DAMAGE ASSESSMENT AND RESTORATION PLAN AND ENVIRONMENTAL ASSESSMENT

M/V FORMOSA SIX ETHYLENE DICHLORIDE DISCHARGE

Gulf of Mexico, LOUISIANA April 11, 1997

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FINAL VERSION
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Table of Contents

1.0 Introduction [Purpose and Need]

1.1 Summary of the Incident

On April 11, 1997, the M/V FORMOSA SIX and the M/V FLORA collided approximately three miles offshore from the Southwest Pass of the Mississippi River. The collision left a 25 foot gash in the FORMOSA SIX which penetrated the #6 cargo tank. This resulted in the release of 1,500 to 1,800 metric tons of ethylene dichloride (also known as 1,2-dichloroethane or EDC). The remaining contents of the damaged cargo tank were initially transferred to other tanks in the vessel. The ship was then moved 60-70 miles offshore, where the product was lightered onto another vessel. The collision and subsequent discharge of EDC is hereinafter referred to as the "incident". This summary is based largely on the information contained in reports (National Oceanic and Atmospheric Administration, 1997) prepared by the Hazardous Materials Division (HAZMAT) of the National Oceanic and Atmospheric Administration (NOAA).

Due to its extremely high specific gravity, the EDC is believed to have sunk rapidly to the bottom, approximately 40-46 meters below. It was estimated that over 90% of the material reached the sea floor (Reilly and Payne, 1997). No recovery of the product released was possible. The U.S. Coast Guard required the responsible parties (RPs) to sample bottom sediments around the collision site in order to evaluate whether response actions would be required. Eighteen sediment samples were collected by the RPs on May 3, 1997 under agency oversight (Beak Consultants, 1997). The USCG considered the data but did not require further response action by the RPs, leaving any impacts to the sea bottom to recover naturally.

The sampling data indicated that an area of approximately 12 acres of bottom sediments had EDC concentrations of greater than 100 ppm (Kern, 1997). The highest concentration observed was >26,000 ppm. The U.S. Environmental Protection Agency's acute ambient water quality criterion for the protection of aquatic organisms is 113 ppm. This criterion provides a benchmark from which the potential for injury to benthic organisms can be roughly estimated. At concentrations exceeding 100 ppm, losses to benthic invertebrate populations due to direct toxicity from the EDC and reductions in benthic service flows, such as reductions in secondary productivity, would be expected. An additional 50 or so acres had EDC concentrations between one and 100 ppm, suggesting this area may have suffered a lesser degree of injury (Kern, 1997). There was no evidence to indicate any other natural resource was adversely affected by the spill. This is due to the Trustees' belief that:

1) the EDC sank very rapidly to the sea floor with only a minimal possibility of exposure of birds, turtles, and marine mammals at the sea surface;
2) the rapid descent to the seafloor with little dissolving into the water column during

the descent causing minimal exposure to water column organisms during this period; and

3) the rate of EDC dissolution into the water column from the EDC on the sea floor is too low to cause levels of concern in the water column above the sediments after it reached the seafloor (Reilly and Payne, 1997).

This incident is subject to provisions of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 U.S.C. §§9601 et seq. and the Federal Water Pollution Control Act (FWPCA), 33 U.S.C. §§1251 et seq., and applicable state laws. These authorities establish natural resource damages liability where natural resources are injured, lost, or destroyed due to the unauthorized release of a hazardous substance. EDC is designated as a hazardous substance for purposes of the FWPCA and CERCLA 42 U.S.C. §9601(14) and the owner(s) and operator(s) of the vessel(s) responsible for the release are the parties liable for such damages, including reasonable assessment costs. The costs of actions to restore, replace, or provide for equivalent resources or services are the preferred measure of natural resource damages under these authorities and are recoverable by Federal and State Trustees.

EDC is known to gradually biodegrade and to gradually disperse into the water column during calm periods. Dispersion occurs more rapidly during turbulent events (e.g., Hurricane Daniel, which passed near the site in July 1997). Therefore, it is likely that the affected area has recovered to baseline populations and service levels by this time. Action to restore or replace the benthic services that were lost pending resource recovery, however, is appropriate and will serve to compensate for the interim losses.

The National Oceanic and Atmospheric Administration, the Louisiana Department of Wildlife and Fisheries (LDWF), the Louisiana Department of Environmental Quality (LDEQ), and the Louisiana Department of Natural Resources (LDNR) (collectively, the Trustees) developed this Damage Assessment and Restoration Plan/Environmental Assessment (DARP/EA) in order to identify the preferred approach to restore or replace ecological services to compensate for those benthic services lost.

1.2 Affected Environment

1.2.1 Physical Environment

The area affected is located approximately three miles offshore of the Southwest Pass of the Mississippi River. The area in the vicinity of the incident is a very dynamic environment due to the strong influence of the Mississippi River plume. The water depth in the area is approximately 40-46 meters. The seafloor in the vicinity of the collision is largely a soft bottom, but is more heterogeneous than typical offshore benthic habitats in the nearshore Gulf of Mexico due to the complex pattern of erosion and deposition of

sediments due to the river's influence. The sediments in this area are relatively fine silty clays.

1.2.2 Biological Environment

The benthic habitat provides a number of ecological services to the marine environment in the affected area. One important service is the breakdown of organic material deposited from the water column by benthic bacteria. These bacteria are utilized as prey items by meiofauna and macrofauna that live in the sediments on the seafloor. These benthic organisms are prey items for epibenthic crustaceans and demersal fishes that live in association with the seafloor. Fish species that utilize the benthic environment in this area include red and black drum, croaker, sheepshead, mullet, and Spanish mackerel. Various pelagic and reef-associated species including Gulf menhaden and red snapper live associated with these sediments to a lesser degree. A variety of crustacean species such as crabs and commercially important shrimp also utilize the benthic habitat in this depth zone off the Mississippi River delta. Brown shrimp, an extremely important commercial species in the Gulf of Mexico, can be abundant in this environment.

1.2.3 Cultural Environment

Since the area affected by the incident is located offshore, there are unlikely to be any important historical or archeological resources located in the vicinity. Shrimpers trawl in this area and it may also be used to some extent by recreational fishermen.

1.3 Authority

NOAA, LDWF, LDEQ, and LDNR are each designated natural resource trustees under CERCLA, 42 U.S.C. §§9601 et seq., the Federal Water Pollution Control Act (FWPCA), 33 U.S.C. §§1251 et seq., and other applicable Federal law including the National Oil and Hazardous Substances Pollution Contingency Plan, Subpart G, 40 C.F.R. §§300.600 - 300.615. In addition, LDWF, LDEQ, and LDNR are acting pursuant to authority provided by state law, including Titles 56 and 30 of the Louisiana Revised Statutes and Article 9 of the Louisiana Constitution. Pursuant to these authorities, the agencies share trusteeship for the living and non-living resources of the marine environment. As co-trustees, the agencies also share responsibility for assessing injuries to those resources when it is likely they have been harmed by the release of a hazardous substance and for ensuring the public is compensated for such losses through the restoration, replacement, or acquisition of equivalent resources or resource services.

1.4 Strategy for Plan Development

Under CERCLA, the FWPCA, and relevant state law, the Trustees share a common

objective to provide for expeditious restoration, replacement, or acquisition of equivalent resources or services when injuries to natural resources result from unlawful discharges of hazardous substances. The actions needed to restore injured resources and lost resource services to baseline ("primary restoration") and to compensate for interim losses ("compensatory restoration") represent a primary basis for assessing and satisfying the public's natural resource damage claims under these authorities.

Consistent with this legal and policy framework, the Trustees' strategy in developing the DARP/EA has been to determine the restoration actions which are necessary or appropriate to return resources or services to baseline levels or to compensate for interim losses. In this process, the need for restoration action(s) is considered and, where restoration is determined to be appropriate, alternatives capable of providing in-kind restoration, replacement or acquisition of resource services are preferred. This ensures the most direct relationship between the injuries or service losses that occur and the benefits of restoration actions.

Although restoration planning is concerned with the resources directly affected by the spill, the Trustees also take into account the fact that an injured resource is part of a larger ecological system. Under this approach, off-site actions may appropriately be considered, particularly where restoration at the site of the injury or loss is unnecessary, technically infeasible, or not cost-effective.

Finally, in developing this DARP/EA, the Trustees have sought to identify the restoration action(s) preferred for use to compensate for the resource injuries, including interim service losses, in a cost-effective manner.

1.5 Public Participation

Consistent with applicable federal and state laws, including the regulations guiding natural resource damage assessments under CERCLA at 43 C.F.R. Part 11, the National Environmental Policy Act, 42 U.S.C. 4371, et seq. (NEPA), and the regulations implementing NEPA at 40 C.F.R. Part 1500, et seq., a draft plan was subject to public review and comment prior to the Trustees making a final decision on the restoration action which is appropriate to compensate for the natural resource losses identified herein. Therefore, the draft plan was made available for public review and comment for 30 days. The comment period ran from April 12, 1999, following publication of a notice announcing its availability for public review in the Baton Rouge Morning Advocate, until May 12, 1999. No comments were received, and the plan was therefore finalized, accepting the preferred restoration alternative identified in the draft DARP/EA.

1.6 NEPA Compliance/Environmental Assessment

This plan integrates and evaluates information necessary to an Environmental Assessment (EA) of the proposed restoration action, as required by NEPA. As such, it includes a description of the purpose and need for the action, action alternatives, the applicability of the actions to address the losses which likely occurred, their potential environmental consequences and the relevant environmental setting. NOAA has used this information in making a threshold determination as to whether preparation of an Environmental Impact Statement (EIS) is required prior to the selection of the final restoration action (i.e., is the proposed action a major federal action that may significantly affect the quality of the human environment?). Based on the EA integrated in this plan, NOAA believes the proposed restoration action does not meet the threshold requiring an EIS.

2.0 Assessment and Restoration Plan

2.1 Preassessment Activities and Findings

The Trustees considered the potential for injury to various offshore resources and for disruption of human uses of those resources following the event. The sampling was implemented by the RPs around the collision site on May 3, 1997 and provided useful, albeit limited, data for consideration in an assessment.

There were no reported observations or other evidence indicating that any natural resource other than benthic species may have been adversely affected by the spill. Indeed, other resources (e.g., fish or birds) in the vicinity during the spill event were likely not numerous and/or would have had little if any opportunity for exposure to the EDC considering the likely fate of the EDC (rapid sinking) following release. In addition, although vessel traffic at the site was restricted to accommodate response actions, disruptions to recreation or navigation in the area, if they occurred at all, were likely di minimus due to the ready availability of substitute sites/alternate routes in the open waters at the spill site.

The Trustees considered conducting further assessment studies focused on the benthic injuries but concluded the anticipated high cost of conducting further offshore work was not justifiable in this instance given the nature of the potential losses involved, including the limited area and duration of service losses expected.

2.2 Injury Assessment: Benthic Habitat Injury

The data collected by the RPs in May of 1997 represents the only data available to support an assessment of benthic injuries (Beak Consultants, 1997). As noted in Section 1.1 of this document, the Trustees' review of that data indicated that an area of roughly 12 acres of bottom sediments had EDC concentrations of greater than 100 ppm (highest sample had >26,000 ppm), close to EPA's acute ambient water quality criterion for EDC (113

ppm). At these concentrations, the Trustees estimate that most of the approximately 12 acres suffered losses to benthic invertebrate populations in the sediments due to toxicity from the EDC and reductions in benthic habitat services, such as reduced function as the base of the food web. The data indicate an additional 50 or so acres had EDC concentrations between one and 100 ppm, suggesting this area may have suffered a lesser degree of injury.

The loss of benthic services is not permanent. EDC is known to gradually biodegrade and to gradually disperse into the water column during calm periods. Dispersion occurs more rapidly during turbulent events (e.g., Hurricane Daniel, which passed near the site in July 1997). Based on properties associated with the EDC and its anticipated behavior or fate in a marine environment, the Trustees believe the affected area has recovered to baseline populations and service levels by this time. The impacts described above, therefore, represent losses which are likely of less than two years in duration.

2.3 Restoration Plan

2.3.1 Objectives and Strategy for Restoration Planning

As noted in the injury assessment findings, offshore benthic species were injured and benthic habitat services were disrupted as a result of exposure to EDC. The objectives of restoration planning for these losses are to:

A) Determine what actions, if any, are necessary or appropriate to facilitate recovery of the injured benthic species and services at the site of injury (Primary Restoration); and

B) Determine what actions, if any, are appropriate to restore, replace or acquire ecological services equivalent to those lost due to exposure to EDC in order to compensate for this loss (Compensatory Restoration).

Trustees sought input from a variety of local biologists and restoration scientists in order to develop a list of restoration alternatives. The alternatives considered for both primary and compensatory restoration requirements, and the preferred alternatives selected by the Trustees, are presented below. The Trustees used the following selection criteria to evaluate the restoration alternatives:

1) Extent to which each alternative can return the injured natural resources to baseline (primary restoration) or compensate for the interim lost services (compensatory restoration).

2) Extent to which each alternative will avoid additional injury to the

injured resource.

3) Level of uncertainty in the success of each alternative.

4) Extent to which each alternative benefits more than one natural resource and/or service.

5) Cost effectiveness.

6) Effects of each alternative on the environment.

7) Consistency with policy and compliance with law.

The first criterion was considered to be the most important to the Trustees' evaluation of restoration alternatives, as it considers the relative ability of each alternative to achieve the objectives of restoration and support the measurement of restoration-based compensation under applicable laws.

The following sections present the Trustees' evaluation of restoration alternatives based on these criteria and, based on that evaluation, identifies the alternatives which are preferred for use to achieve the objectives for the restoration of resources and resource services lost as a result of this incident.

2.3.2 Primary Restoration

This section considers actions that may be appropriate to restore or facilitate the recovery of the offshore benthic populations injured as a result of the release.

Alternatives Considered:

1) Natural Recovery - This alternative would not involve any direct intervention to restore the resource. While natural processes may assist or provide for the natural recovery of this resource, no additional actions are proposed under this alternative. [The natural recovery alternative for primary restoration of this and other natural resource categories is equivalent to the "no action" alternative under NEPA].

2) Removal of Residual EDC - Actions to remove residual contamination would be appropriate for consideration where EDC concentrations remain and continue to inhibit natural recovery of benthic species and services at the site, and natural recovery is expected to occur over unacceptably long periods of time.

Evaluation of Alternatives and Environmental Consequences

The natural recovery alternative meets several of the criteria for evaluation of restoration alternatives listed above (see Table 1 for summary of evaluation for each criterion). Evidence from other EDC releases and expert opinion indicate that natural recovery of benthic habitat is occurring, or has occurred, at the affected site and full recovery to baseline is expected without human intervention (Reilly and Payne, 1997). Additional injury to benthic habitat services and other ecological resources will be avoided under this alternative. It is cost-effective, and is consistent with policy and law. It will not provide additional benefits to other natural resources.

The removal of EDC contaminated sediment fails to meet several criteria. Since return to baseline conditions is expected to have occurred or to occur in the near future, there is no increased benefit from dredging sediments in this area. Dredging carries a risk of causing injury to adjacent sediments from increased turbidity and by disturbing the recovering benthic services in the immediate area. Due to the risk of causing additional injury, the likely success of this alternative in enhancing recovery is small. It is unlikely that implementation of this alternative would benefit other resources. The cost of this alternative would be relatively high due to the remoteness of the area and the water depth, contrary to the cost-effectiveness criterion. It is not consistent with Trustee policies or law to perform active primary restoration actions where recovery to baseline will proceed in an appropriately rapid timeframe without these actions.

Preferred Alternative: The Trustees propose the natural recovery alternative for primary restoration of injured benthic sediments

2.3.3 Compensatory Restoration

This section considers alternatives that may be appropriate to restore, replace or acquire services equivalent to those lost as a result of the injury to offshore benthic resources.

Alternatives Considered:

1) No action to compensate for interim losses of benthic resources or services - This alternative would involve no further action to offset interim benthic species or services losses. [The no action to compensate alternative is equivalent to the "no action" alternative under NEPA].

2) Intermediate marsh creation - This alternative would involve creation of marsh in a location where marsh does not currently exist. Marsh development may occur through natural recruitment or direct plantings in the area.

3) Artificial Reef Construction - This alternative would involve the placement of hard

substrate on the seafloor to allow colonization by invertebrates and plants, and utilization as a feeding site and habitat for fish.

4) Creation of shallow subtidal benthic habitat- This alternative would involve the excavation of material from an upland area and creating a breach or breaches to allow inflow of tidally-influence water to form shallow benthic habitat.

Evaluation of Alternatives and Environmental Consequences

The no compensation alternative fails to meet important criteria (See Table 1). It may be appropriate where little or no interim resource or resource service losses occur or where actions to compensate for those losses are not cost-effective. In this instance, the Trustees have found significant ecological service losses likely occurred. As such, this alternative fails to meet important objectives embodied in CERCLA and other applicable authorities, i.e., to make the public whole for resource losses through appropriate restoration actions. Further, there are cost-effective alternatives that can achieve restoration and statutory objectives. This alternative does not benefit other resources but also does not cause additional injury to benthic services at the site or have adverse impacts to the environment.

Creation of intermediate marsh is a restoration alternative that is consistent with the criteria used by the Trustees to evaluate restoration alternatives. It will provide an outflow of organic material that will generally benefit the offshore ecosystem by providing a source of organic carbon. It will directly provide benefits to some of the species that were likely most affected by the reduction in benthic habitat services, such as Atlantic croaker and brown shrimp, by providing critical nursery habitat. These benefits are appropriate to satisfy the compensatory restoration objectives. This alternative will avoid any additional injury to the affected offshore benthic habitat. Intermediate marsh creation projects typically have a high likelihood of success and tend to be very cost-effective to implement. Marsh will provide services benefiting a wide range of resources, including to benthic invertebrate species that inhabit marshes and the bird and fish species that feed on them. Further, opportunities exist in Louisiana to restore intermediate marsh that was converted to cropland by re-establishing historic hydrology. Such projects have little effect on existing natural habitats. Therefore, this alternative would have clear overall benefits to the environment. It is also consistent with Trustee policies and law.

Installation of an artificial reef meets several of the restoration criteria but fails to satisfactorily meet some other restoration criteria. It is likely that the constructed reef would be successful in providing ecological service flows in the appropriate depth zone, but mostly to reef-associated species that are not, for the most part, the kinds of species that were most affected by the loss of soft bottom benthic habitat services. Therefore it is not as consistent with important objectives embodied in CERCLA and other applicable

authorities, i.e., to make the public whole for resource losses through appropriate restoration actions, as is the marsh creation alternative. It would not cause additional injury to the affected benthic habitat, but would adversely affect the existing benthic community in the immediate area on which it would be placed. This alternative would be relatively expensive in relation to the benefits to the affected resources.

Construction of shallow benthic habitat would benefit species that utilize soft bottom benthic habitat, but it would provide relatively fewer benefits to the kinds of offshore species that were affected by the incident than would marsh. Shallow unvegetated benthic habitat is not as important as nursery habitat as is marsh for offshore species, and will not produce as much organic material for export to the offshore as does marsh. It would not cause additional injury to the affected area, and would provide benefits to a large number of resources, but would involve the conversion of existing terrestrial habitat to submerged estuarine habitat. It could be relatively cost-effective. Given the alarming rate of land loss in Louisiana, however, this alternative would not be consistent with Louisiana policies to reduce the rate of land loss.

Preferred Alternative: The Trustees propose creating intermediate marsh as the restoration action to achieve compensatory restoration requirements.

2.3.4 Restoration Scaling

The Trustees have used simple Habitat Equivalency Analysis (HEA) calculations to estimate the scale of marsh creation needed to restore, replace or acquire resource services comparable to those lost, based on the limited assessment information available. For created marsh, this work suggests that a minimum of one to two acres would be required to restore or replace lost benthic services to directly compensate for those losses. This scaling analysis was consistent with the injury assessment for benthic habitat and used conservative assumptions regarding the degree of injury likely to have occurred to this habitat, the period of time required for recovery to baseline, and the relevant ecological benefits that would be provided by the restoration project.

2.4 Summary of Restoration Plan

The Trustees' evaluation of the potential injuries resulting from the discharge of EDC as a result of this incident indicates that compensatory restoration is required for the loss of benthic habitat services due to EDC contamination. No primary restoration actions are proposed. Actions to speed recovery were deemed unnecessary due to the relatively rapid natural recovery that followed the incident, unjustifiable due to high costs, and potentially counter-productive given the possibility of causing additional injury and thus actually delaying recovery to baseline conditions. The Trustees, therefore, concluded that the

preferred alternative to accomplish the goal of primary restoration for injuries resulting from this incident is the natural recovery alternative.

Based on the Trustees' conclusion that significant losses of benthic habitat services are likely to have resulted from this incident, it was determined that compensatory restoration is required to make the public whole for these interim losses. Intermediate marsh creation was deemed to be the most appropriate restoration alternative. It is believed to be most likely to be successful in providing ecological benefits to the species affected by the lost benthic services, and will additionally provide benefits to a large number of other resources. It is cost-effective and consistent with both CERCLA's objective to make the public whole for interim losses and state and federal policies concerning wetlands. Other compensatory restoration alternatives considered did not fit the selection criteria utilized by the Trustees as well as the intermediate marsh creation alternative.

Project selection will be based on this final restoration plan which was approved by the Trustees following the public review of the draft DARP/EA. However, to facilitate and expedite restoration planning and to support decisions regarding an appropriate settlement, the Trustees have proceeded with research regarding projects to create intermediate marsh that will provide benefits to offshore species that were affected by the loss of service from the benthic habitat injured by this incident. This review is focused on projects that will create a minimum of two acres of marsh that could serve as nursery habitat and provide other benefits to marine species. The Trustees' goal has also been to identify a marsh creation project in Louisiana that will minimize negative environmental impacts during implementation, such as a project allowing the restoration of intermediate marsh previously converted to cropland, by removal of levees. After a specific marsh restoration project consistent with the preferred alternative identified herein has been selected, the Trustees will ensure that project implementation will comply with all applicable Federal and State laws, including any necessary environmental compliance permitting and any required supplemental environmental analysis (i.e., NEPA).

TABLE 1

Summary of Evaluation of Primary and Compensatory Restoration Alternatives

Criteria considered are: 1) extent to which each alternative can return the injured natural resources to baseline (primary restoration) or make the environment and public whole for the interim lost services (compensatory restoration); 2) extent to which each alternative will avoid additional injury to the injured resource; 3) level of uncertainty in the success of each alternative; 4) extent to which each alternative benefits more than one natural resource and/or service; 5) cost effectiveness; 6) effects of each alternative on the environment; and 7) consistency with policies and compliance with law.

Restoration Alternative Evaluation

Restoration Alternative	Criterion 1: Return injured resources to baseline	Criterion 2: Avoidance of add'l. injury	Criterion 3: Level of uncertainty in success	Criterion 4: Benefits to more than 1 resource/ service	Criterion 5: Cost effectiveness	Criterion 6: Effects on environm't.	Criterion 7: Consistent w/ policies and law
PRIMARY RESTORATION.:							
Natural Recovery ॐ	●	●	◒	○	●	◒	●
Removal of Contaminated Sediment	○	○	○	○	○	○	◒
COMPENSATORY RESTORATION:							
No Compensation	○	●	○	○	N/A	◒	○
Marsh Creation ॐ	●	●	◒	●	●	●	●
Artificial Reef	◒	◒	◒	◒	○	●	◒
New Subtidal Habitat	◒	●	◒	◒	●	◒	○

Key:
● = fully meets criteria ◒=partially meets criteria ○=does not meet criteria N/A=not applicable
ॐ = preferred restoration alternative

3.0 Preparers

The following individuals participated in the development of this DARP/EA:

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4.0 Persons Consulted

Persons consulted to assist in the assessment of potential injuries resulting from this incident and/or the development of appropriate restoration alternatives include the following individuals (not including preparers listed above):

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Jim Holcombe, LDNR
Rick Kasprzak, LDWF
Carol-Ann Manen, NOAA
Billy Moore, Natural Resource Conservation Service
Gary Petrae, NOAA
Tim Reilly, Industrial Economics, Inc.
Erik Zobrist, NOAA

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Supplemental Environmental Analysis
Supporting Final Project Selection

Final Damage Assessment and Restoration Plan for the April 11, 1997 spill of Ethylene Dichloride from the M/V FORMOSA SIX in the Gulf of Mexico

Introduction

The Damage Assessment and Restoration Plan (DARP) for the April 11, 1997, spill of Ethylene Dichloride (EDC) from the M/V FORMOSA SIX in the Gulf of Mexico was developed pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 U.S.C. §§9601 et seq., the Federal Water Pollution Control Act (FWPCA), 33 U.S.C. §§1251 et seq., and applicable state laws. That plan and associated Environmental Assessment (EA) identifies the restoration of intermediate estuarine marsh as the preferred action to be undertaken to provide for the restoration, replacement or acquisition of natural resource services equivalent to those lost due to benthic injuries resulting from the subject EDC spill. That plan became final on April 13, 1999, following public notice and a period for public comment.

The Trustees and the parties responsible for the spill have signed an administrative settlement agreement to resolve liability for natural resource damages for the benthic losses. That settlement provides funds, that will be used to restore estuarine marsh in Louisiana consistent with the DARP/EA.

Implementation of the DARP requires selection of a specific project to restore intermediate estuarine marsh. NOAA has considered available marsh restoration and creation projects in Louisiana. This Supplemental Analysis identifies the selected project and the rationale for its selection, including its potential affects on the human environment. This analysis supplements the Environmental Assessment (EA) incorporated in the DARP and, together with that EA, provides the basis for the agency's consideration of whether the restoration action to be undertaken to restore lost resource services in this case will result in a significant effect on the quality of the human environment.

Selected Project

Under the DARP/EA, the Trustees estimated the amount of intermediate estuarine marsh creation needed to restore, replace or acquire resource services comparable to those lost, based on the limited assessment information available. This work suggests that at least one to two acres of estuarine marsh are required to meet the restoration objective for benthic losses.

The Trustees researched available projects that would create intermediate marsh. That review focused on projects that would create a minimum of two acres of marsh capable of providing nursery habitat and other services to marine species potentially affected by the loss of benthic habitat services caused by the spill.

The project identified as best fitting these goals is one to restore lands previously converted to agricultural use from estuarine marsh, in order to return such lands to function as estuarine marsh. This project will be implemented under the Wetlands Reserve Program (WRP), which is a voluntary program to restore and protect wetlands on private property. It is an opportunity for landowners to receive financial incentives to enhance wetlands in exchange for retiring marginal agricultural land. Applications to the program are ranked to ensure the most environmentally and economically valuable wetlands are restored with the funds that are available. Congress authorized WRP (7 CFR Part 1467) under the Food Security Act of 1985, as amended by the 1990 and 1996 Farm Bills. The U.S. Department of Agriculture's (USDA) Natural Resources Conservation Service (NRCS) administers the program.

Landowners who choose to participate in WRP may sell a conservation easement or enter into a cost-share restoration agreement with USDA to restore and protect wetlands. The landowner voluntarily limits future use of the land, yet retains private ownership. The landowner and NRCS develop a plan for the restoration and maintenance of the wetland.

The program offers landowners three options: permanent easements, 30-year easements, and restoration cost-share agreements of a minimum 10-year duration. The option selected in this case is a permanent easement, which is a conservation easement in perpetuity.

Lands which is restorable and suitable for the wildlife benefits, as determined through the evaluation process, are elligible for the WRP. The landowner continues to control access to the land (and may lease the land) for hunting, fishing, and other undeveloped recreational activities. At any time, a landowner may request that additional activities be evaluated to determine if they are compatible uses for the site. This request may include such items as permission to cut hay, graze livestock or harvest wood products. Compatible uses are allowed if they are fully consistent with the protection and enhancement of the wetland according to the site-specific, landowner-NRCS plan for the restoration and maintenance of the wetland.

The project site is located at approximately 29° 50' N and 92° 06' W, in Vermillion Parish, just north of Vermillion Bay and south of Abbeville, Louisiana. The project involves removing levees that currently surround agricultural fields. The levees are typically three feet high by six feet wide spoil berms that prevent estuarine water flow and tidal influence. Removal of these levees will reestablish fishery access to these acres, allowing them to naturally revegetate and function as intermediate

marsh. On-site construction activities will be relatively minor, limited to removal of the levees and occur within the present footprint of the levee system. A U. S. Department of the Army, Corps of Engineers Section 404 permit for dredge and fill is not required because the levees and fields are presently uplands, not wetlands. NRCS will obtain a State coastal use permit for the project if one is required.

State and other matching funds are being used to restore approximately 500 marsh acres under this project. Applying the FORMOSA SIX settlement funds to this project will allow the NRCS to acquire and restore approximately 140 additional marsh acres that would otherwise be excluded from the project. With this addition, the project would involve the removal of about 300' feet of levees and result in the restoration of about 640 marsh acres.

Supplemental Analysis Supporting Project Selection

As noted above, the project will restore the natural hydrologic flow in an area that had previously been converted from estuarine marsh to agricultural use. The natural hydrologic flow had been eliminated through the construction of a levee, allowing the area to be used for rice production. Under the restoration project, on-site activities consist of removing the levee and the spoil bank habitat of shrubs and trees that presently exists. This will allow the original, natural hydrologic flow to resume.

Removal of levee was preferred over other types of marsh creation projects, such as grading uplands to marsh elevations or using dredge spoil material to construct marsh. Upland conversion and use of dredge spoil material were not selected because there are either greater environmental impacts associated with these projects or they are not as cost effective when compared to levee removal. Creating marsh from uplands would involve disposal of potentially large volumes of fill and eliminating potentially beneficial upland habitat. Moreover, upland conversion would be more expensive than levee removal due to the additional costs associated with permitting, engineering and survey costs, as well as the cost to dispose of larger quantities of fill. Use of dredge spoil material to create marsh would require the use of dredges. Dredges are very expensive to hire and/or operate and would, therefore, not be cost effective to use for small marsh creation projects. Finally, planting may be required to stabilize and vegetate newly created marsh that would further drive up project costs.

The primary negative environmental impact from the levee removal project is the loss of about 1800 ft^2 of spoil bank vegetation. The vegetation on the spoil bank likely provides some limited ecological services, such as shelter for small animals or feeding or nesting areas for some birds. The surface area, however, is relatively small.

The entire project area has been surveyed and found to be at the proper elevation for recruitment and survival of estuarine marsh vegetation. Once the levee is removed and water flow and tidal influence restored, marsh vegetation will recolonize the area. The environmental benefits of estuarine marsh are summarized in the DARP (pp 11-12). These include providing an outflow of organic carbon that will generally benefit the coastal and offshore marine ecosystem, providing habitat for benthic species, and providing a benthic food source and critical nursery habitat for fishery species. Some fish and shellfish species most likely affected by the reduction in benthic habitat services attributable to the spill, such as Atlantic croaker and brown shrimp, directly benefit from estuarine marsh. Such marshes will also provide habitats or food sources for other wildlife, such as small mammals and bird species that utilize marsh. The creation of estuarine marsh in the manner outlined will achieve positive environmental effects with minimal disruption or loss of other ecological services. Further, the ecological benefits created are much greater (over 640 acres, with 147 additional acres per the DARP) than the limited services removed (over 1800 m^2).

The creation of marsh in the manner outlined is consistent with known federal and state policies, laws, and regulations, including but not limited to CERCLA and the FWPCA (as it is sufficient to meet restoration objectives for the benthic resources injured by this spill), the Magnuson-Stevens Act (16 U.S.C. §1801 et seq.) as amended and reauthorized by the Sustainable Fisheries Act (Public Law 104-297) (as it will help establish additional essential fish habitat), and Louisiana's Coastal Zone Management Act (which supports the restoration of coastal wetlands in Louisiana through properly permitted projects). The restoration of coastal wetlands is also generally consistent with the stated federal policy of no-net loss of wetlands.

Finding of No Significant Impact

In compliance with the National Environmental Policy Act (NEPA), an Environmental Assessment has been prepared for the proposed marsh restoration project in Vermillion Parish, Louisiana. The environmental review process has led NOAA to determine that this action will not have a significant effect on the quality of the human environment. Therefore, an Environmental Impact Statement is not required by Section 102 (2) (C) of NEPA or its implementing regulations.

Penelope D. Dalton
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Date