EXHIBIT I

Planned Restoration Activities
at the Hippolyte-Coulee Site
(ENTRIX, 1996)

PLANNED RESTORATION ACTIVITIES AT THE HIPPOLYTE-COULEE SITE

Prepared for

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Project No. 146903-1100

February 21, 1996

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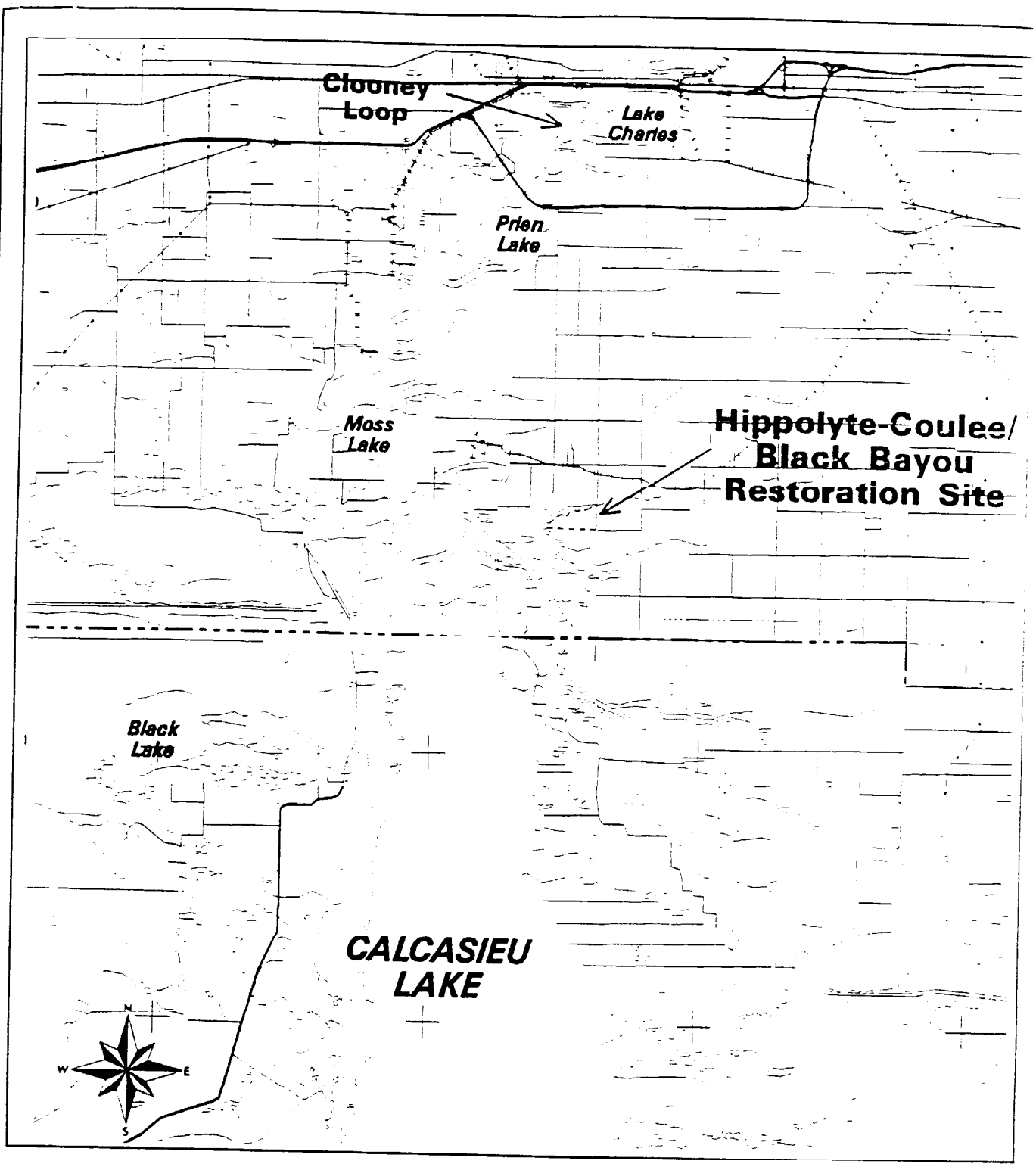
1.0 INTRODUCTION

1.1 Purpose

This document summarizes the restoration activities to be performed as compensation for potential ecological injuries and corresponding interim lost services that occurred as a result of a chemical release at a Conoco Inc. (Conoco) facility in Louisiana. Conoco's Gulf Coast Business Unit of Lake Charles, Louisiana retained ENTRIX, Inc. (ENTRIX) to prepare this restoration plan for the purpose of presenting the planned restoration activities to the natural resource trustees. The Federal trustees include the National Oceanic and Atmospheric Administration (NOAA) and the U.S. Department of Interior (DOI). The Louisiana trustees include the Louisiana Department of Environmental Quality (LDEQ) and the Louisiana Department of Wildlife and Fisheries (LDWF). Both the Federal and Louisiana trustees are hereinafter collectively referred to as the "Trustees."

The potential ecological injuries and corresponding interim lost services for which the restoration activities are presented herein occurred as a result of the March 31, 1994 release of 1,2-dichloroethane (also referred to as ethylene dichloride or EDC) into a drainage ditch (the "boat slip") and the northern portion of Clooney Island Loop (Clooney Loop), immediately adjacent to the Marine Terminal's Dock No. 1. Clooney Loop, an ox-bow channel on the Calcasieu River, provides access for commercial shipping in the Lake Charles, Louisiana area. The Marine Terminal is operated in conjunction with Conoco's Lake Charles Refinery.

Conoco has proposed to perform restoration activities at an off-site location, approximately seven river miles to the south of Dock No. 1. The site is part of a larger tract that is bounded by the Hippolyte-Coulee Bayou to the north and Black Bayou to the south. Figure 1-1 presents the location of the restoration site and its proximity to Clooney Loop.



SOURCE: USGS 1:100,000 Scale Metric Topographic Map – 1986 Lake Charles, Louisiana–Texas

ENTRIX

Figure 1–1
General Site Vicinity Map
Hippolyte–Coulee Restoration Site
CONOCO, Inc.
Westlake, Louisiana

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01/26/96 14:01 KCD R:\ACAD\146903\TEMP\FIG1-1

1.2 Report Organization

Section 2.0 of this report provides a description of the existing conditions at the Restoration Site (including vegetative species, soil type, etc.) and a description of the restoration activities to be performed at the Restoration Site. Section 3.0 presents a bibliography of references made in the previous sections, respectively. A list of abbreviations and acronyms used throughout the report is provided in Appendix A.

2.0 HIPPOLYTE-COULEE RESTORATION SITE

The Hippolyte-Coulee restoration site (hereinafter "Restoration Site") is located below the saltwater intrusion barrier, in the lower segment of the Calcasieu River watershed and is approximately seven miles from the affected Clooney Loop site. The drainage at the site is ideal for wetlands creation and enhancement, with the site already supporting abundant emergent freshwater vegetation along the northern and western property boundaries. For the purposes of the planned restoration activities presented herein, the site consists of two distinct areas: the restoration area and buffer areas. The restoration area is the transitional community area located between the mature marsh community area bordering the Hippolyte-Coulee Bayou and the higher elevation bottomland hardwood lower and upper associations. The buffer areas consist of those above-mentioned areas that surround the restoration area. While not provided as compensation for the injuries that actually or potentially occurred as a result of the Clooney Loop EDC release, restoration of the "buffer areas" will serve to protect the integrity of the restoration acreage and will provide ecological services to the Calcasieu Ecosystem.

The restoration project and subsequent performance monitoring activities to be performed within the restoration area will result in the re-establishment of a wetland/bottomland hardwood ecosystem that will create ecological service flows from natural resources that are similar to those lost at the affected site. Further, the planned restoration activities in buffer areas will result in the creation of new habitats, resources and ecological services, all of which will indirectly enhance or support resources within the restoration area.

2.1 Existing Site Conditions

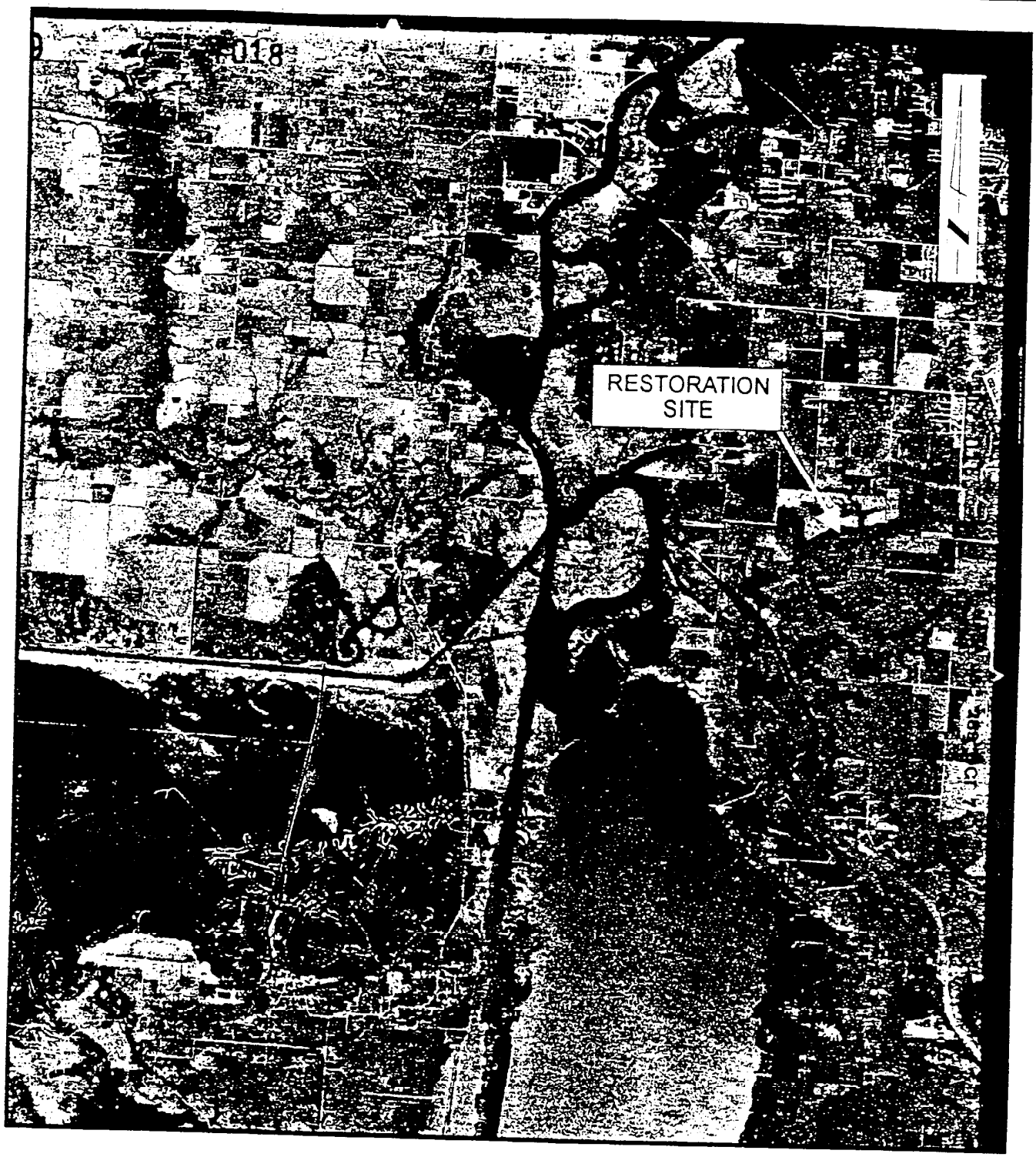
The Restoration Site is located in Section 14, 22, 23, and 26, Township II South, Range 9 West, Calcasieu Parish, Louisiana and is bounded on the north and west by Hippolyte-Coulee Bayou, south by a dirt road, and east by an existing fence line which follows the boundary-section lines.

The land has historically been used for pastureland and therefore retained its natural drainage patterns and canals, unlike other evaluated tracts which had been converted to agricultural use. The site has good accessibility and has been periodically stripped of large vegetation in order to preserve its use as pasturelands. Further, the site is located behind the lock on the Intracoastal Waterway adjacent to the Calcasieu River and, therefore, is fairly well protected from hurricane and storm surges. This is a unique feature for a site located in the lower segment of the Calcasieu River since sites located in this area are extremely vulnerable to destruction or degradation as a result of periodic storm surges and the intrusion of highly saline waters.

Elevation of the property grades up from the bordering water courses and a marsh elevation of approximately 1.0' National Geodetic Vertical Datum (NGVD) to an elevation of greater then 5' and less than 10' NGVD. Figures 2-1 and 2-2 provide an infra-red satellite photograph of the site and the site topography, respectively.

The Restoration Site, including the restoration and buffer areas, is comprised of 252 total acres. Of this total acreage, 133 acres are currently used as pastureland and for agricultural purposes and 119 acres support low to transitional freshwater vegetative communities. These land uses are graphically presented in Figure 2-3 and can be observed in a recent aerial photograph of the site (April 1, 1995) provided as Figure 2-4.

The various land types (or communities) present at the Restoration Site that currently support specific vegetative communities and associated habitats within the existing ecosystem are graphically presented in Figure 2-5 and are described as follows:



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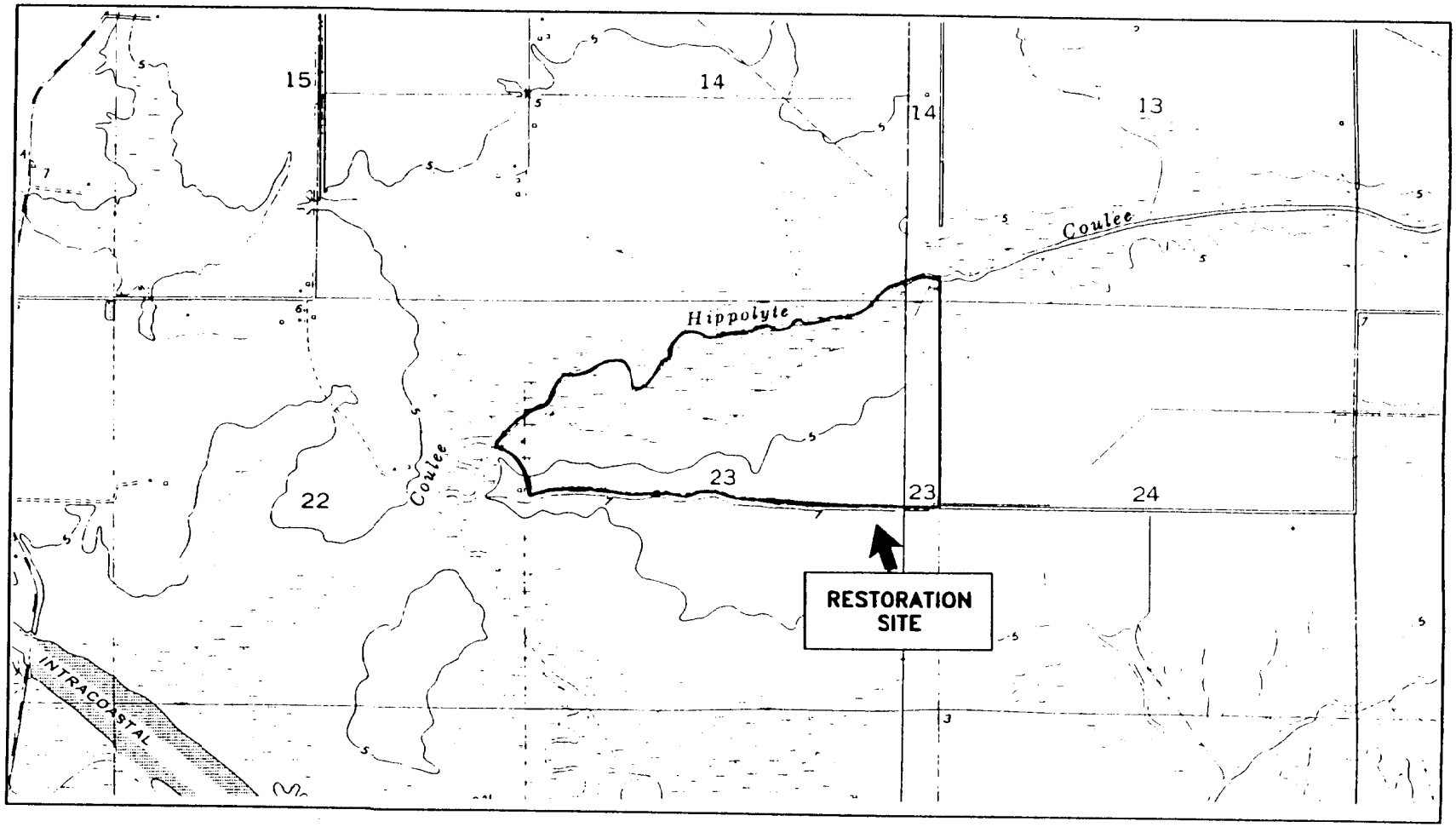
Scale in Feet

Source: National Aeronautics and Space Administration, 289-7-018 (October 1974)

Figure 2-1
Satellite Photograph
Hippolyte-Coulee Restoration Site
CONOCO, Inc.
Westlake, Louisiana



SOURCE:

U.S.G.S. 7.5 Minute Topographic Maps
Lake Charles SW, Louisiana - 1955
(Photorevised 1975)
Moss Lake, Louisiana - 1955
(Photorevised 1975)

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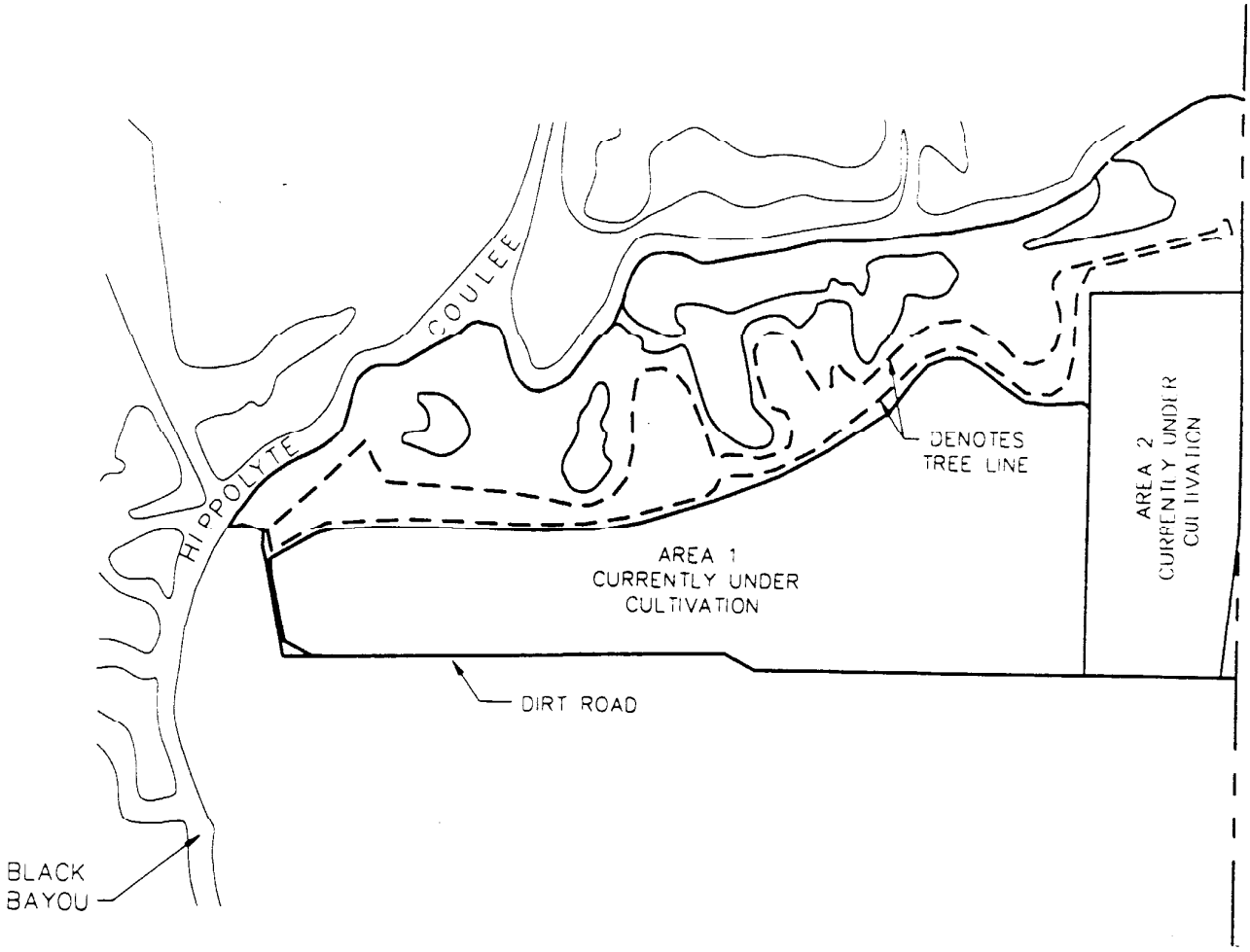
ENTRIX

Figure 2-2
Site Topography Map
Hippolyte Coulee Restoration Site
CONOCO, Inc.
Westlake, Louisiana



SOURCE: Stream Property Management, 1995

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Figure 2-3
Existing Site Land Use
Hippolyte-Coulee Restoration Site
CONOCO, Inc.
Westlake, Louisiana

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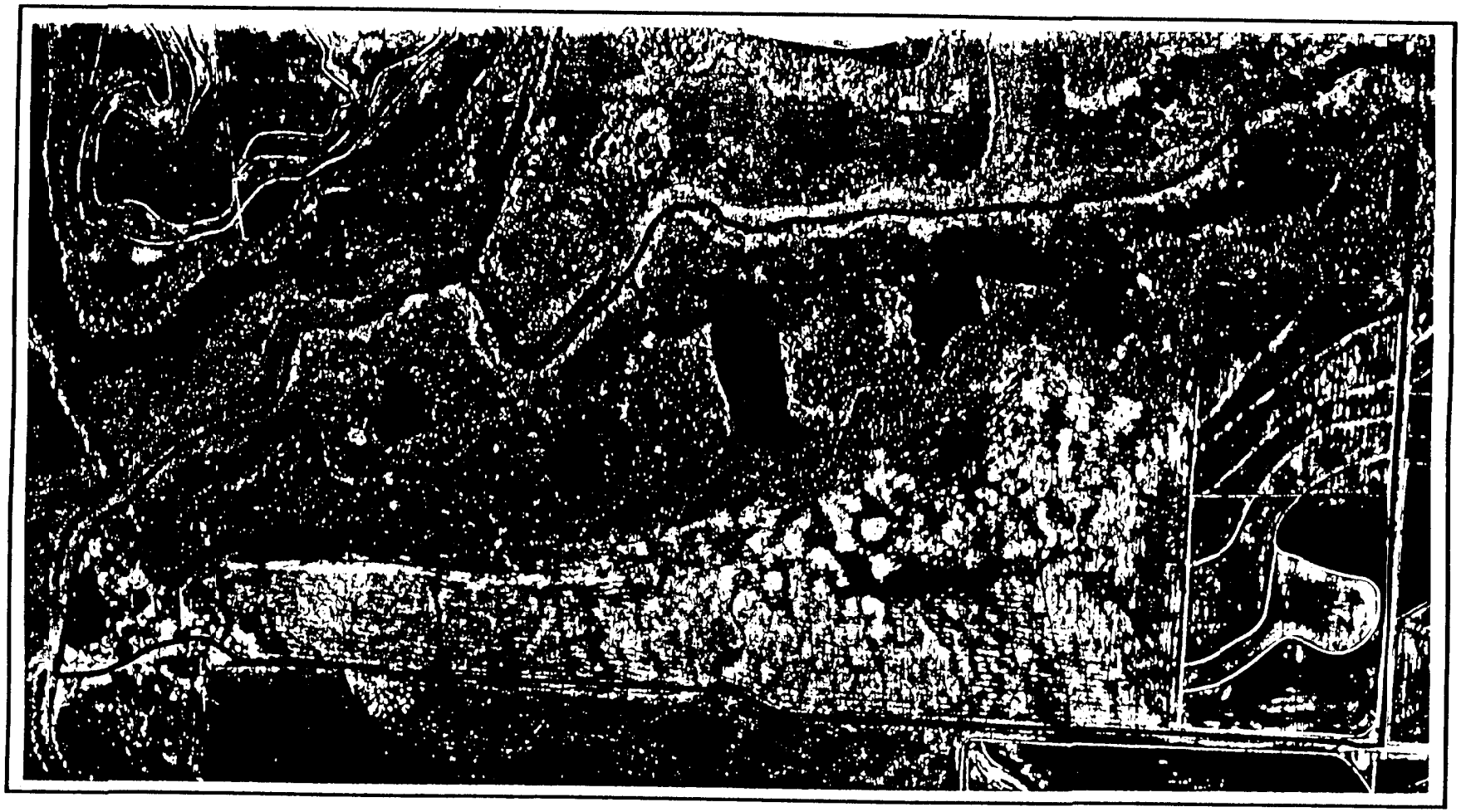
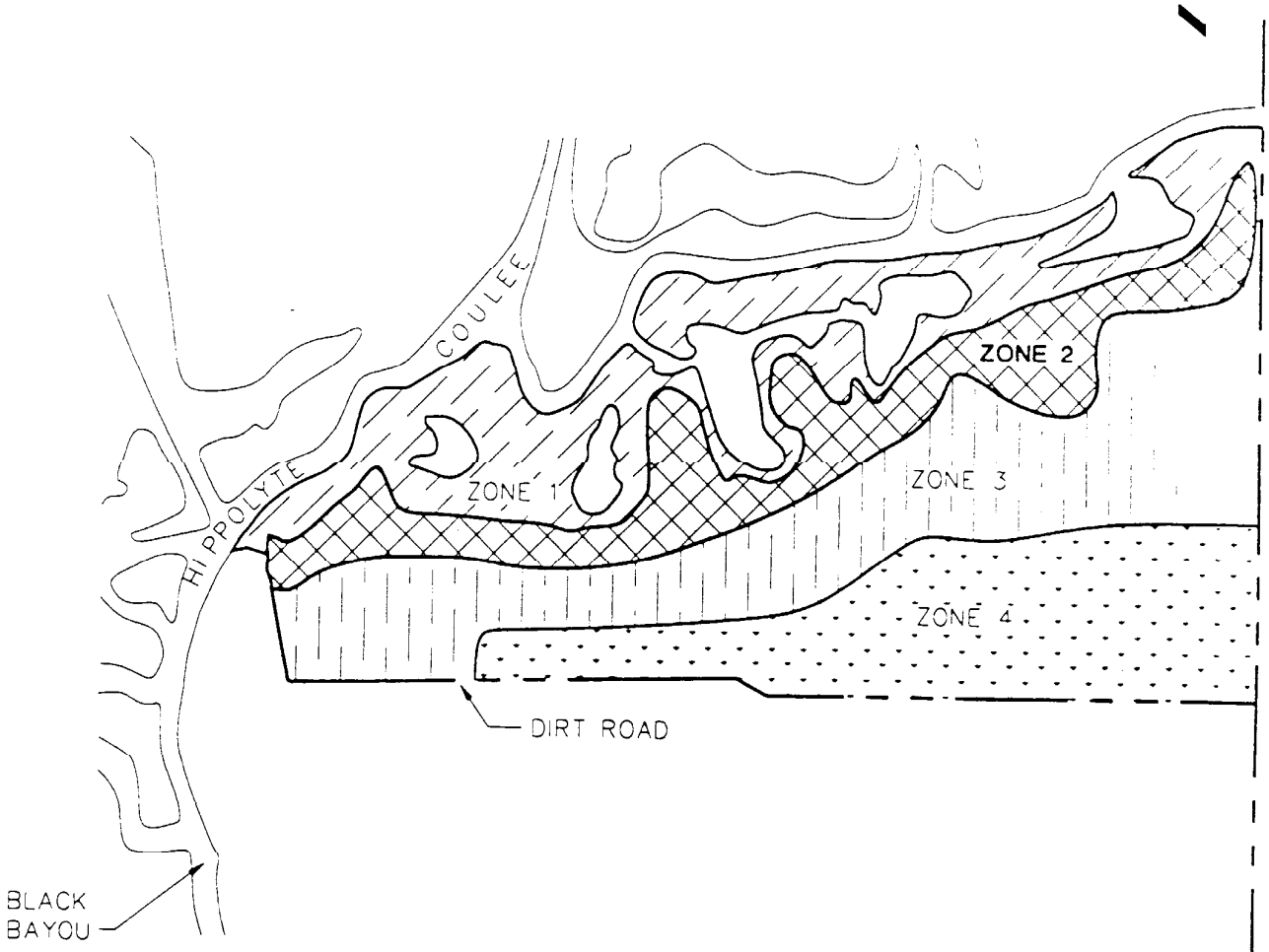


Reference: April 1, 1995 Aerial Photograph

0 200
Scale in Feet
(Approx.)

ENTRIX

Figure 2-4
Aerial Photograph
Hippolyte Coulee Restoration Site
CONOCO Inc.
Ye Olde Plantation



LEGEND

- ZONE 1 (54 ACRES OF MARSHES AND 24 ACRES OF PONDS)
- ZONE 2 (41 ACRES)
- ZONE 3 (79 ACRES)
- ZONE 4 (54 ACRES)

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SOURCE: Stream Property Management, 1995

ENTRIX

Figure 2-5
Zone Delineation
Hippolyte-Coulee Restoration Site
CONOCO, Inc.
Westlake, Louisiana

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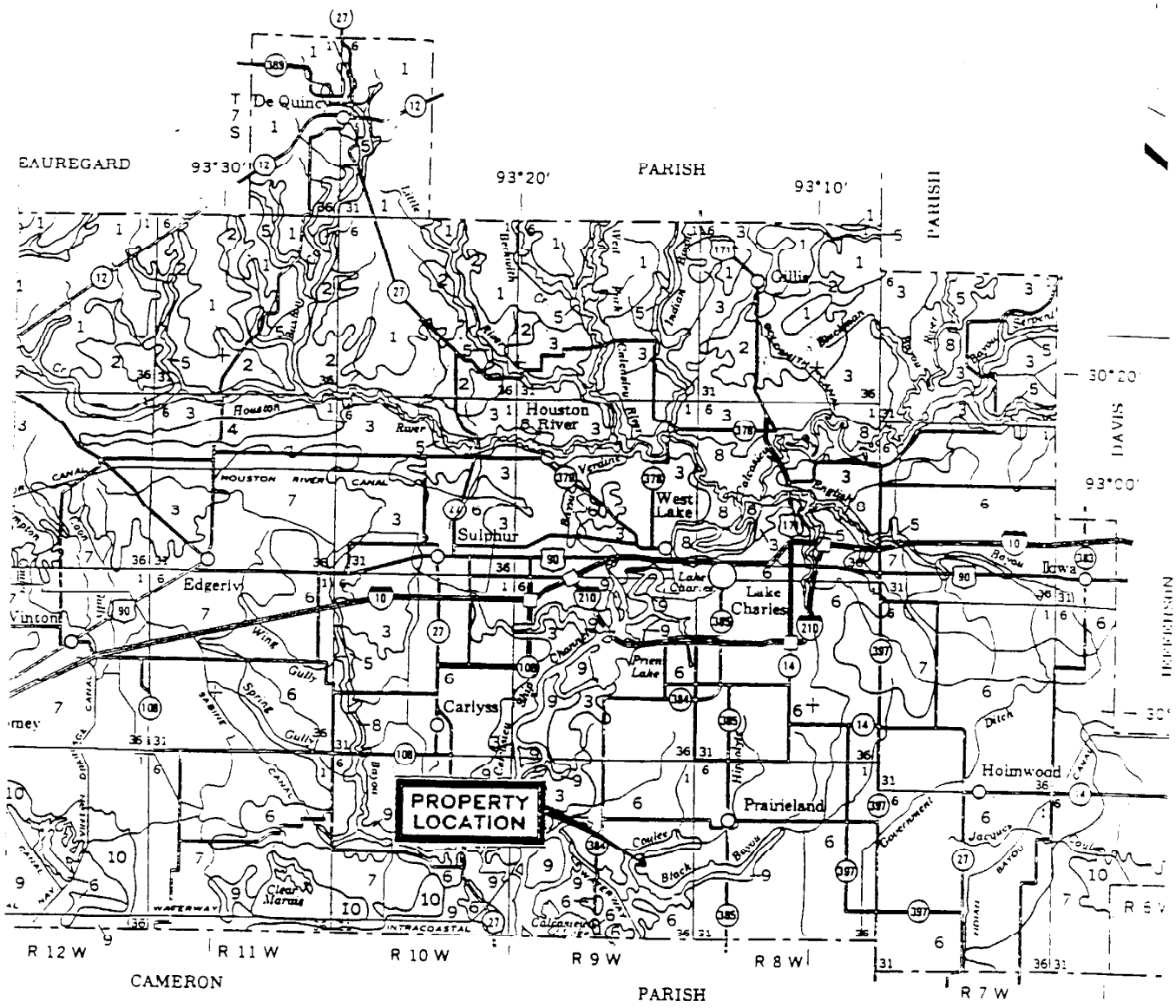

POORLY DRAINED AND SOMEWHAT POORLY DRAINED SOILS: ON THE GULF COAST PRAIRIE

6 — Mowata-Vidrine-Crowley: Level and very gently sloping, poorly drained and somewhat poorly drained soils that have a loamy surface layer and a loamy and clayey subsoil

VERY POORLY DRAINED SOILS: ON MARSHES AND SWAMPS

9 — Gentilly-Clovelly: Level, very poorly drained soils that have a very fluid, mucky surface layer and a very fluid, loamy and clayey or mucky and clayey underlying material; in marshes

ENTRIX

Figure 2-6
General Soil Map
Hippolyte-Coulee Restoration Site
CONOCO, Inc.
Westlake, Louisiana

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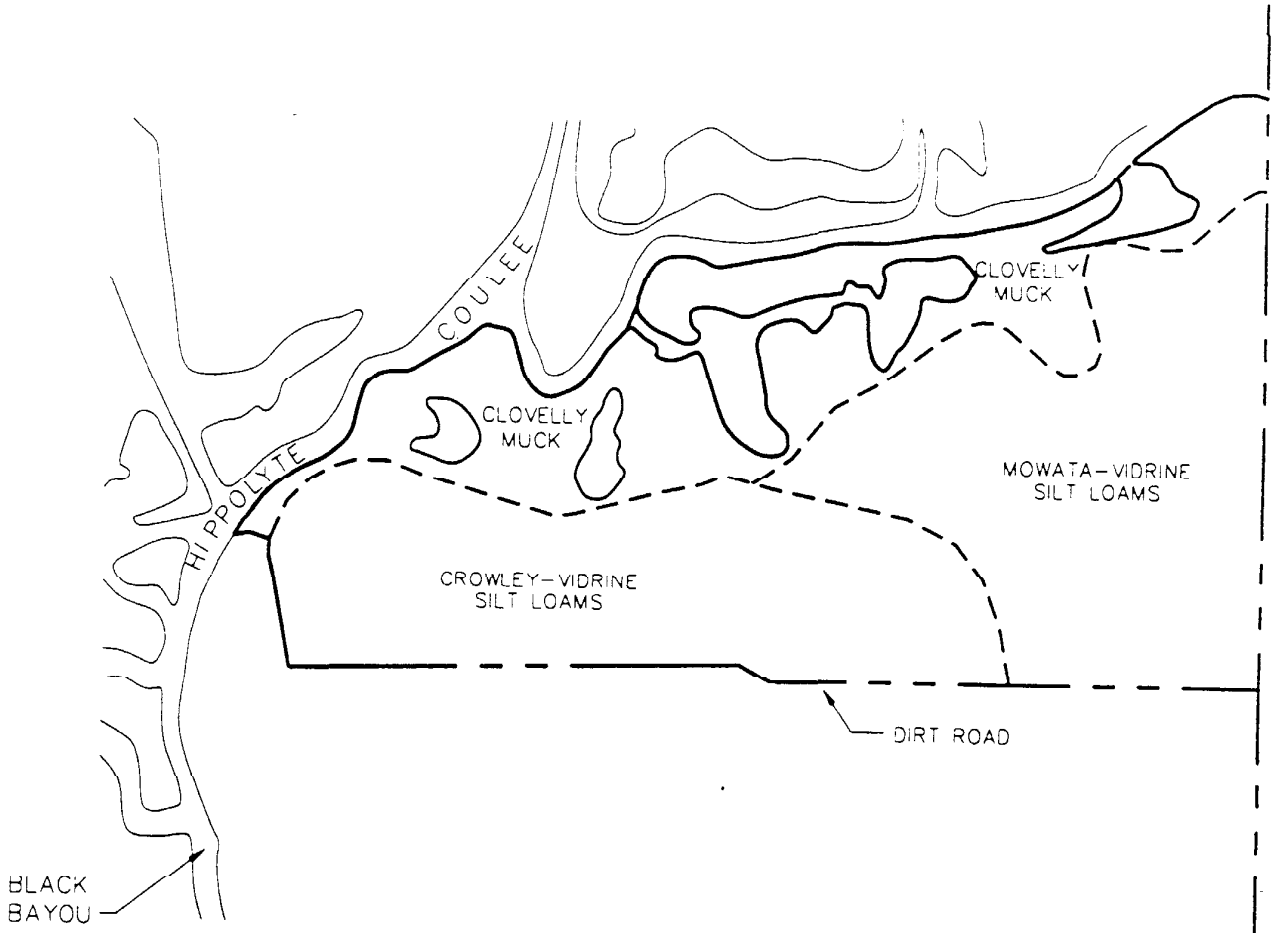

SOURCE: Stream Property Management, 1995

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ENTRIX

Figure 2-7
Site Soil Map
Hippolyte-Coulee Restoration Site
CONOCO, Inc.
Westlake, Louisiana

PROJ. NO. 146903	CK	DATE 2 96

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To further enhance and to protect the ecological services produced by the restored habitat within Zone 2, Conoco will also perform restoration activities on the 211 acres of habitat surrounding Zone 2. These areas, previously discussed above as the buffer areas, include Zones 1, 3 and 4. The restoration of these buffer areas is to enhance the viability and success of the restoration activities conducted in Zone 2. While not provided as compensation for the injuries that actually or potentially occurred as a result of the Clooney Loop EDC release, restoration of the "buffer areas" will serve to protect the integrity of the restoration acreage and will provide ecological services to the Calcasieu Ecosystem.

The overall goal of the restoration activities at the site is the re-establishment of a stratified ecosystem grading from bottomland hardwood, associations to a cypress forest transition zone to a marsh zone. These diverse and unique associations of wetlands by their sheer nature will create a biodiverse habitat for indigenous flora and fauna. The objectives of the restoration project are to: (1) achieve a 70% tree survival rate one year following the initial plantings, (2) adequately suppress the growth of Chinese Tallow Trees (*Sapium sebiferum*) and other undesirable vegetation, and (3) ultimately establish 200 trees per acre within three years following the initial plantings. Wildlife utilization, water quality, nutrient and sediment reduction, ground water recharge and discharge and creation of a biologically diverse ecosystem are some of the long term wetland function and values of the planned activities. These planned restoration activities were designed to enhance, alter, or supplement the existing vegetative communities, while utilizing current land configurations and drainage patterns. Increased interface between each zone will contribute to the potentially high biodiversity of the restored ecosystem. A summary of the planned activities that comprise the restoration project are as follows:

- Preparation of the project site for seedling planting will be performed using best forestry management practices;

- Select and plant an appropriate mixture of hardwood seedlings, as described below, based on site specific soil and drainage characteristics;
- Utilize the optimum planting season beginning December 15, and ending March 15; and
- Seedlings will be placed at appropriate spacing.

Each of these activities is described below in further detail for each zone at the Restoration Site.

2.2.1 Zone 2 Compensation Acreage

The restoration activities to be conducted in the restoration area (known as the Zone 2-Baldcypress Transition Association) will serve as compensation for the natural resource injuries and corresponding interim lost services potentially or actually lost as a result of the EDC release.

This area, involving 41 acres, is representative of the transitional community in terms of existing vegetation. Restoration of this area will involve both the mechanical shearing and raking of subordinate understory vegetation, the Chinese Tallow Tree to facilitate the planting of selected seedlings, followed by the chemical application of a herbicide (via hand or truck-mounted application devices). The shearing will be conducted during dry and favorable conditions using a D-6 or D-8 dozer with wide tracks. Where appropriate and at the interface of Zones 1 and 2, hand removal of Chinese Tallow Trees will be conducted. Once shearing, raking and chemical applications are made, plantings of desirable woody wetland vegetation will occur. The removal of the Chinese Tallow Trees in this zone will provide soft-bottom habitat improvement in both Zones 1 and 2. Once the desirable hardwood species mature, detrital sources through leaf production and particulate organic material will increase providing nutrient sources to the wetland soil/sediment. The increase in detrital sources will also enhance the benthic community and its associated ecological services.

Restoration in Zone 2 will involve the planting of Baldcypress (*Taxodium distichum*) and Overcup Oak (*Quercus lyrata*) seedlings (one year old or older). Since Baldcypress have adapted to grow in poorly drained areas having organic or clay soils, this species will be established in the lower lying portions of this zone. Table 2-1 provides an overview of the soil conditions suitable for successful growth of these two species. The Baldcypress will be planted on 8 foot by 12 foot spacings, an equivalent of 454 trees per acre, to allow for a safety factor in anticipation of predatation. The seedlings will be monitored closely in the first year following the initial planting and, if necessary, predator guards will be installed to maintain the 200 trees per acre target.

The Overcup Oak is also adapted to poorly drained areas, but requires soils having heavy clays and clay loams (USFS/USFWS, 1989). This species will be established in the higher portions of this zone. The Overcup Oak will be planted on 12 foot by 12 foot spacings for an equivalent of 302 trees per acre. The 12 foot spacing will allow for future inter-planting between rows in the event the 200 trees per acre target level is not achieved.

Both the Baldcypress and Overcup Oak will be planted in randomly selected plots to promote biodiversity within the zone designation. Both species are moderately suitable in providing food for waterfowl and the Overcup Oak is valuable to other wildlife in periods of high water since it is the only species that produces acorns that float when viable.

The seedlings will be purchased from the Louisiana Department of Agriculture and Forestry's hardwood nursery in Columbia. When seedlings are lifted they are bagged and placed in cold storage. They will then be transported in refrigerated trucks to the State's Beauregard nursery and placed in cold storage. They will be picked up on an as needed basis, with no more than 5 days run picked up at a time.

TABLE 2-1
Hardwood Suitability Chart

Common Name	Soil (type(s) for best growth	Flood tolerance	Seed dissemination	Direct seeding	Waterfowl food	Deer/turkey food	Timber production	Additional Information
Nutall Oak	Heavy, poorly drained clays & clay loams	MT	Sept.-Feb.	H	H	H	M	Best overall direct seeding success; this is an especially valuable species for wildlife since acorns fall gradually throughout the winter.
Overcup Oak	Heavy, poorly drained clays & clay loams	MT	Sept.-Nov.	M	M	H	L	The only species that produces acorns that float when viable; this is valuable to wildlife in periods of high water. Timber quality is generally low in lower Mississippi Valley, but some what better in other river bottoms.
Pin Oak	Heavy, poorly to moderately well-drained clays or clay loams	MT	Sept.-Dec.	H	H	H	L	A fairly consistent mast producer.
Shummard Oak	Well-drained loams	WT	Sept.-Dec.	H	H	H	H	The only oak recommended for soils with pH greater than 7.5.
Swamp Chestnut Oak, Cow Oak	Moderately well-drained silty clays & loams	WT	Sept.-Oct.	M	M	H	H	
Water Oak	Moderately well-drained silty clays & loams	WT-MT	Sept.-Nov.	M	H	H	H	A fairly consistent mast product.
White Oak	Well-drained loams	WT-I	Sept.-Nov.	M	H	H	H	Limited to northernmost areas of lower Mississippi Valley.
Willow Oak	Moderately well-drained silty clays & loams	WT-MT	Oct.-Dec.	H	H	H	M	A good mast producer; the only oak whose foliage is a highly preferred food for deer.
Baldcypress	Very poorly drained organic or clay soils	T	Nov.-Feb.	I	M	L	H	Needs special protection areas with high beaver or nutria populations.
Bitter Pecan Water Hickory	Poorly to moderately well-drained clays & loams	MT	Oct.-Dec.	L	I	M	L	A good tree to plant with overcup or nuttall oaks.
Blackgum	Well-drained silty & loamy soils	WT	Sept.-Nov.	I	I	M	M	This species is a valuable food source for a wide variety of nongame wildlife.
Green Ash	Poorly to moderately well-drained clays & loams	MT	Oct.-Nov.					A good species to plant with nuttall oak.
Pecan, Sweet Pecan	Moderately well-drained loams	WT	Sept.-Dec.	M	H	H	H	Although pecans are reportedly eaten by waterfowl, they are seldom available due to the lack of flooding of pecan sites.
Persimmon	Poorly drained clays & heavy loams	MT	Sept.-Dec.	I	L	H	M	A good tree to plant with nuttall oak; market for timber is limited mostly for specialty products, such as golf club heads.

T = **Tolerant.** Species are able to survive and grow on sites where soil is saturated or flooded for long periods during the growing season. Species have special adaptations for flood tolerance.
MT = **Moderately tolerant.** Species are able to survive saturated or flooded soils for several months during the growing season, but mortality is high if flooding persists or reoccurs for several consecutive years. These species may develop some adaptations for flood tolerance.
WT = **Weakly tolerant.** Species are able to survive saturated or flooded soils for relatively short periods of a few days to a few weeks during the growing season; mortality is high if flooding persists longer. Species do not appear to have special adaptations for flood tolerance.
I = **Intolerant.** Species are not able to survive even short periods of solid saturation or flooding during the growing season. Species do not show special adaptations for flood tolerance.

SUITABILITY KEY:

H = high suitability;
M = medium suitability;
L = low suitability;
I = insufficient data to determine suitability or unsuitability.

Source: *Bottomland Hardwood Reforestation In The Lower Mississippi Valley*, Published By The U.S. Forest Service and U.S. Fish & Wildlife Service

2.2.2 Restoration of Buffer Areas

Zones 1, 3 and 4 will serve as buffer areas for the restoration area (Zone 2). This ensures that the restored acreage within Zone 2 is protected from potentially harmful anthropogenic influences and further enhances the likelihood of a successful restoration project. The restoration activities proposed for each of these zones are as follows:

- **Zone 1—Freshwater Marsh Association.** This 78-acre area would be maintained in its present natural state and will not require the planting of trees or additional wetland species to enhance or diversify the existing plant community. The existing habitat would be enhanced with the addition of artificial nesting structures placed on poles at appropriate heights and selected locations to encourage the use of this area by wood ducks.

- **Zone 3—Bottomland Hardwood Lower Association.** This agricultural segment, involving 79 acres, is representative of the agricultural community in terms of existing vegetation. This particular area is situated below the 5 foot contour (all points determined to be 5' above mean sea level) and will require mowing prior to planting activities to ensure the most advantageous growing conditions for the newly introduced plant seedlings. The relevance of this area to the 5 foot contour line is significant in distinguishing between the lower and upper bottomland hardwood associations in Zones 3 and 4, respectively.

  The restoration of this area will involve the planting of Nuttall Oak (*Quercus nuttalli*), Green Ash (*Fraxinus pennsylvanica*), and Bitter Pecan (*Caryx aquatica*). Each of these species will be planted on 12 foot by 12 foot spacings for an equivalent of 302 trees per acre. The planting of these tree species will provide indirect benefits to the soft-bottom sediment in both Zones 1 and 2. These benefits include: (1) detrital transformations and

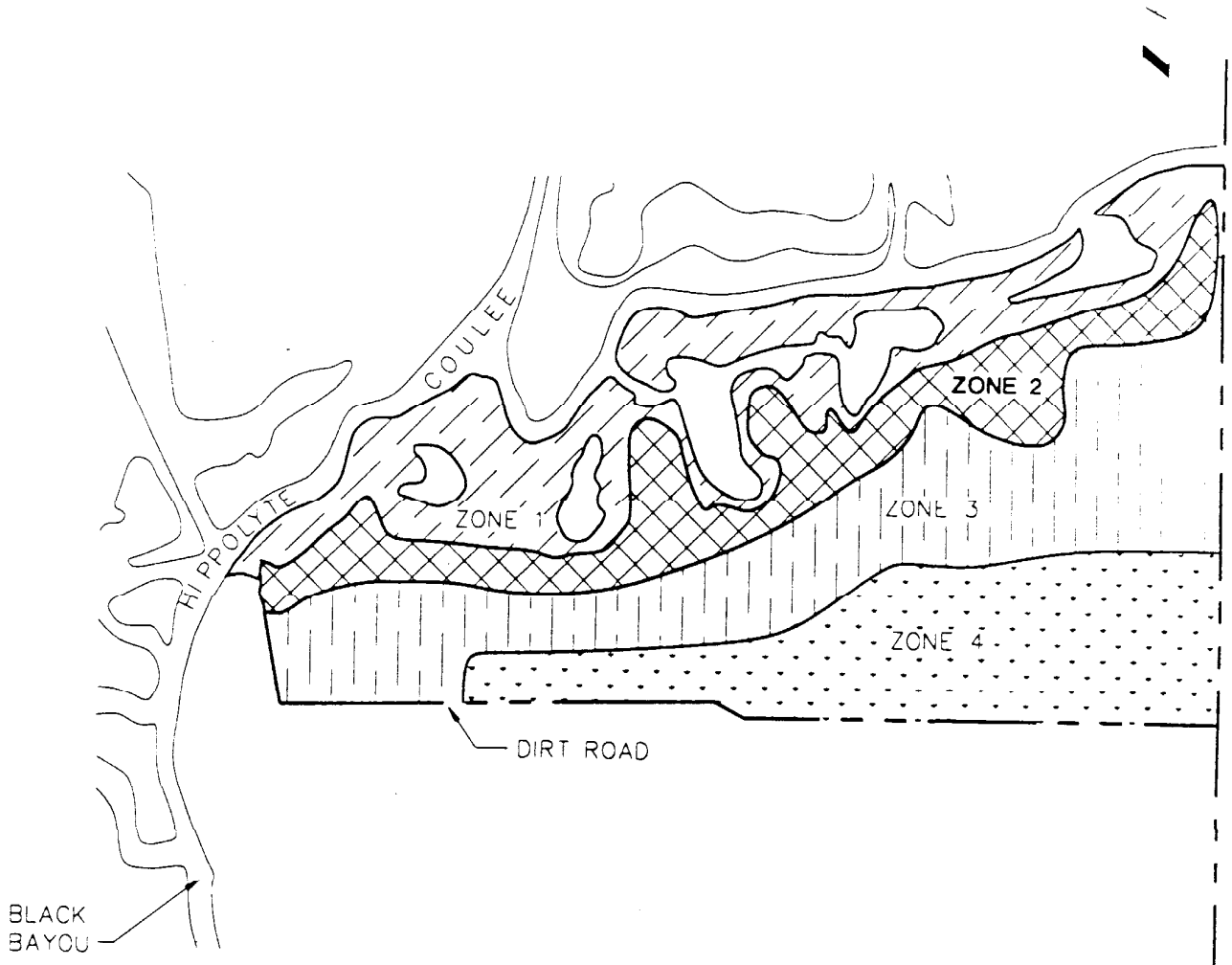
export of tree leaves and other particulate organic matter, which forms in part the basis of the freshwater and estuarine food chains that support shellfish and finfish productivity; and (2) sediment retention and reduced erosion.

- **Zone 4—Bottomland Hardwood Upper Association.** This 54-acre agricultural segment is also representative of an agricultural community in terms of the existing vegetation. This particular area is situated above the 5 foot contour and will mowing prior to planting activities to ensure the most advantageous growing conditions for the planted species. The restoration of this area will involve the re-introduction of Willow Oak (*Quercus phellos*), Water Oak (*Quercus nigra*), and Pin Oak (*Quercus palustris*) to the ecosystem. These species will be planted on 12 foot by 12 foot spacings for an equivalent of 302 trees per acre. All of these species grow best in moderately well to poorly drained clay and loam clay soils (USFS/USFWS, 1989). As with Zone 3, the planting of these tree species will provide indirect benefits to the soft-bottom sediment in Zones 1 and 2.

The seedlings will be purchased and transported in the same manner as those for Zone 2. They will be picked up on an as needed basis, with no more than 5 days run picked up at a time. Figure 2-8 presents the proposed tree species, as available, for planting within each zone, including Zone 2.

2.3 Stream Property Management, Inc.

Conoco proposes to utilize the services of Stream Property Management, Inc. ("Stream Management"), located in Lake Charles, Louisiana, to perform the restoration activities at the proposed site. Stream Management is actively involved in wetlands mitigation and restoration activities in Southern Louisiana. Indeed, Stream Management has built the



LEGEND

Zone 1 - Coastal Marsh Association
Wiregrass *(Spartina patens)*
Cutgrass *(Zizaniopsis miliacea)*

Zone 2 - Baldcypress Transition Association
Baldcypress *(Taxodium distichum)*
Overcup oak *(Quercus lyrata)*

Zone 3 - Bottomland Hardwood Lower Association
Nuttall oak *(Quercur nuttalli)*
Green ash *(Franxinus pennsyvanica)*
Bitter Pecan *(Caryx aquatica)*
Common Persimmon *(Diospyros Virginiana)*

Zone 4 - Bottomland Hardwood Upper Association
Willow oak *(Quercus phellos)*
Water oak *(Quercus nigra)*
Pin oak *(Quercus palustris)*

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SOURCE: Stream Property Management, 1995

ENTRIX

Figure 2-8
Selected Tree Species Planting
Hippolyte-Coulee Restoration Site
CONOCO, Inc.
Westlake, Louisiana

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02/21/96 10:30 I:\M R:\ACAD\146903\FIG2-8

largest wetland mitigation and restoration program in Louisiana and they currently have approximately 2,000 acres of approved bottomland hardwood and cypress-tupelo wetland restoration sites in Calcasieu and Lafourche parishes. Additionally, Stream Management's management of some of the most productive estuaries and coastal wetlands in Louisiana has led to thousands of acres of coastal wetlands being preserved, restored and enhanced.

2.4 Performance Monitoring and Maintenance

Through the utilization of the services of Stream Management, the site shall meet the following performance requirements:

- Seedlings will have a guaranteed survival rate of 70 % following one year after initial plantings. If this rate of survival is not achieved, Stream Management, with the concurrence of the Trustees, will conduct mid-course corrections in order to achieve the 70 % survival rate. This includes, but is not limited to, interplanting of new seedlings;
- By the end of the first year, a sampling report will be prepared by Stream Management, which will include the survival rate of the seedlings, and a reporting of any adverse impact from unforeseen events, such as Acts of God. As appropriate and agreed upon by all parties, mid-course corrections, approved by the Trustees, will be conducted in order to restore the Restoration Site;
- Attainment of a stem density goal of 200 viable trees per acre by the end of the third year following the initial plantings. As appropriate and agreed upon by all parties, mid-course corrections, concurred with by the Trustees, will be conducted in order to achieve this goal.
- Appropriate measures will be taken to suppress the growth of Chinese Tallow Trees and other undesirable vegetation for three years following the initial plantings;

- Normal silvicultural practices that include thinning and culling will be used at the site during the lifespan of the project. In Zone 2, thinning and culling may be performed where needed, subject to the concurrence of the Trustees, to improve the habitat value for wildlife; and
- An annual report for the first three years of the project and every fifth year thereafter, which documents survival rates, growth rates, species composition and wildlife utilization.

An initial survival study will be made after the first growing season by placing 4 tree survival plots 150' apart on a diagonal X pattern across the tract. Thereafter and during the first years growing season, ten 1/10 acre permanent CFM plots will be installed. Each plot center will be marked by a treated fence post and all trees falling within the 1/10 acre plot will be permanently tagged, numbered and recorded for continuous inventory. Photos, measurements, growth studies and wildlife utilization will be reported by March 15, for the first three (3) years of the contract and every fifth (5th) year thereafter.

Firelanes shall be maintained for the first 20 years, or until crown closure of the stand. In Zone 2, two firelines will be established, both oriented perpindicular to the long axis of the area. One lane within Zone 2 will be located at the easternmost boundary of the site and the other at a midway location. Neither of these firelines will be located through or adjacent to the certain 4.5 acre plot (to be held in perpetuity) located within Zone 2.

In order to enhance understory development and wildlife habitat utilization, select thinning will be conducted at age twenty five (25) not removing more than fifty percent (50%) of the existing stems. At age forty (40), selected thinning will again be performed not removing more than thirty percent (30%) of the existing stems. This density will be maintained until the expiration of the restoration project at age fifty (50).

3.0 BIBLIOGRAPHY

Stream Property Management, 1995. *Hippolyte Coulee-Black Bayou Wetland Restoration Area*,. Stream Property Management Inc., Calcasieu Parish, Louisiana, 1995.

USFS/USFWS. Bottomland Hardwood Reforestation in the Mississippi Valley, U.S. Forest Service and U.S. Fish and Wildlife Service, September, 1989.

APPENDIX A

Abbreviations and Acronyms

Appendix A

Abbreviations and Acronyms

Clooncy Loop	The Clooney Island Loop of the Calcasieu River
COE	U.S. Army Corps of Engineers
Conoco	Conoco Inc.
DOI	U.S. Department of Interior
EDC	1,2-Dichloroethane
ENTRIX	ENTRIX, Inc.
EPA	U.S. Environmental Protection Agency
HEA	Habitat Equivalency Analysis
LDEQ	Louisiana Department of Environmental Quality
LDWF	Louisiana Department of Wildlife and Fisheries
NGVD	National Geodetic Vertical Datum
NOAA	National Oceanic and Atmospheric Administration
SAY	Service-Acre-Year
Stream Management	Stream Property Management, Inc.
Task Force	Calcasieu Estuary Environmental Task Force

APPENDIX B

Detailed Soil Types

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Detailed Soil Types

MOWATA SERIES

The Mowata series consists of poorly drained, very slowly permeable soils on broad flats and along drainage ways on the Gulf Coast Prairies. These soils formed in clayey alluvium of Pleistocene age. Slopes are less than 1 percent.

Soils of the Mowata series are fine, montmorillonitic, thermic Typic Glossaqualfs.

Mowata soils commonly are near Crowley, Judice, Leton, Midland, Morey, and Vidrine soils. Crowley soils are on the higher convex ridges and have an abrupt textural change from the higher E horizon to the Btg horizon. Judice and Leton soils are in lower positions on the landscape than Mowata soils. In addition, Judice soils have a mollic epipedon, and Leton soils have a fine-silty control section. Midland soils are in slightly lower positions than Mowata soils. These soils do not have a subsurface layer that has tongues extending into the subsoil. Morey soils are in similar positions as Mowata soils. These soils have a coarse-silty over clayey control section.

Typical pedon of Mowata silt loam, in an area of Mowata-Vidrine silt loams; 3 miles west of Iowa, 0.2 miles south of U.S. Highway 190, 105 feet south of dirt road; NW 1/4 NW 1/4 sec. 34, T 9 S, R 7 W.

AP 0 to 6 inches; dark grayish brown (10 YR 4/2) silt loam, weak fine granular structure; friable; common fine roots; strong brown oxidation strains along root channels; very strongly acid; abrupt smooth boundary.

EG 6 to 21 inches; gray (10YR 5/1) silt loam; few fine faint light brownish gray mottles; weak medium subangular blocky structure; friable; few fine roots; few fine discontinuous tubular pores; strong brown oxidation strains along root channels and some ped faces; strongly acid; abrupt irregular boundary.

B/E 21 to 34 inches ; gray (10YR 5/1) silty clay; many coarse distinct strong brown (7.5YR 5/8) mottles; few fine faint light brownish gray mottles; weak coarse prismatic structure parting to moderate medium subangular blocky; firm; few fine roots; thick continuous dark gray clay films on faces of peds; about 20 percent tongues of gray (10YR 6/1) silt loam (E) to a depth of 32 inches; few fine dark concentrations; strongly acid; clear wavy boundary.

Btg1 34 to 45 inches; gray (10YR 6/1) silty clay; many coarse distinct strong brown (7.5YR 5/8) mottles; moderate coarse and medium subangular blocky structure; firm; few fine roots; thick discontinuous clay films on faces of peds; few

slickensides 5 to 15 centimeters long in lower part; few fine and medium dark concretions; strongly acid; gradual wavy boundary.

Btg2 45 to 60 inches; light brownish gray (2.5Y 6/2) silty clay loam; many medium distinct yellowish brown (10YR 5/8) mottles; few medium distinct yellowish brown (10YR 5/8) mottles; few medium faint gray (10YR 5/1) mottles; weak medium subangular blocky structure; firm; thin patchy clay films on faces of peds; common medium and coarse dark concentrations; few fine barite crystals; slightly acid.

The solum is 40 to 60 inches thick.

The A horizon has hue of 10YR, value of 3 to 5, and chroma of 1 or 2. It is 4 to 8 inches thick. If moist values are less than 3.5, the A horizon is less than 6 inches thick. Reaction is very strongly acid or strongly acid.

The Eg horizon has hue of 10YR, value of 5 or 6, and chroma of 1 or 2. It is 9 to 15 inches thick. Reaction is very strongly acid or strongly acid.

The Btg horizon has hue of 10YR, 2.5Y, or 5Y, value of 5 or 6, and chroma of 1 or 2. Surfaces of peds are dark gray or gray. Texture is silty clay, silty clay loam, or clay loam. Mottles are in shades of brown or yellow. Reaction is strongly acid to moderately alkaline. Tongues of silt loam extend deep into the Btg horizon and are 0.5 inch to 8 inches wide.

The Mowata soils in Calcasieu Parish are taxadjuncts to the Mowata series because they have A and Eg horizons that are very strongly acid or strongly acid. The Mowata series has A and E horizons that are medium acid to neutral. This difference, however, does not affect the use and management of the soils.

VIDRINE SERIES

The Vidrine series consists of somewhat poorly drained, slowly permeable soils on low mounds on broad flats and on side slopes on the Gulf Coast Prairies. These soils formed in clayey alluvium of late Pleistocene age. Slopes range from 0 to 3 percent.

Soils of the Vidrine series are coarse-silty over clayey, mixed, thermic Glossaquic Hapludalfs.

Vidrine soils commonly are near Crowley, Kinder, Leton, Morey, and Mowata soils. The associated soils are in the intermound areas. Crowley soils are somewhat poorly drained and have a fine control section. Mowata soils are poorly drained and also have a fine control section. Kinder, Leton, and Morey soils are poorly drained. These soils have a fine-silty control section.

Typical pedon of Vidrine silt loam, in an area of Crowley-Vidrine silt loams; 2.5 miles northeast of Holmwood, 140 feet north of Louisiana State Highway 14; SE 1/4 SW 1/4 sec. 20, T 10 S, R 7 W.

Ap1 0 to 4 inches; dark grayish brown (10YR 4/2) silt loam; weak fine granular structures; friable; common fine roots; strongly acid; abrupt smooth boundary.

Ap12 4 to 8 inches; dark grayish brown (10YR 4/2) silt loam; few streaks of yellowish brown silt loam; massive; firm; few fine roots; strongly acid; abrupt wavy boundary.

BA 8 to 20 inches; yellowish brown (10YR 5/4) silt loam; few medium faints yellowish brown (10YR 5/6) mottles; weak medium subangular blocky structure; friable; few fine roots; common medium tubular pores; common medium black and brown accumulations; strongly acid; clear irregular boundary.

B/E 20 to 23 inches; brown (10YR 5/3) silty clay loam (Bt); many coarse prominent red (2.5YR 4/8) mottles; moderate medium subangular blocky structure; firm; pale brown (10YR 6/3) silt coatings about 1 to 5 millimeters thick on faces of peds (E); medium acid; clear wavy boundary.

Btg1 23 to 39 inches; grayish brown (10YR 5/2) silty clay; many coarse prominent red (2.5YR 4/8) mottles; few medium distinct yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure parting to moderate fine subangular blocky; firm; thick continuos clay films on faces of peds; medium acid; gradual wavy boundary.

Btg2 39 to 51 inches; light brownish gray (10YR 6/2) silty clay; many coarse prominent red (2.5YR 4/8) and common medium distinct yellowish brown (10YR 5/6) mottles; moderate medium subangular block structure: firm; thick discontinuous clay films on faces of peds; slightly acid; gradual wavy boundary.

Btg3 51 to 60 inches; light brownish gray (10YR 6/2) silty clay loam; common medium prominent red (2.5YR 4/8) mottles; common medium distinct yellowish brown (10YR 5/6) mottles; weak medium subangular blocky structure; firm; slightly acid; gradual wavy boundary.

The solum is 48 to 80 inches thick. Combined thickness of the A and BA horizons ranges from 14 to 22 inches if mounds are smoothed and ranges from 20 to 36 inches in the natural state. The effective cation-exchange capacity has 50 percent or more exchangeable aluminum in the control section to a depth of 30 inches or more.

The Ap horizon has hue of 10YR, value of 3 to 5, and chroma of 2 or 3. It is 5 to 12 inches thick. An Ap horizon that has a value of 3 is less than 6 inches thick. Reaction is very strongly acid to medium acid.

The BA horizon has hue of 10YR, value of 5 or 6, and chroma of 3 or 4. Texture is silt loam or very fine sandy loam. Reaction is very strongly acid to medium acid.

The Btg horizon has hue of 10YR, value of 4 to 6, and chroma of 1 or 2. Texture is silty clay loam or silty clay. Mottles in shades of red or brown range from few to many. Reaction is very strongly acid to medium acid in the upper part of the Btg horizon, and medium acid to moderately alkaline in the lower part. In some pedons, carbonate concretions are in the lower part of the Btg horizon.

Some pedons have a BCg horizon. It has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 1 to 6. Texture is silty clay loam, silty clay, or silt loam. Reaction is slightly acid to moderately alkaline.

CROWLEY SERIES

The Crowley series consists of somewhat poorly drained, very slowly permeable soils on broad, slightly convex ridges on the Gulf Coast Prairies. These soils formed in clayey alluvium of late Pleistocene age. Slopes are less than 1 percent.

Soils of the Crowley series are fine, montmorillonitic, thermic Typic Albaqualfs.

Crowley soils commonly are near Leton, Midland, Morey, Mowata, and Vidrine soils. Leton, Midland, Morey, and Mowata soils are poorly drained and are in lower positions on the landscape than Crowley soils. In addition, Leton soils are loamy throughout. Midland soils have a more clayey surface layer than Crowley soils, Morey soils have a mollic epipedon, and Mowata soils have tongues of albic material extending into the argillic horizon. Vidrine soils are somewhat poorly drained. They are on mounds and side slopes. These soils have a coarse-silty over clayey control section.

Typical pedon of Crowley silt loam, in an area of Crowley-Vidrine silt loams; 2.5 miles northwest of Holmwood, 900 feet north of Louisiana State Highway 14, 350 feet east of a fence; SE 1/4 SW 1/4 sec. 20, T 10 S, R 7 W.

Ap1 0 to 3 inches; dark grayish brown (10YR 4/2) silt loam; weak medium granular structure; friable; common fine roots; very strongly acid; clear smooth boundary.

Ap2 3 to 10 inches; dark grayish brown (10YR 4/2) silt loam; common medium distinct dark yellowish brown (10YR 4/4) mottles; massive; firm; many fine roots; very strongly acid; abrupt smooth boundary.

E 10 to 25 inches; grayish brown (10YR 5/2) silt loam; few medium distinct dark yellowish brown (10YR 4/4) mottles: weak coarse subangular blocky structure; friable; few fine roots; few medium black concretions; few fine tubular pores; strongly acid; abrupt irregular boundary.

Btg1 25 to 34 inches; grayish brown (10YR 5/2) silty clay, many coarse prominent red (2.5YR 4/8) mottles; dark gray (10YR 4/1) and very dark gray (10YR 3/1) coatings on faces of peds; weak coarse prismatic structure parting to moderate medium subangular blocky; firm; few fine roots; thick continuous clay films on faces of peds; common vertical channels filled with streaks and pockets of grayish brown silt loam; strongly acid; gradual wavy boundary.

Btg2 34 to 41 inches; gray (10YR 6/1) silty clay; many coarse prominent red (2.5YR 4/8) mottles; moderate medium subangular blocky structure; firm; few fine roots; thick discontinuous clay films on faces of peds; few vertical channels filled with streaks of grayish brown silt loam; strongly acid; gradual wavy boundary.

Btg3 41 to 53 inches; gray (10YR 6/1) clay loam; common medium prominent red (2.5 5/8) mottles; common coarse distinct yellowish brown (10YR 5/6) mottles; weak medium subangular blocky structure; firm; few fine roots; thick discontinuous clay films on faces of peds; medium acid; gradual wavy boundary.

Btg4 53 to 65 inches; gray (10YR 6/1) clay loam; many medium distinct yellowish brown (10YR 5/6) mottles; weak medium subangular blocky structure; firm; few fine roots; then discontinuous clay films on faces of peds; medium acid.

The solum is 40 to 75 inches thick. The effective cation-exchange capacity of this soil has 20 to 50 percent exchangeable aluminum in the control section to a depth of 30 inches or more.

The A horizon has hue of 10YR, value of 4 or 5, and chroma of 1 or 2. It is 4 to 11 inches thick. Reaction is very strongly acid to medium acid.

The E horizon has hue of 10YR, value of 5 or 6, and chroma of 1 or 2. It is 5 to 15 inches thick. Reaction is very strongly acid to medium acid.

The Bt horizon has hue of 10YR, value of 4 to 6, and chroma of 1 or 2. Texture is silty clay or silty clay loam and ranges from silty clay or silty clay loam to clay loam in the lower part. Mottles in shades of red and brown range from common to many. The faces of peds are very dark gray or dark gray in the upper part of the Bt horizon. Reaction is very strongly acid to slightly acid.

The Crowley soils in Calcasieu Parish are taxadjuncts to the Crowley series because they have mixed mineralogy. The Crowley series is montmorillonitic. This difference, however, does not affect the use and management of the soils.

CLOVELLY SERIES

The Clovelly series consists of very poorly drained, very slowly permeable organic soils that are moderately saline and very fluid. These soils are in brackish coastal marshes that are ponded and flooded most of the time. Clovelly soils formed in moderately thick

accumulations of herbaceous plant material underlain by clayey alluvium. Elevation ranges from sea level to 1 foot above sea level. Slope is less than 0.2 percent.

Soils of the Clovelly series are clayey, montmorillonitic, euic, *thermic* Terric Medisaprists.

Clovelly soils commonly are near Aquents, Gentilly, and Larose soils. Aquents are in higher positions of the landscape then Clovelly soils. Aquents are made up of soil material that was excavated or pumped out in the construction and maintenance of waterways. Gentilly soils and Larose soils are in similar positions as Clovelly soils. They are mineral soils.

Typical pedon of Clovelly muck; 9 miles south of Sulphur, 250 feet south of Choupique Bayou bridge, 120 feet west of Louisiana State Highway 27; NE 1/4 NW 1/4 sec. 23, T 11 S, R 10 W.

Oa1 0 to 8 inches; very dark grayish brown (10YR 3/2) muck; pressed and rubbed , very dark grayish brown (10YR 3/2) massive; about 30 percent fiber, 8 percent rubbed; about 50 percent mineral; many medium and fine roots; very fluid (flows easily between fingers leaving only fiber and roots in hand); slightly acid; clear smooth boundary.

Oa2 8 to 20 inches; black (10YR 2/1) muck; black (10YR 2/1) pressed and rubbed; about 10 percent fiber, 3 percent rubbed; about 60 percent mineral; massive; very fluid (flows easily between fingers when squeezed leaving hand empty); few medium and fine roots; neutral, gradual smooth boundary.

Oa3 20 to 36 inches; black (10YR 2/1) muck; black (10YR 2/1) pressed and rubbed; about 5 percent fiber, 2 percent rubbed; about 65 percent mineral; massive; very fluid (flows easily between fingers when squeezed leaving hand empty); neutral; gradual smooth boundary.

Abg 36 to 51 inches; black (10YR 2/1) mucky clay; few streaks of dark gray (N 4/0) clay, massive, very fluid (flows easily between fingers when squeezed leaving hand empty); neutral; clear smooth boundary.

Cg 51 to 80 inches; gray (N 5/0) clay; massive; very fluid (flows easily between fingers when squeezed leaving hand empty); neutral.

The organic horizons are 16 to 51 inches thick. The organic fraction is dominantly herbaceous sapric material, but some pedons have hemic or fibric surface layers. The accumulative thickness of these surface layers is less than half of the total thickness of the organic horizons. Reaction of the organic layers is slightly acid to moderately alkaline. Reaction of the mineral layers is neutral to moderately alkaline. Salinity, expressed as electrical conductivity of the saturation extract (millimhos/centimeter), ranges from 3 to 8 in at least one layer within a depth of 40 inches.

The Oa horizon has hue of 10YR or 7.5YR, value to 2 to 4, and chroma of 2 or less. Mineral content ranges from 40 to 70 percent. The Abg horizon has hue of 10YR to 5Y, value of 2 to 4, and chroma of 2 or less. Texture is mucky clay, clay, or silty clay. The n value ranges from 0.7 to more than 1.0. Some pedons do not have an Abg horizon. The Cg horizon has hue of 10YR, 5Y, 5BG, 5GY, or 5G, value of 4 to 6, and chroma of 1; or it is neutral. Texture is mucky clay, clay, or silty clay. The n value ranges from 0.7 to more than 1.0 depth of 60 inches or more. A few pedons have mineral overwash layers 2 to 10 inches thick.

EXHIBIT I Addendum

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The total acreage noted in the text of the report regarding the buffer areas (Zones 1, 3 and 4) was mistakenly reported as higher than the actual acreage for these areas. It was originally reported to Conoco that 211 acres comprised these buffers areas. However, these areas were recently surveyed (April, 1996) as part of a survey of the entire property by Lonnie G. Harper, P.L.S. Reg. No. 4326 of On Target Surveying, Inc., Grand Chenier, Louisiana. The findings of this survey indicate that 186.25 acres actually comprise these buffer areas.