R-HEAST	04/16/01

R-HEAST = Radionuclide Health Effects Assessment Summary Tables; April 2001

+ D = principal radionuclide with associated decay chain; see Table B-6.5

Table 10

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
Glen Cove Creek - Glen Cove, NY

Scenario Timeframe:	Current/Future
Receptor Population:	Recreational - Creek
Receptor:	Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Sediment	Sediment	Creek	**CHEMICALS**										
			Chemical Total	NA	--	--	NA	--		1.6E-03	--	--	1.6E-03
			RADIONUCLIDES										
			Uranium-238	2.5E-07	--	--	3.1E-07	5.6E-07	--	--	--	--	--
			Uranium-235	3.2E-08	--	--	2.4E-07	2.8E-07	--	--	--	--	--
			Thorium-230	2.8E-05	--	--	2.6E-07	2.8E-05	--	--	--	--	--
			Radium-226	1.1E-05	--	--	2.9E-04	3.0E-04	--	--	--	--	--
			Lead-210 *	4.0E-05	--	--	1.5E-07	4.0E-05	--	--	--	--	--
			Thorium-232	7.0E-05	--	--	2.4E-07	7.0E-05	--	--	--	--	--
			Radium-228	6.6E-04	--	--	3.0E-03	3.6E-03	--	--	--	--	--
			Thorium-228	2.3E-04	--	--	5.1E-03	5.3E-03	--	--	--	--	--
			Radioactive Total	1.0E-03	--	--	8.4E-03	9.4E-03		--	--	--	--
		Exposure Point Total						9.4E-03					1.6E-03
	Exposure Medium Total							9.4E-03					1.6E-03
Sediment Total								9.4E-03					1.6E-03
Surface Water	Surface Water	Creek	**CHEMICALS**										
			Chemical Total	NA	--	--	NA	--		1.9E-04	--	--	1.9E-04
			RADIONUCLIDES										
			Radium-228	2.1E-05	--	--	NA	2.1E-05	--	--	--	--	--
			Radioactive Total	2.2E-05	--	--	--	2.2E-05		--	--	--	--
		Exposure Point Total						2.2E-05					1.9E-04
	Exposure Medium Total							2.2E-05					1.9E-04
Surface Water Total								2.2E-05					1.9E-04
Fish/Crustacea	Fish/Crustacea	Creek	**CHEMICALS**										
			Chemical Total	NA	--	--	NA	--		3.8E-03	--	--	3.8E-03
			RADIONUCLIDES										
			Radioactive Total	1.9E-04	--	--	NA	1.9E-04		--	--	--	--
		Exposure Point Total						1.9E-04					3.8E-03
	Exposure Medium Total							1.9E-04					3.8E-03
Fish/Crustacea Total								1.9E-04					3.8E-03
Receptor Total								9.6E-03					5.6E-03

Total Risk Across All Media = 1E-02

Total Hazard Across All Media = 6E-03

Total Kidney HI Across All Media = 5.6E-03

Total Whole Body HI Across All Media = 5.6E-03

Table 11

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
Glen Cove Creek - Glen Cove, NY

Scenario Timeframe:	Current/Future
Receptor Population:	Recreational - Creek
Receptor:	Adolescent

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Sediment	Sediment	Creek	**CHEMICALS**										
			Chemical Total	NA	--	--	NA	--		2.0E-03	--	--	2.0E-03
			RADIONUCLIDES										
			Thorium-230	5.5E-06	--	--	5.1E-08	5.6E-06	--	--	--	--	--
			Radium-226	2.2E-06	--	--	5.9E-05	6.1E-05	--	--	--	--	--
			Lead-210 *	8.1E-06	--	--	2.9E-08	8.1E-06	--	--	--	--	--
			Thorium-232	1.4E-05	--	--	4.7E-08	1.4E-05	--	--	--	--	--
			Radium-228	1.3E-04	--	--	6.0E-04	7.3E-04	--	--	--	--	--
			Thorium-228	4.7E-05	--	--	1.0E-03	1.1E-03	--	--	--	--	--
			Radioactive Total	2.1E-04	--	--	1.7E-03	1.9E-03		--	--	--	--
		Exposure Point Total						1.9E-03					2.0E-03
	Exposure Medium Total							1.9E-03					2.0E-03
Sediment Total								1.9E-03					2.0E-03
Surface Water	Surface Water	Creek	**CHEMICALS**										
			Chemical Total	NA	--	--	NA	--		2.3E-04	--	--	2.3E-04
			RADIONUCLIDES										
			Radium-228	4.3E-06	--	--	NA	4.3E-06	--	--	--	--	--
			Radioactive Total	4.4E-06	--	--	NA	4.4E-06		--	--	--	--
		Exposure Point Total						4.4E-06					2.3E-04
	Exposure Medium Total							4.4E-06					2.3E-04
Surface Water Total								4.4E-06					2.3E-04
Fish/Crustacea	Fish/Crustacea	Creek	**CHEMICALS**										
			Chemical Total	NA	--	--	NA	--		4.9E-02	--	--	4.9E-02
			RADIONUCLIDES										
			Radioactive Total	3.0E-05	--	--	NA	3.0E-05		--	--	--	--
		Exposure Point Total						3.0E-05					4.9E-02
	Exposure Medium Total							3.0E-05					4.9E-02
Fish/Crustacea Total								3.0E-05					4.9E-02
Receptor Total								1.9E-03					5.2E-02

Total Risk Across All Media = 2E-03

Total Hazard Across All Media = 5E-02

Total Kidney HI Across All Media = 5.8E-03

Total Whole Body HI Across All Media = 5.1E-03

Table 12

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
Glen Cove Creek - Glen Cove, NY

Scenario Timeframe:	Current/Future
Receptor Population:	Recreational - Creek
Receptor:	Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Sediment	Sediment	Creek	**CHEMICALS**										
			Chemical Total	NA	--	--	NA	--		3.1E-03	--	--	3.1E-03
			RADIONUCLIDES										
			Thorium-230	2.3E-06	--	--	1.1E-08	2.3E-06	--	--	--	--	--
			Radium-226	9.3E-07	--	--	1.2E-05	1.3E-05	--	--	--	--	--
			Lead-210 *	3.4E-06	--	--	6.1E-09	3.4E-06	--	--	--	--	--
			Thorium-232	5.9E-06	--	--	9.9E-09	5.9E-06	--	--	--	--	--
			Radium-228	5.5E-05	--	--	1.3E-04	1.8E-04	--	--	--	--	--
			Thorium-228	2.0E-05	--	--	2.1E-04	2.3E-04	--	--	--	--	--
			Radioactive Total	8.8E-05	--	--	3.5E-04	4.4E-04		--	--	--	--
		Exposure Point Total						4.4E-04					3.1E-03
	Exposure Medium Total							4.4E-04					3.1E-03
Sediment Total								4.4E-04					3.1E-03
Surface Water	Surface Water	Creek	**CHEMICALS**										
			Chemical Total	NA	--	--	NA	--		1.9E-04	--	--	1.9E-04
			RADIONUCLIDES										
			Radioactive Total	9.2E-07	--	--	NA	9.2E-07		--	--	--	--
		Exposure Point Total						9.2E-07					1.9E-04
	Exposure Medium Total							9.2E-07					1.9E-04
Surface Water Total								9.2E-07					1.9E-04
Fish/Crustacea	Fish/Crustacea	Creek	**CHEMICALS**										
			Chemical Total	NA	--	--	NA	--		3.8E-03	--	--	3.8E-03
			RADIONUCLIDES										
			Radioactive Total	7.5E-06	--	--	NA	7.5E-06		--	--	--	--
		Exposure Point Total						7.5E-06					3.8E-03
	Exposure Medium Total							7.5E-06					3.8E-03
Fish/Crustacea Total								7.5E-06					3.8E-03
Receptor Total								4.5E-04					7.1E-03

Total Risk Across All Media = 4E-04

Total Hazard Across All Media = 7E-03

Total Kidney HI Across All Media = 7.1E-03
Total Whole Body HI Across All Media = 7.1E-03

Table 13

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
Glen Cove Creek - Glen Cove, NY

Scenario Timeframe:	Current/Future
Receptor Population:	Construction Worker
Receptor:	Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Sediment	Sediment	Creek	**CHEMICALS**										
			Chemical Total	NA	--	--	NA	--		7.4E-04	--	--	7.4E-04
			RADIONUCLIDES										
			Radium-226	1.0E-06	--	--	3.3E-05	3.4E-05	--	--	--	--	--
			Lead-210 *	3.7E-06	--	--	1.6E-08	3.7E-06	--	--	--	--	--
			Thorium-232	6.4E-06	--	--	2.6E-08	6.5E-06	--	--	--	--	--
			Radium-228	6.1E-05	--	--	3.3E-04	3.9E-04	--	--	--	--	--
			Thorium-228	2.2E-05	--	--	5.7E-04	5.9E-04	--	--	--	--	--
			Radioactive Total	9.6E-05	--	--	9.4E-04	1.0E-03		--	--	--	--
		Exposure Point Total						1.0E-03					7.4E-04
	Exposure Medium Total							1.0E-03					7.4E-04
Sediment Total								1.0E-03					7.4E-04
Surface Wate	Surface Wate	Creek	**CHEMICALS**										
			Chemical Total	NA	--	--	NA	--		2.6E-05	--	--	2.6E-05
			RADIONUCLIDES										
			Radioactive Total	6.1E-07	--	--	--	6.1E-07		--	--	--	--
		Exposure Point Total						6.1E-07					2.6E-05
	Exposure Medium Total							6.1E-07					2.6E-05
Surface Water Total								6.1E-07					2.6E-05
Receptor Total								1.0E-03					7.7E-04

Total Risk Across All Media = 1E-03

Total Hazard Across All Media = 8E-04

Total Kidney HI Across All Media = 1.5E-03
Total Whole Body HI Across All Media = 7.7E-04

Table 14

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
Glen Cove Creek - Glen Cove, NY

Scenario Timeframe:	Future
Receptor Population:	Dredging Worker
Receptor:	Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Sediment	Sediment	Creek	**CHEMICALS**										
			Chemical Total	NA	--	--	NA	--		3.7E-03	--	--	3.7E-03
			RADIONUCLIDES										
			Radium-226	8.5E-07	--	--	2.7E-05	2.8E-05	--	--	--	--	--
			Thorium-232	5.4E-06	--	--	2.2E-08	5.4E-06	--	--	--	--	--
			Radium-228	5.1E-05	--	--	2.8E-04	3.3E-04	--	--	--	--	--
			Thorium-228	1.8E-05	--	--	4.8E-04	4.9E-04	--	--	--	--	--
			Radioactive Total	8.0E-05	--	--	7.8E-04	8.6E-04		--	--	--	--
		Exposure Point Total						8.6E-04					3.7E-03
	Exposure Medium Total							8.6E-04					3.7E-03
Sediment Total								8.6E-04					3.7E-03
Surface Wate	Surface Water	Creek	**CHEMICALS**										
			Chemical Total	NA	--	--	NA	--		1.3E-04	--	--	1.3E-04
			RADIONUCLIDES										
			Radioactive Total	5.1E-07	--	--	NA	5.1E-07		--	--	--	--
		Exposure Point Total						5.1E-07					1.3E-04
	Exposure Medium Total							5.1E-07					1.3E-04
Surface Water Total								5.1E-07					1.3E-04
Receptor Total								8.6E-04					3.8E-03

Total Risk Across All Media = 9E-04

Total Hazard Across All Media = 4E-03
Total Kidney HI Across All Media = 3.8E-03
Total Whole Body HI Across All Media = 3.8E-03

Table 15

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
Glen Cove Creek - Glen Cove, NY

Scenario Timeframe:	Future
Receptor Population:	Worker
Receptor:	Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	Outdoor Air	**CHEMICALS**										
			Chemical Total	NA	NA	--	NA	--		2.8E-03	4.1E-07	--	2.8E-03
			RADIONUCLIDES										
			Uranium-238	3.6E-07	2.4E-09	--	1.8E-06	2.2E-06	--	--	--	--	--
			Uranium-234	3.7E-07	4.0E-09	--	5.4E-09	3.8E-07	--	--	--	--	--
			Uranium-235	4.7E-08	4.3E-10	--	1.4E-06	1.5E-06	--	--	--	--	--
			Thorium-230	4.0E-05	8.4E-07	--	1.5E-06	4.3E-05	--	--	--	--	--
			Radium-226	1.6E-05	3.8E-08	--	1.7E-03	1.7E-03	--	--	--	--	--
			Lead-210 *	5.9E-05	4.5E-08	--	8.5E-07	6.0E-05	--	--	--	--	--
			Thorium-232	1.0E-04	2.8E-06	--	1.4E-06	1.1E-04	--	--	--	--	--
			Radium-228	9.6E-04	3.2E-07	--	1.7E-02	1.8E-02	--	--	--	--	--
			Thorium-228	3.4E-04	8.8E-06	--	3.0E-02	3.0E-02	--	--	--	--	--
			Radioactive Total	1.5E-03	1.3E-05	--	4.9E-02	5.0E-02		--	--	--	--
		Exposure Point Total						5.0E-02					2.8E-03
	Exposure Medium Total							5.0E-02					2.8E-03
Surface Soil Total								5.0E-02					2.8E-03
Groundwater	Groundwater	Tap Water	**CHEMICALS**										
			Chemical Total	NA	--	--	NA	--		6.5E-02	--	--	6.5E-02
			RADIONUCLIDES										
			Uranium-238	3.0E-06	--	--	--	3.0E-06	--	--	--	--	--
			Uranium-235	3.4E-06	--	--	--	3.4E-06	--	--	--	--	--
			Radium-226	1.2E-04	--	--	--	1.2E-04	--	--	--	--	--
			Radium-228	6.2E-03	--	--	--	6.2E-03	--	--	--	--	--
			Thorium-228	2.1E-06	--	--	--	2.1E-06	--	--	--	--	--
			Radioactive Total	6.4E-03	--	--	--	6.4E-03		--	--	--	--
		Exposure Point Total						6.4E-03					6.5E-02
	Exposure Medium Total							6.4E-03					6.5E-02
Groundwater Total								6.4E-03					6.5E-02

Total Risk Across All Media = 6E-02

Total Hazard Across All Media = 7E-02

Total Kidney HI Across All Media = 6.8E-02

Total Whole Body HI Across All Media = 6.8E-02

Table 16

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
Glen Cove Creek - Glen Cove, NY

Scenario Timeframe:	Future
Receptor Population:	Resident
Receptor:	Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	Surface Soil/ Outdoor Air	**CHEMICALS**										
			Chemical Total	NA	--	--	NA	--		3.9E-03	5.8E-07	--	3.9E-03
			RADIONUCLIDES										
			Uranium-238	4.9E-07	3.2E-09	--	3.5E-06	4.0E-06	--	--	--	--	--
			Uranium-235	6.3E-08	5.7E-10	--	2.8E-06	2.8E-06	--	--	--	--	--
			Thorium-230	5.4E-05	1.1E-06	--	2.9E-06	5.8E-05	--	--	--	--	--
			Radium-226	2.2E-05	5.1E-08	--	3.3E-03	3.3E-03	--	--	--	--	--
			Lead-210 *	7.9E-05	6.1E-08	--	1.6E-06	8.1E-05	--	--	--	--	--
			Thorium-232	1.4E-04	3.8E-06	--	2.7E-06	1.4E-04	--	--	--	--	--
			Radium-228	1.3E-03	4.3E-07	--	3.4E-02	3.5E-02	--	--	--	--	--
			Thorium-228	4.6E-04	1.2E-05	--	5.8E-02	5.8E-02	--	--	--	--	--
			Radioactive Total	2.0E-03	1.7E-05	--	9.5E-02	9.7E-02		--	--	--	--
		Exposure Point Total						9.7E-02					3.9E-03
	Exposure Medium Total							9.7E-02					3.9E-03
Surface Soil Total								9.7E-02					3.9E-03
Groundwater	Groundwater	Tap Water	**CHEMICALS**										
			Chemical Total	NA	--	--	NA	--		1.8E-01	--	--	1.8E-01
			RADIONUCLIDES										
			Uranium-238	8.1E-06	--	--	--	8.1E-06	--	--	--	--	--
			Uranium-234	1.1E-06	--	--	--	1.1E-06	--	--	--	--	--
			Uranium-235	9.1E-06	--	--	--	9.1E-06	--	--	--	--	--
			Radium-226	3.3E-04	--	--	--	3.3E-04	--	--	--	--	--
			Thorium-232	2.0E-06	--	--	--	2.0E-06	--	--	--	--	--
			Radium-228	1.7E-02	--	--	--	1.7E-02	--	--	--	--	--
			Thorium-228	5.7E-06	--	--	--	5.7E-06	--	--	--	--	--
			Radioactive Total	1.7E-02	--	--	--	1.7E-02		--	--	--	--
		Exposure Point Total						1.7E-02					1.8E-01
	Exposure Medium Total							1.7E-02					1.8E-01
Groundwater Total								1.7E-02					1.8E-01

Total Risk Across All Media = 1E-01

Total Hazard Across All Media = 2E-01

Total Kidney HI Across All Media = 1.9E-01

Total Whole Body HI Across All Media = 1.9E-01

Table 17
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
Glen Cove Creek - Glen Cove, NY

Scenario Timeframe:	Future
Receptor Population:	Resident
Receptor:	Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	Surface Soil/ Outdoor Air	**CHEMICALS**										
			Chemical Total	NA	NA	--	NA	--		3.7E-02	2.7E-06	--	3.7E-02
			RADIONUCLIDES										
			Uranium-238	2.4E-07	8.0E-10	--	8.7E-07	1.1E-06	--	--	--	--	--
			Uranium-235	3.1E-08	1.4E-10	--	6.9E-07	7.2E-07	--	--	--	--	--
			Thorium-230	2.7E-05	2.8E-07	--	7.3E-07	2.8E-05	--	--	--	--	--
			Radium-226	1.1E-05	1.3E-08	--	8.3E-04	8.4E-04	--	--	--	--	--
			Lead-210 *	3.9E-05	1.5E-08	--	4.1E-07	4.0E-05	--	--	--	--	--
			Thorium-232	6.8E-05	9.4E-07	--	6.7E-07	7.0E-05	--	--	--	--	--
			Radium-228	6.5E-04	1.1E-07	--	8.5E-03	9.1E-03	--	--	--	--	--
			Thorium-228	2.3E-04	3.0E-06	--	1.4E-02	1.5E-02	--	--	--	--	--
			Radioactive Total	1.0E-03	4.3E-06	--	2.4E-02	2.5E-02		--	--	--	--
		Exposure Point Total						2.5E-02					3.7E-02
	Exposure Medium Total							2.5E-02					3.7E-02
Surface Soil Total								2.5E-02					3.7E-02
Groundwater	Groundwater	Tap Water	**CHEMICALS**										
			Chemical Total	0.0E+00	--	--	NA	--		4.3E-01	--	--	4.3E-01
			RADIONUCLIDES										
			Uranium-238	1.0E-06	--	--	--	1.0E-06	--	--	--	--	--
			Uranium-235	1.1E-06	--	--	--	1.1E-06	--	--	--	--	--
			Radium-226	4.1E-05	--	--	--	4.1E-05	--	--	--	--	--
			Radium-228	2.1E-03	--	--	--	2.1E-03	--	--	--	--	--
			Radioactive Total	2.1E-03	--	--	--	2.1E-03		--	--	--	--
		Exposure Point Total						2.1E-03					4.3E-01
	Exposure Medium Total							2.1E-03					4.3E-01
Groundwater Total								2.1E-03					4.3E-01

Total Risk Across All Media = 3E-02

Total Hazard Across All Media = 5E-01

Total Kidney HI Across All Media = 4.6E-01

Total Whole Body HI Across All Media = 4.6E-01

Table 18

Selected Remedy - Remedial Dredging

Cost Estimate Summary

Glen Cove Creek

Item No.	Item Description	Quantity	Unit Cost	Unit	Extension
CAPITAL COSTS[1]					
General Requirements					
1	Mobilization	1	$ 53,000.00	LS	$ 53,000
2	Workplans	1	$ 40,000.00	LS	$ 40,000
3	Temporary Facilities	1	$ 35,356.00	LS	$ 35,356
4	Surveying	1	$ 65,550.00	LS	$ 65,550
5	Health and Safety	1	$ 123,720.00	LS	$ 123,720
6	Construction Management	1	$ 306,800.00	LS	$ 306,800
Construction Costs					
7	Parcel A Berm Construction	1	$ 107,197	LS	$ 107,197
8	Dredge and Place Material	20500	$ 25	CY	$ 512,500
9	Underwater Gamma Survey	1	$ 23,720	LS	$ 23,720
10	Spread and Pile Material for Dewatering	1	$ 161,226.00	LS	$ 161,226
11	Placement for Survey/Trans. to Holding Area	1	$ 112,060.00	LS	$ 112,060
Transportation & Disposal (T&D)					
12	Upland Gamma Survey	1	$ 95,680	LS	$ 95,680
13	Contaminated Sediment T&D	81.6	$ 300	TON	$ 24,480
14	Uncontaminated Sediment T&D	32720	BUD	TON	$ 0
Water Treatment					
15	System	1	$ 33,947	LS	$ 33,947
16	Expendables & Analysis	1	$ 9,697	LS	$ 9,697
17	Labor	1	$ 5,200	LS	$ 5,200
	SUBTOTAL CONSTRUCTION COSTS				**$ 1,710,133**
18	General Contractor Overhead and Profit (25% construction, excluding T&D)				$ 421,413
19	Design Engineering (20% construction, excluding T&D)				$ 337,131
20	Resident Engineering/Inspection (10% construction, excluding T&D)				$ 168,565
21	Contingency (20%)				$ 342,027
	TOTAL CAPITAL COSTS				**$ 2,979,269**
22	**Annual O&M Costs[2]**				$ 0
PRESENT WORTH OF COSTS[3]					
23	Total Capital Costs				$ 2,979,269
24	O&M Costs (30 year duration)				$ 0
25					**$ 2,979,269**
					$ 2,979,000

1 Capital Costs - capital costs include both the direct and indirect capital costs required to implement the remedial action. Direct costs are comprised of construction costs for equipment, labor, materials, transportation, and disposal. Indirect costs include those associated with permitting and legal, engineering, services during construction, and contingencies.

2 O & M Costs - These costs include labor and materials associated operation and maintenance following the remedial action, such as cap maintenance, long-term monitoring costs, or 5-year site reviews. The EPA RI/FS guidance document recommends that O & M costs be determined for 30 years.

3 Present Worth Costs - The present worth value of the capital and O & M costs are determined to evaluate expenditures that occur over different time periods so that the costs for remedial alternatives can be compared on the basis of a single figure. The present worth cost has been calculated based on Federal policy which recommends assuming a 7% discount rate after inflation.

APPENDIX III

ADMINISTRATIVE RECORD INDEX

LI TUNGSTEN CORPORATION SITE
OPERABLE UNIT 4
ADMINISTRATIVE RECORD FILE
INDEX OF DOCUMENTS

1.0 SITE IDENTIFICATION

1.4 Site Investigation Reports

P. 100001 - 100165 Letter (with attachment) to Mr. Monte Greges, U.S. Army Corps of Engineers, New York District, from Ms. Jeanne Litwin, Delivery Order Manager, COM Federal Programs Corporation, re: Sediment Sampling/Radiological Data Report, Glen Cove Sediment Sampling, Glen Cove, New York, October 27, 1995.

4.0 FEASIBILITY STUDY

4.2 Feasibility Study Work Plans

P. 400001 - 400064 Final Sampling and Analysis Plan, Radiological Scoping Survey and Sediment Sampling of Glen Cove Creek, Glen Cove, New York, prepared by Cabrera Services, Inc., prepared for U.S. Army Corps of Engineers, October 24, 2001.

P. 400065 - 400271 Removal Action Work Plan, Segregation and Management of Dredge Spoils; Li Tungsten Property, Li Tungsten Superfund Site, Glen Cove, New York, prepared by Earth Sciences Consultants, Inc., prepared for TDY Holdings, LLC, December 2001, Revised January 2002.

4.3 Feasibility Study Reports

P. 400272 - 400529 Report: Glen Cove Creek Sampling Program Report in Support of Option for Upland Disposal of Dredged Materials, prepared by Dvirka and Bartilucci, prepared for City of Glen Cove, New York, June 1996.

P. 400530 - 400604 Report: Environmental Assessment- Glen Cove Creek, prepared by U.S. Army Corps of Engineers, August 2000.

P. 400605 - 400887 Report: Final Report, Radiological Scoping Survey and Sediment Sampling, Glen Cove Creek, Glen Cove, NY, prepared by Cabrera Services, Inc., prepared for U.S. Army Corps of Engineers, Baltimore District, March 1, 2002.

P. 400888 - 400893 Report: Final Technical Memorandum, Radiological Analyses of Samples from the Dredged Materials Piles, Glen Cove Creek, Glen Cove, NY, prepared by Cabrera Services, Inc., prepared for U.S. Army Corps of Engineers, Baltimore District, March 4, 2002.

P. 400894 - 401390 Report: Final Report, Segregation and Management of Dredge Spoils, Li Tungsten Property, Volume 1 of 2, Li Tungsten Superfund Site, Glen Cove, New York, prepared by Earth Sciences Consultants, Inc., October 2002.

P. 401391 - 402019 Report: Final Report, Segregation and Management of Dredge Spoils, Li Tungsten Property, Volume 2 of 2, Li Tungsten Superfund Site, Glen Cove, New York, prepared by Earth Sciences Consultants, Inc., October 2002.

P. 402020 - 402757 Memorandum for Distribution from Mr. John R. Hartmann, Chief, Operation Division, Department of the Army, New York District, Corps of Engineers, re: Final Report-Rapid Response Support, Glen Cove Creek, Glen Cove, New York, March 21, 2003. (Attachment: Final Report, Rapid Response Support, Glen Cove Creek, Glen Cove, New York, prepared by Shaw Environmental & Infrastructure, Inc., prepared for U.S. Army Corps of Engineers, January 2003).

P. 402758 - 402969 Report: Final Human Health Risk Assessment, Glen Cove Creek, Glen Cove, New York, prepared by COM, prepared for U.S. Army Corps of Engineers, Kansas City District, July 2003.

P. 402970 - 403036 Report: Final Screening Level Ecological Risk Assessment, Glen Cove Creek, Glen Cove, New York, prepared by COM, prepared for U.S. Array Corps of Engineers, Kansas City District, July 2003.

P. 403037 - 403123 Report: Final Focused Feasibility Study, Li Tungsten Superfund Site, Operable Unit 4 - Glen Cove Creek, prepared by U. S. EPA, October 2004.

10.0 PUBLIC PARTICIPATION

10.3 Public Notices

P. 10.00001- 10.00001 The United States Environmental Protection Agency Announces the Release of a Proposed Plan for the Li Tungsten Superfund Site, Glen Cove, Nassau County, New York, published in Record Pilot - City of Glen Cove, October 14, 2004.

10.4 Public Meeting Transcripts

P. 10.00002- 10.00057 United States Environmental Protection Agency Public Information Meeting, In the Matter of the Li Tungsten Superfund Site, Glen Cove, New York, prepared by Fink & Carney Reporting and Video Services, October 20, 2004.

10.9 Proposed Plan

P. 10.00058- 10.00058 Letter to Mr. George Pavlou, Director, Emergency & Remedial Response Division, U.S. EPA, Region 2, from Mr. Dale A. Desnoyers, Director, Division of Environmental Remediation, New York State Department of Environmental Conservation, re: Draft Final Proposed Plan; Li Tungsten Corporation Site, Operable Unit No. 4, Nassau County (Site No. 1-30-046), September 23, 2004.

P. 10.00059- 10.00070 Proposed Plan: Li Tungsten Corporation Site, Operable Unit 4 - Glen Cove Creek, City of Glen Cove, Nassau County, New York, prepared by U.S. EPA, Region 2, October 2004.

11.0 TECHNICAL SOURCES AND GUIDANCE DOCUMENTS

11.1 EPA Headquarters

P.	1100001-1100188	Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA, Interim Final, prepared by U.S. EPA, Office of Emergency and Remedial Response, October 1988.
P.	1100189-1100208	Memorandum to Addressees from Mr. Stephen D. Luftig, Director, Office of Emergency and Remedial Response, and Mr. Larry Weinstock, Acting Director, Office of Radiation and Indoor Air, U.S. EPA, re: Establishment of Cleanup Levels for CERCLA Sites with Radioactive Contamination, August 22, 1997. (OSWER Directive No. 9200.4-18)
P.	1100209-1100214	Memorandum to Addressees from Mr. Stephen D. Luftig, Director, Office of Emergency and Remedial Response, and Mr. Larry Weinstock, Acting Director, Office of Radiation and Indoor Air, U.S. EPA, re: Use of Soil Cleanup Criteria in 40 CFR Part 192 as Remediation Goals for CERCLA sites, February 12, 1998. (OSWER Directive No. 9200.4-25}

11.4 Technical Sources

P.	1100215-1100235	Report: Radionuclide Concentrations in Surface Sediments and Core Sediments from Glen Cove Creek and Hempstead Harbor, New York, prepared by Paul Linsalata, Ph. D., and Norman Cohen, Ph. D., prepared for Hart Environmental Management Corp., October 28, 1989.

APPENDIX IV

STATE LETTER OF CONCURRENCE

New York State Department of Environmental Conservation
Division of Environmental Remediation, 12th Floor
625 Broadway, Albany, New York 12233-7011
Phone: (518) 402-9706 • **FAX:** (518) 402-9020
Website: www.dec.state.ny.us

Denise M. Sheehan
Acting
Commissioner

MAR 29 2005

Mr. William J. McCabe
Acting Director
Emergency & Remedial Response Division
U. S. Environmental Protection Agency
Region II
290 Broadway, 20th Floor
New York, New York 10007-1866

RE: Draft Final Record of Decision; Li Tungsten Corporation Site
Operable Unit No. 4, Nassau County (Site No. 1-30-046)

Dear Mr. McCabe:

The New York State Department of Environmental Conservation, in conjunction with the New York State Department of Health, has reviewed the Draft Final Record of Decision for the Li Tungsten Corporation Site Operable Unit No. 4 and concur with the remedy. The following are the key components of the remedy:

- Dredging of Glen Cove Creek to remove approximately 20,500 cubic yards of sediment.
- Dewatering and segregating on Parcel A.
- Dredging of approximately 500 cubic yards of the radionuclide hot spots.
- Proper handling and off-site disposal of radionuclide contaminated material.

If you have any questions or comments on this matter, please contact Mr. Sal Ervolina at (518) 402-9707.

Sincerely,

Dale A. Desnoyers
Director
Division of Environmental Remediation

cc: J. LaPadula - USEPA, Region II
A. Carpenter - USEPA, Region II
E. Als - USEPA, Region II
G. Litwin - NYSDOH
R. Fedigan - NYSDOH

APPENDIX V

RESPONSIVENESS SUMMARY

RESPONSIVENESS SUMMARY

Li Tungsten Superfund Site
Operable Unit 4
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.

SUMMARY OF COMMUNITY RELATIONS ACTIVITIES

The Focused Feasibility Study (FFS) for Operable Unit 4 and the Proposed Plan for the Site were released to the public for comment on October 14, 2004. These documents, as well as other documents in the administrative record file (see Administrative Record Index, **APPENDIX III**) have been made available to the public at information repositories maintained at the EPA Region II Docket Room located at 290 Broadway, New York, New York and at 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 the Glen Cove Record Pilot on October 14, 2004. A public comment period was established from October 14, 2004 through November 16, 2004. A request for an extension to the public comment period was granted by EPA, and the public comment period was extended through December 16, 2004. EPA's decision to extend the comment period was publicized through mailings to interested parties on the Site mailing, list.

An October 20, 2004 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 raised by local officials, residents and other interested parties related to the FFS report and supporting documents. 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 Superfund pilot studies with Clean Sites, Inc., and included the Li Tungsten site as a "pilot" Superfund site for the application of Clean Sites' Superfund improvement concepts, e.g., early stakeholder involvement and early identification of the 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 it developed a citizen's advisory group called the Li Tungsten Task Force in March 1994, complete with a Charter of Rules and Procedures. During the course of EPA's response actions at the Site, the Task Force has continued to conduct periodic meetings with EPA to facilitate information transfer and feedback. 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:

Attachment A - Proposed Plan
Attachment B - Public Notice
Attachment C - October 20, 2004 Public Meeting Attendance Sheet
Attachment 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 was generally supportive of the remedy, particularly the objectives of the proposed plan, EPA did receive several comments asking that EPA select Alternative 3 rather than Alternative 2, contending that the added protection of Alternative 3 was worth the additional incremental cost.

Significant issues . and concerns were also expressed by a potentially responsible party, i.e., TOY Holdings LLC and TOY Industries, Inc. (both a successor to Teledyne, Inc.), regarding the acceptability of the human health and ecological risk assessments.

A summary of the comments and concerns expressed and EPA response's are provided below:

<u>Comments on the risk assessments from Kirkpatrick and Lockhart, on behalf of TOY</u>:

Comment 1: Exposure point concentrations for radionuclides in sediment/soil calculated in the human risk assessment (HRA) and ecological risk assessment (ERA) are grossly overestimated, leading to overstatement of risks.

> **1A**: Hot spot data are incorrectly weighted.... the exposure point concentrations overestimate the risk by a factor of 26, if one considers the areal ratio of Creek bed showing elevated gamma activity to total Creek bed (Figure 11-21 of the Cabrera Report), or 7,840 if one considers the volume ratio of segregated radioactive material to dredge spoils from the Summer 2002 removal action.
>
> **EPA Response to 1A**: EPA agrees that the exposure point concentrations represent conservative values for the levels of radioactivity associated with the Creek slag. This conservativeness is consistent with the concept of reasonable maximum exposure (RME) which is fundamental to EPA risk assessment methodology (Risk Assessment Guidance for Superfund (RAGS): Human Health Evaluation Manual Part A, United States Environmental Protection Agency, Office of Emergency and Remedial Response, Washington, DC. EPA/540/1-89/002. OSWER Directive 9285.701A. NTIS PB90-155581).
>
> However, EPA disagrees that the overestimate could be high by a factor of 26, based on a comparison of the areal extent of elevated gamma radiation to the entire Creek bed. Figure 3 from the Cabrera Report shows the distribution of elevated gamma radiation measured during Cabrera's 2001 gamma survey of the Creek bottom. As shown on the drawing, there are more than 30 locations with elevated gamma activity, with many along the side slopes of the Creek, in shallower areas. These are the locations where recreational users/construction workers would be exposed. The exposure point concentrations used in the risk assessment were designed to represent these locations.
>
> Further, the use of a physical volume comparison to arrive at an overestimate of 7,840 is misleading since it does not properly consider the exposure effects of gamma radiation projected from a source. The Cabrera gamma survey data indicate that some of the radionuclide-contaminated slag is close to the surface of the Creek sediments, resulting in very high gamma exposure rates. A volume-based average using the noncontaminated dredged sediments taken from depth would completely underestimate the current and potential future exposures.
>
> **1B**: The average hotspot concentration for radium 226 is calculated incorrectly... Sample 1A (12 pCi/g) and Sample 2A (8.2 pCi/g) average 10.1 pCi/g, not 53.05 pCi/g, as reported in the risk Table A-l. This error overstates the average concentration by a factor of 5.

EPA Response to 1B: To calculate the average "hot spot" concentration of radionuclides, CDM used the actual laboratory results of the two chunks of slag isolated by Cabrera during its study, not the results reported in the Cabrera report (Final Technical Memorandum: Radiological Analyses of Samples from the Dredged Materials Piles, Glen Cove Creek, Glen Cove, NY prepared for USACE, Baltimore District. Cabrera Services, Inc. March 4, 2002).

The laboratory results indicated that the chunks were counted by gamma spectroscopy two times, once as "quick count" (within three days of sample receipt) and a second time, 23 days after sample receipt. While the bismuth-214 results from the second counting would typically be considered more representative of radium-226 concentrations because the decay products would have had a chance to ingrow, Sample 2A showed lower bismuth-214 results on the second count. The other nuclides present also showed much lower results for the second counting, indicating that either a different aliquot was counted or that the sample was extremely nonhomogeneous.

It was decided to use the two counts as "duplicate" results and, following EPA policy, use the greater result. Therefore, the data at the bottom of Table A-l in the Human Health Risk Assessment shows the highest of the gamma spectroscopy and/or alpha spectroscopy results for each radionuclide detected in the two Cabrera samples. Radium-226 concentrations in Sample 1A and 2A were 12.37 pCi/g and 93.73 pCi/g, respectively, with an arithmetic average of 53.05 pCi/g.

1C: The arithmetic mean concentrations of radionuclides in sediment is calculated incorrectly.... the average for Th-228, reported at 402.92 pCi/g in the risk assessments, actually is 64.5 pCi/g. This error overstates the average concentration by a factor of 6.

EPA Response to 1C: As stated in Section 4.1.2.1, Calculation of Exposure Point Concentration for Radionuclides (p. 4-5) of the Human Health Risk Assessment Report, the arithmetic mean and 95% UCL concentrations for Th-228 were calculated using the lift data generated by Earth Sciences combined with the average "hot spot" concentrations obtained from the Cabrera data to represent the sediment concentration from grids where "above action level" (AAL) pieces were found. The calculations produced an arithmetic mean of 402.92 pCi/g for thorium-228.

1D: The risk assessments incorrectly assume that there may be significant concentrations of undetectable uranium in the Creek. These assumptions are apparently based on the inconsistency of uranium data between the Cabrera and Envirocare data sources and the uranium-238 decay products not being in equilibrium. The risk assessments theorize that elevated concentrations of uranium precipitate could be present but not detected by a gamma survey.

EPA Response to 1D: EPA quantified the risk from uranium using the available analytical data, which included alpha spectroscopy data from the two elevated Cabrera samples and gamma spectroscopy results from Earth Sciences (using the thorium-234 daughter of uranium-238). Therefore, the risk assessments indicate that the quantified risks may underestimate the actual risk from uranium. This assumption was based on the two reasons mentioned in the comment, plus uranium's presence at the Site, the different aqueous solubility (and hence mobility) of uranium compared to thorium or radium, and the difficulty in detecting uranium gamma emission during gamma walkover surveys. EPA recognized during the development of these risk assessments that these factors argue against discounting the presence of uranium isotopes in the Creek in the absence of alpha field measurements. Therefore, EPA's selected remedy includes a sediment sampling/analysis event to be performed during remedial design in order to confirm field conditions, including the presence or absence of uranium.

Comment 2: External exposures are incorrectly estimated in the human risk assessment. Resultant risks are excessively high.

2A: The risk assessment uses incorrect exposure frequencies for recreational and worker exposure scenarios. Reasonable assumptions for recreational and worker exposures are 2 hours/day and 8 hours/day, respectively. The recreational direct exposure is therefore overestimated by a factor of 12, and the worker exposure by a factor of 3.

EPA Response to 2A: Comment is acknowledged. See response to Comment 2B, below.

2B: The risk assessment fails to properly consider the effects of shielding. Creek water will act as a shield in exposure scenarios involving people in or near the Creek. RESRAD uses a shielding factor of 0.6 for houses in residential exposure scenarios. Resulting overestimates are by a factor of 3 for Creek scenarios and 2.5 for off-site residential scenarios.

EPA Response to 2B: Comment is acknowledged. EPA has revised the risk estimates for the Creek considering both the hours per day exposure assumptions and the effects of shielding. The Administrative Record file will be amended to include the revised portions of the Human Health Risk Assessment and the Screening Level Ecological Risk Assessment.

To summarize the recalculations, after using the exposure assumptions of 2 hours per day for recreational users, 8 hours per day for workers, 18 hours per day for residents, and assuming a shielding factor of 0.6 for residential exposure scenarios, the revised risk estimates still exceed the EPA threshold level of $1x10^{-4}$, indicating that remedial action is still warranted for the Creek.

2C: The risk assessment fails to properly consider the thickness of contamination. Risk factors typically assume an infinitely thick source of radionuclides in soil, which is essentially equal to a layer of radionuclides two feet thick, since deeper sources would be shielded by the top two feet. Resulting overestimates of risk are by a factor of 1.25 to 2.

EPA Response to 2C: EPA agrees that the risk coefficients for gamma radiation exposure used in the risk assessment assume a source geometry that is effectively an "infinite slab," or a two-foot thick layer of radionuclides. This is a standard assumption within EPA risk assessment guidelines. Based on the "area correction factors" presented for thorium-232 (the risk-driving contaminant for the Creek) in EPA's Soil Screening Guidance for Radionuclides: User's Guide (USEPA, Office of Radiation and. Indoor Air EPA/540-R-00-007 October 2000), this will result in an overestimate of the risk by about 1.25 (assuming contaminated areas of 50-100 square meters per Cabrera Figure 3) and is not considered significant in making the determination that remedial action is warranted.

Comment 3: Internal exposures are incorrectly calculated in the risk assessments.

3A: Ingestion source terms are improperly calculated. First, groundwater ingestion exposure is overestimated because it is based on the incorrectly calculated average sediment concentration of radionuclides, as previously discussed. Second, the use of very conservative default K_ds is not warranted, since the contamination in the slag is not very leachable, based on available information.

EPA Response to 3A: The average sediment concentration of radionuclides was calculated correctly (see response to **Comments 1A, 1B, 1C** above and **Comment 4** below). The RESRAD Biota model uses the most conservative documented K_d value (i.e., soil to water partition coefficient) to estimate the pore water concentration of radionuclides based on the sediment concentrations. This results in groundwater estimates of radium-228 that are about 100 times higher than the maximum concentrations found at the Site, as shown on Table C-3 in the Human Health Risk Assessment. Without site-specific leachability data, the use of such conservative K_ds is within current EPA guidance.

3B: Inhalation pathway risks are incorrectly calculated for workers and children. Workers are not on site 24 hours/day, and the children's inhalation rate is incorrectly assumed to be 20 liters/day, instead of 6 liters/day. Therefore, worker and children inhalation risks are overestimated by a factor of 3.

EPA Response to 3B: Risks from the inhalation of fugitive dust from future surface soil derived from sediment disposed off-site were calculated for future potential adult site workers and adult and child residents. For all receptors an inhalation rate of 20 cubic meters per day (not 20 liters per day, as was stated in the comment) was used.

The use of an inhalation rate of 20 cubic meters per day for adult residents and for outdoor workers involved in moderate to heavy activity (such is common at golf courses or landfills) is consistent with EPA-Region II Superfund standard default assumption guidance. While a worker is only present on the Site for 8 hours, HIs increased activity (as compared to a resident) results in a greater hourly inhalation rate.

For the child resident, EPA Region-II typically uses an inhalation rate of 10 cubic meters per day, which should have been used for the child resident, instead of 20 cubic meters per day. However, if this lower inhalation rate had been used, the resulting risk for child residents from the inhalation pathway would be 2.1×10^{-6}, instead of 4.2×10^{-6}. This difference in risk is not significant compared to the risks to this receptor from the external gamma radiation and soil ingestion pathways.

Comment 4: All risk estimates based on the mass concentration of radionuclides are incorrectly calculated.

EPA Response to 4: EPA correctly calculated the exposure point concentrations for the sediments using the available analytical data, which included the gamma spectroscopy results from Earth Sciences' lift samples combined with the alpha and gamma spectroscopy data of the two Cabrera slag samples. These two data sets were combined to create a dataset which would be representative of the material encountered by Earth Sciences during its segregation surveys.

Comment 5: The radiological doses for riparian animals are calculated incorrectly.

EPA Response to 5: The radiological risks for riparian animals were calculated correctly, by using the U.S. Department of Energy's (DOE) Biota Concentration Guide (BCG) model as described in the DOE Standard, A Graded Approach for Evaluating Radiation Doses to Aquatic and Terrestrial Biota, DOE-STD-1153-2002, US Department of Energy, Washington, D.C. 20585. July 2002.

However, the risks in the text and in the headings for Table 5-1 are incorrectly presented, and revised text as well as a revised Table 5-1 will be added to the Administrative Record file.

To summarize the revisions, the title for Table 5-1 of the Screening Level Ecological Risk Assessment should say "Assessment of Radiological Risks with BCG Calculator." The headings for columns 3, 6, and 9 should say "BCG Calculated Risks" instead of " BCG Calculated Dose." The text for the last three sentences of the last paragraph in Section 5.1 of the Screening Level Ecological Risk Assessment should read as follows: "The total sediment risk for all receptors using the BCG calculator is 13, greater than the threshold acceptable value of 1.

The total calculated surface water risk for all receptors, using site-specific surface water concentrations, is 29. The total calculated BCG risks for all receptors from both the sediment and surface water pathways using the BCG calculator and using conservative default partition coefficients is 4,510, which is greater than the acceptable threshold risk of 1. This risk is entirely as a result of the estimated risks for the riparian receptor."

Comment 6: Comments on the Proposed Plan from Kirkpatrick and Lockhart, on behalf of TOY:

6A: The proposed cleanup criterion for radionuclides of particular concern is not supported by the underlying analysis. "Twice the background level" is arbitrary, and is not discussed in terms of risk or cost to achieve this level of cleanup.

EPA Response to 6A: Based on available information, the radionuclides above background in the Creek are primarily concentrated in discrete chunks of slag, so EPA has made the assumption that by finding and remediating the slag chunks, the Creek itself will be effectively remediated of radionuclide contaminants. To accomplish this, EPA intends to use equipment to detect radiation at twice the background level, a technique which has been considered an acceptable "finding" method in the Superfund program to locate the presence of radioactive materials.

EPA's efforts to develop the remedy were complicated by the technical inability to get a sampling profile of radionuclides in the Creek, other than through detection of gamma radiation. Several attempts by the USACE to obtain samples of radioactive materials from the Creek were unsuccessful because of the difficulty in pinpointing these discrete chunks buried in underwater sediment. Samples of the slag found in upland dewatered sediment, however, strongly suggest that the radioactivity present in any particular slag chunk will be substantially above background levels and thus merit removal, in accordance with the revised Human Health Risk Assessment. Therefore, EPA decided that a technically feasible approach was to target and remove slag chunks from the Creek by finding them with gamma detection instrumentation, set at approximately twice the background level.

To summarize, the development of cleanup levels related to risk, while typically done in the Superfund program, was not technically feasible in this relatively unique circumstance.

6B: The cleanup level for dredged material is unduly restrictive. The sum of radium-226 and radium-228 not to exceed 5 pCi/g above background and the sum of thorium-230 and thorium-232 not to exceed 5 pCi/g above background is more restrictive than the cleanup criteria for the 1999 ROD.

EPA Response to 6B: The cleanup criteria in the Proposed Plan for dredged material is a residential standard protecting against the possibility that future dredged materials could eventually come to be located in areas that are then residentially developed. The radiological cleanup criteria in the 1999 ROD was intended to protect future commercial development, and thus were less restrictive. However, the City has just re-zoned certain portions of the north shore of the Creek to allow for residential future use. Therefore, EPA will shortly be issuing a determination, based on the City' s re-zoning (which includes the Site's upland properties), that will apply the same residential radiological standard now being proposed for dredged sediments to the cleanup of the Li Tungsten properties.

6C: The remedial alternatives require dredging beyond that required to remediate the contamination. The radiological contamination can be remediated with much less dredging, by dredging only those areas indicating elevated gamma in the Cabrera report. The history of the Creek, i.e., no dredging of the eastern end after the original navigational dredging, which took place before the operation of the tungsten facility, means that all radioactive slag chunks deposited as a result of facility operations would come to be located above the navigational depth. There is no physical or chemical mechanism to transport the contamination below the navigational maintenance depth.

EPA Response to 6C: In order to insure that future maintenance dredging does not result in radiation exposures to workers or potential off-site residents, EPA developed remedial alternatives using the maintenance dredging depth as a guideline. EPA believes that periodic maintenance dredging of the navigation channel by the USACE will be necessary in the future to maintain the viability of the Creek area, particularly in light of the City's ongoing efforts to revitalize its waterfront.

EPA contends that removing all radioactive slag from above the maintenance depth can not be done effectively without first dredging the Creek to at least maintenance depth in the process. Significant shoaling and uneven deposition has historically occurred in this Creek because of the tidal nature of the Creek, boat traffic/propwash in a shallow waterway and sediment deposition from upland properties (recently mitigated by bulkheading additions/improvements). Therefore, significant gamma sources could be above navigational depth but still completely shielded by a large deposition of sediment. Further, EPA disagrees with the commenter's contention that radioactive materials could not come to be located below the maintenance depth. First, dredging to a specified depth is an inexact technology which typically can have an error of a few feet. The original maintenance dredging to 8 feet could have had some variability in actual depths achieved. Second, while EPA agrees that it's not likely that slag would appreciably migrate laterally over time, it nevertheless recognizes that the potential for slag to sink into the sediment bed over a long period of time is definitely possible. In fact, the field evidence strongly suggests that this has happened to some extent, i.e., the Creek in front of the former loading dock area was dredged to navigation depth prior to suspension of dredging, but nonetheless it still exhibits a very strong gamma signature, which strongly suggests radioactive materials is present below the navigation depth in this location.

Further, as explained in the Proposed Plan and further in response to **Comment 6E**, below, it is anticipated that the USACE will finance elements of the selected remedy which are determined to be within its routine programmatic purview.

6D: The preferred alternative contains unnecessary elements. Two unnecessary tasks are the post-remediation survey to detect uranium and the post-hydrographic survey, which is relevant for navigational but not remedial dredging.

EPA Response to 6D: EPA will take the post-remediation survey comment under consideration when developing the details for the post-remediation survey. The absence of uranium in the Creek may be satisfactorily demonstrated during design and may not require confirmation after remediation. Further, as explained in the Proposed Plan and further in response to Comment 6E, below, it is anticipated that the USACE will finance elements of the selected remedy which are determined to be within its routine programmatic purview. The hydrographic survey may be paid for by the USACE.

6E: The USACE should contribute the funds it would spend to meet its navigational maintenance dredging obligations.

EPA Response to 6E: The USACE has agreed in principle to provide that portion of funding which the Corps normally would have allocated to dredging the remaining sediment from the navigational channel at or above the maintenance navigation depth, including any related supporting tasks like hydrographic surveys (see D, above). Further, the City also agrees that the disposal of the remaining non-radioactive sediment is the responsibility of the City and outside the scope of the EPA/USACE response. Therefore, no estimated costs have been included in the Proposed Plan for off-site disposal of remediated sediments.

Other comments received on the Proposed Plan and supporting documentation:

Comment 7: EPA has clearly acknowledged in its Proposed Plan that Alternative 3 is more protective of human health and the environment. Alternative 3 would provide greater assurance that any historically buried radioactive slag is removed and would result in a small incremental cost increase compared to Alternative 2. Alternative 2 (the preferred alternative) could result in suspensions of future dredging (similar to the present suspension) if additional radioactive material were encountered, resulting in additional costs and delays and possible lawsuits. EPA's analysis using the nine criteria does not support the selection of Alternative 2.

EPA Response to 7: Each of the alternatives has undergone a detailed cost analysis. The capital cost to perform Alternative 2 is estimated at $2.98 million, compared to $3.44 million to perform Alternative 3. These costs may be borne to some extent by the USACE, to defray the cost of dredging to navigational depth which, while necessary to find the slag, nevertheless is an intrinsic part of the Army's navigational dredging program.

The selected remedy satisfies the remedial action objectives of this project in a cost-effective manner. EPA does not believe that the greater level of certainty afforded by Alternative 3, in dredging all slag below the maintenance depth, justifies the additional cost. That additional cost, approximately $460,000, is not justified considering that any slag below the maintenance depth and not detectable in phase two would be deep enough 1) to not pose a radiation risk in the Creek, and 2) to remain undisturbed during future maintenance dredging. It should also be noted that the additional dredging required in Alternative 3 would require the City to dispose of approximately 50% more remediated dredge material which, depending on the disposal options available, may require significant capital outlay, i.e., as much as $1,000,000 more for landfilling options.

Comment 8: Dredging to the exact navigational maintenance depth seems to leave no margin of error. The depth will be very difficult to ascertain given the tidal range of 7.5 feet. As a result, future dredging which inadvertently goes beyond the maintenance depth will risk encountering radioactive materials.

EPA Response to 8: There is always the risk that incidental slag may be encountered in a future dredging operation. However, the "margin of error" mentioned in this comment does not account for the fact that the second phase of dredging will be detecting radiation from slag through overlying sediment, which in turn will depend on the strength of the gamma signal, the thickness and density of the sediment, and other factors. In other words, radioactive slag several inches below the maintenance depth should be detectable and removable during the second phase of dredging.

For example, the dredging operations in the year 2000 dredged to the maintenance depth in front of the Li Tungsten loading dock, and the subsequent Cabrera gamma survey detected significant levels of radioactive materials below the navigational depth in this location. Under Alternative 2, this particular area will be dredged during phase two so that all radioactive materials in this location, which are exclusively below the maintenance depth, are removed.

Comment 9: Sediments may be more contaminated with uranium radionuclides than the data indicate.

EPA response to 9: As stated in the Proposed Plan, EPA is aware that there is a low possibility of uranium nuclide contamination in the Creek, and sampling will be performed to ascertain uranium levels during the remedial design.

Comment 10: Construction of a bermed dewatering facility on Parcel A in order to accommodate dredged spoils contaminated with pieces of radioactive slag poses potential exposures to human health and the environment. It would also lead to additional remedial activity, potentially including the issuance of an additional UAO directing PRPs to remediate contaminated sediments moved to Parcel A.

EPA response to Comment 10: The levels of exposure on Parcel A should be minimal and controllable during the relatively brief time that sediments are being dewatered and slag is being segregated. Health and safety considerations include, at a minimum, the following: first, Parcel A is fenced and will be fully placarded to discourage trespass. Second, perimeter air monitoring will be performed during any active remediation period (airborne contamination is not anticipated to be a health issue, based on perimeter air monitoring results during the prior dewatering and segregation effort performed in 2002, as discussed earlier under Site History). Lastly, segregated radioactive material can easily be kept a safe distance from the Site perimeter during operations to eliminate gamma exposure,, as was done during the prior dredge spoil remediation.

It is true that EPA may seek to enlist PRPs in the performance of the selected remedy or any portion thereof. However, this potential is not relevant to the selection of an appropriate remedy under the National Contingency Plan.

Comment 11: The Proposed Plan is not practical from a cost-benefit perspective. While there were few locations in the Creek that actually reflected the presence of radionuclide-contaminated materials, EPA plans to dredge approximately 20,500 cy. It would be more practical for EPA to focus its dredging efforts on the few radionuclide contaminated hot spots as opposed to undertaking a mass dredging operation, and then subsequently focusing on the hot spots. Focusing initial dredging efforts on the hot spots would significantly reduce the cost of the Proposed Plan.

EPA response to 11: Focusing initial dredging efforts on the hot spots, while it would significantly reduce costs, would not achieve the remedial action objectives (RAOs). At the present time, there is an estimated 20,000 cy of sediment above the maintenance depth.

This volume of sediment exists as random shoaling throughout the project area, and it could easily be masking or minimizing gamma hot spots. The only sound approach to determine that all radioactive materials above the maintenance dredging depth are removed is to first dredge to at least the maintenance depth (phase 1) and then to dredge further wherever radionuclide contamination remains detectable at the phase 1 depth (phase 2).

Comment 12: The Proposed Plan is not consistent with the RAO of reducing direct contact, inhalation, ingestion or external threat. Dredging of the Creek improperly places highest priority on navigational concerns, by proposing to dredge to the navigational depth of 8 feet. There is no basis in the RAOs for dredging to the navigational depth.

EPA response to 12: Both RAOs for this project are based to some extent on future dredging operations. The first RAO requires that Creek sediment be remediated to a condition such that several potential receptors, including future dredging project personnel, do not receive unacceptable radiation exposures (see earlier discussion of risk). The second RAO is exclusively predicated on future dredging and requires that deposition of future dredged material does not result in unacceptable exposure at the deposition location. While EPA recognizes that this is not a navigational dredging project, the RAOs nevertheless recognize the realities of the future anticipated uses of the Creek and how it will be maintained and utilized.

Comment 13: The Proposed Plan does not take into account the potential impact of other contaminated sites, including Mattiace. The Proposed Plan is not tailored to address only that contamination in the Creek attributable to the Site, and may result in Li Tungsten PRPs improperly incurring expenses remediating conditions attributable to Mattiace or other known or suspected contamination sources.

EPA response to 13: EPA believes that the Proposed Plan is tailored to address only that contamination in the Creek attributable to the Site. For this project, EPA purposely limited the contaminants of concern to radionuclide-bearing materials originating from the Site, and we developed two alternatives that specifically target only those contaminants. Because of the way the alternatives (and, hence, the selected remedy) were developed, the remediation of radioactive slag is the sole focus of the selected remedy.

<u>The following comments were not specifically related to the Proposed Plan or supporting documents</u>:

Comment 14: Fill was dumped into the southern course of the Creek surrounding the island that was created by the USACE around 1932-34, during initial construction of the navigational channel. Recent corings show some radionuclide hot spots, which are not present in background samples taken from adjacent areas. The radioisotopes are found in the fill portion, and are similar in nature to those found at the Captain's Cove former dumpsite.

EPA response to 14: Analytical results for the recent corings were subsequently provided by the commenter to EPA for evaluation. These data were part of a final Environmental Impact Statement (EIS) for Sea Isle Marina Properties, LLC, and prepared by Freudenthal and Elkowitz, Principal Consulting Group, Inc. The coring data were presented in Table 4 of the EIS, including background concentrations and citing the EPA's Li Tungsten 1999 ROD as the source of the background information.

Specifically, the background concentrations were from Volume II of the EPA's Li Tungsten Remedial Investigation (RI) Report, Table 5-3 (13 sample locations were selected to establish a true background). It should also be noted that Table 4 of the EIS also appears to have footnotes 2 and 3 regarding uranium and thorium reversed. And finally, Table 4's thorium background concentration appears to be only for thorium-230 and not the combination of thorium-230 and thorium-232, as indicated in the footnote.

That being said, the highest concentration of combined thorium reported in the EIS is 2.0 picoCuries per gram (pCi/g) and 1.3 pCi/g for uranium. These maximum results are comparable to maximum background readings taken from across the Creek at Li Tungsten (maximum background of 1.5 pCi/g and 1.1 pCi/g for thorium and uranium-238, respectively). They are also below the conservative cleanup criteria that EPA has been employing to remediate the Li Tungsten and Captain's Cove properties. [Note: It should also be pointed out that EPA did not develop nor review the quality assurance/quality control aspects of the field sampling protocols or the laboratory analytical procedures employed to develop these data, and hence cannot vouch for the quality/validity of the results].

Comment 15: Flooding in the vicinity of the Mattiace Site may have the potential to expose workers in nearby buildings to whatever contaminants may be in the floodwater.

EPA Response to 15: Floodwaters as described are typically surface runoff from precipitation events and not as a result of contaminated groundwater several feet below ground coming to the surface. Flooding could entrain a variety of contaminants, such as oil and grease, from parking lots and other nearby surfaces. However, these contaminants would not be from the Mattiace "Superfund" contamination, because Mattiace soils, including surface soils, have been remediated.