



FINAL

RESTORATION PLAN AND

ENVIRONMENTAL ASSESSMENT

FOR THE

C & R BATTERY NATIONAL PRIORITIES LIST SITE

Prepared by:
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Region 5
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"Our mission is working with others to conserve, protect, and enhance fish, wildlife, and plants and their habitats for the continuing benefit of the American people."

PREFACE

"Only when the last tree has died and the last river has been poisoned and the last fish been caught will we realize we cannot eat money."

~Cree Indian Proverb

EXECUTIVE SUMMARY

The C & R Battery Company, Inc. National Priorities List (NPL) Site (Site) is located in an industrial area in Chesterfield County, Virginia, approximately 6 miles southeast of Richmond, Virginia. The site encompasses approximately 11 acres of open fields, barren ground, and woods. C & R Battery was a former battery sawing and shredding facility designed to recover lead from discarded automobile and truck batteries. General operations involved receiving bulk shipments of discarded batteries, cutting open the tops of the batteries, and draining the battery acids into on-site acid storage-containment ponds located within the central area of the Site. Waste generated by the operation was located throughout the Site and included lead sulfide, lead and other heavy metals, plastic battery casing material, and sulfuric acid. The Site operated from the early 1970s until 1985.

In 1994, an Administrative Order by Consent (Consent Order) was entered into voluntarily by and between the U.S. Environmental Protection Agency (EPA) and all of the *de minimis* potentially responsible parties. The purpose of this Consent Order was “. . . to reach final settlement between the EPA and the *de minimis* Respondents which allows for each *de minimis* Respondent to make a cash payment . . . for response costs that EPA has incurred . . . and for natural resource damages under the trusteeship of the Department of the Interior (DOI) and the National Oceanic and Atmospheric Administration (NOAA) (jointly “Trustees”) in exchange for a covenant not to sue. . . .” The *de minimis* parties consisted of about 86 different business entities, all of whom shipped batteries to the Site for disposal over extend periods. By 1999, all *de minimis* parties had settled with EPA and the Trustees for past costs and natural resource damages. The Trustees eventually received a total of about \$63,523. The U.S. Fish and Wildlife Service (Service), on behalf of DOI and NOAA, has prepared this Restoration Plan and Environmental Assessment (RP/EA) to address and evaluate restoration alternatives related to natural resource injuries within the James River watershed, and to select a set of preferred restoration alternatives to be implemented with these funds that will restore, rehabilitate, replace, or acquire natural resources, and the services provided by those resources, that approximate those injured or destroyed as a result of the hazardous substance releases at the Site.

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ACRONYMS AND ABBREVIATIONS

| | |
|--------|---|
| BMPs | best management practices |
| CD | Consent Decree |
| CERCLA | Comprehensive Environmental Response, Compensation, and Liability Act |
| CFR | Code of Federal Regulations |
| CWA | Federal Water Pollution Control Act (Clean Water Act) |
| DOI | Department of the Interior |
| EA | Environmental Assessment |
| EIS | Environmental Impact Statement |
| ESA | Endangered Species Act |
| FONSI | Finding of No Significant Impact |
| FWS | U.S. Fish and Wildlife Service |
| HU | hydrologic unit |
| NCP | National Oil and Hazardous Substances Pollution Contingency Plan |
| NEPA | National Environmental Policy Act |
| NOAA | National Oceanic and Atmospheric Administration |
| NPL | National Priorities List |
| NRDA | natural resource damage assessment |
| NRDAR | natural resource damage assessment and restoration |
| OSHA | Occupational Safety and Health Administration |
| PRP | potentially responsible party |
| RP/EA | Restoration Plan and Environmental Assessment |
| USEPA | U.S. Environmental Protection Agency |
| VDGIF | Virginia Department of Game and Inland Fisheries |
| VDEQ | Virginia Department of Environmental Quality |

1.0 INTRODUCTION: PURPOSE AND NEED FOR RESTORATION

This document constitutes the final Restoration Plan and Environmental Assessment (RP/EA) on proposed restoration actions associated with the C & R Battery NPI Site Natural Resource Damage Assessment and Restoration (NRDAR) case. The U.S. Fish and Wildlife Service (Service) has prepared this RP/EA to address and evaluate restoration alternatives related to natural resource injuries within the James River watershed, and to select a set of preferred restoration alternatives that will restore, rehabilitate, replace, or acquire natural resources, and the services provided by those resources, that approximate those injured or destroyed as a result of the hazardous substance releases at the Site. Funds to accomplish such actions were collected by the Department of the Interior (DOI) as natural resource damages for injuries, pursuant to the Comprehensive Environmental Response, Compensation and Liability Act of 1980, as amended (CERCLA).

1.1 Authorities

Under the authority of the CERCLA, "natural resource trustees may assess damages to natural resources resulting from a discharge of oil or a release of a hazardous substance . . . and may seek to recover those damages." Natural resource damage assessments (NRDA) are separate from the cleanup actions undertaken at a hazardous waste or spill site, and provide a process whereby the natural resource trustees can determine the proper compensation to the public for injury to natural resources. The natural resource damage assessment process seeks to: 1) determine whether injury to, or loss of, trust resources has occurred; 2) ascertain the magnitude of the injury or loss; 3) calculate the appropriate compensation for the injury, including the cost of restoration; and 4) develop a restoration plan that will restore, rehabilitate, replace, and/or acquire equivalent resources for those resources that were injured or lost.

Section 111(i) of the CERCLA requires natural resource trustees to develop a restoration plan prior to allocating recoveries to implement restoration actions, and to obtain public comment on that plan. Under the National Environmental Policy Act (NEPA), federal agencies must identify and evaluate environmental impacts that may result from federal actions. This final RP/EA integrates CERCLA and NEPA requirements by summarizing the affected environment, describing the purpose and need for action, and selecting and describing the preferred restoration activities.

The DOI, acting through the Service, evaluated damages to natural resources that resulted from releases of hazardous substances to the James River watershed in Chesterfield County, Virginia. Section 107 of CERCLA [42 U.S.C. § 9601 *et seq.*], Section 311 of the Federal Water Pollution Control Act (CWA) [33 U.S.C. § 1321], and the National Oil and Hazardous Substances

Pollution Contingency Plan (NCP) [40 CFR Part 300] provide authority to the DOI to seek such damages and effect appropriate restoration actions.

The National Contingency Plan (40 CFR 300.600) designated federal officials to act on behalf of the public as Trustees for natural resources. The Secretary of the Interior was designated Trustee for natural resources, including their supporting ecosystems, belonging to, managed by, held in trust by, appertaining to, or otherwise controlled by the DOI. Among these trust resources are: migratory birds; inter-jurisdictional fish; some marine mammals; endangered species and their respective habitats; and federal lands managed by the DOI. The Service's Region 5 Regional Director has been designated as the Authorized Official to act on behalf of the Secretary of Interior as Trustee for natural resources related to this NRDAR action.

In 1994, an initial Consent Order was entered into voluntarily by and between the U.S. Environmental Protection Agency (EPA) and all of the *de minimis* potentially responsible parties. The purpose of this Consent Order was ". . . to reach final settlement between the EPA and the *de minimis* Respondents which allows for each *de minimis* Respondent to make a cash payment . . . for response costs that EPA has incurred . . . and for natural resource damages under the trusteeship of the DOI and the National Oceanic and Atmospheric Administration (NOAA) (jointly "Trustees") in exchange for a covenant not to sue. . . ." The *de minimis* parties consisted of about 86 different business entities, all of whom shipped batteries to the Site for disposal over extended periods.

By 1999, all *de minimis* parties settled with EPA and the Trustees for past costs and natural resource damages. The DOI NRDAR Fund eventually received a total of about \$63,523 for restoration planning and implementation. The expenditure of this remaining sum forms the basis of this document.

This final RP/EA has been prepared to fulfill requirements under CERCLA to develop a restoration plan prior to allocating recovered natural resource damages for restoration. In addition, this document constitutes an environmental assessment as defined under the National Environmental Policy Act (NEPA) of 1969, as amended (42 U.S.C. 4321 *et seq.*) and addresses the potential impacts of proposed restoration actions on the quality of the physical, biological, and cultural environment. Authority for NRDAR also lies under the Federal Water Pollution Control Act of 1972, as amended, commonly referred to as the Clean Water Act (33 U.S.C. 1251 *et seq.*). The NRDAR regulations for hazardous substances are codified at 43 CFR Part 11. The NRDAR regulations are available for developing natural resource damage claims based on the cost of restoration and the value of interim public losses, and also contain useful concepts and guidance for post-recovery restoration planning where no formal damage assessment was prepared. Other laws, regulations, and policies that may be applicable to, or otherwise inform,

the development and implementation of this NRDAR RP/EA include the following: the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*); the Migratory Bird Treaty Act of 1918, as amended (16 U.S.C. 703 *et seq.*); the Wilderness Act of 1964, as amended (16 U.S.C. 1131 *et seq.*); the Bald Eagle Protection Act of 1940, as amended (16 U.S.C. 668 *et seq.*) and the Fish and Wildlife Coordination Act of 1958, as amended (16 U.S.C. 661 *et seq.*). Any restoration actions undertaken pursuant to this document will be conducted in compliance with all applicable State and federal regulations.

1.2 Trustee Responsibilities Under CERCLA and Federal Agency Obligations Under NEPA

Under CERCLA, Trustees are authorized to assess damages for injury to, destruction of, or loss of natural resources resulting from the release or threat of release of hazardous substances for those resources under their trusteeship, and may seek to recover such damages from responsible parties. Monetary damages recovered by Trustees can only be used to restore, replace, or acquire natural resources equivalent to those injured or destroyed (42 U.S.C. 9607 (f)(1)).

Section 111(i) of CERCLA requires the Trustees to develop a restoration plan prior to spending recoveries to implement restoration actions, and to solicit and consider public comment on that plan. To fulfill this requirement, this final RP/EA describes a proposed preferred alternative for achieving restoration of natural resource injuries. Moreover, this RP/EA identifies and describes how settlement monies will be spent to achieve restoration goals.

Under NEPA, federal agencies must identify and evaluate environmental impacts that may result from federal actions. Federal agencies must prepare an EA to facilitate such an evaluation. This RP/EA integrates NEPA requirements by: summarizing the affected environment; describing the purpose and need for action; identifying alternative actions; assessing each alternative's applicability and environmental consequences; and summarizing opportunities for public participation in the decision process.

1.3 Affected Area

1.3.1 Site Background

The Site is located in an industrial area in Chesterfield County, Virginia, approximately 6 miles southeast of Richmond, Virginia (Figure 1). The Site encompasses approximately 11 acres of open fields, barren ground, and woods and is situated on the banks of the James River. The C & R Battery Company Inc. was a former battery sawing and shredding facility designed to recover lead from discarded automobile and truck batteries. It operated from 1969 until 1985. The

battery recycling process required that batteries be cut open at the Site. The metal-contaminated acid was drained into the on-site storage pond. The recovered lead (and lead compounds) was then separated and also stored on-site prior to transport. The battery casings were subsequently shredded and stored on the Site in unlined piles. Waste generated by the operation was located throughout the Site and included lead sulfide, lead and other associated heavy metals, plastic battery casings, and sulfuric acid.

According to the EPA (USEPA 1987a), in 1982, the company detected high lead levels in an on-site monitoring well, in soils to a depth of 2 feet, and in drainage ditches leading to the James River. Portions of the James River within three miles downstream of the Site are used for recreation and designated as wetlands by the Service. An estimated 1,200 people draw drinking water from private wells that tap the contaminated aquifer within three miles of the Site.

The Commonwealth of Virginia took the first of numerous enforcement actions at the Site on March 28, 1979. The Water Control Board issued an Administrative Order requiring a cleanup plan. On December 3, 1984, Virginia issued a court order requiring a cleanup plan, construction of a treatment plant, and reclamation of the Site.

The Virginia Occupational Safety and Health Administration (OSHA) also had extensive involvement with the Site. During its first inspection in 1983, numerous OSHA violations were noted. Monitoring of the breathing zone at several work stations indicated lead well above the lead standard. In addition, some company employees were found to have elevated levels of lead in their blood. In 1985, Chesterfield County enjoined C & R Battery from further operation due to OSHA violations.

The Site was placed on the National Priorities List (Superfund) in July 1987 (USEPA 1987b).

Using CERCLA removal funds, EPA took emergency action at the Site. Soils and pools on the site were limed to reduce acidity, some contaminated soils were excavated and stored pending final disposal, drainage controls were installed, and the Site was graded, capped, and partially fenced. In 1986, the EPA removed the acidic liquid from the pool and blended the lagoon sludge with hydrated lime. Soils were disked and mixed with lime to a depth of two feet in most areas. The drainage ditch was graded and rip-rapped channels and dams were installed to reduce erosion. A six-foot high chain link fence was installed inside the tree line; however, the contamination extends beyond the fenced area. Average pH ranged from 4.0 to 4.6 in the upper ten feet of the soil column with some pH values as low as 2.8.

1.3.2 Overview of the James River Watershed

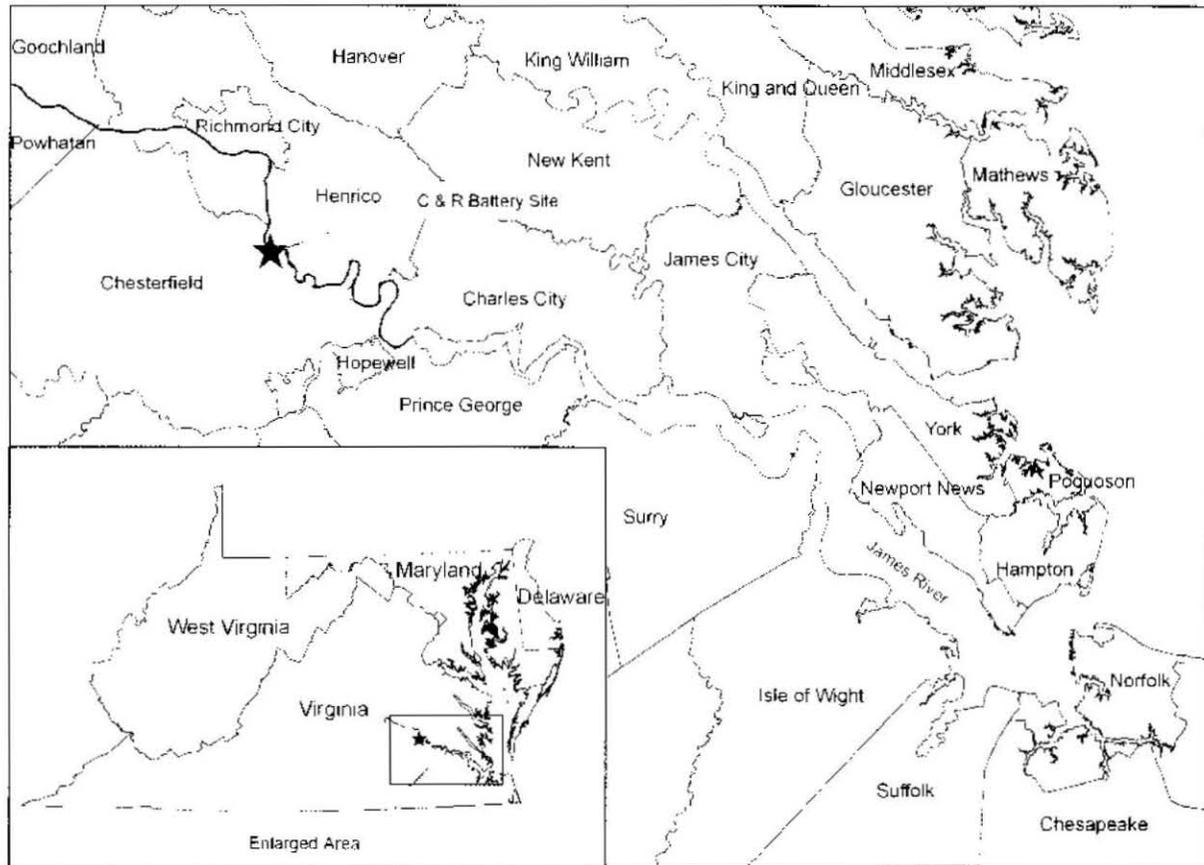
The James River is Virginia's largest river, flowing across the entire state from its beginning at the headwaters of the Cowpasture and Jackson Rivers in Bath and Highland Counties, to its mouth at the Chesapeake Bay in Hampton Roads. The James River is over 340 miles long, making it one of the longest rivers in America that begins and ends within the same state. The James River watershed encompasses approximately 10,000 square miles, which makes up almost 25% of the state. It is home to one-third of all Virginians who live in its 39 counties and 19 cities and towns, and touches the lives of more Virginians than any other feature on the landscape. The watershed is comprised of three sections. The Upper James begins in Allegheny County and travels through the Allegheny and Blue Ridge Mountains until Lynchburg. The Middle James runs from Lynchburg to the Fall Line in Richmond, while the Lower James stretches from the Fall Line in Richmond to the Chesapeake Bay (JRA 2007). The Site is situated in Lower James below the Fall Line just downstream from the City of Richmond.

1.4 Natural Resource Injury Summary

Natural resource injury is defined under 43 CFR 11.14 as "... a measurable adverse change, either long- or short-term, in the chemical or physical quality or the viability of a natural resource resulting either directly or indirectly from exposure to a ... release of a hazardous substance, or exposure to a product of reactions resulting from the ... release of a hazardous substance." Injuries to biological resources include death, behavioral abnormalities, cancer, genetic mutations, physiological malformations (including malfunctions in reproduction), and physical deformation [43 CFR 11.62 (f)]. Biological resources may also be injured when they contain hazardous substance concentrations that exceed action or tolerance levels under federal or state laws regulating human consumption. Injury to surface and ground water resources is defined to include concentrations of hazardous substances in the water or sediment of sufficient concentrations to have caused injury to other natural resources, such as biological resources [43 CFR 11.62 (b) & (c)].

Injuries to trust resources were not quantified at the Site, however the potential for adverse effects exists due to the type of contamination, and the physical and chemical properties of the contaminants (see below 1.4.1). Migratory birds, including ducks, geese, hawks and warblers, have ranges that include the Site, and the James River near the Site supports 56 species of fish, including the federally endangered shortnosed sturgeon, *Acipenser brevistrum*, two species of mussel and eight species of crayfish (USEPA 1994b). These species were likely impacted by elevated levels of lead and other contaminants present in soil, sediment and water, as well as by the loss of wooded habitat.

Figure 1. – Location of C & R Battery NPL Site



1.4.1 Physical and Chemical Effects

The contaminants of concern released from the Site include lead, cadmium, arsenic, antimony and nickel. The release of these hazardous substances negatively impacted surface waters and sediments within the James River for several miles downstream. It is highly probable that these contaminants caused injury to trust resources.

Lead

Lead is the primary contaminant and was measured on Site in concentrations orders of magnitude higher than the other contaminants. The affected media were soil, sediment, and surface water. During remedial work, EPA and the Trustees identified the potential for contaminants to migrate off Site to the James River. Lead is a mutagen and a teratogen, and when absorbed in excessive amounts, has carcinogenic or co-carcinogenic properties, interferes with resistance to infectious diseases and impairs reproduction, liver and thyroid function (EPA, 1979). Of great concern is that continuous exposure to low concentrations of the metal, as a result of widespread environmental contamination, may result in severe adverse effects (Nriagu 1978). The lead cation is relatively insoluble and exhibits a high level of adsorption to clay rich soils such as those present in the upper 20 feet of soil at the site. Site soils below 20 feet are predominately sand and silt. Sand generally exhibits a significantly lower adsorption capacity than clay. Lead may be directly taken from the soil by plants and soil organisms such as earthworms, and may be potentially hazardous to wildlife food chains (Helmke *et al.* 1979; Beyer *et al.* 1990).

Lead concentrations ranged from 16,000 to 122,000 mg/kg (milligram per kilogram) in on-site surface soil samples. Subsurface soil samples contain lead ranging from 15,000 to 79,400 mg/kg. The surface water sample from the drainage ditch exhibited a dissolved lead concentration of 2,210 ug/L (microgram per liter) and a total lead concentration of 2,260 ug/L. The groundwater monitoring well samples had total lead concentrations ranging from no detection to 2.130 ug/L at the down-gradient well.

Arsenic

Arsenic is a teratogen and carcinogen that can traverse placental barriers and produce fetal malformations and death in many mammal species (Eisler 1988a). The chemistry of arsenic is complex. Arsenic may exist by forming many different compounds. Although the pentavalent (V) state of arsenic is less toxic than trivalent (III) state, higher organisms reduce pentavalent arsenic to its more toxic trivalent state when it is not excreted (Goyer 1986). The environmental fate of arsenic is also complex. Once arsenic is in the soil, its mobility is controlled by adsorption/desorption processes. Clays, iron oxides, manganese compounds and organic matter absorb arsenic, serving as sinks and making it unavailable to the biota (ATSDR 1987). Thus, arsenic concentrations in soil are generally elevated compared to levels found in overlying water.

The water column is, however, the most mobile transport mechanism for arsenic bound sediments (Goyer 1986). Elevated levels of arsenic in soil raise some concern since plants readily uptake arsenic via their roots (ATSDR 1987).

Arsenic is a bio-accumulative poison. Even in areas where arsenic levels are not high, there is potential for detrimental effects to wildlife. Animals may be exposed to arsenic through ingestion, inhalation, dermal absorption, and through drinking water (Menzer and Nelson 1986; Keystone 1990). Wildlife, such as birds and small mammals, feeding on invertebrates and plant matter contaminated with arsenic may exhibit chronic effects from concentrations lower than the suggested criteria due to bioaccumulation.

The surface soil samples showed arsenic concentrations ranging from 2.9 to 60 mg/kg, and the subsurface samples ranged from 2.6 to 50 mg/kg. The surface water sample from the drainage ditch exhibited total dissolved arsenic concentrations of 4.4 ug/L. The dissolved arsenic concentrations from the monitoring wells ranged from no detection to 5.1 ug/L. The levels for total arsenic in the groundwater samples ranged from 7 to 412 ug/L.

Antimony

Antimony is a mutagen and has been associated with an increase in respiratory cancer. The available data for antimony indicates that acute and chronic toxicity to freshwater organisms occurs at concentrations as low as 9,000 ug/L, and 1,600 ug/L respectively (and may occur at lower levels in some organisms). Antimony exerts toxic effects on the respiratory system, reproduction, development, and to most of the major organs in the body (EPA 1980a).

Antimony concentrations in the surface soil at the Site ranged from 38 to 6,410 mg/kg and subsurface concentrations ranged from 31 to 210mg/kg. Total antimony concentrations in the groundwater monitoring wells ranged from no detection to 86.2 ug/L.

Nickel

The toxicity of nickel is a function of the chemical form of the element and the route of exposure. Exposure via inhalation, maternal transfer, and cutaneous contact are of greater significance than ingestion. Mammalian cell transformation data indicate that several nickel compounds are mutagenic and can cause chromosomal damage. Nickel is considered a carcinogen with relation to respiratory cancers.

The dissolved concentrations of nickel in the monitoring wells ranged from no detection to 331 ug/L. The total nickel concentration for the monitoring wells ranged from 325 to 1,110 ug/L. The surface water sample from the drainage ditch showed a dissolved nickel concentration of 44.8 ug/L. The total concentration for nickel in the drainage ditch surface water sample was 43.4

ug/l. Surface soil and subsurface soil concentrations for nickel ranged from 12 to 44 mg/kg and from 12 to 47 mg/kg respectively.

Cadmium

Cadmium, a known carcinogen and teratogen, and probable mutagen, has been implicated as the cause of severe deleterious effects on fish and wildlife. There is no evidence that cadmium is biologically essential or beneficial. Freshwater biota is considered the most sensitive to cadmium. Water column concentrations between 0.8 and 9.9 ug/l. are lethal to aquatic insects, crustaceans, and fish. Concentrations between 0.7 and 5.0 ug/L are associated with chronic effects such as decreased growth and inhibited reproduction in certain freshwater biota. Mammals and birds are comparatively resistant to cadmium. However, there is some evidence that wildlife populations, especially migratory birds, which feed on crops grown on contaminated soil, may be exposed to considerable risk of harmful effects from cadmium (Eisler 1985).

The surface soil concentration for cadmium at the Site ranges from 1.4 to 31 mg/kg and the subsurface concentration ranges from 1.2 to 11 mg/kg. Monitoring well concentrations for total cadmium ranged from no detection in one well to 130 ug/l. in another. The dissolved concentrations ranged from no detection to 8.2 ug/l. For the surface water sample from the drainage ditch, the total concentration for cadmium was 26.9 ug/L and the dissolved concentration was 30.2 ug/L (USFWS 1991).

1.5 Natural Resources Compensation

In 1998, pursuant to the settlement with *de minimis* responsible parties, the DOI NRDAR Program Fund received a lump sum of \$63,523 for certain administrative expenses and to compensate the public for restoration of injuries resulting from the release(s). These funds were placed in an interest bearing account that is managed by the DOI NRDAR Program Office. As of December 2008, with interest and minus restoration planning costs, an amount of \$78,590 is available for restoration implementation. By law, the remaining settlement recovery, including interest, can only be used for the specific restoration, rehabilitation, replacement, or acquisition of equivalent natural resources injured or potentially injured by the spill and for the planning, implementation oversight, and monitoring of restoration projects related to this release.

1.6 Purpose of the Proposed Action

The purpose of the proposed restoration plan is to restore, rehabilitate, replace, and/or acquire the equivalent of any natural resources injured or destroyed by the chemical spill, pursuant to the requirements of the Consent Order, and applicable state and federal laws and regulations.

1.7 Need for the Proposed Action

The proposed action is needed to facilitate the restoration and recovery of natural resources injured as a result of the chemical release(s).

1.8 Public Notification and Review

The Service believes that public comment and input is a critical aspect of a successful restoration. A notice of availability of the draft Restoration Plan and Environmental Assessment (RP/EA) was published in the *Richmond Times-Dispatch* on July 25, 2008 and a thirty day public comment period ended on August 25, 2008. Where appropriate, the Service has made changes to the RP/EA by incorporating concepts and ideas submitted by interested parties during the public comment period. Comments and suggestions received by the Trustee are addressed in Section 6 of this final RP/EA.

2.0 REVIEW OF CONSIDERED RESTORATION ALTERNATIVES

In developing the RP/EA, the NEPA requires that the Trustees consider possible restoration alternatives. The NRDAR regulations also provide procedures and criteria for developing and evaluating restoration alternatives. Section 2.2 explains the criteria for identifying and evaluating alternatives. Section 2.3 reviews restoration alternatives previously publicly considered. The proposed preferred restoration alternative is identified and expanded upon in Section 2.4.

2.1 Definition of Key Terms and Concepts

To provide perspective on the restoration planning methodologies presented in this final RP/EA, the following key terms and concepts are defined and discussed.

Restoration refers to actions undertaken to return an injured resource to its baseline condition as measured by the services provided by that resource [43 CFR § 11.14 (ll)]. Restoration includes rehabilitation, replacement, or acquisition of resources or services.

Restoration or rehabilitation actions are those actions undertaken to return injured resources to baseline condition, as measured in terms of the physical, chemical, or biological properties that the injured resources would have exhibited or the services that would have been provided by those resources had the discharge of oil or release of the hazardous substance under investigation not occurred. Restoration can be accomplished by restoring or rehabilitating resources or by replacing or acquiring the equivalent of the injured natural resources and their services [43 CFR § 11.14 (ll)].

Replacement or acquisition of the equivalent means the substitution for injured resources with resources that provide the same or substantially similar services, when such substitutions are in addition to any substitutions made or anticipated as part of response actions and when such substitutions exceed the level of response actions determined appropriate to the site pursuant to the NCP [43 CFR § 11.14 (a)].

Baseline refers to the conditions that would have existed in the assessment area had the release of hazardous substances not occurred [43 CFR § 11.14 (e)]. The Service's estimate of baseline seeks improvement of water quality and other riparian services commensurate with those lost to the release(s) of hazardous substances from the Site.

Services are defined as the "physical and biological functions performed by the resource, including the human uses of those functions" [43 CFR § 11.14 (nn)]. Restoration should be

distinguished from *remediation or response actions* undertaken pursuant to CERCLA or the NCP.

2.2 Criteria for Identifying and Evaluating Restoration Alternatives

The primary restoration goal is to restore riparian service functions in a ratio that approximates baseline conditions. Under authorities outlined in Section 1, the Service will consider restoration actions within the James River watershed in the vicinity of the Site. With this general goal in mind, the Service will attempt to also achieve the following primary compensable restoration objectives:

- increase survival probabilities for migratory fish and birds in the restoration area(s);
- improve prey base and nesting habitat for bald eagles;
- improve water quality by reducing riverbank erosion;
- improve the quality of bed and bank sediments; and
- improve and protect riparian buffer habitats.

The proposed preferred restoration alternative seeks a set of actions that achieves these objectives in a coordinated and cost-effective manner. By undertaking restoration activities, the Service hopes to also achieve the added benefit of restoring/enhancing the public's ability to use and enjoy the restored resources, including the enhancement of local eco-tourism. The preferred restoration alternative will restore, rehabilitate, replace, or acquire the equivalent of the injured resources. Unless otherwise indicated, the term "restoration" is used to refer generally to any and all of these types of actions (i.e., restore, rehabilitate, acquire, etc.). The proposed preferred restoration alternative consists of actions, individually or in combination, that would achieve those purposes through site-specific projects. These actions reflect a combination of restoration or rehabilitation management activities and opportunities for resource replacement or acquisition.

Drawing upon the factors within the DOI NRDAR regulations and DOI policy for selecting restoration alternatives, the Service must select a preferred restoration alternative based upon consideration of the following factors:

- closeness of nexus between the restoration activity and the injuries;
- degree to which restoration activity will directly benefit injured resources;
- technical feasibility;
- relationship of the expected costs of the proposed actions to the expected benefits from the restoration action, including amount of desirable functions restored and ecological benefit to the surrounding watershed;

- cost-effectiveness;
- potential for additional injury resulting from the proposed actions, including long-term and indirect impacts, to the injured resources or other resources;
- ability of the resources to recover with or without alternative actions;
- potential effects of the action on human health and safety;
- consistency with relevant federal and state policies; and,
- compliance with applicable federal and state laws.

The proposed preferred restoration alternative described herein is based on conceptual plans for which some costs have been estimated. The size and design of the recommended restoration actions may change based on additional public input and/or additional scientific findings. If, during implementation, the Service determines that significant changes are appropriate to the selected restoration alternative, or if the amounts of funding described in this plan are shifted significantly among the various components of the selected alternative, additional public review and comment may be sought. No restoration activities will be conducted by the Service that would incur ongoing expenses in excess of those that can be funded by settlement monies and/or the interest there from, unless such additional monies are allocated through the normal budget process.

2.3 Restoration Alternative 1: No Action Alternative

No-action/natural recovery (with monitoring) must always be considered in the environmental analysis, and should be chosen when it provides greater environmental benefits than other alternatives. For purposes of this discussion, the no-action alternative assumes that no direct environmental restoration action will be undertaken by the Service.

This alternative is being evaluated to fulfill requirements under NEPA, and is consistent with the damage assessment process under the NRDAR regulations. Under this alternative no action would be taken to restore resources injured due to contamination within the James River watershed or to replace or acquire additional natural resources to restore ecological and human services provided by the injured resources. The funds recovered for the natural resource damages claim for the site would not be spent. Restoration of the resource and resource function would be completely dependent upon natural processes. This alternative is technically feasible, has no cost, but would result in no benefit from the funds specifically recovered for restoration.

2.4 Restoration Alternative 2: Property Acquisition

This alternative would potentially seek to purchase property for perpetual protection. One such potential parcel is the "Blair's Wharf" property that is located directly along the James River.

downstream of the Site. This property is surrounded by the James River National Wildlife Refuge (JRNWR) on three sides, and the James River on the fourth.

Blair's Wharf is a 125-acre tract with nearly one mile of shoreline on the James River and is surrounded by the 4,200-acre JRNWR in Prince George County, Virginia. The property is vegetated primarily in hardwoods and pines, providing excellent habitat for bald eagles and other priority birds. The JRNWR was established in 1991 under the Endangered Species Act to protect nationally significant habitat for bald eagles (*Haliaeetus leucocephalus*). The Refuge and Blair's Wharf shoreline contribute to one of the east coast's premier eagle roosting sites. Both Blair's Wharf and the JRNWR are part of the Lower James River Important Bird Area (IBA) as designated by the National Audubon Society, a site which covers approximately 20 river miles of the James. Blair's Wharf supports many of the same flora and fauna as does the JRNWR, which is the largest contiguous tract of protected land in the IBA. Widely known as a bald eagle stronghold within Virginia, this IBA also supports one of the densest piscivorous bird communities in Virginia (eagles, osprey, herons, egrets, and cormorants). The Lower James River IBA is recognized as one of the largest bald eagle roosting areas east of the Mississippi because it typically supports hundreds of roosting eagles each year. It also supports one of the densest breeding populations in the mid-Atlantic. As one of only four National Wildlife Refuges created to protect bald eagles, JRNWR currently has three active bald eagle nests.

The "Blair's Wharf" property is privately owned and is being represented by a local real estate agent. This property is on the market for approximately \$3.9 million dollars. This alternative is technically feasible and would result in significant restoration benefit, but is cost-prohibitive for the available NRDAR funds unless other funds are obtained. In the fiscal year 2008 federal budget, Congress made \$1.6 million available for land protection at Blair's Wharf. Rescissions have reduced the appropriated amount by \$25,000. The Conservation Fund is currently negotiating with the landowner on behalf of the Service. Should an agreement to purchase the property be reached, the Conservation Fund and other partners would request additional appropriations to cover the cost of acquisition. If total appropriated funds are insufficient to fully reimburse the Conservation Fund for the acquisition costs of this property, NRDAR funds could be appropriately and effectively used to cover potential shortfalls.

2.5 Restoration Alternative 3: Habitat Restoration on the Presquile National Wildlife Refuge

2.5.1 River Bank Stabilization/Erosion Control Projects

River bank stabilization specifically meets the restoration goals outlined in Section 2.2. Extant bank stabilization structure(s) along the southern shore of the Presquile National Wildlife Refuge

(PNRW) are designed to stem bank sloughing and erosion. These structures need maintenance and upgrading to improve efficacy and better help stabilize the riverbank to prevent further loss of material in the James River. This will also improve water quality by reducing siltation caused by storm events. The channel along the southern side of the refuge is a heavily used shipping channel, many large marine vessels use this channel and the wake resulting from these large ships also causes water to get through the current bulkhead and remove material from the island.

Another restoration project alternative would be to increase riparian tree planting and buffer width along the southern and western borders of PNWR. These two banks are extremely steep, and major flood events may scour out the bottom part of the bank causing the top parts of the bank to collapse, resulting in major loss of the material from the PNWR. These erosional processes greatly degrade the water quality in the area. The planting of riparian tree species would help to stabilize the banks while also providing a value to wildlife. The tree species were chosen on their ability to survive in rocky/sandy soils and also provide wildlife value. The PNWR hosts nesting bald eagles, and the tree planting would provide future nest sites for this species as well as providing habitat for a number of other species. The James River Association, Alliance for the Chesapeake Bay, Richmond Chapter Audubon and National Audubon, in association with the Service, have planted, and are currently maintaining, over 20 acres of trees along the southern and western shores of the refuge as a riparian buffer. These funds will help widen this buffer, increasing the integrity of the shoreline stabilization.

An additional restoration action that may improve the likelihood of riparian buffer planting success on PNWR is to increase control of invasive plant species on PNWR. Johnson grass (*Sorghum halepense*) and Canada thistle (*Cirsium arvense*) are the main intruders on the island, and chemical and additional mechanical control will help keep these species at bay and promote the growth of native species with a greater wildlife value. The refuge was originally established to protect habitat for wintering waterfowl and other migratory birds and this action will help improve habitat, making it more suitable for these species.

2.5.2 Environmental Educational Outreach

Community environmental educational outreach at PNWR and/or JRNWR would focus us on preserving the values of the James River watershed by providing the public with the information such as:

- history and status of various threats (e.g., spills);
- general information on the importance of preserving biodiversity in this unique region;
- biological requirements of the species inhabiting the James River;
- restoration and conservation management strategies; and,
- roles of the natural resource agencies and private citizens groups.

These proposed activities will provide outreach to the public through distribution of information at schools, various organizational meetings, media events, and through communication with individuals in the watershed. Information could be tailored to meet anticipated needs of various audiences. These actions could also include the development of interpretive signs that would be placed along the current trail system on PNWR. This signage would educate the public about the importance of riparian buffers and water quality.

2.6 Environmental Consequences of the Proposed Restoration Alternatives

2.6.1 Environmental Consequences of Proposed Restoration Alternative 1: No Action Alternative

This alternative proposes that no action would be taken to restore or rehabilitate resources injured due to contamination within the James River watershed or to replace or acquire additional natural resources to restore ecological and human services provided by the injured resources. Presumably restoration would occur naturally over a significant period of time. Although this alternative is technically feasible and has no cost, it would result in no benefit from the funds specifically recovered for restoration and an uncertain environmental consequence.

2.6.2 Environmental Consequences of Proposed Restoration Alternative 2: Property Acquisition

This alternative proposes to purchase the "Blair's Wharf" property downstream of the Site for perpetual protection. The property would provide breeding, wintering and migratory stopover habitat for birds, including eagles, osprey, herons, egrets, and cormorants. This alternative will restore, rehabilitate or replace similar resources that existed prior to injury and provide perpetual protection of these resources. This alternative is technically feasible and would result in significant restoration benefit, but is cost-prohibitive for the available NRDAR funds unless other funds are obtained.

2.6.3 Environmental Consequences of Proposed Restoration Alternative 3: Habitat Restoration on the Presquile National Wildlife Refuge

This alternative proposed to implement river bank stabilization/erosion control projects and environmental educational outreach projects on Presquile National Wildlife Refuge. This alternative is proposed in accord with the language contained within the Consent Order that requires that recovered funds shall be used to compensate the public for "... natural resource damages ... " resulting from releases from the Site. This alternative will restore, rehabilitate, or

replace similar resources that existed within the James River watershed prior to the injury, and will provide those resources with long-term protection on federal lands. The benefits of the proposed activities are in line with expected costs. The proposed actions use an integrated natural resource management approach intended to maximize restoration and minimize unforeseen losses to natural forces such as drought, floods, disease, or impacts from normal human uses. The net benefit realized would be the restoration and rehabilitation of a yet-to-be-determined number of acres of riparian habitat, the reestablishment of the full potential of ecological services provided by that habitat, and the general improvement of the James River ecosystem quality. The beneficiary of these actions will be the people of Chesterfield County, Virginia, the people of the Commonwealth of Virginia, and the people of the United States through the improvement of the cultural, aesthetic, ecological, economic, intrinsic, and scientific values of the James River.

2.6.3.1 Environmental Consequences of River Bank Stabilization/Erosion Control Projects

River bank stabilization and erosion control activities may include, but need not be limited to, the implementation of best management practices, stream bank stabilization, riparian buffer planting, and permanent riparian protection. These actions either replace lost resources or provide additional natural resources and natural resource services by providing protection and enhancement for riparian areas within the Lower James River watershed. Such activities will provide the potential for restoration, rehabilitation, enhancement, protection, or creation of the functions of sustainable vegetated riparian buffers. Further, selected lands may contain desirable natural resources possessing the potential for protection, buffering, or otherwise supporting the ecological development, maturation, function, or sustainability of desirable habitats within the surrounding watershed. These actions facilitate the buffering of environmental impacts associated with urban, agricultural, resource extraction practices, and suburban development within the watershed.

The consequence of river bank stabilization and erosion control activities is the restoration and preservation (in perpetuity) of riparian areas, a rapidly vanishing and valuable natural resource of Chesterfield County, Virginia. The expected cost of river bank stabilization and erosion control activities is believed to be commensurate with current market values and availability. Riparian restoration actions are not expected to create the potential for causing additional injury to the natural resources within the watershed. In addition, these actions are not expected to have any adverse impact on human health and safety. It is the intent of the Service to maximize the benefits in relation to the cost of restoring riparian areas within the watershed. The necessity and magnitude of restoration activities and costs required to achieve management objectives will be determined on a site-specific basis. Since the projects proposed are primarily designed to

improve and protect degraded habitats for fish and wildlife, the cumulative environmental consequences of these actions will be beneficial.

2.6.3.2 Environmental Consequences of Environmental Education Outreach

It is crucial to the overall success of restoration actions that residents of the watershed be apprized of ongoing restoration actions, as well as the scope, goals, and reasons for those actions. The natural resources at issue are managed in trust for the continuing benefit of the public. The net benefits of this action include the enhancement of the public's general natural resource knowledge, the development of educational tools designed to promote public protection and conservation of natural resources, and the installation of a sense of civic responsibility for those resources. Therefore, the environmental consequences of providing educational outreach to the public must also be considered to be decidedly positive. It should be noted that, while these benefits are indirect, community educational outreach is appropriate under the review criteria as an adjunct activity that improves the value of the core restoration and habitat protection activities.

3.0 PROPOSED PREFERRED RESTORATION ALTERNATIVE - Restoration Alternative 3: Habitat Restoration on the Presquile National Wildlife Refuge

Implementation of the habitat protection and enhancement measures as described in Restoration Alternative 3: Habitat Restoration on the Presquile National Wildlife Refuge can restore the natural riparian structure and function, reduce nutrient and sediment input, provide organic debris as energy source, moderate and restore naturally occurring temperature regimes, and enhance natural recovery of biota. These activities will help to improve water quality, riparian habitat functions and bald eagle recovery to restore this small portion of the watershed to its approximate pre-spill condition. Specific types of riparian habitat protection and enhancement measures that can maximize the recovery of injured resources, yet provide flexibility for implementation, include: riparian buffer planting, stream bank stabilization and natural stream channel design, implementation of best management practices (BMP), and long-term protection of riparian areas.

The selection of any form of habitat protection and/or agriculture/forest BMP implementation as a viable restoration alternative must be based upon the supposition that concomitant water quality improvement would occur with each restoration project. Implementation of non-point runoff control BMPs within the James River watershed can include specific activities such as establishing or improving stream-side buffer vegetation, stabilizing eroding stream banks, and construction of sedimentation control structures as outlined in Section 2.5.1. Riparian habitat

protection projects provide great potential to restore riverine habitats and facilitate the recovery of fauna within impacted watersheds (Sweeney 1993).

Improving riparian buffer zones and working with landowners such as the PNWR on implementing BMPs within the James River watershed in the vicinity of the Site will provide the benefit of improving water quality and the overall health of the aquatic ecosystem. Habitat protection measures considered in "Alternative 3" will enhance water quality and habitat for a wide variety of trust resources. This alternative also provides a significant level of flexibility to restoration/refuge biologists in that a specified suite of habitat restoration and outreach options can be selected in order to optimize restoration a restoration program at PNWR. Finally, implementation of projects on National Wildlife Refuge tracts ensures long-term success as these lands have been set aside in perpetuity.

3.1 Estimated Costs of the Proposed Preferred Restoration Alternative

Specific habitat enhancement and protection actions have not yet been determined, but may include a variety of management actions such as those outlined in Section 2.5. NRJAR staff and PNWR staff will work closely to determine the most beneficial ratio of fund expenditure on each proposed restoration action proposed for PNWR. The Service proposes that the entire remaining sum of approximately \$76,591 be allocated to habitat protection and enhancement projects at the PNWR over the next 3 to 5 years.

4.0 ENVIRONMENTAL COMPLIANCE AND CONSEQUENCES

Addressing the potential effects of restoration alternatives is required under NEPA. This section discusses how the Service will comply with certain environmental regulations and describes the potential benefits and consequences of the actions of the preferred alternative.

4.1 Compliance with Other Environmental Regulations

4.1.1 National Historic Preservation Act

For any restoration actions considered, the potential to affect cultural resources, such as prehistoric and historic resources, Native American remains and cultural objects, will be determined early in project planning. To this end, the procedures in 36 CFR 800 implementing Section 106 of the National Historic Preservation Act of 1966, as amended (16 U.S.C. 470 *et seq.*), requirements of the Native American Graves Protection and Repatriation Act of 1990, as amended (25 U.S.C. 3001 *et seq.*), and policies and standards specified in the Fish and Wildlife Service Manual 614 FW 1-5 will be followed.

4.1.2 Virginia Erosion and Sedimentation Law

In Virginia, there are approximately 170 local erosion and sediment control programs. They work to prevent soil erosion, sedimentation, and runoff from land-disturbing activities. These problems can damage public and private properties, waters, stream channels, and other natural resources. One way Virginia Department of Conservation and Recreation and local government employees fight erosion and sedimentation is by implementing the Virginia Erosion and Sediment Control (ESC) Law. Virginia was one of the first states to tackle this problem. The ESC law encourages land developers to consider soil erosion and sediment control a routine part of development. Local authorities must approve a riparian project's erosion and sediment control plan before land can be cleared or excavated. Clearly, erosion and sediment control practices and principles help owners protect their land and water resources. Some agricultural practices and engineering operations, along with other activities such as mining and silviculture, are exempt. Projects disturbing less than 10,000 square feet are usually exempt unless a local ordinance has lowered that limit. This information will be forwarded to restoration project proponents for consideration.

4.1.3 Solid and Hazardous Waste Management

Any soil or sediment that is suspected of contamination, or wastes that are generated, must be tested and disposed of in accordance with applicable federal, state, and local laws and regulations. This applies to soils that are disturbed by restoration endeavors contemplated in the RP/EA. The VDEQ does not suggest that additional soils be removed. The laws which might apply to contaminated soils encountered in RP/EA implementation include, but are not limited to, the Virginia Hazardous Waste Act (*Virginia Code* sections 10.1-1400 *et. sec.*), the Virginia Hazardous Waste Management Regulations (9 VAC 20-60), and the Virginia Regulations for the Transport of Hazardous Materials (9 VAC 20-110). This information will be forward to restoration project proponents for consideration.

4.1.4 National Environmental Policy Act Compliance

CERCLA and NEPA require the Trustees to assess and disclose the potential effects of restoration alternatives. Chapter 2.0 discusses the environmental consequences of each alternative, and evaluates each alternative according to the criteria for identifying and evaluating restoration alternatives discussed in Section 2.2. Based on this evaluation, the Service has determined that the selected restoration actions do not meet the threshold requiring an Environmental Impact Statement (EIS) and a Finding of No Significant Impact (FONSI) has been issued.

5.0 SUMMARY

In summary, in order to achieve the above stated objectives, the Service will implement the following actions contained within the selected restoration alternative:

- enhancement and protection of riparian areas, in perpetuity;
- bank stabilization and erosion control on PNWR;
- implementation of a local public educational outreach plan; and,
- restoration monitoring and administrative oversight.

A further inferred action of the selected alternative promotes restoration and protection of natural resources by cost-sharing with PNWR and non-governmental organizations for selected projects. The Service will provide funding, consistent with applicable laws and regulations, to projects that satisfy criteria of the CD and that acquire, restore, rehabilitate, or enhance trust species populations within the James River watershed. This action will assist in replacing the ecological services lost to the release(s) of hazardous substances at the Site. This action will also facilitate buffering the impacts of normal human activities within the watershed, will preserve, protect, and maintain the quality of surface waters entering the James River, and will promote cooperation between the PNWR and local communities to mutually preserve and conserve the resources of the Lower James River watershed.

The Service believes that the actions contained within the proposed preferred alternative represent cost-effective, practical, and beneficial means by which to restore or replace the natural resources injured and the services they provided. All specific work plans, including any additional NEPA analysis developed for implementation of specific projects will be made available for public review upon request.

6.0 COMMENTS RECEIVED ON THE DRAFT RESTORATION PLAN

The Service received no comment letters from public entities. Other editorial and organizational comments provided from various sources have already been incorporated into the text of this document.

7.0 MONITORING AND CORRECTIVE ACTION MEASURES

A monitoring plan and corrective action measures will be an integral part of specific restoration actions contained within the proposed preferred alternative. The specific restoration actions presented in the Final RP/EA will be biologically monitored. For riparian projects this could include monitoring vegetation survival in restored/enhanced habitats or other faunal responses. Evaluation and corrective action techniques, time tables, and allocation of funding for the monitoring and corrective action portion of any project are considered to be site-specific. Selected restoration projects may include specific monitoring and corrective action components within written agreements and will be publicly available.

8.0 LIST OF AGENCIES, ORGANIZATIONS, AND PARTIES CONSULTED FOR INFORMATION

Northeast Regional Office, Hadley, MA, U. S. Fish & Wildlife Service
Virginia Field Office, U. S. Fish and Wildlife Service
Virginia Department of Game and Inland Fisheries
Department of the Interior, Office of the Solicitor
Virginia Department of Environmental Quality
James River Association

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