

FINAL
RESTORATION PLAN AND
ENVIRONMENTAL ASSESSMENT
FOR THE
CERTUS CHEMICAL SPILL
NATURAL RESOURCE DAMAGE ASSESSMENT

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Region 5
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and

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PREFACE

“When we try to pick out anything by itself, we find it hitched to everything else in the universe.”

John Muir

EXECUTIVE SUMMARY

On August 27, 1998, a tanker truck overturned on U.S. Route 460 in Tazewell County, Virginia. The truck released approximately 1,350 gallons of Octocure 554-revised, a rubber accelerant, into an unnamed tributary about 530 feet from its confluence with the Clinch River. The spill turned the river a snowy white color and caused a significant fish kill. The spill also killed most aquatic benthic macroinvertebrates for about seven miles downstream and destroyed one of the last two known remaining reproducing populations of the endangered tan riffleshell mussel. A consent decree was entered with the U.S. District Court for the Western District of Virginia, Abingdon Division by the United States and Certus, Inc. on April 7, 2003, to address natural resource damages resulting from the 1998 release. The consent decree required that Certus Inc., pay \$3,800,000 to the Department of Interior Natural Resource Damage Assessment and Restoration (NRDAR) Fund. The consent decree stipulates that these funds are to be “...managed by the DOI for the joint benefit and use of the Federal and State Trustees to plan, perform, monitor and oversee native, freshwater mussel restoration projects within the Clinch River watershed...”

Under the authority of the Comprehensive Response, Compensation and Liability Act of 1980, as amended (CERCLA), 42 U.S.C. 9601 *et. seq.*, “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 Restoration Plan and Environmental Assessment (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.

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ACRONYMS AND ABBREVIATIONS

AP	assessment plan
AWCC	VDGIF Aquatic Wildlife Conservation Center at Buller Hatchery, Marion, VA
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
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
ESC	Virginia Erosion and Sediment Control Law
Fed. Reg.	Federal Register
FWS	U.S. Fish and Wildlife Service
HU	hydrologic unit
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NEPA	National Environmental Policy Act
NPL	National Priorities List
NRDA	natural resource damage assessment
PACF	Patuxent Analytical Control Facility
PRP	potentially responsible party
RCDP	Restoration and Compensation Determination Plan
RP/EA	Restoration Plan and Environmental Assessment
SHPO	State Historic Preservation Office
TVA	Tennessee Valley Authority
UTRB	Upper Tennessee River Basin
VAFO	U.S. Fish and Wildlife Service, Virginia Field Office
VDGIF	Virginia Department of Game and Inland Fisheries
VDEQ	Virginia Department of Environmental Quality
VA Tech	Virginia Polytechnic Institute and State University

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 Certus Chemical Spill Natural Resource Damage Assessment and Restoration (NRDAR) case. The U.S. Fish and Wildlife Service (Service) and the Commonwealth of Virginia (jointly referred to as Trustees) have prepared this RP/EA to address and evaluate restoration alternatives related to natural resource injuries within the Clinch River watershed. The purpose of this RP/EA is to select a preferred restoration alternative 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 spill. Funds to accomplish such actions were collected as natural resource damages for injuries, pursuant to the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA).

1.1 Authorities

The Department of the Interior (DOI) acting through the Service evaluated damages to natural resources that resulted from the August 27, 1998, release of hazardous substances to the Clinch River watershed in Tazewell 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 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 accordance with 42 U.S.C. 9607(f)(2)(B) and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 C.F.R. Part 300.600, the Secretary of Natural Resources for the Commonwealth of Virginia (Secretary) has been designated as the natural resource trustee by the Governor of the Commonwealth of Virginia.

A Consent Decree (CD) was entered by the U.S. District Court for the Western District of Virginia, Abingdon Division by the United States and Certus on April 7, 2003, to address natural resource damages resulting from the 1998 release. The CD required that Certus pay \$3,800,000 to the DOI NRDAR fund. The CD stipulates that these funds are to be "...managed by the DOI for the joint benefit and use of the Federal and State Trustees to plan, perform, monitor, and oversee native, freshwater mussel restoration projects within the Clinch River watershed..."

A memorandum of agreement (MOA) between the Commonwealth of Virginia and the DOI (jointly referred to as "Trustees") regarding this NRDAR action was finalized on March 25, 2003. This MOA ensures the coordination and cooperation of the Trustees in carrying out their collective natural resource responsibilities concerning the restoration of natural resources injured or destroyed by the release of hazardous substances to the Clinch River.

This 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.*); 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 Trustees' 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 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 actions¹; assessing each alternative's applicability and environmental consequences; and, summarizing opportunities for public participation in the decision process. A 30 day public comment period on a draft version of this plan ended on June 24, 2004. Several comments were received and are addressed within this document.

1.3 Affected Area

1.3.1 Spill Event Background

On August 27, 1998, a tanker truck overturned on U.S. Route 460 in Tazewell County, Virginia. The truck released approximately 1,350 gallons of Octocure 554-revised, a rubber accelerant, into an unnamed tributary about 530 feet from its confluence with the Clinch River (Figure 1). Octocure 554-revised was manufactured by Tiarco Chemical Company and was transported by Certus Inc. Octocure 554-revised is a chemical mixture that was used in the manufacture of foam rubber and rug materials. The spill turned the river a snowy white color and caused a significant fish kill. The spill also killed most aquatic benthic macroinvertebrates, including three species of federally listed endangered mussels, for about seven miles downstream.

¹Stipulated restoration criteria outlined in the CD limited the scope of the restoration alternatives generally required.

1.3.2 Overview of the Clinch River Watershed

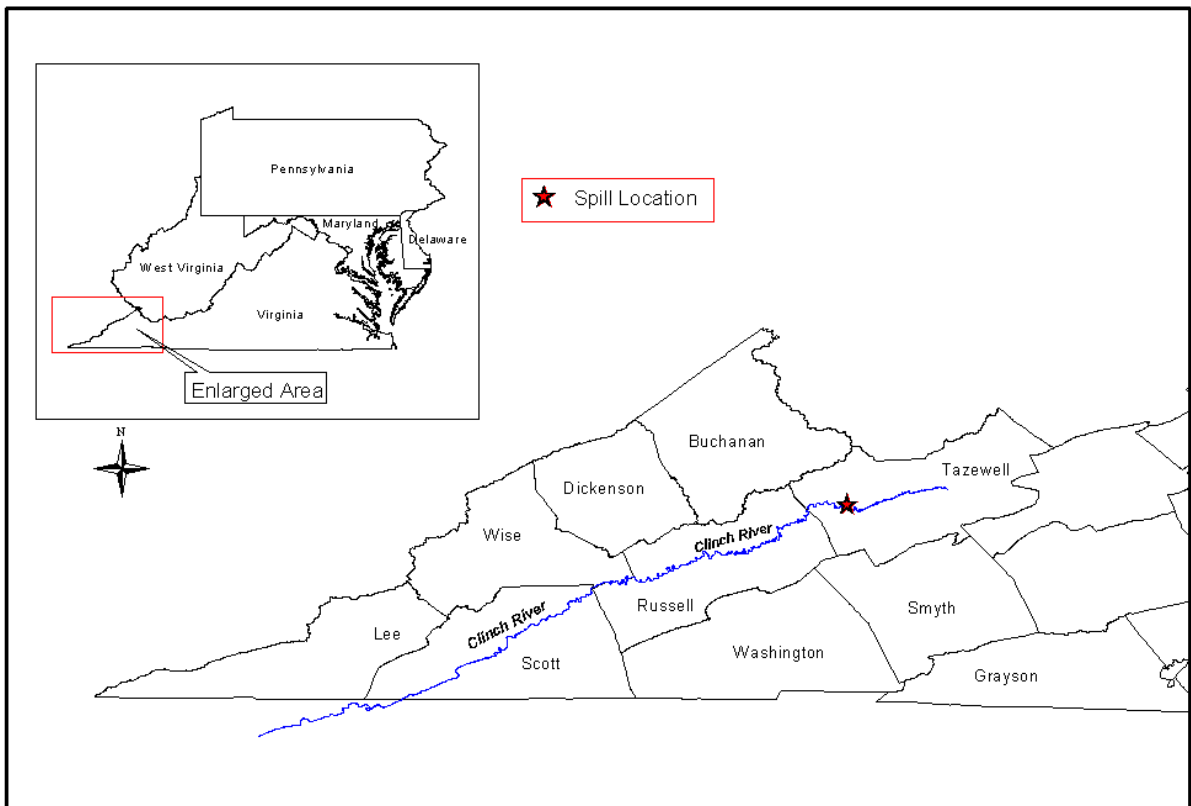
The Upper Tennessee River Basin (UTRB) is primarily located in southwestern Virginia and eastern Tennessee (Figure 1). The UTRB, which includes the Clinch River watershed, is considered one of the Nation's most biologically diverse and important freshwater systems. Most of the UTRB above the Norris Reservoir is forested or in crops and pasture. A minor portion of the remaining land use is industrial, residential, or commercial. The population of nearly 500,000 residents is concentrated along rivers and highways in urban centers. The upper regions of the Clinch and Powell Rivers drain areas of approximately 1,912 square miles and 938 square miles, respectively. All the major tributaries of the upper Tennessee River system have experienced severe declines in mussel populations, reductions in species diversity, and loss of habitat resulting from water quality degradations and habitat alterations (Ahlstedt, 1992; Yeager, 1993).

The remnants of this diverse fauna presently exist as disjunct populations and are largely limited to the riverine reaches upstream from tributary impoundments and the tailwaters downstream from mainstem dams.

Prior to the spill, the Upper Clinch River was a biologically diverse and complex system that supported, directly and indirectly, a wide array of organisms. The Octocure 554-revised spill temporarily eliminated, or nearly eliminated, entire biotic communities. The losses caused by the spill are not simply inventories of injured, killed, or displaced organisms, but include the disruption of entire trophic levels, a disruption that is expected to have long-lasting effects.

All trophic levels in the spill assessment area in the Clinch River were impacted by the spill, and many were eliminated. The secondary and tertiary trophic level species (herbivores and carnivores) include aquatic organisms such as mayflies, stoneflies, caddisflies, flies, dragonflies, damselflies, alderflies, beetles, tree bugs, and moths; these organisms were found in great number and diversity prior to the spill. Fish were also found in good numbers and diversity prior to the spill. Fish are an extremely important component of the food chain, feeding on most other biological organisms in the aquatic community. Fish, in turn, provide food for a variety of other wildlife, including otter, raccoon, mink, and birds, as well as humans. Fish are also a vital component in the life cycle of freshwater mussels, acting as an intermediate host. Mussels are important because they stabilize river and stream bottoms. They also act as natural filters by straining out suspended particles from the water as they feed. In addition, mussels are a vital link in riverine food webs, serving as prey for wildlife such as the muskrat, otter, raccoon, mink, and fish. Young mussels are also eaten by sport fish and waterfowl.

**FIGURE 1 - LOCATION OF CEDAR BLUFF
CHEMICAL SPILL SITE ON THE CLINCH RIVER**



The diversity of freshwater mussels in the UTRB, which includes the Clinch River and its tributaries, is particularly significant because mussel populations have suffered severe declines that are unprecedented among other wide-ranging faunal groups. Since the turn of the century, about 50 percent of the 300 species of freshwater mussels in North America have become so rare that they are either extinct, listed as threatened or endangered, or likely to become imperiled. Prior to the August 27, 1998, chemical spill, this area in the Clinch River supported very diverse populations of mussels, including three federally listed endangered species. It is for this reason that our primary focus for this RP/EA is on freshwater mussels.

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)).

1.4.1 Physical and Chemical Effects

The Certus chemical spill released hazardous substances that impacted the Clinch River and the organisms living therein for about seven miles (Table 1). Most forms of life that inhabited the Clinch River were killed upon initial exposure to the spilled product. Based on turbidity levels recorded at the water filtration plant for the municipal water supply around the time of the spill, it took at least 12 hours for the spill to pass through the Cedar Bluff reach of the Clinch River. The exposure time for mussels and other biological resources was relatively long. Immediately following the spill, many dead specimens of clams, fish, and mussels, including three species of federally listed endangered mussels, and several species of documented host fish for those listed mussel species were retrieved.

Mussel habitat was adversely impacted by the chemical spill. Prior to the spill, the Clinch River had been described as having one of the most diverse mussel and fish faunas of any comparable sized stream in North America (Neves, 1991). In addition, prior to the spill, one of the only two known remaining populations of the tan riffleshell mussel inhabited this river reach. Historically, one third of all freshwater mussel species in the United States was located in the UTRB, which includes the Clinch River and its tributaries. Currently, half of those mussel species are either extinct, federally protected, and/or imperiled in some way. The remaining mussel species are restricted to just a few isolated river reaches (Richard Biggins, U.S. Fish and Wildlife Service, personal communication). The endangered freshwater mussels in the Clinch River rely on clean, stable substrate for their continued existence.

Mussel larvae, known as glochidia, are obligate parasites dependent upon a particular host fish, which renders them very sensitive to disturbances of the freshwater ecosystem (Bogan 1993). Mussels are threatened not only by actions that directly impact them, but also any actions that affect their host fish. Without the host fish, many of which are species specific, mussels cannot complete their reproductive cycle. Decreases in fish host populations directly affect reproductive success in mussels (Kuznik 1993). There is a significant correlation between the incidence of glochidial encystment on fish hosts and fish species richness (Wiess 1993). The significance of host fish abundance is evident when considering that only 0.0004% of released glochidia become encysted on fish hosts (Young and Williams 1984). Fish species acting as hosts to mussel glochidia that were killed by the Certus spill were likely to have been infected by mussel glochidia, including the glochidia of endangered mussels. Glochidia parasitizing host fish killed during the spill would have perished along with the host. In addition, those fish capable of acting as hosts to mussel glochidia but killed by the spill were rendered unavailable as hosts.

Chapter 5 of the Assessment Plan (AP) (FWS 2001) proposed seven injury assessment studies to be conducted within the spill-impacted reach of the Clinch River. All studies have been completed and final reports and/or data for each study have been received by the Service from each of the contractors/experts.

Table 1 Mussel Age Data and Kill Estimates

Species	Min Age	Max Age	Mean Age	Collected @ Spill	Aged @ VA Tech	FWS Kill Estimate
<i>Actinonaias pectorosa</i>	6	32	15.5	135		405
<i>Epioblasma f. walkeri (E)</i>	2	11	4.9	178		534
<i>Fusconaia barnesiana</i> <i>Pleurobema oviforme</i>	4	51	18.8	610	42	1,830
<i>Lampsilis ovata</i>	5	38	14.2	62	24	186
<i>Lampsilis fasciola</i>	8	33	18.5	962	10	2,886
<i>Lasmogona costata</i>	4	33	16.5	84	28	252
<i>Medionidus conradicus</i>	2	14	6.2	219		657
<i>Ptychobranhus fasciolaris</i>	7	85	31	579	41	1,737
<i>Ptychobranhus subtentum (C)</i>	9	55	21.9	35	13	105
<i>Quadrula c. strigillata (E)</i>	11	63	44.5	20	16	60
<i>Villosa iris</i>	2	20	7.2	3247		9,741
<i>Villosa perpurpurea (E)</i>	4	29	11.3	52	21	156
<i>Villosa vanuxemensis</i>	6	22	11.4	24	14	72

(E) = Federally listed endangered species

(C) = Federally listed candidate species

The results from several toxicity studies conducted by the EPA between September 3, 1998, and January 4, 1999, are presented in Chapter 5 of the AP. These bioassay tests indicated that pure product, river water, and river sediment were significantly toxic to aquatic invertebrates. Given the demonstrated aquatic toxicity of the pure product (Octocure 554-revised) and the complexity of its make-up (a proprietary formula), the Service determined that it was necessary to characterize the nature and extent of sediment contamination by documenting key contaminant concentrations in the sediments. Results from sediment chemistry analyses establish the pathway between contaminant media and biological resources, and provide data necessary for consideration of appropriate restoration alternatives. Sediment samples from 44 sites in the Clinch River were collected by Service personnel in March 2000. These samples were analyzed for priority pollutants, organics (aromatics, organochlorines, volatiles, and semi-volatiles), and metals by Patuxent Analytical Control Facility contract laboratories (FWS 2000). Results of these, and subsequent, laboratory analyses indicate that levels of key constituents of the pure product, which are generally known to be toxic to aquatic life, are probably no longer present at elevated levels.

Sediment toxicity tests were conducted in October 2000, to determine if residual contamination in River sediments and pore water were injurious to benthic organisms, including mussels. Three toxicity tests were performed: a 14-day survival and growth test using the amphipod, *Hyaella azteca*, exposed to whole sediment, a 7-day survival and reproduction test using the water flea, *Ceriodaphnia dubia*, exposed to pore water, and a 9-day survival test using juvenile pheasantshell mussels, *Actinonaias pectorosa*, exposed to both pore water and whole sediments. The results from all of the bioassay tests indicated no significant differences between test replicates and control treatments. Survivorship ranged between 87% and 100% among all tests, replicates and controls (EPA 1998, EPA 2000). These results are consistent with the results of the analytical chemistry (previous section) and provide further indication that toxic components of the spilled product are no longer present within sediments of the assessment area.

1.5 Natural Resources Compensation

Pursuant to the settlement with Certus, the DOI NRDAR program fund received a lump sum of \$3,800,000 for reimbursement of past, unpaid assessment costs, certain administrative expenses, and restoration of injuries resulting from the spill. After the subtraction of remaining past injury assessment costs, \$3,707,432.84 was placed in an interest bearing account that is managed by the NRDAR program office. 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 Decree, 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 spill.

1.8 Public Notification and Review

The Trustees believe that public comment and input is a critical aspect of a successful restoration. Comments and suggestions received by the Trustees during the 30 day public comment period have been incorporated within this document and are specifically discussed in Section 7 of this document. The Trustees will published a Notice of Availability of this Final RP/EA in the Federal Register and local newspapers.

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 publically considered. The preferred restoration alternative is identified and expanded upon in Section 3.0.

2.1 Definition of Key Terms and Concepts

To provide perspective on the restoration planning methodologies presented in this 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 (II)]. Restoration includes rehabilitation, replacement, or acquisition of resources or services.

Restoration or rehabilitation actions are those actions undertaken to return injured resources to their 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 (II)].

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 conditions for the mussel assemblage is consistent with the characterization of the assemblage in the impacted area before the spill. Mussel populations exhibited significant population density and recent recruitment, with individuals present across various age ranges.

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 the mussel assemblage and its supporting habitats to approximate baseline conditions. Under authorities outlined in Section 1, the Trustees will consider restoration actions within the Clinch River watershed and associated habitats and/or resources to support faunal assemblages that were impacted following releases of the hazardous substances. With this general goal in mind, the Trustees will attempt to also achieve the following primary compensable restoration objectives:

- increase survival probabilities for common and federally listed endangered mussel species;
- restore/enhance water quality;
- improve the quality of bed and bank sediments; and
- improve and protect riparian buffer habitats.

The preferred restoration alternative (Section 3) seeks a set of actions that achieves these objectives in a coordinated and cost-effective manner. By undertaking restoration activities, the Trustees hope 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 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 a restoration alternative, the Trustees select a preferred restoration alternative based on all relevant considerations including, but not limited to, general 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 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 Trustees determine that significant changes to the selected restoration alternative are needed, 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 will be sought as appropriate. No restoration activities will be conducted by the Trustees that would incur ongoing expenses in excess of those that can be funded by settlement monies and/or the interest therefrom, unless such additional monies are allocated through the normal budget process.

2.3 Restoration Alternatives Previously Considered in the Restoration Compensation and Determination Plan

When developing and evaluating restoration alternatives for litigation and settlement purposes, the Trustees considered a variety of restoration activities within the Initial Restoration Compensation and Damage Determination Plan (FWS 2002) (RCDP). The RCPD considered in-kind, out-of-kind, on-site and off-site restoration alternatives and received public comment pursuant to a Federal Register Notice of Availability (FR Vol. 67, No. 89/Wednesday, May 8, 2002/pages 30947-30948) and publication in local newspapers. These restoration alternatives were re-considered in the draft RP/EA for incorporation into the Trustees' NEPA analysis and are provided here again for informational purposes.

2.3.1 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 analysis, the no-action alternative assumed that no direct environmental restoration action would be undertaken by the Trustees.

This alternative was evaluated to fulfill requirements under NEPA, and was found to be 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 Clinch 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 on these restoration activities. Restoration of the resource and resource function would be completely dependent upon natural processes. This alternative, was technically feasible, had no cost, but would result in no benefit from the funds specifically recovered for restoration.

2.3.2 Alternative 2: Propagation of Federally Endangered Mussel Species

This alternative proposed to restore only the federally listed mussel species within the spill zone of the upper Clinch River. The process for propagating listed and non-listed mussels has been developed and refined over the past two decades and is currently at a state where most mussel species can be propagated (O'Beirn *et al.* 1998, Henley *et al.* 2001). The process involves collecting gravid females from the wild, artificially infecting host fish with mussel larvae in the laboratory, and then collecting and holding transformed juvenile mussels. Mussels and host fish are held in the laboratory in recirculating

systems for the majority of this process. Juvenile mussels are held in captivity as long as possible to improve the survival rate of the released cohort.

The environmental consequences of propagating freshwater mussels in order to restore populations are decidedly positive. Mussel propagation activities provide several benefits in addition to reestablishing extirpated populations. Propagation and release of mussels help to: 1) increase the re-colonization rates of species into suitable habitat, 2) increase the likelihood of recruitment into currently occupied habitat, 3) increase the chance of species' continued existence in currently occupied river reaches, and 4) stabilize declining populations of non-listed species which in turn may preclude the need for certain Federal listing actions.

Some uncertainty exists in the propagation of rare mussel species. The availability of gravid females may vary year to year. Rare species can be difficult to locate in general. For some species there is only a short window of a few weeks when they become gravid. The search for and availability of gravid females can be further confounded by droughts and floods. Additionally, the relative success rate of mussel releases has not been rigorously assessed. However, propagation is currently being conducted by several agencies/researchers around the country and is generally accepted as a viable solution for species restoration. A wealth of knowledge exists on the life history attributes of the mussel species that inhabit the Clinch River. Source populations and gravidity windows are also known for many species. Furthermore, a diverse community of biologists from university, state, federal, and non-governmental organizations are working together to conserve this important natural resource and are available to assist in a variety of ways.

Mussel restoration projects must be monitored during and beyond the propagation phase to document that the mussels reach sexual maturation and to document recruitment—an important indicator of a successful restoration. Monitoring is also needed to ensure that augmented individuals within a population reach ages similar to those lost during the spill. Mortality, recovery, and fitness indicators (growth and fecundity) may also be monitored for each species. Predator control at augmentation sites will also be a necessary restoration component.

2.3.3 Alternative 3: Propagation of the Entire Mussel Assemblage within the Spill Zone

This alternative took into consideration the interdependence that exists between all the mussel species killed by the spill and recognized them as a single mussel assemblage. Several thousand individuals of at least 13 species of non-listed mussels (including one federal candidate species) were also killed as a result of the August 1998 release. Since both the listed and non-listed species of mussels form an

important segment of the ecosystem, this alternative proposed to restore both the listed and non-listed mussel species within the spill zone of the upper Clinch River. Monitoring and predator control efforts would also be required under this alternative.

2.3.4 Alternative 4: Propagation of Entire Mussel Assemblage Within the Spill Zone and Off-Site Area(s)

This alternative included the mussel propagation goals of Alternative 3 and additionally provided for the release of propagated species into predetermined areas outside of the spill zone within the Clinch River watershed. This alternative provided an additional tool for use in ensuring that propagated mussels are replaced into the broader watershed in areas where these species already occur. Increasing the number and location of augmentation areas beyond the footprint of the spill will enable restoration biologists to reduce the risk of losing propagated mussels to potential natural and human perturbations. Pressures on freshwater mussels are varied and diverse. Mussels are generally susceptible to water quality degradation, droughts, flooding events, spill events, agricultural and urban runoff, and natural predation. Alternative 4 provides a hedging strategy that does not put all of the propagated mussels in one “basket.” Three other mussel augmentation sites on the Clinch River have been identified in a planning document of the VDGIF (Woodfin 2000).

The trade-off considered under this alternative was that gains in terms of safety/protection by spreading out propagated mussels come at the price of possibly increasing the time it would likely take for the extirpated mussel cohort to return to its pre-spill size and age structure and to provide baseline ecological services.

3.0 PREFERRED RESTORATION ALTERNATIVE

The NEPA requires that the Trustees consider a continuum of possible restoration alternatives. The DOI NRDAR regulations also provide procedures and criteria for developing and evaluating restoration alternatives. Utilizing this guidance and criteria, the draft RP/EA identified and evaluated a suite of restoration alternatives within the confines of the CD. Based upon likelihood of restoration success, feasibility, and public comment Alternative 5 has been selected as the preferred restoration alternative. This alternative seeks to combine certain habitat protection and community outreach and facilitation goals in concert with an aggressive, long-term mussel propagation program. Alternative 5 incorporates restoration activities identified in Alternatives 2 through 4. Specific facets of the preferred restoration alternative are discussed here.

3.1 Propagation of the Entire Mussel Assemblage

The preferred restoration alternative proposes to restore the entire mussel assemblage within the spill zone of the upper Clinch River. This alternative takes into consideration the interdependence that exists between all the mussel species that were killed by the spill and recognizes them as a single mussel assemblage. Several thousand individuals of at least 13 species of non-listed mussels (including one federal candidate species) and three Federally listed endangered species were killed by the August 1998 release. Since both the listed and non-listed species of mussels form an important segment of the ecosystem, this preferred restoration alternative will restore both the listed and non-listed mussel species within the spill zone of the upper Clinch River.

Restoration of the mussel assemblage is preferable for a number of reasons. Mussels improve the water quality of a stream through their filter feeding activity. It is important to have large mussels of various species within the assemblage as their filtering and water-clarifying capacity is greater than that of juvenile mussels. Mussel assemblages serve to stabilize river and stream bottoms and add to the general biotic integrity and diversity of the river system. The habitat heterogeneity is enhanced by a mussel assemblage of diverse age and size class make-up. The relic shells of the entire mussel assemblage provide important substrate and refuge for mussel host fish and sport fish eggs and also provide habitat for insect larvae that comprise mussel host fish and sport fish prey bases. By restoring the entire assemblage, non-listed mussels will serve to reduce depredation of the endangered mussels. The restored mussel assemblage will provide vital aquatic ecosystem functions such as nutrient cycling, the conversion of food resources into forms readily assimilated by other organisms, and long-term storage and release of important elements such as calcium, phosphorous, and nitrogen (Nedeau *et al.* 2000).

The process for propagating listed and non-listed mussels has been developed and refined significantly as previously stated and is currently at a state where most mussel species can be propagated (O'Beirn *et al.* 1998, Henley *et al.* 2001). The process involves collecting gravid females from the wild, artificially infecting host fish with mussel larvae in the laboratory, and then collecting and holding transformed juvenile mussels. Mussels and host fish are held in the laboratory in recirculating systems for the majority of this process. Juvenile mussels are held in captivity as long as possible to improve the survival rate of the released cohort.

On a limited case-by case basis, the Trustees reserve the decision to release propagated species into predetermined augmentation areas outside of the spill zone within the Clinch River watershed. This strategy conforms to Service and the DOI restoration policies as they relate to restoring, replacing, rehabilitating, or acquiring similar resources lost to the release of hazardous substances. This strategy also provides an additional tool for use in ensuring that propagated mussels are replaced into the broader watershed in areas where these species already occur. Increasing the number and location of augmentation areas beyond the footprint of the spill will enable restoration biologists to reduce the risk of losing propagated mussels to potential natural and human perturbations. Pressures on freshwater mussels are varied and diverse. Mussels are generally susceptible to water quality degradation, droughts, flooding events, spill events, agricultural and urban runoff, and natural predation. This approach provides a hedging strategy that does not put all of the propagated mussels in one "basket." Three other mussel augmentation sites on the Clinch River have been identified in a planning document of the VDGIF (Woodfin 2000). The trade-off that must be considered, however; is that gains in terms of safety/protection by spreading out propagated mussels comes at the price of possibly increasing the time it would likely take for the extirpated mussel cohort to return to its pre-spill size and age structure and to provide baseline ecological services and will be dependent upon the numbers of individuals of each species that can be propagated within a given year.

Mussel restoration projects must be monitored during and beyond the propagation phase to document that the mussels reach sexual maturation and to document recruitment—an important indicator of a successful restoration. Monitoring is also needed to ensure that augmented individuals within a population reach ages similar to those lost during the spill. Mortality, recovery, and fitness indicators (growth and fecundity) may also be monitored for each species. Predator control at augmentation sites will also be a necessary restoration component.

Adult mussels of several species of non-listed mussels may be opportunistically translocated from other areas within the Clinch River to the spill area to facilitate restoration of the mussel assemblage. Mussel translocation by itself is not considered to be a viable option for mussel restoration because it fails to produce a net gain in mussels in the river. However, translocation of some non-listed mussel species could potentially enhance the rate at which mussel restoration takes place by setting up conditions that are supportive of a stable mussel assemblage. Several issues must be considered in a restoration plan before any mussel translocation could take place. Surveys would be required to identify appropriate source populations. These surveys must include baseline information such as size/age structure and sex ratios to assess possible impacts of removing adult mussels. Some work may be required to address concerns about the genetic relatedness, or lack thereof, of certain source populations and mussel populations within the Upper Clinch watershed. The VDGIF has indicated they will require that mussels removed from one part of the river to restore another must be “back-propagated” so that no net loss of mussels occurs. Mussel translocation projects have met with mixed success (Sheehan *et al.* 1989, Cope and Waller 1995), therefore, a translocation plan would have to be developed that includes protocols for yearly monitoring to detect potential problems and provide assurance that those issues would be rectified. It is likely that several years of translocation efforts would be necessary for each species that meets predetermined criteria for translocation.

3.2 Habitat Protection and Restoration

The selection of any form of habitat protection and/or agriculture/forest best management practices (BMP) implementation as a viable alternative must be based upon the supposition that mussel restoration is occurring, at some level, within the spill zone on the Clinch River. Implementation of non-point runoff control BMPs within the Clinch River watershed can include specific activities such as erecting livestock exclusion fencing, installing alternative watering sources, planting stream-side buffer vegetation, stabilizing eroding stream banks, sedimentation control structures, and/or natural stream channel design.

Riparian habitat protection projects provide great potential to restore riverine habitats and facilitate the recovery of aquatic fauna within impacted watersheds (Sweeney 1993). Improving riparian buffer zones and working with local landowners on implementing BMPs within the Clinch River will provide the benefit of improving water quality and the overall health of the aquatic ecosystem. Habitat protection measures will be designed to protect and enhance the likelihood of success of mussel propagation projects that are intended to return the mussel assemblage to baseline conditions. This strategy also provides a significant level of flexibility to restoration biologists in that a variety of habitat restoration options can be selected in order to optimize restoration activities.

3.3 Community Educational Outreach Component

Community educational outreach will focus on preserving the value of the Clinch River watershed by providing the public with the history and status of the chemical spill, general freshwater mussel biological information, knowledge of the importance of preserving aquatic biodiversity, significance and requirements of the unique species in the Clinch River, restoration and conservation management strategies, and the roles of the natural resource agencies and private citizens involved in NRDAR. 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 will be tailored to meet anticipated needs of various audiences.

3.4 Estimated Costs of Restoration Projects

3.4.1 Mussel Propagation

The process of propagating freshwater mussels is time and labor intensive. Therefore, the bulk of the costs are associated with salaries and benefits and logistical support for technical staff. Full-time restoration staff would be required throughout the year to: 1) conduct the necessary field work to locate, collect, and recover gravid mussels; 2) locate, collect and recover appropriate host fish; 3) maintain a healthy laboratory environment for mussels and host fish while in captivity (cleaning, feeding, etc.); 4) conduct host fish infections; 5) collect juvenile mussels and culture them until released; and 6) release propagated juveniles and many other ancillary activities.

Mussel propagation facilities at both Virginia Polytechnic Institute and State University (Virginia Tech) and at the Virginia Department of Game and Inland Fisheries' Aquatic Wildlife Conservation Center (AWCC) will be required to meet the mussel restoration needs of this proposed action because neither facility alone could provide sufficient space and personnel to meet task requirements. Staff at Virginia Tech and AWCC are uniquely qualified to accomplish mussel restoration tasks and have decades of combined experience and knowledge of the Clinch River mussel fauna assemblage. Additionally, both facilities are physically located in close proximity to the UTRB; a factor that significantly lowers operational and travel costs. Specific tasks and the division of labor for this effort will be further developed in separate cooperative agreements between these two entities and the Trustees. In general, biologists from both facilities would participate in a cooperative effort to obtain, culture, and grow-out mussel species of the UTRB.

Based on the requirements of the CD, and past experience, the Trustees are considering allocating approximately \$2.8 million over an estimated twelve-year period to propagate freshwater mussels and augment existing populations in predetermined areas within the impacted area of the Clinch River watershed.

3.4.2 Community Outreach and Facilitation

A series of public community outreach/facilitation scoping meetings were held during Fall 2003 and Winter 2004. Input from local agencies and citizens has provided great insight into specific community needs. These comments were collected and will be expanded upon in a planning phase. Based on preliminary input, educational outreach and community facilitation will focus on preserving the values of the Clinch River watershed by providing the community with tools, opportunities, and information concerning the importance of natural resources within the Clinch River watershed. The activities could include dissemination of aquatic biology information, knowledge of the importance of preserving aquatic biodiversity, significance and socio-economic importance of the rare species that inhabit the Clinch River, restoration and conservation management strategies, water quality issues, and the stewardship roles of the natural resource agencies and private citizens involved in natural resource conservation. These proposed activities will provide outreach and facilitation to the public through distribution of information at schools, various organizational meetings, media events, and through communication with local residents. Tools, such as workshops, seminars, outdoor classroom(s) and other similar activities will be tailored to meet anticipated needs of various audiences. An outreach and facilitation plan will be produced by and for the community, with the guidance of an outreach coordinator, in order to anticipate and attempt to fulfill goals.

It is estimated that community educational outreach/facilitation activities will begin with an analysis of ongoing outreach activities within the impacted area as well as the concurrent development of the community outreach plan. The plan will take into consideration similar, ongoing and planned actions of other entities operating within the watershed. The planning and implementation of outreach/facilitation activities will proceed for an estimated period of four to five years. The Trustees are considering allocating approximately \$150,000 to implement this action to cover the salary of an outreach facilitator and a variety of projects. Fund leveraging will be sought.

3.4.3 Riparian Habitat Protection and Enhancement

Specific habitat enhancement and protection actions have not yet been determined, but may include a variety of management actions that would improve ecological productivity and facilitate recovery of habitat for injured trust resources through the addition of key structural or biological elements. Mussel recovery includes actions that will improve recruitment and population stability. Implementation of the habitat protection and enhancement measures 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 endangered species recovery to restore the watershed to its approximate pre-spill condition. Specific types of riparian habitat protection and enhancement restoration 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, and long-term protection of riparian areas. Preliminary screening criteria for potential projects can be found in Appendix A at the end of this document.

Estimating costs for riparian habitat enhancement and protection is driven by several factors. These factors include the cost of reestablishing a desirable vegetative community and hydrology, parcel availability, size, and location, the parcel's development or commercial potential, and market value. The Trustees will rely upon the project screening criteria outlined in Appendix A in making project funding determinations. The Trustees are proposing to allocate approximately \$150,000 towards riparian habitat enhancement and protection within the vicinity of Cedar Bluff, Virginia.

3.4.4 Monitoring, Predator Control, and Administrative Oversight

Mussel restoration projects must be monitored during and beyond the propagation phase to document that the mussels reach sexual maturation and to document recruitment—an important indicator of a successful restoration. Monitoring is also needed to ensure that augmented individual mussels reach ages similar to ages of mussel lost during the spill. Mortality, recovery, and fitness indicators (growth and fecundity) may also be monitored for each species.

Predator control at reintroduction sites will also be a necessary restoration component. Muskrats are a primary mussel predator. Local trappers have been contracted in the past by State and Federal workers in Southwest Virginia to provide predator control at certain sites on certain rivers. The Trustees will employ this strategy to control mussel predation on an as-needed basis.

Trustee oversight of restoration actions will include activities such as planning, coordination, contracting, budget management, contractor and cooperator oversight, report review, and corrective action. Oversight is critical to the success of the restoration program and is required by the DOI NRDAR policy and regulations. Under the current Trustee MOA, this duty falls to the Service acting as the lead administrative trustee (LAT). The estimated cost of qualitative mussel monitoring at potential and actual reintroduction sites is estimated to be approximately \$15,000 per year. Annual costs for predator control are estimated to be \$11,000 per year. However, given the dynamic nature of muskrat populations (Neves and Odom 1989) actual yearly costs may vary. Restoration oversight costs are estimated to vary between \$15,000 and \$25,000 per year for the duration of the restoration program (12+ years) with costs expected to exceed these estimates for the first few years and to decrease over time. In total, the estimated costs associated with monitoring, predator control, and administrative oversight are approximately \$612,000.

4.0 ENVIRONMENTAL COMPLIANCE AND CONSEQUENCES

Addressing the potential effects of restoration alternatives is required under NEPA. Section 3.0 discusses how the Trustees 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. Specifically, the Service is developing a programmatic consultation for all NRDAR activities within the Commonwealth of Virginia with the State Historic Preservation Office (SHPO) to ensure Section 106 compliance.

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 are quality engineering and contracting practices that 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 NEPA Compliance

After the EA has been completed, made available for public comment and the Trustees have reviewed and considered all comments received, the Trustees shall determine whether to prepare an Environmental Impact Statement (EIS) or a Finding of No Significant Impact (FONSI) for the proposed action(s). If a FONSI is issued, it will be circulated by the Authorized Official with the Final RP/EA.

4.1.5 Endangered Species Act, Section 7 Consultation

Because it was determined that actions proposed within this RP/EA may affect Federally-listed species, an informal, intra-Service Endangered Species Act (ESA) Section 7 consultation was conducted. The consultation concluded that actions proposed by this RP/EA will “not likely adversely affect” protected species, and will “not likely destroy or adversely modify critical habitat.” The consultation will remain within the administrative record for this matter.

4.2 Environmental Consequences of the Selected Preferred Alternative

This alternative is proposed in accord with the language contained within the consent decree that requires that recovered funds shall be used “...to plan, perform, monitor, and oversee native, freshwater mussel restoration projects within the Clinch River watershed...” This alternative will restore, rehabilitate, or replace similar resources that existed within the Clinch River watershed prior to the injury, and will provide those resources with long-term protection where possible. 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 activities. The net benefit realized would be the restoration and rehabilitation of 16 mussel species and a yet-to-be-determined number of acres of riparian habitat, the reestablishment of the full potential of ecological services provided by aquatic fauna, and the general improvement of the Clinch River ecosystem quality. The beneficiary of these actions will be the people of Tazewell 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 Clinch River.

The proposed actions call for in-kind restoration within the Clinch River watershed. These actions include monitoring programs over the life of each individual action. Monitoring will evaluate the effectiveness of the prescribed actions and will be used by the Trustees to determine whether mid-course corrections are necessary to achieve the restoration objectives on a case by case basis.

4.2.1 Environmental Consequences of Propagation and Augmentation of Freshwater Mussel Populations

The environmental consequences of propagating freshwater mussels in order to restore populations are decidedly positive. Augmentation activities provide several benefits in addition to reestablishing substantially extirpated populations. Propagation and release of mussels help to: 1) increase the re-colonization rates of species into suitable habitat, 2) increase the likelihood of recruitment into currently occupied habitat, 3) increase the chance of species' continued existence in currently occupied river reaches, and 4) stabilize declining populations of non-listed species which in turn may preclude the need for future Federal or State listing actions.

The environmental consequences of restoring imperiled species has long been recognized in legal forums. The Federal ESA reflects the concern of Congress at the rate of extinction of species in the modern era. In *Tennessee Valley Authority v. Hill*, 437 U.S. 153, 178-79 (1978), the Supreme Court, in interpreting the ESA, recognized that one of Congress' primary concerns with respect to extinction of species was "about the unknown uses that endangered species might have and about the unforeseeable place such creatures may have in the chain of life on this planet." More recently, the Fourth Circuit echoed these concerns about the failure to preserve endangered species noting that; "Extinction, after all, is irreversible. If a species becomes extinct, we are left to speculate forever on what we might have learned or what we may have realized. If we conserve the species, it will be available for the study and benefit of future generations." *Gibbs v. Babbitt*, 214 F.3d 483, 496 (4th Cir. 2000). These assertions by Congress and the Courts indicate the acknowledgment that the magnitude of potential future positive environmental consequences could be vast.

4.2.2 Environmental Consequences of Public Educational Outreach/Community Facilitation

Since the projects of the proposed preferred alternative are primarily designed to improve and protect degraded habitats and improve fish and mussel populations, the cumulative environmental consequences of these actions will be beneficial. The environmental consequences will likely not be limited to specific project locations. Indirect and direct beneficial impacts will occur for some distance from selected projects. It is therefore 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 endangered species restoration and habitat protection activities.

4.2.3 Environmental Consequences of Riparian Habitat Protection and Enhancement

Riparian habitat protection and enhancement 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 options such as the development of conservation easements and outright acquisition. 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 upper Clinch River watershed. Such activities will provide the potential for restoration, rehabilitation, enhancement, production, 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 riparian habitat protection and enhancement is the restoration and preservation (in perpetuity where possible) of riparian areas, a rapidly vanishing and valuable natural resource of Tazewell County, Virginia. The ecological services provided by such lands (e.g., wildlife habitat, intrinsic values, flood water control, erosion control, esthetic values, eco-tourism values) will also bestow protection based on the length of individual land protection agreements. Another consequence of this action is that any lands potentially protected by conservation easements will no longer be available for commercial, residential, or economic development (potentially elevating the market value of other properties in the area).

The expected cost of riparian habitat protection and enhancement is believed to be commensurate with current real estate market values, availability of willing land owners/partners, and parcel size. Consideration of parcel-specific costs compared to the benefits that may be realized through the establishment of conservation easements and riparian buffer enhancements will be made on a case-by-case basis. 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 Trustees 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.

Habitat restoration actions will be implemented through grant agreements or cooperative agreements for selected projects. An intended consequence of these actions is to facilitate buffering the impacts (e.g., increased amounts of impervious cover, road run-off, and toxicant deposition; reduced groundwater recharge; loss of wildlife habitat) within the watershed. Further consequences of this action are the preservation, protection, and maintenance of surface water quality, and cooperation between the Trustees and local communities to preserve and conserve the natural resources of the Clinch River watershed. Restoration of properties and acquisition of conservation easements is consistent with Federal and State policies and laws promoting the conservation and protection of fish and wildlife resources.

5.0 SUMMARY

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

1. augmentation of mussel populations of the Clinch River watershed;
2. implementation of a local public educational outreach plan;
3. enhancement and protection of riparian areas, in perpetuity were feasible, and
4. restoration monitoring, predator control, and administrative oversight.

A further inferred action of the selected preferred alternative promotes restoration and protection of natural resources by cost-sharing with local municipalities or other interested organizations through grant agreements or cooperative agreements for selected projects. The Trustees will provide funding, consistent with applicable laws and regulations, to local projects that satisfy criteria of the CD and that acquire, restore, rehabilitate, or enhance rare species populations within the Clinch River watershed. This action will assist in replacing the ecological services lost because of the spill. 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 Clinch River, and will promote cooperation between the Trustees and local communities to mutually preserve and conserve the resources of the Clinch River watershed.

The Trustees believe that the aforementioned 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 actions will be made available for public review upon request.

6.0 MONITORING AND CORRECTIVE ACTION MEASURES

A monitoring 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 this RP/EA will be biologically monitored. For riparian projects this could include monitoring vegetation survival in restored/enhanced habitats or other faunal responses. For mussel propagation, monitoring could include documentation of recruitment, ensuring reintroduced individuals reach ages similar to those lost during the spill as well as mortality, recovery, and fitness indicators (growth and fecundity). Evaluation and corrective action techniques, time tables, and allocation of funding for the monitoring and corrective action portion of any action are considered to be site- and action-specific. Selected restoration projects may include specific monitoring and corrective action components within written agreements and will be publically available as developed and requested.

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

Northeast Regional Office, Hadley, MA, U. S. Fish and Wildlife Service
Virginia Field Office, U. S. Fish and Wildlife Service
Southwestern Virginia Field Office, U. S. Fish and Wildlife Service
Black Diamond Resource Conservation and Development, Inc.
Tennessee Valley Authority
Tazewell Soil and Water Conservation District
Virginia Department of Game and Inland Fisheries
The Nature Conservancy, Clinch Valley Program
Clinch Rivers Headwaters Association
Tazewell County, Virginia
Virginia Department of Conservation and Recreation
Office of the Solicitor, Department of the Interior
Virginia Department of Environmental Quality
Town of Richlands, Virginia
Town of Cedar Bluff, Virginia
Richlands Chamber of Commerce
Tazewell County School District
The Upper Tennessee River Roundtable

8.0 RESPONSE TO COMMENTS

During the 30 day public comment period, the Trustees received a set of coordinated comments from the Commonwealth of Virginia, Department of Environmental Quality, Office of Environmental Impact Review. The following State agencies participated in the review:

Department of Environmental Quality
Department of Conservation and Recreation
Marine Resources Commission
Department of Historic Resources

In summary, the review indicated that, “The Commonwealth of Virginia supports the recommended plan, as indicated by the enclosed comments . . . and has no objection to a Finding of No Significant Impact for this project.” In addition, the review provided a reiteration of several standard policies and regulatory requirements of the above listed agencies. All relevant policies and regulations will be considered and adhered to by the Trustees and their cooperating partners, upon implementation of restoration actions that fall under agency purview. No editorial comments were received.

The Trustees received a comment letter from the County Administrator for Tazewell County, Virginia, after the closure of the 30 day public comment period. All comments received were considered. Three basic comments focused on an error in the title of the Notice of Availability, a suggestion for use of the Tazewell County Soil and Water Conservation District office (District) for outreach implementation, and a discrepancy in overall settlement fund accounting with the RP/EA. Comments will be addressed in turn.

Title Error

Tazewell County noted that the Federal Register notice of the availability of the draft RP/EA erroneously identified the location of the spill as Lee County instead of Tazewell County. The Trustees feel confident that by advertising the availability of the draft RP/EA in several local newspapers, the placement of the RP/EA in the local library, the recent series of scoping meetings within the community (including one with the Tazewell County Administrator), and the coordinated State review, we have sufficiently sought and received significant public input and involvement in project planning. While we cannot speculate on the impact this error may have had on public input, the Trustees believe that the implementation of restoration projects will be a long-term and iterative process and will continue to require public input. If there are citizens within Tazewell County who are not yet aware of planned restoration efforts, the trustees feel confident that these people will gain an awareness, and have the ability to provide input, during the ongoing development and implementation of the Community Outreach Plan.

District Involvement

The Trustees agree that the District is already conducting a suite of vitally needed environmental education outreach activities for the public within the county. An important outcome of the draft RP/EA scoping meetings (which focused primarily on outreach) was the realization that there is a need for other environmental outreach activities more specific to the issues related to spill response and the rare aquatic resources of the Clinch River, in addition to what is already being accomplished. These activities will be further developed and prioritized in a community-developed document later this year. It is expected that the District will play a significant role in the development of this document and will likely play a role in the implementation of various NRDAR-related restoration actions. The outreach facilitator position proposed by the draft RP/EA will be attached to the Virginia Polytechnic Institute and State University and, as such, will bring to bear the full experience and expertise of the University under the guidance of a Human Dimensions Professor, who is personally well known and respected by District staff. The RP/EA does not omit the District, but proposes to utilize and build upon its strengths.

Accounting

The Tazewell County administrator indicated they “. . . would like to see an accounting for the \$95,432.84 not accounted for as well as [an]d accounting for the anticipated interest over the 12+ years outlined in the plan.” The dollar amounts discussed within the RP/EA were general estimates, and actual amounts will be determined during annual work plan implementation. To provide a better overall estimate, however, a change was made in section 3.4.1 (Mussel Propagation) of this document from \$2.7 million (M) to \$2.8M to correct the mathematical error. Anticipated interest on these funds cannot be specifically projected at this point due to fluctuating interest rates over the twelve year period. By DOI policy, all interest earned on the settlement funds relating to this case can only be used to implement restoration actions within the Clinch River watershed. Additional restoration funds received from future interest have not yet been specifically targeted to any one activity. However, it is likely that at around year 10 of the project, the Trustees will conduct a fiscal analysis to determine how many additional years of mussel propagation can be implemented using interest-derived funds. At that time, a final reckoning of interest-derived funds will be made. Throughout the life of the restoration implementation plan, all funds and interest will be strictly accounted for and subject to the internal audit procedures of the Department of the Interior.

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APPENDIX A

**PRELIMINARY CLINCH RIVER RIPARIAN RESTORATION PROJECT SCREENING
 CRITERIA**

Required Criteria	General Description	YES	NO
Long-Term Protection	The project/site provides perpetual habitat protection and/or enhancement of water quality within the Clinch River watershed.		
Location	Physical location of potential restoration project is within the Virginia portion of the Clinch River watershed.		
Site Suitability	Available sites are those that may not contain substantial structures or pavement.		
Availability of other funding for this project	Projects wholly eligible or appropriate for funding from other sources will not be considered. Projects proponents are encouraged to seek appropriate leverage funds from third parties to enhance the quality and likelihood of project success.		
Restoration of the site will provide direct, functional benefits to injured natural resources	Site restoration project will include restoration activities that preserve and/or enhance designated critical habitat, threatened and endangered fish and mussels, and their supporting ecosystem.		
Partner Commitment	The project partner(s) is/are committed and capable of successful completion of the proposed restoration project.		
Oversight	The project includes oversight components designed to document the objective and successful attainment of project goals, overall fiscal responsibility, and cost-effectiveness of the project.		

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Preferred Ranking Criteria	Description	H (3)	M (2)	L (1)	Final Ranking
	HIGH IMPORTANCE (X3)				
Long Term Protection	The project/site provides perpetual habitat protection within the Clinch River watershed.				
Cost-Effectiveness	Site attributes impacting cost compared to the expected benefit realized by the documented success of the proposed project.				
Functional Benefits	Site restoration project activities will provide benefits to trust resources and their supporting ecosystem.				
Leverage Potential	Ability that these restoration funds would leverage other resources, excluding federal match.				
Novel Project Ideas	Novel project ideas that exhibit a high likelihood of success and are exportable to other watersheds.				
	MEDIUM IMPORTANCE (X2)				
Point source or non-point source control	Source control is sufficient if an environmental audit or similar report demonstrates that the site has limited potential for re-contamination.				
Ownership and Management	Availability of the site for potential restoration. Willingness to provide access.				
Land Use Compatibility	The nature and condition of existing surrounding land use and future concerns such as zoning, comprehensive or project-specific planning.				
Regulatory	Does the proposed project require additional regulatory review (beyond categorically excluded actions considered in the RP/EA)?				

Preliminary Explanation of Criteria Implementation

The required criteria will be used to determine whether or not a proposed riparian restoration project attains a minimum level of temporal protection, is spatially appropriate, is suitable and available, and adequately addresses natural resource and oversight concerns. Preferred criteria will then be used to rank suitable riparian restoration projects and actions based upon that specific project's merit and ability to meet or exceed listed criteria.

To establish project priorities, it is possible to use a weighting and scoring system in which the first step is to assign a numerical weight to each restoration project criterion. Each criterion receives a numerical weight of 1 to 3 with a 3 for high importance, a 2 for medium importance, and a 1 for low importance. The next step reflects how well a specific restoration project ranks for each criterion, with a 3 being a high match, 2 a medium or okay match and 1 a maybe or poor match. Then, each site score is multiplied by the weighting factor of the criterion and added for all criteria in order to obtain an aggregate project score. Based on these scores, the projects can be divided into groups of high priority, medium priority, and low priority.

This project screening process is dynamic. Changing conditions and new information may result in a project(s) receiving a higher or lower priority in the future.