# RECORD OF DECISION
# MARATHON BATTERY COMPANY SITE
# NEW YORK

## SITE LOCATION AND DESCRIPTION

### SITE LOCATION

The Marathon Battery Company site is situated in the Village of Cold Spring in Putnam County, New York. It is across the Hudson River and slightly north of the United States Military Academy at West Point, and approximately 65 kilometers (40 miles) north of New York City. The site is located within the incorporated boundaries of Philipstown (Figure 1).

### SITE DESCRIPTION

The site is comprised of three study areas: Area I, which consists of East Foundry Cove Marsh and Constitution Marsh; Area II, which encompasses the former nickel-cadmium battery plant, presently a book storage warehouse, the surrounding grounds, a vault with cadmium contaminated sediments dredged from East Foundry Cove in the 1970s, and adjacent residential yards; and Area III, which includes East Foundry Cove, West Foundry Cove and the Hudson River in the vicinity of the Cold Spring pier (Figure 2).

This Record of Decision (ROD) addresses the Area III portion of the site.

Foundry Cove, a shallow bay and cattail marsh on the east bank of the Hudson River across from West Point, is composed of east and west components. East Foundry Cove is partially isolated from West Foundry Cove and the Hudson River by a railroad bed to the west. The 20 hectare (ha) (48 acre) East Foundry Cove consists of approximately 5 ha (12 acres) of marsh to which the plant's outfall discharged, and 15 ha (36 acres) of tidal flat and cove. The exchange of water between East Foundry Cove and West Foundry Cove during flood and ebb tides is through a 10 meter (m) (33 foot) passage under a Metro-North railroad trestle and a channel system which connects Foundry Cove to Constitution Marsh, a 117 ha (281 acre) Audubon Society Sanctuary to the south. Located to the north of the site is the residential/business district of Cold Spring. The eastern boundary of the site includes the Old Foundry, a national historic site.

Water depths in West Foundry Cove and the Hudson River in the vicinity of the Cold Spring pier range from 0 to about 6 m (20 feet (ft)), increasing dramatically within several hundred meters of

shore. The main channel of the Hudson River in this area averages between 20 and 80 m (65 to 262 ft) in depth. The Cold Spring Pier Area is in an eddy zone created by the pier at the south end of this area and encompasses an area of 110 m (361 ft) taken from the pier. Similarly, West Foundry Cove is in an eddy area created by Constitution Island. These slow flow eddy areas have a significantly higher deposition of contaminants. Water circulation between Foundry Cove and the Hudson River is mainly influenced by a tide of 1 to 1.5 m (3.3 to 5 ft), exposing a considerable portion of the East Foundry Cove bottom at low tide. Because of the shallow water depths in the Cove, almost one third of the Cove bottom is covered with aquatic plant growth and is considered an emergent wetland.

## SITE HISTORY AND ENFORCEMENT ACTIVITIES

The source of contaminants found throughout Area III emanates from wastewater that was discharged by the former battery manufacturing plant, where nickel-cadmium batteries were manufactured 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 by-pass 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 East Foundry Cove.

The battery manufacturing facility was designed and constructed in 1952 by the U.S. Army Corps of Engineers (USACE) for the U.S. Army Signal Corps. Initial operation of the facility was contracted by the Signal Corps to Sonotone Corporation. The first batteries manufactured were used in the NIKE Missile Program, and other missile programs. In 1957, the facility began production of aircraft batteries for military jet fighters.

In September 1962, Sonotone Corporation purchased the plant and its equipment from the United States. In 1963, thirty-five thousand square feet of production area were added and production of nickel-cadmium batteries for commercial customers was initiated.

In December 1967, Sonotone became a wholly-owned subsidiary of Clevite, Incorporated (Clevite) which operated the facility for slightly over 18 months. In July 1969, Clevite merged with Gould, Incorporated (Gould); however, Gould was required to divest itself of the plant due to its ownership of other battery facilities. As a result, the plant appears to have been operated by Gould for only one week.

In July 1969, the plant was sold to Business Funds, Incorporated, which subsequently changed its name to Marathon Battery Company. Production increased to near capacity in Cold Spring, and expansion of the assembly operations was undertaken in Waco, Texas.

Eventually, all operations were transferred to the Texas plant. The last manufacturing operations were performed in the Cold Spring facility during March 1979.

The facility, with the equipment removed, was purchased in November 1980 by Merchandise Dynamics, Incorporated (Merchandise Dynamics) for use as a book storage and distribution facility. Merchandise Dynamics has filed for Chapter 7 bankruptcy.

On September 22, 1970, a complaint was filed (70 Civ. 4110) in the U.S. District Court for the Southern District of New York, by the United States against Marathon Battery Company et al for violation of Sections 407, 413, and 441 of Title 33 of the United States Code (Refuse Act). The complaint sought preliminary and permanent injunctive relief, enjoining and restraining the "discharge or deposit of any alkali, or any salt of nickel, cadmium or cobalt...directly or indirectly into Foundry Cove or the Hudson River" and ordered Marathon Battery Company and the other defendants to remove the "deposited salts, and any other refuse or debris deposited in Foundry Cove."

A Final Judgment was filed in 1972, which required Marathon Battery Company, Sonotone, Clevite, and Gould to remove contaminated sediments to a concentration of 900 milligrams per kilogram (mg/kg) from the outfall area adjacent to the discharge pipe, the channel leading to the main body of Foundry Cove, and a portion of Foundry Cove. Marathon Battery Company, Sonotone, Clevite, and Gould, participated in the limited cleanup of Foundry Cove.

In response to a report filed with the Court on behalf of the defendants, the United States filed a Satisfaction of Judgment, stating that "the defendants...are deemed to have complied with the terms of the Final Judgment, as amended, with respect to the removal of the deposits of cadmium from Foundry Cove and are relieved from any further obligation with respect thereto." (REI, 1983).

The Army was not named as a co-defendant in the United States' suit. Marathon Battery Company, Sonotone Corporation, Clevite, and Gould alleged that the Army had participated in damaging Foundry Cove by engineering and approving the plant design and by constructing the plant.

Between November 1972 and July 1973, dredging was conducted. The dredged sediments were mixed with 0.5% limestone and were buried in an asphalt and clay-lined underground vault on the plant property. A fence was placed around the vault. The surface of the vault was to be maintained in perpetuity by the property owner and monitoring was to be conducted by the New York State Department of Environmental Conservation (NYSDEC).

Studies conducted from 1976 to 1980 by NYSDEC, the United States

Environmental Protection Agency (EPA), and New York University indicated, however, the East Foundry Cove was still contaminated, much of it at concentrations greater than 900 mg/kg (900 parts per million (ppm)).

In October 1981, the Marathon Battery Company site was included on the Interim National Priorities List. Subsequently, 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.

In 1983, in response to an informal complaint regarding possible employee illnesses associated with cadmium exposure, the Occupational Safety and Health Administration (OSHA) took air samples during routine and maintenance work in the warehouse. These data showed that exposure levels of cadmium, lead, and nickel were below OSHA's permissible exposure limits. Based upon these sample results, OSHA concluded that, although there was evidence of heavy metal contaminated dust in the facility, the only potential exposure was to workers involved in maintenance operations. OSHA advised that these employees should wear respiratory equipment while performing dust-producing activities.

In 1984, in order to investigate the feasibility of remediating the site, NYSDEC contracted with Acres International Corporation (Acres) of Buffalo, New York, to perform a Remedial Investigation and Feasibility Study (RI/FS). Area II sampling efforts in the summer of 1985 identified contamination both inside the building in the dust (cadmium and nickel concentrations as high as 120,000 mg/kg and 130,000 mg/kg, respectively) and outside in the surrounding soils.

In August 1985, a draft RI/FS report was prepared by Acres. Because the FS contained insufficient information to evaluate effectively the effects of remedial alternatives under consideration, the USACE was tasked to expand upon the study by further evaluating the technically feasible means of remediating Foundry Cove and Constitution Marsh. The USACE completed this technical assistance in February 1986.

In March 1986, following a contractual dispute with Acres, NYSDEC requested that EPA assume the lead responsibility for the project.

EPA's contractor, Ebasco Services, Inc. (Ebasco), completed a supplemental RI/FS for the East Foundry Cove Marsh/Constitution Marsh portion of the site (Area I) in August 1986. On September 30, 1986, a ROD was signed for this portion of the site. The selected remedy includes dredging of the contaminated sediments from East Foundry Cove Marsh followed by chemical fixation of these sediments and off-site disposal, as well as a no action alternative for Constitution Marsh.

An analysis of the data from the former battery facility by the Agency for Toxic Substances and Disease Registry (ATSDR) in late June 1986 led to the recommendation that the facility be closed immediately to all personnel not in personal protective equipment, until the cadmium levels were below occupational standards and guidelines. On July 3, 1986, EPA advised OSHA of the levels of cadmium detected in the warehouse, referring the project for immediate action.

In July 1986, OSHA performed an investigation of the warehouse. Air and wipe samples were collected. Results from the air sampling showed levels of cadmium in the employees' breathing zone to be below OSHA's occupational exposure criteria.

Because of the proximity of the local residences to the former battery facility, on July 9-10, 1986, the EPA Technical Assistance Team (TAT) collected twenty-two surface soil samples from the yards of residences on Constitution Avenue and the Boulevard. TAT inspected the warehouse and took soil and air samples around the perimeter of the facility. Results from this investigation showed no detectable levels of cadmium in the air, and concentrations ranging to 600 mg/kg in the soil.

Supplemental field activities for Area II were initiated in late 1987, and were completed in April 1988. A ROD for this operable unit was signed on September 30, 1988. The selected remedy includes decontamination of the interior of the former battery plant building and its contents, excavation and chemical fixation of the vault and cadmium-contaminated soils on the plant grounds and nearby residential yards, enhanced volatilization of the volatile organic-contaminated soils, and off-site disposal of the treated waste. No action was selected for the groundwater underlying the site.

In February 1988, in response to the notification by the Cold Spring fire department, EPA conducted an investigation of the sprinkler system within the battery facility. EPA, concerned that a fire could result in a release of dust to the environment, inspected the facility and verified that the sprinkler system was inoperable.

Demand letters for past costs by EPA and NYSDEC were sent to the Potentially Responsible Parties (PRPs) in September 1988. Marathon and Gould have refused to pay any costs associated with Areas I and III, contending that they were released from liability in the federal district court case, 70 Civ. 4110, as discussed above.

Marathon Battery Company, Gould, and Merchandise Dynamics, were issued a unilateral order in March 1989 to decontaminate the former battery facility and its contents, as called for in the ROD for Area II. Recently, Merchandise Dynamics, was found to be in noncompliance with the order due to its unauthorized removal of

books from the facility. ENSR, the contractor for Marathon and Gould, has commenced work in compliance with the Order.

Negotiations with the PRPs for the design and construction of the remaining portions of the Area II remedy are currently ongoing.

Marathon Battery Company, Gould, and the USACE have cooperated in supplying information and meeting with the Agency to comment on the proposed remedial alternative.

## HIGHLIGHTS OF COMMUNITY PARTICIPATION

The governmental effort to ensure significant community involvement in Cold Spring has been extensive. A comprehensive public relations strategy was developed by EPA to keep concerned parties cognizant of CERCLA activities at the site.

The EPA maintains three public information repositories in Cold Spring. They are located at the Cold Spring Village Hall, Philipstown Town Hall, and The Preservation and Revitalization of the Cold Spring Area office (PROCO). Other repositories are maintained at NYSDEC offices in Albany and EPA offices in New York City.

A community group, Concerned Citizens Action to Remove Toxins (CCART), received a Technical Assistance Grant (TAG) for $50,000 on February 2, 1989 to hire a technical advisor to assist in explaining to the public the results of the studies. The public is also kept informed through frequent public meetings.

The RI/FS report and Proposed Plan were released for public comment on June 28, 1989 and July 11, 1989, respectively. The notice of availability of these documents was published in the Citizen Register on July 13, 1989. A public meeting was held on July 19, 1989 to discuss the results of the RI/FS, the preferred alternative for the Area III portion of the site, and to solicit public comments. A more detailed discussion of the outcome of this public meeting as well as the questions and concerns raised by the public during the public comment period, can be found in the Reponsive-ness Summary, which is part of this ROD.

The public comment period was originally scheduled to close on August 1, 1989, but was extended to August 21, 1989 at the request of the PRPs and the general public.

## SCOPE AND ROLE OF OPERABLE UNIT

As stated, the site has been divided into three areas, addressed as separate operable units. EPA has already selected remedies for Areas I and II. The design of Area I is currently being completed, and the performance of the design and the remedy for Area II is the

subject of negotiations with the PRPs.

The third operable unit addresses the contaminated sediments in East Foundry Cove, West Foundry Cove, and the Cold Spring Pier Area. This area of the site poses a threat to the environment and human health due to risks from the possible ingestion of fish, blue crabs, and cadmium-contaminated suspended sediments in the surface water during water sports. The purpose of this response is to prevent potential exposure to the contaminated sediments.

## SUMMARY OF SITE CHARACTERISTICS

The RI/FS was prepared by EPA's contractor, Ebasco, in May 1989. Surface and subsurface soils, sediment and surface water were sampled during the RI. In addition, fish were sampled and bio-assays were performed using contaminated sediment. All media were found to be contaminated to various degrees.

Cadmium contamination in the sediments of East and West Foundry Coves and the Pier Area is of greater concern than cobalt and nickel contamination because cadmium is more toxic. Nickel concentrations in surficial sediments are generally of the same order of magnitude and vary in parallel with cadmium concentrations. East Foundry Cove is contaminated to a greater extent than West Foundry Cove or the Pier Area. Surface water cadmium, cobalt, and nickel concentrations are not affected by sediment-bound contamination. No differences could be found from background Hudson River metal concentrations or from wet weather storm events during the RI/FS. The sediment is predominantly a silt sized particle with substantial quantities of clay. No RCRA listed wastes were found on-site.

### SEDIMENTS

Sixty sediment samples from East Foundry Cove, two hundred eight sediment samples from throughout the Cold Spring Pier Area, and eighty-nine samples from West Foundry Cove were analyzed and evaluated for Area III. In addition, sediment samples were collected from the Hudson River within an area extending from Wappingers Falls to Croton Bay to determine whether additional cadmium deposition areas existed. All samples were analyzed for cadmium, cobalt, and nickel. Table 1 shows the range of cadmium contamination in Area III.

East Foundry Cove sediment samples were collected at nineteen locations by Acres in 1985 at three regular intervals down to a depth of 50 centimeters (cm) (19.7 in) (see Table 2). As part of the bioassay tests performed by Ebasco in 1988, nine sediment samples were collected in the East Foundry Cove and analyzed (see Table 3 and Figure 3). Although these samples were analyzed under special analytical service procedures and not subjected to EPA's quality assurance and quality control process, they confirm the

results of the Acres samples. In addition, as part of the remedial design for Area I, Malcolm Pirnie collected thirty-one confirmatory sediment samples in May 1989 (see Table 4 and Figure 4). Only the data points located within East Foundry Cove were used to determine the extent of contamination.

These data show that cadmium contamination ranges from 0.28 mg/kg to 2700 mg/kg with a mean of 179.25 mg/kg and a median of 5.6 mg/kg for all depths. The mean for each sampled depth is 439.4 mg/kg (0-10 cm), 50.5 mg/kg (10-25 cm), and 2.1 mg/kg (25-50 cm). The major portion of the contamination is found in the upper layer of the sediment. In fact, at the 10-25 cm depth, only six samples exhibited cadmium contamination at levels greater than 3.8 mg/kg. Nickel concentrations ranged from 47.9 to 1369 mg/kg, and cobalt from 14.5 to 75.7 mg/kg.

In the Hudson River in the area of the Cold Spring Pier, samples from eighty-five locations, covering about 465 acres, were collected at regular intervals down to a depth of 137 cm (53.94 inches). Cadmium contamination ranges from 1.2 mg/kg to 1,030 mg/kg, with a mean of 12.6 mg/kg and a median of 3.9 mg/kg for all depths. It should be noted that only 6 of the 208 samples showed levels of cadmium above 20 mg/kg. Cobalt and nickel contamination ranged from 7.5 mg/kg to 70 mg/kg and 15 mg/kg to 193 mg/kg, respectively. The vast majority of the contamination was found in the upper layers of the sediment. At depths below 50 cm (19.7 inches), the highest level of cadmium found was 8.1 mg/kg. The sediment underlying the Cold Spring pier will be sampled and analyzed during the Area III design phase.

In West Foundry Cove, forty-three locations were sampled at regular intervals down to a depth of 94 cm (37 inches). Cadmium contamination ranged from 1.1 mg/kg to 569 mg/kg with a mean of 43.9 mg/kg and a median of 4.2 mg/kg for all depths. Cobalt and nickel contamination ranged from 5.9 mg/kg to 33 mg/kg and 16 mg/kg to 381 mg/kg, respectively. The contamination in West Foundry Cove appears to be evenly dispersed vertically throughout the sediment. West Foundry Cove is believed to act as a depositional area.

In order to determine the impact of tidal flow on cadmium deposition in backwater cove areas of the Hudson River, sediment samples were collected from seven locations up river from the Village of Cold Spring. At each location, samples were recovered at two depths (0-10 and 40-50 cm) and analyzed for cadmium, cobalt, and nickel. Cadmium concentrations ranged from 1.3 to 6.4 mg/kg, cobalt ranged from 10 to 17 mg/kg, and nickel from 22 to 40 mg/kg. These concentrations of metals are consistent with metal concentrations found elsewhere in the Hudson River, and are not considered site-related contamination.

In addition, sediment samples were also collected down river from the Village of Cold Spring at nineteen locations along the river

banks and ten locations in mid-channel. Fifty samples were recovered from two depths (0-10 and 40-50 cm), where possible, and were analyzed for cadmium, cobalt and nickel. Cadmium concentrations ranged from 1.3 to 29 mg/kg; cobalt concentrations ranged from 5.2 to 20 mg/kg, and nickel concentrations ranged from 16 to 47 mg/kg. These values are consistent with normal background levels found in the Hudson River and not considered to be site-related.

Sediment samples from all three subareas were collected for analysis to investigate whether the sediments contain compounds which may not be compatible with the treatment alternatives considered as part of the FS. The results of this analysis, which are presented in Table 5, indicate that no significant contamination by other inorganic elements is present in area sediments. The majority of organic compounds detected are polycyclic aromatic hydrocarbons (PAHs) and are believed to be the result of petroleum products spilled in the Hudson River by boat, barge, shipping traffic, and land-based runoff, not from site-specific discharges.

GRAIN SIZE ANALYSIS

Sediment grain size samples were collected in the Pier Area and West Foundry Cove to aid in determining what effect dredging may have on down river transport of resuspended sediments.

The percent by weight of gravel (> 2 millimeters (mm)), sand (2-0.062 mm), silt (0.062-.002 mm) and clay (< 0.002 mm) in the sixty samples that were collected was calculated. The results show that silt is the most abundant fraction in the majority of sediment samples, followed by clay, sand, then gravel. The ranges, means, and standard deviations of the fraction weight percentages are as follows:

| | Range | Mean | Standard Deviation |
|---|---|---|---|
| Silt: | 51.89 - 88.48% | 65.93 + | 5.60 % |
| Clay: | 6.73 - 34.36% | 24.88 + | 6.24 % |
| Sand: | 4.19 - 15.42% | 8.00 + | 2.57 % |
| Gravel: | 0 - 26.01% | 1.17 + | 4.35 % |

During dredging operations, certain amounts of the dredged sediment may be introduced into the water column. Due to the nature of the sediments, sediment transport will be evaluated during design of the remedial action with the goal to minimize resuspension of sediments.

## SURFACE WATER

Surface water samples were collected from five locations during August and September 1987, during dry and wet weather, and during ebbing and flowing tides. Fifty-seven samples were analyzed for cadmium, cobalt, nickel, total suspended solids, and several for hardness. The concentrations of cadmium, cobalt, and nickel are generally less than 4 micrograms per liter (ug/l) except in six cases. The highest level was 67 milligrams per liter (mg/l).

## FISH

Fish samples were collected at four locations. All fish were analyzed for cadmium, cobalt, and nickel, and showed below detection limit results (less than 1.0 mg/kg) for all three metals, no matter where the fish were collected. Although only Fundulus were to be collected, all fish caught were saved for analysis. Interference from matrix effects prohibited the laboratory from attaining a detection limit lower than 1.0 mg/kg.

The Acres' study (1985) also sampled Foundry Cove finfish for metal contamination. Results revealed elevated levels of cadmium in muscle tissues of fish up to 0.320 ug/g while fish sampled from outside the Cove never exceeded 0.1 ug/g.

## SOIL

Soil samples were taken from beneath the Village of Cold Spring's storm sewer. To evaluate the possibility that the corrosive nature of the wastewater from the battery plant may have deteriorated the storm sewer line on Main Street to the point where wastewater might have also entered the underlying ground, six locations were sampled at two foot intervals down to a depth of sixteen feet. Samples were analyzed for cadmium, cobalt, and nickel. The highest concentration of cadmium was 3.8 mg/kg and the mean for all samples was 1.4 mg/kg. In addition, the results for cobalt and nickel also did not indicate significant concentration in the soil.

Three samples were also collected from the sand on the beach near the Cold Spring Pier. Two samples were collected at 0-6 inches and one sample was collected at 12-18 inches in depth. All samples were analyzed for cadmium, cobalt and nickel (see Table 6). Cadmium concentrations ranged from 2 mg/kg to 12 mg/kg with a mean of 7.3 mg/kg. Cobalt ranged from 3.9 mg/kg to 8.9 mg/kg, and nickel from 10 mg/kg to 33 mg/kg.

## SUMMARY OF SITE RISKS

A public health evaluation was performed using the basic methodology described in the Superfund Public Health Evaluation Manual, incorporating data from the site investigation and previous studies. The information cited in this ROD is expanded upon in Chapter 6 of the supplemental RI/FS.

Based upon the results of the remedial investigation, the Pier Area and East and West Foundry Cove sediments were determined to be contaminated with cadmium, cobalt, and nickel. Contamination was also detected in area crabs and fish. Based on environmental features and the surrounding location of these areas and organisms, along with possible activities and concerns of nearby residents, the following exposure pathways were considered:

- Ingestion of fish caught in the Foundry Cove/Pier Area
- Ingestion of Blue Crabs caught in Foundry Cove
- Ingestion of contaminated surface water/suspended sediments during water sport activities

## CONTAMINANT IDENTIFICATION

Due to the aquatic nature of East and West Foundry Coves and the Pier Area, the media of concern are limited to surface water and sediments.

The analytical results of surface water samples collected from Area III and the Hudson River were generally below 5.0 ug/1 for cadmium. This is below the applicable standard of 10.0 ug/1 for cadmium in drinking water. In addition, most of the metals in Hudson River waters are bound to resuspended particulate sediments. Therefore, surface water is not considered a medium of concern unless it contains resuspended sediments.

Cadmium and nickel are considered the contaminants of concern in the sediment found in East Foundry Cove, West Foundry Cove, and the Pier Area. These metals were chosen because they were detected at elevated concentrations, were found in greater than 25 percent of the samples analyzed, were present in the effluent from the former battery manufacturing process, and are known to cause adverse human health effects (EPA, 1981; EPA, 1983). Renal dysfunction is the most typical and severe effect of chronic low-level cadmium exposure.

Cobalt, although present in the media of concern, was detected on-site at concentrations below cadmium and nickel, and is also recognized as an essential nutrient. Therefore, cobalt was not evaluated as a contaminant of concern in the risk assessment, but it should be noted that remediation of cadmium and nickel will

reduce cobalt concentrations.

Levels of cadmium and nickel vary widely over the study areas included in Area III. In West Foundry Cove, cadmium sediment concentration ranged from 1.1 to 569 mg/kg with a mean of 43.9 mg/kg. Nickel concentrations ranged from 16 to 381 mg/kg with a mean of 65.3 mg/kg. Cadmium concentrations in the Pier Area ranged from 1.2 to 1,030 mg/kg with a mean of 12.6 mg/kg. All samples except six contained 20 mg/kg of cadmium or less. Nickel levels detected were between 150 and 1,260 mg/kg with a mean of 36.8 mg/kg. East Foundry Cove exhibited cadmium concentrations between 0.28 mg/kg to 2700 mg/kg with a mean of 179.25. The Spring 1989 sampling, by Malcolm Pirnie, although not considered in the risk assessment, is consistent with the earlier sampling data.

EXPOSURE ASSESSMENT

As previously stated, three exposure pathways were evaluated in the risk assessment. They consist of the ingestion of blue crabs, ingestion of fish, and the ingestion of suspended sediments. For each intake route, potential health impacts were evaluated using site and contaminant-specific models. Latin hypercube sampling (LHS) was then used to determined the range of uncertainty for the input variables. Since only site-specific values should be considered in the risk assessment, actual fish and water contamination values could not be used since both area fish and Hudson River water are exposed to additional sources of contamination. Therefore, to obtain the site-specific fish and water data necessary for the risk assessment, the site sediment contamination data was modelled to aquatic species consumed by man or suspended in the water column.

The potentially exposed population that was evaluated consisted of adults who crab, fish, and swim in the Foundry Cove area. The cumulative frequency figures for children do not vary from the adult figures. Therefore, all presented results apply to both adults and children. Exposure via these pathways was assumed to be limited to a 3 month fishing/crabbing/swimming season, with a minimum use of 1 day per year, maximum use of 91 days per year, and a median of 24 days.

TOXICITY ASSESSMENT

Since ingestion is the only contaminant pathway considered, and ingested cadmium and nickel are not considered carcinogens, only reference doses (RfDs) are used in the risk assessment. RfDs have been developed by EPA for indicating the potential for adverse health effects from exposure to chemicals exhibiting noncarcinogenic effects. RfDs, which are expressed in units of mg/kg/day, are estimates of lifetime daily exposure levels for humans, indicating sensitive individuals. Estimated intakes of chemicals from environmental media (e.g., the amount of a chemical

ingested from contaminated drinking water) can be compared to the RfD. RfDs are derived from human epidemiological studies or animal studies to which uncertainty factors have been applied (e.g., to account for the use of animal data to predict effects on humans). These uncertainty factors help ensure that the RfDs will not underestimate the potential for adverse noncarcinogenic effects to occur.

The RfD for cadmium is 1.0E-03 mg/kg/day for ingested food and 5.0E-04 mg/kg/day for water. The acceptable intake for nickel is 2.0E-02 mg/kg/day.

The normal dietary intake for cadmium can range from 7.1E-05 to 1.4E-04 mg/kg/day and from 4.3E-04 to 8.5E-03 for nickel. When the normal dietary intake is added to the chronic daily intake for each of the contaminant pathways, the resulting figure will show whether the RfD has been exceeded. The data show that the blue crab and sediment ingestion pathways are of little concern because they have little probability of exceeding an acceptable intake. The fish pathway remains as the critical exposure pathway for the area.

For all exposure pathways, the acceptable intake of nickel might be exceeded approximately 15% of the time.

Working backwards, it is possible to calculate acceptable sediment concentrations which are protective of human health. In Area III, the resultant figure is 220 mg/kg for cadmium. A similar analysis was not conducted for nickel due to its lesser toxicity and bioaccumulation rate. In addition, any recommended remedial action for cadmium would also apply to nickel.

Potential concern for noncarcinogenic effects of a single contaminant in a single medium is expressed as the hazard quotient (HQ) (or the ratio of the estimated intake derived from the contaminant concentration in a given medium to the contaminant's reference dose). By adding the HQs for all contaminants within a medium or across all media to which a given population may reasonably be exposed, the Hazard Index (HI) can be generated. The HI provides a useful reference point for gauging the potential significance of multiple contaminant exposures within a single medium or across media.

ENVIRONMENTAL RISKS

Sediment bioassays were conducted on four freshwater estuarine species (Ceriodaphnia dubia, Selanastrum capricornutum, Crangog sp and Pimephales promales) to determine the concentrations of cadmium, nickel, and cobalt in sediment which adversely affect aquatic organisms. Thirteen sediment samples were collected from Foundry Cove and the Pier Area and one from Wappingers Falls (reference location) and used in the bioassay tests. Samples were recovered from the top 6 inches of sediment. Based on the results

of those tests, it was concluded that a level between 10 and 255 mg/kg of cadmium in the sediment would protect the environment.

Research performed for EPA (JRB, 1984) established sediment criteria for cadmium based upon limiting concentrations in water to levels below EPA Ambient Water Quality Criteria. Preliminary results have shown that sediment cadmium toxicity decreases with increasing organic content. Therefore, for a total organic carbon (TOC) concentration of 5%, the chronic sediment cadmium criterion was found to be 38.5 mg/kg, and at a TOC of 10%, the chronic level was found to be 77 mg/kg. Ebasco's field results showing an average TOC value of 9.4% for this area would imply that a cadmium concentration somewhere in the range of 73 mg/kg would be required to prevent chronic exposure. The proportion of cadmium found in the sediment to that in aqueous solution in the marsh, however, will depend not only on TOC, but on other site-specific factors, including water chemistry, pH, oxidation/reduction potential, and temperature. Therefore, the model for partitioning based upon simplifying assumptions will only approximate site-specific cadmium criteria (ERT, 1986). NYSDEC feels that even at 10 mg/kg of cadmium in sediments there may be adverse ecological impacts.

The shortnosed sturgeon (Acipenser brevirostrum), an endangered species since 1967, occurs in the Hudson River from Troy to Piermont, a range of 125 miles which includes the site. Because it is a bottom feeder, and benthic organisms accumulate cadmium, exposure to site contamination is possible. However, since critical life stages (e.g., juveniles and larvae) and over-wintering individuals do not congregate in the Foundry Cove area, it is expected that the site contamination may not have a significant effect on these fish.

## DOCUMENTATION OF SIGNIFICANT CHANGES

Based upon the requirements of CERCLA Section 117(b), EPA has determined that significant changes have not been made to the selected remedy from the time that it was proposed in the Proposed Plan until final adoption of the remedy in the ROD.

## DESCRIPTION OF ALTERNATIVES

As previously stated in the summary of site risks, the contaminants which pose a significant health and environmental threat are cadmium and nickel in sediments. Because cadmium occurs in the sediments in equal or greater concentrations than nickel, and because cadmium is more toxic than nickel, nickel was not evaluated for all the alternatives. Remedial objectives which control cadmium will effectively deal with the lesser health and environmental problems posed by nickel and will also reduce cobalt concentrations.

Based on the results of the site investigation, and the public

health and environmental evaluations, the remedial objectives are:

- Reduce cadmium in sediments to protect aquatic organisms and protect human health.

- Reduce the transport of suspended sediments from East and West Foundry Coves and the Pier Area.

For the FS, Area III was divided into three subareas: East Foundry Cove, West Foundry Cove, and the Pier Area. Six alternative actions, including no action, contaminant removal/treatment/ disposal options, and acid extraction and disposal and/or redeposition, were evaluated for each subarea.

These alternatives are described below:

**EAST FOUNDRY COVE**

**Alternative EFC-1:** No Action

The Superfund program requires that the "no-action" alternative be considered at every site. Under this alternative, EPA would take no further action to reduce the levels of sediment contamination in this subarea.

Human access to East Foundry Cove would be restricted. A fence would be erected along the shoreline, preventing access to the cove by land. Signs would be posted instructing people to avoid contact with cove sediments, and to avoid consuming fish caught in the cove. Maintenance for this area would include a yearly ecological survey and a water and sediment sampling program for a period of 30 years. The present worth cost to implement this remedy is $1,241,700, and the remedy can be completed in 3 months.

This alternative complies with action-specific ARARs. Because this alternative would result in contaminants remaining on-site, CERCLA requires that the site be reviewed every five years. If justified by the review, remedial actions may be implemented at a later time to remove or treat wastes.

**Alternative EFC-2:** Containment

Under this alternative, containment of contaminated sediments would be accomplished by constructing a multi-layer cap. The cap would consist of a geotextile layer, an Armorform (TM) layer or its equivalent, and a foot of sand. This alternative would be executed in accordance with federal and New York State dredging and flood hazard area construction practice requirements. Also, during construction of the cap, silt curtains would be utilized to meet Clean Water Act Section 401 certification water quality standard requirements.

This alternative, with a present worth cost of $16.5 million, would take approximately 28 months to implement.

**Alternative EFC-3:** Dredging, Thickening, On-site Fixation, Off-Site Disposal

Under this alternative, contaminated sediments would be dredged to a depth of one foot and thickened. During design, further analysis of the environmental effects of the contamination will be done to ascertain the precise areal extent of the dredging necessary to protect the environment. The data compiled for East Foundry Cove, to date, indicate that over 95% of the cadmium-contamination is located in the upper layer (1 foot) of the sediments. Due to the nature of the dredging process, dredging to a specific action level (e.g., 10, 100, or 250 mg/kg of cadmium) would be technically difficult, since these concentrations vary in the sediments by only a few inches. Therefore, expectations are that by dredging the upper layer of the sediments, 95% of the cadmium contamination would be removed. Approximately 55,000 cubic yards (cy) of sediment would be removed if the entire Cove needed to be dredged to a depth of 1 foot. During dredging, the goal will be to minimize transport and suspension of contaminated sediments. Silt curtains will be utilized during dredging to contain resuspended sediments.

Treatment of the dredged sediment would consist of three major components: thickening, fixation and clarification. During the thickening process the dredged sediment is dewatered. Then the thickened sediment is fixated. Transportable treatment equipment would be situated on-site to fixate the contaminated sediments. Fixation chemically binds the contaminants within the sediments, and would render the sediments non-hazardous. The dredge water would be clarified to remove remaining suspended solids. The clarified water would be tested before being discharged into the Cove and the solids would be added to the thickened sediments. Following treatment, the fixated material would be transported to an off-site sanitary landfill. This technology is commercially available, and has been selected for use in Areas I and II of the site. Following dredging, the Cove would be resampled to determine the effectiveness of the dredging operation in meeting its cleanup goals. The sampling data will become part of the environmental baseline study and will be used as a basis for comparison during monitoring.

A hydrologic analysis of the Cove and Marsh would also be undertaken. To preserve its estuary structure and function, the Cove bottom would be restored, as necessary, using as a basis for design the data generated by the hydrologic analyses. To achieve this goal, consideration would be given to the selection of fill material that would be conducive to binding any remaining cadmium in the sediments. The extent of revegetation would also be determined at this time. Monitoring would be conducted to

ascertain the degree of restoration of the Cove.

This alternative is expected to comply with all pertinent ARARs, as follows: as with EFC-2, the use of silt curtains during construction would meet Clean Water Act Section 401 certification water quality standard requirements; the treated discharge water would meet the federal and New York water quality criteria and mixing zone requirements imposed under the SPDES permit program; and the off-site disposal process would meet the New York non-hazardous solid waste (Part 360) requirements. Since the location of the upland treatment facility to be used for remediation will remain the same for Areas I and III, the archaeological investigations required to conform with the National Historic Preservation Act (NHPA) and RCRA facility location requirements have been initiated under the Area I remedial action and will be continued to encompass Area III. Other location-specific ARARs will be met, since this alternative greatly reduces the levels of contaminated sediments which pose a threat to human health and the environment.

The time required to implement this alternative is approximately 25 months. The estimated present worth cost is $37,042,000. For comparing costs it was assumed that fixated sediments are removed from the site via rail. Due to concerns expressed by the public that the Village of Cold Spring's narrow streets would make truck transport extremely difficult, the utilization of trucks to transport fixated sediments through the Village is not a viable option. (Other options include rail and barge.) Trucks may be utilized, however, for the movement of materials on-site, and to transfer fixated sediments unloaded from barges or trains to the ultimate disposal site. The estimated capital cost also assumes that the entire cove would require one foot of fill material (55,000 cy) for restoration. It should be noted that approximately $10 million in capital cost savings could be realized if East Foundry Cove were remediated concurrently with Area I.

**Alternative EFC-4:** Dredging, Thickening, Dewatering, Off-Site Treatment, Off-Site Disposal

This alternative is similar to EFC-3 in all aspects except for the location of the treatment facility.

Contaminated sediments would be dredged to a depth of one foot, thickened and dewatered using vacuum filtration. The dredge water would be clarified, tested and discharged into the cove. The dewatered sediments would be transported to an off-site facility for treatment and disposal. Following treatment, the sediments would be transported to an off-site sanitary landfill. Restoration of the Cove would be as described in Alternative EFC-3.

In addition to the ARARs required for the dredging and thickening portions of Alternative EFC-3, this alternative would also have to

comply with RCRA standards for generators, transporters, and hazardous waste facilities (40 CFR 262, 263 and 264) since hazardous wastes would be transported off-site.

This alternative could be implemented in approximately 25 months at a present worth cost of $29,170,600. The costs were developed assuming that the hazardous wastes would be transported off-site via railroad.

**Alternative EFC-5:** Dredging, Acid Extraction, Thickening, Dewatering, Off-Site Disposal

Similar to Alternatives EFC-3 and EFC-4, under Alternative EFC-5, East Foundry Cove would be dredged at least one foot in depth and restored, as necessary. The contaminated sediment would be treated at an on-site acid extraction plant. Bench scale acid leaching tests were conducted during the RI to determine the appropriate extraction acids for leaching metals from the sediments. A combination of sulfuric acid and ferric sulfate was chosen. Approximately 6,400 tons of these chemicals would be required for the extraction process. The extracted metals, including cadmium, would be transported off-site to an approved RCRA treatment, storage, and disposal facility. The treated sediments would then be thickened and dewatered using vacuum filtration and transported off-site for disposal at a sanitary landfill. The treated dredge water would be tested and discharged into the cove.

The ARARs discussed previously in conjunction with dredging and thickening processes and the discharge of treated water into the Cove all apply to this alternative. In addition, it is assumed that the acid extraction facility will utilize a carbon adsorption treatment system to enable air emissions to meet New York State air emissions requirements.

The time required to implement this alternative is approximately 18 months. Assuming rail transport of materials, the estimated present worth cost is $27,423,500.

**Alternative EFC-6:** Dredging, Acid Extraction, Thickening, On-Site Redeposition

This alternative is similar to Alternative EFC-5, except that following acid extraction and thickening, the treated sediments would be neutralized and redeposited in East Foundry Cove via a pipeline. A silt curtain would also be used to prevent the migration of resuspended sediments as the cleaned sediment is redeposited. The metal sludges would be fixated on-site and transported off-site to a sanitary landfill.

This alternative would also comply with ARARS. The time required to implement this alternative is approximately 20 months at an estimated present worth cost of $14,337,500.

**WEST FOUNDRY COVE**

**Alternative WFC-1:** No Action

Under the no-action alternative for West Foundry Cove, warning signs would be posed instructing people to avoid the area. A public education program would also be initiated. Operation and maintenance costs include an annual ecological survey and sediment and water sampling and analysis.

This alternative could be implemented in 3 months at an approximate present worth cost of $1,000,400.

**Alternative WFC-2:** Containment

Containment of contaminated sediments in West Foundry Cove would be accomplished by constructing a one foot sand cap over the contaminated sediments. The cap would cover approximately 26 acres. The time needed to implement this alternative is estimated to be 10 months. The present worth cost is $8,040,500.

A long-term monitoring program similar to that for EFC-2 would be implemented.

**Alternative WFC-3:** Dredging, Thickening, On-Site Fixation, Off-Site Disposal

The technology utilized for this remedy would be similar to that for Alternative EFC-3. Implementation, however, would be more difficult because the area to be remediated lies within the main flow of the Hudson River. Approximately 58,000 cubic yards would be dredged under this alternative. At least 26 months would be needed for implementation. The present worth cost is $60,468,200.

**Alternative WFC-4:** Dredging, Thickening, Dewatering, Off-Site Treatment, Off-Site Disposal

The technology utilized for this remedy would be similar to that for Alternative EFC-4.

Approximately 24 months would be required to implement this alternative. The present worth cost is $38,009,500.

**Alternative WFC-5:** Dredging, Acid Extraction, Thickening, Dewatering, Off-Site Disposal

Under this alternative, West Foundry Cove would be dredged. Cadmium would then be removed from the sediments at an on-site acid extraction plant and the sediments would be thickened as they would be with the other dredging alternatives. Approximately 12,100 tons of ferric sulfate and sulfuric acid would be used during the extraction process. Used acid and the extracted cadmium would be transported off-site to an approved RCRA treatment, storage and disposal facility. The cleaned sediments would be disposed of in a sanitary landfill. The Cove would be sampled and restored, as necessary, similar to all dredging scenarios.

Approximately 25 months would be needed to implement this alternative. The present worth cost is $35,714,600.

**Alternative WFC-6:** Dredging, Acid Extraction, Thickening, On-Site Redeposition

This alternative is similar to Alternative WFC-5, except that following acid extraction, cleaned sediments would be redeposited in West Foundry Cove. This alternative would also be more difficult to implement since West Foundry Cove lies within the main flow of the Hudson River. The present worth cost is estimated to be $17,038,000. The time required for implementation is 24 months.

## COLD SPRING PIER AREA

**Alternative CSP-1:** No Action

Under this alternative, a fence would be erected to prevent access to Pier Area sediments by land. Signs would be posted warning people to avoid contact with the sediments. A long-term monitoring program and a public education program similar to those for EFC-1 would be implemented.

This alternative could be implemented in 1 month. The present worth cost is $648,100.

**Alternative CSP-2:** Containment

This alternative is similar to Alternative WFC-2. Approximately 1 acre would be capped.

This alternative would take approximately 3 months to implement. The present worth cost is $1,216,100.

**Alternative CSP-3:** Dredging, Thickening, On-site Fixation, Off-Site Disposal

This alternative is similar to Alternative EFC-3. Approximately 900 cubic yards would be dredged from the area adjacent to and beneath the Cold Spring pier and the area would be restored, as necessary.

This alternative would take about 17 months to implement. The present worth cost is $10,457,100. If this alternative is implemented concurrently with the remedy for Area I, cost savings similar to those for Alternative EFC-3 would be realized.

**Alternative CSP-4:** Dredging, Thickening, Dewatering, Off-Site Treatment, Off-site Disposal

This alternative is similar to alternative EFC-4. Approximately 17 months could be required to implement this alternative. The present worth cost is $10,268,800.

**Alternative CSP-5:** Dredging, Acid Extraction, Thickening, Dewatering, Off-Site Disposal

This alternative is similar to alternative EFC-5. Approximately 17 months would be required to implement this alternative. The present worth cost is $12,068,100.

**Alternative CSP-6:** Dredging, Acid Extraction, Thickening, On-Site Redeposition

This alternative is similar to Alternative EFC-6. Approximately 14 months would be required to implement this alternative. The present worth cost is $7,233,900.

## SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

During the detailed evaluation of remedial alternatives, each alternative was assessed against nine evaluation criteria. The nine criteria are summarized below:

**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.

**Long-term effectiveness and permanence** refer to the ability of a remedy to maintain reliable protection of human health and the environment over time once cleanup goals have been met.

**Reduction of toxicity, mobility, or volume** is the anticipated performance of the treatment technologies a remedy may employ.

**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 costs, and net present worth costs.

**Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)** addresses whether or not a remedy will meet all of the applicable or relevant and appropriate requirements of other Federal and State environmental statutes and/or provide a basis for invoking a waiver.

**Overall protection of human health and the environment** addresses whether or not a remedy provides protection and describes how risks posed through each exposure pathway are eliminated, reduced, or controlled through treatment, engineering controls, or institutional controls.

**State Acceptance** indicates whether the State concurs with, opposes, or has no comment on the preferred alternative.

**Community Acceptance** indicates whether, based upon input received during the comment period, the public concurs with, opposes, or has no comment on the preferred alternative.

The comparisons of the alternatives against each of the nine evaluation criteria for each of the three subareas are summarized below.

**EAST FOUNDRY COVE**

A. Short-Term Effectiveness

The time to implement Alternatives EFC-2 through EFC-6 ranges from 19 to 28 months. Alternative EFC-1 could be implemented in approximately 3 months.

Alternatives EFC-3 through EFC-6 involve dredging and will have short-term adverse impacts on the biota of East Foundry Cove. These short-term impacts would be confined to East Foundry Cove, and efforts to minimize these impacts would be undertaken as part of the implementation of any of these remedies. These alternatives will also be designed so as to reduce short-term impacts locally and down river due to the resuspension of contaminated sediments.

The use of trains and/or barges to transport material off-site would have less adverse impacts on the local community than the use of trucks for transport. Alternatives EFC-1, EFC-2, and EFC-6 would have the least short-term impact on the community since

they do not involve removal of large quantities of material from the site. Alternative EFC-4 would transport sediments off-site untreated.

During the implementation of any remedy, precautions would be undertaken to limit the exposure of on-site workers to contaminated sediments; however normal construction hazards would be associated with the implementation of Alternatives EFC-3 through EFC-6.

B. Long-Term Effectiveness and Permanence

By removing 95 percent of the cadmium-contaminated sediments Alternatives EFC-3 through EFC-6 would be protective of public health and the environment. Implementation of these alternatives would result in the permanent removal of the cadmium. By containing rather than treating contaminated sediments, Alternative EFC-2 would provide reduced long-term effectiveness since the cap would require regular monitoring and maintenance to insure its integrity. Failure of the cap would re-expose the contaminated sediments to the environment. Alternative EFC-1 would not provide protection to human health and the environment over the long term.

C. Reduction of Toxicity, Mobility or Volume

Dredging and fixating cadmium-contaminated sediments under Alternative EFC-3 would reduce the toxicity and mobility of the site contaminants. The volume of material would be increased by the fixation process, but this increased volume of material would be non-hazardous. Alternatives EFC-4, EFC-5, and EFC-6 would provide similar reductions in toxicity and mobility. Alternative EFC-4 would result in an increased volume of material but not until it is transported off-site and treated at an off-site facility. Alternatives EFC-5 and EFC-6 would not result in an increased volume of material at the site. Alternative EFC-2 would eliminate the mobility, but not the toxicity or volume of contaminated material. Alternative EFC-1 would not eliminate the toxicity, mobility or volume of contaminated material.

D. Implementability

The technologies utilized for Alternative EFC-3 are proven, and transportable treatment facilities are commercially available. This is the same technology to be utilized to remediate Area I. This remedy would be implemented in coordination with the Area I remedy, expediting implementation and reducing capital and contracting costs.

Locating a landfill with the capacity to accept the fixated material or the material remaining after acid extraction could affect the implementability of Alternatives EFC-3 through EFC-5. While it is expected that a landfill which would accept the

material could be located, the distance to a landfill, the landfill tipping fee and the proximity of a rail line or navigible waterway will greatly influence the cost of implementing these alternatives.

Alternative EFC-1 is easily implemented. Alternative EFC-2 would be difficult to construct. Alternative EFC-4 would rely on the capacity of commercial fixation facilities for implementation. Alternatives EFC-5 and EFC-6 would require the fabrication of acid extraction equipment, and the large amount of acids may be difficult to transport on-site.

E. Cost

The direct capital costs for Alternative EFC-3, assuming train transport, are estimated to be $17,000,000. The annual operation and maintenance costs will be approximately $19,770,160 for the first year and $47,600 for each of the next 29 years. The present worth based on a rate of 5% is $37,042,000. While Alternative EFC-3 is the most costly of the alternatives considered for East Foundry Cove, the cost estimates are within the range of Alternatives EFC-4 through EFC-6, and the capital costs of implementing Alternative EFC-3 would be significantly lower if implemented concurrently with the Area I remedy.

F. Compliance With ARARs

Alternative EFC-3 would comply with all ARARs. Alternatives EFC-4, EFC-5, and EFC-6 would also comply with ARARs. Alternatives EFC-1 and EFC-2 may not comply with location-specific ARAR's because all contaminants remain on-site.

G. Overall Protection of Human Health and the Environment

By utilizing treatment technologies to eliminate exposure to levels of cadmium, nickel and cobalt which would pose a threat public health and the environment, Alternative EFC-3 provides overall protection since 95 percent of the contamination would be removed. Alternatives EFC-2, EFC-4, EFC-5, and EFC-6 are similarly protective. Alternative EFC-1 would not provide overall protection, since exposure to contaminants above health-based levels would not be eliminated.

H. State Acceptance

Because the sediment removal alternatives provide adequate protection of public health and the environment, the State of New York would concur with the selection of Alternatives EFC-3 through EFC-6, but prefers Alternative EFC-3.

I. Community Acceptance

The general public supports those alternatives which involve the removal of contaminated sediments (Alternatives EFC-3 through EFC-6). The public also supports the utilization of rail as a means of transporting materials to and from the site. Marathon Battery Company and Gould, Inc. have stated that the remediation processes would have a much greater adverse impact on the area than no action.

**WEST FOUNDRY COVE**

A. Short-Term Effectiveness

Implementation of Alternative WFC-1 would take approximately 3 months and have little or no short-term impacts. Alternatives WFC-2 through WFC-6 would involve disturbing sediments in the Hudson River, and would result in some downstream migration of contaminants as it would be more difficult for silt curtains to effectively contain the suspended sediments. The short-term impacts associated with implementing Alternatives WFC-2 through WFC-6 in West Foundry Cove would be similar to those associated with the East Foundry Cove alternatives. However, the volume of material is greater; thus the time to implement the remedies would be greater.

B. Long-Term Effectiveness and Permanence

Alternative WFC-1 does not involve any construction or require long-term maintenance; it requires only periodic monitoring. Since the present average cadmium concentrations do not pose a threat to public health or the environment, Alternative WFC-1 would be effective over the long-term. Additionally, cadmium concentrations in the upper layer of sediment in West Foundry Cove are expected to decrease over time due to tidal action.

By removing sediments, Alternatives WFC-3 through WFC-6 would be effective in the long term and considered permanent. Alternative WFC-2 would require constant maintenance to insure the integrity of the containment cap due to the Hudson River's currents and tidal action and would be less permanent than Alternatives WFC-3 through WFC-6.

During remedial design activities for East Foundry Cove, additional studies will be performed to determine if contaminated sediments from West Foundry Cove would re-contaminate East Foundry Cove and Marsh after remediation of those areas. If West Foundry Cove is found to be a source of contamination to East Foundry Cove and Marsh, a limited removal of the contaminated sediments would be evaluated and incorporated into final remedial construction plans.

C. Reduction of Toxicity, Mobility or Volume

Alternative WFC-1 provides no reduction of the toxicity, mobility or volume of contaminants in West Foundry Cove. Over the long term, concentrations would decrease by downstream migration of cadmium. Dredging and treating cadmium contaminated sediments by fixation or acid extraction under Alternatives WFC-3 through WFC-6 would reduce the toxicity and mobility of the site contaminant. The volume of material would be increased by the fixation process but this increased volume of material would be non-hazardous.

D. Implementability

Alternative WFC-1 is the easiest of the West Foundry Cove Remedies to implement. The ease or difficulty of implementing Alternatives WFC-2 through WFC-6 is similar to the discussion for Alternatives EFC-2 through EFC-6; however the volume of material to be transported off-site would be greater, and locating adequate landfill capacity may be more difficult.

E. Cost

The direct and indirect capital costs for Alternative WFC-1 are estimated to be $16,400 and $4,400 respectively. The annual operation and maintenance costs would be approximately $59,200 for 30 years. The present worth based on a rate of 5% is $1,000,400. The implementation costs of other alternatives range from $7.6 million to $54.28 million and do not provide for significantly greater protection of public health or the environment.

F. Compliance with ARARs

Although the no-action alternative will not remediate the contaminated sediments, the levels of contamination, when averaged, are fairly low (43.9 mg/kg). As a result, Alternative WFC-1 would comply with all applicable or relevant and appropriate requirements. Alternatives WFC-2 through WFC-6 would comply as well.

G. Overall Protection of Human Health and the Environment

While small areas of sediment containing elevated cadmium concentrations occur throughout West Foundry Cove, when averaged over the Cove, cadmium concentrations are quite low, and do not pose a threat to human health or the environment. Thus, Alternative WFC-1 provides overall protection of human health and the environment. By utilizing treatment or containment technologies, Alternatives WFC-2 through WFC-6 would also provide overall protection of human health and the environment.

H. State Acceptance

The State concurs with a no-action alternative for West Foundry Cove based on conditions known to date. If remedial design activities show West Foundry Cove sediments as a source of recontamination of the areas to be remediated (East Foundry Cove and East Foundry Cove Marsh), then the State recommends re-evaluating removal of sediments or other remedial measures to address those sediments that are contributing to the recontamination.

I. Community Acceptance

The general public supports the no-action alternative for West Foundry Cove.

**COLD SPRING PIER AREA**

A. Short-Term Effectiveness

Alternative CSP-3 could be implemented in about 14 months. Alternatives CSP-1 and CSP-2 could be implemented in one to four months. Alternatives CSP-4 through CSP-6 could be implemented in 14 to 17 months.

The short-term impacts associated with the implementation of Alternatives CSP-3 are similar to those discussed for Alternative EFC-3, except that there is less material to be treated. However, there is a greater potential for material being carried down-stream during dredging operations at the pier, and measures would have to be taken to limit the impact of the Cold Spring Pier Area remediation on the Hudson River.

B. Long-Term Effectiveness and Permanence

Alternative CSP-1 does not involve major construction or maintenance, with the exception of periodic monitoring. Cadmium concentrations in the upper layer of sediment in the Pier area of the Hudson River would be expected to decrease over time due to tidal action, provided that the sediment beneath the Pier is uncontaminated and not a source of cadmium contamination.

Alternative CSP-2 would require constant maintenance to insure the integrity of the containment cap and would be less permanent that Alternatives CSP-3 through CSP-6. Also the long-term effectiveness of CSP-2 is unknown due to tidal action.

The discussion of long-term effectiveness of CSP-3 through CSP-6 is similar to the discussion for Alternative EFC-3. During remedial design, the sediment adjacent to and beneath the Cold Spring Pier will be sampled to determine the full extent of

contamination. If the sediment beneath the Pier is found to be present a threat to public health and the environment, this area will be included in the remediation.

C. Reduction of Toxicity, Mobility or Volume

The discussion of reduction of toxicity, mobility, or volume for CSP-3 is similar to the discussion for Alternative EFC-3.

D. Implementability

The technology utilized for Alternative CSP-3 is proven, and transportable treatment facilities are commercially available. This remedy could be implemented in coordination with Alternative EFC-3 and the Area I remedy, reducing capital costs and expediting implementation.

Limitations to the implementability of Alternative CSP-3 are similar to Alternative EFC-3, although implementing this alternative concurrently with the Area I remedy would expedite implementation and reduce capital costs.

E. Cost

The direct and indirect capital costs for Alternative CSP-3, utilizing train transport, are estimated to be $6,779,700 and $1,830,500, respectively. The annual operation and maintenance costs will be approximately $1,473,970 for the first year and $25,900 for each of the next 29 years. The present worth based on a rate of 5% is $10,457,100. The capital costs shown would be greatly reduced if this remedy were implemented with Alternative EFC-3 and the Area I remedy. The implementation costs of the other alternatives range from $648,100 to $12,068,100 and do not provide for significantly greater protection of public health or the environment.

F. Compliance With ARARs

Alternatives CSP-3 through CSP-6 would comply with all applicable or relevant and appropriate requirements. Alternatives CSP-1 and CSP-2 may not comply with location-specific ARAR's because contaminants would remain on-site.

G. Overall Protection of Human Health and the Environment

Alternative CSP-3 utilizes treatment technologies to eliminate the threat to human health and the environment posed by sediments containing elevated cadmium, nickel, and cobalt concentrations. Alternatives CSP-2 and CSP-4 through CSP-6 are similarly protective. Alternative CSP-1 would not provide overall protection, since exposure to contaminants above health-based levels would not be eliminated.

H. State Acceptance

Because the sediment removal alternatives provide adequate protection of public health and the environment, the State of New York would concur with the selection of Alternatives CSP-3 through CSP-6, but prefers Alternative CSP-3.

I. Community Acceptance

The Village of Cold Spring intends to replace the Cold Spring pier in the near future. Accordingly, the public would prefer Alternatives CSP-3 through CSP-6, since any contaminated sediments that are present would be removed.

## THE SELECTED REMEDY

The results of the RI/FS have shown that elevated levels of cadmium above backround are present in Area III sediments.

Based upon consideration of the requirements of CERCLA, the detailed analysis of the alternatives, and public comments, both EPA and NYSDEC have selected Alternative EFC-3, dredging of the contaminated sediments from East Foundry Cove to a depth of one foot, chemical fixation and off-site disposal of those sediments, and restoration of the original contours, as necessary; Alternative WFC-1, continued monitoring, for West Foundry Cove; and Alternative CSP-3, sampling and analysis adjacent to and under Cold Spring pier with dredging of any contaminated sediments determined to be a threat to the environment, followed by chemical fixation, off-site disposal, and restoration of the original contours, as necessary.

The data compiled for East Foundry Cove indicate that over 95% of the cadmium contamination is located in the upper layer (1 foot) of the sediments. Due to the nature of the dredging process, dredging to a specific action level (e.g., 10, 100, or 250 mg/kg of cadmium) would be technically difficult, since these concentrations vary in the sediments by only a few inches of depth. Therefore, expectations are that by dredging the upper layer of contaminated sediments, 95% of the cadmium contamination will be removed. Following remediation, it is anticipated that cadmium concentrations would not exceed 10 mg/kg in most of the dredged areas.

A no-action alternative was chosen for West Foundry Cove. It was assumed that West Foundry Cove receives cadmium-contaminated sediments from East Foundry Cove and East Foundry Cove Marsh and the Cold Spring Pier Area. Once these sources are remediated, cadmium-free sediments would then be deposited in West Foundry Cove. Tidal action would cause the existing sediments to mix with the newly deposited sediments thereby causing the average cadmium

concentration in the sediments to decrease gradually below its current average concentration of 43.9 mg/kg. A hydrologic analysis of Area III will be conducted in order to evaluate sediment transport routes.

Sediment samples at and beneath the Cold Spring pier will be collected, analyzed, and evaluated to ascertain whether this area is a source of cadmium contamination. If, based upon this analysis, these sediments are determined to be a source, these sediments will be dredged to a depth of one foot.

During the dredging operation, silt curtains will be utilized to contain resuspended sediments and minimize short-term environmental impacts.

**The dredged sediments will be thickened on-site.** The dredge water, resulting from the thickening process, will be clarified and tested to make sure that it meets EPA and New York State water quality standards before it is discharged into the Cove. The solids resulting from the clarification process will be added to the contaminated sediments awaiting fixation. Fixation of the thickened sediments will take place at an on-site facility. Bench scale tests were performed for the Area I ROD and indicate that fixation of the contaminated sediments is a viable remedy. Following treatment, the fixated material will be transported to an off-site sanitary landfill. For costing purposes, it was assumed that the more costly rail transport would be used to remove the fixated sediments from the site.

Following dredging, the dredged areas will be resampled to determine the levels of cadmium remaining in the sediment; this information will be used as a baseline study for the monitoring program. The dredged areas will be restored as necessary, pending the outcome of the previously stated studies to preserve the estuary structure and function and to provide an added level of protection to the environment. Monitoring will be conducted to assure the success of the restoration. The capital cost for the remedy in East Foundry Cove is $17,000,000. The operation and maintenance cost is estimated to be $19,770,160. The estimated capital cost for the remedy for the Pier Area is $8.5 million. The operation and maintenance cost is estimated to be $1.5 million.

The selected remedy for treating the contaminated sediments from Area I and Area II is chemical fixation. It was assumed that sediments from Area III could be treated at the facility constructed on-site for Areas I and II, and a savings in capital cost could be realized. This cost saving was not reflected in the cost estimates stated in the ROD.

## REMEDIATION GOALS

The risk assessment has concluded that, with the cadmium contamination presently remaining in East Foundry Cove and the Pier Area, a threat to human health and the environment exists. Existing conditions at the site have been determined to pose a threat predominantly from ingestion of contaminated sediments by human and animal populations.

The purpose of this response action is to remove the contaminated sediments to levels consistent with state and Federal ARARs and to ensure protection of the environment from the continued exposure of contaminants from the sediments. Since no federal or state ARARs exist for sediments, the action level was determined through a site-specific risk analysis.

## STATUTORY DETERMINATIONS

Under its statutory authority, EPA's primary responsibility at Superfund sites is to undertake remedial actions that achieve adequate protection of human health and the environment. In addition, Section 121 of CERCLA establishes several other statutory requirements and preferences. These specify that when complete, the selected remedial action for this site must comply with applicable or relevant and appropriate environmental standards established under Federal and state environmental laws unless a statutory waiver is justified. The selected remedy also must be cost-effective and utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. Finally, the statute includes a preference for remedies that employ treatments that permanently and significantly reduce the volume, toxicity, or mobility of hazardous wastes as their principal element. The following sections discuss how the selected remedy meets these statutory requirements.

### Compliance With Applicable or Relevant and Appropriate Requirements

The selected remedy of dredging of the contaminated sediments, followed by chemical fixation and off-site disposal, will comply with all action, and location-specific ARARs. Specifically, these are the Clean Water Act Section 401 water quality standard requirements, federal and New York State water quality criteria and mixing zone requirements under the SPDES permit program, NHPA and RCRA facility location requirements, and New York State non-hazardous soil waste (Part 360) requirements.

## Cost-Effectiveness

The selected remedy is cost-effective because it has been determined to provide overall effectiveness proportional to its cost. A cost savings of almost $20 million will be realized since the selected remedy would be able to utilize much of the capital equipment constructed for the remediation of Area I and the contractor procurement costs would be reduced.

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

EPA and New York State have determined that the selected remedy represents the maximum extent to which permanent solutions and treatment technologies can be utilized in a cost-effective manner for the Area III portion of the site. Of those alternatives that are protective of human health and the environment and comply with ARARs, EPA and NYSDEC have determined that the selected remedy provides the best balance of tradeoffs in terms of long-term effectiveness and permanence; reduction in toxicity, mobility, or volume achieved through treatment; short-term effectiveness; implementability, cost, while considering the statutory preference for treatment as a principal element, and state and community acceptance.

The selected remedy is as effective as the other remedial action alternatives in the short-term, offering the additional advantage of on-site treatment, which reduces potential risks to residents along transportation routes. The implementability of the selected remedy is comparable to that of the other alternatives. The selected remedy is the least costly treatment option.

The selection of treatment of the contaminated sediments is consistent with program expectations for treatment to ensure the long-term effectiveness of a remedy. Since all of the alternatives are comparable with respect to long-term effectiveness, toxicity, mobility, and implementability, the major tradeoffs that provide the basis for the selection of the remedy are long-term effectiveness and cost. The selected remedy can be implemented with less risk to the area residents and at less cost than the other remedial action alternatives and is, therefore, determined to be the most appropriate solution for the contaminated sediments at the Marathon Battery Company site.

## Preference for Treatment as a Principal Element

By chemically fixating the dredged sediments, the selected remedy addresses the principal threats posed by Area III through the use of treatment technologies. Therefore, the statutory preference for remedies that employ treatment as a principal element is satisfied.

## REFERENCES

ERT, 1986. Comments of the Marathon Battery Company and Gould, Inc. on the Supplemental Remedial Investigation and Feasibility Study of the Marathon Battery Superfund Site, Cold Spring, New York.

JRB Associates. 1984. Initial Evaluation of Alternatives for Development of Sediment Related Criteria for Toxic Contaminants in Marine Waters Phase II: Development and Testing of the Sediment-Water Equilibrium Partitioning Approach (EPA 910/9-83-117).

USEPA. 1981. Health Assessment for Cadmium (Final Report). L.D. Grant et al., Research Triangle Park, North Carolina, No. 60018-81/023. In Acres, 1985.

USEPA(a). 1983. Revised Section B of Ambient Water Quality Criteria for Cadmium Aquatic Toxicology.

**ATTACHMENT A**

**FIGURES**

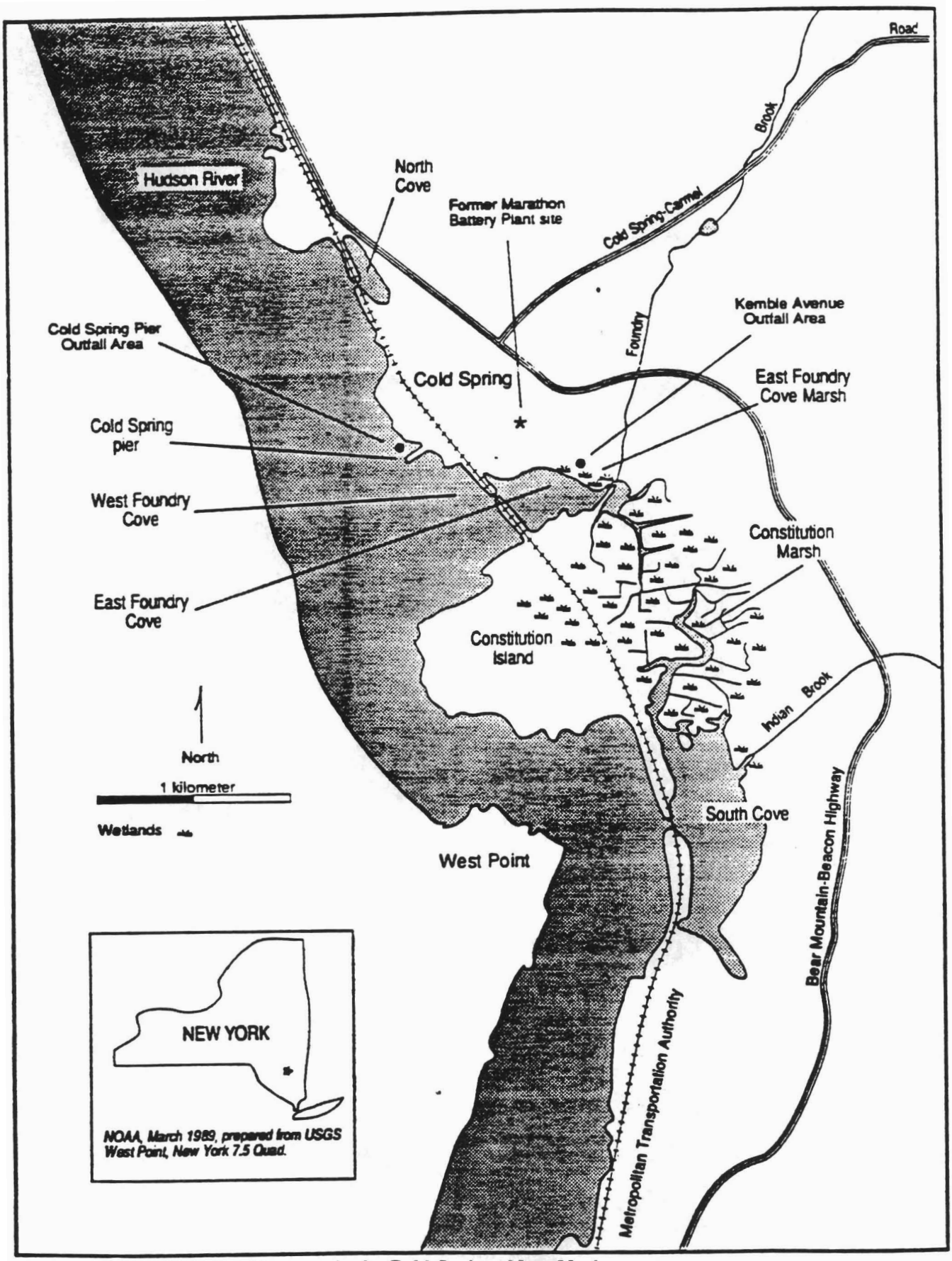
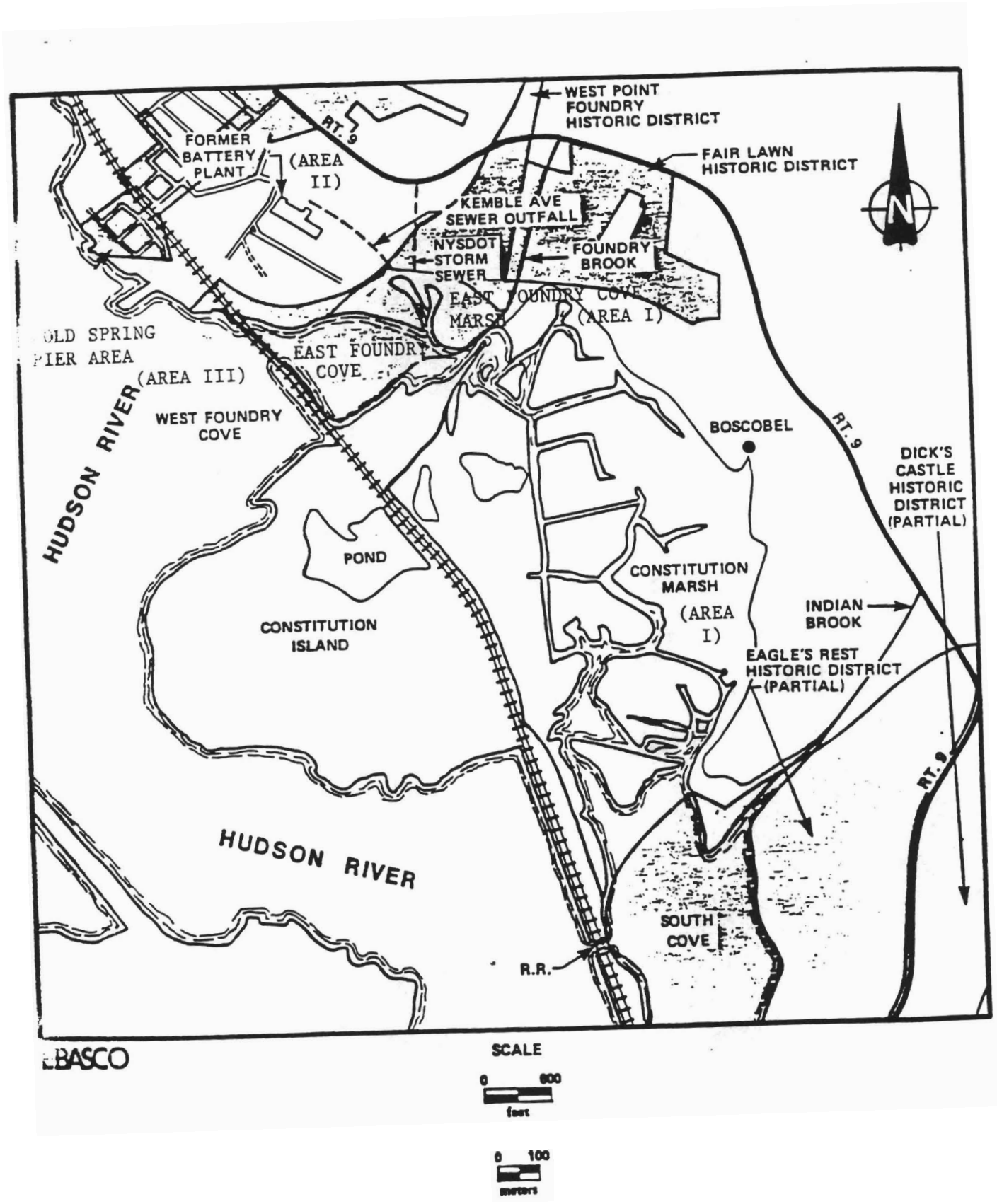


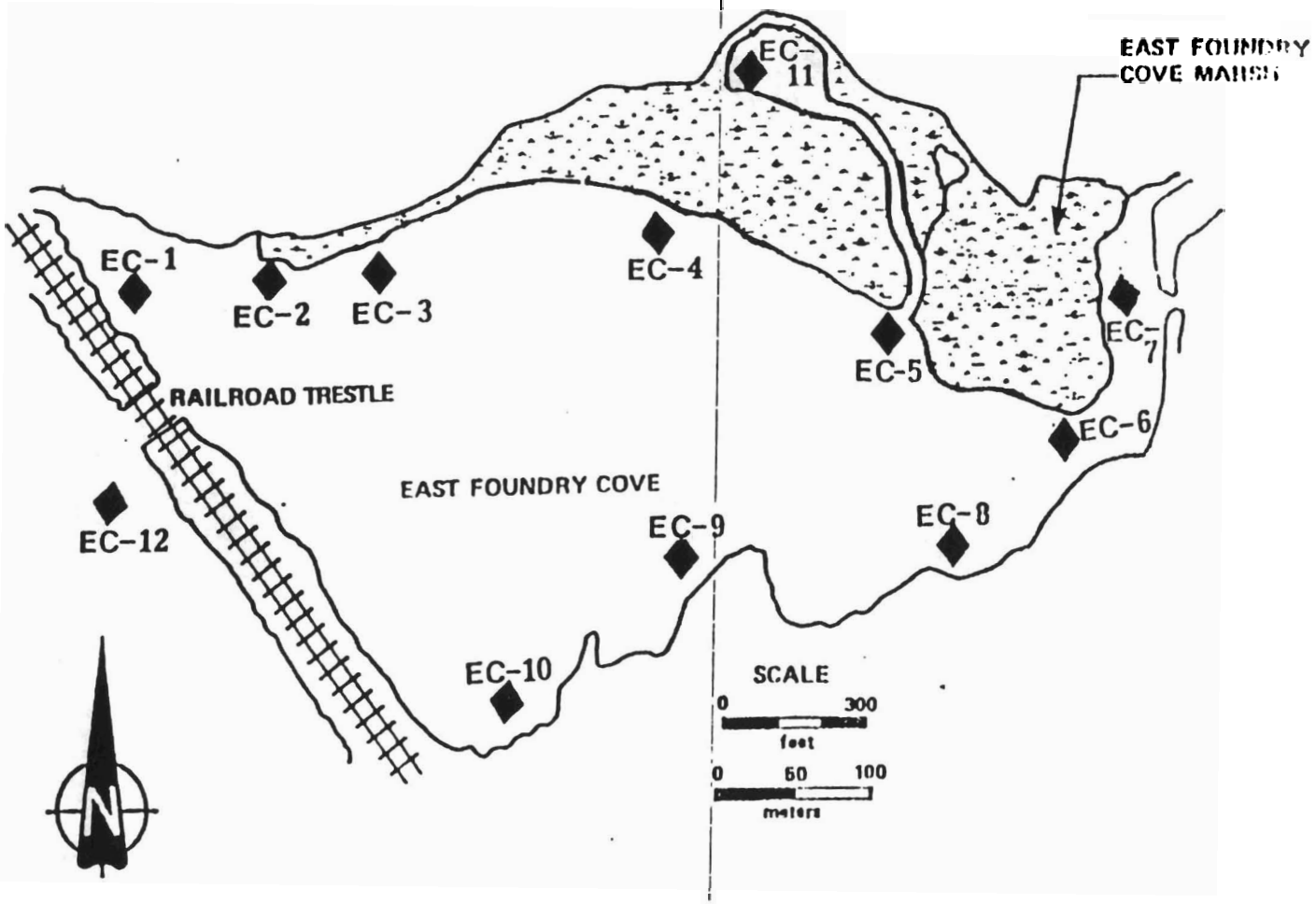

Figure 1. The Marathon Battery site in Cold Spring, New York.

# FIGURE 2


WEST POINT FOUNDRY HISTORIC DISTRICT
FAIR LAWN HISTORIC DISTRICT
RT. 9
FORMER BATTERY PLANT
(AREA II)
KEMBLE AVE SEWER OUTFALL
NYSDOT STORM SEWER
FOUNDRY BROOK
EAST FOUNDRY COVE MARSH
(AREA I)
OLD SPRING PIER AREA
(AREA III)
EAST FOUNDRY COVE
WEST FOUNDRY COVE
HUDSON RIVER
BOSCOBEL
RT. 9
DICK'S CASTLE HISTORIC DISTRICT (PARTIAL)
POND
CONSTITUTION MARSH
(AREA I)
INDIAN BROOK
CONSTITUTION ISLAND
EAGLE'S REST HISTORIC DISTRICT (PARTIAL)
RT. 9
HUDSON RIVER
SOUTH COVE
R.R.
N
BASCO
SCALE
0 600
feet
0 100
meters

# FIGURE 3

## BIOASSAY SEDIMENT LOCATIONS
## EAST FOUNDRY COVE AND
## WEST FOUNDRY COVE




EBASCO

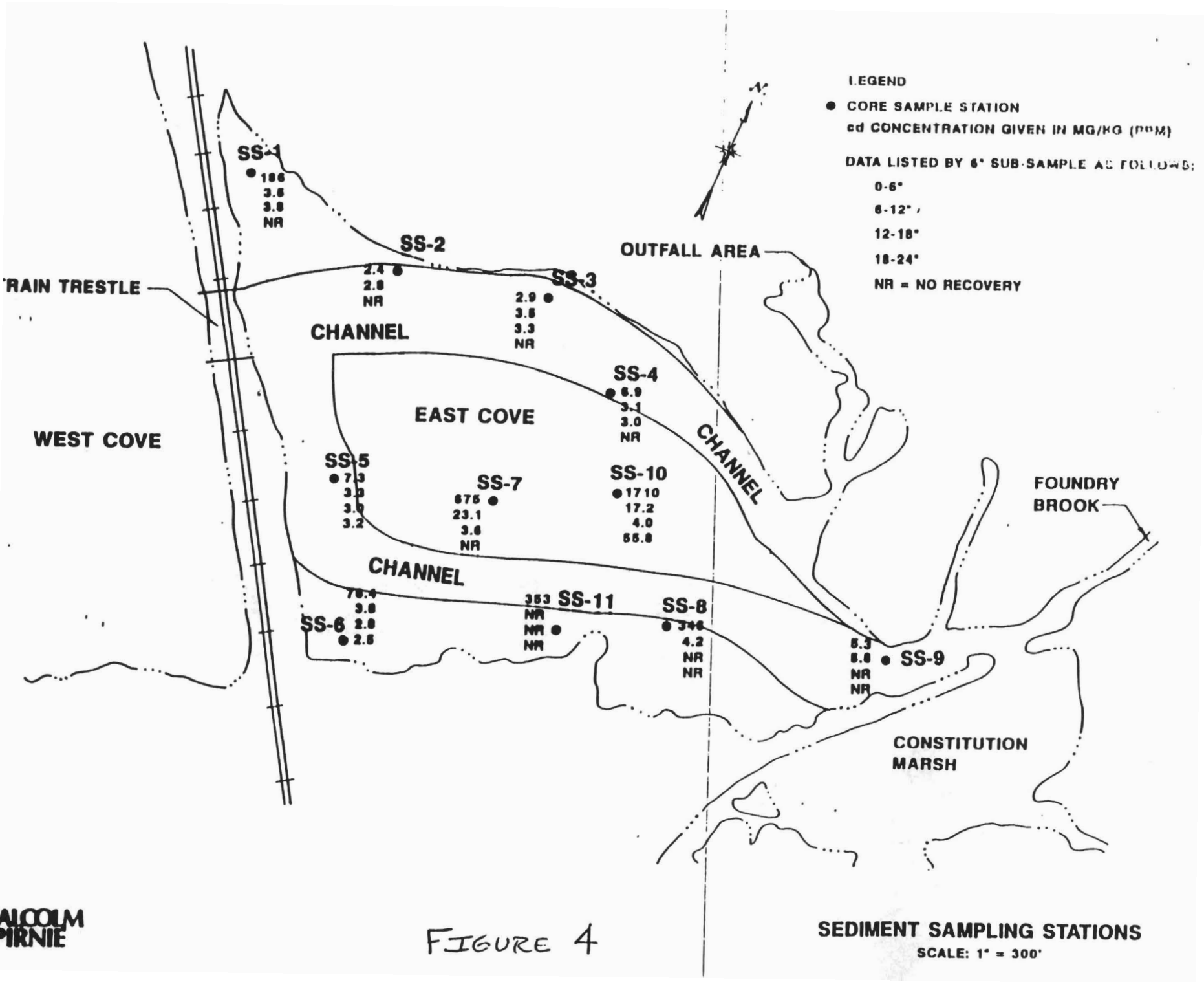

LEGEND
● CORE SAMPLE STATION
cd CONCENTRATION GIVEN IN MG/KG (PPM)
DATA LISTED BY 6" SUB-SAMPLE AS FOLLOWS:
0-6"
6-12"
12-18"
18-24"
NR = NO RECOVERY
SS-1
186
3.6
3.8
NR
SS-2
2.4
2.8
NR
SS-3
2.9
3.6
3.3
NR
SS-4
6.9
3.1
3.0
NR
SS-5
7.3
3.2
SS-6
2.6
SS-7
675
23.1
3.6
NR
SS-8
346
4.2
NR
NR
SS-9
5.3
5.6
NR
NR
SS-10
1710
17.2
4.0
55.8
SS-11
353
NR
NR
NR
OUTFALL AREA
RAIN TRESTLE
CHANNEL
EAST COVE
WEST COVE
CHANNEL
CHANNEL
FOUNDRY BROOK
CONSTITUTION MARSH
MALCOLM PIRNIE
SEDIMENT SAMPLING STATIONS
SCALE: 1" = 300'

FIGURE 4

# ATTACHMENT B

## TABLES

**TABLE 1**

**MARATHON BATTERY COMPANY SITE**

**AREA III**

**SEDIMENT CADMIUM CONCENTRATIONS (mg/kg)**

| | EAST FOUNDRY COVE | WEST FOUNDRY COVE | PIER AREA |
|---|---|---|---|
| NUMBER OF SAMPLES | 57 | 89 | 208 |
| MINIMUM | 0.29 | 1.1 | 1.2 |
| MAXIMUM | 2,700 | 569 | 1,030 |
| MEDIAN | 5.6 | 4.2 | 3.9 |
| MEAN | 179.3 | 43.9 | 12.6 |

**AREA I**

**SEDIMENT CADMIUM CONCENTRATIONS (mg/kg)**

| | EAST FOUNDRY COVE MARSH | CONSTITUTION MARSH |
|---|---|---|
| NUMBER OF SAMPLES | 19 | 70 |
| MINIMUM | 70 | 4 |
| MAXIMUM | 116,100 | 940 |
| MEDIAN | 2,800 | 170 |
| MEAN | 27,799 | 178 |

**TABLE 2**

**EAST FOUNDRY COVE**

**ACRES SAMPLES**

| | 0-10 cm | 10-25 cm | 25-50 cm |
|---|---|---|---|
| 1. | 140.0 | 142.0 | 1.9 |
| 2. | 0.29 | 0.32 | *0.28 lowest |
| 3. | 7.0 | 0.35 | 0.30 |
| 4. | 796.0 | 38.0 | 5.6 |
| 5. | 712.0 | 14.0 | 2.1 |
| 6. | 640.0 | 0.54 | 0.33 |
| 7. | 267.0 | 131.0 | 2.1 |
| 8. | 460.0 | 4.1 | 0.38 |
| 9. | 315.0 | 2.8 | 1.2 |
| 10. | 814.0 | 3.8 | 1.1 |
| 11. | 280.0 | 1.6 | 0.57 |
| 12. | 14.0 | 0.36 | 0.44 |
| 13. | 410.0 | 0.39 | 0.62 |
| 14. | 67.0 | NR | NR |
| 15. | 8.5 | 0.6 | NR |
| 16. | 39.0 | 3.2 | NR |
| 17. | 680.0 | 560.0 | 2.2 |
| 18. | 850.0 | 1.9 | 2.4 |
| 19. | 17.0 | NR | NR |
| 20. | 9.8 | 0.43 | 0.40 |
| 21. | 2700.0 highest | 55.0 | 11.0 |

57 Samples, 21 Stations

(1985)

**TABLE 3**

**EAST FOUNDRY COVE**

**BIOASSAY SEDIMENT SAMPLES**

| | Cd | Ni | Co |
|---|---|---|---|
| EC-1 | 157 | 117 | 22.6 |
| EC-2 | 12.7* | 47.9* | 23.6 |
| EC-3 | 34.7 | 59 | 22.2 |
| EC-4 | 2015 | 1369* | 75.7* |
| EC-5 | 3244* | 1009 | 63.1 |
| EC-6 | 407 | 223 | 23.8 |
| EC-7 | N/A | N/A | N/A |
| EC-8 | 81.7 | 67.4 | 14.5* |
| EC-9 | 246 | 132 | 23.1 |
| EC-10 | 246 | 153 | 22.9 |
| MEAN | 716 | 353 | 32.4 |

TABLE 4

HAZARDOUS SUBSTANCE LIST ANALYSES OF SEDIMENTS

| COMPOUND | SAMPLE NUMBER/LOCATION PIER AREA HSL-1 | PIER AREA HSL-2 | WEST FOUNDRY COVE HSL-3 | WEST FOUNDRY COVE HSL-4 | FIELD BLANK (ug/l) |
|---|---|---|---|---|---|
| INORGANICS (mg/kg) | | | | | |
| ALUMINUM | 17300 | 21200 | 22400 | 13000 | ND |
| BARIUM | ND | 91 | 113 | 83 | ND |
| CADMIUM | ND | 16 | ND | 31 | ND |
| CALCIUM | 2690 | 4020 | 2480 | 3180 | ND |
| CHROMIUM | 41 | 134 | 43 | 53 | 5 |
| COPPER | 7.0 | 96 | ND | 43 | ND |
| IRON | 31600 | 33100 | 33200 | 25700 | ND |
| LEAD | ND | ND | 38 | 315 | ND |
| MAGNESIUM | 6410 | 7600 | 7420 | 5880 | ND |
| MANGANESE | 433 | 1100 | 641 | 576 | ND |
| MERCURY | ND | 1.3 | 0.3 | 0.4 | ND |
| NICKEL | ND | ND | ND | 198 | ND |
| POTASSIUM | 2810 | 3020 | 3350 | 1720 | ND |
| SODIUM | 384 | 704 | 497 | 454 | ND |
| ZINC | 84 | 316 | 114 | 141 | ND |
| ORGANICS (ug/kg) | | | | | |
| CHLOROFORM | ND | ND | 10 | 50 | ND |
| BROMODICHLOROMETHANE | ND | ND | 14 | 16 | ND |
| DIBROMOCHLOROMETHANE | ND | ND | 6J | 6J | ND |
| FLUORANTHENE | 72J | ND | 320J | ND | ND |
| PYRENE | 110J | ND | 490J | ND | ND |
| BENZO(a)PYRENE | 550J | 950 | 370J | 470J | ND |
| BENZO(b)FLOURANTHENE | ND | ND | 460J | ND | ND |
| CHRYSENE | ND | ND | 350J | ND | ND |
| PHENANTHRENE | ND | ND | 290J | ND | ND |

NOTE: J = ESTIMATED VALUE
ND = NOT DETECTED

TABLE 5

ANALYTICAL RESULTS OF
BEACH SAMPLES AND SOIL SAMPLING
ALONG MAIN STREET STORM SEWER (mg/kg)

| SAMPLE | LOCATION/DEPTH | CADMIUM | COBALT | NICKEL |
|---|---|---|---|---|
| BCH-01 | BEACH/0-6" | 2.0 | 4.5 | 10.0 |
| BCH-02 | BEACH/12-18" | 8.1 | 3.9 | 13.0 |
| BCH-03 | BEACH/0-6" | 12.0 | 8.9 | 33.0 |
| 1-1 | West of Lunn & Main/0-2' | 1.5 | 8.7 | 24.0 |
| 1-2 | West of Lunn & Main/2-4' | 1.5 | 8.6 | 2.0 |
| 1-3 | West of Lunn & Main/4-6' | 1.2 | 7.6 | 19.0 |
| 1-4 | West of Lunn & Main | * NO RECOVERY * | | |
| 1-5 | West of Lunn & Main/8-10' | 1.2 | 8.6 | 22.0 |
| 1-6 | West of Lunn & Main/10-12' | 1.8 | 10.0 | 24.0 |
| 1-7 | West of Lunn & Main/12-14' | 1.2 | 89.0 | 19.0 |
| 1-8 | West of Lunn & Main/14-16' | 3.8 | 1.2 | 26.0 |
| 2-1 | East of Depot Sq. & Main/0-2' | 1.0 | 5.9 | 9.3 |
| 2-2 | East of Depot Sq. & Main/2-4' | 1.1 | 8.6 | 19.0 |
| 2-3 | East of Depot Sq. & Main/4-6' | 2.5 | 8.4 | 23.0 |
| 2-4 | East of Depot Sq. & Main/6-8' | 1.8 | 12.0 | 23.0 |
| 2-5 | East of Depot Sq. & Main/8-10' | 3.3 | 18.0 | 37.0 |
| 2-6 | East of Depot Sq. & Main/10-12' | 1.5 | 11.0 | 23.0 |
| 2-7 | East of Depot Sq. & Main/12-14' | 1.2 | 8.0 | 18.0 |
| 2-8 | East of Depot Sq. & Main/14-16' | 1.4 | 9.6 | 20.0 |
| 3-1 | Between Stone & Depot 0-2' | 1.0 | 8.7 | 20.0 |
| 3-2 | Between Stone & Depot 2-4' | 1.3 | 9.3 | 22.0 |
| 3-3 | Between Stone & Depot 4-6' | 1.1 | 8.5 | 24.0 |
| 3-4 | Between Stone & Depot 6-8' | 1.5 | 11.0 | 21.0 |
| 3-5 | Between Stone & Depot 8-10' | 1.5 | 9.7 | 21.0 |
| 3-6 | Between Stone & Depot 10-12' | 2.4 | 18.0 | 33.0 |
| 3-7 | Between Stone & Depot 12-14' | 1.9 | 12.0 | 26.0 |
| 3-8 | Between Stone & Depot 14-16' | 2.0 | 13.0 | 28.0 |
| 4-1 | Between Stone & Depot 0-2' | 1.0 | 4.7 | 12.0 |
| 4-2 | Between Stone & Depot 2-4' | 1.2 | 8.8 | 17.0 |
| 4-3 | Between Stone & Depot 4-6' | 2.1 | 15.0 | 21.0 |
| 4-4 | Between Stone & Depot 6-8' | 1.4 | 11.0 | 22.0 |
| 4-5 | Between Stone & Depot 8-10' | 1.7 | 11.0 | 27.0 |
| 4-6 | Between Stone & Depot 10-12' | 1.6 | 10.0 | 25.0 |
| 4-7 | Between Stone & Depot 12-14' | 1.4 | 8.5 | 23.0 |
| 4-8 | Between Stone & Depot 14-16' | 1.2 | 9.2 | 20.0 |
| 5-1 | Between Stone & Fair 0-2' | 1.4 | 8.0 | 19.0 |
| 5-2 | Between Stone & Fair 2-4' | 1.4 | 8.4 | 21.0 |
| 5-3 | Between Stone & Fair 4-6' | 1.5 | 10.0 | 24.0 |

TABLE 5

## ANALYTICAL RESULTS OF BEACH SAMPLES AND SOIL SAMPLING ALONG MAIN STREET STORM SEWER (mg/kg)

| SAMPLE | LOCATION/DEPTH | CADMIUM | COBALT | NICKEL |
|---|---|---|---|---|
| 5-4 | Between Stone & Fair 6-8' | 1.6 | 11.0 | 24.0 |
| 5-5 | Between Stone & Fair 8-10' | 1.6 | 10.0 | 24.0 |
| 5-6 | Between Stone & Fair 10-12' | 1.7 | 10.0 | 23.0 |
| 5-7 | Between Stone & Fair 12-14' | 1.2 | 11.0 | 24.0 |
| 5-8 | Between Stone & Fair 14-16' | 1.3 | 9.3 | 20.0 |
| 6-1 | Between Stone & Fair 0-2' | 1.2 | 8.9 | 19.0 |
| 6-2 | Between Stone & Fair 2-4' | <0.22 | 5.1 | 10.0 |
| 6-3 | Between Stone & Fair 4-6' | 1.9 | 10.0 | 23.0 |
| 6-4 | Between Stone & Fair 6-8' | 1.0 | 6.4 | 16.0 |
| 6-5 | Between Stone & Fair 8-10' | <0.43 | 5.7 | 12.0 |
| 6-6 | Between Stone & Fair 10-12' | <0.24 | 5.7 | 11.0 |
| 6-7 | Between Stone & Fair 12-14' | 1.6 | 10.0 | 22.0 |
| 6-8 | Between Stone & Fair 14-16' | 1.1 | 6.6 | 16.0 |
| 7-1 | Fair and Main 0-2' | 1.2 | 11.0 | 22.0 |
| 7-2 | Fair and Main 2-4' | <0.47 | 5.6 | 16.0 |

TABLE 6

HUDSON RIVER SEDIMENT CADMIUM CONCENTRATIONS

| Location | Cadmium Concentrations (mg/kg) |
|---|---|
| Newburgh Bay (3) | 8.91 (1) |
| Bannerman's Island (3) | 6.09 (1) |
| Little Stony Point (3) | 3.60 (1) |
| Con Hook (4) | 3.21 (1) |
| Iona Island (4) | 1.94 (1) |
| Stony Point (4) | 2.6 (2) |
| Yonkers | 14.1 (2) |
| Weehawken (4) | 4.7 (2) |
| N.Y. Port Authority (4) | 4.4 (2) |
| Staten Island (4) | 11.5 (2) |
| Passaic River (4) | 11.8 (2) |
| Port Newark (4) | 14.0 (2) |
| Wappingers Creek (5) | 24.2 |

(1) From Kneip and O'Connor 1979
(2) From O'Connor and Moese 1984
(3) Upstream from Marathon Battery Site
(4) Downstream from Marathon Battery Site
(5) Above Wappinger's Creek (Ebasco (1989)

# ATTACHMENT C

## ADMINISTRATIVE RECORD INDEX

MARATHON BATTERY COMPANY SITE
THIRD OPERABLE UNIT
ADMINISTRATIVE RECORD FILE *
INDEX OF DOCUMENTS

## SITE IDENTIFICATION

### Background - RCRA and Other Information



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* Administrative Record File available October 2, 1989.

Note: Company or organizational affiliation is mentioned only when it appears in the record.

**ATTACHMENT D**

**NYSDEC LETTER OF CONCURRENCE**

# ATTACHMENT E

## RESPONSIVENESS SUMMARY

REM III PROGRAM

REMEDIAL PLANNING ACTIVITIES AT
SELECTED UNCONTROLLED HAZARDOUS SUBSTANCE
DISPOSAL SITES WITHIN EPA REGIONS I-IV

EPA WORK ASSIGNMENT NUMBER 112-2L37.0
EPA CONTRACT NUMBER 68-01-7250

# FINAL RESPONSIVENESS SUMMARY
# MARATHON BATTERY COMPANY SITE
# VILLAGE OF COLD SPRING, NEW YORK

SEPTEMBER 1989


Prepared by:

Joanne M. Giordano — Date
REM III Community
Relations Specialist
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Sheila Conway — Date
REM III Community
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Dev R. Sachev, Ph.D, P.E. — Date
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FINAL RESPONSIVENESS SUMMARY
MARATHON BATTERY COMPANY SITE - AREA III
VILLAGE OF COLD SPRING, NEW YORK

**TABLE OF CONTENTS**

# FINAL RESPONSIVENESS SUMMARY

## MARATHON BATTERY COMPANY SITE - AREA III
## VILLAGE OF COLD SPRING, NEW YORK

The U.S. Environmental Protection Agency (EPA) held a public comment period from July 3, 1989, through August 22, 1989, for interested parties to comment on EPA's supplemental Remedial Investigation/Feasibility Study (RI/FS) and Proposed Plan for the Area III portion of the Marathon Battery Company Superfund site. Although the public comment period was scheduled to end on August 1, 1989, EPA extended it to August 22, 1989.

EPA held a public meeting on July 19, 1989 at Haldane Central High School in the Village of Cold Spring, New York. At the meeting EPA described the remedial alternatives and presented EPA's and the New York State Department of Environmental Conservation's (NYSDEC) preferred remedial alternatives for cleaning up Area III of the Marathon Battery Company site.

This responsiveness summary provides a summary of citizens' comments and concerns received during the public comment period, and EPA's responses to those concerns. All comments summarized in this document will be considered in EPA's final selection of the remedial alternatives for cleanup of the site. This responsiveness summary is organized into five sections; each of these sections is described briefly below.

I. **RESPONSIVENESS SUMMARY OVERVIEW.** This section briefly describes the background of the Marathon Battery Company site and outlines the proposed remedial alternatives for Area III of the Marathon Battery Company site.

II. **BACKGROUND ON COMMUNITY INVOLVEMENT AND CONCERNS.** This section provides a brief history of community interest and concerns regarding the Marathon Battery Company site.

III. **SUMMARY OF MAJOR QUESTIONS AND COMMENTS RECEIVED DURING THE PUBLIC COMMENT PERIOD AND EPA's RESPONSES TO THESE COMMENTS.** This section summarizes both oral and written comments submitted to EPA at the public meeting and during the public comment period, and provides EPA's responses to these comments.

IV. **REMAINING CONCERNS.** This section discusses community concerns that EPA should be aware of as they prepare to undertake the remedial designs and remedial actions at the Marathon Battery Company site.

V. **APPENDICES.** There are seven appendices attached to this document. They are as follows:

Appendix A: Proposed Plan for the Marathon Battery Company site, Area III;

Appendix B: Public Notice which appeared in local newspapers informing the residents of the public meeting held at Haldane Central High School, Cold Spring, New York, on July 19, 1989;

Appendix C: Agenda;

Appendix D: Sign-In sheets;

Appendix E: A list of information repositories which contain technical and informational documents pertaining to the Marathon Battery Company site;

Appendix F: Written comments from Marathon Battery Company/Gould Incorporated and The Army Corps of Engineers, and EPA's responses to those comments; and

Appendix G: Written comments from citizens.

## I. RESPONSIVENESS SUMMARY OVERVIEW

The Marathon Battery Company Superfund site is located in the Village of Cold Spring, New York, approximately 50 miles north of New York City. The site includes a former nickel-cadmium battery manufacturing facility and surrounding plant grounds; the Hudson River in the vicinity of the Cold Spring pier; West Foundry Cove; and a series of river backwater areas known as East Foundry Cove and Constitution Marsh. A map of these areas can be found in the Proposed Plan, which is located in Appendix A of this document.

In 1952, the U.S. Army Corps of Engineers (COE) constructed a battery manufacturing facility in the Village of Cold Spring, for the U.S. Army Signal Supply Agency.

In 1953, under contract with the Army Signal Corps, Sonotone Corporation began operating the plant to produce nickel-cadmium batteries for use in the NIKE Missile Program. Subsequent contracts for battery production at the plant included batteries for warhead failsafe systems and military jet fighters. Between 1954 and 1955, the contract was amended to permit Sonotone Corporation to produce commercial batteries.

In 1962, the government, having declared the area excess property, sold it to Sonotone Corporation, who in 1967, became a wholly-owned subsidiary of Clevite Corporation. In 1969, Clevite Corporation merged with Gould, Incorporated who sold the plant to Business Fund, Incorporated, which later changed its name to Marathon Battery Company. Marathon Battery Company operated the plant until March 1979. The plant was inactive from March 1979 until November 1980, when it was sold to the current owner, Merchandise Dynamics Incorporated, for use as a book storage facility. Merchandise Dynamics Incorporated is presently bankrupt.

The plant's wastewater treatment system originally consisted of a lift station and piping for the transfer of all process wastewater into the Cold Spring sewer system. The wastewater was then discharged from the Cold Spring sewer system directly into the Hudson River at Cold Spring pier. In addition, a by-pass was installed so that when the lift station was shut down or overloaded the wastewater was discharged directly into East Foundry Cove Marsh.

In 1965, the New York State Department of Health (NYSDOH) identified the need for a sewage treatment plant in the Village of Cold Spring. During the design of the sewage treatment facility, the Village's consultant concluded that the battery plant's process effluent could not be managed by the proposed sewage treatment system. Subsequently, the Village of Cold Spring ordered Sonotone Corporation to disconnect its industrial discharge from the Village's sanitary sewer.

To accomplish this directive, Sonotone shut down the pumps which discharged into the Hudson River through the Cold Spring municipal sewer system and by-passed the entire wastewater flow into East Foundry Cove. Sonotone then installed equipment which was designed to precipitate metal hydroxides and adjust the acidity of the wastewater prior to discharge into the storm sewer system. However, this treatment system failed to operate properly. As a result, the treated wastewater failed to meet state discharge regulations, and the plant was given a deadline of January 1, 1970 to achieve compliance with these regulations.

In 1972, the U.S. Department of Justice filed a suit and then signed a Consent Agreement requiring present and past owners/operators to remove as much contamination from Foundry Cove as was economically, technically, and ecologically feasible. Hydraulic dredging was conducted between September 1972 and July 1973 and the dewatered dredge spoils were placed in a clay-lined underground vault on the plant property. The vault was then sealed with asphalt and fenced.

Various studies by New York University and others were conducted on the Foundry Cove cadmium contamination problem prior to, during, and after the dredging activities. Post-dredging monitoring continued to detect elevated cadmium and nickel concentrations in the Cove's sediments, flora, and fauna.

In October 1981, the Marathon Battery Company site was added to EPA's National Priorities List (NPL) of hazardous waste sites.

In August 1983, EPA and the State of New York signed a cooperative agreement to undertake an RI/FS for the Marathon Battery Company site. ACRES International, NYSDEC's consultant, initiated the RI/FS required by the cooperative agreement in May 1984.

The RI/FS report on the nature and extent of the contamination of the Foundry Cove/Hudson River portion of the site was completed in July 1985. Because the FS contained insufficient information to evaluate the technical merits and environmental effects of the remedial alternatives under consideration, additional RI/FS activities were necessary. Lead responsibility for the site was transferred to EPA and a supplemental RI/FS was completed by Ebasco Services Incorporated (EPA's contractor) in August 1986.

In order to expedite the Superfund process, EPA has divided the site into three separate geographic areas: Area I, East Foundry Cove Marsh and Constitution Marsh; Area II, the former battery facility and surrounding yards; and Area III, East Foundry Cove, West Foundry Cove, and the Hudson River in the vicinity of the Cold Spring pier.

## RECORD OF DECISION, AREA I: EAST FOUNDRY COVE MARSH AND CONSTITUTION MARSH

In September 1986, EPA signed a Record of Decision (ROD) designating a remedy for Area I. Selection of the cleanup option was based on previous studies, EPA site investigations, and comments received from the public.

The selected clean-up activities include:

- dredging contaminated sediments from East Foundry Cove Marsh to a level of 100 milligrams per kilogram (mg/kg);
- thickening and chemically fixating the contaminated sediments, and disposing of the chemically fixated sediments in an off-site sanitary landfill;
- replacing excavated sediments with clay and clean fill followed by revegetation of the marsh; and

- long-term monitoring of heavy-metal concentrations at Constitution Marsh.

RECORD OF DECISION, AREA II: THE FORMER BATTERY FACILITY AND SURROUNDING AREAS

In September 1988, EPA signed a ROD designating a remedy for Area II. Selection of the clean-up option was based on previous studies, EPA site investigations, and comments received from the public.

The selected clean-up activities include:

- using the existing monitoring wells to conduct a long-term groundwater monitoring program to monitor concentrations of contaminants in the aquifer underlying the former battery plant;
- decontaminating the inside surfaces and contents of the former battery facility to remove the heavy metal-contaminated dust;
- excavating the dredge spoils vault and the cadmium contaminated soils on the battery plant grounds and adjacent residential yards to a level of 20 mg/kg;
- chemically fixating the contaminated dust and soil and disposing of it in an off-site sanitary landfill;
- excavating the volatile organic-contaminated soil hot-spots followed by enhanced volatilization and replacement of the clean residuals on-site; and
- replacing the excavated sediment with clean fill and re-seeding where necessary.

REMEDIAL INVESTIGATION AND PROPOSED ALTERNATIVES, AREA III: EAST AND WEST FOUNDRY COVES, AND THE HUDSON RIVER IN THE COLD SPRING PIER AREA

EPA's RI activities for Area III were initiated in late 1986 and included the collection of soil, sediment, water, and fish tissue samples from East Foundry Cove, West Foundry Cove, and the Hudson River in the vicinity of the Village of Cold Spring pier. The following section contains the results of EPA's remedial investigation activities, and their proposed remedial action plans.

**EAST FOUNDRY COVE**

High concentrations of cadmium, nickel, and cobalt (all are metals), were found dispersed throughout East Foundry Cove as a result of the migration of contaminants from East Foundry Cove Marsh. East Foundry Cove sediments contain cadmium at concentrations as high as 2,700 milligrams of cadmium per kilogram of sediment (mg/kg). The average cadmium concentration is 179.3 mg/kg. Elevated contamination concentrations were found to a depth of approximately one foot in East Foundry Cove, with the majority of contamination in the top four inches of sediment.

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| PREFERRED ALTERNATIVE: | Dredging, Thickening, On-Site Fixation, Off-Site Disposal |
| PRESENT WORTH COST: (includes implementation and annual operation and maintenance costs for a 30 year period) | $37,042,000 |
| IMPLEMENTATION TIME: | 22 months |

Under this alternative, EPA would collect, analyze, and evaluate supplemental sediment samples to determine the extent of cadmium-contaminated sediments that present a threat to the environment. Supplemental bioassay tests would also be conducted. Contaminated sediments would be dredged to a depth of one foot and thickened. After the contaminated sediment is thickened, transportable treatment equipment would be situated on-site to fixate the contaminated sediments. Fixation chemically binds the contaminants to the sediments and would render the sediments non-hazardous. The treatment technology is commercially available and has been selected by EPA for use in Areas I and II of the site.

Following treatment, the fixated material would be transported to an off-site sanitary landfill.

Following dredging, the cove bottom would be re-sampled and restored to its original contours, as necessary, to preserve its original structure and function and to provide an added level of protection to the environment. Replanting will also be conducted.

**WEST FOUNDRY COVE**

The RI found that areas of elevated cadmium concentrations occur in patches throughout West Foundry Cove at depths of up to 20 inches. The maximum cadmium concentration found in West Foundry Cove was 568 mg/kg and the average cadmium concentration was 44 mg/kg. The average concentration level in West Foundry Cove, an area unrestricted from the main flow of the Hudson River, appears to approach Hudson River background concentrations.

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| PREFERRED ALTERNATIVE: | No-Action |
| PRESENT WORTH COST: | $1,000,400 |
| IMPLEMENTATION TIME: | 3 months |

Under the no-action alternative for West Foundry Cove, warning signs would be posted instructing people to avoid the area. Over time, cadmium concentrations in West Foundry Cove would decrease due to tidal action. The area would be monitored and a hydrologic study performed to ascertain whether or not West Foundry Cove is a depositional area. If sediment transport is occurring, further action may be necessary.

**THE HUDSON RIVER IN THE COLD SPRING PIER AREA**

Marathon Battery Company plant wastewater discharged via the Cold Spring sewer system was the source of the cadmium in the Cold Spring pier area. While a large volume of wastewater was discharged to the Hudson River at the pier area, most of this material was carried downstream and only limited areas of metal contamination remain. Metal concentrations in the vicinity of the Cold Spring pier generally approach Hudson River background concentrations, though several pier area samples contained cadmium concentrations in the range of 100 mg/kg. The average cadmium concentration in the Cold Spring pier area was 13 mg/kg.

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| PREFERRED ALTERNATIVE: | Dredging, Thickening, On-Site Fixation, Off-Site Disposal |
| PRESENT WORTH COST: | $10,457,100 |
| IMPLEMENTATION TIME: | 14 months |

The preferred alternative for cleaning up the Cold Spring pier area is similar to the preferred alternative for addressing East Foundry Cove contaminants. Additional sediment samples would be collected and analyzed to ascertain whether the sediments adjacent to and beneath the Cold Spring Pier are contaminated with cadmium. The sampling results would be used to determine the extent of dredging necessary. The remediation would involve dredging and thickening the contaminated sediments. The excavated sediments would be fixated using transportable on-site equipment. Following treatment, the fixated material would be transported to an off-site sanitary landfill. In addition, the bottom would be restored to its original contours, as necessary, to preserve its original structure and function.

A comprehensive description of all remedial alternatives is included in the Proposed Plan which can be found in Appendix A of this document, or at one of the following information repositories:

The Preservation and Revitalization of the Cold Spring Area (PROCO)
87 Main Street
Cold Spring, NY 10516
(914) 265-2111

Hours of Operation:
Monday - Friday, 9-3

Philipstown Town Hall
238 Main Street
Cold Spring, NY 10516
(914) 265-3329

Hours of operation:

Monday - Friday, 9-4:30
Saturday, 9-12

Cold Spring Village Hall
194 Main Street
Cold Spring, NY 10516
(914) 265-3611

Hours of Operation:
Monday - Friday, 9-4

U.S. Environmental Protection Agency
Emergency and Remedial Response Division
26 Federal Plaza
New York, NY 10278

New York State Department of Environmental Conservation
Division of Hazardous Waste Remediation
50 Wolf Road
Albany, NY 12233

## II. BACKGROUND ON COMMUNITY INVOLVEMENT AND CONCERNS

The Marathon Battery Company site emerged as a major community issue in Cold Spring when EPA and the NYSDEC signed a cooperative agreement in September 1983 to undertake an investigation of the site. EPA and NYSDEC have both been actively involved with the public participation program at the site. The agencies have held several public meetings, numerous informal meetings, and public availability sessions, as well as meetings with the local officials.

The community and many organizations have been very involved with the Marathon Battery Company site. These organizations include: the National Audubon Society; Scenic Hudson and the Clearwater, two Hudson River-based environmental groups; the Preservation and Revitalization of the Cold Spring Area (PROCO); the Hudson River Fisherman's Association; and the Concerned Citizens About Removing Toxins (CCART).

The major concerns expressed by the community over the last few years are listed below.

- Health Risk Associated with the Plant Facility. Results of the RI indicate that there has been no migration of contaminants from the vault. However, areas of contamination have been found on the facility property, in the facility building, and in adjacent residential yards. Although this is an issue of genuine concern for the residents of Constitution Drive, they are equally, if not more, concerned with the pile of debris that has accumulated in the yard on the facility property. Local firemen have expressed concern over the possible release of hazardous substances occurring in the event of an on-site fire.

- Health Risks Associated with Eating Local Marine Life. Blue claw crabs are harvested in the lower Hudson River basin, and are a regular part of the diet of many residents. Studies have shown that crabs and other marine life in the Cold Spring area contain high levels of cadmium, and residents have expressed concerns over the possible health effects.

- User and Property Issues. The West Foundry Cove is a hub for recreational boating in the area. The Cold Spring Boat Club and business interests in the community would like to upgrade the existing waterfront facilities and further develop waterfront property. These members of the community have a strong desire to see the remedial action selected and completed.

- Property Values. Although property values have risen dramatically in recent years, residents stated their fear that property values will be hurt eventually by prolonging implementation of a remedial action. At least one local resident has been denied a home equity loan due to the property's proximity to the site.

- Water Source for the Fire Department. The Village of Cold Spring has expressed the need for an additional water supply for its fire department. There are two logical and readily available options: the water well at the former Marathon Battery Company plant; and the Hudson River near the Cold Spring pier. However, due to the contaminated sediments in the Hudson River and volatile organics in the groundwater, access to both sources has been denied until completion of the remedial action.

- Hudson River Contamination. The overall cleanliness of the Hudson River is a major concern to both the local community and a number of national and regional environmental groups. Groups such as The Clearwater and Scenic Hudson have been

actively involved in all phases of the work conducted to date. These groups can be expected to remain active throughout the entire remedial action.

- Railroad Easement. The tracks of MTA Railroad, one of the major rail connections between New York City and Albany, divides East and West Foundry Coves. The railroad is supported by pilings in the channel, and MTA wants to be assured that any remedial action will not damage the existing structure.

- Issues Concerning Remedial Action. Local residents believe that money has been spent with no tangible results. They feel that there is no developed plan of action and that they have yet to be given any real guarantee that the site will be cleaned up. The ROD signed for Areas I and II has mitigated this concern somewhat. The residents also wanted to be assured that the Marathon Battery Company site would be carefully monitored during all phases of the remediation. In addition, residents have expressed concern over increased truck traffic associated with off-site disposal of the chemically fixated contaminated soil. These residents are concerned about the noise and disturbance associated with the increased truck traffic.

- Dredge Spoils Vault. Residents have expressed concern over the possible leakage of contaminated material from the dredge spoils vault, and have asked EPA for assurance that the vault will be permanently removed or remediated.

- Costs of Remediation. A concern of local residents is who will pay for the clean-up of the Marathon Battery Company site. Specifically, they are worried that there will not be enough Superfund monies in the future to remove or remediate the dredge spoils vault.

## III. SUMMARY OF MAJOR QUESTIONS AND COMMENTS RECEIVED DURING THE PUBLIC COMMENT PERIOD AND EPA's RESPONSES TO THESE COMMENTS

Written and oral comments raised during the public comment period for Area III of the Marathon Battery Company site are summarized below. Written comments from the Marathon Battery Company/Gould Incorporated and The Army Corps of Engineers, and EPA's responses can be found in Appendix F of this document. Letters from citizens are located in Appendix G of this document. The public comment period was held from July 3, 1989, through August 22, 1989, to receive comments on the supplemental RI/FS and the Proposed Plan.

The comments received by EPA are organized into seven categories:

- Sampling and Proposed Clean-up Levels;
- The Proposed Remedial Alternatives;
- Potentially Responsible Party;
- Health Risks;
- Public Participation;
- Costs/Funding Issues; and
- Other Comments.

SAMPLING AND PROPOSED CLEAN-UP LEVELS

**Comment:** Several residents expressed concern over the 20 parts per million (ppm) sediment cleanup level for cadmium proposed for the Area II portion of the site because they felt that the level was not safe enough. They asked EPA why EPA chose this clean-up level.

**EPA Response:** EPA answered that the cleanup level was based upon the Agency for Toxic Substances and Disease Registry's (ATSDR) recommendations and the site health assessment. A health assessment utilizes current epidemiological and toxicological knowledge to provide a qualitative evaluation of a community's potential health risks.

After consultation with the U.S. Department of Agriculture, ATSDR advised that cadmium levels greater than 20mg/kg in garden soil are unacceptable, since certain leafy vegetables and roots will accumulate cadmium.

**Comment:** A city official asked if EPA had taken sediment samples deeper than 12 inches during the remedial investigation.

**EPA Response:** EPA stated that site investigators took samples as far down as two and a half feet, and at two and a half feet they found very low levels of cadmium.

**Comment:** A resident asked how far along the Hudson River EPA had sampled, how the sampling points were chosen, how many fish were sampled, and if EPA anticipated doing further sampling to determine contaminated sediment dispersal.

**EPA Response:** EPA said that its sampling area included the width of the Hudson River and began just north of Wappinger's Creek and as far downriver as Croton Bay. These points were chosen based on sediments in depositional areas within the Hudson River. EPA said that it sampled approximately five to ten fish from each of seven different locations. EPA has no plans to do further river sampling.

**Comment:** A city official asked what the contamination level of the sediment would be after it is fixated.

**EPA Response:** EPA responded that the contamination level of the sediments would not change after it is fixated. However, although the contamination would still be present in the sediments, the contaminants would not leach out of the fixated material. EPA feels confident that this method would ensure protection of human health and the environment.

**Comment:** A city official noted that there were discrepancies between EPA's sampling techniques and findings, and those of the NYSDEC. Specifically, NYSDEC found 30 ppm of cadmium in the beach area, while EPA found 12 ppm. The official was concerned about this discrepancy because the area in question is heavily used by residents for recreation and leisure.

**EPA Response:** The Area II Risk Assessment shows that levels of cadmium up to 50 mg/kg present a risk in an acceptable risk range. ATSDR recommends that root crops not be grown in soils with a cadmium level of 20 mg/kg or above.

## THE PROPOSED REMEDIAL ALTERNATIVES

**Comment:** A resident asked for assurance that, by dredging East Foundry Cove and the Cold Spring pier area to a depth of one foot, all the contamination will be removed.

**EPA Response:** According to EPA, the sampling results obtained show that if one foot of contaminated sediment is removed, most of the contaminants would be removed with it. In addition, EPA would replace the removed sediment with one foot of clean sediment to approximate its original contours. This procedure would add an extra level of protection, as well as maintain the current hydraulic flow in the area.

**Comment:** A resident asked how much sediment will be removed and where it will be stored. The resident suggested returning the treated sediment to the bottom of the cove and river areas in order to save money on clean fill.

**EPA Response:** EPA said it will be transporting approximately 67,600 cubic yards of fixated sediments to a sanitary landfill. For costing purposes, EPA identified a landfill that will accept fixated material from Area I. Where the sediments are ultimately disposed of will be determined by the construction contractor.

EPA said that although the contaminated material will not leach when placed in a sanitary landfill, it could leach when exposed to tidal environments. For that reason, EPA proposes depositing the fixated sediments in a landfill rather than back in the cove and river beds.

**Comment:** A resident asked if EPA had found any other toxins in the water and sediment, such as acid and lithium hydroxide, and if such toxins had combined with the sediments to form new toxins.

**EPA Response:** EPA responded that it had no knowledge as to whether the aforementioned toxins had combined with the sediments to form new toxins. EPA said that it studied only metals during the remedial investigation.

**Comment:** A resident asked if EPA will construct a wall around the dredging area so that suspended sediments could not escape the area and contaminate the river.

**EPA Response:** EPA said that it planned to implement measures such as erecting silt curtains around the perimeter of the dredging area in order to trap suspended sediment.

**Comment:** A resident asked about EPA's time-frame for site activities.

**EPA Response:** EPA answered that the design for Area I has been completed, and it anticipates awarding a contract and starting construction either in the late Fall or by next Spring, 1990.

EPA's first action will be constructing a dike. A dike is an embankment of earth, built to control flooding or water flow. The dike will be made out of clean soil which will be deposited between East Foundry Cove Marsh and East Foundry Cove. Once remediation of East Foundry Cove Marsh is completed, the material from the dike will replace the contaminated sediment that is removed during dredging.

**Comment:** A resident asked where the treatment facility will be located.

**EPA Response:** EPA proposes to construct a treatment facility in an area adjacent to East Foundry Cove Marsh. EPA said it wants to keep the treatment facility close to the dredging operation itself, and away from residents living in the vicinity of the plant. EPA is currently negotiating with the property owner to obtain access to the land adjacent to East Foundry Cove Marsh.

**Comment:** A resident asked about the remediation plans for the dredge spoils vault.

**EPA Response:** EPA replied that it would be removing the dredge spoils vault as part of the remedial action for Area II.

**Comment:** A resident asked how EPA plans to minimize disruptions that will result from cleanup activities.

**EPA Response:** EPA said that if the contaminated material is transported by train, it will be done at night, not during normal commuting hours. Also, all construction and remedial activities will comply with the noise specifications outlined by law.

**Comment:** A resident commented that the average contamination level of West Foundry Cove is greater than that of the Cold Springs pier area. Yet, according to EPA's proposal, the Cold Spring pier area will be dredged, and West Foundry Cove will be left untouched. The resident asked for EPA's rationale behind the proposed remediation plan.

**EPA Response:** EPA said it has proposed no remedial action in West Foundry Cove because it is a depositional area for contamination, not a source. In other words, West Foundry Cove is receiving contaminated sediments that are migrating from other areas.

EPA plans to conduct a hydrologic study on the area to determine whether or not assumptions about the depositional nature of West Foundry Cove are valid. If the area is not found to be a depositional area, then EPA may also remediate West Foundry Cove.

**Comment:** A representative from an environmental group expressed concern that EPA had not considered enough alternatives for addressing the contaminants in Area III.

**EPA Response:** EPA said that it conducted a Feasibility Study to

investigate viable alternatives for Area III of the site. Although EPA investigated many more options than were being presented to the public, many were found to be unsuitable for addressing contamination in Area III.

POTENTIALLY RESPONSIBLE PARTY

**Comment:** A resident asked EPA whether the party potentially responsible for the contamination of the site is cooperating to clean up the plant.

**EPA Response:** EPA said it has signed a Consent Order with several of the potentially responsible parties (PRPs) for decontamination of the facility. The next step is for the PRPs to perform a treatability study which analyzes ways of properly removing the contaminated dust from the book platforms. EPA said that it is negotiating with the PRPs for cleanup of various other parts of the site, the entire plant facility, and nearby residential yards.

**Comment:** A resident asked if the current property owner would be prosecuted for attempting to remove the books from the facility.

**EPA Response:** EPA said it is discussing penalties that it can impose since the PRP violated an Administrative Order when it transported hazardous waste without a permit. However, no actions have been taken yet.

**Comment:** A resident asked if EPA had any documents outlining the types and amounts of waste products that left the Marathon Battery Company plant during its operations. A City official also asked if EPA had documentation showing whether drums of hazardous waste were shipped off the site to a disposal facility.

**EPA Response:** EPA acknowledged that it did have such information in a report prepared by a consultant to the PRP. In addition, EPA has copies of permits showing that the drums of hazardous waste leaving the Marathon Battery Company plant site were shipped to Precious Metals Refining in Hollywood, California.

HEALTH RISKS

**Comment:** A former employee of the book repository located in the facility asked whether there might be any long-term health effects from past exposures to contaminants inside the facility.

**EPA Response:** EPA responded that the Occupational Safety and Health Administration (OSHA) conducted air monitoring in the respirable zone of people who actually worked in the Marathon Battery Company facility. They found that occupational exposure to contaminants, essentially eight hours a day, five days a week, 52 weeks a year, was within acceptable limits and presented no increased risk to the workers.

**Comment:** Several residents expressed concern about the air quality during remedial activities. Specifically, they were worried about inhaling contaminated dust particles.

**EPA Response:** EPA assured the residents that it would develop a Health and Safety Plan to ensure both the workers' and the residents' safety during the clean-up. In addition, the on-site coordinator (OSC) and the on-site health and safety officer will shut down the operation if at anytime public health or the environment is threatened.

**Comment:** A resident asked if any of the chemicals being used for the fixation process were toxic.

**EPA Response:** EPA replied that none of the chemicals that would be used to fixate or bind the contaminated materials to the sediments are toxic.

PUBLIC PARTICIPATION

**Comment:** Several residents asked if EPA knew when the Village of Cold Spring would receive a $50,000 Technical Assistance Grant (TAG). The residents would like to have a technical advisor evaluate the proposed remedial alternatives and the remedial design because they do not feel they have the expertise to properly comment on the proposed remediation plan themselves.

**EPA Response:** EPA explained that the Concerned Citizens About Removing Toxins (CCART) has been awarded a TAG, not the Village of Cold Spring. The technical advisor subcontract is lacking some pertinent information, and as soon as the information is received, the money will be awarded approximately 1-2 weeks later.

**Comment:** Several residents asked whether the public comment period could be extended in order to provide more time to review site-related documents.

**EPA Response:** EPA said that it would consider an extension.

**Comment:** A resident asked if there would be an opportunity to review and comment on the work plans for the Remedial Designs before they are implemented.

**EPA Response:** EPA said that it would put the Remedial Design documents in the local information repositories once the construction job is advertised. EPA explained that the documents could not be released before the construction job is advertised since it might give an unfair advantage to a construction contractor that had earlier access and was thus able to begin the preparation of bid documents before other prospective bidders. During that time, EPA would welcome the residents' comments. In addition, at the residents' request, EPA will hold another meeting or availability session to discuss the remedial design.

COSTS/FUNDING ISSUES

**Comment:** A resident asked why removing contaminated sediments via train was so much more expensive than removal by truck; and why train transport was the preferred removal method.

**EPA Response:** **EPA commented that transporting the contaminated** sediments via train would be more expensive because it required the use of both trains and trucks. Trains would transport the contaminated sediments from the site to the area where the landfill is located, and trucks would carry the material from the train to the landfill itself.

EPA endorses transporting the contaminated material via train for two reasons: it would be easier to implement; and it would create less disturbance for the residents. EPA believes that rail transport is easier because it will be difficult to get large quantities of trucks through the narrow streets of the Village of Cold Spring. In addition, after considering resident's concerns over the disturbance large trucks would make, EPA believes that hauling contaminated sediments on trains would create less noise pollution, traffic congestion, and vehicle emissions than trucks.

**Comment:** A resident asked if the proposed funding would cover the costs of the hydrologic study on West Foundry Cove.

**EPA Response:** EPA confirmed that the proposed funding did include the cost of a hydrologic study.

OTHER COMMENTS

**Comment:** A resident asked why a contractor would be doing the clean-up, and not the Army Corps of Engineers or the EPA themselves.

**EPA Response:** EPA said that the Army Corps of Engineers and EPA would supervise all phases of the work, but do not have the personnel to do the work themselves. Also, government procurement requirements stipulate that EPA must competitively bid the cleanup work.

## IV. REMAINING CONCERNS

The community had several concerns that EPA should be aware of as they prepare to undertake the remedial designs and remedial actions at the Marathon Battery Company site. Residents were concerned about:

- The lack of studies done on the amount of cadmium absorbed by vegetables from the soil in Area II. They would like to see more research done on this subject;
- The possibility of contaminated dust migrating from the site. Residents want strong dust suppression measures taken; regular monitoring of dust in the air; and signs posted near the site listing daily contamination levels;
- The lack of information, or information that was too technical, provided by EPA. Residents would like more fact sheets, posters, or flyers;
- How the remediation would affect the Village of Cold Springs' plans for rebuilding the pier;
- Whether or not the Village could use EPA's dredging permit to do their own dredging when rebuilding the pier;
- The possibility that acid may have emanated from the plant and caused deterioration of several homeowners' pipes; and
- The possibility that the Cold Spring pier has been functioning as a sediment trap over the years.