

**Five-Year Review Report  
Marathon Battery Company Superfund Site  
Village of Cold Spring  
Putnam County, New York**

**Prepared by:**

**United States Environmental Protection Agency  
Region 2  
New York, New York**

**June 2008**

## **EXECUTIVE SUMMARY**

This is the third five-year review for the Marathon Battery Company Superfund site, located in Village of Cold Spring, Putnam County, New York. Currently, the remedy is protecting human health and the environment. This review has, however, raised a concern about the extent of the groundwater plume and the potential for vapor intrusion. As a result, while a protectiveness determination can be made for Operable Units 1 and 2, a protectiveness determination for Operable Unit 3 cannot be made until additional information is obtained. It is expected that a report addendum containing a protectiveness statement for Operable Unit 3 will be issued within eighteen months of the date of this report.

## Five-Year Review Summary Form

SITE IDENTIFICATION		
<b>Site Name</b> ( <i>from WasteLAN</i> ): Marathon Battery Co.		
<b>EPA ID</b> ( <i>from WasteLAN</i> ): NYD010959757		
<b>Region:</b> 2	<b>State:</b> NY	<b>City/County:</b> Cold Spring/Putnam
SITE STATUS		
<b>NPL Status:</b> <input type="checkbox"/> Final <input checked="" type="checkbox"/> Deleted <input type="checkbox"/> Other (specify)		
<b>Remediation Status</b> (choose all that apply): <input type="checkbox"/> Under Construction <input type="checkbox"/> Operating <input checked="" type="checkbox"/> Complete		
<b>Multiple OUs?</b> <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	<b>Construction completion date:</b> 07/11/95	
<b>Has site been put into reuse?</b> <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A		
REVIEW STATUS		
<b>Lead agency:</b> <input checked="" type="checkbox"/> EPA <input type="checkbox"/> State <input type="checkbox"/> Tribe <input type="checkbox"/> Other Federal Agency		
<b>Author name:</b> Pamela Tames		
<b>Author title:</b> Remedial Project Manager	<b>Author affiliation:</b> EPA	
<b>Review period:</b> ** 06/10/2003 to 06/10/2008		
<b>Date(s) of site inspection:</b> 4/28/08 and 5/28/08		
<b>Type of review:</b> <input type="checkbox"/> Post-SARA <input type="checkbox"/> Pre-SARA <input type="checkbox"/> NPL-Removal only <input type="checkbox"/> Non-NPL Remedial Action Site <input type="checkbox"/> NPL State/Tribe-lead <input type="checkbox"/> Regional Discretion <input checked="" type="checkbox"/> Statutory		
<b>Review number:</b> <input type="checkbox"/> 1 (first) <input type="checkbox"/> 2 (second) <input checked="" type="checkbox"/> 3 (third) <input type="checkbox"/> Other (specify)		
<b>Triggering action:</b> <input type="checkbox"/> Actual RA Onsite Construction at OU #____ <input type="checkbox"/> Actual RA Start at OU#____ <input type="checkbox"/> Construction Completion <input checked="" type="checkbox"/> Previous Five-Year Review Report <input type="checkbox"/> Other (specify)		
<b>Triggering action date</b> ( <i>from WasteLAN</i> ): 06/10/2003		
<b>Due date</b> ( <i>five years after triggering action date</i> ): 06/10/2008		
<b>Does the report include recommendation(s) and follow-up action(s)?</b> <input checked="" type="checkbox"/> yes <input type="checkbox"/> no <b>Is human exposure under control?</b> <input checked="" type="checkbox"/> yes <input type="checkbox"/> no <b>Is contaminated groundwater under control?</b> <input type="checkbox"/> yes <input type="checkbox"/> no <input checked="" type="checkbox"/> not yet determined <b>Is the remedy protective of the environment?</b> <input type="checkbox"/> yes <input type="checkbox"/> no <input checked="" type="checkbox"/> not yet determined <b>Acres in use or available for use:</b> restricted: <u>12</u> unrestricted: <u>12</u>		

## **Five-Year Review Summary Form (continued)**

### *Other Comments on Operation, Maintenance, Monitoring, and Institutional Controls*

This site has ongoing operation, maintenance, and monitoring activities as part of the selected remedy. As was anticipated by the decision documents, these activities are subject to routine modification and adjustment.

### *Issues, Recommendations, and Follow-Up Actions*

This review has raised concerns related to the groundwater plume and vapor intrusion and contains recommendations and follow-up actions which should ensure long-term protectiveness.

### *Protectiveness Statement*

The implemented Operable Unit (OU) 1 and 2 remedies protect human health and the environment by controlling exposure pathways that could result in unacceptable risks. The levels of contaminants remaining in the surface sediments are protective of the environment and human health. Institutional controls restricting the consumption of crabs and the disturbance of the marsh address concerns about contaminated subsurface sediments.

The extent of the groundwater contaminant plume has not been delineated. In addition, there appear to be houses that are close enough to the suspected path of the groundwater plume to raise concern about possible unacceptable vapor intrusion exposures. Therefore, a protectiveness determination related to the OU3 remedy cannot be made until further information recommended in this five-year review is obtained. It is expected that a report addendum containing a protectiveness statement for OU3 will be issued within eighteen months of the date of this report.

## **I. Introduction**

This five-year review was conducted pursuant to Section 121(c) of the Comprehensive Environmental Response, Compensation, and Liability Act, as amended, 42 U.S.C. §9601 *et seq.* and 40 CFR 300.430(f)(4)(ii) and in accordance with the Comprehensive Five-Year Review Guidance, OSWER Directive 9355.7-03B-P (June 2001). The purpose of a five-year review is to ensure that implemented remedies are protective of public health and the environment and that they function as intended by the decision documents. This document will become part of the site file.

This is the third five-year review for the Marathon Battery Company site. Since, after the completion of the remedial action, contaminants remain on-site, a statutory five-year review is required. In accordance with the Section 1.3.3 of the five-year review guidance, a subsequent statutory five-year review is triggered by the signature date of the previous five-year review report. The trigger for this subsequent five-year review is the date of the previous five-year review report, which is June 10, 2003.

The site consists of three operable units (OUs). The first OU consists of Constitution Marsh and East Foundry Cove Marsh and is also known as “Area I.” The second OU consists of East Foundry Cove, West Foundry Cove, and the Hudson River in the vicinity of the Cold Spring Pier and is referred to as “Area III.” The third OU contains the former Marathon Battery Company plant grounds and the surrounding residential neighborhood and is known as “Area II.”

## **II. Site Chronology**

Table 1 (attached) summarizes the site-related events from discovery to the previous five-year review for the site.

## **III. Background**

### *Site Location*

The Marathon Battery Company site is located in the Village of Cold Spring, Putnam County, New York.

### *Physical Characteristics*

The site includes a 12-acre former nickel-cadmium battery manufacturing facility, the Hudson River in the vicinity of the Cold Spring pier, and a series of river backwater areas known as East Foundry Cove, East Foundry Cove Marsh, Constitution Marsh, and West Foundry Cove. Before

the site was remediated, a battery plant and an underground asphalt- and clay-lined vault containing spoils from dredging activities in the cove were located on the facility's grounds. Twenty-nine houses, located on Constitution Drive, are in the vicinity of the site.

### *Geology/Hydrogeology*

The former battery plant grounds are underlain by thin, unconsolidated deposits of glacial till consisting of clay and boulders with some deposits of outwash sand and gravel resting upon fractured and faulted bedrock, mainly granite and gneiss. The degree of bedrock fracturing decreases with increasing depth. The depth to bedrock varies greatly throughout the site (2.5 feet below ground surface [fbgs] in the west corner to 89 fbgs in the southern portion of the site). In Foundry Cove, loose unconsolidated sediments 3 feet or less in thickness overlay a hard impermeable clay-like material. Soil permeabilities range from  $4 \times 10^{-4}$  to  $1 \times 10^{-2}$  centimeters/second.

Average depth to groundwater in the overburden aquifer ranges from approximately 25 to 30 fbgs. Groundwater flow in the overburden is generally to the south/southeast toward Foundry Cove. Groundwater flow in the bedrock is generally to the southwest toward the Hudson River. The hydraulic gradient follows the trend of the bedrock surface, and due to outcropping in the western corner, is greater in the northern portion of the site as compared to the southern portion.

Saturated aquifer thickness varies throughout the site. Saturated thickness is greatest at the southern portion of the site and thins significantly to the north. The average thickness was calculated to be 75 feet.

Based on data collected from the pumping test conducted during the supplemental RI, the specific capacity of the aquifer is 64 gallons/minute/foot and the transmissivity is 127,000 gallons/day/foot. Hydraulic conductivity and groundwater flow velocity were calculated to be 1,701 gallons/day/square foot and 6.7 feet/day, respectively. These values are indicative of a highly transmissive aquifer in which contaminants will migrate rapidly.

### *Land and Resource Use*

The 12-acre former battery plant grounds parcel is zoned "light industrial" and is currently awaiting redevelopment. Since this portion of the site is surrounded on three sides by residential properties and the access roads leading to it are very narrow, it is unlikely that its future use will mirror its historic industrial use. Potential redevelopment scenarios include single and/or multi-family homes, senior housing and a municipal parking lot.

Scenic Hudson, a not-for-profit conservation organization, bought East Foundry Cove and East Foundry Cove Marsh, in addition to the adjacent 95-acre West Point Foundry Historic site (see below). The area is open to the public for walking, hiking, bird watching, canoeing, and kayaking. Hunting and camping are not allowed. The Marsh and Cove areas are managed by

the Audubon Society, which also manages the adjacent Constitution Marsh.

### *History of Contamination*

Nickel-cadmium batteries were manufactured at the plant from 1952-1979. The plant's wastewater treatment system originally consisted of a lift station and piping for transfer of all process wastewater into the Cold Spring sewer system for discharge directly into the Hudson River at the Cold Spring pier. In addition, a bypass valve was installed so that when the lift station was shut down or overloaded, a direct gravity discharge could be made into the Kemble Avenue storm sewer for discharge into Foundry Cove.

Studies conducted from 1976 to 1980 by New York University, EPA, and the New York State Department of Environmental Conservation (NYSDEC) showed high levels of cadmium contamination in Foundry Cove sediments. Samples of vegetation and various species of fish, muskrat, turtle eggs, and green heron revealed high concentrations of cadmium, as well.

### *Initial Response*

In 1972, the U.S. Department of Justice signed a Consent Agreement requiring the owners/operators to remove as much cadmium from the outfall area and channel leading into the cove as was economically, technically, and ecologically feasible. Dredging was performed between November 1972 and July 1973. The dredge spoils were entombed in the above-described vault.

### *Basis for Taking Action*

The dredging that was performed was not totally successful. Post-dredging monitoring continued to detect elevated cadmium concentrations in the cove's sediments, flora, and fauna. Tidal action slowly flushed some of the remaining cadmium deposits from the cove into the Hudson River and into Constitution Marsh, a National Audubon Society sanctuary. Based upon these findings, in October 1981, the Marathon Battery Company site was included on the Interim National Priorities List.

In August 1983, EPA and the State of New York signed a Cooperative Agreement to undertake a remedial investigation and feasibility study (RI/FS) at the Marathon Battery Company site. An RI report describing the nature and extent of the contamination at and emanating from the site was completed in July 1985. The results of the RI sediment sampling program indicated widespread heavy metal contamination of the sediments in Foundry Cove. The highest level of contamination occurred in East Foundry Cove Marsh in close proximity to the Kemble Avenue outfall. This area, characterized by a layer of greenish-white sediment spanning an approximately 50 by 100 foot area, showed concentrations as high as 171,000, 156,000, and 6,700 milligrams/kilogram (mg/kg) for cadmium, nickel, and cobalt, respectively. Cadmium levels as high as 2,200 mg/kg were found in the Hudson River in the vicinity of the Cold Spring

pier.

Samples from the former battery facility indicated contamination as high as 120,000 mg/kg cadmium and 130,000 mg/kg nickel in the rafters, and up to 600 mg/kg cadmium on the surrounding grounds. Cadmium concentrations up to 67 mg/kg were found in soils in the adjacent residential yards.

In March 1986, NYSDEC requested that EPA assume the lead role for this project. EPA's contractor, Ebasco Services, Inc., completed a supplemental RI/FS for the East Foundry Cove Marsh/Constitution Marsh portion of the site (Area I) in August 1986.

#### **IV. Remedial Actions**

##### *Remedy Selection*

On September 30, 1986, a Record of Decision (ROD) was signed for Area I (OU1), calling for the dredging of the contaminated sediments within East Foundry Cove Marsh exceeding 100 mg/kg<sup>1</sup>, placement of a clay cap and soil cover on the excavated marsh areas, restoration of the marsh, chemical fixation of the excavated sediments, followed by their off-site disposal. Long-term monitoring was selected for Constitution Marsh<sup>2</sup>.

Supplemental RI activities for the former battery facility (Area II and OU3) were completed in April 1988. A ROD for this OU was signed on September 30, 1988. The selected remedy included decontamination of the interior of the former battery plant building and its contents, excavation and chemical fixation of the dredge spoils vault, excavation and chemical fixation of the cadmium-contaminated soils on the plant grounds and adjacent properties which exceeded 20 mg/kg<sup>3</sup>, enhanced volatilization of the volatile organic compound (VOC)-contaminated soils, and off-site disposal of the contaminated dust and fixated soils. Long-term monitoring was selected for the VOC-contaminated groundwater underlying the site.

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<sup>1</sup> In conjunction with the clay cap and soil cover, the 100 mg/kg action level, which was based upon an analysis of available information and discussions with state and federal fish and wildlife experts, was found to be protective of human health and the environment.

<sup>2</sup> Although cadmium-contaminated sediment hot spots were identified in Constitution Marsh, remediation of these sediments would have had a significant adverse impact on the marsh's sensitive ecosystem. In addition, the cadmium-contaminated sediments would eventually be covered with clean sediments following the remediation of the cadmium-contaminated sediments in East Foundry Cove Marsh. Therefore, long-term monitoring was selected for Constitution Marsh.

<sup>3</sup> The 20 mg/kg action level was based upon a risk assessment performed by the Agency for Toxic Substances and Disease Registry. The risk assessment assumed that the risk pathway for humans was via ingestion of vegetables grown in cadmium contaminated soils.



An RI/FS report for the East Foundry Cove, West Foundry Cove, and Hudson River in the vicinity of the Cold Spring pier portion of the site (Area III and OU2) was completed in June 1989. The Area III ROD was signed on September 26, 1989. The selected remedy called for dredging one foot of contaminated sediments from East Foundry Cove and the Hudson River in the vicinity of the Village of the Cold Spring pier<sup>4</sup>, followed by chemical fixation and off-site disposal. Long-term monitoring was selected for West Foundry Cove<sup>5</sup>.

In June 1987, funds were provided to the U.S. Army Corps of Engineers (USACE) for the design of the selected remedy for Area I. Under a USACE contract, Malcolm Pirnie, Inc. (MPI) commenced the design of a containment dike around East Foundry Cove Marsh, a haul road, a railroad spur (the treated sediments and soils were to be transported off-site via a nearby rail line), a marsh excavation and restoration plan, and the treatment process.

In September 1989, MPI began the Area III design. In September 1991, the portion of the Area II design associated with the excavation of the dredge spoils vault and the cadmium-contaminated soils on the former battery plant grounds and the enhanced volatilization of the VOC-contaminated soils<sup>6</sup> commenced. A consolidated design for Areas I, II (the dredge spoils vault and the plant grounds), and III was completed in May 1992.

### *Remedy Implementation*

Since the proposed treatment area, the proposed location for the haul road, East Foundry Cove Marsh, and East Foundry Cove were located within the West Point Foundry National Historic District, a cultural resources survey was conducted. The cultural resources survey indicated that five archaeologically-sensitive areas would be impacted as a result of construction activities. Accordingly, a Data Recovery Plan was developed to recover, remove, stabilize, conserve, and curate artifacts from these areas and thereby document these archeological resources. Through these efforts, over 145,000 prehistoric and Civil War era artifacts were analyzed, documented, and recovered. The artifacts were transferred to the Orange County Historical Society for display and research.

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<sup>4</sup> Since most of the contamination was located in the top 4 inches of the sediment, removal of one foot of sediment would achieve the 95% removal rate and the cleanup goal of about 10 mg/kg which was sought in the 1989 ROD.

<sup>5</sup> Although West Foundry Cove sediments are contaminated with cadmium, since they would eventually be covered with clean sediments following the remediation of the cadmium-contaminated sediments in the other portions of the site, long-term monitoring was selected for West Foundry Cove.

<sup>6</sup> A search for VOC-contaminated soils on the plant grounds during the design failed to find any hot spots and the enhanced volatilization aspect of the remedial design was eliminated. This was documented in an August 1993 Explanation of Significant Differences (ESD). The subsequent demolition of the former battery plant revealed elevated levels of VOCs in some sections of the sealed process trenches and an ejector pit, which were removed and disposed of off-site.

On March 26, 1989, EPA issued a Unilateral Administrative Order (UAO) to the potentially responsible parties (PRPs), Marathon Battery Company, Gould Inc., and Merchandise Dynamics (the property owner), requiring them to decontaminate the interior of the 114,000-square foot former battery plant (which at the time was an abandoned book repository) and its contents, to recycle the decontaminated books, and to properly dispose of contaminated materials. Following a pilot-scale study conducted by ENSR Consulting and Engineering, Marathon Battery Company and Gould Inc.'s contractor<sup>7</sup>, to evaluate decontamination techniques, the facility, as well as 4,170 pallets containing approximately 2.5 million books, was decontaminated. Based on the results of the sampling of seventy-six rolloffs which were filled with debris from the building and HEPA vacuum filters from the decontamination work, twelve were determined to contain hazardous debris and were disposed of at Chemical Waste Management's hazardous landfill in Model City, New York. The remaining rolloffs were sent to Waste Management's Modern Landfill in York, Pennsylvania. While the book and building decontamination work was completed in December 1991, due to the limited production rate of available book recycling companies, the recycling of the books continued until March 1993.

Following the completion of field investigations to more fully delineate the areas of the adjacent properties that required remediation, in May 1992, this portion of the Area II remediation effort commenced. When the remedial action was completed in March 1993, approximately 1,600 cubic yards of contaminated soil had been excavated and removed from the site.

After the completion of the comprehensive remedial design for Areas I, II (the dredge spoils vault and the plant grounds), and III, bids for the implementation of the remedial action were solicited by the USACE. EPA and the PRPs, however, negotiated a settlement the week prior to the bid opening, and the bidding process was halted. A Consent Decree, in which Gould Inc. agreed to perform the remedial action, and the remaining PRPs, Marathon Battery Company and the U.S. Army, agreed to a cash settlement, was entered with the Southern District Court on April 1, 1993.

Gould Inc., as the settling work defendant, took over the solicitation of the contract and chose Severson Environmental Services as its contractor. The USACE performed oversight of the work effort.

The temporary haul road, rail spur, treatment facilities, and dike were completed in early August 1993. Full-scale dredging of East Foundry Cove Marsh and East Foundry Cove and the excavation of the plant grounds began in September 1993. The treated sediments and soils were stockpiled on the treatment area for curing and post-treatment testing prior to off-site disposal at City Management Landfill in Michigan. All treated materials were subjected to the Toxicity Characteristics Leaching Procedure as required by EPA and the Extraction Procedure Toxicity Test as required by the State of Michigan.

Dredging in the Hudson River in the vicinity of the Cold Spring pier was completed in July 1994 and dredging of East Foundry Cove continued until February 1994. All dredged areas underwent

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<sup>7</sup> The bankrupt Merchandise Dynamics did not comply with the UAO.

post-remediation sampling. The dredged areas in the Hudson River and East Foundry Cove were surveyed to determine whether the proper dredging depth was achieved. In East Foundry Cove Marsh, post-dredging cadmium levels in the sediments did not exceed the 100 mg/kg action level, averaging 11.75 mg/kg. In the Hudson River and East Foundry Cove, an average of 10 mg/kg cadmium remained, which was consistent with the ROD requirement that at least one foot of sediment and 95% of the contamination be removed.

The collection of ice and snow on the former battery facility's roof during the winter of 1994 resulted in the collapse of a 10,000 square foot section of the roof, thereby exposing a portion of the concrete foundation to the outside elements. This particular portion of the foundation contained numerous trenches which were used for waste disposal during the manufacture of nickel-cadmium batteries. Sample analyses revealed that elevated levels of cadmium and nickel remained encased in the rubble-filled and cemented-over trenches. Due to the concern that continued exposure to the elements and freeze/thaw cycles may cause the concrete floor and/or trenches' cement caps to heave and crack, possibly resulting in a release of contaminated dust, the PRPs agreed to demolish the building and remove the foundation and process trenches. Demolition of the former battery facility began in September 1994 and was completed in January 1995<sup>8</sup>.

Following the demolition of the former battery facility, it was discovered that a cadmium nitrate tank located on a pedestal immediately adjacent to the plant had leaked onto the underlying soil prior to the closing of the plant in 1979. In an attempt to remove this cadmium-contaminated soil, a twenty by sixty-foot area was excavated to a depth of approximately twenty-two feet (approximately two feet above the groundwater table). While post-excavation sampling of this area showed that some cadmium contamination remained in the saturated soils at levels above the 20 mg/kg action level, and that cadmium was present in the groundwater, it was determined that excavating an additional four feet of contaminated soil to a depth of 26 feet (two feet below the water table), placing two feet of limestone at the bottom of the excavation (to raise pH levels and keep the cadmium insoluble), and backfilling the excavation with clean fill would be protective of public health and the environment<sup>9</sup>.

At the completion of the marsh remediation and restoration activities in April 1995, the marsh was planted with cattails, bull rush, arrow arrum, and upland shrubs in specified areas. Growth of these plants was interrupted by significant ice scour and an invasion of geese, which destroyed approximately 40% of the newly-planted marsh areas. A geese control plan was devised and denuded areas were replanted during molting season when the geese wouldn't be able to fly in. The plantings are being monitored on a regular basis by the warden of the adjacent National Audubon sanctuary, Constitution Marsh.

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<sup>8</sup> As was noted above, the selected remedy for the former battery facility involved decontamination to remove the heavy metal-contaminated dust. A June 1994 ESD documented the incorporation of the demolition of the facility.

<sup>9</sup> The noted modification to the remedy was documented in a May 1995 ESD.

The plant grounds were regraded and reseeded in July 1995. Fourteen monitoring wells remain in place on the plant grounds for the long-term monitoring of the groundwater for VOCs and cadmium.

In all, 189,265 tons of treated soils and sediments were transported off-site (via 1,979 railcars) to City Management Landfill in Michigan. Chemical Waste Management's hazardous waste landfill in Model City, New York received 906 tons of hazardous materials.

A Remedial Action Report associated with the remediation of the adjacent properties was approved on September 28, 1993. A Remedial Action Report associated with the East Foundry Cove, East Foundry Cove Marsh, Hudson River in the vicinity of the Cold Spring pier, former battery facility, and plant grounds portions of the site was approved on September 18, 1995. A Superfund Site Close-Out Report was approved on September 28, 1995. The site was deleted from the National Priorities List on October 18, 1996.

#### *Institutional Controls Implementation*

The 1988 and 1989 RODs provided for the application of institutional controls to prevent perforation of the cap in the marsh, human consumption of contaminated blue claw crabs, and the potable use of on-site groundwater.

The New York State Commissioner of Health, on April 21, 1977, issued a health advisory that crabs from foundry cove not be consumed. An expansion of the advisory was made in the spring of 1981, advising the public to eat not more than one meal a week of crabs taken from the Hudson River.

Deed restrictions were placed by the PRPs barring the construction of on-site ground water wells without the approval of EPA and excavation deeper than 15 feet within the pedestal area. On November 14, 2003, Gould added the deed restrictions when it transferred ownership of the factory grounds to Ken Kearney.

Through a prospective purchaser agreement with EPA and covenant not to sue, Scenic Hudson Land Trust Inc., a conservation group, agreed to limit disturbances to the marsh and not to expose or puncture the protective clay cap covering it and to not construct or use any groundwater wells on the property or any new lots or parcels created from the property without EPA approval in an agreement signed on October 10, 1996.

Constitution Marsh is owned by New York State and zoned as a wildlife sanctuary. Access to the marsh is restricted by the Audubon Society, which manages the marsh.

#### *System Operations/Operation and Maintenance*

Annual site inspections are conducted to examine the restored marsh for invasive vegetative species and to determine the percentage of vegetative cover on the cap in East Foundry Cove Marsh, identify irregular settlement, bubbles, erosion, or other disturbances which might affect

the integrity of the cap and vegetative cover, check the integrity of the fencing surrounding the plant grounds, and check the integrity of the monitoring wells. Maintenance is performed as necessary.

In accordance with the Site Monitoring Plan, site monitoring originally included the collection of groundwater, surface water, sediment, and wildlife tissue samples and the performance of marsh vegetation inventories on a more-or-less annual basis. Laboratory analyses included metals for sediments, VOCs and metals for groundwater, metals for surface water, and metals for wildlife analyses. Since during the last five-year review period, there had not been a change in the wetland surface water and soil sample results and since the levels of contaminants present in the surface water and East Foundry Cove Marsh soil concentrations do not pose a significant threat to the environment, sampling and analysis of surface water and East Foundry Cove Marsh soils is no longer performed.

A hydrogeologic investigation was conducted by the PRPs' contractor, AGC, in 2003 at the request of EPA. The purpose of the investigation was to delineate the chlorinated solvent plume and to evaluate if biodegradation through reductive dechlorination was occurring<sup>10</sup>. The investigation concluded that the volatile organic compound plume has not been delineated and may extend off-site, and that biodegradation is limited in extent and is not likely to occur to at significant levels under natural conditions.

In order to address the chlorinated solvent plume in groundwater, two in-situ bioremediation events were conducted at the site. The purpose of the bioremediation was to augment reductive dechlorination, thereby decreasing concentrations of trichloroethylene (TCE)<sup>11</sup>. Fourteen injection wells were installed perpendicular to the inferred groundwater flow and one downgradient monitoring well was installed.

The first event was conducted in February 2005. Hydrogen Release Compound (HRC<sup>®</sup>)<sup>12</sup> was pumped into each injection well. Post-injection groundwater sampling results indicated that although hydrogen concentrations decreased in all of the wells (indicating the consumption of hydrogen and a possible change in oxidation/reduction conditions), a significant change in TCE concentrations did not occur as a result of the injection.

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<sup>10</sup> Chlorinated solvents can biodegrade through the process of reductive dechlorination, where anaerobic bacteria gain energy by sequentially replacing a chlorine atom with a hydrogen atom on a chlorinated solvent. Hydrogen is generally supplied by the fermentation of organic carbon.

<sup>11</sup> While tetrachloroethylene (PCE) is present in the groundwater, the concentrations fluctuate marginally above and below the groundwater standard.

<sup>12</sup> HRC<sup>®</sup> was chosen as the substrate for bioaugmentation because it is a slow release compound that produces lactic acid when hydrated. When fermented by microbes, the lactic acid provides the hydrogen necessary for the reductive dechlorination process.

A second in-situ bioremediation event was conducted in October 2006. Due to the limited results of the first event conducted with HRC<sup>®</sup>, HRC-Advanced<sup>®</sup> was chosen as the substrate for the second bioremediation event. HRC-Advanced<sup>®</sup> contains lactic and fatty acids for both rapid and long-term fermentation. HRC-Advanced<sup>®</sup> was pumped into five of the injection wells. Post-injection sampling results once again indicated that a significant change in TCE concentrations did not occur as a result of the injection.

The estimated annual inspection, maintenance, sampling, and monitoring costs are \$81,000; these costs are broken down in Table 2 (attached).

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

The first and second five-year reviews were conducted in June 1998 and June 2003, respectively, pursuant to OSWER Directives 9355.7-02 (1991), 9355.7-02A (1994), and 9355.7-03A (1995). These five-year reviews concluded that the implemented remedy continued to provide adequate protection of public health and the environment. There were no recommendations, follow-up actions, or issues presented in the first or second five-year reviews. Additional monitoring which has occurred since the second five-year review is discussed below.

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

### *Administrative Components*

The five-year review team consisted of Pamela Tames (Remedial Project Manager [RPM]), Amanda Gallagher (hydrologist), Mindy Pensak (biologist) and Michael Sivak (risk assessor).

### *Community Involvement*

The EPA Community Involvement Coordinator for the Marathon Battery Company site, Cecilia Echols, published a notice in the *Putnam County News*, a local newspaper, on January 16, 2008, notifying the community of the initiation of the five-year review process. The notice indicated that EPA would be conducting a five-year review of the remedy for the site to ensure that the implemented remedy remains protective of public health and the environment and is functioning as designed. It was also indicated that once the five-year review is completed, the results will be made available in the local site repository. In addition, the notice included the RPM's address and telephone number for questions related to the five-year review process or the Marathon Battery Company site.

In response to the notice, a resident wrote a letter asking questions about the fence around the site, long-term monitoring, site use restrictions, and reuse of the property. Responses to the comments are included in the Responsiveness Summary (see Appendix A, attached hereto).

### *Document Review*

The documents, data, and information which were reviewed in completing the five-year review are summarized in Table 3 (attached).

### *Data Review*

In accordance with the Site Monitoring Plan, site monitoring includes the collection of groundwater, East and West Foundry Cove surface water and sediment samples, biological samples, and a vegetative inventory of East Foundry Cove Marsh. Five rounds of post-construction sampling have been conducted since the second five-year review was conducted in 2003. Laboratory analyses included cadmium for sediments, VOCs for groundwater, and cadmium for the fauna.

As can be seen from Table 4 (attached), while the levels of TCE in the groundwater were relatively stable over the 5-year review period, the concentrations were well above the New York State standard (5 micrograms per liter [ $\mu\text{g/l}$ ]). On the other hand, during the review period, PCE concentrations were also relatively stable, fluctuating marginally above and below the York State standard of 5  $\mu\text{g/l}$  (only 3 out of 11 samples were above the standard).

Sediment samples were collected from East Foundry Cove, and West Foundry Cove. Although there was some variation in the level of cadmium concentrations in the post-remediation samples, the amount of cadmium remaining in the sediment remains close to background levels which is more than an order-of-magnitude lower than the cadmium concentrations in the pre-remediation samples.

Cadmium bioaccumulation data was collected from killifish and crayfish placed in East Foundry Cove, West Foundry Cove, and Manitou Bay (background) in 2003. Cadmium levels in the fish after 35 days were found to be at the same level as the control sample which is also between one and two levels of magnitude less than the data collected prior to the site remediation.

### *Site Inspection*

The need for ongoing five-years reviews stems from the presence of cadmium contamination beneath the soil cap in East Foundry Cove Marsh, in the sediments of the unremediated West Foundry Cove and Constitution Marsh, in the soils at depth on the former plant grounds, and groundwater contamination underlying the former factory grounds.

EPA's five-year review team conducted a Site inspection on April 28, 2008 and the annual Marsh monitoring visit was performed on May 28, 2008 with the property owner, PRP, NYSDEC, USACE and NOAA in attendance as part of this five-year review.

### *Interviews*

No interviews were conducted for this review.

### *Institutional Controls Verification*

The 1996 prospective purchaser agreement and 2003 deed restriction remain in force and are on file at EPA and the Putnam County Clerk's office, respectively.

In 1977, the New York State Commissioner of Health issued a health advisory that crabs from foundry cove not be consumed. An expansion of the advisory was made in 1981, advising the public to eat not more than one meal a week of crabs taken from the Hudson River. The New York State Department of Health published its most recent health advisories in an annual report titled, "Chemicals in Sportfish and Game, 2008-2009 Health Advisories" and can be found at <http://www.health.state.ny.us/environmental/outdoors/fish/docs/fish.pdf>. Advice regarding ingestion of crabs near the site is included in this report.

### *Other Comments on Operation, Maintenance, Monitoring, and Institutional Controls*

Table 5 (attached) presents comments and offers suggestions.

## **VII. Technical Assessment**

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

The three RODs for the site provided for exposure protection through the excavation of contaminated soils on the former plant grounds and adjacent properties, dredging of the contaminated sediments in East Foundry Cove Marsh, East Foundry Cove, and the Hudson River in the vicinity of the Village of the Cold Spring pier, placement of a clay cap and soil cover on the excavated marsh areas in East Foundry Cove Marsh, natural attenuation for the groundwater, and the application of institutional controls to prevent perforation of the cap, human consumption of contaminated blue claw crabs, and the potable use of on-site groundwater.

While the remedies to address the contaminated soils and sediments are functioning as intended by the decision documents, the contamination levels in the groundwater have remained stable since the last five-year review. To ensure that degradation continues to occur at the site and that the plume is not migrating off-site, further plume delineation and monitoring of off-property groundwater is necessary. Furthermore, given that two previous attempts at bioremediation have not been successful, investigation of alternative methods of addressing the groundwater contamination need to be assessed and implemented.

### *Question B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives used at the time of the remedy still valid?*

There have been no changes in the physical conditions of the site that would affect the protectiveness of the remedy.



Although specific parameters may have changed since the time the time of the original risk assessments, the process that was used is consistent with current practice.

The land-use assumptions, exposure assumptions and pathways, cleanup goals, and remedial action objectives considered in the decision documents remain valid<sup>13</sup>. Although residential cleanup objectives were used to remediate the site, the former factory facility grounds are currently zoned for light industrial use. The current property owner has expressed interest in rezoning the property for residential use. If the property is rezoned, while the land use assumptions would change, the remedy would still be protective.

The levels of cadmium in the sediments and surface water site-wide do not pose a significant threat to human health or the environment. Therefore, the remedies for these areas are considered protective.

With the exception of cadmium-contaminated soils exceeding the 20 mg/kg clean up level in a twenty by sixty-foot area of saturated soils at a depth of 26 feet (two feet below the water table), all of the soils on the former battery facility grounds and residential yards have been remediated to 20 mg/kg. As a result of the placement of two feet of limestone at the bottom of the excavation (to raise pH levels and keep the cadmium insoluble), the backfilling of the excavation with clean fill, and the placement of institutional controls to restrict excavation within the former pedestal area on the former battery plant grounds, there is no route of exposure to the contaminated soils. Therefore, the soils remedy is considered protective.

The excavation and treatment of soils contaminated with VOCs beneath the former battery plant was expected to remove much of the source of contamination to groundwater. Groundwater samples, however, indicate that while the levels of TCE in the groundwater have been relatively stable since the implementation of the remedial action, the concentrations continue to be well above the New York State standard. PCE concentrations, on the other hand, have also been relatively stable, but they have fluctuated marginally above and below the York State standard. The remedy remains protective of human health, however, since area residents receive public water and the direct contact exposure pathway to groundwater is incomplete.

Soil vapor intrusion is evaluated when soils and/or groundwater are known or suspected to contain VOCs. TCE remains the only VOC in groundwater identified in the 1995 ROD that still exceeds its vapor intrusion screening criteria at the most protective increased cancer risk ( $1 \times 10^{-6}$

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<sup>13</sup> The remedial action objectives included prevention of all biota from contacting East Foundry Cove Marsh and Constitution Marsh contaminated sediments that would threaten them, prevention of resuspension and redistribution of the contaminated sediments that would threaten the area flora and fauna, minimization of the disturbance to Constitution Marsh, a delicate ecological habitat, reduce cadmium in sediments to protect aquatic organisms and protect human health and reduce the transport of suspended sediments from East and West Foundry Coves and the Pier Area, eliminate exposure to contaminated soils, and restore the groundwater to drinking water standards.

<sup>6</sup>) identified in the draft *Evaluating the Vapor Intrusion into Indoor Air* guidance document (EPA, 2002). Contaminated site groundwater resides in the shallow aquifer (20 ft), which may be a potential concern for vapor intrusion. A more comprehensive investigation of the vapor intrusion pathway should be completed to evaluate the impact of VOCs, namely TCE, to downgradient properties that may be potentially impacted.

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

There is no information that calls into question the protectiveness of the remedy.

#### *Technical Assessment Summary*

Vegetation inventories in East Foundry Cove Marsh were performed annually during the review period. Sizable exposed areas in addition to infestations of phragmites and purple loosestrife continue to affect the full recovery of the marsh<sup>14</sup>. Healthy areas of the marsh show a large variety of vegetation suitable for sustaining wildlife and include cattails, arrow arum, saltmarsh fleabane, water plantain, wild rice, spikerush, pickeralweed, wild millet, tickseed, and water hemp. In October 2007, bare areas of the marsh were surveyed and the elevations were compared to those taken at the completion of construction activities in 1995. It appears that these bare areas have subsided up to two feet and are no longer at the proper elevation to promote the growth of cattails. A pilot study will be conducted during the summer of 2008 to determine which wetland species can be successfully grown at the lower elevation.

Based upon the results of the five-year review, it has been concluded that the remedy is functioning as intended by the RODs. Specifically,

- The soil cover in East Foundry Cove Marsh is intact and in good condition. The vegetative cover is in good condition over two thirds of the Marsh but it is not spreading over the remaining bare areas;
- Organic buildup in East Foundry Cove Marsh, which supports vegetative growth by increasing nutrient levels, is occurring;
- The fence around the site is intact and in good repair;
- The groundwater monitoring wells installed within and around the site are functional; and
- There is no evidence of trespassing, vandalism or damage (to the cap and vegetative cover, monitoring wells, or fence).

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<sup>14</sup> Due to the difficulty and potential for disturbing the cap, physical removal of the phragmites and purple loosestrife has not been attempted. Beetles have been successfully used in the marsh to control the spread of purple loosestrife.

A review of the groundwater monitoring data indicates that low levels of VOCs are still present in the groundwater.

Compared to the initial post-remediation sampling results, the average cadmium concentration in East Foundry Cove sediment samples is greatly reduced, having stabilized at an average concentration of 25 mg/kg over the past few sampling events. Cadmium concentrations in sediment samples collected in West Foundry Cove (depositional area) generally show a decreasing trend. Cadmium levels in post-remediation sediment samples in these areas range from 0.3 to 144 mg/kg, which is well below the pre-remediation maximum concentration of 569 mg/kg.

### **VIII. Recommendations and Follow-Up Actions**

Table 6 (attached) identifies concerns related to the groundwater plume and vapor intrusion and contains recommendations and follow-up actions which should ensure long-term protectiveness.

### **IX. Protectiveness Statement**

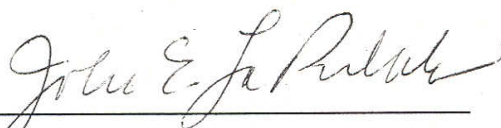
The implemented OU1 and OU2 remedies protect human health and the environment by controlling exposure pathways that could result in unacceptable risks. The levels of contaminants remaining in the surface sediments are protective of the environment and human health. Institutional controls restricting the consumption of crabs and the disturbance of the marsh address concerns about contaminated subsurface sediments.

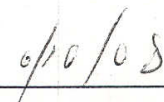
The extent of the groundwater contaminant plume is unknown. In addition, there appears to be houses that are close enough to the suspected path of the groundwater plume to raise concern about possible unacceptable vapor intrusion exposures. Therefore, a protectiveness determination related to the OU3 remedy cannot be made until further information recommended in this five-year review is obtained. It is expected that a report addendum containing a protectiveness statement for OU3 will be issued within eighteen months of the date of this report.

**X. Next Review**

The next five-year review for the site will be completed before June 2013, five years from the date of this review.

Approved:

  
\_\_\_\_\_  
George Pavlou, Acting Director  
Emergency and Remedial Response Division

  
\_\_\_\_\_  
Date

<b>Table 1: Chronology of Site Events</b>	
<b>Event</b>	<b>Date(s)</b>
High levels of cadmium contamination were discovered in Foundry Cove sediments by New York University, EPA, and the New York State Department of Environmental Conservation.	Early 1970s
U.S. Department of Justice required owners/operators to remove cadmium from the outfall area and channel leading into the Cove and place in an on-site vault	1972
Dredging of Foundry Cove conducted	1972-1973
Marathon Battery Company site included on the Interim National Priorities List	1981
NYSDEC undertakes RI/FS	1983
EPA's contractor, Ebasco Services, Inc., conducts a Supplemental RI/FS	1986-1989
ROD issued selecting remedy for Area I	1986
ROD issued selecting remedy for Area II	1988
Unilateral Administrative Order required owners to decontaminate the former battery plant and its contents	1989
ROD issued selecting remedy for Area III	1989
Consent Decree entered by the Southern District of New York with the PRPs to undertake the construction of the selected remedy for the site	1993
Site remedy implemented by Severson Environmental Services, Inc.	1993-1995
ESD Issued	1993
ESD Issued	1994
ESD Issued	1995
Final Close-Out Report approved	1995
Marathon Battery Company Site deleted from the NPL	1996
First Five-Year Review conducted	1998
Second Five-Year Review conducted	2003

**Table 2: Annual Monitoring Costs**

<b>Estimated Costs for Contract Performance</b>	<b>Cost per Year</b>
Sampling and analysis	\$40,000
Site inspection/maintenance	\$41,000
Total estimated cost	\$81,000

**Table 3: Documents, Data, and Information Reviewed in Completing the Five-Year Review**

- Record of Decision, EPA, September 1986
- Record of Decision, EPA, September 1988
- Record of Decision, EPA, September 1989
- RD/RA Report, Malcolm Pirnie, Inc., 1992
- ESDs, EPA, August 1993, June 1994, and May 1995
- Close-Out Report, EPA, 1995
- Long Term Monitoring Plan, Advanced GeoServices Corp., December 1995
- Five-Year Review Report, EPA, June 1998
- 1998 Annual Report, Long Term Monitoring Program, Advanced GeoServices Corp., 1999
- 1999 Annual Report, Long Term Monitoring Program, Advanced GeoServices Corp., 2000
- 1999 Biological Sampling/Monitoring Report, Advanced GeoServices Corp., 2000
- 2000 Annual Report, Long Term Monitoring Program, Advanced GeoServices Corp., 2001
- 2001 Sampling Event Report, Long Term Monitoring Program, Advanced GeoServices Corp., 2001
- 2002 Sampling Event Report, Long Term Monitoring Program, Advanced GeoServices Corp., 2003

**Table 3: Documents, Data, and Information Reviewed in Completing the Five the Five-Year Review Continued**

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|---|
| <ul style="list-style-type: none"><li>• Five-Year Review Long-Term Monitoring Program Report, Advanced GeoServices Corp., 2001</li></ul>  |
| <ul style="list-style-type: none"><li>• Long-Term Monitoring Program Sampling Event Report, Advanced GeoServices Corp., 2003</li></ul>  |
| <ul style="list-style-type: none"><li>• EPA guidance for conducting five-year reviews and other guidance and regulations to determine if any new applicable or relevant and appropriate requirements relating to the protectiveness of the remedy have been developed since EPA issued the RODs, 2001</li></ul> |
| <ul style="list-style-type: none"><li>• Second Five Year Review, EPA, June 2003</li></ul>   |
| <ul style="list-style-type: none"><li>• Long-Term Monitoring Program Sampling Event Report, Advanced GeoServices Corp., 2004</li></ul>  |
| <ul style="list-style-type: none"><li>• Groundwater Delineation for VOCs, Plant Grounds, Advanced GeoServices Corp., January 2004</li></ul>   |
| <ul style="list-style-type: none"><li>• Bioaugmentation Work Plan, Advanced GeoServices Corp., October 2004</li></ul>   |
| <ul style="list-style-type: none"><li>• In-Situ Bioaugmentation Report, Advance GeoServices Corp., August 2005</li></ul>  |
| <ul style="list-style-type: none"><li>• Long-Term Monitoring Program Sampling Event Report, Advanced GeoServices Corp., 2006</li></ul>  |
| <ul style="list-style-type: none"><li>• Long-Term Monitoring Program Sampling Event Report, Advanced GeoServices Corp., 2007</li></ul>  |
| <ul style="list-style-type: none"><li>• In-Situ Bioremediation Final Report, Advanced GeoServices Corp., January 2008</li></ul>   |



<b>Table 4: Levels of Trichloroethylene in the Groundwater from 1988-2007 (micrograms per liter)</b>								
<b>Well</b>	<b>1988</b>	<b>1994</b>	<b>1996</b>	<b>1998</b>	<b>2000</b>	<b>2003</b>	<b>2006</b>	<b>2007</b>
<b>MW-7S</b>	82	100	89	100	82	74	79	76
<b>MB-3</b>	65	73	70	78	46	50	47	35

<b>Table 5: Other Comments on Operation, Maintenance, Monitoring, and Institutional Controls</b>	
<b>Comment</b>	<b>Suggestion</b>
Large bare areas exist in the marsh due to subsidence of the cap. An analysis of which plants can grow within that lower wetland elevation is currently ongoing.	A pilot planting program should be performed during the 2008 growing season so that those plant varieties that can be grown within the current bare Marsh areas can be planted during the 2009 growing season.
New York State now requires annual certifications that institutional controls that are required by RODs are in place and that remedy-related operation and maintenance (O&M) is being performed.	The annual O&M reports should include a certification that remedy-related O&M is being performed.

**Table 6: Recommendations and Follow-up Actions**

Issue	Recommendations and Follow-Up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness (Y/N)	
					Current	Future
The extent of the groundwater plume is not known. In addition, the levels of VOCs in the groundwater plume continue to be stable. Attempts to enhance the natural degradation process have not been successful.	The groundwater plume needs to be better delineated and alternative methods of addressing the groundwater contamination need to be assessed and implemented.	PRPs	EPA	October 2010	N	Y
Several residences are located within 100 feet of the volatile organic compound plume. Need to assess the vapor intrusion pathway.	A subslab vapor intrusion investigation should be performed during the next heating season. The data that is collected should be evaluated to determine if any further investigation or response actions are required.	EPA	EPA	October 2009	N	Y

**Table 7: Acronyms Used in This Document**

CIC	Community Involvement Coordinator
EPA	United States Environmental Protection Agency
ESD	Explanation of Significant Differences
HRC	Hydrogen Release Compound
NPL	National Priorities List
NYSDEC	New York State Department of Environmental Conservation
MPI	Malcolm Pirnie, Inc.
µg/l	Micrograms per Liter
mg/kg	Milligrams per Kilogram
O&M	Operation and Maintenance
PCE	Tetrachloroethylene
PRP	Potentially Responsible Party
RA	Remedial Action
RD	Remedial Design
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
RPM	Remedial Project Manager

TCE	Trichloroethylene
UAO	Unilateral Administrative Order
USACE	United States Army Corps of Engineers
USFWS	United States Fish and Wildlife Service
VOC	Volatile Organic Compound

## *Appendix A – Responsiveness Summary*

### **INTRODUCTION**

The Environmental Protection Agency (EPA) published a notice in the *Putnam County News* notifying the community of the initiation of the five-year review process for the Marathon Battery Company site. The notice indicated that EPA would be conducting a five-year review of the remedy for the site and identified the Remedial Project Manager's address and telephone number for questions related to the five-year review process or the Marathon Battery Company site. In response to the notice, a resident wrote a letter asking questions about the fence around the site, long-term monitoring, site use restrictions, and reuse of the property. This Responsiveness Summary provides a summary of the resident's comments and concerns and provides EPA's responses.

*Comment #1:* The resident indicated that during the cleanup activities that took place in the 1970's, a fence was placed on the former battery plant property several feet from the adjacent residents' property lines. The residents were told at that time that they could use the property from the fence to the residents' property line. The residents have maintained that property since that time. The resident inquired as to whether it is likely that the fence will be removed and they will have to relinquish control of this property.

*Response #1:* Since the former factory grounds were remediated in 1995, the land is available for reuse and a fence is not needed for the remedy. It is up to the current owner of the property to decide if he wants the fence to remain. Regarding the control of the property if the fence is removed, this is a legal matter that is not within EPA's purview.

*Comment# 2:* The resident inquired as to whether or not site-wide, long-term monitoring will continue.

*Response #2:* To insure that the implemented actions remain protective, long-term monitoring is being conducted. While most of the monitoring will be performed indefinitely, some of the monitoring has been discontinued. Site monitoring originally included the collection of groundwater, surface water, sediment, and wildlife tissue samples and the performance of marsh vegetation inventories on a more-or-less annual basis. Since during the last five-year review period, there had not been a change in the wetland surface water and soil sample results and since the levels of contaminants present in the surface water and East Foundry Cove Marsh soil concentrations do not pose a significant threat to the environment, sampling and analysis of surface water and East Foundry Cove Marsh soils is no longer being performed. Once groundwater standards are met, groundwater monitoring will also terminate, as well.

*Comment #3:* The resident asked that the “restricted” and “unrestricted” areas be identified.

*Response #3:* The cap in the marsh is restricted in that digging or otherwise puncturing it is prohibited. Use of the 12-acre former factory grounds is unrestricted as long as there is no excavation below a 15-foot depth in a small area known as the “former pedestal area,” where a leaking cadmium tank was once located. This area was excavated down to 2 feet below the water table (26 feet below the ground surface) and restored with 2 feet of limestone and 24 feet of clean fill.

*Comment #4:* The resident asked if residential houses are built on the former plant grounds, will the builder be required to inform any prospective buyers that the land was a former Superfund site. The resident also asked whether excavating soil would be protective of human health, and whether future home owners be allowed to have a garden?

*Response #4:* Currently, the former plant grounds are zoned as light industrial. The current landowner has expressed an interest in rezoning the property as residential. With the exception of the “former pedestal area” 24 feet below the ground surface described in Response #3, above, all of the contaminated soils have been removed. Therefore, if the zoning of the property is changed to residential and houses are constructed, excavating soil and planting a garden would not present a risk to human health. New York State’s Property Disclosure Act requires the seller of residential real property to complete form DOS-1614, a property condition disclosure statement, and deliver it to the buyer.

*Comment #5:* The resident asked whether groundwater wells could be installed on the property in the future.

*Response #5:* Since the groundwater is contaminated, deed restrictions were placed on the property barring the construction of on-site groundwater wells. Once contaminant levels in the groundwater have dropped to safe levels, it is possible that the restriction on the use of groundwater could be lifted. It should be noted, however, that the area is served by municipal water.

*Comment #6:* The resident asked what residual levels of cadmium contamination remain on the former plant grounds and whether or not these levels would be protective if the property is developed.

*Response #6:* Based upon assumptions about vegetable consumption and using World Health Organization estimates related to

cadmium toxicity, EPA determined a level of 20 mg/kg cadmium was protective of public health under a residential use scenario. Post-remediation samples were collected and they confirmed that this cleanup level was reached. Following the post-excavation sampling, the factory grounds were brought up to their current elevation using clean fill brought in from an off-site source. In addition, dermal contact with and inhalation of cadmium is not a human health risk at these levels.