Appendix 4E

Phase I and II Biological Assessments, Phase I Biological Opinion, and Concurrence Letter

Phase 1 Biological Assessment

February 14, 2000

HJN 990144

BIOLOGICAL ASSESSMENT

LONGHORN PIPELINE PROJECT
MAINTENANCE ACTIVITIES
AND MINOR CONSTRUCTION
HOUSTON TO CRANE, TEXAS

Prepared For:

Longhorn Partners Pipeline, L.P.

US Environmental Protection Agency
Region 6

US Department of Transportation
Office of Pipeline Safety

Prepared By:

Horizon Environmental Services, Inc.
Austin - Beaumont - Houston - Shreveport

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PROJECT DOCUMENTATION APPENDIX ACCOMPANYING DOCUMENT

1.0 INTRODUCTION

This Biological Assessment (BA) is prepared in connection with the draft Environmental Assessment of the Longhorn Pipeline owned by Longhorn Partners Pipeline, L.P. (Longhorn). That Environmental Assessment was the product of a settlement reached in the matter of *Spiller, et al v. Walker, et al* pending in the United States District Court in Austin, Texas. The plaintiffs in that lawsuit alleged failure on the part of numerous federal agencies to adequately analyze the potential environmental impacts of the Longhorn Pipeline. Though the federal defendants and Longhorn denied the plaintiffs' allegations, the parties reached a negotiated settlement that was approved by the Court on March 5, 1999. Parties to that settlement included Longhorn, the US Environmental Protection Agency (EPA), the US Department of Transportation (DOT), the US Department of Justice, the City of Austin, the Lower Colorado River Authority, and the remaining plaintiffs.

As part of that Court ordered settlement, the agencies involved in the original litigation were required to conduct an Environmental Assessment, including specific consideration of species protected under the Endangered Species Act (ESA). The Court ordered EPA and DOT, acting as Lead Agencies, to be responsible for the Environmental Assessment, and ordered the Department of Army to act as a cooperating agency. A draft Environmental Assessment, with a preliminary Finding of No Significant Impact (FONSI), was prepared by Radian International LLP at the direction of and pursuant to a work plan approved by the Lead Agencies. As a result of the Environmental Assessment, and with the support of the Lead Agencies, Longhorn has committed to implement a slate of 34 pipeline mitigation measures. (The pipeline mitigation measures are identified and described in the Longhorn Mitigation Plan included in the accompanying Project Documentation Appendix at Tab 2). The pipeline mitigation measures focus on two general areas: first, the enhancement of pipeline integrity to reduce the probability of a pipeline release and to reduce risks to pipeline integrity, and second, enhancement of emergency response capability and development of plans for corrective action in the unlikely event of a pipeline release. Both categories of pipeline mitigation measures are discussed below in greater detail in Section 4.0, Project Description.

Pursuant to Section 7 of the ESA, the Lead Agencies have requested consultation with the US Fish and Wildlife Service (the Service) regarding the Draft Environmental Assessment and the package of pipeline mitigation measures upon which the Lead Agencies' preliminary FONSI is predicated. In connection with the inter-agency consultation, Longhorn prepared and submitted to the Service a draft BA on the entire pipeline project on September 27, 1999. The Service responded to the September draft BA with comments and requests for additional information in the form of a letter to Horizon Environmental Services, Inc., dated December 15, 1999 (the Comment Letter – see accompanying Project Documentation Appendix at Tab 12).

On February 3, 2000, the Lead Agencies designated Longhorn has a non-federal representative for the purpose of consultation with the Service and preparation of a BA on the Longhorn project.

The *Spiller* Court's order provides that issuance of any FONSI with regard to the Longhorn project "shall be conditioned upon implementation" of measures to protect public safety and the environment. Settlement Stipulation at 6. The order also prohibits the DOT from authorizing Longhorn to commence operations until Longhorn has implemented those mitigation measures upon which the FONSI is conditioned. Settlement Stipulation at 7. The order contemplates that Longhorn will apply for, and accept, such ESA permits as may be required in connection with the implementation of any mitigation measures upon which a FONSI may be conditioned. *Id.*

The results of this consultation by the Lead Agencies with the Service are expected to be incorporated in the Record of Decision issued by the Lead Agencies. If the Lead Agencies issue an EA/FONSI, the terms and conditions, mitigatory measures and protections incorporated herein for the benefit of species will be adopted and incorporated by Longhorn in its operating and maintenance manuals submitted to, and enforceable by, DOT pursuant to the Pipeline Safety Act (49 U.S.C. §60101, et seq.) or the Longhorn mitigation commitments.

The Office of Pipeline Safety (OPS) administers DOT's regulatory program to ensure the safe transportation of various hazardous liquids by pipeline under

the Pipeline Safety Act. OPS is responsible for inspecting pipelines before they are placed in service to ensure that they are in accordance with DOT's regulations and are being operated safely. The OPS's published statement of its authority is set out below:

> The Department of Transportation's **(DOT)** Research and Special Programs Administration (**RSPA**), acting through the Office of Pipeline Safety (OPS), administers the Department's national regulatory program to assure the safe transportation of natural gas, petroleum, and other hazardous materials by pipeline. OPS develops regulations and other approaches to risk management to assure safety in design, construction, testing, operation, maintenance, and emergency response of pipeline facilities.

Although the Service and the Lead Agencies are in consultation with respect to the entire proposed Longhorn Project, this consultation is being approached in two distinct, yet related phases[1]. The first phase of the consultation (Phase I) relates to pipeline maintenance, pipeline testing and the first category of measures that Longhorn will take to fulfill its commitment to ensure pipeline safety and integrity. These measures focus on pipeline integrity enhancements such as a number of pipe replacements, lowering of some sections of pipe, investigation of possible pipe flaws, hydrostatic pressure testing, and similar actions.

The second phase of the consultation (Phase II) will be more directly related to the actual operation of the pipeline, specifically the operation and maintenance of the pipeline system and the potential effects of the unlikely event of a pipeline release. Additional mitigation measures, such as internal pipeline inspections and construction in two particular areas, also will be addressed in Phase II. Those areas are (a) Houston toad habitat and (b) areas of potential effect to the Barton Springs Salamander over the Edwards Aquifer Recharge Zone. A two-stage consultation offers the most protection to the species, because the second phase will benefit from and build upon species information gathered in the first stage of review, while allowing the most efficient route to

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1 U.S. Fish and Wildlife regulations allow for a staged consultation. 50 C.F.R § 402.14(k). Section 402.14(k) provides a mechanism for the Service to review a project, and provide biological opinions on each incremental step.

startup of the pipeline.

The *Spiller* settlement specifically contemplates that Longhorn will undertake certain construction and maintenance activities prior to issuance of a final agency decision in this matter. Settlement Stipulation at 8-11. The parties to the settlement specifically agreed that any such investments by Longhorn in Kimble, Menard, Hays, Travis, Caldwell, Bastrop and any counties within the jurisdiction of the LCRA after August 25, 1998 would not be considered "for the purposes of determining the reasonableness of alternatives" (Settlement Stipulation at 11), meaning that these investments would not constitute irretrievable commitments of resources for the purposes of the National Environmental Policy Act or Section 7(d) of the ESA.

Phase I of the consultation focuses on near-term discrete tasks that are requisite preliminary activities—tasks that Longhorn must complete before it can place the pipeline into operation, such as right-of-way clearing and pipeline safety mitigation measures. They will be implemented in a manner that avoids and minimizes potential effects upon species and habitat.

Phase II of the consultation will focus on long-term programmatic activities, operation and maintenance of the pipeline, and the possibility of an emergency response. These activities are either (a) not necessarily discrete or (b) not precisely estimable before the fact. Phase II activities carry different risks from Phase I activities. For example, the operation and maintenance activities are ongoing and long-term. Further, though the probability of a pipeline release will be minimized as a result of the Longhorn Mitigation Plan, should a release occur, it has the potential to result in adverse effects to species and habitat at locations and of magnitudes that are difficult to predict with precision. Nevertheless, because of the low risk of such a release and the comprehensive nature of the Longhorn Mitigation Plan, Longhorn and the Lead Agencies believe that it is appropriate to conclude that there is a reasonable likelihood that the entire project is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of critical habitat. This is because the Phase I review is being conducted against the backdrop of a larger mitigation package, which the Service has had an opportunity to review. The Service had an opportunity to review and

comment on the entire project based upon the September draft BA.

The two phases thus can be logically separated. Phase I of the Service's review (this BA) will focus on those actions that are designed to make the pipeline safer. The Service can complete this stage of review without pre-judging whether or not the pipeline will be used. Phase II of the Service's review will focus on whether and how the pipeline will be used. The Phase I procedures are routine in the US pipeline industry, during operation, for periodic maintenance, testing and repair of hazardous liquids and gas pipelines. However, to ensure that the pipeline is safe, the Longhorn Mitigation Plan specifies that these activities shall be conducted prior to startup of the Longhorn Pipeline under its proposed use.

This BA encompasses Phase I of the consultation. Included in this phase are maintenance of the pipeline right-of-way; maintenance construction to replace and/or lower certain segments of the pipeline, along with investigation and repair of possible flaws in the pipe at an identified number of locations; enhancements to the pipeline cathodic protection system; and hydrostatic pressure testing of the pipeline to ensure the integrity of the pipe for its intended service. None of these activities constitutes an irreversible or irretrievable commitment of resources, natural or monetary, which have the effect of foreclosing the formulation or implementation of any reasonable and prudent alternative measures.

This BA is provided to facilitate a formal Section 7 consultation between the EPA, the DOT, and the Service to evaluate the potential for adverse effects to listed species resulting from activities related to the implementation of pipeline mitigation measures to improve pipeline integrity and thereby enhance pipeline safety. Those pipeline mitigation measures are referred to hereafter in this BA as projects. The specific maintenance and testing projects to be implemented are described in detail in Section 4.0 of this BA.

Where appropriate, this BA generally comports with EPA Guidelines for Ecological Risk Assessment. See Guidelines for Ecological Risk Assessment, 63 Fed. Reg. 26,846 (1998). For example, EPA guidelines suggest that a suitable

assessment approach will identify the explicit, ecologically relevant expressions of environmental value that are to be protected. See 63 Fed. Reg. at 26,858. To that end, the BA guides project development, in part, by identifying particular species of concern within the project area, and suggesting mitigation efforts which will minimize exposure and impact to those species. Where uncertainty has been encountered, doubt has been resolved in favor of the species, and in this regard, the results of a precise application of EPA Guidelines have likely been exceeded. Precise application of the Guidelines would likely reveal far fewer areas of ecological sensitivity than have been assumed.

2.0 PROJECT OVERVIEW

Longhorn proposes to operate a 723-mile refined petroleum products pipeline system from the GATX Terminal in Galena Park, Texas, to a refined petroleum products terminal in El Paso, Texas. The pipeline also has a 28-mile intermediate connection from a station in Crane County to a planned meter station in Odessa, Texas. The pipeline consists of a combination of 20-inch and 18-inch diameter pipe from Galena Park Station to El Paso Terminal and an 8-inch diameter pipeline from a station in Crane County to a meter station in Odessa, Texas. Finally, three as yet to be built pipelines will connect the El Paso terminal to interstate common carrier pipelines west of El Paso. The pipeline's initial capacity of 72,000 barrels per day (bpd) will be supplied by a new pump station at Galena Park and five newly constructed booster pump stations at the following locations: Satsuma (Harris County), Cedar Valley (Hays County), Kimble County (Kimble County), Crane (Crane County), and El Paso (El Paso County).

Two new pipeline construction projects remain to be completed. An 8-inch diameter, 2500-foot lateral that originates at the terminus of the existing Odessa lateral will connect to a terminal facility in Odessa, Texas, owned by Equilon. Three 8.3-mile lateral pipelines, which originate at the El Paso Terminal, will connect with Kinder Morgan (formerly the Santa Fe Pacific pipeline) and Chevron pipelines in the El Paso area. The connection to Kinder Morgan will consist of one 8-inch diameter pipeline and one 12-inch diameter pipeline. The Chevron connection will consist of an 8-inch diameter pipeline. The purpose of the lateral pipelines is to connect into Kinder Morgan and Chevron pipelines to distribute product into the Phoenix, Tucson, and Albuquerque (New Mexico) markets. Chevron operates an 8-inch pipeline that delivers product to the Albuquerque market; Kinder Morgan operates one 12-inch pipeline and one 8-inch pipeline serving the Tucson market. Other Kinder Morgan pipelines connect Tucson to the Phoenix market.

The proposed project includes both new construction and refurbishment of

an existing pipeline that has been converted from its former use of transporting crude oil from West Texas to the Gulf Coast area, the majority of which is complete. As described in this chapter, the existing pipeline has been modified to transport refined petroleum products, with flow going from east to west. Williams Pipeline Company (later to become part of Williams Energy Services) will be the contract operator of the Longhorn Pipeline System. Longhorn intends to transport multiple grades of gasoline and distillates, which will include special reformulated grades of gasoline needed to control air emissions in certain areas of the Southwest.

The Longhorn Pipeline System is designed for service in excess of 50 years and is made up of four main pipeline segments, several stations, and one terminal, as listed below:

- New and refurbished 20-inch diameter pipeline from Galena Park Station to Satsuma Station
- Refurbished 18-inch diameter pipeline from Satsuma Station to Crane Station
- New 18-inch diameter pipeline from Crane Station to El Paso Terminal
- New lateral pipeline connections to Odessa and to other pipelines at El Paso
- New Pump Stations
- El Paso Terminal
- Odessa Meter Station

A detailed description of the Longhorn Pipeline System is included in the Longhorn Pipeline Project Description section of the accompanying Project Documentation Appendix at Tab 1. More detailed descriptions of the project components that are subject to this BA are included in Section 4.0. Future pipeline upgrades, repairs, and maintenance beyond that identified in this document will be addressed in Phase II of the consultation.

3.0 EXISTING ENVIRONMENT

3.1 GENERAL

The Longhorn Pipeline traverses the State of Texas from east to west originating in east Houston, Harris County and extending westward to Crane Station, Crane County (Figure 1). Auxiliary lines extend from Crane Station northward to Odessa and westward to El Paso in far west Texas. The area traversed by the pipeline varies physiographically from flat or rolling coastal prairie in the Houston region to hilly woodlands of the Edwards Plateau in central Texas to the xeric Permian Basin region of west Texas.

3.2 VEGETATION

From east to west, the Longhorn Pipeline traverses the Gulf Prairies and Marshes, Post Oak Savannah, Blackland Prairies, Edwards Plateau, and Trans-Pecos, Mountains and Basins Vegetational Areas (Gould, 1975; Figure 2). The following provides a summary description of each ecological region.

3.2.1 Gulf Prairies and Marshes Vegetational Area

This ecological region, approximately 9.5 million acres in extent, is divided into the Coastal Prairie and Gulf Coast Marshlands. The Coastal Prairie is a nearly level plain less than 150 feet above mean sea level (MSL) and dissected by streams and rivers flowing into the Gulf of Mexico while the Gulf Coast Marshlands are limited to narrow belts of low wet marsh immediately adjacent to the coast and along waterways. Surface soils are acid sands, sandy loams, and clays with low permeability and droughty in nature. Annual precipitation averages from 20 inches in the west to 50 inches in the east (Gould, 1975).

The climax vegetation is largely grassland or post oak savannah (Gould, 1975). Ranches and rangelands are interspersed by farms. Most of the marsh areas are grazed by cattle within large land holdings.

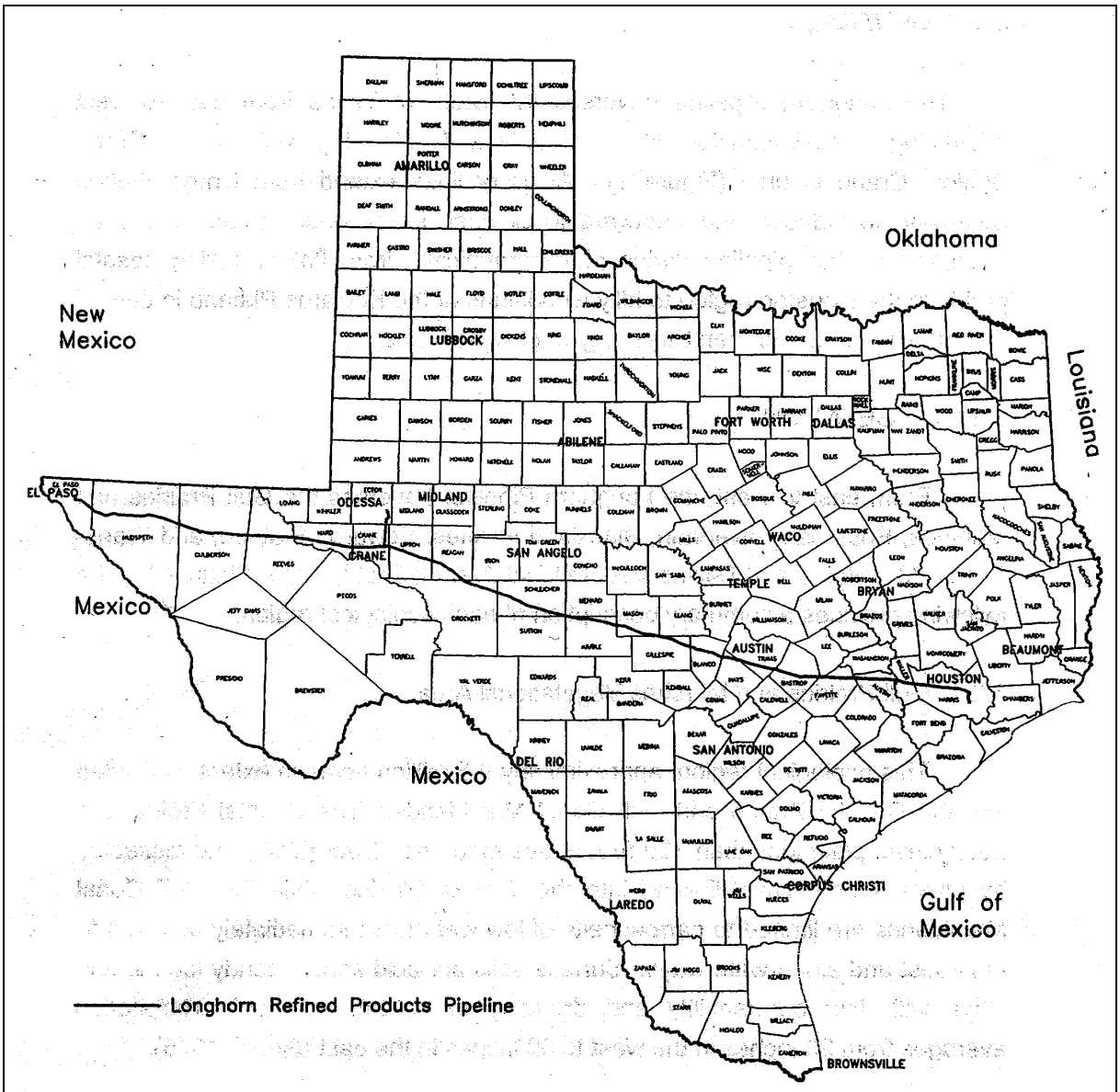


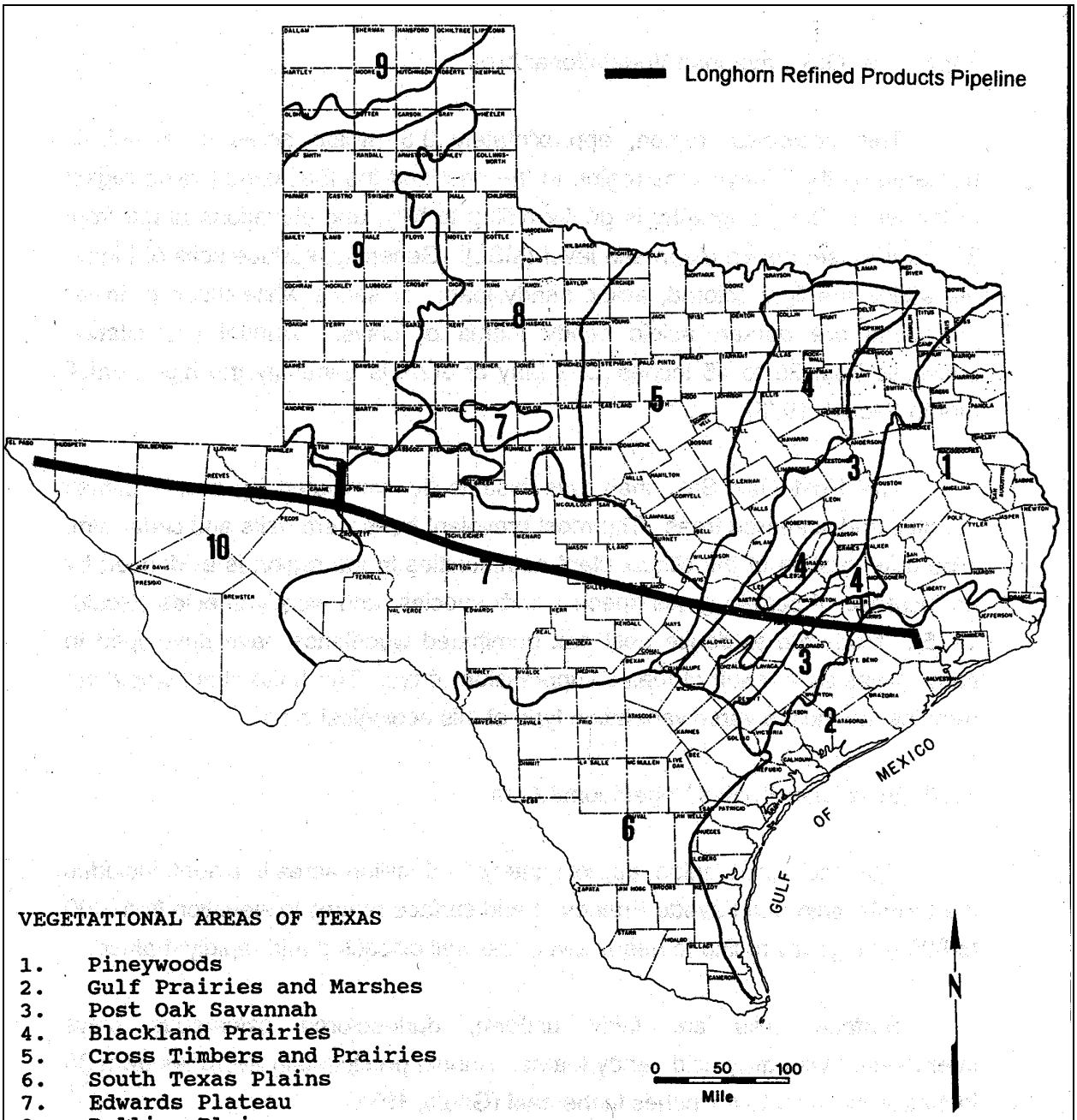
FIGURE I

LONGHORN PIPELINE
LOCATION MAP

NOT TO SCALE

MAP SOURCES:
TEXAS NATURAL RESOURCE INFORMATION SYSTEM

LONGHORN PIPELINE



VEGETATIONAL AREAS OF TEXAS

1. Pineywoods
2. Gulf Prairies and Marshes
3. Post Oak Savannah
4. Blackland Prairies
5. Cross Timbers and Prairies
6. South Texas Plains
7. Edwards Plateau
8. Rolling Plains
9. High Plains
10. Trans-Pecos, Mountains and Basins

Source: Gould, 1975.

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FIGURE 2

LONGHORN PIPELINE
IN RELATION TO THE
VEGETATIONAL AREAS OF TEXAS

3.2.2 Post Oak Savannah Vegetational Area

This ecological region, approximately 8.5 million acres in extent, is bordered by the Pineywoods region to the east and the Blackland Prairie region to the west. The topography is gently rolling to hilly, and elevations range from 300 to 800 feet above mean sea level (MSL). Generally, surface soils of higher elevations are light-colored, acidic sandy loams or sands while those of lower elevations are darker, acidic sandy loams or clays. Annual precipitation averages from 35 to 45 inches, and May or June is generally the high rainfall month (Gould, 1975).

The Post Oak Savannah was historically dominated by prairie climax grasses and scattered trees. The most prevalent trees were oaks and cedar elm. The deterioration of the climax plant communities in the region is evidenced by an increase of certain grass species, forb species, and woody species (Gould, 1975). Moderate to dense post oak dominated woodlands have developed in many areas as a result of man's suppression of fire. The bottomland woodland remains the most diverse vegetation type of this ecological area.

3.2.3 Blackland Prairies Vegetational Area

This ecological region, approximately 11.5 million acres in extent, includes the San Antonio and Fayette Prairies. Land surface ranges in elevation from 300 to 800 feet, gently rolling to nearly level, and well dissected and rapidly drained.

Surface soils are fairly uniform, dark-colored calcareous clays interspersed with gray acid sandy loams. Annual precipitation averages from 30 inches in the west to 40 inches in the east (Gould, 1975).

The climax native vegetation is true prairie (Gould, 1975). The majority of this ecological area has been brought under cultivation. Farms are interspersed among ranches and rangelands.

3.2.4 Edwards Plateau Vegetational Area

This ecological region encompasses approximately 24 million acres in west-central Texas. Land surface ranges in elevation from 100 to 3000 feet above MSL, rough and well drained, and dissected by several river systems.

Surface soils are usually shallow and underlain by material ranging from limestone or caliche to granite. Annual precipitation averages from 15 inches in the west to over 33 inches in the east, and droughts are not uncommon (Gould, 1975).

The Edwards Plateau Vegetational Area is predominantly rangeland (Gould, 1975). Bottomland areas of this ecological area having deeper soils have been brought under cultivation. Small farms are interspersed among ranches and rangelands.

3.2.5 Trans-Pecos, Mountains and Basins Vegetational Area

This ecological region encompasses approximately 19 million acres of mountains and arid valleys in extreme west Texas. Land surface ranges in elevation from 2500 to over 8500 feet, rough and well drained, and dissected by several river systems.

Surface soils have developed from out-wash materials from mountains, varied in texture, calcareous, and some areas are alkaline due to poor drainage. Surface conditions include stony hills, clay flats, sands, salty-saline soils, gypsum flats, deep upland, rough stony mountains, gravelly outwash, and badlands (Gould, 1975). The average annual precipitation for the area is less than 12 inches while higher elevations can range from 16 to 20 inches (Gould, 1975).

Cultivated areas are confined largely to irrigable valleys. The majority of land is in large holdings as native range. Ranch operations include cattle, sheep, and goats.

3.3 WILDLIFE

From east to west, the Longhorn Pipeline traverses the Austroriparian, Texan, Balconian, Kansan, and Chihuahuan Biotic Provinces described by Blair (1950; Figure 3). The following provides a summary description of each biotic province.

3.3.1 Austroriparian Biotic Province

This province includes the Gulf coast plain from the Atlantic to eastern Texas. The western boundary of this province in Texas is along a line running approximately north from western Harris County to western Red River County. The pine and hardwood forest of the Austroriparian is limited to the west by available moisture.

The vertebrate fauna of the Austroriparian Province in Texas is typical of the species in the province to the east. At least 47 species of mammals occur in this province in Texas. Some 29 species of snakes, 10 lizards, 2 land turtles, 17 anurans, and 18 urodels are known to occur in the Texas part of this province (Blair, 1950).

3.3.2 Texan Biotic Province

This province is a transitional area and is recognized as a broad ecotone between the forests of the Austroriparian and Carolinian provinces of eastern Texas and Oklahoma, and the grasslands of the western parts of these states.

The integration of woodlands and grasslands within the region results in a mixture of wildlife species typical of the 2 general habitats. The vertebrate fauna of the Texan Biotic Province consists of at least 49 species of mammals, 16 lizards, 2 land turtles, 39 snakes, 18 anurans (frogs and toads), and 5 urodeles (salamanders, newts, etc.) (Blair, 1950). No endemic vertebrates are known from the Texan Province.

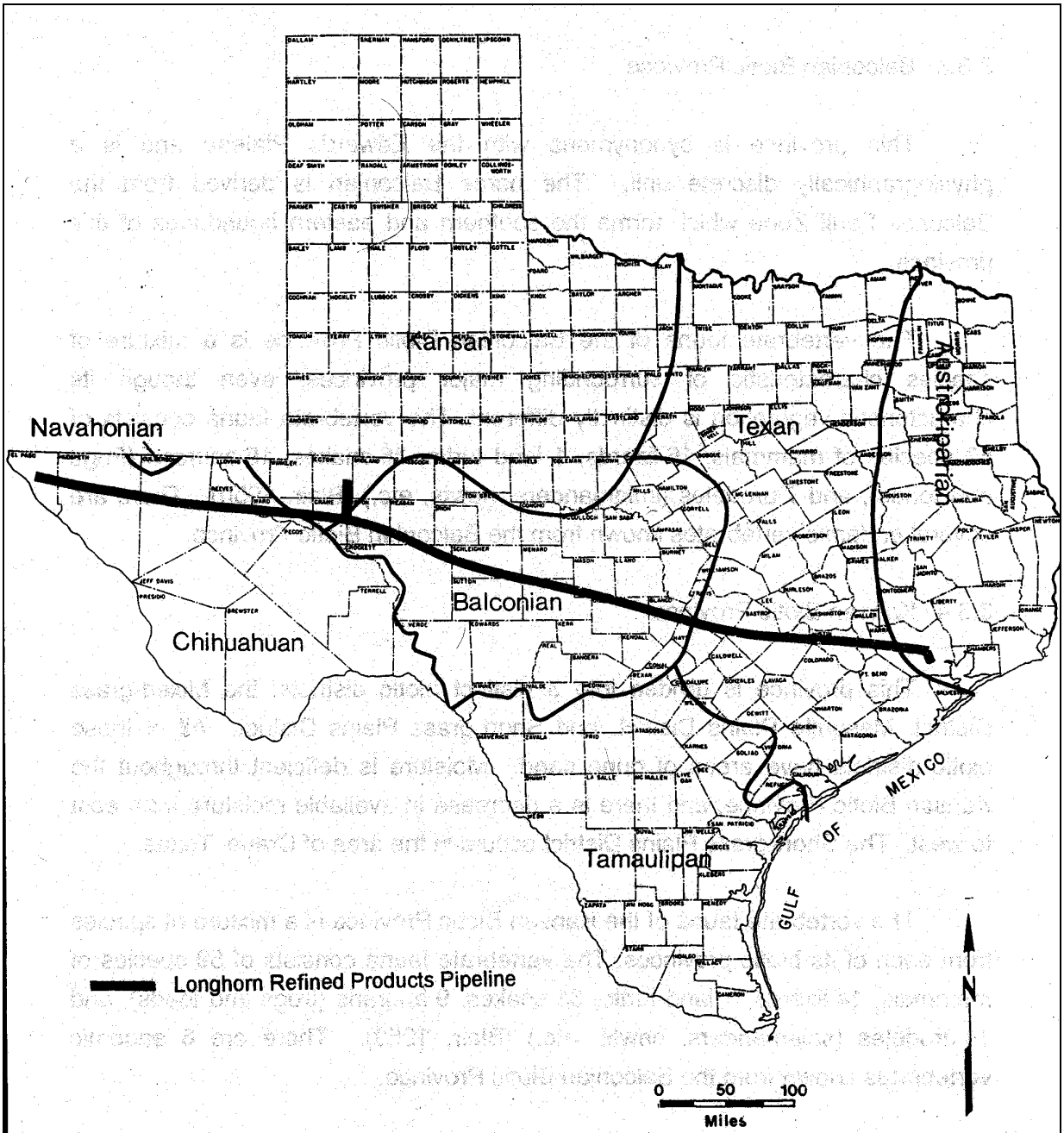

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FIGURE 3

LONGHORN PIPELINE
IN RELATION TO THE
BIOTIC PROVINCES OF TEXAS

3.3.3 Balconian Biotic Province

This province is synonymous with the Edwards Plateau and is a physiographically discrete unit. The name Balconian is derived from the Balcones Fault Zone which forms the southern and eastern boundaries of this province.

The vertebrate fauna of the Balconian Biotic Province is a mixture of species characteristic of surrounding major provinces, even though its characteristic vegetation is distinctly different. The vertebrate fauna consists of 57 species of mammals, 16 lizards, 1 land turtle, 36 snakes, 15 anurans (frogs and toads), and 7 urodeles (salamanders, newts, etc.) (Blair, 1950). There are several endemic vertebrates known from the Balconian Biotic Province.

3.3.4 Kansan Biotic Province

This province is divided into 3 distinct biotic districts: the Mixed-grass District, Mesquite Plains District, and Short-grass Plains District. All of these biotic districts have areas of dune sand. Moisture is deficient throughout the Kansan Biotic Province, and there is a decrease in available moisture from east to west. The Short-grass Plains District occurs in the area of Crane, Texas.

The vertebrate fauna of the Kansan Biotic Province is a mixture of species from each of its biotic provinces. The vertebrate fauna consists of 59 species of mammals, 14 lizards, 1 land turtle, 31 snakes, 9 anurans (frogs and toads), and 14 urodeles (salamanders, newts, etc.) (Blair, 1950). There are 6 endemic vertebrates known from the Balconian Biotic Province.

3.3.5 Chihuahuan Biotic Province

Within Texas, the Chihuahuan Biotic Province includes all of the Trans-Pecos Texas except the Guadalupe Mountains in Culberson County. The physiography of the province includes desert basins, mountains, and major waterways and drainages. Even though the climate of most of the province in Texas is arid and seriously deficient of moisture for plant growth, vegetational communities are very diverse.

The vertebrate fauna of the Chihuahuan Biotic Province is extremely diverse and many of the same species can be found in both desert basin and mountain areas. The vertebrate fauna consists of 83 species of mammals, 22 lizards, 1 land turtle, 38 snakes, 13 anurans (frogs and toads), and 1 urodele (salamanders, newts, etc.) (Blair, 1950). There are 6 endemic vertebrates known from the Balconian Biotic Province.

3.4 THREATENED AND ENDANGERED SPECIES

Horizon Environmental Services, Inc. (Horizon) has performed investigations along the existing Longhorn Pipeline right-of-way (ROW) and vicinity from Houston to Crane for the possible occurrence of all federally-listed, threatened, or endangered species which are known to exist in all counties of Texas traversed by the Longhorn Pipeline (Table 1). Following investigation of the species which potentially occur in these counties, several species were identified for which there was a possibility of occurrence within the area of potential effect for pipeline maintenance construction, routine ROW maintenance, hydrostatic pressure testing, and the remaining integrity related activities. The area of potential direct effects for the Phase I activities includes the immediate, existing 50-foot wide ROW, and those additional construction specific adjacent areas up to 100 feet either side of the ROW, and other areas that could reasonably and foreseeably be affected by the subject pipeline maintenance, construction, and testing activities (ie., hydrotest releases). No areas of indirect effect are anticipated due to avoidance and minimization procedures.

A biological investigation was conducted along the pipeline ROW and immediately adjacent lands to determine if these species and/or suitable habitat were present within the area of concern. Horizon conducted habitat assessments and survey efforts throughout April, May, and June 1999 from

Table 1: Federally-listed Threatened or Endangered Species which occur in counties traversed by Longhorn Pipeline

Species - Federal Classification	Austin	Bastrop	Blanco	Crane	Crockett	Ector	Fayette	Gillespie	Harris	Hays	Kimble
American alligator - TSA											
Attwater's prairie-chicken - E	O										
Bald eagle - T(PDL)											
Barton Springs salamander - E											
Bee Creek Cave harvestman - E											
Black-capped vireo - E			X		O			X		O	X
Bone Cave harvestman - E											
Clear Creek gambusia - E											
Comal Springs dryopid beetle - E										O	
Comal Springs riffle beetle - E										O	
Devil's River Minnow - PE											
Fountain darter - E										O	
Golden-cheeked warbler - E			X					X		X	O
Houston toad - E	O	X									
Interior least tern - E	X	X						X			X
Kretschmarr Cave mold beetle - E											
Navasota Ladies-tresses - E							X				
San Marcos gambusia - E										O	
San Marcos salamander - T										O	
Texas blind salamander - E										O	
Texas prairie dawn-flower - E									X		
Texas snowbells - E											O
Texas wild-rice - E										O	
Tobusch fishhook cactus - E											X
Tooth Cave ground beetle - E											
Tooth Cave pseudoscorpion - E											
Tooth Cave spider - E											
Whooping crane - E								M			
	E - Listed Endangered										
	T - Listed Threatened										
	TSA - Listed Threatened Due to Similarity of Appearance										
	PDL - Proposed to be De-listed										
	X - Known or Suspected to Occur Within Area of Potential Effect										
	O - Not Likely to Occur Within Area of Potential Effect										
	Source of Species: US Fish and Wildlife Service										

Table 1: Federally-listed Threatened or Endangered Species which occur in counties traversed by Longhorn Pipeline

Species - Federal Classification	Lee	Llano	Mason	Menard	Reagan	Schleicher	Travis	Upton	Waller	Downstream
American alligator - TSA										X
Attwater's prairie-chicken - E										
Bald eagle - T(PDL)									X	X
Barton Springs salamander - E							X			
Bee Creek Cave harvestman - E							O			
Black-capped vireo - E		X		O	O	O	O	O		
Bone Cave harvestman - E							O			
Clear Creek gambusia - E				O						
Comal Springs dryopid beetle - E										
Comal Springs riffle beetle - E										
Devil's River Minnow - PE										O
Fountain darter - E										
Golden-cheeked warbler - E		O	X	O			O			
Houston toad - E	O								O	X
Interior least tern - E			X						X	X
Kretschmarr Cave mold beetle - E							O			
Navasota Ladies-tresses - E										
San Marcos gambusia - E										
San Marcos salamander - T										
Texas blind salamander - E										
Texas prairie dawn-flower - E									X	
Texas snowbells - E										
Texas wild-rice - E										
Tobusch fishhook cactus - E										
Tooth Cave ground beetle - E							O			
Tooth Cave pseudoscorpion - E							O			
Tooth Cave spider - E							O			
Whooping crane - E							M			
	E - Listed Endangered									
	T - Listed Threatened									
	TSA - Listed Threatened Due to Similarity of Appearance									
	PDL - Proposed to be De-listed									
	X - Known or Suspected to Occur Within Area of Potential Effect									
	O - Not Likely to Occur Within Area of Potential Effect									
	Source of Species: US Fish and Wildlife Service									

Crane Station, Crane County, Texas to Highway 6 in Houston, Harris County, Texas. The portion of the pipeline extending from Crane to El Paso is not subject to this BA since none of the subject activities will apply to that pipeline segment area. Species which potentially occur in or near waterways downstream of the pipeline were assessed based on literature and agency file information. In 1998, the Service concurred with Longhorn's conclusion that the project was not likely to adversely affect species and habitat along the pipeline segment between Crane and El Paso (a copy of the Service's concurrence is included in the accompanying Project Documentation Appendix at Tab 13).

As indicated in Table 1, many species have been excluded from further consideration due to Horizon=s determination that the activities are not likely to adversely affect these species. Horizon's determination was based on information regarding distribution of the various species obtained from various published, agency file, or personal communication sources such as the Texas Parks and Wildlife Department, the US Fish and Wildlife Service, recognized experts for certain species, published species documentation, and published reference books. Those species indicated by an AO@ in Table 1 have been determined not likely to occur within the area of potential effect. Those additional species indicated by an AM@ are migrants that would not likely be affected. Species indicated by an AX@ are those determined by Horizon=s studies to occur or possibly occur in the area of potential effect for present purposes. Those species are addressed in more detail below and on attached maps.

Texas Prairie Dawn-flower (*Hymenoxys texana*)

Small, delicate annual to 6 inches tall with single or branching stems. Small yellow flowers blooming in late March to early April. Occurs in sparsely vegetated areas of fine-sandy compacted soil. Specifically, the species occurs in the northern part of the Gulf Coastal Prairie, where it is found in poorly drained depressions or saline swales around the periphery of low, natural mounds (mima mounds) in open grasslands. These mostly barren areas are sparsely vegetated, and the soil is often covered with a blue-green alga (*Nostoc* sp.). It can also occur on disturbed soils such as rice fields, vacant lots, and pastures if the soil structure remains relatively intact.

An assessment of potentially suitable habitat for the prairie dawn was conducted by Horizon in early June 1999 along the Longhorn pipeline ROW in western Harris and eastern Waller counties from the Satsuma Station on the west edge of Houston to near Monaville in Waller County. Three areas along the ROW, one in Waller County and two in Harris County, exhibited native range conditions with suitable soils that could be considered potentially suitable habitat areas for the prairie dawn (Figures 4 to 12). All other areas along the pipeline within the area investigated had been converted to row crop (corn), monoculture, hay or grazing pasture, or disturbed for land development. A survey for the prairie dawn has not been conducted within the potentially suitable habitat areas to confirm its presence or absence. Longhorn will conduct a survey of the ROW within the potential habitat areas in March of 2000 to determine if the prairie dawn is present, and if so, its distribution and abundance.

Navasota Ladies-tresses (*Spiranthes parksii*)

The Navasota Ladies-Tresses (NLT) occurs primarily in moist, sandy soils in small openings amongst Post Oak Savannah vegetation associated with the Navasota, Brazos, and Trinity River drainages. The plant has previously been found in Brazos, Burleson, Freestone, Grimes, Fayette, Leon, Madison, Jasper, Robertson, and Washington counties. NLT are typically found on erosional remnants between rills in slightly to moderately eroded areas along minor intermittent tributaries of the Navasota, Brazos, and Trinity Rivers. NLT grows on sandy loam soils and is often associated with post oak, blackjack oak, yaupon, slender bigelowia (*Bigelowia nuttallii*), and *Spiranthes cernua*. The species has also been recorded in open savannahs and shrublands that have experienced little or no grazing pressure, and in hillside seepages.

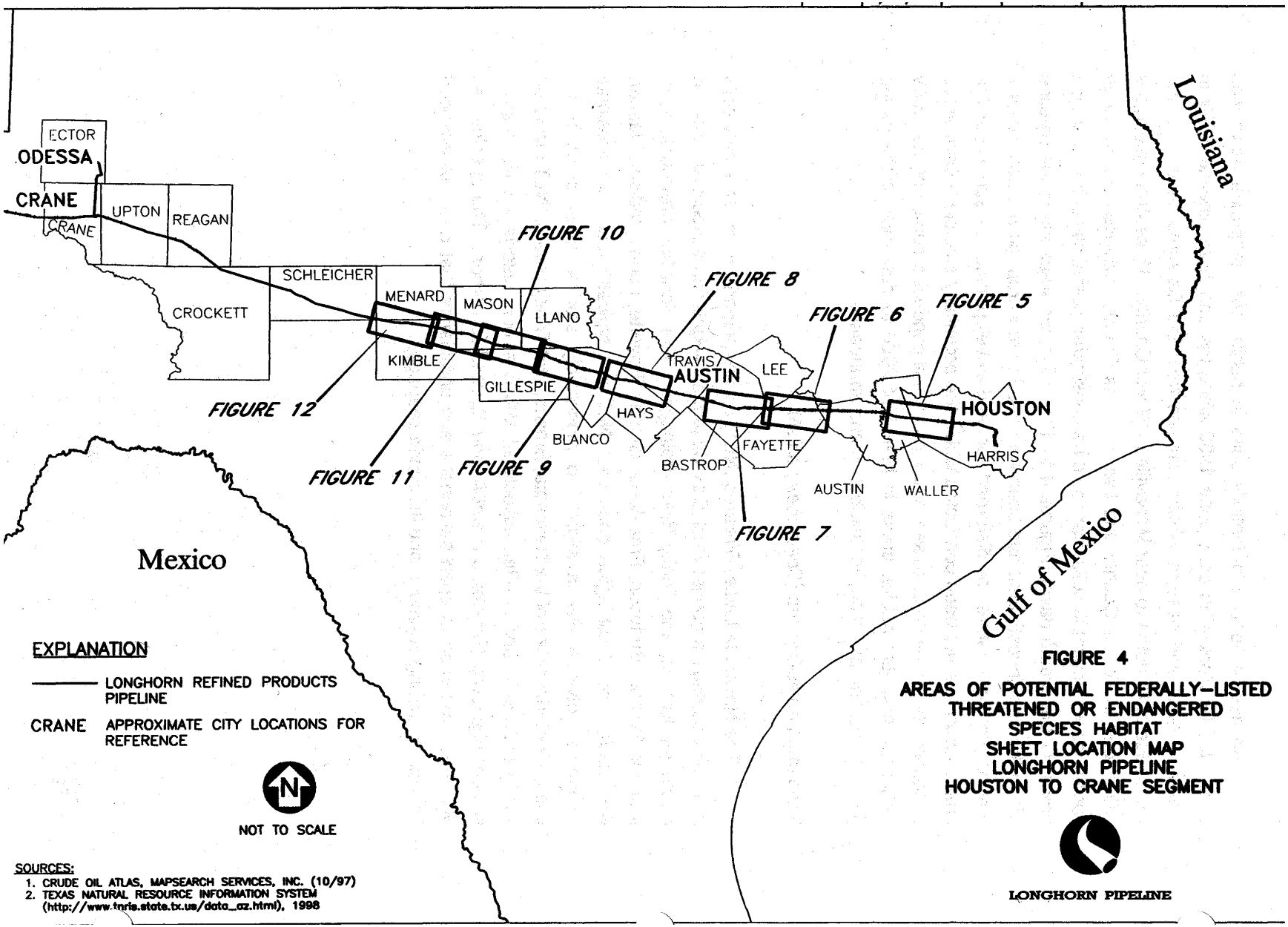
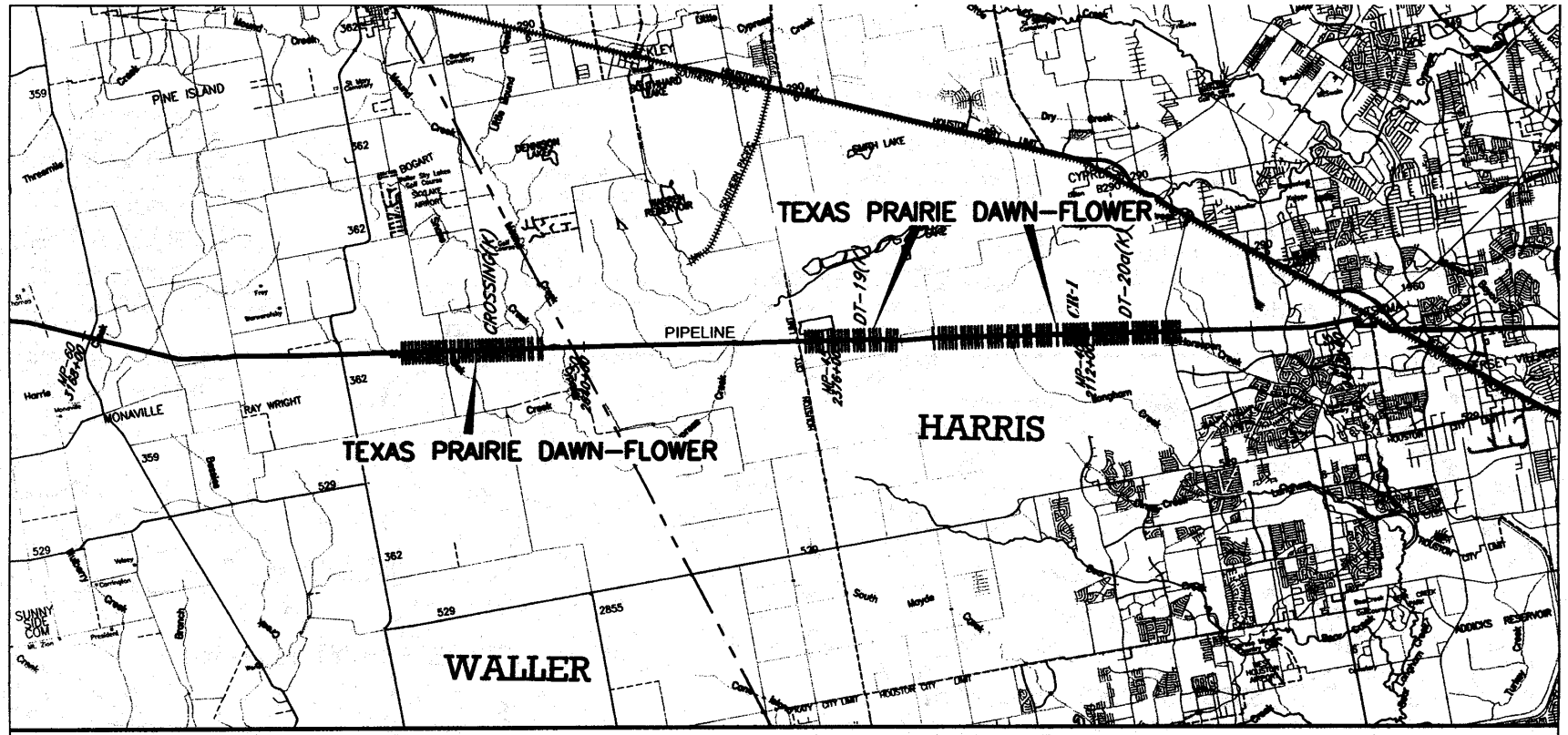


FIGURE 4

AREAS OF POTENTIAL FEDERALLY-LISTED THREATENED OR ENDANGERED SPECIES HABITAT
SHEET LOCATION MAP
LONGHORN PIPELINE
HOUSTON TO CRANE SEGMENT

LONGHORN PIPELINE



SOURCES:

MAP SOURCES:

1. TEXAS NATURAL RESOURCE INFORMATION SYSTEM (http://www.tnris.state.tx.us/data_cz.html), 1998
2. TxDot COUNTY FILES FROM TEXAS NATURAL RESOURCES INFORMATION SYSTEM (3/9/98)

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6. HORIZON ENVIRONMENTAL SERVICES, INC., SITE INVESTIGATION (JUNE 1999)

0 1.5 3
MILES

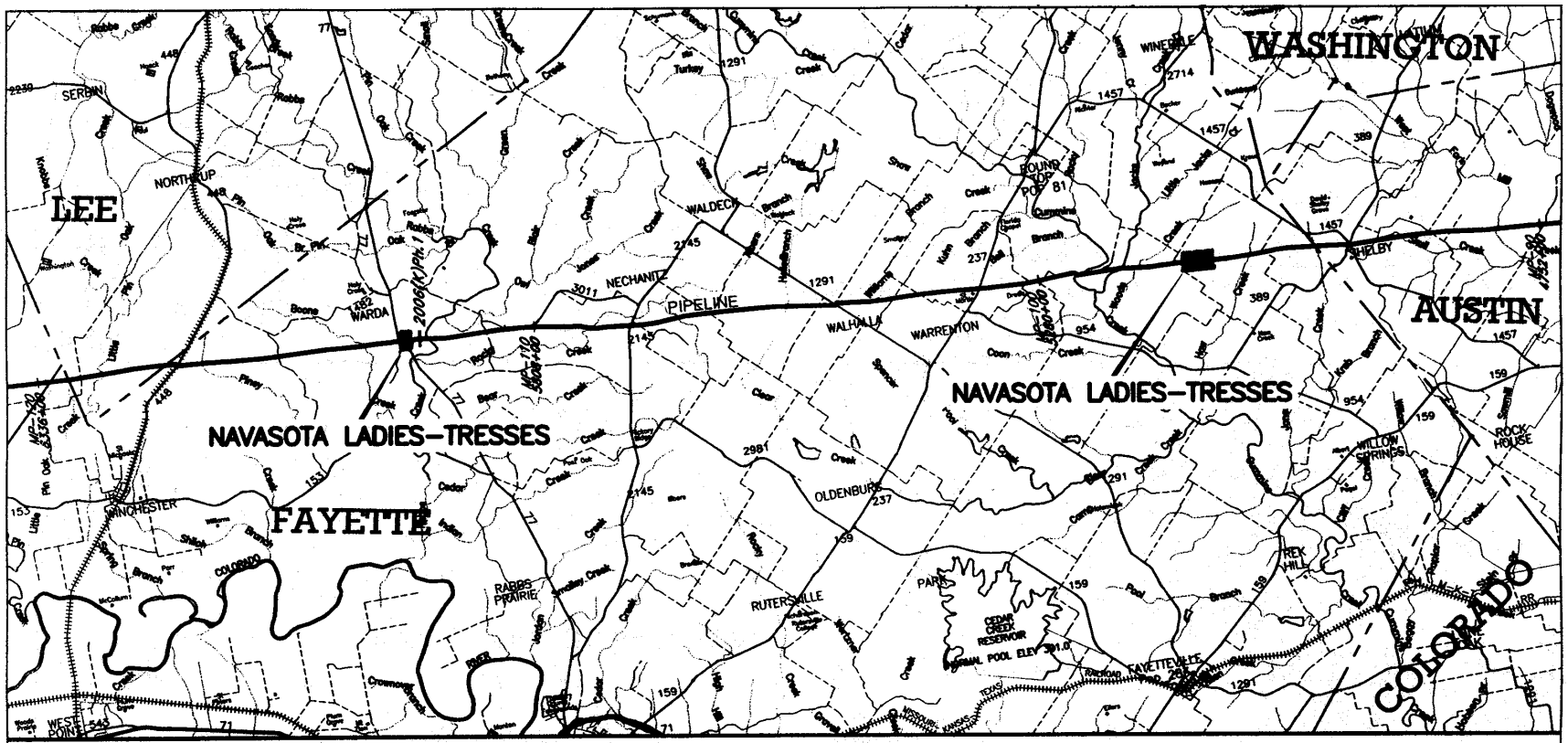
EXPLANATION

- COUNTY BOUNDARY
- HIGHWAY OR MAJOR ROADS
- CITY STREETS
- ROADS
- RIVERS AND STREAMS
- INTERMITTENT STREAMS
- COMMUNITY BOUNDARIES
- RAILWAYS
- BRIDGES
- CEMETERY
- LONGHORN PIPELINE
- *LLP–2546* MAINTENANCE CONSTRUCTION LOCATION
- *SITE 6-2* HYDROSTATIC PRESSURE TEST – HEADER INSTALLATION LOCATIONS
- *CR-1* CATHODIC PROTECTION ENHANCEMENTS
- *SURGE 4* SURGE PRESSURE PROTECTION
- TEXAS PRAIRIE DAWN–FLOWER *(Hymenoxys texana)*
- HOUSTON TOAD – DESIGNATED HABITAT *(Bufo houstonensis)*
- HOUSTON TOAD – POTENTIAL HABITAT *(Bufo houstonensis)*
- GOLDEN–CHEEKED WARBLER *(Dendroica chrysoparia)*
- BLACK–CAPPED VIREO *(Vireo atricapillus)*
- TOBUSCH FISHHOOK CACTUS *(Ancistrocactus tobuschii)*
- NAVASOTA LADIES–TRESSES *(Spiranthes parksii)*
- EDWARDS RECHARGE ZONE
- CONTRIBUTING ZONE

FIGURE 5

AREAS OF POTENTIAL FEDERALLY–LISTED THREATENED OR ENDANGERED SPECIES HABITAT TRAVERSED BY LONGHORN PIPELINE HOUSTON TO CRANE SEGMENT COUNTIES OF TEXAS

LONGHORN PIPELINE



SOURCES:

MAP SOURCES:

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6. HORIZON ENVIRONMENTAL SERVICES, INC., SITE INVESTIGATION (JUNE 1999)

0 1.5 3
MILES

EXPLANATION

- COUNTY BOUNDARY
- HIGHWAY OR MAJOR ROADS
- CITY STREETS
- ROADS
- RIVERS AND STREAMS
- INTERMITTENT STREAMS
- COMMUNITY BOUNDARIES
- RAILWAYS
- BRIDGES
- CEMETERY
- LONGHORN PIPELINE
- *LLP–2546* MAINTENANCE CONSTRUCTION LOCATION
- *SITE 6-2* HYDROSTATIC PRESSURE TEST – HEADER INSTALLATION LOCATIONS
- *CR-1* CATHODIC PROTECTION ENHANCEMENTS
- *SURGE 4* SURGE PRESSURE PROTECTION
- TEXAS PRAIRIE DAWN–FLOWER *(Hymenoxys texana)*
- HOUSTON TOAD – DESIGNATED HABITAT *(Bufo houstonensis)*
- HOUSTON TOAD – POTENTIAL HABITAT *(Bufo houstonensis)*
- GOLDEN–CHEEKED WARBLER *(Dendroica chrysoparia)*
- BLACK–CAPPED VIREO *(Vireo atricapillus)*
- TOBUSCH FISHHOOK CACTUS *(Ancistrocactus tobuschii)*
- NAVASOTA LADIES–TRESSES *(Spiranthes parksii)*
- EDWARDS RECHARGE ZONE
- CONTRIBUTING ZONE

FIGURE 6

AREAS OF POTENTIAL FEDERALLY–LISTED THREATENED OR ENDANGERED SPECIES HABITAT TRAVERSED BY LONGHORN PIPELINE HOUSTON TO CRANE SEGMENT COUNTIES OF TEXAS

LONGHORN PIPELINE

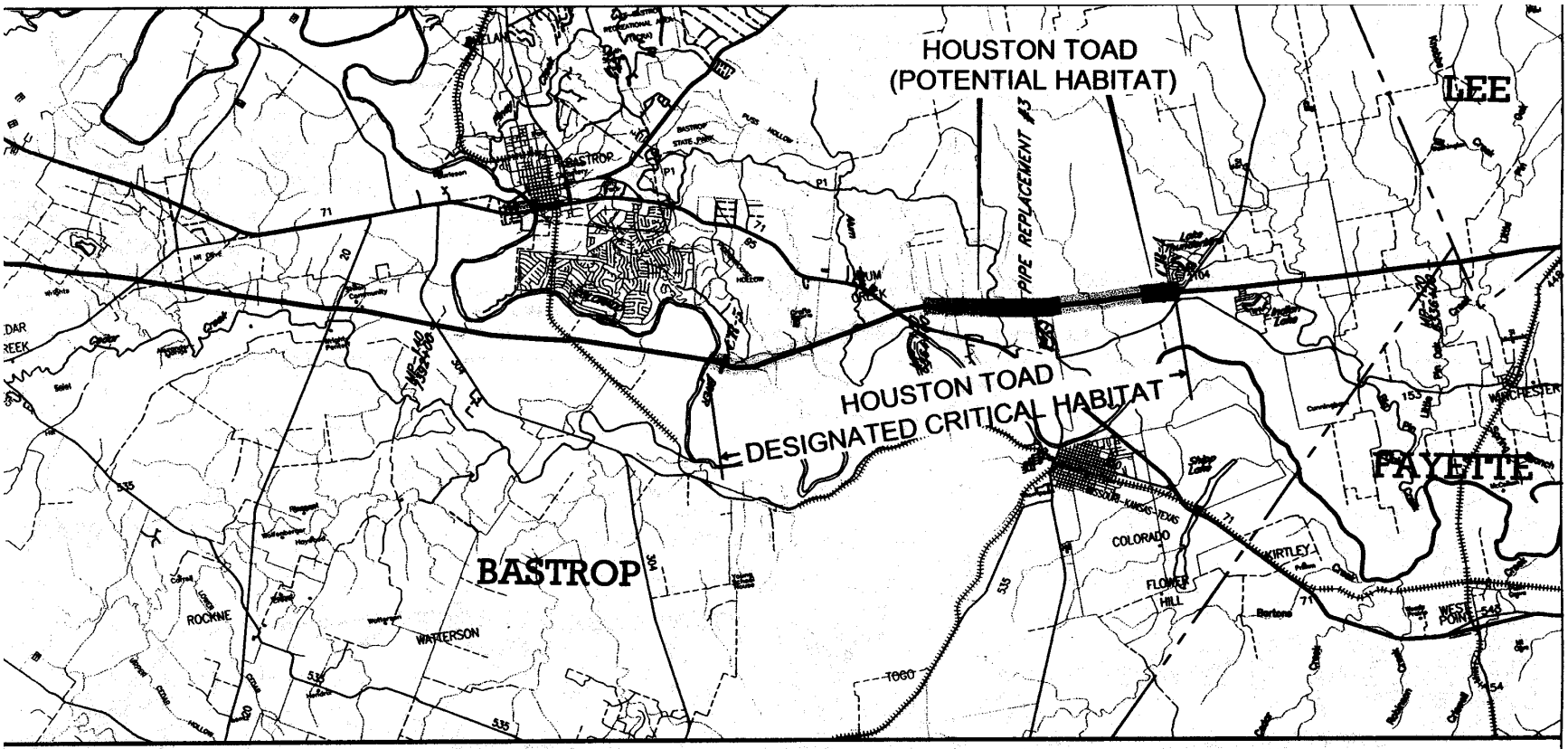
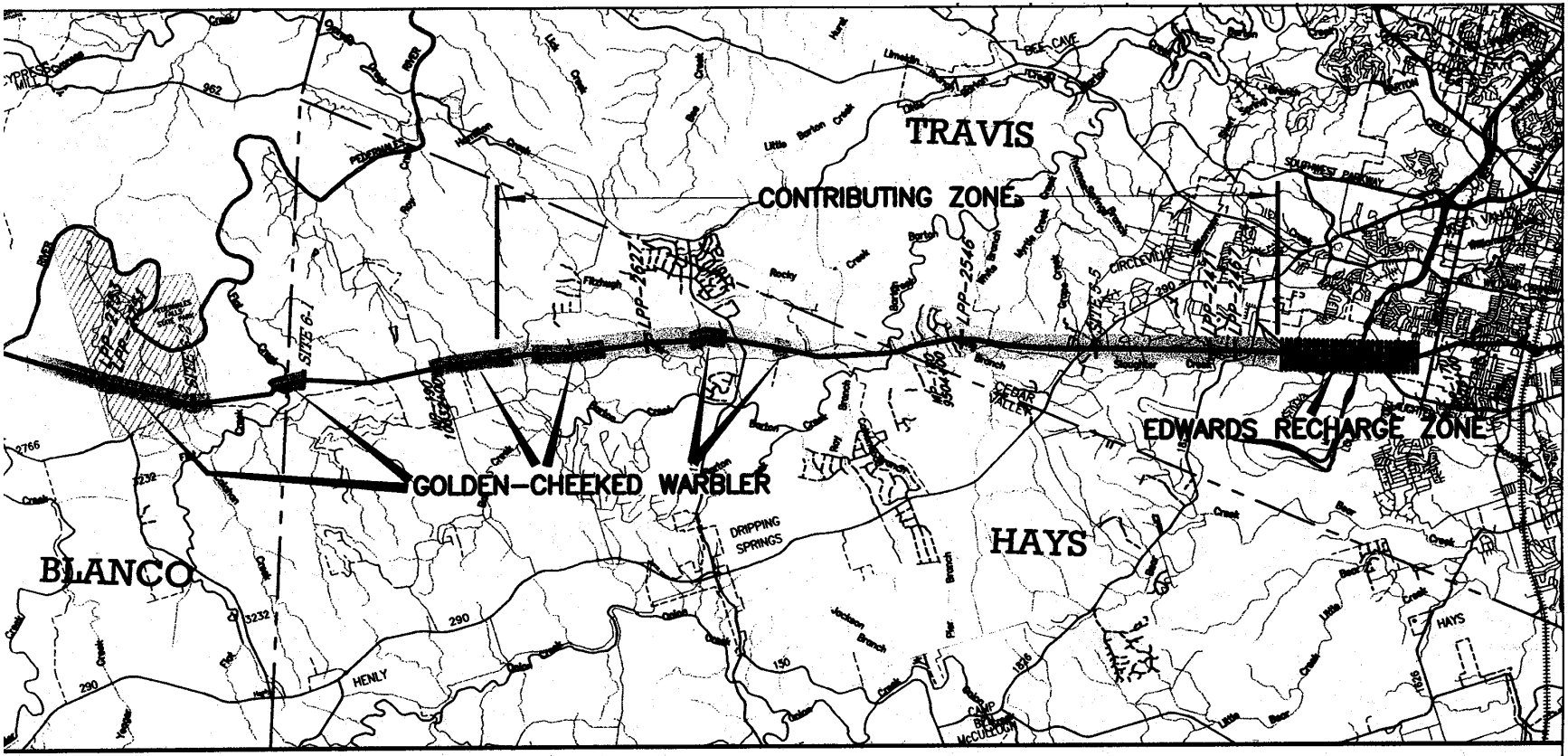


FIGURE 7

AREAS OF POTENTIAL FEDERALLY-LISTED THREATENED OR ENDANGERED SPECIES HABITAT TRAVERSED BY LONGHORN PIPELINE HOUSTON TO CRANE SEGMENT COUNTIES OF TEXAS

LONGHORN PIPELINE



SOURCES:

MAP SOURCES:

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6. HORIZON ENVIRONMENTAL SERVICES, INC., SITE INVESTIGATION (JUNE 1999)

0 1.5 3
MILES

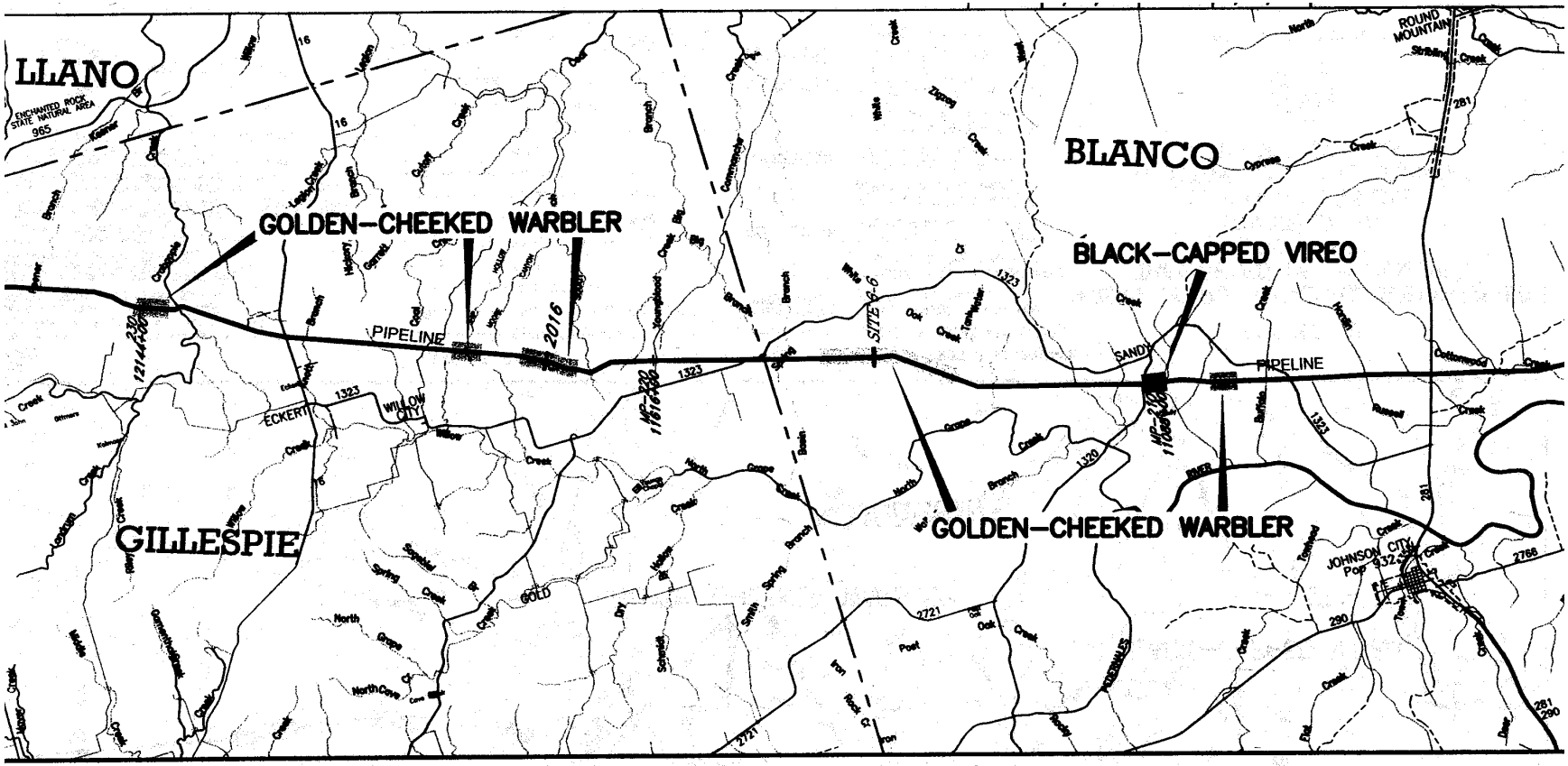
EXPLANATION

- COUNTY BOUNDARY
- HIGHWAY OR MAJOR ROADS
- CITY STREETS
- ROADS
- RIVERS AND STREAMS
- INTERMITTENT STREAMS
- COMMUNITY BOUNDARIES
- RAILWAYS
- BRIDGES
- CEMETERY
- LONGHORN PIPELINE
- *LLP-2546* MAINTENANCE CONSTRUCTION LOCATION
- *SITE 6-2* HYDROSTATIC PRESSURE TEST - HEADER INSTALLATION LOCATIONS
- *CR-1* CATHODIC PROTECTION ENHANCEMENTS
- *SURGE 4* SURGE PRESSURE PROTECTION
- TEXAS PRAIRIE DAWN-FLOWER *(Hymenoxys texana)*
- HOUSTON TOAD - DESIGNATED HABITAT *(Bufo houstonensis)*
- HOUSTON TOAD - POTENTIAL HABITAT *(Bufo houstonensis)*
- GOLDEN-CHEEKED WARBLER *(Dendrocia chrysoparia)*
- BLACK-CAPPED VIREO *(Vireo atricapillus)*
- TOBUSCH FISHHOOK CACTUS *(Ancistrocactus tobuschii)*
- NAVASOTA LADIES-TRESSES *(Spiranthes parksii)*
- EDWARDS RECHARGE ZONE
- CONTRIBUTING ZONE

FIGURE 8

AREAS OF POTENTIAL FEDERALLY-LISTED THREATENED OR ENDANGERED SPECIES HABITAT TRAVERSED BY LONGHORN PIPELINE HOUSTON TO CRANE SEGMENT COUNTIES OF TEXAS

LONGHORN PIPELINE



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6. HORIZON ENVIRONMENTAL SERVICES, INC., SITE INVESTIGATION (JUNE 1998)

0 1.5 3
MILES

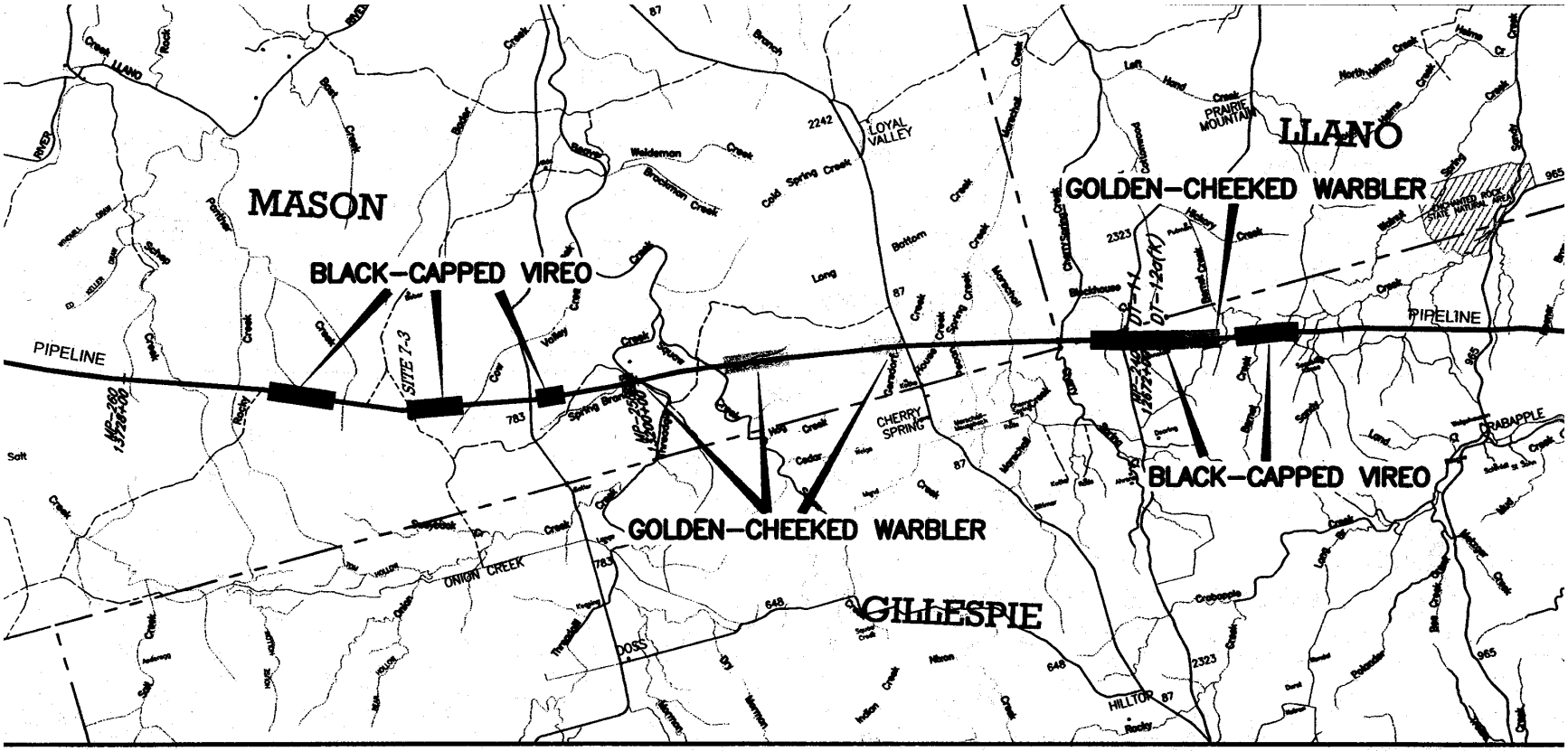
EXPLANATION

- COUNTY BOUNDARY
- HIGHWAY OR MAJOR ROADS
- CITY STREETS
- ROADS
- RIVERS AND STREAMS
- INTERMITTENT STREAMS
- COMMUNITY BOUNDARIES
- RAILWAYS
- BRIDGES
- CEMETERY
- LONGHORN PIPELINE
- *LLP-2546* MAINTENANCE CONSTRUCTION LOCATION
- *SITE 6-8* HYDROSTATIC PRESSURE TEST - HEADER INSTALLATION LOCATIONS
- *CR-1* CATHODIC PROTECTION ENHANCEMENTS
- *SURGE 4* SURGE PRESSURE PROTECTION
- TEXAS PRAIRIE DAWN-FLOWER *(Hymenoxys texana)*
- HOUSTON TOAD - DESIGNATED HABITAT *(Bufo houstonensis)*
- HOUSTON TOAD - POTENTIAL HABITAT *(Bufo houstonensis)*
- GOLDEN-CHEEKED WARBLER *(Dendroica chrysoparia)*
- BLACK-CAPPED VIREO *(Vireo atricapillus)*
- TOBUSCH FISHHOOK CACTUS *(Ancistrocactus tobuschii)*
- NAVASOTA LADIES-TRESSES *(Spiranthes parksii)*
- EDWARDS RECHARGE ZONE
- CONTRIBUTING ZONE

FIGURE 9

AREAS OF POTENTIAL FEDERALLY-LISTED THREATENED OR ENDANGERED SPECIES HABITAT TRAVERSED BY LONGHORN PIPELINE HOUSTON TO CRANE SEGMENT COUNTIES OF TEXAS

LONGHORN PIPELINE



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0 1.5 3
MILES

EXPLANATION

- COUNTY BOUNDARY
- HIGHWAY OR MAJOR ROADS
- CITY STREETS
- ROADS
- RIVERS AND STREAMS
- INTERMITTENT STREAMS
- COMMUNITY BOUNDARIES
- RAILWAYS
- BRIDGES
- CEMETERY
- LONGHORN PIPELINE
- *LLP–2546* MAINTENANCE CONSTRUCTION LOCATION
- *SITE 6-2* HYDROSTATIC PRESSURE TEST – HEADER INSTALLATION LOCATIONS
- *CR-1* CATHODIC PROTECTION ENHANCEMENTS
- *SURGE 4* SURGE PRESSURE PROTECTION
- TEXAS PRAIRIE DAWN–FLOWER *(Hymenoxys texana)*
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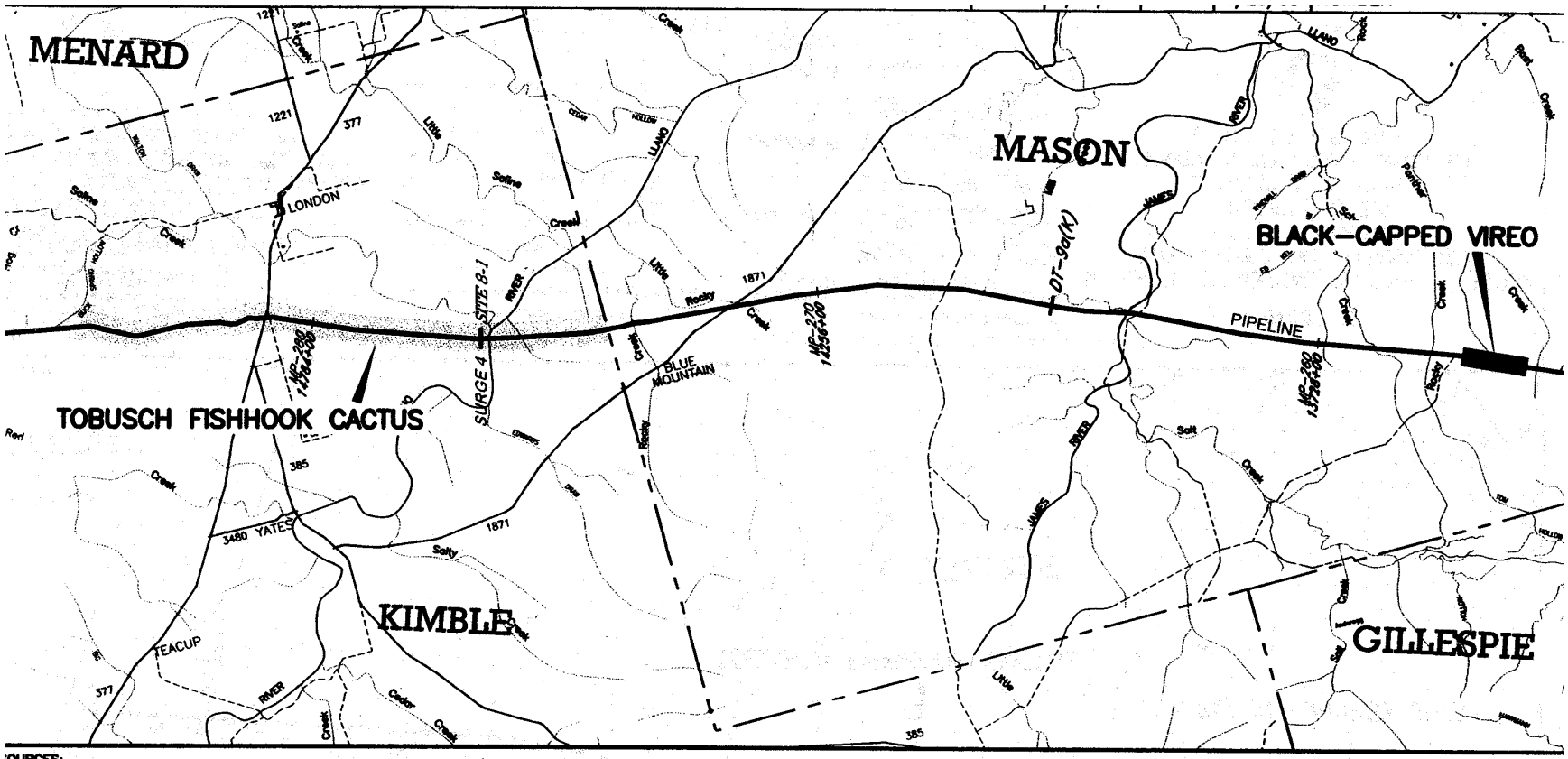
- TOBUSCH FISHHOOK CACTUS *(Ancistrocactus tobuschii)*
- NAVASOTA LADIES–TRESSES *(Spiranthes parksii)*
- EDWARDS RECHARGE ZONE
- CONTRIBUTING ZONE

FIGURE 10

AREAS OF POTENTIAL FEDERALLY–LISTED THREATENED OR ENDANGERED SPECIES HABITAT TRAVERSED BY LONGHORN PIPELINE HOUSTON TO CRANE SEGMENT COUNTIES OF TEXAS

LONGHORN PIPELINE



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6. HORIZON ENVIRONMENTAL SERVICES, INC., SITE INVESTIGATION (JUNE 1999)

N

0 1.5 3
MILES

EXPLANATION

- COUNTY BOUNDARY
- 35 290 HIGHWAY OR MAJOR ROADS
- CITY STREETS
- ROADS
- RIVERS AND STREAMS
- INTERMITTENT STREAMS
- COMMUNITY BOUNDARIES
- RAILWAYS
- BRIDGES
- CEMETERY
- LONGHORN PIPELINE
- LLP-2546 MAINTENANCE CONSTRUCTION LOCATION
- SITE 6-2 HYDROSTATIC PRESSURE TEST – HEADER INSTALLATION LOCATIONS
- CR-1 CATHODIC PROTECTION ENHANCEMENTS
- SURGE 4 SURGE PRESSURE PROTECTION
- TEXAS PRAIRIE DAWN–FLOWER (*Hymenoxys texana*)
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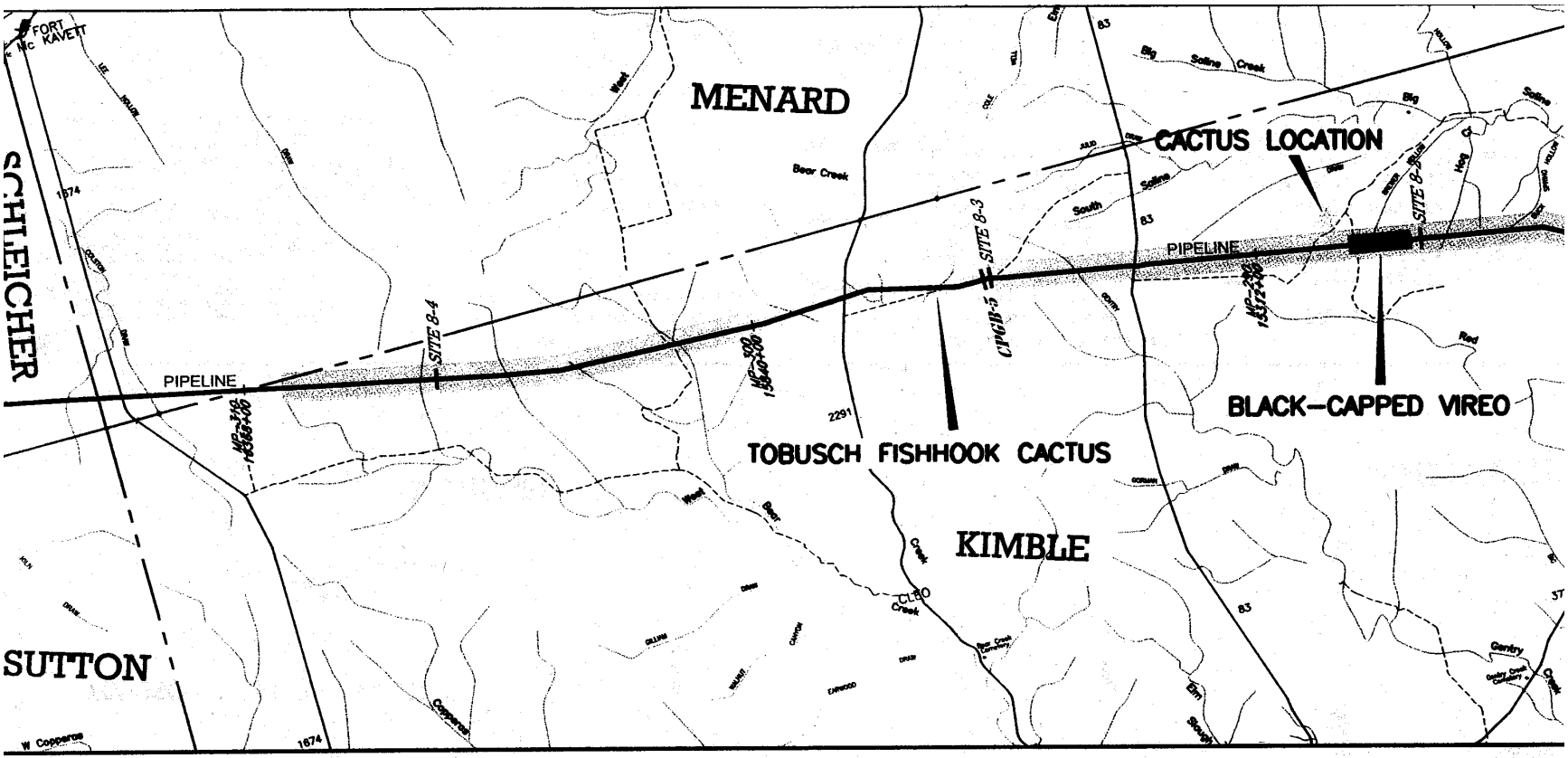
- GOLDEN–CHEEKED WARBLER (*Dendrocia chrysoparia*)
- BLACK–CAPPED VIREO (*Vireo atricapillus*)
- TOBUSCH FISHHOOK CACTUS (*Ancistrococtus tobuschii*)
- NAVASOTA LADIES–TRESSES (*Spiranthes parksii*)
- EDWARDS RECHARGE ZONE
- CONTRIBUTING ZONE

FIGURE 11

AREAS OF POTENTIAL FEDERALLY–LISTED THREATENED OR ENDANGERED SPECIES HABITAT TRAVERSED BY LONGHORN PIPELINE HOUSTON TO CRANE SEGMENT COUNTIES OF TEXAS

LONGHORN PIPELINE



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0 1.5 3
MILES

EXPLANATION

- COUNTY BOUNDARY
- HIGHWAY OR MAJOR ROADS
- CITY STREETS
- ROADS
- RIVERS AND STREAMS
- INTERMITTENT STREAMS
- COMMUNITY BOUNDARIES
- RAILWAYS
- BRIDGES
- CEMETERY
- LONGHORN PIPELINE
- *LLP-2546* MAINTENANCE CONSTRUCTION LOCATION
- *SITE 6-2* HYDROSTATIC PRESSURE TEST – HEADER INSTALLATION LOCATIONS
- *CR-1* CATHODIC PROTECTION ENHANCEMENTS
- *SURGE 4* SURGE PRESSURE PROTECTION
- TEXAS PRAIRIE DAWN–FLOWER *(Hymenoxys texana)*
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- GOLDEN–CHEEKED WARBLER *(Dendrocia chrysoparia)*
- BLACK–CAPPED VIREO *(Vireo atricapillus)*
- TOBUSCH FISHHOOK CACTUS *(Ancistrocactus tobuschii)*
- NAVASOTA LADIES–TRESSES *(Spiranthes parksii)*
- EDWARDS RECHARGE ZONE
- CONTRIBUTING ZONE

FIGURE 12

AREAS OF POTENTIAL FEDERALLY–LISTED THREATENED OR ENDANGERED SPECIES HABITAT TRAVERSED BY LONGHORN PIPELINE HOUSTON TO CRANE SEGMENT COUNTIES OF TEXAS

LONGHORN PIPELINE

In Fayette County, the species is known from one small population approximately 6 miles south of the pipeline and 2 miles north of the town of Fayette. Based on analysis of soil distribution, vegetative cover, physiographic setting, and field assessment by Horizon in November of 1999, two small areas of potential habitat for NLT are present along the pipeline corridor (Figures 4 to 12). No surveys for the species have been conducted along the pipeline. Longhorn will conduct a Fall survey (15 October to 15 November, 2000) for this species within the ROW if suitable climatic conditions occur to determine the presence or absence of this species, and if present, its distribution and abundance.

Tobusch Fishhook Cactus (*Ancistrocactus tobuschii*)

Rounded, biscuit-shaped cacti usually 2 to 3 inches tall and up to 3.5 inches in diameter. There are 3 to 5 central spines with the upper 2 to 3 erect and straight and the lower central spines hooked at the tip and spreading. Occurs on limestone gravels of stream terraces, limestone ledges, ridges, and openings on the rocky hills of live oak - juniper woodlands. The Tobusch fishhook cactus has been documented in Kimble County. An assessment of potentially suitable habitat and pedestrian survey for the cacti was conducted by Horizon in April 1999 along portions of the Longhorn pipeline ROW in Kimble County, and no specimens were observed within the ROW. However, one Tobusch fishhook cactus was observed approximately 50 feet north of the cleared ROW (Figures 4 to 12). Longhorn will conduct a blooming period survey (March to April 2000) within the ROW throughout Kimble County to determine the species' distribution and abundance.

Houston Toad (*Bufo houstonensis*)

The Houston toad is 2.0 to 3.5 inches long with general coloration varying from light brown to gray or purplish gray, sometimes with green patches. The pale ventral (underneath) surfaces often have small dark spots. The toad is a terrestrial amphibian associated with deep sandy soils within the Post Oak Savannah vegetational area of east central Texas. The vegetation type of currently known Houston toad sites can typically be described as pine or oak

woodland or savannah, with native bunchgrasses and forbs (flowering plants) present in open areas.

For breeding, including egg and tadpole development, Houston toads also require still or slow-flowing bodies of water that persist for at least 30 days. The source of ephemeral or permanent water should be located within one-half to three-quarters miles of the toad=s hibernation/foraging habitat (deep sands supporting woodland or savannah).

Critical habitat was designated for the Houston toad 31 January 1978, of which a portion of Longhorn pipeline traverses through in Bastrop County (Figures 4 to 12).

The Longhorn Pipeline ROW within the Houston toad Critical Habitat area is immediately adjacent to the Phillips EZ Pipeline ROW which Horizon studied in 1991 for endangered species. As part of Horizon's studies, a Houston toad survey was conducted along the EZ Pipeline corridor in 1991 by Dr. James R. Dixon of Texas A&M University with negative results, although minor potential habitat areas were noted (Horizon, 1991). Horizon conducted a reevaluation of suitable habitat along the Longhorn Pipeline ROW within Bastrop County. The field reconnaissance was conducted on 2 June 1999 from the Colorado River, southeast of Bastrop, to FM 2104. Within the designated Critical Habitat, portions of the area along the pipeline had been cleared and planted in improved grasses. These areas were determined to be unsuitable for Houston toad occupation.

Based on field observations, and confirmation by the Service, it was determined that two areas of potentially suitable habitat existed along and adjacent to the pipeline ROW. One area included Buescher State Park from approximately 1/2 of a mile to the east of the eastern boundary of the park westward to near Highway 71. The majority of this area contained a moderately thick understory with all drainages flowing south toward the Colorado River.

The second area began approximately 500 feet to the west of FM 2104 and extended westward approximately 3/4 of a mile. This area contained two stock tanks with the majority of the surrounding area exhibiting a moderately

thick understory and pine re-growth. The drainages in this area also flowed to the south toward the Colorado River.

One or more additional spring surveys (as acceptable to the Service) for the toad will be conducted along and downstream of the pipeline to determine the presence or absence of toads and their overall distribution and abundance.

Golden-cheeked Warbler (*Dendroica chrysoparia*)

The golden-cheeked warbler (GCW) is a small, migratory songbird, 4.5 to 5 inches long, with a wingspan of about 8 inches. The male has a black back, throat, and cap, and yellow cheeks with a black stripe through the eye. Females are similar, but less colorful. The lower breast and belly of both sexes are white with black streaks on the flanks. Typical nesting habitat is found in tall, dense, mature stands of Ashe juniper (cedar) mixed with trees such as Texas (Spanish) oak, Lacey oak, shin (scalybark) oak, live oak, post oak, Texas ash, cedar elm, hackberry, bigtooth maple, sycamore, Arizona walnut, escarpment cherry, and pecan. This type of woodland generally grows in relatively moist areas such as steep-sided canyons and slopes. A mix of juniper and deciduous trees on the slopes, along drainage bottoms, and in creeks and draws provide an ideal mix of vegetation for birds. Warblers are also occasionally found in drier, upland juniper-oak (i.e. live oak, post oak, blackjack oak) woodlands over flat topography.

An assessment of potentially suitable habitat and surveys for the GCW was conducted by Horizon in April and May 1999 along the Longhorn pipeline ROW from Austin, Texas, to the Mason/Kimble County line. Although no potentially suitable habitat areas were observed within the Longhorn ROW, several areas were located adjacent to the previously cleared permanent ROW. All areas were surveyed by Horizon a minimum of 5 times during April and May on days with favorable weather conditions for bird activity, per US Fish and Wildlife Service guidelines (FWS, 1994). Surveys were conducted on 8, 9, 12, 27, 28 April, and 3, 11, 19 May. An equivalent of 4 person-hours per 100 acres were spent at each site, based on habitat size. No GCWs were found to be utilizing any of the potentially suitable habitat areas on or immediately adjacent to the ROW. One to two additional spring breeding season surveys (as acceptable

to the Service) will be conduced for the GCW along and adjacent to the ROW within the potential habitat areas to determine habitat utilization and overall distribution and abundance.

Black-capped Vireo (*Vireo atricapillus*)

The black-capped vireo (BCV) is a 4.5 inch long, insect-eating songbird. Mature males are olive green above and white below with faint greenish-yellow flanks. The crown and upper half of the head is black with a partial white eye-ring. The iris is brownish-red and the bill black. The plumage of the female is duller than the male. Females have a dark slate gray head. In Texas, vireo habitat is found on rocky limestone soils of the Edwards Plateau, Cross Timbers and Prairies, eastern Trans-Pecos, and, to a limited extent, on igneous soils in the Chisos Mountains. BCVs require shrub vegetation reaching to ground level for nesting cover. They typically nest in shrublands.

An assessment of potentially suitable habitat and surveys for the BCV was conducted by Horizon in April and May 1999 along the Longhorn pipeline ROW from Austin, Texas to Crane County. Potentially suitable habitat areas were observed within the Longhorn ROW as well as several areas located immediately adjacent to the previously cleared permanent ROW. All areas were surveyed by Horizon a minimum of 5 times during April and May on days with favorable weather conditions for bird activity, per US Fish and Wildlife Service guidelines (FWS, 1994). Surveys were conducted on 8, 9, 12, 27, 28 April, and 3, 11, 19 May. An equivalent of 4 person-hours per 100 acres were spent at each site, based on size. No BCVs were found to be utilizing any of the potentially suitable habitat areas on or immediately adjacent to the ROW. One to two additional spring breeding season surveys (as acceptable to the Service) will be conduced for the BCV along and adjacent to the ROW within the potential habitat areas to determine habitat utilization and overall distribution and abundance.

Bald Eagle (*Haliaeetus leucocephalus*)

The bald eagle is a migrant and winter resident in Texas. The bald eagle was recently down-listed from endangered to threatened due to successful conservation efforts and is now proposed for de-listing. Migrating and wintering

bald eagles typically arrive in Texas in November and depart sometime in February. They are found primarily in association with reservoirs, rivers or other large bodies of water where they feed on fish, carrion, and waterfowl. Nesting bald eagles in Texas are found in the eastern portion of the state and along the coastal plain as far south as Calhoun and Refugio counties. No bald eagle nests have been identified near the pipeline ROW, however, bald eagles may occur along major waterways (Brazos and Colorado rivers, or major tributaries with impoundments) downstream of the pipeline corridor.

The Federal Register, Volume 64 No. 128 (Tuesday, July 6, 1999; Page 36454) puts forth a proposed rule to remove the bald eagle from the List of Threatened and Endangered Wildlife In the Lower 48 States of the United States and de-listing is expected in the near future. The action is proposed because available data indicates that the species has recovered.

Interior Least Tern (*Sterna antillarum athalassos*)

Premier nesting sites for the interior least tern are salt flats, broad sandbars, and barren shores along wide, shallow rivers. Important breeding habitat characteristics include: (1) presence of bare or nearly bare ground and alluvial islands or sandbars for nesting; (2) availability of food (primarily small fish); and (3) favorable water levels during the nesting season (so nests remain above water). They usually nest on sites devoid of vegetation, but have been found in areas with an average of 11 to 30% vegetative cover, composed of grasses, shrubs, and trees and ranging from 1 to 3 feet in height. Vegetation, if present, is usually located well away from the colony, with the exception of bugseed, eastern cottonwood, and sandbar willow. As natural nesting sites have become sparse, birds have used sand and gravel pits, ash disposal areas of power plants, reservoir shorelines, gravel levee roads, and other manmade sites. The typical nesting period for the least tern in Texas is mid-April to mid-August.

While the interior least tern has not been documented along the pipeline corridor, potential habitat for the tern is present downstream of the pipeline along several major waterways including the Brazos, Colorado, Llano, and James Rivers, and Squaw, Beaver, and Sandy Creeks. The seasonal occurrence

(spring and summer) and potential nesting of least terns is possible in these areas.

Conclusions

In conclusion, of the 29 federally listed species of potential occurrence in counties traversed by the Longhorn Pipeline between Houston and Crane, only 8 of those species are documented or estimated to occur within the area of potential effect for the pipeline safety projects due to the presence of potentially suitable habitat. None of the species have been documented to occur within the existing ROW of the pipeline, but several have been documented within proximity, either by suitable habitat, or by sightings of individuals. Additional surveys for the Texas prairie dawn-flower, Navasota ladies-tresses, Tobusch fishhook cactus, Houston toad golden-cheeked warbler, and black-capped vireo will be conducted to further document their presence or absence and population densities in the vicinity of the pipeline. These surveys must be conducted during certain narrow seasons, and therefore, can only be conducted once per year. The survey season for the prairie dawn, fishhook cactus, and Houston toad is February to April. The season for the GCW and BCV are late March to late May. The season for the ladies-tresses is October to November.

4.0 PROJECT DESCRIPTION

Longhorn will implement various pipeline safety and integrity enhancements for the pipeline that include various methods of pipeline testing, anomaly investigations, ROW maintenance, section replacements, cathodic protection enhancements, and pipeline lowerings. Table 2 contains a summary of the proposed projects relating to clearing, maintenance construction, hydrostatic testing, and other integrity-related projects that are addressed in this BA (ref. Project Documentation Appendix at Tab 2).

Following is a general description of these safety enhancement projects and the methods by which they will be implemented for the Longhorn Pipeline System. Additional detail may be found in Construction Specification CS4 contained in the accompanying Project Documentation Appendix at Tab 4.

4.1 RIGHT-OF-WAY CLEARING AND MARKING

Longhorn has committed to bring the surface of the ground within the ROW into “excellent condition” in order to facilitate surveillance prior to startup of the pipeline (ref. Project Documentation Appendix at Tab 2). Excellent condition is that condition which provides a clear line of sight for aerial and ground surveillance patrols in order to effectively monitor and inspect the ground surface along the ROW. A clean and clearly marked ROW provides a distinctive line of demarcation, indicating a change in land use, where surrounding terrain is natural or heavily developed.

ROW maintenance will include mowing, brush-hogging, back-dragging, or hand trimming of tall grass or woody re-growth, trimming of tree canopies overhanging the ROW, setting signs, marking points of intersection (horizontal bends) in the pipeline with PVC posts, and painting cross-fence posts.

ROW mowing is performed by a twin-blade mower or a brush-hog drawn by a tractor, to a height between two and four inches. Back-dragging is a method of clearing in rocky terrain; back-dragging involves pulling a dozer blade backwards across the ground surface which has the effect of bending vegetation over at the ground surface. Back-dragging typically does not result in the

uprooting of vegetation. Rather, the vegetation is bent or broken just above the ground surface. Back-dragging is used only in areas where rocks on the surface pose a risk of damage to a mower or brush-hog. Weedy vegetation around surface facilities such as valve settings is at times treated with herbicides such as Roundup and Rodeo.

Hand trimming involves line trimmers, chain saws, and similar hand-held equipment. Tree canopies are trimmed by workers, using chain saws, that are raised within reach of the canopies by a man-lift.

Steel sign posts are typically set by driving the posts directly into the ground. PVC posts are set into shallow holes dug by post-hole digger. In limited circumstances such as when vandals repeatedly remove pipeline markers, sign-posts are dug by post-hole digger to allow the posts to be set into concrete.

Clearing within areas identified as endangered species habitat will not result in any ground disturbance because only mechanical or hand cutting will be employed. The term ground disturbance is intended to mean soil disturbance that would result from grubbing brush and tree stumps; rather, they will be cut at ground level. In limited circumstances, stumps directly over the pipeline, which could have adverse effects on the pipe, will be hand-treated with minimal amounts of non-aromatic and non-persistent herbicide to retard re-growth. Herbicides will be applied in accordance with EPA-approved label directions.

These activities are routine and are conducted periodically by pipeline operators in the United States.

All areas of the ROW are subject to periodic clearing form time to time. ROW clearing occurs at intervals that depend upon the rate of vegetation growth, typically averaging once per year in arid and semi-arid territory (generally, from Austin to Crane) and typically averaging twice per year in territory with greater rainfall (generally, Houston to Austin). Further, metropolitan areas may be mowed as frequently as monthly to meet municipal ordinance requirements and in response to landowner requests. ROW clearing will be conducted on a schedule that avoids impacts to species; for example, Houston toad habitat will be avoided during the warmer seasons (February through November) when

toads are typically active and potentially upon the surface of the ROW, and plant habitat areas are avoided during the respective blooming seasons.

4.2 PIPELINE MAINTENANCE - CONSTRUCTION PLANNING

Prior to project engineering and scheduling, each site is surveyed by qualified personnel to determine whether or not the activity (a) may affect threatened or endangered species and habitat, (b) may cause disturbance of cultural resources, (c) may be subject to Clean Water Act Section 404 (U.S. Army Corps of Engineers jurisdiction over dredge and fill materials in waters of the United States), or (d) may be subject to other federal, state or local laws, regulations or ordinances. Appropriate authorizations are obtained (such as this consultation), and necessary requirements are identified and incorporated into project planning and engineering documentation.

Project engineers and technicians perform site inspections to identify site-specific conditions and features that require consideration in project planning, such as site ingress/egress routes, workspace requirements, spoil management, equipment storage, servicing and parking needs, and the like (ref. Tab 5, Environmental Protection Plan, and Tab 6, Storm Water Pollution Prevention Plan in the accompanying Project Documentation Appendix). Such considerations are incorporated into project planning and engineering activities. Unless required by the particular project or by site conditions, workspace is limited to the established ROW. Where workspace is required beyond the limits of the established ROW, those areas have been incorporated into project documentation.

TABLE 2
2000 MAINTENANCE ACTIVITIES
TESTING AND CLEARING
LONGHORN PIPELINE

Site	Begin Station	End Station	County	Species	Comments
Right-of-Way Clearing (Maintenance) -- See Comments for Avoidance Timing					
Right-of-Way (50')	2013+44	2279+20	Harris	Texas Prairie Dawn	Avoid February through April
Right-of-Way (50')	2310+88	2411+20	Harris	Texas Prairie Dawn	Avoid February through April
Right-of-Way (50')	2684+00	2831+84	Waller	Texas Prairie Dawn	Avoid February through April
Right-of-Way (50')	5095+20	5128+64	Fayette	Navasota Ladies-Tresses	Avoid October through November
Right-of-Way (50')	5936+48	5948+80	Fayette	Navasota Ladies-Tresses	Avoid October through November
Right-of-Way (50')	6600+00	6638+72	Bastrop	Houston Toad	Avoid February through October
Right-of-Way (50')	6723+20	6864+00	Bastrop	Houston Toad	Avoid February through October
Right-of-Way (50')	9152+00	9961+60	Travis/Hays	EA Contributing Zone	
Right-of-Way (50')	9657+12	9674+72	Hays	Golden-Cheeked Warbler	Avoid March through July
Right-of-Way (50')	9724+00	9762+72	Hays	Golden-Cheeked Warbler	Avoid March through July
Right-of-Way (50')	9850+72	9926+40	Hays	Golden-Cheeked Warbler	Avoid March through July
Right-of-Way (50')	9945+76	10036+40	Hays	Golden-Cheeked Warbler	Avoid March through July
Right-of-Way (50')	10164+00	10199+20	Hays/Blanco	Golden-Cheeked Warbler	Avoid March through July
Right-of-Way (50')	10266+08	10461+44	Blanco	Golden-Cheeked Warbler	Avoid March through July
Right-of-Way (50')	11008+80	11036+96	Blanco	Golden-Cheeked Warbler	Avoid March through July
Right-of-Way (50')	11080+96	11105+60	Blanco	Black-Capped Vireo	Avoid March 15 through September 1
Right-of-Way (50')	11295+68	11441+76	Blanco	Golden-Cheeked Warbler	Avoid March through July
Right-of-Way (50')	11691+68	11751+52	Gillespie	Golden-Cheeked Warbler	Avoid March through July
Right-of-Way (50')	11791+28	11821+92	Gillespie	Golden-Cheeked Warbler	Avoid March through July
Right-of-Way (50')	12114+08	12149+28	Gillespie	Golden-Cheeked Warbler	Avoid March through July
Right-of-Way (50')	12513+60	12606+88	Gillespie	Black-Capped Vireo	Avoid March 15 through September 1
Right-of-Way (50')	12596+32	12631+52	Gillespie	Golden-Cheeked Warbler	Avoid March through July
Right-of-Way (50')	12633+28	12728+32	Gillespie	Black-Capped Vireo	Avoid March 15 through September 1
Right-of-Way (50')	12921+92	12953+60	Mason	Golden-Cheeked Warbler	Avoid March through July
Right-of-Way (50')	13043+36	13110+24	Mason	Golden-Cheeked Warbler	Avoid March through July
Right-of-Way (50')	13203+52	13217+60	Mason	Golden-Cheeked Warbler	Avoid March through July
Right-of-Way (50')	13277+44	13305+60	Mason	Black-Capped Vireo	Avoid March 15 through September 1
Right-of-Way (50')	13381+28	13437+60	Mason	Black-Capped Vireo	Avoid March 15 through September 1
Right-of-Way (50')	13513+28	13578+40	Mason	Black-Capped Vireo	Avoid March 15 through September 1
Right-of-Way (50')	14476+00	16329+28	Kimble	Tobusch Fishhook Cactus	Avoid March through July

Site	Begin Station	End Station	County	Species	Comments
Right-of-Way (50')	15153+60	15234+56	Kimble	Black-Capped Vireo	Avoid March 15 through September 1
Maintenance Construction					
DT-20a (K)	2073+52	2073+52	Harris	Texas Prairie-Dawn	Investigation of possible dent; access from improved road to ROW, then 1000 feet down ROW
Crossing (K)	2737+37	2737+37	Harris	Texas Prairie-Dawn	Investigation of possible anomaly; access from improved road to ROW, then 3000 feet down ROW
2008 (K) Ph. 1	5926+74	5931+12	Fayette	Navasota Ladies-Tresses	Site entry only, via 5936+48--5948+80
LPP-2467	9195+80	9197+24	Travis	Barton Springs Salamander (EA Contributing Zone)	Lowering / Replacement; access under development
LPP-2471	9220+80	9222+24	Travis	Barton Springs Salamander (EA Contributing Zone)	Lowering / Replacement; access from improved road to ROW, then 1000 feet down ROW
LPP-2546	9483+31	9488+24	Travis	Barton Springs Salamander (EA Contributing Zone)	Lowering / Replacement; access from improved road to ROW, then 1000 feet down ROW
LPP-2627	9807+10	9807+42	Hays	Barton Springs Salamander (EA Contributing Zone)	Lowering / Replacement; access from improved road to field road, then via field road to project site
LPP-2751	10369+55	10373+24	Blanco	Golden-Cheeked Warbler	Lowering / Replacement; access from improved road to ROW, then 600 feet down ROW to project site
LPP-2753	10380+60	10381+24	Blanco	Golden-Cheeked Warbler	Lowering / Replacement; access 800 feet down ROW from Site LPP-2751
2016	11725+22	11725+71	Gillespie	Golden-Cheeked Warbler	Lowering / Replacement; access from improved road to ROW, then 2500 feet down ROW
DT-12a (K)	12659+39	12659+39	Gillespie	Black-Capped Vireo	Investigation of possible dent; access from improved road and dirt road to ROW, then 1300 feet down ROW
DT-11	12682+16	12682+16	Gillespie	Black-Capped Vireo	Investigation of possible dent; access from improved road to ROW, then 1000 feet down ROW
DT-9a (K)	14012+73	14012+73	Mason	Black-Capped Vireo	Investigation of possible dent; access from improved road, 3700 feet of unimproved road to ROW, then 7000 feet to project site
Hydrostatic Pressure Test - Header Installation Locations					
Site 5-5	9338+50		Travis	EA Contributing Zone	

Site	Begin Station	End Station	County	Species	Comments
Site 6-1	10163+00		Blanco	Near Golden-Cheeked Warbler	
Site 6-2	10280+00		Blanco	Golden-Cheeked Warbler	
Site 6-6	11385+50		Blanco	Golden-Cheeked Warbler	
Site 7-3	13435+00		Mason	Black-Capped Vireo	
Site 8-1	14606+00		Kimble	Tobusch Fishhook Cactus	
Site 8-2	15143+00		Kimble	Tobusch Fishhook Cactus	
Site 8-3	15586+00		Kimble	Tobusch Fishhook Cactus	
Site 8-4	16167+00		Kimble	Tobusch Fishhook Cactus	
Hydrostatic Pressure Test - Test Segments					
Segment 2					
>Section 1	1802+63	2415+50	Harris-Waller	Texas Prairie Dawn	
>Section 2	2415+50	3385+00	Waller	Texas Prairie Dawn	
Segment 3					
>Section 2	5039+00	5966+47	Fayette	Navasota Ladies-Tresses	
Segment 5					
>Section 6	9647+00	10163+00	Travis-Hays	Barton Springs Salamander (EA Contributing Zone) and Golden-Cheeked Warbler	
Segment 6					
>Section 1	10163+00	10265+00	Hays-Blanco	Golden-Cheeked Warbler	
>Section 2	10265+00	10504+50	Blanco	Golden-Cheeked Warbler	
>Section 4	10742+50	11188+00	Blanco	Golden-Cheeked Warbler and Black-Capped Vireo	
>Section 5	11188+00	11385+50	Blanco	Golden-Cheeked Warbler	
>Section 6	11385+50	12033+73	Blanco-Gillespie	Golden-Cheeked Warbler	
>Section 7	12033+73	12360+00	Gillespie	Golden-Cheeked Warbler	
Segment 7					
>Section 1	12360+00	13040+00	Gillespie-Mason	Golden-Cheeked Warbler and Black-Capped Vireo	
>Section 2	13040+00	13435+00	Mason	Golden-Cheeked Warbler and Black-Capped Vireo	
>Section 3	13435+00	13910+00	Mason	Black-Capped Vireo	
>Section 6	14373+00	14606+00	Kimble	Tobusch Fishhook Cactus and Black-Capped Vireo	
Segment 8 (all)	14606+00	16992+40	Kimble	Tobusch Fishhook Cactus and Black Capped Vireo	
Cathodic Protection Enhancements					
CR-1	2127+97	2128+97	Harris	Texas Prairie Dawn	Coating Reconditioning
CR-4	6609+49	6612+99	Bastrop	Houston Toad	Coating Reconditioning
CR-5	7084+74	7085+24	Bastrop	Houston Toad	Coating Reconditioning
CPGB-5	15592+90	15592+90	Kimble	Tobusch Fishhook Cactus	CP Ground Bed - Kimble County Station
Surge Pressure Protection					

Site	Begin Station	End Station	County	Species	Comments
Surge -4	14606+51	14606+51	Kimble	Tobusch Fishhook Cactus	Bypass Valve - Llano River East Bank; Same Location as Hydrostatic Test Header Location,

Workspace beyond the limits of the established ROW may be required for a number of reasons. First, avoidance of habitat or the natural terrain along one side of the ROW may necessitate expansion of workspace along the opposite side of the ROW. Second, a sloping surface gradient at a project site may require that spoil removed from the pipeline trench be stockpiled with a wider base, extending off of the ROW, than would be required at a project site with a level surface. Further, a project to lower or replace pipe at a creek crossing may require water diversion measures that necessitate a workspace wider than the established ROW. In addition, though project equipment is typically aligned along the existing pipeline ROW, project site conditions such as size, shape and/or slope may require that equipment be centralized in an equipment marshalling area (typically 25 ft. wide by 100 ft. long). for temporary storage, security and/or service.

Biological surveys encompass both areas of potential surface disturbance and areas within the zone of potential indirect construction impacts, such as noise. In addition, applicable project best management practices (BMPs) are identified at this stage of project planning and incorporated into planning documentation.

A Project Construction Plan is prepared for each individual project location to document project planning. The Project Construction Plan contains the following sections of detailed information:

a. Description of Work for the Project
b. Responsibilities and Authorities
c. Safety Requirements
d. Job Contacts and Notification Requirements Matrix
e. Pre-Job Training Requirements
a. Environmental Protection
b. Project Schedule
c. Forms / Documents Required
a. Chronological Sequence of Events
b. Appendices as follows:
    i. Appendix 1 – Location Map
    ii. Appendix 2 – Drawings, Calculations, and

iii. Specifications
iv. Appendix 3 – Environmental Protection Plan
v. Appendix 4 – Storm Water Pollution
vi. Prevention Plan
vii. Appendix 5 – Safety Procedures Document
viii. Appendix 6 – Sample Forms

An example Project Construction Plan (Site LPP-2627, pipeline lowering/replacement in Hays County, Texas) is included in the accompanying Project Documentation Appendix, at Tab 3, for reference. A Project Construction Plan relating to each project identified in Table 2 is presently under development; Longhorn will provide to the Service a copy of each Project Construction Plan as it is completed.

Project BMPs are defined as procedures and specifications by which environmental controls will be implemented and include such items as sedimentation and erosion controls, reclamation procedures, minimization and avoidance procedures, inspection and reporting procedures, spill containment and cleanup procedures, procedures for addressing unforeseen circumstances, procedures for addressing foreseen, but unpredictable circumstances, and others. Project BMPs are identified and adapted from technical guidance manuals generally accepted as providing the appropriate environmental protection measures, such as the Texas Natural Resource Conservation Commission (TNRCC) technical guidance manual, Federal Energy Regulatory Commission (FERC) Environmental Guidance Manuals, and the City of Austin Environmental Criteria Manual. BMPs are incorporated within the Longhorn Storm Water Pollution Prevention Plan (SWPPP); an example of an SWPPP is included the accompanying Project Documentation Appendix at Tab 6.

4.3 PROJECT ENVIRONMENTAL INSPECTORS

Longhorn and Williams shall employ the services of environmental inspectors (such as Horizon and 3D/International) at every project site with associated species-related constraints. These environmental inspectors are qualified under FERC guidelines. The environmental inspector will remain at each project site during the period of activity to ensure compliance with all project constraints and project BMPs. The inspector is authorized to dictate any additional project BMPs that may become necessary during the activity and to modify work activities and progress to the extent necessary to ensure compliance with project environmental constraints. However, in the event of a conflict between project constraints and sound engineering practices, the inspector shall consult with project engineers and the Service, as appropriate, to achieve project goals while minimizing any impacts to the environment. The environmental inspector retains oversight of site closure and performs, or supervises the performance of, post-activity inspections of project BMPs until site stabilization is achieved. The environmental inspector will produce appropriate documentation for each construction location to include BMP compliance logs, photographs, as-built dimensions of disturbance, and any encounters with listed species during the construction process. The reports will be provided to the Service after completion.

4.4 SITE PREPARATION

Prior to site entry, at locations where avoidance and/or minimization of species effects has been recommended, a qualified biologist will clearly identify areas for avoidance and will stake and/or flag such areas. The project environmental inspector also surveys the site to ensure that all such avoidance areas are clearly identified in accordance with conditions approved in the consultation process and confirms other site-specific areas in which disturbances may occur such as routes of ingress/egress, spoil management areas, equipment marshalling areas, workspace areas, and the like. Project BMPs are reviewed prior to site entry, and the locations of any necessary physical control measures to be employed are identified.

A survey crew will precede the project equipment and mark the project

boundaries. In addition, the pipeline centerline is marked at 100 foot to 200 foot intervals.

4.5 SITE ENTRY

Upon site entry, the necessary project equipment is transported to the site via the designated route for ingress/egress. Site access is achieved via improved roadways and the established ROW, using the shortest available route between improved roadways and the project site. Routes of ingress/egress take into account any potential for effects to threatened and endangered species and habitat that may exist along the ROW between the improved roadway and the project site, as well as accounting for other potential impacts to the environment. At times, equipment will remain on-site only during the time that it is in active use to allow it to be shared between project sites in close proximity.

Prior to any excavation, site vegetation is removed, and project BMPs are installed. Site vegetation is cleared to the extent necessary for project completion, so long as the vegetation is not located in areas identified for avoidance. Clearing is accomplished by the methods described in Section 4.1, Right-of-Way Clearing, though vegetation within the workspace may require removal. Project BMPs are installed in accordance with project planning documentation and in accordance with the site-specific SWPPP.

The following task descriptions identify process steps that occur once all authorizations are obtained and regulatory requirements are identified and incorporated into project planning and engineering documentation. Detailed procedures for each of the activities summarized below are available in Pipeline Construction Specification CS4, which is included in the accompanying Project Documentation Appendix at Tab 4. In the event of a conflict between Construction Specification CS4 and the site-specific components of the Project Construction Plan, the Project Construction Plan controls.

4.6 PIPELINE LOWERING AND/OR REPLACEMENT – OPEN TERRAIN

Once the project site has been prepared and equipment brought onto the location, the following major activities take place:

- Isolate pipeline segment to be replaced by cutting and plugging at boundaries. Williams operating personnel will establish that the line is unpressurized and properly isolated such that the contractor may cut the pipeline at the project limit boundaries. Mechanical plug devices will be utilized to prevent residual product leakage from the pipeline segments or entry of foreign materials into the pipeline. These devices shall be secured to prevent their loss or tampering.

- Remove large rocks, if any, from ROW work area to appropriate disposal/storage area. Trackhoes with buckets are used, unless larger rocks require grapple capable (clam) buckets.

- Remove and set aside topsoil spoil (double ditch practices). Double-ditching will be required in areas where native plant communities need to be re-established, or there are topsoil improvements, such as sodded lawn areas and cultivated fields. Double-ditching allows topsoil management by making two passes to remove and segregate spoil; one to remove and set aside topsoil and one to remove and set aside subsoils.

- Remove overburden and expose pipe. Utilizing track hoes, remove and set aside overburden from the pipeline and load and remove excess amounts from the work site for disposal. Unsuitable overburden (i.e., large rocks) will be disposed of in approved sites.

- Cut pipe into subsections at road and water crossings. Expose and cut the pipeline at road crossing boundaries to isolate the removal section into subsections. Utilize drain pans to recover any remaining liquids as the cut is made. Install mechanical plugs in all exposed pipe ends.

- Raise and crib pipe on side of trench. Properly manage any coating which comes loose from the pipe.

- Prepare and wrap pipe for disposal. Double wrap the pipe sections with 6-mil thickness plastic wrap, taping and sealing each wrapping separately. Ensure that the ends are sealed to prevent any release of coating.

- Remove pipe from ROW. Load and remove the wrapped pipe sections by truck. Care will be taken to preserve the plastic wrapping on the pipe. Secure the pipe to the trailer and haul to the disposal site for final disposition.

- Cleanup and grade ROW for survey and trenching operations

- Capture, contain, and remove any remaining coating materials/scraps using project-prescribed methods for asbestos containing materials. Prepare the grade on either side of the ditch to accommodate the trenching machinery, removing any large rocks. Survey crew should mark and stake the centerline offsets as required by the trenching crew.

- Deepen trench to new depth. Depending upon the length of the desired lowering and/or replacement, and depending upon whether the trench is in soil or rock, a track-hoe or wheel trencher ("rock saw") deepens the trench to the new depth. A wheel trencher is typically used for longer trenches and trenches in consolidated rock. Dust generation is monitored during trenching, and a water fog of the trenching mechanism may be employed to minimize airborne dust in non-rural areas.

- String new pipe along trench. As the ditch is prepared, the pipe may be strung along the workpad in anticipation of measuring and marking for bending, welding, and lowering operations. The survey crew will note the pipe heat and identification numbers sequence for the individual pieces as they are placed. The survey crew will survey the new ditch profile and mark the pipe for calculated field bends.

- Make field bends. The field bending crew will proceed ahead of the welding crew to make any required field bends. The contractor may also elect to set up field bending in one of the equipment marshalling areas and perform bending there rather than on the ROW.

- Weld and Radiograph new pipeline. The welding crew will proceed to weld the pipeline. Inspectors and survey will note the weld numbers and identification of the welders for this activity. The radiography crew will follow the welding crew. Inspection will be per standard specification API 1104 and include 100% radiography of all girth welds.

- Apply weld joint coating and inspect pipeline coating for “holidays”; a holiday is a point where the coating fails to electrically insulate the pipe. Weld joint coating will be applied as specified in the Project Construction Plan. This will be by field-applied FBE (fusion bond epoxy). Following weld joint coating, the entire coating system will be inspected for holidays and repaired as required.

- Pad and lower pipe. Pad the ditch and lower the pipeline as specified in Construction Specification CS4. Install ditch plugs as required to stabilize pipeline during hydrotest and backfilling. The pipeline coating will receive a final “jeeping” as the pipe is lowered to ensure its integrity. Jeeping is the process of electrically inspecting the pipeline coating to ensure that no “holidays” exist in the coating, so named due to the “jeeping” sound the inspection device emits when a holiday is identified.

- Complete as-built survey. Complete as-built survey activities, noting weld locations, pipe identification codes, and location and stationing of bends, fittings and other such features for inclusion in alignment sheet drawings.

- Backfill and compact trench. Backfill and compact the ditch according to Construction Specification CS4, maintaining sufficient

cover to allow for settling. Install ditch breakers and silt fencing as appropriate for surface erosion control until the site is stabilized.

- Perform hydrostatic pressure test on new pipeline segment. Obtain fresh water for pressure test and begin line fill behind a pig. The test pressure and test duration will be established and specified in the Project Construction Plan or in separate hydrostatic testing plans.

- Drain and dispose of hydrostatic test water. Upon completion of the hydrostatic test, the test water is either pushed with nitrogen to a subsequent test site or removed into mobile tanks for hauling to a disposal facility. Test water is controlled to ensure that it is fully contained in order to prevent discharge to the environment.

- Perform Final Tie-Ins. Remove the test headers and make the final tie-ins of the new pipe segment to the existing pipeline. The tie-in welds will be 100% radiographed to ensure their integrity. Coat the tie-in welds with an appropriate joint coating system compatible with both FBE and coal tar coatings. The coating is inspected, or "jeeped," and any holidays are repaired. The tie-in locations are backfilled and compacted.

- Clean, Grade, and Seed Right-of-Way. Following installation of erosion control measures, re-seed the right-of-way with native grass seed and/or sod as prescribed for the location. Re-install pipeline markers and any traffic control devices to limit or restrict ROW access by motor vehicles.

- Perform Site Cleanup and Restoration. Clean up equipment marshalling and material storage sites, ensure that the worksite access roads are restored to prime condition, and that any road access ways are cleaned and restored.

4.7 PIPELINE LOWERING AND/OR REPLACEMENT – CREEK CROSSING

Pipeline lowering and/or replacement at creek crossings follows generally the same sequence of activities described above for open terrain; however, the additional activities described below apply to the actual creek crossing area. In addition, creeks may be crossed by either trenching or boring. Each crossing method is summarized separately below.

4.8 TRENCHING

A trenched crossing is lowered and replaced in much the same manner as an open terrain project; however, incremental measures are employed to ensure both that erosion and sedimentation are minimized and that no potentially harmful materials are discharged to the waterway. Pipeline Construction Specification CS4 provides additional details.

- Cut Pipe at Creek Crossings. Expose and cut the pipeline at the creek crossing boundaries to isolate the removal section into subsections. Utilize drain pans to recover any remaining liquids as the cut is made. Install mechanical plugs in all exposed pipe ends.

- Implement Water Quality Protection Measures. Staging areas, spoil storage areas, and additional workspace areas are located in upland areas above the creek bed. Hazardous materials such as chemicals, fuels, lubricating oils and any other potentially harmful materials are maintained at least 100 feet from the water body. BMPs are installed to prevent sedimentation. Flumes, dams, equipment bridges and other diversion devices are installed as necessary to perform “dry ditch” excavation.

- Erosion control measures are employed after project completion to ensure that stream flows do not cause erosion of disturbed areas and subsequent sedimentation. Erosion controls protect against sedimentation and prevent stream flow from removing pipeline cover which could expose the pipe to steam bed forces. Erosion control measures are site-specific, depending upon site conditions, and include berms, dikes, water bars (perpendicular to the pipeline

alignment), silt fences, staked hay bales, seeding, mulching, hydromulching, riprap, and trench plugs.

4.9 BORING

Stream crossings may be installed by boring rather than trenching, depending upon hydrologic and engineering considerations and soil types. The existing pipeline may be abandoned in place after obtaining approvals from the landowner and, if necessary, state and federal authorities, and after (a) filling the pipe with an inert material such as grout or concrete, or (b) sealing the ends of the pipe. The pipe may not be abandoned in place if its presence could interfere with stream flows or interfere with future uses of the waterway.

Boring a stream crossing requires the use of a work space for installation of bore pits in which the boring equipment operates. The boring operations typically require a workspace approximately 100 to 250 feet wide by 150 feet long. The workspaces are located above the high water mark unless topography or other factors dictate otherwise. Typically, no instream soil disturbance occurs, and BMPs are employed to ensure that spoil storage and other project activities do not cause erosion or sedimentation.

From within the bore pits, the boring equipment creates a parabolic pathway to the pit on the other side of the stream bed. Bored material is circulated out of the bore and retained at the upland spoil storage area. The bore is sealed with grout or bentonite to fill fissures along the course and to ensure bore stability.

The new pipe is then pulled through the bore using equipment designed for that purpose. Once the pipe is welded, inspected, surveyed, coated and tested, the excavations are filled and compacted, and the site is restored. Site restoration and stabilization is achieved in the same manner as described in Section 4.6, Pipeline Lowering and/or Replacement – Open Terrain. Any necessary erosion and sedimentation controls are employed, and the site is inspected and maintained until final stabilization is reached.

4.10 HYDROSTATIC TESTING – OVERVIEW OF ACTIVITIES

A hydrostatic pressure test is scheduled to be performed to ensure the integrity of the system. This test is scheduled to commence in February 2000 and conclude in May 2000.

Hydrostatic testing will start at the Longhorn GATX pump station in Galena Park (Houston) and proceed westward to Crane Station. The test medium will be potable water from a local municipal supply source. In the event some water is lost due to pipe failure, or if water is needed to fill longer test sections, fresh make-up water will be acquired, by permit, from sources crossed by the pipeline (i.e., from rivers or streams).

The hydrostatic testing occurs in segments, which are subdivided into test sections of varying lengths. Factors that contribute to test section length include (a) target test pressures; (b) pipe size and grade; (c) the presence or absence of species and habitat; (d) the location of valves and pump stations; and (e) elevation changes along the pipeline.

Due to additional factors, two test sections will not be tested during the Houston to Crane hydrostatic testing project. Those two sections are (a) Segment 4, Section 1, which encompasses habitat for the endangered Houston toad and (b) Segment 5, Section 4, which encompasses the recharge zone of the Edwards Aquifer and part of the adjacent contributing zone, areas of potential effect to the endangered Barton Springs Salamander. Rather, those sections will be tested after Phase II consultation relating to pipeline operation, maintenance and emergency response, and after maintenance construction to replace pipeline segments in those areas is completed.

The current hydrostatic testing schedule is as follows:

TEST SEGMENT	START DATE – END DATE
Segment 1	February 11 – February 13
Segment 2	February 14 – February 20
Segment 3	February 21 – February 27

Segment 4	February 28 – March 5 (Section 1 after completion of maintenance construction (May))
Segment 5	After completion of maintenance construction (May)
Segment 6	March 6 – March 15
Segment 7	March 16 – March 26
Segment 8	March 27 – April 2
Segment 9	April 3 – April 9
Segment 10	April 10 – April 16
Segment 11	April 17 – April 23

As noted above, the test sections traversing Houston toad habitat and the Edwards Aquifer Recharge Zone will not be tested until after the completion of maintenance construction in those areas, which will not commence until after completion of Phase II of this consultation. The start date for Segment 1 identifies the date that actual testing is scheduled to begin; however, for the remaining test segments, the start date identifies the date on which test water is scheduled to be introduced into that segment from the preceding segment. In addition, any delay encountered during testing, such as to replace a failed segment of pipe, will result in equivalent delays in the remainder of the test schedule.

To facilitate hydrostatic testing of the pipeline, headers will be installed on the pipeline at intervals along its length which divide the pipeline into segments for discrete testing. There are forty (40) header sites involved in the test. A general description of the installation of the test headers follows. Additional information is provided in the accompanying Project Documentation Appendix at Tab 8, including a graphic depiction of a typical header site. Headers vary in configuration; however, all function similarly to allow the introduction of test water, the pressurization of the test segment and the displacement, after testing, of the test water to the following test section.

- Prior to any work, the sites will be subject to an environmental, endangered species, and archeological survey conducted by qualified third-party biologists and archeologists. The headers will be installed by excavating an area approximately 20 ft. wide x 80 ft. long x 4 ft. deep around and under the pipeline. The spoil will be

stored on the temporary work easement. The topsoil will be segregated from the sub-grade for restoration of the site following the hydrostatic test. Storm water management during construction and testing will be by methods prescribed in the SWPPP, an example of which is included in the Project Documentation Appendix at Tab 6.

- The exposed pipe will be cut and spread apart horizontally, and pre-fabricated headers will be welded to each section. The downstream header shall have a wire brush pig and displacement pig inserted in it before it is welded on the pipeline. A 6-inch temporary crossover pipe with valve will be installed between the upstream and downstream header. Upon completion of the test, the hydrostatic test water will be displaced into the next test segment by nitrogen. The test section will be vented to atmosphere and the temporary piping and headers will be removed. The pipeline will be tied back together with a joint of new pre-tested pipe and the joints will then be coated and wrapped to provide corrosion protection. Coating is inspected for holidays, and repairs are made if holidays are identified. The excavated area will be backfilled and compacted with the subgrade material in the spoil pile followed by the topsoil to finished grade to match the surrounding terrain. The disturbed area is seeded with native grasses or sod, and BMPs are inspected and maintained until the site is stabilized. Total surface workspace requirements for test header installations are about 100 feet wide by 150 feet long along the pipeline.

4.11 HYDROSTATIC TESTING – POTENTIAL FAILURE OF PIPE

Hydrostatic testing of the existing Longhorn Pipeline between Houston and Crane is expected to result in a number of failures. Some of those failures, and actions taken to locate failure locations, could have effects upon both species and habitat. However, the calculation of the effects of such failures is difficult to estimate since the location of any such failure cannot be predicted and since the volume of test water that may be discharged is difficult to predict.

Calculations by a pipeline integrity consulting firm estimate that approximately 18 to 20 failures will occur at the high test pressures planned. Since the most likely failure location is at pipeline flaws, the location of the expected failure cannot be predicted with any accuracy; at most, a minimal number of recently replaced sections of pipe may be eliminated from consideration. Therefore, the expected failures will approximate a random distribution over the Houston to Crane segment. A finite number of failures could be assigned to the habitat areas based upon the proportional share of pipeline mileage in habitat areas; however, that methodology would probably result in either overestimation or underestimation of the number of failures in habitat areas.

In addition, the potential volume of test water discharged in the event of failure is difficult to estimate. First, if a failure results in rapid depressurization of the test segment, the volume of test water discharged will be the sum of (a) water expelled as the pipe returns to atmospheric pressure, which depends upon test pressure and test segment length, and (b) drainage from any adjacent segments at elevations higher than the failure location. Second, if a failure results in a slow depressurization of the test segment, it may be readily identifiable and quickly contained. If a slow leak is difficult to locate, one or more investigative excavations could be required to either search for the failure or plug a portion of the segment so that lengths of pipe may be eliminated from the search. Therefore, given that failure location and size cannot be predicted, potential effects on species and/or habitat cannot be reasonably estimated in advance. Another factor that makes such estimates difficult is the existence of residual amounts of diesel fuel that remain in the pipeline from cleaning during 1998. As the hydrostatic testing proceeds from east to west, the test water may be expected to reflect relatively higher levels of hydrocarbon content; however, those concentrations cannot be predicted. Spill response equipment such as booms, sorbant pads, and other containment and cleanup equipment will be maintained in the vicinity of the test sites during the procedure.

In summary, the locations of hydrostatic test failures cannot be predicted, the volume of test water discharged may not be calculated, and the number of investigative excavations cannot be predicted.

4.12 CATHODIC PROTECTION ENHANCEMENTS

Enhancements of the pipeline cathodic protection system consist of (a) installation of anode beds and (b) re-coating of sections of existing pipe. The cathodic protection system protects the pipe from corrosion. These enhancements are identified and described in the accompanying Project Documentation Appendix at Tab 2, and the locations where activities may affect species and habitat are identified in Table 2. Project planning is performed in a manner similar to that described in Sections 4.3 through 4.5 above.

Installation of deep anode ground beds requires a series of vertical bores within which sacrificial anodes are placed; the anodes within each bore and among the series of bores are connected by subsurface wiring that is then connected to the pipeline. The bores and wiring trenches are installed within the existing ROW. During boring, a circulating pit is dug to contain cuttings removed from the bore. After project completion, the pit is filled, excess cuttings are removed for disposal, and the site is closed in the manner described in previous discussions of construction site closure.

An example project work plan and related diagrams that provide additional detail about deep ground-bed installation are included in the accompanying Project Documentation Appendix at Tab 11.

Pipeline coating reconditioning involves the same activities required for a pipeline lowering or replacement, with the exception of the process steps to remove existing pipe and install new pipe. A coating replacement site undergoes the project planning, site preparation, site entry, and site closure steps much as described above in Sections 4.2 through 4.6. Since the pipe is not cut, any residual liquids within the pipe do not present contamination potential. Asbestos containing pipe coating is managed in accordance with the provisions of the Environmental Protection Plan and the Project Construction Plan (ref. the accompanying Project Documentation Appendix at Tabs 5 and 3, respectively). All coating reconditioning is inspected, or “jeeped,” and any holidays are repaired.

4.13 SURGE PRESSURE PROTECTION

To reduce the risk of over-pressurization of the pipeline, Longhorn will implement system changes and operating practices to limit surge pressures to no more than maximum operating pressure in sensitive and hypersensitive areas identified by the Lead Agencies (ref. Project Documentation Appendix at Tab 2).

One system change involves the installation of over-pressure activated by-pass systems that will allow a pressure spike to be relieved around certain gate valves. The installation of a by-pass system involves the same process steps as the installation and removal of a hydrostatic test header; see Section 4.10. The by-pass system to be installed at the east bank of the Llano River will use the same work location as the hydrostatic test header to be installed at that valve site.

4.14 INVESTIGATIONS

Projects to investigate possible pipe dents and corrosion anomalies follow the same planning and preparation procedures for a pipeline lowering/replacement, but on a lesser scale. Table 2 identifies relevant information for, and the locations of, projects to investigate possible pipe dents and corrosion anomalies.

Typical investigation sites require a trench approximately 20 feet in length. If a dent or anomaly cannot be field repaired, a segment of pipe will be removed and replaced, with the length replaced at least twice the pipe diameter. Coating and coating inspection and repair, as well as site closure, follow the procedures described in Section 4.0.

5.0 POTENTIAL IMPACTS (TAKE) AND COMPENSATION

ATake@ of listed species is defined in the ESA and implementing regulations as the act or attempted act of pursuing, hunting, shooting, wounding, killing, trapping, capturing, collecting, harming, or harassing. Harm and harass are defined as the act of disturbing individuals or modifying habitat to the extent that wildlife are actually killed or injured by impairment of essential behavioral patterns such as breeding, feeding, or sheltering.

Potential take of certain listed species could occur from a number of actions or events associated with the implementation of the subject project activities described in Section 4.0, including maintenance construction, hydrostatic testing, ROW maintenance, and cathodic protection enhancements. No individuals of any listed species have thus far been documented within the existing pipeline ROW; however, the potential for incidental take cannot be eliminated. Surveys and detailed habitat assessments have been conducted for a number of species of concern, and additional surveys are scheduled for the near future; however, the Service has recommended in the December 15, 1999 Comment Letter that additional surveys be conducted for several years into the future to confirm the presence or absence of species within areas of potential habitat. Furthermore, the hydrostatic testing project could affect habitat areas, but no reasonable means exists to predict or to quantify the potential for take. Alternatively, take may be assumed without reference to the presence or absence of species. Assumed take will very likely result in overcompensation; that is, since surveys have not identified individuals in the pipeline ROW, assumed take will result in compensation for areas of potential habitat where species utilization has, to date, not been confirmed.

That overcompensation will provide a net benefit to the species for several reasons. First, surveys to date have not identified individuals in the area of impact for the subject maintenance construction activities; thus, compensation occurs even though there is no documented take. Second, Longhorn will implement numerous controls to ensure that the project activities are conducted first to avoid, and otherwise to minimize, potential effects to species and habitat. Examples include identifying and marking habitat areas for avoidance; planning project implementation to minimize the potential for any effects; use of FERC-

qualified inspectors with authority to alter a project in areas with species related concerns; adjusting project timing to avoid periods of activity and blooming seasons; and implementing storm water pollution control BMPs even when not required by permit. Thus, any potential adverse effects will be avoided or minimized. Third, potential habitat has been assumed over broad areas when, in fact, detailed surveys could reveal that occupied habitat is either absent or of doubtful viability to a species. The end result is that the potentially affected species benefit by conservation efforts on a scale greater than any likely incidental take.

Longhorn proposes, therefore, to assume an incidental take for the entire width of the pipeline ROW traverse of broad areas of potential habitat. This conservative assumption will result in overcompensation to the benefit of the potentially affected species and habitats. Take is calculated based on the extent of potentially suitable habitat within the established ROW (50-foot width x length) and within temporary workspaces that exceed the ROW (i.e., equipment staging areas, spoil management areas, and stream diversion areas, the size of which varies by location). On that basis, the take for each species is calculated as indicated in Table 3.

As discussed in Section 4.11, Hydrostatic Testing – Potential Failure of Pipe, the locations of potential hydrostatic test failures cannot be accurately predicted, the volume of test water discharged cannot be accurately predicted or calculated, and the number of investigative excavations cannot be predicted. The inability to accurately predict the potential impacts of hydrostatic test failures precludes any pre-activity attempt to predict and/or estimate the potential effects of test failures. Any such attempt would be likely to result in inaccurate estimates. Therefore, Longhorn proposes to provide for a contingent methodology for calculating any such effects.

Table 3:
ROW Clearing/Maintenance and Additional Construction Impacts* Within Listed Species Habitat - Longhorn Pipeline

ROW Clearing/Maintenance Area:

Texas Prairie Dawn	53,392 linear feet x 50 feet	61.3 acres
Navasota Ladies-tresses	4,576 linear feet x 50 feet	5.2 acres
Houston Toad	17,952 linear feet x 50 feet	20.6 acres
Golden-cheeked Warbler	90,096 linear feet x 50 feet	103.4 acres
Black-capped Vireo	36,256 linear feet x 50 feet	41.6 acres
Tobusch Fishhook Cactus	185,328 linear feet x 50 feet	212.7 acres

TOTAL ROW IMPACTS = 444.8 acres

Additional Maintenance Construction Area

Construction Site	Stationing	Dimensions**	Species	Impact Acres
LPP-2751	10369+55 – 10373+24	200 x 1033	GCW	4.7
LPP-2753	10380+60 – 10381+24	200 x 1000	GCW	4.6
2016		200 x 806	GCW	3.7
Hydrostatic Header And Test Sites				
Site 6-2	10280+00	50 x 100	GCW	0.1
Site 6-6	11385+50	50 x 100	GCW	0.1
Site 7-3	13435+00	50 x 100	BCV	0.1
Site 8-2	15143+00	50 x 100	TFC	0.1
Site 8-3	15586+00	50 x 100	TFC	0.1
Site 8-4	16167+00	50 x 100	TFC	0.1
Hydrostatic Transfer Sites				
Site 6-1	10163+00	50 x 150	GCW	0.2
Site 8-1 And Surge-4	14606+00	50 x 150	TFC	0.2
		TOTAL MAINTENANCE CONSTRUCTION IMPACTS		14.0
		TOTAL IMPACTS		458.8

* For construction that exceeds the 50 ft ROW.
** Dimensions include only area exceeding ROW.
HT – Houston Toad
GCW – Golden-cheeked Warbler
BCV – Black-capped Vireo
TFC – Tobusch Fishhook Cactus

Of the methodologies available for calculating the effects of activities upon

species and habitat, the most applicable is the Habitat Equivalency Analysis (HEA) methodology developed by the National Oceanic and Atmospheric Administration for Natural Resources Damages Assessments (NRDAs). The HEA methodology is briefly described by the following steps:

- The duration and extent of injury are documented and estimated from the time of injury until the resource recovers to baseline;
- The services provided by a compensatory project are documented and estimated over the full life of the project;
- The size of a compensatory project is calculated such that the total increase in services provided by the compensatory project equals the total interim loss of services due to the injury; and
- The cost of the compensatory project is calculated.

A more detailed description of the HEA methodology is provided in accompanying Project Documentation Appendix at Tab 10.

Longhorn's proposal, then, is to execute the following sequence of measures in the event a hydrostatic test discharge occurs in areas of concern for species and/or habitat:

- In the event of a test failure, immediately notify a qualified biologist, who will be maintained on standby along the test segment, and direct the biologist to the failure site;
- If a discharge occurs, the biologist will assist the identification of response actions to minimize potential impacts to the environment; and,
- The biologist will perform a field survey to document the loss of, destruction of, or injury to natural resources (a) at the location of any excavation, whether the excavation is for location of a failure or for repair of pipe; (b) within the area of impact of the test water; and (c) in any other areas affected by the response to the test failure, as at any other construction site.

The effects, if any, of the hydrostatic test failure upon species and/or habitat will then be calculated pursuant to the HEA methodology. Longhorn shall

compensate for the value of any such adverse effects by paying the monetary value of an appropriate compensation project to conservation efforts directed at the preservation and recovery of the affected species and habitat in the region where the impact occurred. For example, if a hydrostatic test resulted in a take of golden-cheeked warbler or black-capped vireo habitat, Longhorn would contribute the requisite monies to appropriate conservation entities acceptable to the Service, such as Balcones Canyonlands Conservation Plan, The Texas Nature Conservancy, or similar initiatives.

5.1 SPECIES BY SPECIES IMPACT ANALYSIS

Texas Prairie Dawn (*Hymenoxys texana*)

Potential impacts to the Texas prairie dawn may result from a number of activities. Right-of-way maintenance will occur with the periodic (typically twice per year) use of tractor drawn mowers. Tractors will be rubber-tired, but crushing of plants could occur from time to time, particularly during blooming periods. Mowing height will typically be 3 to 4 inches. Since only the blooming shoot is usually that high, impacts from mowing are deemed to be minimal, except during blooming. Impacts, while not believed to be significant, are quantified as the total ROW (50') through the entire area of identified potential habitat. As indicated in Table 3, this area constitutes approximately 61.3 acres. As an avoidance and minimization measure, mowing will be scheduled to avoid the February through April blooming season. A blooming season survey of the ROW and adjacent areas is recommended to identify any plant locations for specific avoidance, if present.

Three construction sites have been identified for completion in the near-term, two dent investigations, and one anomaly investigation (ref. to Table 2). Impact for these three construction areas will be contained within the existing 50' ROW for relatively short distances along the pipeline (see Table 3). Within these areas, excavation, temporary spoil storage, equipment movement, and grading will likely result in elimination of any prairie dawn plants that may occur within the ROW in the construction areas. The area of these impacts is already included in the total ROW impact mentioned above.

Navasota Ladies-tresses (*Spiranthes parksii*)

As in the case of the prairie dawn, periodic (twice per year) mowing with rubber-tired tractor mowers may result in sporadic crushing of plants under tractor tires or mower wheels, or cutting of bloom stalks. Impacts from periodic mowing are again not expected to be significant, but in the absence of detailed plant inventory information for the ROW, an assumed total impact for the ROW through the identified potential habitat areas constitutes 5.2 acres (Table 3). As an avoidance and minimization measure, mowing will be scheduled to avoid the October and November blooming season. A blooming season survey of the ROW and adjacent areas is recommended to identify any plant locations for specific avoidance, if present.

No areas of construction are identified in the two potential habitat areas. However, construction will occur just east of the most westerly potential habitat area. The ROW is to be used for access to the construction zone (see Table 3). It is presumed that heavy equipment movement along this portion of the ROW will result in destruction of any plants growing at that locality. Access will be kept within the existing 50' ROW; therefore, potential impacts have already been calculated in the ROW maintenance value above.

Houston Toad (*Bufo houstonensis*)

Right-of-way maintenance will again include periodic mowing with rubber-tired tractors. Mowing could generally reduce grass thickness and height, thereby improving mobility for Houston toads. However, since Houston toads are mobile, the possibility exists for run-overs by tractor tires or jumping into the mower blades by toads. Toads are predominantly active during a few months of the year; therefore, the possibilities of encounter are fairly remote. As a means of providing additional avoidance procedures, pipeline ROW maintenance will be timed to occur in the late fall through early spring (November to January) when the toads are generally inactive to limit the possibility of direct impact. In addition to these avoidance procedures and the low likelihood of encounters, Longhorn will assume that all areas of potential habitat traversed by the pipeline ROW are suitable and will commit to compensate for the entire ROW width. From Table 3, this amount is approximately 20.6 acres. Horizon has recommended a spring

breeding season survey for the toad in the vicinity of, and downstream of the pipeline to determine possible toad presence, population, and breeding areas that could be affected.

No construction impacts to Houston toads are contemplated in this consultation. Pipe replacements within the toad habitat area will be addressed in the second phase consultation.

Edwards Aquifer Contributing Zone - Barton Springs Salamander

Right-of-way maintenance and four construction locations are presently contemplated to occur within the contributing zone of the Edwards Aquifer in Travis and Hays counties. The principal concern for impacts to listed species in this area is by siltation from disturbed areas being transported by storm runoff to streams that eventually run onto the Edwards Aquifer Recharge Zone, potentially entering the aquifer, and lowering the quality of water utilized by the Barton Springs salamander. While single projects are not likely to have any demonstrable effects on the salamander, the cumulative effects of many development projects throughout the recharge zone and contributing zone may collectively cause negative impacts.

Right-of-way maintenance, consisting of mowing and trimming, is not likely to result in any level of sedimentation or impacts since the activity will not result in ground disturbance. Enhanced Best Management Practices (BMPs) will be utilized throughout construction in disturbed areas to prevent sediment loads from reaching the aquifer or significantly reduce such loads. BMPs are identified in the Project Documentation Appendix, Stormwater Pollution Prevention Plan (Tab 6). The BMPs will also include reclamation of disturbed areas immediately following construction for rapid growth and stabilization of grasses and annuals.

As a result of these enhanced BMPs, no significant impacts to the aquifer or Barton Springs salamander are contemplated.

Golden-cheeked Warbler – *(Dendroica chrysoparia)*

Golden-cheeked warbler habitat does not exist in the established ROW,

but is presently adjacent to the ROW in a number of locations from Hays County westward to Mason County. Right-of-way maintenance will not directly affect warbler habitat, except for hand pruning of canopies which overhang the ROW. Indirect effects may result from mowing noise or activity if birds are present in the vicinity during maintenance activities. As a minimization procedure, Longhorn will schedule maintenance activities to occur during the non-nesting season (September 1 to March 1) within or near warbler habitat areas to avoid indirect impacts. While no significant impacts are anticipated to occur, Longhorn will mitigate for the full ROW width (50') through potential warbler habitat areas. The area of potential effect is determined to be 103.4 acres (Table 3).

Six areas of pipeline maintenance construction or investigation are anticipated to occur along the pipeline within areas identified as potential warbler habitat (Table 2). Each of those areas are estimated to require additional construction space in excess of the existing ROW by variable widths (Table 3). The total additional impact to warbler habitat resulting from construction clearing is 13.4 acres. The additional areas of temporary work space are needed in these areas to facilitate temporary spoil storage, machinery access, pipe stacking, and miscellaneous construction related activities. As avoidance and minimization procedures, Longhorn will to the extent possible, schedule construction activities, particularly clearing, to occur during the non-nesting period (September 1 to March 1). As with the immediately impending construction schedule, clearing will commence prior to March 1st and construction activities will continue continuously until completion.

Total estimated impacts to potential warbler habitat are 116.8 acres.

Black-capped Vireo – (*Vireo atricapillus*)

Seven areas of potential black-capped vireo habitat exist along the ROW between Blanco and Kimble counties. Black-capped vireo habitat, being an early successional stage of brushy regrowth, does exist within the existing ROW in locations where previous maintenance activities have not occurred in several years. In this case, ROW maintenance will directly impact potential habitat within the existing ROW. The area of direct impact for the full 50' width of the ROW through the various habitat areas constitutes approximately 41.6 acres. Indirect

impacts from ROW maintenance are not likely since maintenance activities will be conducted during the non-nesting season (September 1 to March 15) for vireos.

Four maintenance construction locations have been proposed within the areas identified as potential vireo habitat (Table 2). Only one of those construction sites will require clearing beyond the 50' ROW width. An additional 50' of temporary work space will be needed to facilitate temporary spoils storage, equipment access, pipe layout and construction room. The additional acreage of disturbance for this construction site is 0.1 acre.

The total area of impact to potential black-capped vireo habitat is 41.7 acres.

Tobusch Fishhook Cactus – (*Ancistrocactus tobuschii*)

Potential habitat for the fishhook cactus is very generally estimated from general soils and plant distribution information to include the entire reach of the pipeline's traverse of Kimble County. Without specific survey information for the cactus, it is assumed that the entire ROW across Kimble County is potential cactus habitat. As with the Texas prairie dawn and Navasota ladies-tresses, the Tobusch fishhook cactus is low growing and not likely to be directly affected by mowing, except for possible crushing by tractor tires. However, due to the significant extent of large rocks within the ROW, mowing is not always feasible in this region. A preferred method in rocky terrain is to back drag a bulldozer blade across the ground which knocks down undesirable woody vegetation. This activity can disrupt the ground surface and possibly injure or destroy cactus plants. Therefore, direct impacts to fishhook cactus habitat may occur from time to time. The total area occupied by the ROW across Kimble County is 212.7 acres.

Four test header installation locations are planned within the potential fishhook cactus habitat. Each site will disturb an additional 50' width beyond the ROW for the construction of the headers. The additional space is required to facilitate temporary spoils storage, equipment access, pipe construction, and testing equipment. The additional area of impact per site is between 0.1 and 0.2

acre. The total additional impact to cactus habitat is 0.5 acre.

The total impact acreage for Tobusch fishhook cactus is 213.2 acres.

Other Species

Listed species that may occur away from or downstream of the pipeline corridor (ie., bald eagle, interior least tern, American alligator, Barton Springs salamander) are not likely to be adversely affected by the proposed maintenance and minor construction activities. Any discharges of hydrotest waters are not expected to contain levels of hydrocarbons or other toxic materials sufficient to result in adverse impacts.

5.2 AVOIDANCE AND MINIMIZATION

Longhorn will, to the extent reasonably possible, conduct the maintenance construction, testing, and other subject activities in a manner that avoids potential effects to species and habitat. If avoidance is reasonably and practically unachievable, Longhorn will conduct the activities in a manner that minimizes any potential effects. Controls and other measures designed to achieve that goal are described in the foregoing descriptions of the various activities. A number of those controls and measures are summarized as follows:

1. Identifying and marking habitat areas for avoidance;
2. Planning project implementation to minimize the potential for any effects;
3. Use of FERC-qualified environmental inspectors with authority to alter project implementation procedures in sensitive areas;
4. Adjusting project timing to avoid breeding populations; for example, projects in Houston toad habitat will avoid the months of February through November, and projects in GCW and BCV habitat areas will avoid March through August and April through September, respectively;
5. Implementing storm water pollution control BMPs even when not required by permit;
6. Maintaining qualified biologists in hydrostatic test project areas for

immediate response in the event of a test water release in a habitat area;

7. Avoiding, until project planning is accomplished, hydrostatic testing over the Edwards Aquifer recharge zone, portions of the contributing zone, and in Houston Toad habitat areas; and
8. Conducting additional species surveys along the pipeline ROW to determine actual presence or absence of species and populations where present.

Additionally, work in areas of noise-sensitive species (i.e., GCW, BCV) will be avoided during the breeding/nesting season. If work must occur in habitat areas during a noise-sensitive seasons, the Service will immediately be notified. Biological surveys of the habitat areas will be conducted prior to construction to determine the presence or absence of species and specific locations if present. Avoidance and minimization procedures, as appropriate to protect the species, will be implemented based on these surveys.

5.3 PROPOSED COMPENSATION FOR POTENTIAL TAKE

Longhorn proposes the following steps for calculating compensation, for funding that compensation, for implementing the process by which the compensation is valued initially and in the future, and for assuring the Service, the public and interested parties that the total compensation will be funded in full.

Longhorn has applied a formula recommended by the Service to determine appropriate compensation. The formula is: *Impact acreage x 1.2 x fair market value of land in the area.* This formula is modified for Houston toad habitat to use a 3x multiplier instead of 1.2 due to the more critically imperiled nature of the toad population in general. The Service also recommends the application of a one-time 10% inflation factor to anticipate increases in land values over time. Longhorn has calculated compensation for purposes of this BA on the basis of this formula and best estimates of land values in the area of each respective species. Longhorn proposes that actual land values be determined for purposes of calculating compensation on the basis of land appraisals according to the following process.

Within 60 days following the Biological Opinion, Longhorn will engage two licensed appraisers to determine the average value of land in the vicinity of the impact areas for each species along the pipeline. If the two appraisals differ by greater than 5%, then a third appraisal shall be engaged to reach a determination. All appraisals shall take into account land uses and conditions in such vicinity. The current calculation of compensation, set out below, will then be revised based upon the average of the two or three, as the case may be, appraisals.

Longhorn proposes a series of payments over time to fund the necessary compensation, with such payments being made in a manner which will maximize benefits to the potentially affected species. For example, maximum benefit to the species may be achieved through Service concurrence that the initial payment go toward conservation efforts directed to the Houston toad and the Tobusch fishhook cactus; since those species face a relatively greater prospect of decline than the remaining species.

Longhorn proposes to provide this compensation amount to one or more conservation funds devoted to conservation of the affected species, on an annual basis over a six year period. Future land values shall be determined on the basis of appraisals performed every second year following the initial appraisals and determined employing the same methodology as described above. The remaining compensation due from Longhorn shall then be recalculated based upon the compensation acreage remaining to be funded and the most recent land appraisals for such acreage.

Longhorn has solicited the participation of the Service in the identification of conservation funds that provide the greatest benefit to the affected species as a whole. In particular, Longhorn's intent is for the funds to support conservation efforts that employ preservation and recovery actions at least as comprehensive as the actions recommended in the Service's December 15, 1999 Comment Letter and in the relevant species recovery plans. Potential recipients may include the National Fish and Wildlife Foundation, the Texas Parks and Wildlife Department (TPWD), Texas Nature Conservancy, Texas Land Trust, Trust For Public Lands, and similar comprehensive conservation initiatives. Longhorn

prefers that the payments be directed to the National Fish and Wildlife Foundation and TPWD.

This amortized payment scale will provide a reliable funding stream for the subject species for an extended period to purchase and manage habitat areas, enhance habitats, fund artificial propagation, and conduct other recovery efforts identified by the various species' recovery plans.

The amortized payment schedule encourages an adaptive approach to managing these species by allowing the Service to redirect the funds over time to their highest and best use. As scientific research on the needs of these species continues, the Service may find that resources for the protection of the species should be redirected—perhaps to management and recovery practices of which the scientific community is not yet aware. Rather than committing all the conservation funds to one particular endeavor now, the amortized payment schedule allows the Service to apply the funds strategically over time as conservation priorities change and the understanding of the species grows.

An amortized payment schedule also allows the regulated community, such as Longhorn, to commit a greater amount of funds than might otherwise be available. A payment schedule such as this one may establish a useful precedent that will provide an incentive for other private entities, including pipelines, to enter into conservation agreements that otherwise may seem financially prohibitive. This encourages voluntary compliance which ultimately benefits the species.

The implementation of the Longhorn proposal will require that appraisals be obtained for calculation of present-day compensation. Longhorn proposes to accomplish the foregoing over the 60 day period following issuance of the Service's biological opinion.

Longhorn may at its discretion, at any point in time, (a) pay all outstanding compensation on the basis of the most recent appraised values; or (b) purchase required acreage acceptable to the Service for any given species. Exercise of the foregoing discretion shall reduce remaining obligations and security requirements.

Given the timing matters identified above, Longhorn will provide assurance to the Service that the calculated compensation (refined on the basis of actual land appraisals) will be funded on time and in full. Such assurance will take the form of security that assures the Service that the compensation will be funded. Longhorn proposes such methods as a bond, a letter of credit, an escrow, or similar such mechanism reasonably acceptable to the Service. The security will cover compensation not proposed for immediate funding and the one-time 10% escalation value applied to same. Longhorn makes this proposal conditioned upon the requirement that, as payments are made or in-kind compensation is provided, a corresponding reduction be made in the compensation acreage outstanding and thus in the amount of security required. At issuance of the Biological Opinion, Longhorn shall provide to the Service reasonable evidence that the security is in place. The proposed payments, as secured, will assure that the compensation acreage is in fact acquired to benefit the species.

Based upon the Service's recommended formula, the impacts described in Section 5.1, and best estimates of present land values, the present calculation of compensation would be as follows:

Texas Prairie Dawn

61.3 acres x 1.2 = 73.56 acres x $3,000/ac + 10% = $242,748

Navasota Ladies-Tresses

5.2 acres x 1.2 = 6.24 acres x $1,000/ac + 10% = $ 6,864

Houston Toad

20.6 acres x 3.0 = 61.80 acres x $2,000/ac = $123,600

Golden-Cheeked Warbler

116.8 acres x 1.2 = 140.16 acres x $2,000/ac + 10% = $308,352

Black-Capped Vireo

41.7 acres x 1.2 = 50.04 acres x $1,000/ac + 10% = $ 55,044

Tobusch Fishhook Cactus

213.2 acres x 1.2 = 255.84 acres x $1,000/ac = $255,840

Total Compensation $992,448

The total compensation figure stated above is to be funded according to the schedule in Table 4.

Table 4
Longhorn Pipeline
Take Compensation

Bonded Amounts

Year	HT	TFC	TPD/NLT/GCW/BCV	TOTAL♦
2000	123,600	255,840		379,440
2001			102,168	102,168
2002			102,168	102,168
2003			102,168	102,168
2004			102,168	102,168
2005			102,168	102,168
2006			102,168	102,168
TOTAL	123,600	255,840	613,008	992,448

Prepay Option

Longhorn may elect to prepay amounts earlier than scheduled with corresponding drop in security and compensation requirements.

In-Kind Option

Longhorn may purchase required acreage acceptable to the Service with corresponding drop in security and compensation requirements.

♦ Subject to adjustment based upon appraisals to be obtained by Longhorn.

Thus, the Longhorn proposal, which is tabulated in Table 4, may be summarized as follows:

1. At issuance of Biological Opinion: Provide security for total estimated compensation of $992,448;
2. During 60 days following Biological Opinion: Obtain land appraisals to determine current value of total compensation;
3. Within 30 days of Appraisals: Fund acreage attributable to Houston Toad and Tobusch fishhook cactus based upon initial appraisals;
4. Adjust security requirement to reflect appraised values and initial payment;
5. Annually following Biological Opinion:
    a. Scheduled payments are made; and
    b. A corresponding reduction is made in the compensation acreage outstanding, and the required security is reduced to an amount necessary to secure the then outstanding compensation acreage; and
6. Bi-Annually following Biological Opinion: Obtain appraisals to determine average land values, and adjust security requirement to reflect changes in land uses.

This commitment is being made without regard to whether or not the pipeline is eventually placed into service; rather, this commitment is based upon the level of take that occurs as described above.

6.0 REFERENCES

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Phase I FWS Biological Opinion

February 17, 2000

United States Department of the Interior
FISH AND WILDLIFE SERVICE
Ecological Services Field Office
10711 Burnet Road, Suite 200
Austin, Texas 78758
(512)490-0057 / 490-0974 (fax)

February 17, 2000

Consultation Number

2-15-00-F-413

Gregg Cooke
Regional Administrator, Region 6
U.S. Environmental Protection Agency
1445 Ross Avenue, Suite 1200
Dallas, Texas 75202-2733

Rodrick Seeley
Regional Director, Southwest Region
U.S. Department of Transportation, Office of Pipeline Safety
2320 LaBranch Road, Room Number 2116
Houston, Texas 77004

Dear Mr. Cooke and Mr. Seeley:

The U.S. Environmental Protection Agency, Region 6 (EPA) (February 10, 2000) and the U.S. Department of Transportation, Office of Pipeline Safety, Southwest Region (OPS) (February 17, 2000) submitted letters requesting consultation with a Biological Assessment for the proposed Longhorn Pipeline Project, Maintenance Activities and Minor Construction, Houston to Crane, Texas. This letter acknowledges the U.S. Fish and Wildlife Service's (Service) receipt of your requests for the initiation of formal consultation under the Endangered Species Act of 1973 as amended (U.S.C. 1531 et seq.) (ESA). The Longhorn Pipeline Partners L.P., is the applicant and designated "non-federal Representative" for this project, and Horizon Environmental Services, Incorporated, prepared the Biological Assessment for EPA, OPS, and Longhorn. All information required of you to initiate consultation was either included with your letters or is otherwise accessible for our consideration and reference. We have assigned this consultation the number 2-15-00-F-413 and this number should be included in all future correspondence.

This letter also transmits the Service's biological opinion on the Longhorn Pipeline Project Maintenance Activities and Minor Construction, Houston to Crane, Texas, proposed for authorization by EPA and OPS. The Service is able to complete this consultation in the short time frame because of the extensive coordination that occurred during informal consultation. This Biological Opinion is only related to the activities proposed in this Phase One of the overall consultation. The phased approach to this consultation is explained in further detail below.

BIOLOGICAL OPINION
Longhorn Pipeline - Phase One

INTRODUCTION

This document represents the Service's biological opinion on the effects of the proposed actions on the species listed in Texas. The Service has reviewed the proposed plans for the Longhorn Pipeline Project Maintenance Activities and Minor Construction from Houston to Crane, Texas, as outlined in the Biological Assessment provided by EPA and OPS. The first phase of the consultation (Phase One) relates to pipeline right-of-way (ROW) maintenance (clearing and marking), selected pipeline maintenance construction activities (pipe replacements and lowering), and pipeline testing (investigation of possible flaws and hydrostatic pressure testing). The Biological Assessment is hereby incorporated into this Biological Opinion by reference. The Service will not duplicate all maps, tables, and figures but will instead refer to the Biological Assessment. There are no species proposed for listing that would be impacted by the proposed action, therefore, no conference opinion will be issued.

The draft Environmental Assessment on Longhorn Pipeline, and the associated Biological Assessment are the product of a settlement reached in the matter of Spiller et al. v. Walker et al. pending in the United States District Court in Austin, Texas (Appendix One). As part of the Court ordered settlement, the agencies involved in the original litigation were required to conduct an Environmental Assessment, including specifically, consideration of species listed under the ESA. The Court ordered EPA and OPS, acting as Lead Agencies, to be responsible for the Environmental Assessment.

The Court order provides that issuance of any finding of no significant impact (FONSI) with regard to the proposed Longhorn Pipeline project "shall be conditioned upon implementation" of measures to protect public safety and the environment (Settlement Stipulation at 6). The order also prohibits the OPS from authorizing Longhorn to commence operations until Longhorn has implemented those mitigation measures upon which any FONSI is conditioned (Settlement Stipulation at 7). The order contemplates that Longhorn will apply for such ESA permits as may be required in connection with the implementation of any mitigation measures upon which a FONSI may be conditioned. (Settlement Stipulation at 7). The results of this consultation by the Lead Agencies with the Service are expected to be incorporated in the Record of Decision issued by the Lead Agencies. The terms and conditions, mitigatory measures and protections incorporated herein for the benefit of species are expected to be adopted and incorporated by Longhorn in its enforceable mitigation commitments or in its operating and maintenance manuals subject to inspection by, and enforceable by OPS, pursuant to the Pipeline Safety Act (49 USC 60101 et seq.).

The Court settlement specifies that Longhorn will undertake certain construction and maintenance activities prior to issuance of a final agency decision in this matter (Settlement Stipulation at 8-11). The parties to the settlement specifically agreed that any such investments by Longhorn in Kimble, Menard, Hays, Travis, Caldwell, Bastrop and any counties within the jurisdiction of the Lower Colorado River Authority after August 25, 1998 would not be considered "for the purposes of determining the reasonableness of alternatives" (Settlement Stipulation at 11).

Although the Service and the Lead Agencies are in consultation with respect to the entire proposed Longhorn project, this consultation is being approached in two distinct, yet related phases. Service regulations allow for a staged consultation (50 CFR 402.14(k)) where the Service reviews a project, and provides biological opinions on each incremental step provided that no irreversible or irretrievable commitments of resources are made. The first phase of the consultation (Phase One) relates to pipeline ROW maintenance (clearing and marking), selected pipeline maintenance construction activities (pipe replacements and lowering), and pipeline testing (investigation of possible flaws and hydrostatic pressure testing). The proposed actions for Phase One are focused on activities that Longhorn wishes to perform before the final decision on the environmental review process is made by EPA and OPS. The Service believes that, by submitting the proposed action, EPA and OPS have made a determination that these activities can proceed before the final environmental decision is made because these activities are consistent with the current operational approvals for this pipeline and the settlement agreement. The Longhorn Pipeline Partners wish to conduct these activities before a final decision is made because of the potential delay in accomplishing this work due to seasonal constraints placed on the activities by the presence of endangered or threatened species. The golden-cheeked warbler and black-capped vireo are migratory birds that would be impacted less if this work were to commence before the birds return to Central Texas from their wintering habitat in Mexico.

Because the pipeline is existing, routine maintenance is supposed to be occurring, and the construction impacts proposed are prudent for whatever liquid would flow through the pipeline, the Service believes that none of these activities constitute an irreversible or irretrievable commitment of resources, natural or monetary, which have the effect of foreclosing the formulation or implementation of any reasonable and prudent alternatives or measures. The Service believes that these investments would not constitute irretrievable commitments of resources for the purposes of Section 7(d) of the ESA. The Service has evaluated the proposed activities only with regard to the potential impacts to listed species and compliance with the ESA. This Biological Opinion does not indicate Service support for any alternatives, including routing, in the EPA and OPS environmental review process and in no way should be viewed as a factor in deciding the outcome of that process. Alternative routes may have less potential impact to listed species. In the opinion of the Service, implementing the proposed projects before completion of the environmental review process is a business decision made by the Longhorn Pipeline Partners.

The second phase of the consultation (Phase Two) will be more directly related to the actual operation of the pipeline, specifically the operation and maintenance of the pipeline system and the potential effects of a pipeline release. The two phases can be logically separated. Phase One of the Service's review will focus on those actions that are designed to make the pipeline safer. The Service can complete this stage of review without pre-judging whether or not the pipeline will be used. Phase Two of the Service's review will focus on whether and how the pipeline will be used. It is anticipated that the consultation for the Longhorn Pipeline will also include a Phase Two Biological Assessment and Biological Opinion that will address issues directly related to the actual long-term operation and maintenance of the pipeline, specifically the operation and maintenance of the pipeline system and the potential effects of emergency response activities in the event of a pipeline release. Both EPA and OPS, within the Biological

Assessment, have committed to continuing the next phase (Phase Two) of consultation.

Based on information available on the proposed project, the Service determines that there is a reasonable likelihood that the entire project is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of critical habitat. During the Phase Two consultation, the Service may change this determination, based on further review of the existing information or new information gathered during the Environmental Assessment process or the Phase Two consultation.

This biological opinion is based on: (1) the information that EPA and OPS provided with a request for formal consultation including the Biological Assessment, (2) the information previously provided as part of the informal consultation (including the draft Environmental Assessment), (3) information in our office (including information provided by the public and the plaintiffs in the lawsuit on the Longhorn Pipeline), (4) field investigations, and (5) other sources of information. In the request for formal consultation, EPA and OPS attached the Biological Assessment and copies of all consultation documents for the activities proposed to be addressed by this Biological Opinion on Phase One activities associated with the Longhorn Pipeline.

CONSULTATION HISTORY

Informal consultation between the Service, Longhorn, and the EPA has been in process since February 1999. Longhorn was formally designated as the Non-federal Representative for conducting informal consultation on behalf of the EPA and OPS on February 3, 2000. The history of consultation (both informal and formal) actions follows in Table One.

Table One. CONSULTATION HISTORY

DATE	HISTORY
10 February, 1999	Meeting Between Service and Longhorn Representatives
25 February, 1999	Meeting Between Service and Longhorn Representatives
9 March, 1999	Meeting of Service and Radian (consultants writing EA for EPA and OPS)
22 March, 1999	Meeting Between Service and Longhorn Representatives
30 April, 1999	Meeting Between Service and Longhorn Representatives
11 May, 1999	Meeting Between Service and Longhorn Representatives
12 May, 1999	Meeting with the Plaintiffs to discuss the Settlement Agreement
1 June, 1999	Meeting with Barton Springs/Edwards Aquifer Conservation District
8 June, 1999	Meeting Between Service and Longhorn Representatives
11 June, 1999	Multi-Agency Field Tour of Longhorn Pipeline in and near Austin, Texas
29 June, 1999	Meeting Between Service and Longhorn Representatives

Table One. CONSULTATION HISTORY	
30 June, 1999	Telephone Conference Between Service and Department of Justice
19 July, 1999	Meeting Between Service and Longhorn Representatives
27 August, 1999	Meeting Between Service and Longhorn Representatives
10 September, 1999	Meeting Between Service and EPA Meeting Between Service and Longhorn Representatives
13 September, 1999	Meeting Between Service, Austin and Regional Director
27 September, 1999	Meeting between Service Austin Office and Washington Office Original Draft Biological Assessment Submitted to Service
30 September, 1999	Meeting Between Service and Longhorn Representatives
4 November, 1999	Meeting Between Service and Longhorn Representatives
9 November, 1999	Meeting Between Service and Longhorn Representatives
16 November, 1999	EPA and OPS Longhorn Public Meeting, Austin
22 November, 1999	Meeting Between Service and Longhorn Representatives
7 December, 1999	Meeting Between Service and Longhorn Representatives
8 December, 1999	Meeting Between Service and EPA
15 December, 1999	Meeting Between Service and Longhorn Representatives Service Issues Comments on Original Draft Biological Assessment Service Issues Response to EPA Regarding EPA's initial Request for Concurrence on a "Not Likely to Adversely Affect" Determination.
17 December, 1999	Meeting Between Service and Longhorn Representatives
6 January, 2000	Meeting Between Service and Longhorn Representatives Longhorn Requests Concurrence from Service for "Not Likely to Adversely Affect" for Maintenance and Construction Activities in Non-habitat Areas for Listed Species.
10 January, 2000	EPA and OPS Longhorn Public Meeting, Austin
11 January, 2000	Meeting Between Service, EPA and OPS
17 January, 2000	Meeting Between Service and Longhorn Representatives
18 January, 2000	Meeting Between Service and Longhorn Representative
28 January, 2000	Draft First Phase Biological Assessment received for review
7 February, 2000	Meeting Between Service and Longhorn Representatives
1 February, 2000	Telephone Conference Between Service and Congressman Doggett's Staff
3 February, 2000	EPA and OPS designate Longhorn the "non-federal repersentative" for purposes of consultation
10 February, 2000	Received EPA Request for Formal Consultation

Table One.	CONSULTATION HISTORY
17 February, 2000	Received Revised Phase One Biological Assessment
17 February, 2000	Received OPS Request for Formal Consultation

DESCRIPTION OF THE PROPOSED ACTION

Project Overview - (Both Phase One and Phase Two)
The following is an overview of the project as proposed by Longhorn Pipeline and is provided to give an overall context of the proposed project. The specific activities proposed for this Biological Opinion are detailed in the next section.

Longhorn proposes to operate a 723-mile refined petroleum products (gasoline and jet fuel) pipeline system from the GATX Terminal in Galena Park, Texas, (near Houston, Texas) to a refined petroleum products terminal in El Paso, Texas. The pipeline also has a 28-mile intermediate connection from a station in Crane County to a planned meter station in Odessa, Texas. The pipeline consists of a combination of 20-inch and 18-inch diameter pipe from Galena Park Station to El Paso Terminal and an 8-inch diameter pipeline from a station in Crane County to a meter station in Odessa, Texas. Finally, three as yet to be built pipelines will connect the El Paso terminal to interstate common carrier pipelines west of El Paso. The pipeline's initial capacity of 72,000 barrels per day (bpd) will be supplied by a new pump station at Galena Park and five newly constructed booster pump stations at the following locations: Satsuma (Harris County), Cedar Valley (Hays County), Kimble County (Kimble County), Crane (Crane County), and El Paso (El Paso County).

Two new pipeline construction projects remain to be completed. An 8-inch diameter, 2500-foot lateral that originates at the terminus of the existing Odessa lateral will connect to a terminal facility in Odessa, Texas, owned by Equilon. Three 8.3-mile lateral pipelines, which originate at the El Paso Terminal, will connect with Kinder Morgan (formerly the Santa Fe Pacific pipeline) and Chevron pipelines in the El Paso area. The connection to Kinder Morgan will consist of one 8-inch diameter pipeline and one 12-inch diameter pipeline. The Chevron connection will consist of an 8-inch diameter pipeline. The purpose of the lateral pipelines is to connect into Kinder Morgan and Chevron pipelines to distribute product into the Phoenix, Tucson, and Albuquerque markets. Chevron operates an 8-inch pipeline that delivers product to the Albuquerque market; Kinder Morgan operates one 12-inch pipeline and one 8-inch pipeline serving the Tucson market. Other Kinder Morgan pipelines connect Tucson to the Phoenix market.

The proposed project includes both new construction and refurbishment of an existing pipeline that has been converted from its former use of transporting crude oil from West Texas to the Gulf Coast area, the majority of which has been completed. As described in this chapter, the existing pipeline has been modified to transport refined petroleum products, with flow going from east to west. Williams Pipeline Company will be the contract operator of the Longhorn

Pipeline System. Longhorn intends to transport multiple grades of gasoline and distillates, which will include special reformulated grades of gasoline needed to control air emissions in certain areas of the Southwest.

The Longhorn Pipeline System is designed for service in excess of 50 years and is made up of four main pipeline segments, several stations, and one terminal, as listed below:

1. New and refurbished 20-inch diameter pipeline from Galena Park to Satsuma;
2. Refurbished 18-inch diameter pipeline from Satsuma Station to Crane Station;
3. New 18-inch diameter pipeline from Crane Station to El Paso Terminal;
4. New lateral pipeline connections to Odessa and to other pipelines at El Paso;
5. New Pump Stations;
6. El Paso Terminal; and
7. Odessa Meter Station.

A detailed description of the Longhorn Pipeline System is included in the Biological Assessment (Project Documentation Appendix at Tab One). Future pipeline upgrades, repairs, and maintenance beyond that identified in the Biological Assessment will be addressed in Phase Two of the consultation.

Project Description (Actions addressed under this Biological Opinion)
This Biological Opinion only covers those portions of the overall project that have been specifically identified in the Phase One - Biological Assessment. Appendix Two contains a list of all of the activities covered in this Phase One consultation including ROW clearing and maintenance, pipeline maintenance and construction, pipeline testing, and other integrity-related projects.

Following is a description of each of these procedures and the methods by which they will be implemented for the Longhorn Pipeline System. Additional detail may be found in Construction Specification CS4 contained in the Biological Assessment (Project Documentation Appendix at Tab Four.

Right-of-way (ROW) Clearing, Marking, and Maintenance
The existing pipeline ROW is about 50 feet wide and 723 miles long and most of it has been routinely maintained and cleared for over 50 years. Longhorn has committed to bring the surface of the ground within the ROW into "excellent condition" in order to facilitate surveillance prior to startup of the pipeline (Biological Assessment - Project Documentation Appendix at Tab 2). Excellent condition is that condition which provides a clear line of sight for aerial and ground surveillance patrols in order to effectively monitor and inspect the ground surface along the ROW. A clean and clearly marked ROW provides a distinctive line of demarcation, indicating a change in land use, where surrounding terrain is natural or heavily developed. These activities are routine and are conducted periodically by pipeline operators in the United States.

ROW maintenance will include mowing, brush-hogging, back-dragging, and/or hand trimming of tall grass or woody re-growth, trimming of tree canopies overhanging the ROW, setting signs, marking points of intersection (horizontal bends) in the pipeline with PVC posts, and painting cross-fence posts. ROW mowing is performed by a twin-blade mower or a brush-hog drawn by a tractor, to a height between two and four inches.

Back-dragging is a method of clearing in rocky terrain; back-dragging involves pulling a dozer blade backwards across the ground surface which has the effect of bending vegetation over at the ground surface. Back-dragging typically does not result in the uprooting of vegetation. Rather, the vegetation is bent or broken just above the ground surface. Back-dragging is used only in areas where rocks on the surface pose a risk of damage to a mower or brush-hog. Vegetation around surface facilities such as valve settings is at times spot-treated, by hand application, with herbicides such as Roundup and Rodeo.

Hand trimming involves line trimmers, chain saws, and similar hand-held equipment. Tree canopies are trimmed by workers, using chain saws, that are raised within reach of the canopies by a man-lift. Steel sign posts are typically set by driving the posts directly into the ground. PVC posts are set into shallow holes dug by post-hole digger. In limited circumstances such as when vandals repeatedly remove pipeline markers, sign-posts are dug by post-hole digger to allow the posts to be set into concrete.

Clearing within areas identified as endangered species habitat will not result in any substantial ground disturbance because only mechanical or hand cutting will be employed. The term ground disturbance is intended to mean soil disturbance that would result from grubbing brush and tree stumps. Back-dragging will result in some minor disturbance of the soil surface similar to grubbing. In limited circumstances, stumps directly over the pipeline, which could have adverse effects on the pipe, will be spot-treated by hand application, with minimal amounts of non-aromatic and non-persistent herbicide to retard re-growth. Herbicides will be applied in accordance with EPA-approved label directions.

All areas of the ROW are subject to periodic clearing from time to time. ROW clearing occurs at intervals that depend upon the rate of vegetation growth, typically averaging once per year in arid and semi-arid territory (generally, from Austin to Crane) and typically averaging twice per year in territory with greater rainfall (generally, Houston to Austin). Further, metropolitan areas may be mowed as frequently as monthly to meet municipal ordinance requirements and in response to landowner requests. ROW clearing will be conducted on a schedule that avoids impacts to species.

Pipeline Maintenance - Construction Planning
Prior to project engineering and scheduling, each site is surveyed by qualified personnel to determine whether or not the activity (a) may affect threatened or endangered species and habitat, (b) may cause disturbance of cultural resources, (c) may be subject to Clean Water Act Section 404 (U.S. Army Corps of Engineers jurisdiction over dredge and fill materials in waters of the United States), or (d) may be subject to other federal, state or local laws, regulations or ordinances. Appropriate authorizations are obtained (such as this consultation), and necessary requirements are identified and incorporated into project planning and engineering documentation.

Project engineers and technicians perform site inspections to identify site-specific conditions and features that require consideration in project planning, such as site ingress/egress routes, workspace requirements, spoil management, equipment storage, servicing and parking needs, and the like (Biological Assessment - Project Documentation Appendix at Tab 5 and Tab 6). Such considerations are incorporated into project planning and engineering activities. Unless required by the particular project or by site conditions, workspace is limited to the established ROW. Where workspace is required beyond the limits of the established ROW, those areas have been incorporated into project documentation.

Workspace beyond the limits of the established ROW may be required for a number of reasons. First, avoidance of habitat or the natural terrain along one side of the ROW may necessitate expansion of workspace along the opposite side of the ROW. Second, a sloping surface gradient at a project site may require that spoil removed from the pipeline trench be stockpiled with a wider base, extending off of the ROW, than would be required at a project site with a level surface. Further, a project to lower or replace pipe at a creek crossing may require water diversion measures that necessitate a workspace wider than the established ROW. In addition, though project equipment is typically aligned along the existing pipeline ROW, project site conditions such as size, shape and/or slope may require that equipment be centralized in an equipment marshaling area (typically 25 ft. wide by 100 ft. long) for temporary storage, security and/or service.

Biological surveys encompass both areas of potential surface disturbance and areas within the zone of potential indirect construction impacts, such as noise. In addition, applicable project best management practices (BMPs) are identified at this stage of project planning and incorporated into planning documentation.

A Project Construction Plan is prepared for each individual project location to document project planning. The Project Construction Plan contains the following sections of detailed information:

Description of Work for the Project;
Responsibilities and Authorities;
Safety Requirements;
Job Contacts and Notification Requirements Matrix;
Pre-Job Training Requirements;
Environmental Protection;
Project Schedule;
Forms / Documents Required;

Chronological Sequence of Events; and
Appendices as follows:

Appendix 1 – Location Map
Appendix 2 – Drawings, Calculations, and Specifications
Appendix 3 – Environmental Protection Plan
Appendix 4 – Storm Water Pollution Prevention Plan
Appendix 5 – Safety Procedures Document
Appendix 6 – Sample Forms

Project BMPs are defined as procedures and specifications by which environmental controls will be implemented and include such items as sedimentation and erosion controls, reclamation procedures, minimization and avoidance procedures, inspection and reporting procedures, spill containment and cleanup procedures, procedures for addressing unforeseen circumstances, procedures for addressing foreseen, but unpredictable circumstances, and others. Project BMPs are identified and adapted from technical guidance manuals generally accepted as providing the appropriate environmental protection measures, such as the Texas Natural Resource Conservation Commission (TNRCC) technical guidance manual, Federal Energy Regulatory Commission (FERC) Environmental Guidance Manuals, and the City of Austin Environmental Criteria Manual. BMPs are incorporated within the Longhorn Storm Water Pollution Prevention Plan (SWPPP); an example of an SWPPP is included the Biological Assessment (Project Documentation Appendix at Tab 6).

Project Environmental Inspectors

Longhorn and Williams shall employ the services of environmental inspectors (such as Horizon Environmental Service Inc. and 3D/International) at every project site with associated species-related constraints. These environmental inspectors are qualified under FERC guidelines. The environmental inspector will remain at each project site during the period of activity to ensure compliance with all project constraints and project BMPs. The inspector is authorized to dictate any additional project BMPs that may become necessary during the activity and to modify work activities and progress to the extent necessary to ensure compliance with project environmental constraints. However, in the event of a conflict between project constraints and sound engineering practices, the inspector shall consult with project engineers and the Service, as appropriate, to achieve project goals while minimizing any impacts to listed species or the environment. The environmental inspector retains oversight of site closure and performs, or supervises the performance of, post-activity inspections of project BMPs until site stabilization is achieved. The environmental inspector will produce appropriate documentation for each construction location to include BMP compliance logs, photographs, as-built dimensions of disturbance, and any encounters with listed species during the construction process. The completion reports for projects listed in Appendix Two, will be provided to the EPA, OPS, and the Service, annually.

Site Preparation

Prior to site entry, at locations where avoidance and/or minimization of species effects has been recommended, a qualified biologist will clearly identify areas for avoidance and will stake and/or flag such areas. The project environmental inspector also surveys the site to ensure that all such avoidance areas are clearly identified in accordance with conditions approved in the consultation process and confirms other site-specific areas in which disturbances may occur such as routes of

ingress/egress, spoil management areas, equipment marshaling areas, workspace areas, and similar areas needed for construction. Project BMPs are reviewed prior to site entry, and the locations of any necessary physical control measures to be employed are identified. A survey crew will precede the project equipment and mark the project boundaries. In addition, the pipeline centerline will be marked at 100-foot to 200-foot intervals.

Site Entry
Upon site entry, the necessary project equipment is transported to the site via the designated route for ingress/egress. Site access is achieved via improved roadways and the established ROW, using the shortest available route between improved roadways and the project site. Routes of ingress/egress account for any potential for effects to threatened and endangered species and habitat that may exist along the ROW between the improved roadway and the project site, as well as accounting for other potential impacts to the environment. At times, equipment will remain on-site only during the time that it is in active use to allow it to be shared between nearby project sites. However, impacts to potential habitat for listed species from site ingress/egress will be minimized to the maximum extent practicable.

Prior to any excavation, site vegetation is removed, and project BMPs are implemented. Site vegetation is cleared to the extent necessary for project completion, so long as the vegetation is not located in areas identified for avoidance. Clearing is accomplished by the methods described in above (ROW Clearing), though vegetation within the workspace may require removal. Project BMPs are installed in accordance with project planning documentation and in accordance with the site-specific SWPPP.

Task Descriptions - (Process Once All Authorizations Are Obtained)
The following task descriptions identify process steps that occur once all authorizations are obtained and regulatory requirements are identified and incorporated into project planning and engineering documentation. Detailed procedures for each of the activities summarized below are available in Pipeline Construction Specification CS4, which is included in the Biological Assessment (Project Documentation Appendix at Tab 4). In the event of a conflict between Construction Specification CS4 and the site-specific components of the Project Construction Plan, the Project Construction Plan will be followed.

Pipeline Lowering and/or Replacement – Open Terrain
Once the project site has been prepared and equipment brought onto the location, the following major activities take place.

- The pipeline segment to be replaced is isolated by cutting and plugging at boundaries. Williams operating personnel will establish that the line is not pressurized and is properly isolated such that the contractor may cut the pipeline at the project limit boundaries. Mechanical plug devices will be utilized to prevent residual product leakage from the pipeline segments or entry of foreign materials into the pipeline. These devices shall be secured to prevent their loss or tampering.

- Remove large rocks, if any, from ROW work area to appropriate disposal/storage area. Track hoes with buckets are used, unless larger rocks require grapple capable (clam) buckets.

- Remove and set aside topsoil spoil (double ditch practices). Double-ditching will be required in areas where native plant communities need to be re-established, or there are topsoil improvements, such as sodded lawn areas and cultivated fields. Double-ditching allows topsoil management by making two passes to remove and segregate spoil; one to remove and set aside topsoil and one to remove and set aside subsoils.

- Remove overburden and expose pipe. Utilizing track hoes, remove and set aside overburden from the pipeline and load and remove excess amounts from the work site for disposal. Unsuitable overburden (i.e., large rocks) will be disposed of in approved sites.

- Cut pipe into subsections at road and water crossings. Expose and cut the pipeline at road crossing boundaries to isolate the removal section into subsections. Utilize drain pans to recover any remaining liquids as the cut is made. Install mechanical plugs in all exposed pipe ends.

- Raise and crib pipe alongside the trench. Properly manage any coating which comes loose from the pipe.

- Prepare and wrap pipe for disposal. Double wrap the pipe sections with 6-mil thickness plastic wrap, taping and sealing each wrapping separately. Ensure that the ends are sealed to prevent any release of coating.

- Remove pipe from ROW. Load and remove the wrapped pipe sections by truck. Care will be taken to preserve the plastic wrapping on the pipe. Secure the pipe to the trailer and haul to the disposal site for final disposition.

- Cleanup and grade ROW for survey and trenching operations.

- Capture, contain, and remove any remaining coating materials/scraps using project-prescribed methods for asbestos containing materials. Prepare the grade on either side of the ditch to accommodate the trenching machinery, removing any large rocks. Survey crew should mark and stake the centerline offsets as required by the trenching crew.

- Deepen trench to new depth. Depending upon the length of the desired lowering and/or replacement, and depending upon whether the trench is in soil or rock, a track-hoe or wheel trencher (“rock saw”) deepens the trench to the new depth. A wheel trencher is typically used for longer trenches and trenches in consolidated rock. Dust generation is monitored during trenching, and a water fog of the trenching mechanism may be employed to minimize airborne dust in non-rural areas.

- String new pipe along trench. As the ditch is prepared, the pipe may be strung along the workpad in anticipation of measuring and marking for bending, welding, and lowering operations. The survey crew will note the pipe heat and identification numbers sequence for the individual pieces as they are placed. The survey crew will survey the new ditch profile and mark the pipe for calculated field bends.

- Make field bends. The field bending crew will proceed ahead of the welding crew to make any required field bends. The contractor may also elect to set up field bending in one of the equipment marshaling areas and perform bending there rather than on the ROW.

- Weld and Radiograph new pipeline. The welding crew will proceed to weld the pipeline. Inspectors will survey and note the weld numbers and identification of the welders for this activity. The radiography crew will follow the welding crew. Inspection will be per standard specification API 1104 and include 100% radiography of all girth welds.

- Apply weld joint coating and inspect pipeline coating for "holidays". A holiday is a point where the coating fails to electrically insulate the pipe. Weld joint coating will be applied as specified in the Project Construction Plan. This will be by field-applied FBE (fusion bond epoxy). Following weld joint coating, the entire coating system will be inspected for holidays and repaired as required.

- Pad and lower pipe. Pad the ditch and lower the pipeline as specified in Construction Specification CS4. Install ditch plugs as required to stabilize pipeline during hydrotest and backfilling. The pipeline coating will receive a final "jeeping" as the pipe is lowered to ensure its integrity. Jeeping is the process of electrically inspecting the pipeline coating to ensure that no holidays exist in the coating, so named due to the "jeeping" sound the inspection device emits when a holiday is identified.

- Complete as-built survey. Complete as-built survey activities, noting weld locations, pipe identification codes, and location and stationing of bends, fittings and other such features for inclusion in alignment sheet drawings.

- Backfill and compact trench. Backfill and compact the ditch according to Construction Specification CS4, maintaining sufficient cover to allow for settling. Install ditch breakers and silt fencing as appropriate for surface erosion control until the site is stabilized.

- Perform hydrostatic pressure test on new pipeline segment. Obtain fresh water for pressure test and begin line fill behind a pig. The test pressure and test duration will be established and specified in the Project Construction Plan or in separate hydrostatic testing plans.

- Drain and dispose of hydrostatic test water. Upon completion of the hydrostatic test, the test water is either pushed with nitrogen to a subsequent test site or

removed into mobile tanks for hauling to a disposal facility. Test water is controlled to ensure that it is fully contained in order to prevent discharge to the environment.

- Perform final tie-ins. Remove the test headers and make the final tie-ins of the new pipe segment to the existing pipeline. The tie-in welds will be 100% radiographed to ensure their integrity. Coat the tie-in welds with an appropriate joint coating system compatible with both FBE and coal tar coatings. The coating is inspected, or jeeped, and any holidays are repaired. The tie-in locations are backfilled and compacted.

- Clean, grade, and seed ROW. Following installation of erosion control measures, re-seed the ROW with native grass seed and/or sod as prescribed for the location. Re-install pipeline markers and any traffic control devices to limit or restrict ROW access by motor vehicles.

- Perform site cleanup and restoration. Clean up equipment marshaling and material storage sites, ensure that the worksite access roads are restored to prime condition, and that any road access ways are cleaned and restored.

Pipeline Lowering and/or Replacement – Creek Crossing

Pipeline lowering and/or replacement at creek crossings follows generally the same sequence of activities described above for open terrain; however, the additional activities described below apply to the actual creek crossing area. In addition, creeks may be crossed by either trenching or boring. Each crossing method is summarized separately below.

Trenching

A trenched crossing is lowered and replaced in much the same manner as an open terrain project; however, incremental measures are employed to ensure both that erosion and sedimentation are minimized and that no potentially harmful materials are discharged to the waterway. Pipeline Construction Specification CS4 in the Biological Assessment (Project Documentation Appendix at Tab 4) provides additional details.

- Cut pipe at creek crossings. Expose and cut the pipeline at the creek crossing boundaries to isolate the removal section into subsections. Utilize drain pans to recover any remaining liquids as the cut is made. Install mechanical plugs in all exposed pipe ends.

- Implement water quality protection measures. Staging areas, spoil storage areas, and additional workspace areas are located in upland areas above the creek bed. Hazardous materials such as chemicals, fuels, lubricating oils and any other potentially harmful materials are maintained at least 100 feet from the water body. BMPs are implemented to prevent sedimentation. Flumes, dams, equipment bridges and other diversion devices are installed as necessary to perform “dry ditch” excavation.

- Erosion control measures are employed after project completion to ensure that stream flows do not cause erosion of disturbed areas and subsequent sedimentation. Erosion controls protect against sedimentation and prevent stream flow from removing pipeline cover which could expose the pipe to stream bed forces. Erosion control measures are site-specific, depending upon site conditions, and include berms, dikes, water bars (perpendicular to the pipeline alignment), silt fences, staked hay bales, seeding, mulching, hydro-mulching, rip-rap, and trench plugs.

Boring

Stream crossings may be installed by boring rather than trenching, depending upon hydrologic setting, engineering considerations, and soil types. The existing pipeline may be abandoned in place after obtaining approvals from the landowner and, if necessary, state and federal authorities, and after (a) filling the pipe with an inert material such as grout or concrete, or (b) sealing the ends of the pipe. The pipe may not be abandoned in place if its presence could interfere with stream flows or interfere with future uses of the waterway.

Boring a stream crossing requires the use of a work space for installation of bore pits in which the boring equipment operates. The boring operations typically require a workspace approximately 100 to 250 feet wide by 150 feet long. The work spaces are located above the high water mark unless topography or other factors dictate otherwise. Typically, no instream soil disturbance occurs, and BMPs are employed to ensure that spoil storage and other project activities do not cause erosion or sedimentation.

From within the bore pits, the boring equipment creates a parabolic pathway to the pit on the other side of the stream bed. Bored material is circulated out of the bore and retained at the upland spoil storage area. The bore is sealed with grout or bentonite to fill fissures along the course and to ensure bore stability.

The new pipe is then pulled through the bore using equipment designed for that purpose. Once the pipe is welded, inspected, surveyed, coated and tested, the excavations are filled and compacted, and the site is restored. Site restoration and stabilization is achieved in the same manner as described in above (Pipeline Lowering and/or Replacement – Open Terrain). Any necessary erosion and sedimentation controls are employed, and the site is inspected and maintained until final stabilization is reached.

Hydrostatic Testing – Overview of Activities

A hydrostatic pressure test is scheduled to be performed to ensure the integrity of the system. This test is scheduled to commence in February 2000 and conclude in May 2000. Hydrostatic testing will start at the Longhorn GATX pump station in Galena Park (Houston) and proceed westward to Crane Station. The test medium will be potable water from a local municipal supply source. In the event some water is lost due to pipe failure, or if water is needed to fill longer test sections, fresh make-up water will be acquired, by permit, from sources crossed by the pipeline (i.e., from rivers or streams) or other sources of fresh water.

The hydrostatic testing occurs in segments, which are subdivided into test sections of varying lengths. Factors that contribute to test section length include:

(a) target test pressures;
(b) pipe size and grade;
(c) the presence or absence of species and habitat;
(d) the location of valves and pump stations; and
(e) elevation changes along the pipeline.

Due to additional factors, two test sections will not be tested during the Houston to Crane hydrostatic testing project. Those two sections are areas that encompass habitat for the Houston toad and areas of potential effect to the Barton Springs Salamander (including the recharge zone and part of the adjacent contributing zone (on each side) of the Edwards Aquifer). Rather, those sections will be tested after Phase Two consultation relating to pipeline operation, maintenance and emergency response, and after maintenance construction to replace pipeline segments in those areas is completed.

To facilitate hydrostatic testing of the pipeline, headers will be installed on the pipeline at intervals along its length which divide the pipeline into segments for discrete testing. There are forty (40) header sites involved in the test. A general description of the installation of the test headers follows. Additional information is provided in the Biological Assessment (Project Documentation Appendix at Tab 8). Headers vary in configuration; however, all function similarly to allow the introduction of test water, the pressurization of the test segment and the displacement, after testing, of the test water to the following test section.

- Prior to any work, the sites will be subject to an environmental, endangered species, and archeological survey conducted by qualified third-party biologists and archeologists. The headers will be installed by excavating an area approximately 20 ft. wide x 80 ft. long x 4 ft. deep around and under the pipeline. The spoil will be stored on the temporary work easement. The topsoil will be segregated from the sub-grade for restoration of the site following the hydrostatic test. Storm water management during construction and testing will be by methods prescribed in the SWPPP, an example of which is included in the Biological Assessment (Project Documentation Appendix at Tab 6).

- The exposed pipe will be cut and spread apart horizontally, and pre-fabricated headers will be welded to each section. The downstream header shall have a wire brush pig and displacement pig inserted in it before it is welded on the pipeline. A 6-inch temporary crossover pipe with valve will be installed between the upstream and downstream header. Upon completion of the test, the hydrostatic test water will be displaced into the next test segment by nitrogen. The test section will be vented to atmosphere and the temporary piping and headers will be removed. The pipeline will be tied back together with a joint of new pre-tested pipe and the joints will then be coated and wrapped to provide corrosion protection. Coating is inspected for holidays, and repairs are made if holidays are identified. The excavated area will be backfilled and compacted with the sub-grade material in the spoil pile followed by the topsoil to finished grade to match the surrounding terrain. The disturbed area is seeded with native grasses or sod, and BMPs are inspected and maintained until the site is stabilized. Total surface

workspace requirements for test header installations are about 100 feet wide by 150 feet long along the pipeline.

Hydrostatic Testing – Potential Failure of Pipe

The locations of potential hydrostatic test failures cannot be accurately predicted, the volume of test water discharged cannot be accurately predicted or calculated, and the number of investigative excavations cannot be predicted. The inability to accurately predict the potential impacts of hydrostatic test failures precludes any pre-activity attempt to predict and/or estimate the potential effects of test failures. Any such attempt would be likely to result in inaccurate estimates. Therefore, Longhorn proposes to provide for a contingent methodology for calculating any such effects.

Of the methodologies available for calculating the effects of activities upon species and habitat, the most applicable is the Habitat Equivalency Analysis (HEA) methodology developed by the National Oceanic and Atmospheric Administration for Natural Resources Damages Assessments (NRDAs).

The HEA methodology is briefly described by the following steps.

- The duration and extent of injury are documented and estimated from the time of injury until the resource recovers to baseline.

- The services provided by a compensatory project are documented and estimated over the full life of the project.

- The size of a compensatory project is calculated such that the total increase in services provided by the compensatory project equals the total interim loss of services due to the injury.

- The cost of the compensatory project is calculated.

A more detailed description of the HEA methodology is provided in Biological Assessment Project Documentation Appendix at Tab 10. Longhorn's will execute the following sequence of measures in the event a hydrostatic test discharge occurs in areas of concern for species and/or habitat:

- In the event of a test failure, immediately notify a qualified biologist, who will be maintained on standby along the test segment, and direct the biologist to the failure site;

- If a discharge occurs, the biologist will assist the identification of response actions to minimize potential impacts to the environment; and,

- The biologist will perform a field survey to document the loss of, destruction of, or injury to natural resources (a) at the location of any excavation, whether the excavation is for location of a failure or for repair of pipe; (b) within the area of

impact of the test water; and (c) in any other areas affected by the response to the test failure, as at any other construction site.

The effects, if any, of the hydrostatic test failure upon species and/or habitat will then be calculated pursuant to the HEA methodology. Longhorn shall compensate for the value of any such adverse effects by paying the monetary value of an appropriate compensation project to conservation efforts directed at the preservation and recovery of the affected species and habitat in the region where the impact occurred. For example, if a hydrostatic test resulted in a take of golden-cheeked warbler or black-capped vireo habitat, Longhorn would contribute the requisite monies to appropriate conservation entities acceptable to the Service, such as Balcones Canyonlands Conservation Plan, The Texas Nature Conservancy, or similar initiatives.

Cathodic Protection Enhancements

Enhancements of the pipeline cathodic protection system consist of (a) installation of anode beds and (b) re-coating of sections of existing pipe. The cathodic protection system protects the pipe from corrosion. These enhancements are identified and described in the Biological Assessment (Project Documentation Appendix at Tab 2), and the locations where activities may affect species and habitat are identified in Appendix Two. Project planning is performed in a manner similar to that described above.

Installation of deep anode ground beds requires a series of vertical bores within which sacrificial anodes are placed; the anodes within each bore and among the series of bores are connected by subsurface wiring that is then connected to the pipeline. The bores and wiring trenches are installed within the existing ROW. During boring, a circulating pit is dug to contain cuttings removed from the bore. After project completion, the pit is filled, excess cuttings are removed for disposal, and the site is closed in the manner described in previous discussions of construction site closure. An example project work plan and related diagrams that provide additional detail about deep ground-bed installation are included in the Biological Assessment (Project Documentation Appendix at Tab 11).

Pipeline coating reconditioning involves the same activities required for a pipeline lowering or replacement, with the exception of the process steps to remove existing pipe and install new pipe. A coating replacement site undergoes the project planning, site preparation, site entry, and site closure steps much as described above. Since the pipe is not cut, any residual liquids within the pipe do not present contamination potential. Asbestos containing pipe coating is managed in accordance with the provisions of the Environmental Protection Plan and the Project Construction Plan (Biological Assessment - Project Documentation Appendix at Tabs 5 and 3, respectively). All coating reconditioning is inspected, or “jeeped,” and any holidays are repaired.

Surge Pressure Protection

To reduce the risk of over-pressurization of the pipeline, Longhorn will implement system changes and operating practices to limit surge pressures to no more than maximum operating pressure in sensitive and hypersensitive areas identified by the EPA and OPS. (Biological Assessment - Project Documentation Appendix at Tab 2). One system change involves the installation of over-pressure activated by-pass systems that will allow a pressure spike to be relieved around certain gate valves. The installation of a by-pass system involves the same

process steps as the installation and removal of a hydrostatic test header; see above (Hydrostatic Testing – Overview of Activities). The by-pass system to be installed at the east bank of the Llano River will use the same work location as the hydrostatic test header to be installed at that valve site.

Investigations

Projects to investigate possible pipe dents and corrosion anomalies follow the same planning and preparation procedures for a pipeline lowering/replacement, but on a lesser scale. Table 2 identifies relevant information for, and the locations of, projects to investigate possible pipe dents and corrosion anomalies.

Typical investigation sites require a trench approximately 20 feet in length. If a dent or anomaly cannot be field repaired, a segment of pipe will be removed and replaced, with the length replaced at least twice the pipe diameter. Coating and coating inspection and repair, as well as site closure, follow the procedures described in Section 4.0 of the Biological Assessment.

Avoidance and Minimization

Longhorn will, to the extent reasonably possible, conduct the maintenance construction, testing, and other subject activities in a manner that avoids potential effects to species and habitat. If avoidance is reasonably and practically not achievable, Longhorn will conduct the activities in a manner that minimizes any potential effects. Controls and other measures designed to achieve that goal are described in the foregoing descriptions of the various activities. A number of those controls and measures are summarized as follows:

- Identifying and marking habitat areas for avoidance;
- Planning project implementation to minimize the potential for any effects;
- Using FERC qualified environmental inspectors with authority to alter project implementation procedures in sensitive areas;
- Adjusting project timing to avoid breeding populations; for example, projects in Houston toad habitat will avoid the months of January through June and projects in golden-cheeked warbler and black-capped vireo habitat areas will be avoided March 1 through August 1 and March15 through September 1, respectively;
- Implementing storm water pollution control BMPs even when not required by permit;
- Maintaining qualified biologists in hydrostatic test project areas for immediate response in the event of a test water release in a habitat area;
- Avoiding, until project planning is accomplished, hydrostatic testing over the Edwards Aquifer recharge zone, portions of the contributing zone, and in Houston Toad habitat areas; and

- Conducting additional species surveys along the pipeline ROW to determine actual presence or absence of species and populations where present.

Additionally, work in areas of noise-sensitive species (i.e., golden-cheeked warbler and black-capped vireo) will be avoided during the breeding/nesting season. If work must occur in habitat areas during noise-sensitive seasons, the Service will immediately be notified.

Proposed Minimization to Offset Impacts to Listed Species

Land Conservation Funding

The extent of the project and timetable for implementation prevent Longhorn from completing detailed surveys for threatened and endangered species in all potential habitat where disturbance or destruction may occur, due to the variable survey times for each species and extensive amounts of habitat areas involved. Exact quantification of impacts to all listed species from scheduled activities is not possible if the project is to be completed on a timely basis. Therefore, Longhorn has requested that the Service prepare a biological opinion based on an evaluation of impacts to potential habitat, rather than impacts to individuals or identified occupied habitat. Longhorn proposes to provide benefits to the species based on potential habitat impacts as if it were occupied. This will insure that all possible impacts are considered and provide maximum species benefits. Longhorn will apply a standard formula to potential impacts to determine appropriate minimization. The formula is: impact acreage x 1.2 x fair market value of land in the area. This formula is modified for Houston toad habitat to use a 3x multiplier instead of 1.2 due to the more critically imperiled nature of the toad population in general. Longhorn will also apply a one-time 10% inflation factor to anticipate increases in land values over time.

Within 60 days following the Biological Opinion, Longhorn will engage two licensed appraisers to determine the average value of land in the vicinity of the impact areas for each species along the pipeline. If the two appraisals differ more than 5%, then a third appraisal shall be obtained to reach a determination. All appraisals shall take into account land uses and conditions in the vicinity. The current calculation of compensation, set out below, will then be revised based upon the average of the two or three appraisals.

Longhorn proposes a series of payments over time to fund the habitat acquisition, with such payments being made in a manner which will maximize benefits to the potentially affected species. The initial payment will go toward conservation efforts directed to the Houston toad and the Tobusch fishhook cactus because those species face a relatively greater prospect of decline than the remaining species.

Longhorn will provide the land conservation funding amount to one or more conservation organizations with funds devoted to conservation of the affected species. Payments will be made on an annual basis over a six-year period. Future land values shall be determined on the basis of appraisals performed every second year following the initial appraisals and determined employing the same methodology as described above. The remaining compensation due from Longhorn shall then be recalculated based upon the compensation acreage remaining to be funded and the most recent land appraisals for such acreage.

Longhorn and the Service will identify conservation organizations that provide the greatest benefit to the affected species as a whole. Potential recipients may include the National Fish and Wildlife Foundation, the Texas Parks and Wildlife Department (TPWD), Texas Nature Conservancy, Texas Land Trust, Trust For Public Lands, the Hill Country Conservancy and similar comprehensive conservation initiatives. The Service will also work with TPWD and other partners to accomplish the greatest benefit for listed species.

Longhorn may at its discretion, at any point in time, (a) pay all outstanding compensation on the basis of the most recent appraised values; or (b) purchase required acreage acceptable to the Service for any given species.

Given the timing matters identified above, Longhorn will provide assurance to the Service that the calculated compensation (refined on the basis of actual land appraisals) will be funded on time and in full. Such assurance will take the form of security that assures the Service that the compensation will be funded. Longhorn proposes such methods as a bond, a letter of credit, an escrow, or similar such mechanism reasonably acceptable to the Service. The security will cover compensation not proposed for immediate funding and the one-time 10% escalation value applied to same. Longhorn makes this proposal conditioned upon the requirement that, as payments are made or in-kind compensation is provided, a corresponding reduction be made in the compensation acreage outstanding and thus in the amount of security required. Before issuance of the Biological Opinion, Longhorn shall provide to the Service reasonable evidence that the security is in place.

Based upon the formula, and the impacts described above, and assumed land values, the present calculation of land conservation funds for minimizing adverse affects would be as follows in Table Two.

Table Two. Proposed Minimization to Offset Impacts to Listed Species

Species	Acres	Multiplier	Acres	Price per acre	Inflation factor	Total ($)
Texas prairie dawn	61.3	1.2	73.56	$ 3000	10%	242,748
Navasota ladies'-tresses	5.2	1.2	6.24	$ 1000	10%	6,864
Houston toad	20.6	3.0	61.80	$ 2000	pay now	123,600
Golden-cheeked warbler	116.8	1.2	140.16	$ 2000	10%	308,352
Black-capped vireo	41.7	1.2	50.04	$ 1000	10%	55,044
Tobusch fishhook cactus	213.2	1.2	255.84	$ 1000	pay now	255,840

Total	992,448

Longhorn's Monitoring Commitment
In addition to Longhorn's land conservation funding, they have also committed to survey the existing ROW to determine the presence/absence of listed species. The following summarizes the Longhorn Monitoring Commitment for each potentially affected species.

- Longhorn will survey for the Texas prairie dawn within the potentially suitable habitat areas to confirm its presence or absence. The survey will be conducted within the ROW in areas identified as potential habitat in March of 2000 to determine if the Texas prairie dawn is present, and if so, its distribution and abundance.

- Longhorn will conduct a Fall survey (15 October to 15 November, 2000) for the Navasota ladies'- tresses within the ROW if suitable climatic conditions occur to determine the presence or absence of this species, and if present, its distribution and abundance.

- For the Tobusch fishook cactus, Longhorn will conduct a blooming period survey (March to April 2000) within the ROW throughout Kimble County to determine the species' distribution and abundance.

- One or more additional Spring surveys (as acceptable to the Service) for the Houston toad will be conducted along and downstream of the pipeline to determine the presence or absence of toads and their overall distribution and abundance.

- One to two additional Spring breeding season surveys (as acceptable to the Service) will be conduced for the golden-cheeked warbler along and adjacent to the ROW within the potential habitat areas to determine habitat utilization and overall distribution and abundance.

- One to two additional spring breeding season surveys (as acceptable to the Service) will be conduced for the black-capped vireo along and adjacent to the ROW within the potential habitat areas to determine habitat utilization and overall distribution and abundance.

STATUS OF THE SPECIES/ENVIRONMENTAL BASELINE

Status of the Species and Distribution
The following is a review of the status of each species being considered in this biological opinion that may be adversely affected by the proposed action. The Service has reviewed the list of threatened and endangered species and identified potential impacts to the following species.

Texas prairie dawn (*Hymenoxys texana*) - The Texas prairie dawn is a small, delicate annual to 6 inches tall with single or branching stems. It has small yellow flowers blooming in late March

to early April. It occurs in sparsely vegetated areas of fine-sandy compacted soil. Specifically, the species occurs in the northern part of the Gulf Coastal Prairie in Harris and Fort Bend counties, where it is found in poorly drained depressions or saline swales around the periphery of low, natural mounds (mima mounds) in open grasslands. These mostly barren areas are sparsely vegetated, and the soil is often covered with a blue-green alga (*Nostoc* sp.). It can also occur on disturbed soils such as rice fields, vacant lots, pastures, and possibly pipeline ROW if the soil structure remains relatively intact.

There are fewer than 35 known sites recorded for the species, and several have been lost in recent years to urbanization in the Houston area. Most populations remaining are small, and are on private land. Very few sites currently have any form of protection. The primary threat to the species is habitat destruction as a result of urbanization, roadway construction, and conversion of habitat for agricultural purposes.

An assessment of potentially suitable habitat for the Texas prairie dawn was conducted by Horizon in early June 1999 along the Longhorn pipeline ROW in western Harris and eastern Waller counties from the Satsuma Station on the west edge of Houston to near Monaville in Waller County. Three areas along the ROW, one in Waller County and two in Harris County, exhibited native range conditions with suitable soils that could be considered potentially suitable habitat areas for the prairie dawn. All other areas along the pipeline within the area investigated had been converted to row crop (corn), monoculture, hay or grazing pasture, or disturbed for land development. A survey for the prairie dawn has not been conducted within the potentially suitable habitat areas to confirm its presence or absence.

Navasota ladies'-tresses (*Spiranthes parksii*) - The Navasota ladies' tresses was listed as endangered on May 6, 1982, without critical habitat. This member of the orchid family occurs primarily in moist, sandy soils in small openings in post oak savanna vegetation. The species is known to occur in Brazos, Burleson, Fayette, Freestone, Grimes, Jasper, Leon, Madison, Robertson, and Washington counties (USFWS 1984b).

Currently, approximately 149 sites have been recorded, representing perhaps 75-80 distinct population areas, predominantly concentrated around two centers of distribution, one in southern Brazos County and one in central Grimes County. Some of these recorded sites have been damaged or destroyed since they were reported. Together these population centers contain the majority of known sites and individuals (Wilson l993). However, the majority of sites contain fewer than 25 recorded plants. It is known that for this species not all individuals in a population are visible above ground in a given year, and most of these sites have been visited only once, so demographic data on populations is very limited. Nevertheless there is great concern among botanists that most of these sites may not represent viable populations.

Navasota ladies'-tresses occur in a variety of moist sandy soils near drainages, in the Post Oak Savannah vegetation associated with the Navasota, Brazos, and Trinity River watersheds. Navasota ladies'-tresses are typically found on erosional remnants between rills in slightly to moderately eroded areas along minor intermittent tributaries, from the upper drainage head, extending along the edges of temporary streams to the flood plain of permanent streams. Navasota ladies-tresses grow on sandy loam soils and are often associated with post oak, blackjack oak, yaupon, slender bigelowia (*Bigelowia nuttallii*), and *Spiranthes cernua*.. Typical

habitat consists of natural openings in upland Post Oak Savanna vegetation (Poole and Riskind 1987, USFWS 1984b, Wilson 1993). Plants are believed to be situated where subsurface flow or seepage of water occurs seasonally, a common feature in other species of the genus (Arft and Ranker 1995, Kathy Parker, pers. comm.). While Navasota ladies'-tresses is found in small naturally created openings in the post oak woodlands, it cannot be regarded as a disturbance species, as it usually occurs in well developed woodland and is not a colonizer of extensively disturbed areas. There are few records in flood plain forests, open savannahs and shrublands that have experienced little or no grazing pressure, and in hillside seepages.

Navasota ladies'-tresses is extremely slow-growing and long-lived. Rosette leaves support the formation of a storage tuber between November and March that sequesters resources in preparation for sending up a leafless bloom stalk at some future time. It is believed that often plants require more than one year of photosynthate storage to successfully send up a bloom stalk. If local conditions have not been favorable for forming sufficient below ground reserves, the plant may not bloom (Wilson 1993).

Navasota ladies'-tresses apparently does not transplant well. In a mining project in Grimes county by Texas Municipal Power Association (TMPA), plants in the impact area were removed and transplanted into an adjacent habitat area. Plant survival has been low in most sites (TMPA 1996). Similarly, in an experiment in Lick Creek Park near College Station, Dr. Hugh Wilson planted some seedlings which survived into their second season, but died prior to the third growing season (Wilson 1993).

Because of the low numbers of individuals reported from populations, the slow growing nature of the plants, its unusual habitat requirements of openings in mature vegetation, and its sensitivity to disturbance and transplanting attempts, the species is not regarded as being very resilient, and recovery following any damage to a population is expected to be slow.
The primary threat to Navasota ladies'-tresses is destruction or modification of habitat due to urbanization, clearing for agricultural production, or mining (47 FR 19539, USFWS 1995, 1984b). Destruction of understory by feral pigs is also a problem in some areas. More than 40 known sites have been lost in the last ten years to mining or urbanization. Post oak savannah in many of these counties continues to be converted to bermuda grass pasture. Subsequently, habitat loss continues, particularly in the areas of Brazos and Grimes counties where most sites are located. The City of College Station in Brazos County is growing rapidly, particularly in the southern and southeastern fringes where most known populations are located. Mining in Grimes County disturbs more than 7,000 acres every 5 years (Wilson 1993).

In Fayette County, the species is known from one small population approximately 6 miles south of the pipeline and 2 miles north of the town of Fayette. Based on analysis of soil distribution, vegetative cover, physiographic setting, and field assessment by Horizon in November of 1999, two small areas of potential habitat for Navasota ladies'-tresses are present along the pipeline corridor. No surveys for the species have been conducted along the pipeline.

Tobusch Fishhook Cactus (*Ancistrocactus tobuschii*) - Tobusch fishhook cactus is a rounded, biscuit-shaped cacti usually 2 to 3 inches tall and up to 3.5 inches in diameter. There are 3 to 5 central spines with the upper 2 to 3 erect and straight and the lower central spines hooked at the tip and spreading. The plants are very inconspicuous, and produce cream to yellow flowers from February through early April. These cacti have been demonstrated to be obligate outcrossers

pollinated by native bees with a foraging distance of about 1/4 mile, and seeds are dispersed by native ants.

The species occurs on limestone gravels of stream terraces, limestone ledges, ridges, and openings on the rocky hills of live oak - juniper woodlands in Bandera, Edwards, Kerr, Kimble, Kinney, Real, Uvalde, and Val Verde counties. A significant number of populations have been documented in Kimble County.

Currently about 50 sites are recorded for the species, following a recent range -wide representative survey. Most of the populations are extremely small (5-20 plants), with individuals widely scattered. Known sites are separated by large distances. Most existing populations are on private land, and there are very few protected sites. Demographic data collected in monitoring studies over the last five years or so show that only one of the known populations is even marginally viable. The species is extremely slow growing and does not appear to reproduce until 10-17 years of age. It takes four successful flowers/fruits to produce one seedling (Jackie Poole, Texas Parks and Wildlife, pers. comm.). It is estimated that very few viable populations (10-15) remain over the 8 county range of the species. The survival and recovery of the species will require restoration and careful management, to provide sufficient numbers of populations and individuals in effective proximity to each other for successful pollination (and gene flow) to ensure the continuity of the species.

Studies examining the probable reasons for population declines are underway. Threats to the species are believed to include inappropriate timing of range management practices (such as fire and clearing practices that disturb the soil), extensive predation by beetle grubs, loss of habitat to real estate development, and some collection by cactus enthusiasts.

An assessment of potentially suitable habitat and pedestrian survey for the cacti was conducted by Horizon in April 1999 along portions of the Longhorn pipeline ROW in Kimble County, and no specimens were observed within the ROW. However, one Tobusch fishhook cactus was observed about 50 feet north of the cleared ROW. All of the ROW within Kimble County has been identified as potentially suitable habitat.

Golden-cheeked Warbler (*Dendroica chrysoparia*) -The golden-cheeked warbler is a small, migratory songbird, 4.5 to 5 inches long, with a wingspan of about 8 inches. The male has a black back, throat, and cap, and yellow cheeks with a black stripe through the eye. Females are similar, but less colorful. The lower breast and belly of both sexes are white with black streaks on the flanks. Typical nesting habitat is found in tall, dense, mature stands of Ashe juniper (cedar) mixed with trees such as Texas (Spanish) oak, Lacey oak, shin (scalybark) oak, live oak, post oak, Texas ash, cedar elm, hackberry, bigtooth maple, sycamore, Arizona walnut, escarpment cherry, and pecan. This type of woodland generally grows in relatively moist areas such as steep-sided canyons and slopes. A mix of juniper and deciduous trees on the slopes, along drainage bottoms, and in creeks and draws provides ideal vegetation for birds. Warblers are also occasionally found in drier, upland juniper-oak (i.e., live oak, post oak, blackjack oak) woodlands over flat topography.

An assessment of potentially suitable habitat and surveys for the golden-cheeked warbler was conducted by Horizon in April and May 1999 along the Longhorn pipeline ROW from Austin, Texas, to the Mason/Kimble County line. Although no potentially suitable habitat areas were

observed within the Longhorn ROW, several areas were located adjacent to the previously cleared permanent ROW. All areas were surveyed by Horizon a minimum of 5 times during April and May on days with favorable weather conditions for bird activity, per U.S. Fish and Wildlife Service guidelines (USFWS, 1994a). Surveys were conducted on 8, 9, 12, 27, 28 April, and 3, 11, 19 May. An equivalent of 4 person-hours per 100 acres were spent at each site, based on habitat size. No golden-cheeked warblers were found to be utilizing any of the potentially suitable habitat areas on or immediately adjacent to the ROW. However, three years of survey are necessary to confirm presence/absence under Service guidelines (USFWS 1994a).

Black-capped Vireo (*Vireo atricapillus*) -The black-capped vireo is a 4.5 inch long, insect-eating songbird. Mature males are olive green above and white below with faint greenish-yellow flanks. The crown and upper half of the head is black with a partial white eye-ring. The iris is brownish-red and the bill black. The plumage of the female is duller than the male. Females have a dark slate gray head. In Texas, vireo habitat is found on rocky limestone soils of the Edwards Plateau, Cross Timbers and Prairies, eastern Trans-Pecos, and, to a limited extent, on igneous soils in the Chisos Mountains. Black-capped vireos require shrub vegetation reaching to ground level for nesting cover. They typically nest in shrublands.

An assessment of potentially suitable habitat and surveys for the black-capped vireo was conducted by Horizon in April and May 1999 along the Longhorn pipeline ROW from Austin, Texas to Crane County. Potentially suitable habitat areas were observed within the Longhorn ROW as well as several areas located immediately adjacent to the previously cleared permanent ROW. All areas were surveyed by Horizon a minimum of 5 times during April and May on days with favorable weather conditions for bird activity, per Service guidelines (USFWS, 1994a). Surveys were conducted on April 8, 9, 12, 27, 28, and May 3, 11, and 19. An equivalent of 4 person-hours per 100 acres were spent at each site, based on size. No black-capped vireos were found to be utilizing any of the potentially suitable habitat areas on or immediately adjacent to the ROW. However, three years of survey are necessary to confirm presence/absence under Service guidelines (USFWS 1994a).

Bald Eagle (*Haliaeetus leucocephalus*) -The bald eagle is a migrant and winter resident in Texas. The bald eagle was recently down-listed from endangered to threatened due to successful conservation efforts and is now proposed for de-listing. Migrating and wintering bald eagles typically arrive in Texas in November and depart around February. They are found primarily in association with reservoirs, rivers or other large bodies of water where they feed on fish, carrion, and waterfowl. Nesting bald eagles in Texas are found in the eastern portion of the state and along the coastal plain as far south as Calhoun and Refugio counties. No bald eagle nests have been identified near the pipeline ROW, however, bald eagles may occur along major waterways (Brazos and Colorado rivers, or major tributaries with impoundments) downstream of the pipeline corridor. The *Federal Register*, (Volume 64 No. 128, Tuesday, July 6, 1999; Page 36454) contains a proposed rule to remove the bald eagle from the List of Threatened and Endangered Wildlife in the Lower 48 States of the United States.

Interior Least Tern (*Sterna antillarum athalassos*) - Premier nesting sites for the interior least tern are salt flats, broad sandbars, and barren shores along wide, shallow rivers. Important breeding habitat characteristics include: (1) presence of bare or nearly bare ground and alluvial islands or sandbars for nesting; (2) availability of food (primarily small fish); and (3) favorable

water levels during the nesting season (so nests remain above water). They usually nest on sites devoid of vegetation, but have been found in areas with an average of 11 to 30% vegetative cover, composed of grasses, shrubs, and trees and ranging from 1 to 3 feet in height. Vegetation, if present, is usually located well away from the colony, with the exception of bugseed, eastern cottonwood, and sandbar willow. As natural nesting sites have become sparse, birds have used sand and gravel pits, ash disposal areas of power plants, reservoir shorelines, gravel levee roads, and other manmade sites. The typical nesting period for the least tern in Texas is mid-April to mid-August.

While the interior least tern has not been documented along the pipeline corridor, potential habitat for the tern is present downstream of the pipeline along several major waterways including the Brazos, Colorado, Llano, and James Rivers, and Squaw, Beaver, and Sandy Creeks. The seasonal occurrence (Spring and Summer) and potential nesting of least terns is possible in these areas.

Barton Springs Salamander (*Eurycea sosorum*)- The Barton Spring salamander was listed as endangered in 1997, without critical habitat. The Barton Springs salamander belongs to a group of related salamanders that are endemic to the Edwards Plateau region of central Texas. All members of this group are obligately aquatic because the adults retain the larval, gill-breathing morphology throughout their lives. The Barton Springs salamander, formally described in 1993, was first collected from Barton Springs in 1946 and has been found only at the four hydrologically connected outlets of Barton Springs in Zilker Park within the City of Austin (Brune, 1981; Chippindale et. al., 1993). This salamander is a small species, adults reaching 2.5 inches (about 68 mm) in total length with reduced eyes and elongate, spindly limbs indicative of a semi-subterranean lifestyle. Barton Springs salamanders are found in the flowing, thermally constant water issuing from the spring outlets in association with aquatic macrophytes, leaves and organic debris, and gravel and rock substrates having little silt and sediment deposition. Water from the contributing and recharge zones of the Barton Springs segment of the Edwards Aquifer influences the conditions at Barton Springs. The main threat to the species has been identified as degradation of water quality from future growth and development on the Barton Springs segment of the Edwards Aquifer (*Federal Register* 62:23385).

Houston Toad (*Bufo houstonensis*) - The Houston toad was listed as endangered in l970 (*Federal Register*, October 13, 1970) and Critical Habitat was designated in Bastrop and Burleson counties in l978 (*Federal Register*, January 31, l978). Houston toads are generally brown and speckled, although individual toad coloration can vary considerably. Some may appear light brown, others almost black and they may also have a slightly reddish, yellowish, or greyish hue. Two dark bands extend down from each eye to the mouth. Their legs are also banded with darker pigment. A variable white stripe streaks along the sides of the toad's body. Their undersides are usually pale with small, dark spots. Males have a dark throat which appears bluish when distended. Adult Houston toads are 2 to 3.5 inches long and like all toads, are covered with raised skin patches that contain chemicals that make the toad distasteful and sometimes poisonous to predators.

The toad was eliminated from three counties (Harris, Fort Bend, Liberty) prior to the 1970s due to habitat loss resulting from urban expansion. Although Houston toad populations have been found in nine other counties (Austin, Bastrop, Burleson, Colorado, Lavaca, Lee, Leon, Milam,

Robertson), the Service is concerned about the long-term viability of these populations. The small population in Lavaca County has not been seen since its discovery in 1991; the population at the critical habitat site (Woodrow Lake) in Burleson County has not been seen since 1983; and the population in Leon County lies within an expanding residential area. The largest known population of Houston toads occurs within the pine/oak woodland region of Bastrop County. This area also contains federally designated critical habitat.

All known Houston toad populations occur along bands of geologic formations that support deep sands. Six populations occur on a band running through Bastrop County northeast to Freestone County. Three other populations occur on another band through Lavaca, Austin, and Colorado counties (USFWS, l994b). Houston toad habitat consists of rolling uplands characterized by pine and/or oak woodlands (loblolly pine, post oak, blackjack or sandjack oak) underlain by pockets of deep, sandy soils. Because their skin is semi-permeable to water, Houston toads become dormant to escape harsh weather conditions, such as winter cold (hibernation) and drought (estivation). They seek protection during this time by burrowing into sand or hiding under rocks, leaf litter, logs or in abandoned animal burrows (TPWD, l993). Although Houston toads are typically associated with woodland habitat, they also breed in and migrate across sparsely wooded and cleared areas near woodlands. They may also breed in and traverse areas that do not support deep sandy soils, including clay and gravel substrates, provided these areas are near woodlands underlain by pockets of deep sandy soils.

Houston toads breed from January to June, with a peak in February and March. During the breeding season, toads appear to move randomly from one breeding site to another, achieving genetic transfer between populations that may appear isolated, thus creating a metapopulation, an aggregation of smaller populations linked genetically and demographically and functioning almost as a single population. Presently, the most reliable breeding sites are stock ponds and similar impoundments, though in wet years breeding may occur wherever sufficient standing water is present. For successful breeding, water must persist for at least 30-60 days to allow egg hatching, tadpole maturation, and emergence of toadlets. Mortality in young is high, due to predation and drying of breeding sites, with significantly less than one percent of eggs laid believed to survive to adulthood (USFWS, 1984a, 1994b, l995).

The Houston toad is vulnerable to extinction primarily due to habitat loss, degradation, and fragmentation. Over the last 50 years, the historic range of Houston toads has contracted and several populations have been lost. Threats include expanding urbanization and conversion of woodlands to agricultural production areas, such as coastal bermuda pastures, use of fertilizers and pesticides that impact the toad directly or its food supply, and loss of suitable breeding habitat because of alterations in watershed drainages and wetland alterations or destruction (such as degraded water quality, draining/filling of wetlands, stocking with predatory fish, etc.).

Since Phase One of the Longhorn Pipeline project involves the continuation of maintenance activities rather than new clearing or development, and minimization of these continuing maintenance activities will include long-term habitat protection for the Houston toad, the Service believes this phase of the project will provide a net conservation benefit for this species. According to the Houston Toad Recovery Plan (USFWS 1984a), Houston toad breeding sights have been recorded in Buescher State Park south of Longhorn Pipeline. Houston toads have also been heard chorusing on the adjacent property owned by the University of Texas to the north of Buescher State Park and Longhorn Pipeline (USFWS, unpublished data). Dr. James R. Dixon of

Texas A&M University conducted a survey along the Longhorn Pipeline ROW and adjacent Phillips EZ Pipeline ROW in 1991 with negative results, although areas of potential habitat were noted (Horizon 1991).

Horizon Environmental Services, Inc. conducted a reevaluation of suitable habitat along the Longhorn Pipeline ROW within Bastrop County. The field reconnaissance was conducted on 2 June 1999 from the Colorado River, southeast of Bastrop, to FM 2104. Portions of the area along the pipeline had recently been cleared and planted in improved grasses. Based on field observations and discussions with the Service, two areas of suitable habitat were identified along and adjacent to the pipeline ROW. One area includes Buescher State Park from approximately 0.5 mile east of the eastern boundary of the park westward to near Highway 71. The second area begins about 500 feet to the west of FM 2104 and extends westward approximately 0.75 mile. The drainages in both of these areas flow south toward the Colorado River.

EFFECTS OF THE ACTIONS

Direct and Indirect Effects

Texas Prairie Dawn - Potential impacts to the Texas prairie dawn may result from a number of activities. ROW maintenance will occur with the periodic (typically twice per year) use of tractor drawn mowers. Tractors will be rubber-tired, and crushing of plants could occur from time to time, particularly during blooming periods. Mowing height will typically be 3 to 4 inches. Since only the blooming shoot is usually that high, impacts from mowing are deemed to be minimal, except during blooming. Longhorn has chosen to quantify impacts as the total ROW (50 feet) through the entire area of identified potential habitat. This area constitutes approximately 61.3 acres. As an avoidance and minimization measure, mowing will be scheduled to avoid the February through April blooming season**.**

Three construction sites have been identified for completion in the near-term, two pipeline dent investigations, and one anomaly investigation (Appendix Two). Impact for these three construction areas will be contained within the existing 50 foot ROW for relatively short distances along the pipeline. Within these areas, excavation, temporary spoil storage, equipment movement, and grading will likely result in elimination of any prairie dawn plants that may occur within the ROW in the construction areas. The area of these impacts is already included in the total ROW impact mentioned above (61.3 acres).

Since Phase One of the Longhorn Pipeline project involves the continuation of maintenance activities rather than new clearing or development, and minimization of these continuing maintenance activities will include long-term habitat protection for the Texas prairie dawn, the Service believes this phase of the project will provide a net conservation benefit for this species.

Navasota Ladies'-tresses - As in the case of the prairie dawn, periodic (twice per year) mowing with rubber-tired tractor mowers may result in sporadic crushing of plants under tractor tires or mower wheels, or cutting of bloom stalks. Impacts from periodic mowing, in the absence of detailed plant inventory information for the ROW, are quantified as of total impact for the ROW through the identified potential habitat areas constitutes 5.2 acres. As an avoidance and minimization measure, mowing will be scheduled to avoid the October and November blooming

season. A blooming season survey of the ROW and adjacent areas will be conducted to identify any plant locations for specific avoidance, if present.

No areas of construction are identified in the two potential habitat areas. However, construction will occur just east of the most westerly potential habitat area. The ROW is to be used for access to the construction zone. It is presumed that heavy equipment movement along this portion of the ROW will result in destruction of any plants growing at that locality. Access will be kept within the existing 50 foot ROW; therefore, potential impacts have already been calculated in the ROW maintenance value above (5.2 acres).

Since Phase One of the Longhorn Pipeline project involves the continuation of maintenance activities rather than new clearing or development, and minimization of these continuing maintenance activities will include long-term habitat protection for the Navasota Ladies-tresses, the Service believes this phase of the project will provide a net conservation benefit for this species.

Tobusch Fishhook Cactus - Potential habitat for the fishhook cactus is very generally estimated from general soils and plant distribution information to include the entire reach of the pipeline's traverse of Kimble County. Without specific survey information for the cactus, it is assumed that the entire ROW across Kimble County is potential cactus habitat. As with the Texas prairie dawn and Navasota ladies'-tresses, the Tobusch fishhook cactus is low growing and not likely to be directly affected by mowing, except for possible crushing by tractor tires. However, due to the significant extent of large rocks within the ROW, mowing is not always feasible in this region. A preferred method in rocky terrain is to back drag a bulldozer blade across the ground which knocks down undesirable woody vegetation. This activity can disrupt the ground surface and possibly injure or destroy cactus plants. Therefore, direct impacts to fishhook cactus habitat may occur. The total area occupied by the ROW across Kimble County is 212.7 acres.

Four test header installation locations are planned within the potential fishhook cactus habitat. Each site will disturb an additional 50-foot width beyond the ROW for the construction of the headers. The additional space is required to facilitate temporary spoils storage, equipment access, pipe construction, and testing equipment. The additional area of impact per site is between 0.1 and 0.2 acre. The total additional impact to cactus habitat is 0.5 acre. The total impact acreage for Tobusch fishhook cactus is 213.2 acres.

Since Phase One of the Longhorn Pipeline project involves the continuation of maintenance activities rather than new clearing or development, and minimization of these continuing maintenance activities will include long-term habitat protection for the Tobusch fishhook cactus, the Service believes this phase of the project will provide a net conservation benefit for this species.

Golden-cheeked Warbler - Golden-cheeked warbler habitat does not exist in the established ROW, but is presently adjacent to the ROW in a number of locations from Hays County westward to Mason County. ROW maintenance will not directly affect warbler habitat, except for hand pruning of canopies which overhang the ROW. Indirect effects may result from mowing noise or activity if birds are present in the vicinity during maintenance activities. As a minimization procedure, Longhorn will schedule maintenance activities to occur during the non-

nesting season (September 1 to March 1) within or near warbler habitat areas to avoid indirect impacts. The area of potential effect is determined to be 103.4 acres.

Six areas of pipeline maintenance, construction, or investigation are anticipated to occur along the pipeline within potential warbler habitat (Appendix Two). Each of those areas are estimated to require additional construction space in excess of the existing ROW by variable widths. The total additional impact to warbler habitat resulting from construction clearing is 13.4 acres. The additional areas of temporary work space are needed in these areas to facilitate temporary spoil storage, machinery access, pipe stacking, and miscellaneous construction related activities. As avoidance and minimization of project impacts, Longhorn will schedule clearing, to occur during the non-nesting period (September 1 to March 1). As with the immediately impending construction schedule, clearing will commence prior to March 1st and construction activities will be continuous until completion. Total estimated impacts to potential warbler habitat are 116.8 acres.

Since Phase One of the Longhorn Pipeline project involves the continuation of maintenance activities rather than new clearing or development, and minimization of these continuing maintenance activities will include long-term habitat protection for the golden-cheeked warbler, the Service believes this phase of the project will provide a net conservation benefit for this species.

Black-capped Vireo - Seven areas of potential black-capped vireo habitat exist along the ROW between Blanco and Kimble counties. Black-capped vireo habitat, being an early successional stage of brushy regrowth, does exist within the existing ROW in places where previous maintenance activities have not occurred in several years. In this case, ROW maintenance will directly impact potential habitat within the existing ROW. The area of direct impact for the full 50 foot width of the ROW through the various habitat areas constitutes approximately 41.6 acres. Indirect impacts from ROW maintenance are not likely since maintenance activities will be conducted during the non-nesting season (September 1 to March 15) for vireos.

Four maintenance construction locations have been proposed within the areas identified as potential vireo habitat (Table 2). Only one of those construction sites will require clearing beyond the 50 foot ROW width. An additional 50 feet of temporary work space will be needed to facilitate temporary spoils storage, equipment access, pipe layout and construction room. The additional acreage of disturbance for this construction site is 0.1 acre. The total area of impact to potential black-capped vireo habitat is 41.7 acres.

Since Phase One of the Longhorn Pipeline project involves the continuation of maintenance activities rather than new clearing or development, and minimization of these continuing maintenance activities will include long-term habitat protection for the black-capped vireo , the Service believes this phase of the project will provide a net conservation benefit for this species.

Houston Toad - ROW maintenance will include periodic mowing with rubber-tired tractors. To avoid mortality of toads that may occur within the ROW during mowing, maintenance activities will be timed to occur in the late summer through fall (July through December) when the toads tend to be less active and are not breeding. In addition to these avoidance procedures and the low likelihood of encounters, Longhorn will assume that all areas of potential habitat traversed

by the pipeline ROW are suitable habitat. This area (ROW width of 50 feet times length) is about 20.6 acres. To minimize edge effects, the ROW will be maintained in native bunchgrasses to facilitate dispersal and provide cover from predators. No construction impacts to Houston toads are contemplated in this consultation. Pipe replacements within the toad habitat area will be addressed in the second phase of consultation.

Because of the toad's vulnerability to development activities, the Service believes that the combined impact of the existing and anticipated habitat fragmentation and destruction in Bastrop County could jeopardize its continued existence and adversely modify its critical habitat at some point in the future, unless immediate efforts are implemented to protect enough remaining habitat to support viable, self-sustaining populations. Several large, high quality, interconnected habitat blocks are needed to promote population viability (USFWS 1994b, Houston Toad Recovery Team 1999). The Houston Toad Recovery Team believes that 20,000-30,000 acres of suitable (undeveloped) habitat in blocks of 5,000 acres or greater are needed to support a viable, self-sustaining population of toads with low risk of extinction, with an absolute minimum of 15,000 acres provided this 15,000 acres is in large, interconnected blocks of the best habitat remaining.

The Service intends to ensure the toad's long-term survival and recovery by ensuring that any activities authorized under the Endangered Species Act provide long-term protection for the Houston toad. Thus, any actions authorized by the Service must permit the persistence of at least 20,000-30,000 acres in large, unfragmented habitat blocks in Bastrop County. Toads must be able to disperse between the habitat blocks through direct connections and/or through migration corridors that allow dispersal to occur (i.e., multiple smaller upland habitat patches and riparian corridors).

Currently, the habitat blocks north of Highway 21 and in and around Bastrop State Park are most likely to continue to support toad populations, provided no additional habitat destruction occurs that significantly disrupts normal feeding, breeding, and sheltering behavior. Since much of the area south of Highway 71 has already been extensively fragmented by development, the Service believes that this area is less likely to continue to support toads over the long-term. The area in and around the University of Texas Science Park and Buescher State Park has potential to support a population, provided enough habitat remains contiguous and undisturbed. Until sufficient high quality habitat has been secured and managed to provide population viability in perpetuity, the Service believes that any further development that would impact the integrity of the remaining habitat blocks or their connections would jeopardize the toad and adversely modify its critical habitat.

Without permanent habitat protection to ensure the persistence of the largest known population of toads in Bastrop County, the Houston toad faces an imminent risk of extinction. Thus, it is imperative that the impacts from any activity authorized by the Service provide habitat protection and maintain migration corridors. By ensuring that all clearing and development activities implement sufficient measures to minimize impacts, the Service believes many projects in toad habitat can move forward without reducing the likelihood of survival and recovery of the species. The Service will continue to assess the impacts of existing and proposed projects and evaluate whether or not this goal is being achieved.

Since Phase One of the Longhorn Pipeline project involves the continuation of maintenance activities rather than new clearing or development, and minimization of these continuing maintenance activities will include long-term habitat protection for the Houston toad, the Service believes this phase of the project will provide a net conservation benefit for this species.

Other Species - Listed species that may occur away from or downstream of the pipeline corridor (bald eagle, interior least tern, Barton Springs salamander) are not likely to be adversely affected by the proposed maintenance and minor construction activities. Any discharges of hydrotest waters are not expected to contain levels of hydrocarbons or other toxic materials sufficient to result in adverse impacts.

Effects of Hydrostatic Testing – Potential Failure of Pipe

Hydrostatic testing of the existing Longhorn Pipeline between Houston and Crane is expected to result in a number of failures. Some of those failures, and actions taken to locate failure locations, could have effects upon both species and habitat. However, the calculation of the effects of such failures is difficult to estimate since the location of any such failure cannot be predicted and since the volume of test water that may be discharged is difficult to predict.

Calculations by a pipeline integrity consulting firm estimate that approximately 18 to 20 failures will occur at the high test pressures planned. Since the most likely failure location is at pipeline flaws, the location of the expected failure cannot be predicted with any accuracy; at most, a minimal number of recently replaced sections of pipe may be eliminated from consideration. Therefore, the expected failures will approximate a random distribution over the Houston to Crane segment. A finite number of failures could be assigned to the habitat areas based upon the proportional share of pipeline mileage in habitat areas; however, that methodology would probably result in either overestimation or underestimation of the number of failures in habitat areas.

In addition, the potential volume of test water discharged in the event of failure is difficult to estimate. First, if a failure results in rapid depressurization of the test segment, the volume of test water discharged will be the sum of (a) water expelled as the pipe returns to atmospheric pressure, which depends upon test pressure and test segment length, and (b) drainage from any adjacent segments at elevations higher than the failure location. Second, if a failure results in a slow depressurization of the test segment, it may be readily identifiable and quickly contained. If a slow leak is difficult to locate, one or more investigative excavations could be required to either search for the failure or plug a portion of the segment so that lengths of pipe may be eliminated from the search. Therefore, given that failure location and size cannot be predicted, potential effects on species and/or habitat cannot be reasonably estimated in advance. Another factor that makes such estimates difficult is the existence of residual amounts of diesel fuel that remain in the pipeline from cleaning during 1998. As the hydrostatic testing proceeds from east to west, the test water may be expected to reflect relatively higher levels of hydrocarbon content. Those concentrations cannot be predicted but are not expected to contain levels of hydrocarbons or other toxic materials sufficient to result in adverse impacts. Spill response equipment such as booms, absorbent pads, and other containment and cleanup equipment will be maintained in the vicinity of the test sites during the procedure.

In summary, the locations of hydrostatic test failures cannot be predicted, the volume of test water discharged can not be calculated, and the number of investigative excavations cannot be predicted. In the event of a pipeline failure in or near habitat for listed species, incidental take may occur. The level of potential take is impossible to predict. Basically, take from failure of the pipeline during this testing would require reinitiation of this consultation.

Cumulative Effects

Cumulative effects of future State, local or private actions that are reasonably certain to occur in the action area are considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to Section 7 of the Act. Because of the linear nature of the pipeline and the long history of clearing (about 50 years) the Service anticipates no cumulative effects from the activities proposed**.** The majority of the counties involved in the project are predominantly rural, and imminent future actions identified that may affect each of the listed species are either not considered to be of sufficient magnitude to result in jeopardy to the species or will include minimization necessary to avoid jeopardy.

Conclusion

The Service in developing its biological opinion has thoroughly reviewed the proposed action submitted by EPA, OPS, and Longhorn Pipeline Partners. This Biological Opinion is predicated on the compliance and the full and complete adherence by EPA, OPS and the Longhorn Pipeline Partners to the Description of the Proposed Action provided earlier in this document. In consideration of the above and after reviewing the current status of the potentially affected species, the environmental baseline for the action area, the effects of the proposed action including direct, and indirect and cumulative effects, it is the Service's biological opinion that the action as proposed by EPA, OPS, and the Longhorn Pipeline Partners for Longhorn Pipeline Project Maintenance Activities and Minor Construction from Houston to Crane, Texas, is not likely to jeopardize the continued existence of any Federally listed species. In addition the proposed action is not likely to destroy or adversely modify the designated critical habitat of the Houston toad. In addition, the Service concurs with the not likely to adversely affect determination, made by EPA and OPS for areas that are not habitat for threatened or endangered species.

INCIDENTAL TAKE STATEMENT

Section 9 of the ESA and Federal regulations pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by the Service as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

The term take in the Endangered Species Act is not defined for plants and therefore plants are not included in the incidental take statement of biological opinions. However, Federal agencies

are required under section 7 (a)(1) of the Act to consult with the Service on actions that may affect listed plants, and to insure that any agency action is not likely to jeopardize the continued existence of the species or result in the destruction or adverse modification of critical habitat. Further, section 7(a)(2) of the Act applies equally to plants and animals.

Amount or Extent of Take

The Service anticipates that the level of incidental take from the proposed activities will be low. The seasonal restrictions placed on these activities, and alternative techniques planned for sensitive habitat areas (land conservation funding), and other conservation actions planned should avoid and minimize the potential for incidental take to the maximum extent practicable. The amount or extent of incidental take resulting from the proposed action on listed species is difficult to assess since comprehensive survey information is not available for all species that could be affected. The approach taken for most of the potentially affected species is to assume that they are present in the identified potential habitat areas and that take will occur. The proposed action uses the potential habitat to define the possible extent of any take that could occur. Based on the proposed action, the Service will assume incidental take for the entire width of the pipeline ROW (and edge effects from the ROW) as it traverses broad areas of potential habitat for listed species. Take is calculated based on the extent of suitable habitat within the established ROW (50-foot width x length) and within temporary work spaces that exceed the ROW (variable by location). The following summarizes by species the amount of potentially suitable habitat that will be impacted by the proposed action (Table Three).

Table Three. Potential Suitable Habitat

Species	**Area Impacted**
Texas prairie dawn	61.3 acres
Navasota ladies'- tresses	5.2 acres
Houston toad	20.6 acres
Golden-cheeked warbler	116.8 acres
Black-capped vireo	41.7 acres
Tobusch fishhook cactus	213.2 acres

Effect of Take

In the accompanying biological opinion, the Service determined that the level of anticipated take identified is not likely to result in jeopardy to the species or destruction or adverse modification of critical habitat. Implementation of this project should result in net benefit to the species listed above in Table Two, to the extent that conservation benefits planned exceed expected impacts to the species.

Reasonable and Prudent Measures

The Service believes the following reasonable and prudent measures are necessary and appropriate to minimize take associated with the proposed Phase One - Longhorn Pipeline Project Maintenance Activities and Minor Construction Houston to Crane, Texas.

The measures described below are non-discretionary, and must be undertaken by EPA and/or OPS so that they become binding conditions on the Longhorn Pipeline Partners, as appropriate, for the exemption in section 7(o)(2) to apply. EPA and OPS have a continuing duty to regulate the activities addressed by this incidental take statement. If EPA or OPS, (1) fails to assume and implement the terms and conditions or (2) fails to require the Longhorn Pipeline Partners to adhere to the terms and conditions of the incidental take statement through enforceable terms and conditions, the protective coverage of section 7(o)(2) may lapse.

In order to monitor the impact of incidental take, EPA, OPS, and/or Longhorn Pipeline Partners must report the progress of the action and its impact on the species to the Service as specified in the incidental take statement (below) [50 CFR §402.14(I)(3)].

Reasonable and Prudent Measure 1: The proposed actions, as described in the above "PROJECT DESCRIPTION (Actions addressed under this Biological Opinion)" and the accompanying Biological Assessment must be followed. In areas where the Biological Assessment and the Biological Opinion are not in agreement, the Biological Opinion will be followed. The Service will be available to clarify any questions that may arise during implementation.

Reasonable and Prudent Measure 2: EPA and/or OPS must ensure that the activities are carried out by the Longhorn Pipeline Partners as they are proposed. Monitoring of these activities must be accomplished to ensure compliance. The level of monitoring must include onsite review of activities with a relatively intense focus on the first year when construction will occur. EPA and/or OPS must submit a monitoring plan detailing the level of monitoring that will occur. Service concurrence with the level and type of monitoring proposed is a requirement.

Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the Act, EPA and OPS must comply with the following terms and conditions, which implement the reasonable and prudent measures described above and outline required reporting/monitoring requirements. These terms and conditions are non-discretionary.

Terms and Conditions to Implement Reasonable and Prudent Measure 1
This term and condition is effective immediately.

Terms and Conditions to Implement Reasonable and Prudent Measure 2
This term and condition is effective immediately. Given that the proposed work is scheduled to begin with the issuance of this opinion, EPA and/or OPS must submit a monitoring plan detailing the level of monitoring within two weeks of the receipt of the Biological Opinion. On site review of the projects should begin before March 1, 2000.

Conservation Recommendations

Section 7(a)(1) of the Act directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to

minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information.

- It is recommended that in areas where surveys are completed ahead of destructive project actions, any plants in the action area be protected and avoided wherever possible. Where Tobusch fishook cactus plants are found that cannot be avoided and will be destroyed by the project activities, the Service recommends these plants be removed and transferred to the conservation collection of the Desert Botanical Garden in Phoenix, Arizona, where they can be cultivated for seed production and cryopreservation for use in future restoration work for the species. Contact Desert Botanical Garden prior to removals to arrange transfer and obtain any special instruction. In general, plants should be removed by digging at least a one foot diameter area around the plant, carefully rinsing to bare root, thoroughly drying the entire subsoil area and any wounds before transport (by placing on newspapers in a cool shaded location) and then (when dry) carefully packing in newspaper in a box, and then packing in a second box surrounded by protective packing materials before express shipping.

- It is recommended that maintenance practices be implemented that will help minimize impacts to the vegetation community, fragmentation of Houston toad habitat, and edge effects.

- To facilitate dispersal for Houston toads that cross the ROW, Longhorn Pipeline has agreed to maintain the ROW in native bunchgrasses rather than sod-forming grasses, which inhibit movement. The height of native bunchgrass communities shall be maintained several inches (i.e., $\geq$ 4 inches) above ground level to provide adequate cover for toads.

- Avoid using herbicides and pesticides in Houston toad areas. If herbicide use cannot be avoided, direct application techniques shall be used to minimize amount of application and areas of the habitat impacted. Avoiding the use of herbicides and pesticides is particularly critical near any wetland areas and during the breeding season (January through June). Avoiding the use of chemicals in habitat minimizes the risk of harm through toxic effects to the toads and tadpoles themselves or their food base.

- To protect the Houston toad from predation by red imported fire ants (*Solenopsis invicta*), periodically inspect the ROW for fire ant activity. Inspections should occur when fire ants are most active. If fire ants are found, individually treat fire ant mounds using commercial fire ant bait in accordance with label instructions. Bait should be placed only near fire ant mounds and not near the mounds of native ant species. To avoid affects on non-target species, apply bait when ants are actively foraging and prevent accumulations of excess bait.

Reinitiation Notice

This concludes formal consultation for Phase One - Longhorn Pipeline Project Maintenance Activities and Minor Construction Houston to Crane, Texas. As provided in 50 CFR §402.16,

reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

In closing we wish to thank EPA, OPS, and the Longhorn Pipeline Partners for the cooperation and patience shown during this consultation. Thank you for your interest in protecting our federal trust resources. If you have any questions, please contact Matthew Lechner (512) 490-0057, extension 234.

Sincerely,

/s/ William M. Seawell (for)
David C. Frederick
Supervisor

Appendix One

Confidential Settlement Agreement

UNITED STATES DISTRICT COURT
WESTERN DISTRICT OF TEXAS
AUSTIN DIVISION

Ethel Spiller, et al., Plaintiffs

versus

Robert M. Walker, et al. Defendants

CIVIL NO. A-98-CA-255-SS

Settlement Stipulation

Appendix Three
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Phase II Biological Assessment

April 10, 2000

Addendum September 14, 2000

Horizon Job No. 990144

PHASE TWO
BIOLOGICAL ASSESSMENT

OPERATION, LONG-TERM MAINTENANCE, AND EMERGENCY RESPONSE, LONGHORN PIPELINE PROJECT HOUSTON TO EL PASO, TEXAS

PREPARED FOR:

LONGHORN PARTNERS PIPELINE
U.S. DEPARTMENT OF TRANSPORTATION
AND
U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION 6

PREPARED BY:

HORIZON ENVIRONMENTAL SERVICES, INC.
AUSTIN - BEAUMONT - HOUSTON - SHREVEPORT

APRIL 10, 2000
Addendum September 14, 2000

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APPENDIX

Phase Two Project Documentation Appendix	Accompanying Document
Longhorn Facility Response Plan	Accompanying Document

1.0 INTRODUCTION

This document is the Biological Assessment (BA) of the potential for effects, arising out of the activities proposed by Longhorn Partners Pipeline, L.P. (Longhorn), on federally-listed species in Texas. This BA presents data and information describing the proposed plans for the second phase of consultation for the Longhorn Pipeline Project -- Operation, Maintenance, and Response Activities, Houston to El Paso, Texas. The first phase of the consultation (Phase One), which has already been completed, related to pipeline right-of-way maintenance, clearing and marking, selected pipeline maintenance construction activities (pipe replacements and lowering), and pipeline testing (investigation of possible flaws and hydrostatic pressure testing). The Service found that Longhorn's Phase One activities were not likely to jeopardize the continued existence of any federally listed species, nor was it likely to destroy or adversely modify the designated critical habitat of the Houston toad. The Phase One BA, dated February 14, 2000, and the Phase One Biological Opinion (BO), dated February 17, 2000, are hereby incorporated into this Phase Two BA by reference (see Phase Two Project Documentation Appendix at Tabs 1 and 2).

The draft Environmental Assessment (EA) of the proposed Longhorn Pipeline System and these BAs are the product of a settlement reached in the matter of Spiller et al. v. Walker et al. pending in the United States District Court in Austin, Texas (See Phase Two Project Documentation Appendix at Tab 3; the Settlement Stipulation). As part of the Court approved settlement, two agencies involved in the original litigation were required to conduct an EA including, specifically, consideration of species listed under the Endangered Species Act (ESA). The Court ordered the U.S. Environmental Protection Agency (EPA) and the U.S. Department of Transportation (DOT), to be responsible for the EA. EPA and the DOT Office of Pipeline Safety (OPS) act as Lead Agencies in the EA process. Radian International LLC (Radian) is a contract preparer of the EA and works at the direction of the Lead Agencies.

The Court order provides that issuance of any finding of no significant impact (FONSI) with regard to the proposed Longhorn Pipeline project "shall be conditioned upon implementation" of measures to protect public safety and the environment (Settlement Stipulation at 6). The order also prohibits OPS from authorizing Longhorn to commence operations until Longhorn has implemented those mitigation measures upon which any FONSI is conditioned (Settlement Stipulation at 7). The order contemplates that Longhorn will apply for such ESA permits as may be required in connection with the implementation of any mitigation measures upon which a FONSI may be conditioned. (Settlement Stipulation at 7). The results of this consultation by the Lead Agencies with the Service are expected to be incorporated in the Record of Decision issued by the Lead Agencies. The terms and conditions, mitigatory measures and protections incorporated herein for the benefit of species are expected to be adopted and incorporated by Longhorn in its enforceable mitigation commitments or in its operating and maintenance manuals subject to inspection by, and enforceable by, OPS pursuant to the Pipeline Safety Act (49 U.S.C. 60101 et seq.).

Although the Service and the Lead Agencies are in consultation with respect to the entire proposed Longhorn pipeline project, this consultation is being approached in two distinct, yet related phases. Service regulations allow for a staged consultation (50 CFR 402.14(k)) where the Service reviews a project and provides biological opinions on each

incremental step, provided that no irreversible or irretrievable commitments of resources are made.

This second phase of the consultation will be directly related to the actual operation of the pipeline, specifically the operation and maintenance of the pipeline system and the potential effects of a pipeline release and related emergency response. Like Phase One, Phase Two activities also include implementation of some mitigation measures, specifically the replacement of pipe in Buescher State Park (see Longhorn Mitigation Commitment 34 (LMC 34) of the Longhorn Mitigation Plan (LMP) dated September 1, 2000; see Phase Two Project Documentation Appendix at Tab 4) and the replacement of some 19 miles of pipe over the Edwards Aquifer recharge and contributing zones with thick-walled pipe. On its own initiative, Longhorn will lower two other sections of pipe in Buescher Park where the pipe crosses streams. Phase Two also includes (a) hydrostatic pressure testing of pipeline segments not tested pursuant to Phase One, specifically, Houston toad habitat areas and areas of potential effect to the Barton Springs Salamander, (b) treatment of the pipeline internally with corrosion inhibitor, and (c) right-of-way clearing in areas of potential effect to the Barton Springs Salamander.

Since none of the Phase Two work will be undertaken by Longhorn until this consultation is complete, neither the federal agencies nor Longhorn will engage in any irreversible or irretrievable commitment of resources during the course of the consultation.

The two phases have been logically separated. Phase One of the Service's review focused on those actions that were designed to make the pipeline safer. That review did not pre-judge whether or not the pipeline would be used. This second phase of the consultation will focus on whether and how the pipeline will be used. New construction of pipe between Crane and El Paso was reviewed by the Service in 1997 and resulted in a not likely to adversely affect determination (See Tab 5 of the Phase Two Project Documentation Appendix).

The Service can logically conclude that operation and maintenance of the Longhorn Pipeline will not jeopardize the continued existence of any federally listed species, and that it is not likely to destroy or adversely modify the designated critical habitat of the Houston toad. This project, as designed, is not likely to adversely affect threatened or endangered species or habitat. There is little risk from operation of the pipeline. The risks that do exist arise in the unlikely event of an accidental release of product from the pipeline. In response to this risk, and pursuant to the Settlement Stipulation, Longhorn will implement numerous mitigation measures designed to avoid a release entirely or reduce the magnitude and the impact of a release. Longhorn developed these mitigation measures in response to risks identified by the Lead Agencies. Mitigation measures such as pipe replacement and pipe lowering, in-line inspections, daily surveillance patrols over the Edwards Aquifer recharge zone, enhanced damage prevention and public education programs, and hydrostatic pressure testing greatly minimize the risk of an accidental release from the pipeline in the first place. These efforts minimize the risk a release will occur. In addition, Longhorn will install an enhanced leak detection system which will allow pipeline operators to rapidly detect even a very small release over the Edwards Aquifer recharge zone and portions of the contributing zone and respond quickly, thereby limiting the amount of product released into the environment. Longhorn will also fund a refugium for the Barton Springs Salamander.

Taken together, the Service can conclude that these measures are sufficient to ensure operation of the pipeline will neither jeopardize the continued existence of any federally listed species, nor adversely affect their habitat, and is not likely to adversely affect threatened or endangered species or habitat along the pipeline route.

This BA is based upon: (1) the information that Longhorn (as designated non-federal representative), provided as part of the informal consultation (including the Draft Environmental Assessment and the Phase One BA), (2) information in the Service's office (including information provided by the public and the plaintiffs in the lawsuit relating to the Longhorn Pipeline), (3) field investigations, and (4) other sources of information.

2.0 CONSULTATION HISTORY

Informal and formal consultation between the Service, Longhorn, EPA, and OPS has been in process since February 1999. Longhorn was formally designated as the non-federal representative for conducting informal consultation on behalf of the EPA and OPS on February 3, 2000. The history of consultation actions (both informal and formal) follows in Table 1.

Table 1: CONSULTATION HISTORY - PHASES ONE AND TWO

DATE	HISTORY
10 February, 1999	Meeting Between Service and Longhorn Representatives
25 February, 1999	Meeting Between Service and Longhorn Representatives
9 March, 1999	Meeting of Service and Radian (consultants writing EA for EPA and OPS)
22 March, 1999	Meeting Between Service and Longhorn Representatives
30 April, 1999	Meeting Between Service and Longhorn Representatives
11 May, 1999	Meeting Between Service and Longhorn Representatives
12 May, 1999	Meeting with the Plaintiffs to discuss the Settlement Agreement
1 June, 1999	Meeting with Barton Springs/Edwards Aquifer Conservation District
8 June, 1999	Meeting Between Service and Longhorn Representatives
11 June, 1999	Multi-Agency Field Tour of Longhorn Pipeline in and near Austin, Texas
29 June, 1999	Meeting Between Service and Longhorn Representatives
30 June, 1999	Telephone Conference Between Service and Department of Justice
19 July, 1999	Meeting Between Service and Longhorn Representatives
27 August, 1999	Meeting Between Service and Longhorn Representatives
10 September, 1999	Meeting Between Service and EPA Meeting Between Service and Longhorn Representatives
13 September, 1999	Meeting Between Service, Austin and Regional Director
27 September, 1999	Meeting between Service Austin Office and Washington Office Original Draft Biological Assessment Submitted to Service
30 September, 1999	Meeting Between Service and Longhorn Representatives

Table 1: CONSULTATION HISTORY - PHASES ONE AND TWO	
DATE	**HISTORY**
4 November, 1999	Meeting Between Service and Longhorn Representatives
9 November, 1999	Meeting Between Service and Longhorn Representatives
16 November, 1999	EPA and OPS Longhorn Public Meeting, Austin
22 November, 1999	Meeting Between Service and Longhorn Representatives
7 December, 1999	Meeting Between Service and Longhorn Representatives
8 December, 1999	Meeting Between Service and EPA
15 December, 1999	Meeting Between Service and Longhorn Representatives Service Issues Comments on Original Draft Biological Assessment Service Issues Response to EPA Regarding EPA's initial Request for Concurrence on a "Not Likely to Adversely Affect" Determination.
17 December, 1999	Meeting Between Service and Longhorn Representatives
6 January, 2000	Meeting Between Service and Longhorn Representatives Longhorn Requests Concurrence from Service for "Not Likely to Adversely Affect" for Maintenance and Construction Activities in Non-habitat Areas for Listed Species.
10 January, 2000	EPA and OPS Longhorn Public Meeting, Austin
11 January, 2000	Meeting Between Service, EPA and OPS
17 January, 2000	Meeting Between Service and Longhorn Representatives
18 January, 2000	Meeting Between Service and Longhorn Representative
28 January, 2000	Initial Draft First Phase Biological Assessment received for review
7 February, 2000	Meeting Between Service and Longhorn Representatives
1 February, 2000	Telephone Conference Between Service and Congressman Doggett's Staff
3 February, 2000	EPA and OPS designate Longhorn the "non-federal representative" for purposes of consultation
10 February, 2000	Received EPA Request for Formal Consultation
14 February, 2000	Received Second Draft of Phase One Biological Assessment For Review
17 February, 2000	Received Revised Final Phase One Biological Assessment
17 February, 2000	Received OPS Request for Formal Consultation
17 February, 2000	Service issued Phase One Biological Opinion
9 March, 2000	Meeting between Service and Longhorn Representatives to initiate informal Phase II consultation with submission of initial draft of Phase Two Biological Assessment
12 April 2000	Received Revised Draft Phase II Biological Assessment
26 April 2000	Meeting Between Service and Longhorn Representatives

Table 1: CONSULTATION HISTORY - PHASES ONE AND TWO	
DATE	**HISTORY**
6 June 2000	Meeting Between Service and Longhorn Representatives
23 June 2000	Meeting Between Service and Longhorn Representatives
30 June 2000	Meeting Between Service and Longhorn Representatives
21to 31 July 2000	Received supplemental information for the Phase II Biological Assessment
3 August 2000	Meeting Between Service and Longhorn Representatives
5 August 2000	Meeting Between Service and Longhorn Representatives
9 August 2000	Meeting Between Service and Longhorn Representatives
23 August 2000	Meeting Between Service and Longhorn Representatives
6 September 2000	Meeting Between Service, Lead Agency, and Longhorn Representatives
11 to 13 Sept. 2000	Received supplemental information for the Phase II Biological Assessment

3.0 DESCRIPTION OF THE PROPOSED ACTIONS

The following is an overview of the project as proposed by Longhorn and is provided to give an overall context of the proposed project. The specific activities proposed for this Phase Two BA are detailed in the following sections. This project overview differs slightly from the project overview contained within the Phase One BA; specifically, this project overview describes four connecting pipelines as opposed to the three previously described. However, the differences implicate no change to the potential effects of the overall project upon species, given that no potential habitat areas have been identified along the planned route of the connecting pipelines.

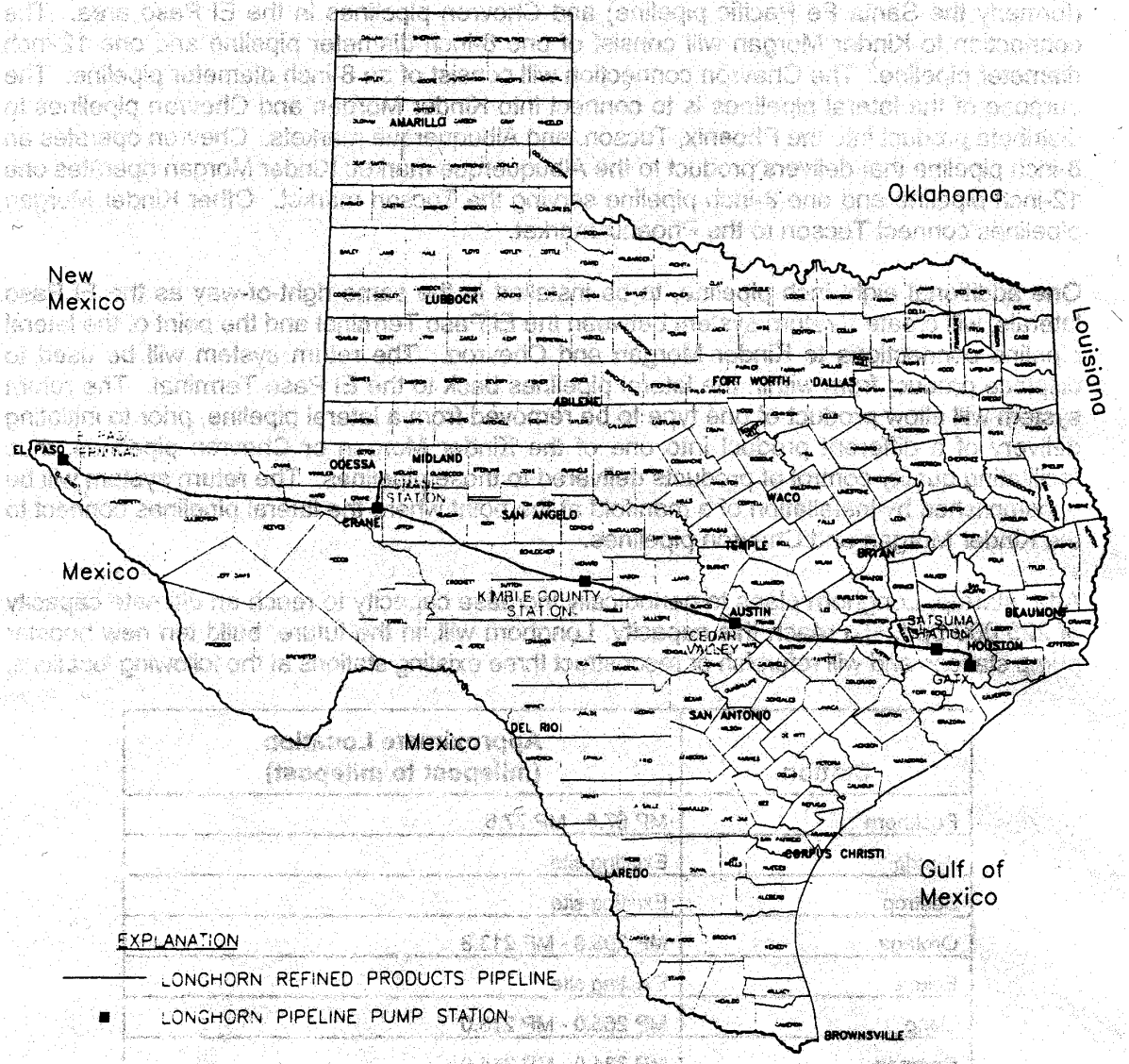
3.1 Project Overview

Due to the expanding demand for refined products in El Paso and other markets in the southwestern United States, the proposed Longhorn Pipeline will transport up to 225,000 barrels per day (bpd) of refined products to the El Paso Terminal and to the Equilon Terminal in Odessa. From these terminals, products will be distributed by truck transport in the El Paso and Odessa markets. Tanker trucks could transport refined products to Juarez in Mexico. The Longhorn Pipeline will connect to the Kinder Morgan and Chevron pipelines at El Paso, enabling shippers to transport products to Phoenix, Tucson, Albuquerque, and other southwestern markets. Market conditions and shipper requirements will determine the actual pattern of distribution of products to El Paso and to the Phoenix, Tucson, Albuquerque, and other southwestern markets.

The Longhorn Pipeline System is designed for service in excess of fifty years from startup and is made up of four main pipeline segments, several stations, and one terminal, as listed below:

1. New and refurbished 20-inch diameter pipeline from Galena Park Station to Satsuma Station
2. Refurbished 18-inch diameter pipeline from Satsuma Station to Crane Station
3. New 18-inch diameter pipeline from Crane Station to El Paso Terminal
4. New lateral pipeline connections to Odessa and to other pipelines at El Paso
5. New Pump Stations: GATX, Satsuma, Cedar Valley, Kimble County, Crane, and El Paso
6. El Paso Terminal
7. Odessa Meter Station

Longhorn has constructed and will operate a 723-mile refined petroleum products pipeline system from the GATX Terminal in Galena Park, Texas, to a refined petroleum products terminal at El Paso, Texas (Figure 1). The pipeline also has a 28-mile intermediate connection from a station in Crane County to a planned meter station in Odessa, Texas. The pipeline consists of a combination of 20-inch and 18-inch diameter pipe from Galena Park Station to El Paso Terminal and an 8-inch diameter pipeline from a station in Crane County to a meter station in Odessa, Texas. The pipeline's initial capacity of 72,000 bpd will be supplied by a new origin pump station at Galena Park and five new booster pump stations, Satsuma, Cedar Valley, Kimble County, Crane, and El Paso.



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PUMP STATIONS LONGHORN PIPELINE STATE OF TEXAS

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MAP SOURCES:
TEXAS NATURAL RESOURCE INFORMATION SYSTEM
(http://www.tnris.state.tx.us/data_az.html), 1998

LONGHORN PIPELINE

An 8-inch diameter, 2,500-foot lateral that originates at the terminus of the existing Odessa lateral will connect to a terminal facility in Odessa, Texas, owned by Equilon. Three 8.3-mile lateral pipelines, which originate at the El Paso Terminal, will connect with Kinder Morgan (formerly the Santa Fe Pacific pipeline) and Chevron pipelines in the El Paso area. The connection to Kinder Morgan will consist of one 8-inch diameter pipeline and one 12-inch diameter pipeline. The Chevron connection will consist of an 8-inch diameter pipeline. The purpose of the lateral pipelines is to connect into Kinder Morgan and Chevron pipelines to distribute product into the Phoenix, Tucson, and Albuquerque markets. Chevron operates an 8-inch pipeline that delivers product to the Albuquerque market; Kinder Morgan operates one 12-inch pipeline and one 8-inch pipeline serving the Tucson market. Other Kinder Morgan pipelines connect Tucson to the Phoenix market.

One additional eight-inch pipeline, to be installed in the same right-of-way as the El Paso laterals, will create a return system between the El Paso Terminal and the point of the lateral pipeline connections to Kinder Morgan and Chevron. The return system will be used to displace product from within the lateral pipelines back to the El Paso Terminal. The return system will allow product of one type to be removed from a lateral pipeline, prior to initiating delivery of a different product into one of the Kinder Morgan or Chevron pipelines, thus facilitating quality control of products delivered to those pipelines. The return system will be accomplished by installation of a manifold at the point where the lateral pipelines connect to the Kinder Morgan and Chevron pipelines.

After startup, Longhorn plans to periodically increase capacity to reach an ultimate capacity of 225,000 bpd. To reach this capacity, Longhorn will, in the future, build ten new booster pump stations and will refurbish or reconstruct three existing stations at the following locations:

Station	Approximate Location (milepost to milepost)
Buckhorn	MP 67.5 - MP 77.5
Warda	Existing site
Bastrop	Existing site
Orotaga	MP 203.8 - MP 213.8
Eckert	Existing site
Llano	MP 265.0 - MP 275.0
Cartman	MP 334.0 - MP 344.0
Olson	MP 410.0 - MP 420.0
Big Lake	Approximately MP 373.4
Pecos	MP 516.2 - MP 526.2
Utica	MP 543.6 - MP 553.6
Cottonwood	Approximately MP 576.3
Harris	MP 642.6 - MP 652.6

The Longhorn project includes both new construction and refurbishment of an existing

pipeline that has been converted from its former use of transporting crude oil from West Texas to the Gulf Coast area. The existing pipeline has been modified to transport refined petroleum products, with flow going from east to west. Williams Pipe Line Company (Williams) will be the contract operator of the Longhorn Pipeline System. Longhorn intends to transport multiple grades of gasoline and distillates (i.e., various grades of diesel fuel and jet fuel).

The GATX to El Paso segment of the Longhorn Pipeline will function as an interstate common carrier pipeline for those product volumes that will be transported across state lines through the Longhorn Pipeline connections with the Kinder Morgan and Chevron pipelines that extend across the Texas border into New Mexico and Arizona. Product volumes moved from GATX to El Paso for delivery at El Paso will be intrastate movements. The Crane to Odessa segment of the Longhorn Pipeline is an intrastate common carrier pipeline since it transports products solely within the State of Texas.

Table 2 lists a chronology of overall pipeline actions leading up to the present.

Table 2 – Chronology of Longhorn Pipeline Actions

1949-1950	Exxon constructed the original 18”/20” pipeline, Crane to Baytown, to transport crude oil.
1950-1990	Operation and Periodic maintenance/refurbishment.
1990	An internal inspection (smart pig) of the 20” pipeline was performed.
1995	An internal inspection of the 18” pipeline was performed.
1995-1996	The 18” and 20” pipelines were subjected to a hydrostatic pressure test and purged with nitrogen.
Oct 21, 1997	Longhorn acquired the existing pipeline from Exxon.
1st Qtr. 98	Longhorn cleaned the existing pipeline to remove crude oil from the inner walls, so to prepare the existing pipeline for use in petroleum products service. Construction of new pump stations, terminals, and new pipeline sections began.
1998/1999	New Construction completion dates (dates shown are dates of substantial completion): Galena Park Origin Station – August 1998 Satsuma Pump Station – August 1998 Cedar Valley Pump Station – July 1999 Kimble County Pump Station – July 1999 Crane Pump Station– March 1999 El Paso Terminal and Pump Station – August 1999 20” Pipeline, GATX to Tie-In to Existing 20” Pipeline, Houston – October 1998 18” Pipeline, Crane to El Paso – November 1998 8” Pipeline, Crane to Odessa – November 1998 (0.5 mile remains to be constructed to Odessa Meter Station) Odessa Meter Station – In design Cleaning and refurbishment of the existing pipeline 18”/20”- March to November 1998 Equipment installation remaining at a few sites Pipeline Laterals – In design (from El Paso terminal to tie-in point with three interstate pipelines)
1999	Longhorn commenced implementation of Environmental Assessment mitigation measures, including maintenance construction and investigation of potential pipeline flaws.
2000	Longhorn continued implementation of Environmental Assessment related pipeline mitigation measures, including ROW maintenance and marking, maintenance construction, hydrostatic testing of the Houston to Crane segment of the pipeline, investigation of potential pipeline flaws, and cathodic protection system improvements.

Additional details about the pipeline system, and its operation and maintenance, are contained in Section 7.0 of the Longhorn Pipeline Project Description prepared in

connection with the EA; a copy of the Project Description is provided in the accompanying Phase Two Project Documentation Appendix at Tab 6.

For purposes of this Phase Two BA, Longhorn has identified the areas along the pipeline where operating and maintenance activities "may affect" species and habitat. Areas of potential effect include areas of potential species habitat along the pipeline route. Those areas are identified in two documents: (a) Table 3, which lists pipeline stationing numbers for potential habitat areas along the course of the pipeline; and (b) Figures 2 through 10 which graphically depict those same potential habitat areas.

This BA addresses those portions of the overall project that were not specifically identified in the Phase One BA. Those items include pipeline operation, long-term maintenance, planned additional construction and future unforeseen construction, potential pipeline release and related emergency response, construction on the Edwards Aquifer recharge zone and at Buescher State Park, hydrostatic pressure testing of approximately 60 miles of pipeline that was not tested pursuant to the Phase One BA, internal treatment of the pipeline with corrosion inhibitor, and right-of-way clearing over the Edwards Aquifer recharge zone. Details of general construction procedures and environmental protection guidelines for implementation of maintenance construction and pipeline testing activities are contained in the Phase One BA and are not repeated herein. Specific construction procedures and environmental protection guidelines for the construction sites at Buescher State Park (Houston toad habitat) and the Edwards Aquifer recharge zone are provided below. Additional procedures and guidelines, as referenced in the following, are contained in various parts of the Phase Two Project Documentation Appendix.

The EA assigned tier rankings to individual segments of the entire pipeline that identify environmentally sensitive areas along the pipeline route. "Areas were identified as sensitive based upon proximity and density of population, ground water (with an emphasis on drinking water supplies), surface water, presence of threatened and endangered species habitats, and proximity to recreational areas." See Draft Longhorn EA at Section 9.2.3. Sensitive areas were divided into two categories, Tier II (sensitive) and Tier III (hypersensitive); areas not designated as Tier II or Tier III are designated as Tier I. A description of the methodology employed by the Lead Agencies to designate such sensitive and hypersensitive areas is set forth in Appendix 9C of the EA, along with maps of those areas. This Phase Two BA refers to such sensitive and hypersensitive areas.

Table 3: List of Endangered Species Habitat Areas Along The Longhorn Pipeline Houston to El Paso

Begin Station	End Station	County	Species
2013+44	2279+20	Harris	Texas Prairie Dawn
2310+88	2411+20	Harris	Texas Prairie Dawn
2684+00	2831+84	Waller	Texas Prairie Dawn
4662+00	4782+00	Austin	Houston Toad
5095+20	5128+64	Fayette	Navasota Ladies-Tresses
5936+48	5948+80	Fayette	Navasota Ladies-Tresses
6600+00	6638+72	Bastrop	Houston Toad
6723+20	6864+00	Bastrop	Houston Toad
9011+20	9152+00	Travis	EA Recharge Zone
9152+00	9961+60	Travis/Hays	EA Contributing Zone
9657+12	9674+72	Hays	Golden-Cheeked Warbler
9724+00	9762+72	Hays	Golden-Cheeked Warbler
9850+72	9926+40	Hays	Golden-Cheeked Warbler
9945+76	10036+40	Hays	Golden-Cheeked Warbler
10164+00	10199+20	Hays/Blanco	Golden-Cheeked Warbler
10266+08	10461+44	Blanco	Golden-Cheeked Warbler
11008+80	11036+96	Blanco	Golden-Cheeked Warbler
11080+96	11105+60	Blanco	Black-Capped Vireo
11295+68	11441+76	Blanco	Golden-Cheeked Warbler
11691+68	11751+52	Gillespie	Golden-Cheeked Warbler
11791+28	11821+92	Gillespie	Golden-Cheeked Warbler
12114+08	12149+28	Gillespie	Golden-Cheeked Warbler
12513+60	12606+88	Gillespie	Black-Capped Vireo
12596+32	12631+52	Gillespie	Golden-Cheeked Warbler
12633+28	12728+32	Gillespie	Black-Capped Vireo
12921+92	12953+60	Mason	Golden-Cheeked Warbler
13043+36	13110+24	Mason	Golden-Cheeked Warbler
13203+52	13217+60	Mason	Golden-Cheeked Warbler
13277+44	13305+60	Mason	Black-Capped Vireo
13381+28	13437+60	Mason	Black-Capped Vireo
13513+28	13578+40	Mason	Black-Capped Vireo
14476+00	16329+28	Kimble	Tobusch Fishhook Cactus
15153+60	15234+56	Kimble	Black-Capped Vireo

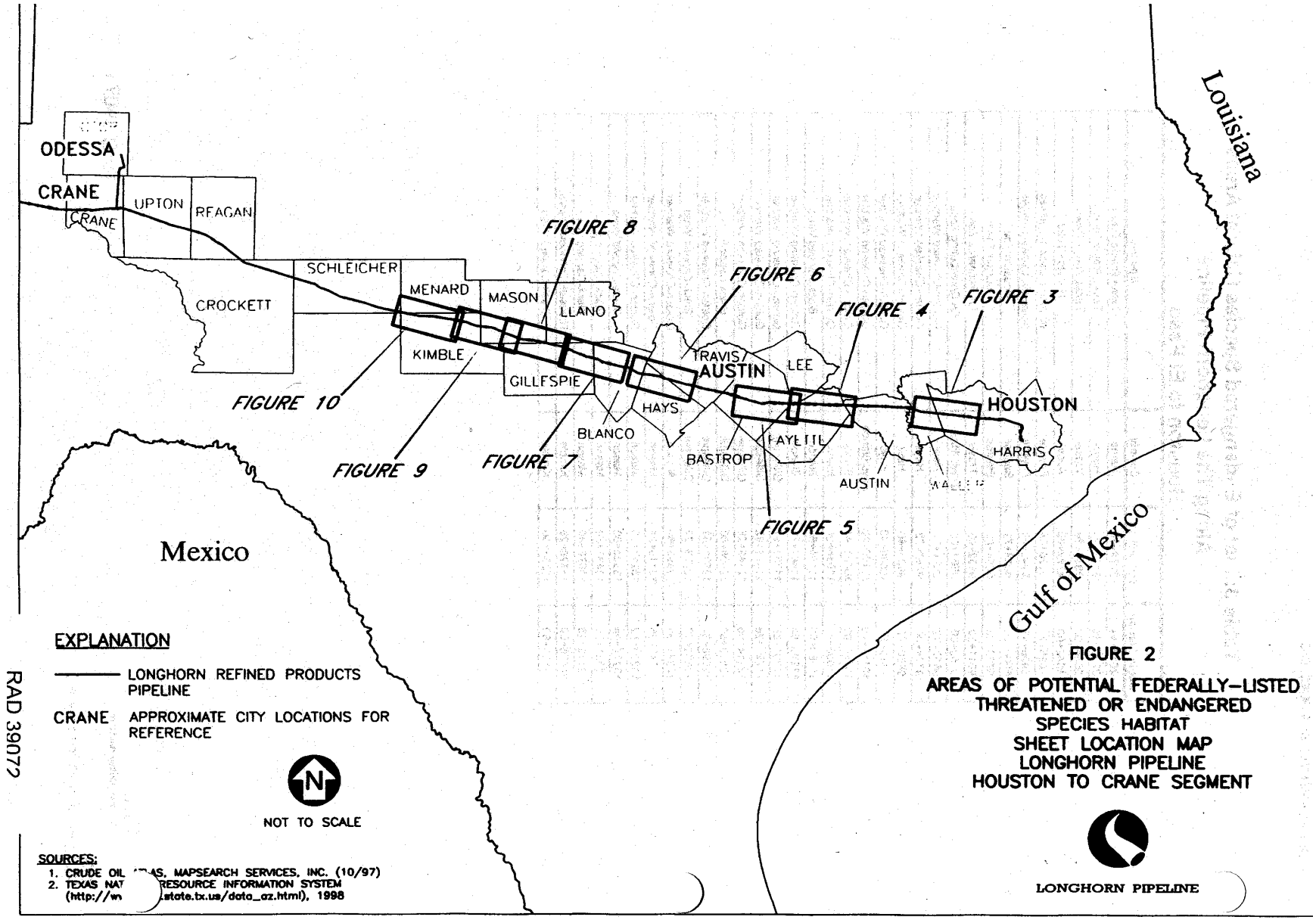

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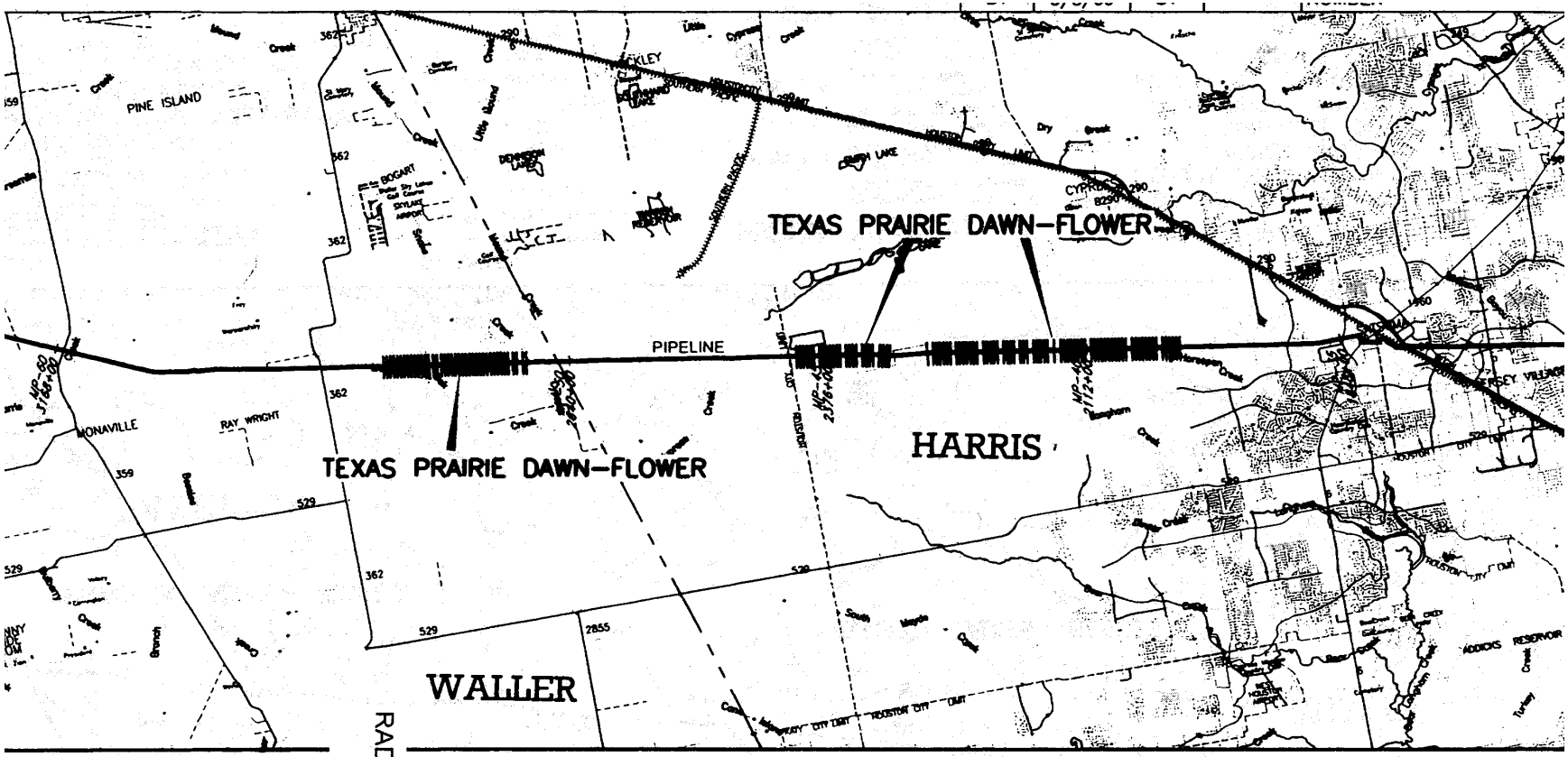
FIGURE 2

AREAS OF POTENTIAL FEDERALLY–LISTED THREATENED OR ENDANGERED SPECIES HABITAT
SHEET LOCATION MAP
LONGHORN PIPELINE
HOUSTON TO CRANE SEGMENT



SOURCES:

MAP SOURCES:

1. TEXAS NATURAL RESOURCE INFORMATION SYSTEM (http://www.tnris.state.tx.us/data_cz.html), 1998
2. TxDot COUNTY FILES FROM TEXAS NATURAL RESOURCES INFORMATION SYSTEM (3/9/98)

THREATENED OR ENDANGERED SPECIES REFERENCES:

1. ENDANGERED AND THREATENTENED ANIMALS OF TEXAS; TEXAS PARKS AND WILDLIFE DEPT. (1985)
2. THREATENED AND ENDANGERED SPECIES OF TEXAS; U.S. FISH AND WILDLIFE SERVICE (1992)
3. DETERMINATION OF CRITICAL HABITAT FOR THE HOUSTON TOAD; FEDERAL REGISTER 43(21):4022–4026; U.S. FISH AND WILDLIFE SERVICE (1978)
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6. HORIZON ENVIRONMENTAL SERVICES, INC., SITE INVESTIGATION (JUNE 1999)

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MILES

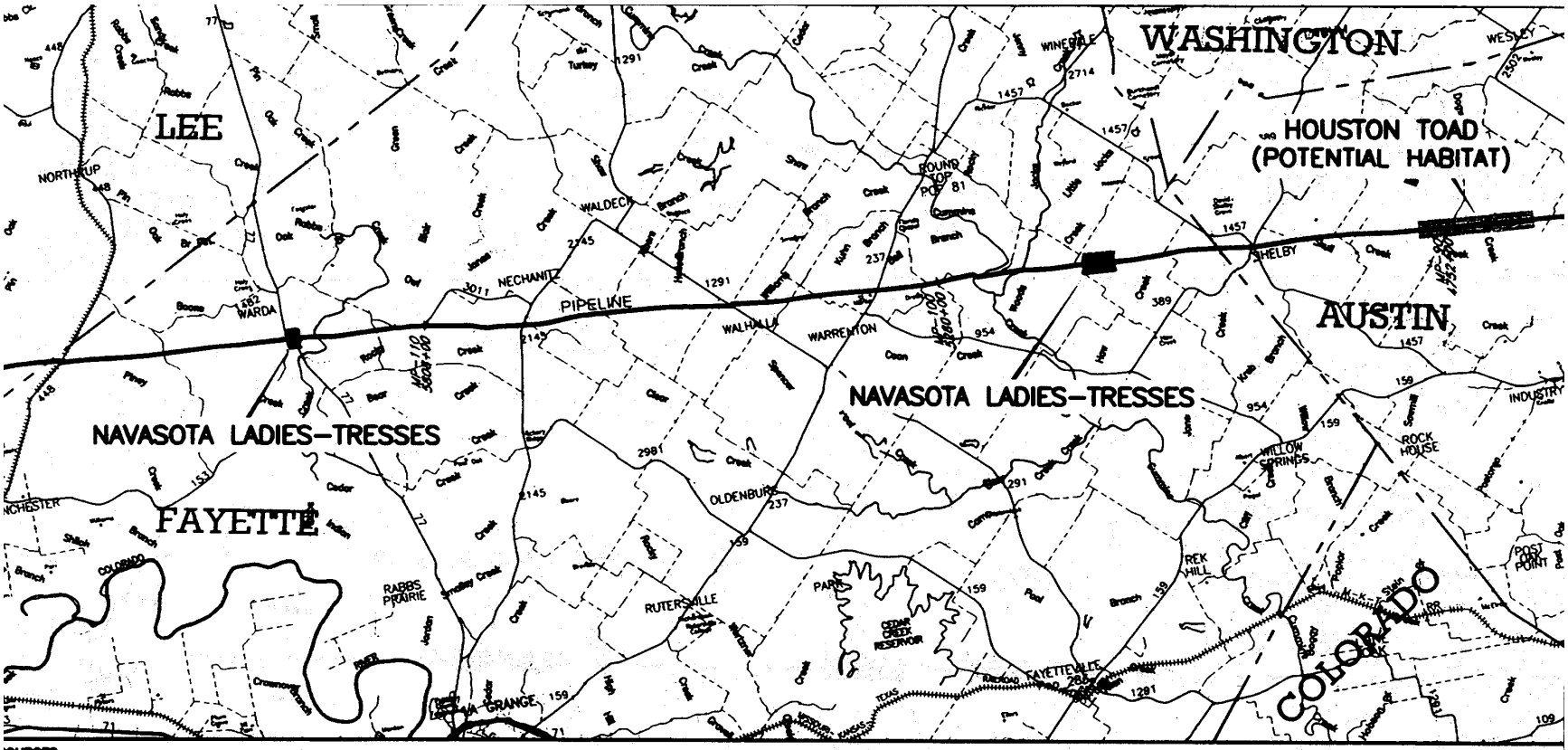
EXPLANATION

- COUNTY BOUNDARY
- HIGHWAY OR MAJOR ROADS
- CITY STREETS
- ROADS
- RIVERS AND STREAMS
- INTERMITTENT STREAMS
- COMMUNITY BOUNDARIES
- RAILWAYS
- BRIDGES
- CEMETERY
- LONGHORN PIPELINE
- *LLP-2546* MAINTENANCE CONSTRUCTION LOCATION
- TEXAS PRAIRIE DAWN-FLOWER *(Hymenoxys texana)*
- HOUSTON TOAD – DESIGNATED HABITAT *(Bufo houstonensis)*
- HOUSTON TOAD – POTENTIAL HABITAT *(Bufo houstonensis)*
- GOLDEN-CHEEKED WARBLER *(Dendroica chrysoparia)*
- BLACK-CAPPED VIREO *(Vireo atricapilla)*
- TOBUSCH FISHHOOK CACTUS *(Ancistrocactus tobuschii)*
- NAVASOTA LADIES-TRESSES *(Spiranthes parksii)*
- EDWARDS RECHARGE ZONE
- CONTRIBUTING ZONE

FIGURE 3

AREAS OF POTENTIAL FEDERALLY–LISTED THREATENED OR ENDANGERED SPECIES HABITAT TRAVERSED BY LONGHORN PIPELINE HOUSTON TO CRANE SEGMENT COUNTIES OF TEXAS

LONGHORN PIPELINE



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- NAVASOTA LADIES-TRESSES (*Spiranthes parksii*)
- EDWARDS RECHARGE ZONE
- CONTRIBUTING ZONE

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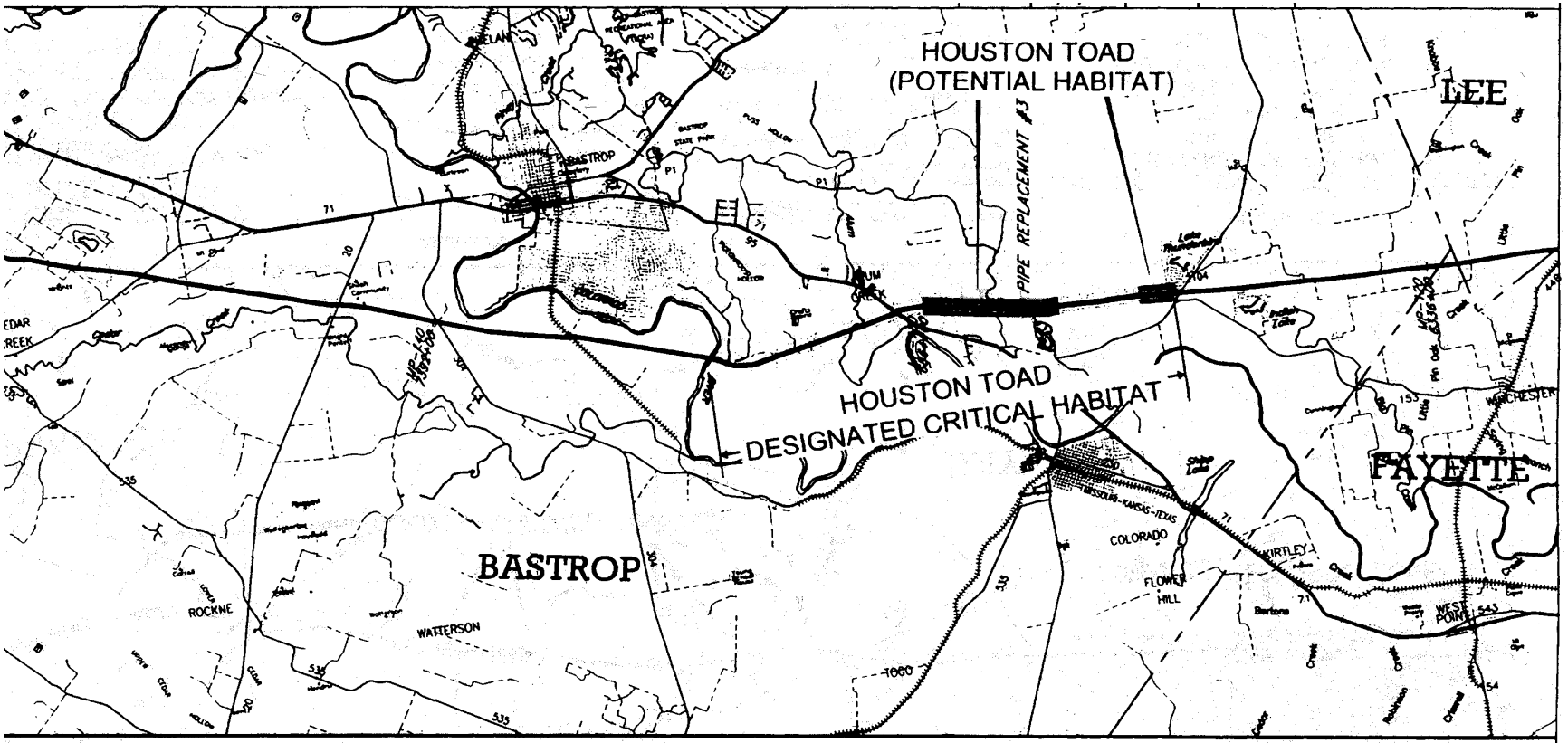
FIGURE 4

AREAS OF POTENTIAL FEDERALLY-LISTED THREATENED OR ENDANGERED SPECIES HABITAT TRAVERSED BY LONGHORN PIPELINE HOUSTON TO CRANE SEGMENT COUNTIES OF TEXAS

LONGHORN PIPELIN



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- CONTRIBUTING ZONE

FIGURE 5

AREAS OF POTENTIAL FEDERALLY-LISTED THREATENED OR ENDANGERED SPECIES HABITAT TRAVERSED BY LONGHORN PIPELINE HOUSTON TO CRANE SEGMENT COUNTIES OF TEXAS

LONGHORN PIPELINE

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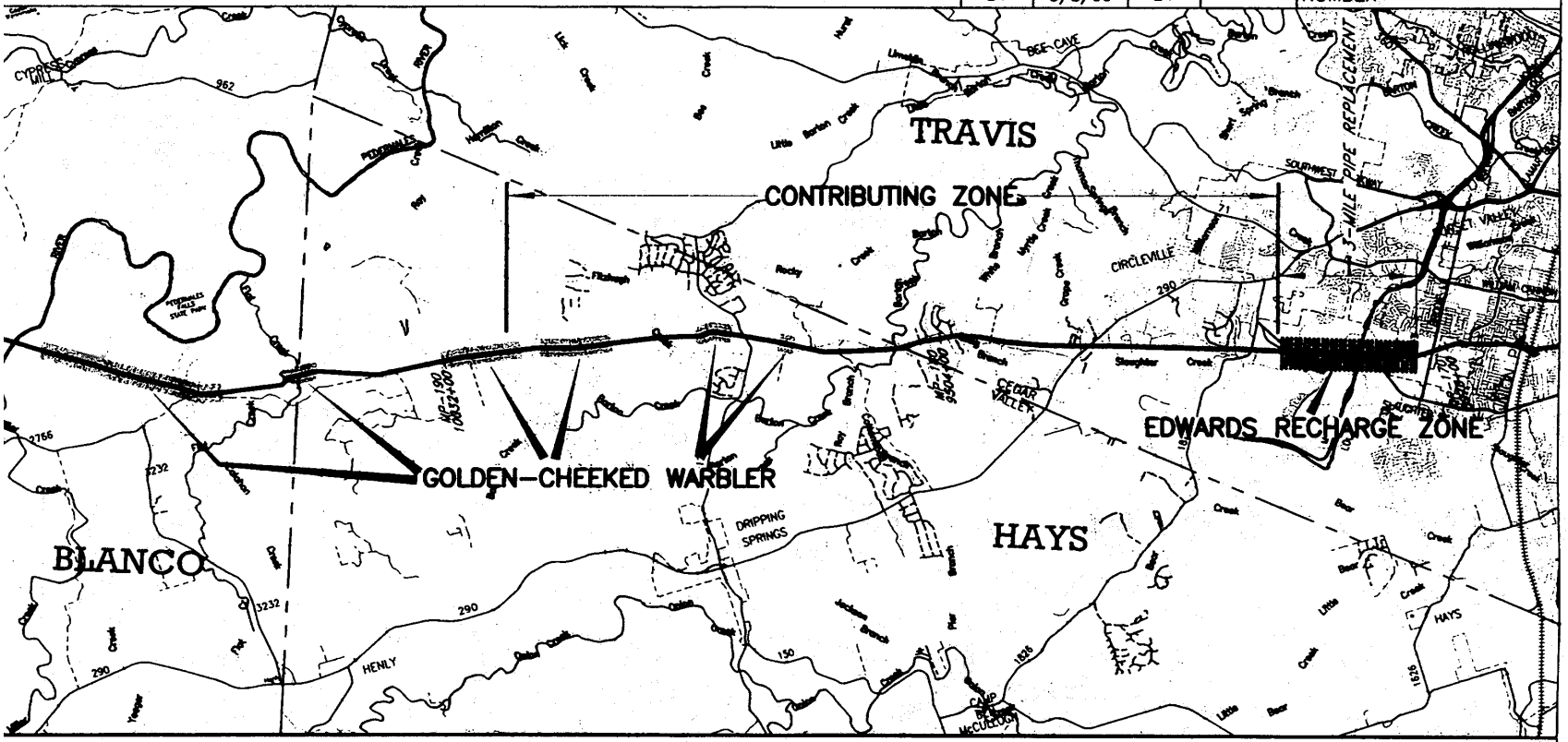

SOURCES:

MAP SOURCES:

1. TEXAS NATURAL RESOURCE INFORMATION SYSTEM (http://www.tnris.state.tx.us/data_oz.html), 1998
2. TxDot COUNTY FILES FROM TEXAS NATURAL RESOURCES INFORMATION SYSTEM (3/9/98)

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- CONTRIBUTING ZONE

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MILES

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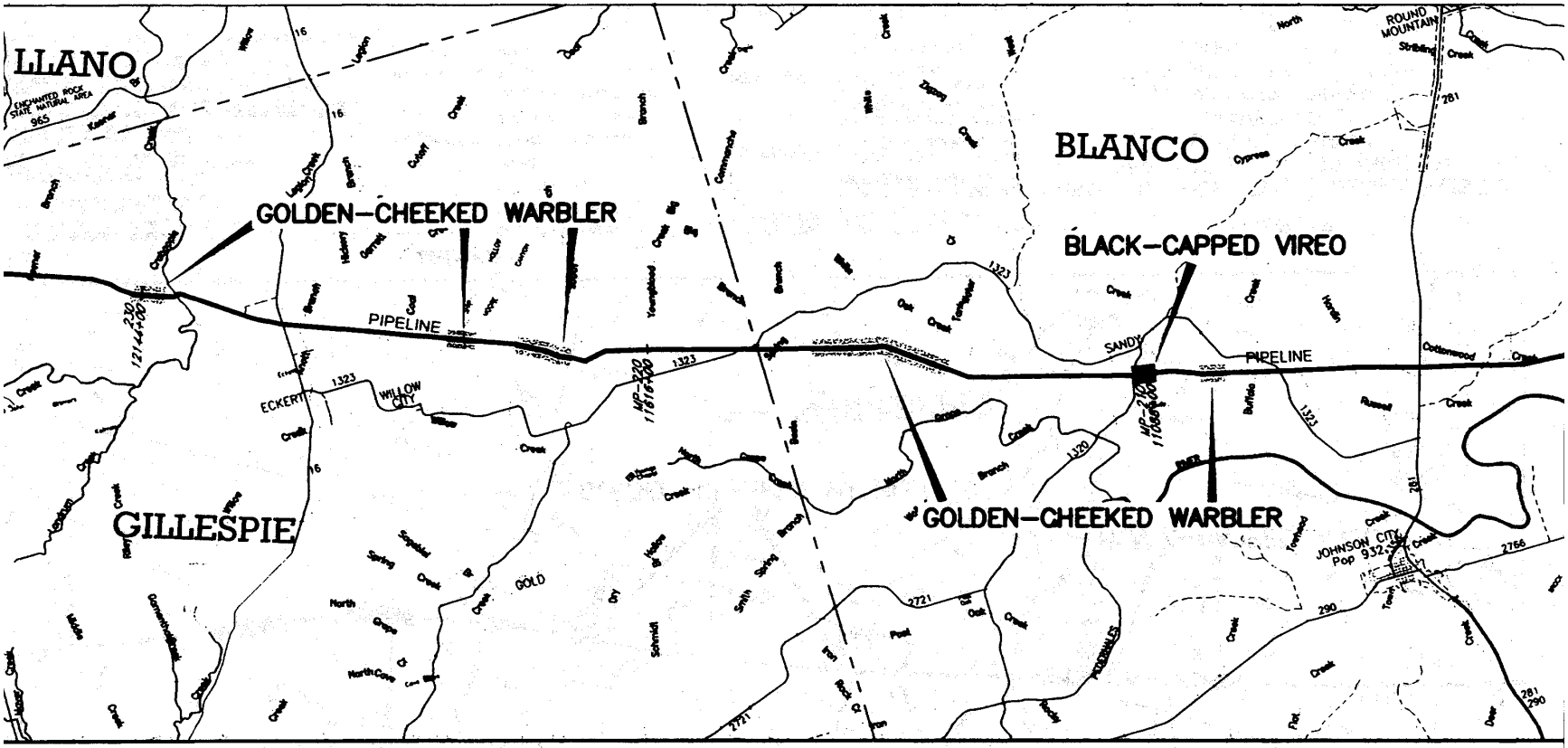
FIGURE 6

AREAS OF POTENTIAL FEDERALLY-LISTED THREATENED OR ENDANGERED SPECIES HABITAT TRAVERSED BY LONGHORN PIPELINE HOUSTON TO CRANE SEGMENT COUNTIES OF TEXAS

LONGHORN PIPELINE



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- CONTRIBUTING ZONE

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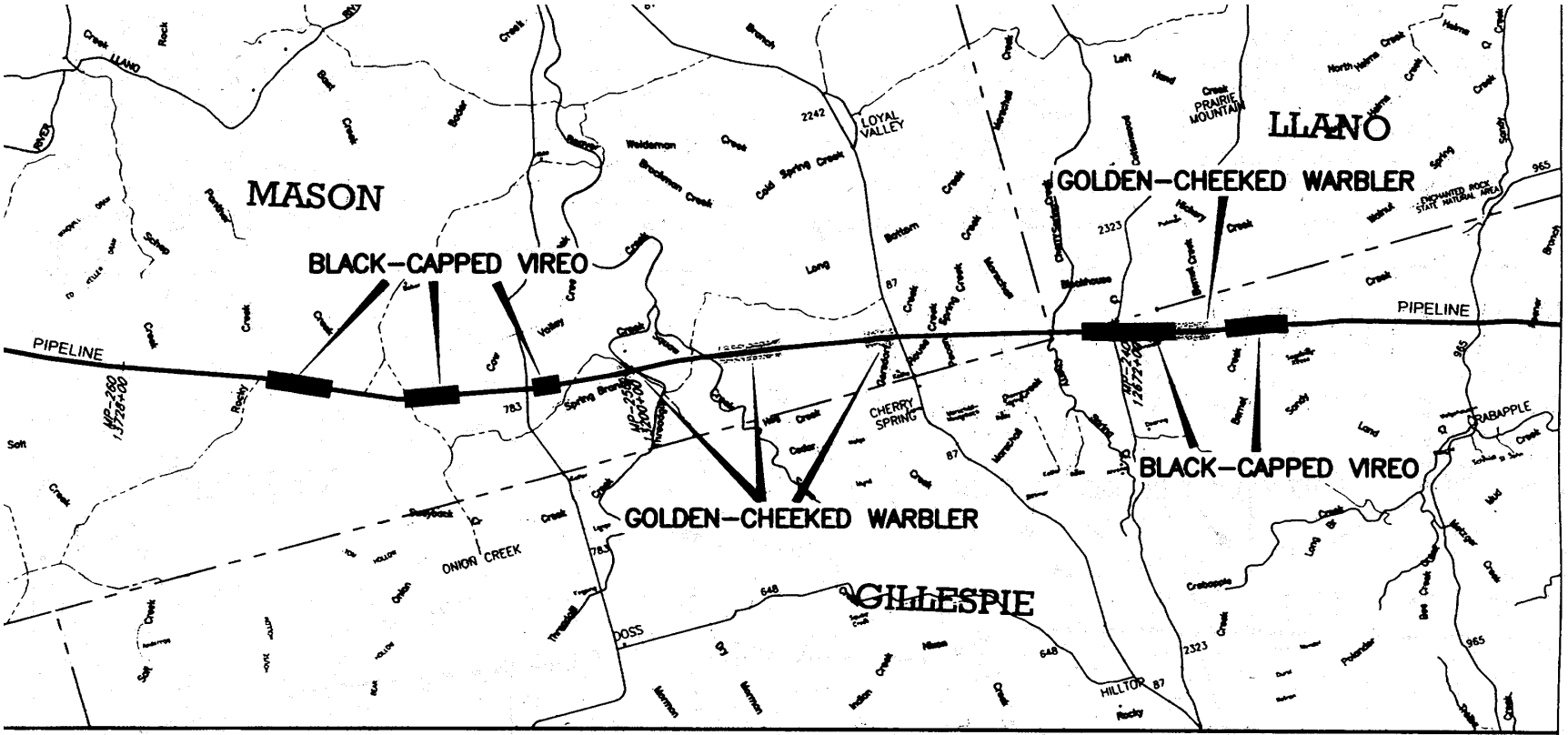
MILES

FIGURE 7

AREAS OF POTENTIAL FEDERALLY-LISTED THREATENED OR ENDANGERED SPECIES HABITAT TRAVERSED BY LONGHORN PIPELINE HOUSTON TO CRANE SEGMENT COUNTIES OF TEXAS

LONGHORN PIPELINE



SOURCES:

MAP SOURCES:

1. TEXAS NATURAL RESOURCE INFORMATION SYSTEM (http://www.tnris.state.tx.us/data_oz.html), 1998
2. TxDot COUNTY FILES FROM TEXAS NATURAL RESOURCES INFORMATION SYSTEM (3/9/98)

THREATENED OR ENDANGERED SPECIES REFERENCES:

1. ENDANGERED AND THREATENTENED ANIMALS OF TEXAS; TEXAS PARKS AND WILDLIFE DEPT. (1985)
2. THREATENED AND ENDANGERED SPECIES OF TEXAS; U.S. FISH AND WILDLIFE SERVICE (1992)
3. DETERMINATION OF CRITICAL HABITAT FOR THE HOUSTON TOAD; FEDERAL REGISTER 43(21):4022-4028; U.S. FISH AND WILDLIFE SERVICE (1978)
4. THREATENED OR ENDANGERED SPECIES INVESTIGATIONS, EZ PIPELINE PROJECT; HORIZON ENVIRONMENTAL SERVICES, INC. (JULY 1991)
5. ENDANGERED, THREATENED, OR PROTECTED NATIVE PLANTS OF TEXAS; TEXAS PARKS AND WILDLIFE DEPT. (1987)
6. HORIZON ENVIRONMENTAL SERVICES, INC., SITE INVESTIGATION (JUNE 1999)

EXPLANATION

- COUNTY BOUNDARY
- HIGHWAY OR MAJOR ROADS
- CITY STREETS
- ROADS
- RIVERS AND STREAMS
- INTERMITTENT STREAMS
- COMMUNITY BOUNDARIES
- RAILWAYS
- BRIDGES
- CEMETERY
- LONGHORN PIPELINE
- LLP-2546 MAINTENANCE CONSTRUCTION LOCATION

- TEXAS PRAIRIE DAWN-FLOWER *(Hymenoxys texana)*
- HOUSTON TOAD - DESIGNATED HABITAT *(Bufo houstonensis)*
- HOUSTON TOAD - POTENTIAL HABITAT *(Bufo houstonensis)*
- GOLDEN-CHEEKED WARBLER *(Dendroica chrysoparia)*
- BLACK-CAPPED VIREO *(Vireo atricapillus)*
- TOBUSCH FISHHOOK CACTUS *(Ancistrocactus tobuschii)*
- NAVASOTA LADIES-TRESSES *(Spiranthes parksii)*
- EDWARDS RECHARGE ZONE
- CONTRIBUTING ZONE

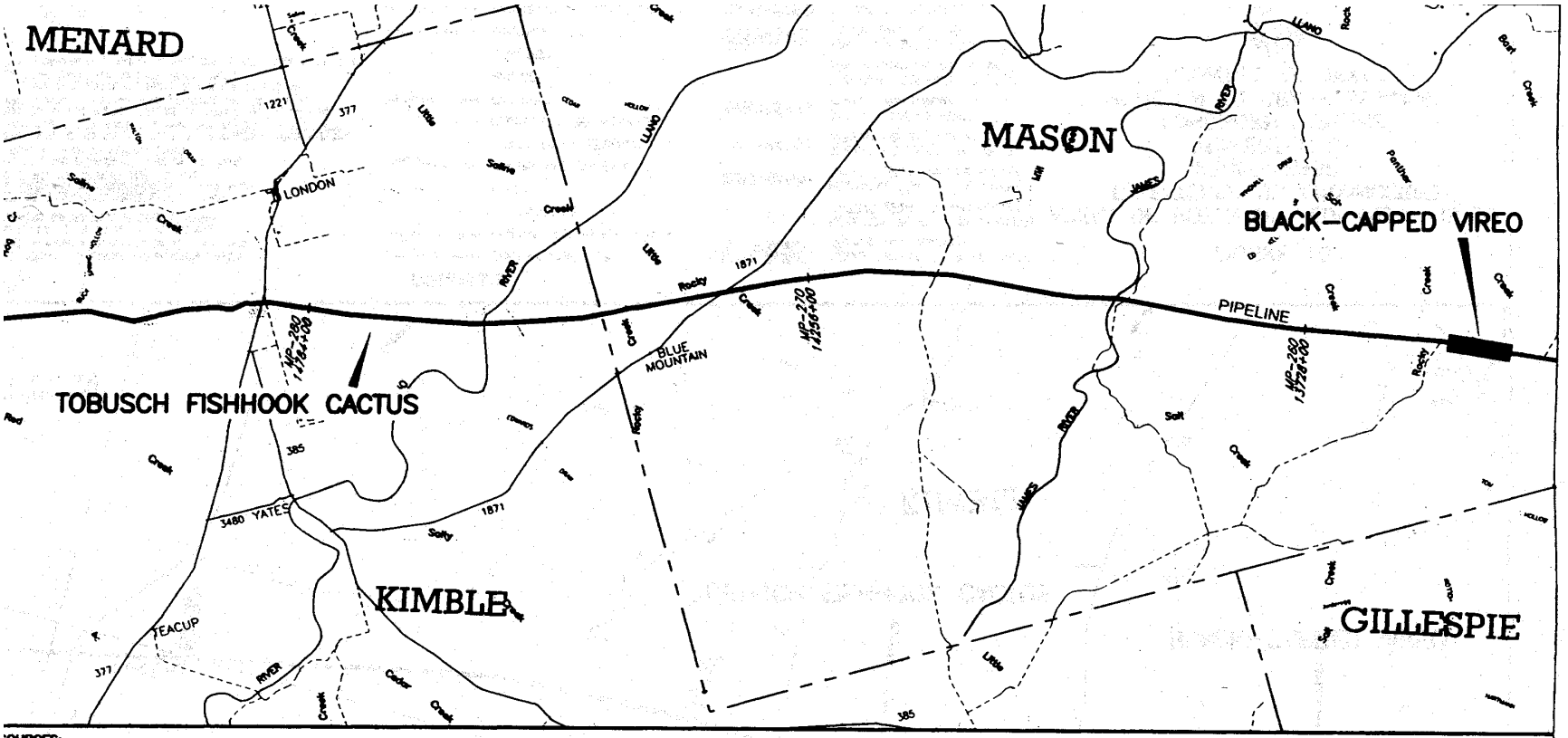
0 1.5 3 MILES

FIGURE 8

AREAS OF POTENTIAL FEDERALLY-LISTED THREATENED OR ENDANGERED SPECIES HABITAT TRAVERSED BY LONGHORN PIPELINE HOUSTON TO CRANE SEGMENT COUNTIES OF TEXAS

LONGHORN PIPELINE

RAD 39078



SOURCES:

MAP SOURCES:

1. TEXAS NATURAL RESOURCE INFORMATION SYSTEM (http://www.twris.state.tx.us/data_oz.html), 1998
2. TxDot COUNTY FILES FROM TEXAS NATURAL RESOURCES INFORMATION SYSTEM (3/9/98)

THREATENED OR ENDANGERED SPECIES REFERENCES:

1. ENDANGERED AND THREATENED ANIMALS OF TEXAS; TEXAS PARKS AND WILDLIFE DEPT. (1995)
2. THREATENED AND ENDANGERED SPECIES OF TEXAS; U.S. FISH AND WILDLIFE SERVICE (1992)
3. DETERMINATION OF CRITICAL HABITAT FOR THE HOUSTON TOAD; FEDERAL REGISTER 43(21):4002–4028; U.S. FISH AND WILDLIFE SERVICE (1978)
4. THREATENED OR ENDANGERED SPECIES INVESTIGATIONS, EZ PIPELINE PROJECT; HORIZON ENVIRONMENTAL SERVICES, INC. (JULY 1991)
5. ENDANGERED, THREATENED, OR PROTECTED NATIVE PLANTS OF TEXAS; TEXAS PARKS AND WILDLIFE DEPT. (1987)
6. HORIZON ENVIRONMENTAL SERVICES, INC., SITE INVESTIGATION (JUNE 1999)

0 1.5 3
MILES

EXPLANATION

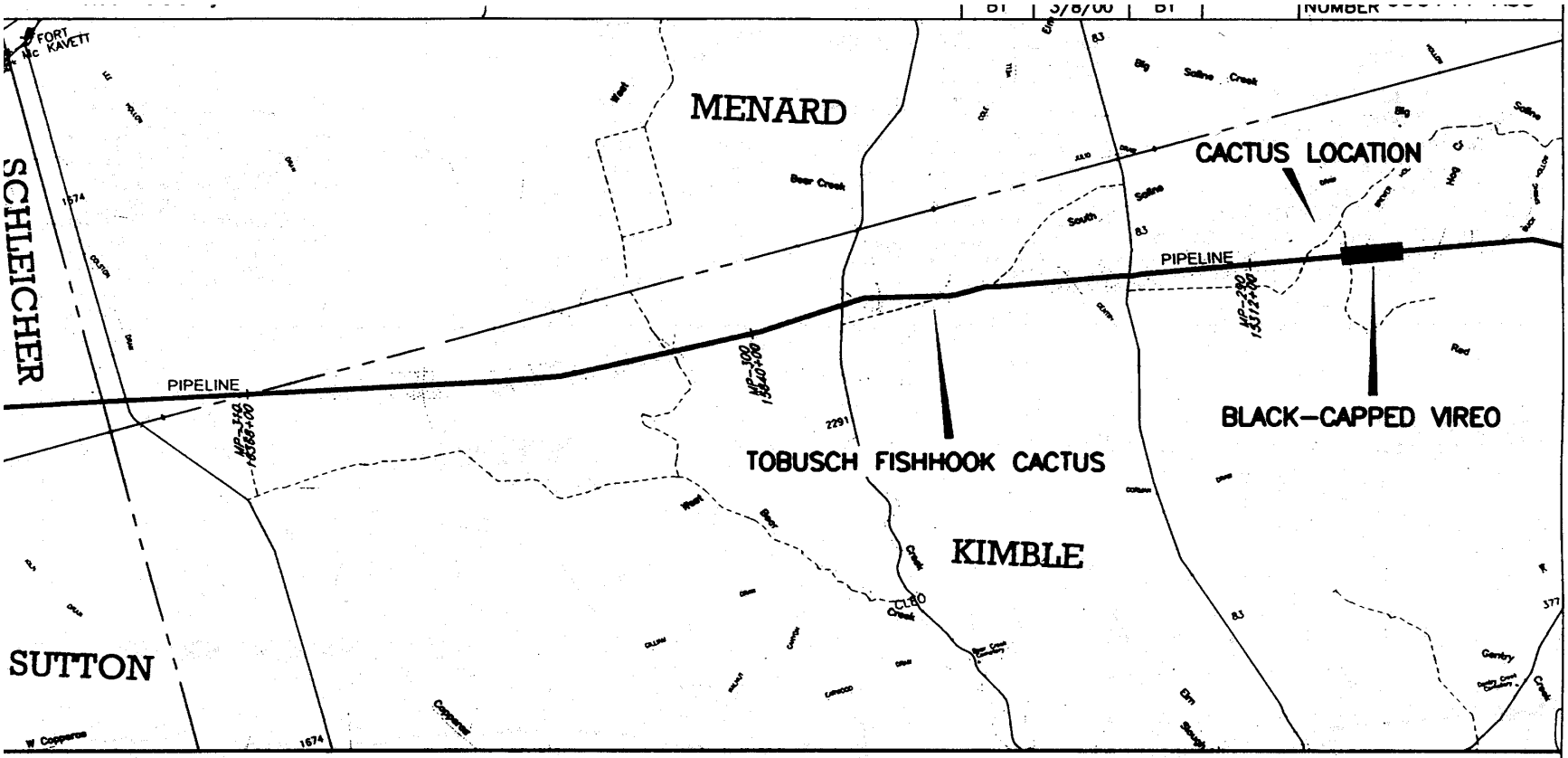
- COUNTY BOUNDARY
- HIGHWAY OR MAJOR ROADS
- CITY STREETS
- ROADS
- RIVERS AND STREAMS
- INTERMITTENT STREAMS
- COMMUNITY BOUNDARIES
- RAILWAYS
- BRIDGES
- CEMETERY
- LONGHORN PIPELINE
- LLP–2546 MAINTENANCE CONSTRUCTION LOCATION

- TEXAS PRAIRIE DAWN–FLOWER (*Hymenoxys texana*)
- HOUSTON TOAD – DESIGNATED HABITAT (*Bufo houstonensis*)
- HOUSTON TOAD – POTENTIAL HABITAT (*Bufo houstonensis*)
- GOLDEN–CHEEKED WARBLER (*Dendroica chrysoparia*)
- BLACK–CAPPED VIREO (*Vireo atricapillus*)
- TOBUSCH FISHHOOK CACTUS (*Ancistrocactus tobuschii*)
- NAVASOTA LADIES–TRESSES (*Spiranthes parksii*)
- EDWARDS RECHARGE ZONE
- CONTRIBUTING ZONE

FIGURE 9

AREAS OF POTENTIAL FEDERALLY–LISTED THREATENED OR ENDANGERED SPECIES HABITAT TRAVERSED BY LONGHORN PIPELINE HOUSTON TO CRANE SEGMENT COUNTIES OF TEXAS

LONGHORN PIPELINE



SOURCES:

MAP SOURCES:

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2. THREATENED AND ENDANGERED SPECIES OF TEXAS; U.S. FISH AND WILDLIFE SERVICE (1992)
3. DETERMINATION OF CRITICAL HABITAT FOR THE HOUSTON TOAD; FEDERAL REGISTER 43(21):4922–4026; U.S. FISH AND WILDLIFE SERVICE (1978)
4. THREATENED OR ENDANGERED SPECIES INVESTIGATIONS, EZ PIPELINE PROJECT; HORIZON ENVIRONMENTAL SERVICES, INC. (JULY 1991)
5. ENDANGERED, THREATENED, OR PROTECTED NATIVE PLANTS OF TEXAS; TEXAS PARKS AND WILDLIFE DEPT. (1987)
6. HORIZON ENVIRONMENTAL SERVICES, INC., SITE INVESTIGATION (JUNE 1999)

0 1.5 3
MILES

EXPLANATION

- COUNTY BOUNDARY
- HIGHWAY OR MAJOR ROADS
- CITY STREETS
- ROADS
- RIVERS AND STREAMS
- INTERMITTENT STREAMS
- COMMUNITY BOUNDARIES
- RAILWAYS
- BRIDGES
- CEMETERY
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- TOBUSCH FISHHOOK CACTUS (*Ancistrocactus tobuschii*)
- NAVASOTA LADIES–TRESSES (*Spiranthes parksii*)
- EDWARDS RECHARGE ZONE
- CONTRIBUTING ZONE

FIGURE 10

AREAS OF POTENTIAL FEDERALLY–LISTED THREATENED OR ENDANGERED SPECIES HABITAT TRAVERSED BY LONGHORN PIPELINE HOUSTON TO CRANE SEGMENT COUNTIES OF TEXAS

LONGHORN PIPELINE

RAD 39080

3.2 Pipeline Operation

Operation of the Longhorn Pipeline essentially involves the pumping of refined petroleum products through the pipeline to terminals at El Paso and Odessa, where the products are stored in above-ground breakout tanks. From either terminal, the products will be loaded into tank trucks for transport to distribution facilities (such as gas stations and fleet servicing facilities). In addition, at the El Paso Terminal the products may be re-introduced into the connecting pipelines, and then to interstate pipelines operated by Kinder Morgan and Chevron, for transport to southwestern markets.

The process of pumping refined products involves the following steps. First, products from bulk storage tanks at the GATX terminal in Galena Park are introduced in batches to the pipeline at the Longhorn GATX pump station. As the products proceed through the pipeline, booster pump stations continue to move the product stream; those booster stations include Satsuma Station in northwest Houston, Cedar Valley Station in Hays County, Kimble County Station in Kimble County, and Crane Station in Crane County. Product destined for Odessa is stored in above-ground breakout tanks prior to re-introduction to the 8-inch pipeline between Crane and Odessa.

The pipeline system is operated and controlled remotely from the Williams control center in Tulsa, Oklahoma, using the supervisory control and data acquisition (SCADA) system. The SCADA system allows the controller to start and stop pumps, open and close valves, and monitor the functions of the system components. Pump station and valve site operations are managed by programmable logic controllers that interpret and execute commands from the system controller. A multitude of sensors installed in the pipeline and its equipment provide data to the controller and the automated leak detection system. Primary communications are conducted by satellite, with backup provided by land line systems.

Section 7.0 of the Longhorn Pipeline Project Description provides additional detail about system operation; see Phase Two Project Documentation Appendix at Tab 6.

3.3 Long-Term Maintenance

Maintenance of the Longhorn Pipeline requires activities directed to specific components of the system. For example, pumps and valves receive inspections and maintenance such as lubrication; above-ground tanks receive inspections and maintenance; the right-of-way (ROW) is mowed periodically, and ROW marker signs are erected and replaced as necessary (see Phase One BA); and the pipe is periodically subjected to thorough inspection and analysis that may dictate a variety of maintenance approaches. Additionally, corrosion inhibitor is regularly injected into the product stream to prevent internal corrosion. This Phase Two BA focuses on those maintenance activities that could occur within areas of habitat identified during Phase One. Since the El Paso terminal is not within potential habitat areas, terminal maintenance activities are not treated in this BA. Since Kimble County Station is within a habitat area (Tobusch Fishhook Cactus) and Cedar Valley Station is in an area of potential effect to the Barton Spring Salamander, station maintenance descriptions will focus on activities conducted at those stations.

<u>Valve Maintenance</u>

Valve maintenance involves periodic inspections (twice per year, not to exceed 7 ½ months between inspections, per 49 C.F.R. 195.420(a)) to ensure that the valve is not leaking and to confirm that the valve is operable. Leak and overall condition inspection is visual, as described in the Williams Operating and Maintenance Manuals, Maintenance and Calibration section, Valve Maintenance and Calibration (Phase Two Project Documentation Appendix at Tab 7). If a leak is identified, corrective action is taken to stop the leak and perform cleanup of any product released. All lubricants are managed to prevent any release to the environment; specific procedures are identified in the Williams System of Manuals, Operating Manual, Section 12 (Phase Two Project Documentation Appendix at Tab 7).

Pipeline Cleaning

Pipeline cleaning is conducted approximately twice per year to remove deposits from the inner walls of the pipe. Pipe cleaning involves the introduction of a spherical or cylindrical scraper (also known as a scraper pig) into the pipeline at a pump station; the scraper travels within the product stream and is removed at a downstream station, along with any debris collected along the way. Launching and receipt of the scrapers is accomplished by way of scraper launchers and scraper receivers (traps, also known as strainers) that are installed at the pump stations. Any debris removed from the pipeline is contained in drums, and drip pans are employed to prevent release to the environment; disposal of the material is conducted in accordance with applicable laws and regulations.

Pump Station Maintenance

Pump station maintenance protocols depend upon the equipment located at each individual station; however, only two similarly equipped stations lie within habitat or in an area of potential effect to species. Those are Kimble County station which is located in Tobusch Fishhook Cactus habitat in Kimble County and Cedar Valley Station which is located in the Edwards Aquifer contributing zone. Each of those stations contains minimal equipment, the major components of which are pumps and electric motors, scraper launcher/traps, above-ground station piping (to bypass a pump or the station as a whole), intake and outflow (suction and discharge) remote-controlled motor operated block valves, and a station control room. No tanks are located at those two stations.

Maintenance of the pump station equipment follows generally the same procedures outlined above for valve maintenance, and below for painting of above-ground components. Pumps require inspection and periodic calibration. Calibration requires that the pump cases be opened for measurement of component tolerances. To do so, the pump is isolated from the pressurized pipeline system, and the case is opened; product remaining within the case is collected in a sump system for re-injection to the product stream. The sump system is sealed and cathodically protected to prevent releases to the subsurface. Drain pans are used if product cannot be drained to the sump; the drain pans are emptied to the sump system for re-injection. Any debris removed from the pump case, along with wipe rags, sorbent pads, and other disposable materials, are collected in a closed top containment drum and stored on a concrete containment skid. The waste materials are classified and then disposed of at an approved disposal facility.

Pipe cleaning debris (see foregoing section) is collected in strainers located at each pump station. The strainers are located upon a concrete skid that contains any liquid from the strainer and drains to the station sump system. Drain pans are used to contain any liquid that will not drain directly to the sump system. Debris removed from the strainer is collected in closed top containment drums and stored on a concrete containment skid. The waste materials are classified and then disposed of at an approved disposal facility.

Painting Above-Ground Components

Above-ground pipeline components must be protected with coatings (Longhorn uses paint) to prevent atmospheric corrosion (49 C.F.R. § 195.416(i)). Above-ground facilities include pump equipment, valves, meter facilities, and the like. Maintenance of the coatings requires periodic painting, typically on a 5 to 10 year cycle. Any waste materials generated during painting are managed to prevent release to the environment. See the Williams System of Manuals, Operating Manual, Section 12 and the Longhorn Environmental Protection Plan (Phase Two Project Documentation Appendix at Tabs 7 and 8, respectively).

Pipe Integrity Maintenance - Introduction

Pipe integrity maintenance activities result from inspections and analyses that identify potential threats to pipe integrity; maintenance may then occur to reduce the risk associated with a particular threat.

In-Line Inspection

In-line inspection is the process of examining the pipe for flaws, corrosion anomalies, dents, cracks, and other flaws using sophisticated electronic inspection devices known as smart pigs. The technology applied is known as high resolution magnetic flux leakage (MFL) and transverse field MFL, and geometry and ultrasonic inspections are performed as well. Smart pigs identify anomalies and record the locations. The smart pig data is then processed and analyzed, both manually and by computer, to determine whether or not the identified anomalies represent pipe flaws that require corrective action. Next, the anomalies are graded and prioritized for inspection; upon inspection, repairs are made, if necessary, to offset the potential adverse effect of the specific flaw. Actions will range from re-coating of a location not requiring repair, to replacement of the flawed pipe with a cylinder of new pipe; typically minor repair such as application of a protective sleeve is all that is necessary. Maintenance construction to investigate and repair flaws identified by the in-line inspection will be conducted in accordance with the procedures set out in the Phase One BA.

An in-line inspection may produce data that indicates an immediate threat to pipeline integrity, prompting an immediate inspection by excavating the pipe. If an actual threat exists, a repair is made, and otherwise the pipe is coated and buried. In either event, the protection of human health and safety and of the environment is accomplished while efforts are undertaken to avoid all potential adverse effects. See LMP at Sec. 3.5.2.

Smart pigs are introduced and extracted from the operating pipeline through the scraper launcher/trap at each pump station; however, some pipeline segments between pump

stations are long enough that the smart pig cannot complete the entire run. In such cases, a temporary launcher/trap assembly is installed on the pipeline to allow removal of the smart pig so that data may be downloaded, batteries recharged, and the smart pig re-launched. Construction to install and remove the temporary launcher/trap assembly is similar to construction to install a hydrostatic pressure test header as described in the Phase One BA. Electronic tracking devices that monitor and record smart pig travel are set on top of the ground during the tests.

The initial in-line inspections to be performed pursuant to Longhorn Mitigation Commitment 11 shall consist of a high resolution MFL inspection within three (3) months of system startup. The timing of subsequent in-line inspections of all types will be determined by the Longhorn Pipeline System Integrity Plan and associated Operational Reliability Assessment processes.; the LMP sets maximum intervals for certain tools See Longhorn Mitigation Plan, Items 10, 11, 12, and 12A, and at Section 4.0. No more than three years shall pass without at least one in-line inspection. Temporary launcher/trap assemblies, if any are necessary, will be installed outside of areas of species habitat; thus, no effect upon species is foreseen as a result of in-line inspections.

Hydrostatic Pressure Testing

Integrity maintenance of the pipeline could require periodic hydrostatic pressure testing, if prompted by the Longhorn Operational Reliability Assessment (see LMP at Sec. 3.3 and 4.0). Hydrostatic pressure testing as prompted by the ORA could encompass different segments of or all of the pipeline. The Phase One BA describes in detail the processes and activities involved in hydrostatic testing, and future testing will be conducted in conformance with the Phase One BA in all respects to avoid potential adverse effects.

Corrosion Inhibitor Treatment

Shortly after the conclusion of this consultation, Longhorn will treat the pipeline to prevent potential internal corrosion. As a matter of course, potential internal pipe corrosion is managed through several means including the injection of corrosion inhibitors to the product stream. Due to the delays encountered during the Environmental Assessment of the Longhorn pipeline, however, product has not been transported and no corrosion inhibitor has been applied.

At the urging of the Service, Longhorn elected not to inject corrosion inhibitor during the hydrostatic and proof tests commenced in February. Due to the project delays associated with the Environmental Assessment, Longhorn intends to treat the pipeline at its next opportunity to reduce the potential for internal corrosion prior to project startup. This process may be repeated from time to time as deemed necessary to maintain internal pipeline integrity; however, Longhorn's present expectation is that only one such treatment will be necessary.

The treatment process involves the introduction of a water and corrosion inhibitor mixture into the pipeline at the GATX Terminal in Houston and the mixture pushed through the pipeline with injected nitrogen gas pressure. This will not constitute a pressure test or alteration of operating pressures. Maximum pressures involved in the procedure would not reach normal operating pressures. These pressures are significantly below the 1,100 to

1,500 psig pressures experienced during periodic hydrostatic testing of the pipeline. At seven intervals along the pipeline (existing valve settings), surface equipment would be needed to facilitate the handling of the water slug and pigs if the procedure is conducted independent of product flow in the line. Those points typically would be:

MP 34.09 (Satsuma Station)

MP 134.67 (west side of Colorado River)

MP 151 (eastern Travis County)

MP 182 (Cedar Valley Station)

MP 227.9 (Eckert Station)

MP 358.7 (west of El Dorado)

MP 457.5 (Crane Station)

At these points, trucks and equipment would be employed to facilitate the launching and recovery of pigs and nitrogen injection. The water mixture would be recovered into vacuum trucks at Crane Station for proper disposal.

The corrosion inhibitor agent to be utilized is manufactured by Baker-Petrolite and goes by the commercial name "Magnacide 575." Material Safety Data Sheets for this product are included in the Phase Two Project Documentation Appendix.

Cathodic Protection

Maintenance of the cathodic protection system requires periodic inspection and testing and potential system enhancements. Testing and inspection involves pipe-to-soil surveys, close interval surveys, rectifier inspections, casing tests, and interference testing.

Pipe-to-soil potential surveys require that pipe-to-soil readings, measured in volts, be taken at pre-existing test stations that are spaced along the pipeline. Survey personnel typically travel along the pipeline in a pickup truck. Pipe-to-soil surveys will occur semi-annually in EA-designated sensitive and hypersensitive areas and annually in other areas.

Close interval surveys require that pipe-to-soil potential readings be taken approximately every three feet along the pipeline; thus, testing personnel walk the pipeline, typically in a group of two to five, carrying testing equipment and data loggers. Close interval surveys will be conducted annually in EA-designated hypersensitive areas and on the balance of the pipeline as dictated by the Longhorn Pipeline System Integrity Plan and associated Operational Reliability Assessment (see LMP at Sections 3 and 4, Tab 4).

Rectifier inspections include monthly visual inspection and recording of voltage and amperage readings to ensure normal operation; bi-monthly inspections are required by the pipeline safety regulations (49 C.F.R. § 195.416(c)). Casing testing may involve pipe-to-soil potential readings and/or electrical current and resistance readings to determine if the

casing is in direct contact or electrolytically shorted to the carrier pipe. Interference testing involves pipe-to-soil readings and/or line current measurements to determine whether or not a nearby metal object (such as a crossing or parallel pipeline) or the associated cathodic protection system is interfering with the cathodic protection current that protects the Longhorn pipeline.

Pipe-to-soil surveys, close interval surveys, casing testing, and foreign interference testing may identify sections of pipe that require additional cathodic protection or other measures, such as coating re-conditioning, shorted casing remediation, or installation of a bond between the Longhorn pipeline and a source of foreign structure cathodic protection interference.

The addition of cathodic protection current most likely will occur through the installation of sacrificial anode or impressed current ground beds. The procedure for installation of a ground bed is contained in the Phase One BA, as is the procedure for coating reconditioning. Shorted casing remediation involves removal of a direct metallic short (i.e., a spacer bolt or a short segment of the casing end in contact with the carrier pipe), or draining electrolyte (water/mud) from the casing. Some casing remediations may require installation of new pipe, often concrete coated, through the casing or the installation of heavy wall thickness pipe, also with an abrasion resistant overcoat (i.e., concrete), bored under the road/railroad crossing. Any such work in habitat areas will follow the maintenance construction procedure outlined in the Phase One BA.

Installation of a bond (a cable) to a foreign source of cathodic protection interference would involve a small excavation between the Longhorn Pipeline and the foreign structure, which are by definition in close proximity. A cable is installed between the facilities and secured to the pipe, usually by thermite welding. Typically, an interference bond installation will occur at or very near a crossing of the pipelines. A bell-hole excavation of approximately ten feet by ten feet, or one-hundred square feet, is sufficient. A depth to that of the deepest line, normally six to eight feet, is needed for the installation. Note that only the top side of the deeper line, not the entire circumference, needs to be exposed to accommodate lead attachment. The cables are brought into an aboveground test station for current flow and pipe-to-soil potential monitoring. The test station will generally be set directly over the pipelines' intersection. However, in some cases, if a fence line is nearby, the leads will be extended to that fence and the test station installed at that location. The trench for leads from the pipelines' intersection to the fence could range from ten to usually not more than fifty feet and from 8 inches to three feet wide and approximately 30 inches deep or below plow depth. Typically, not more than one-hundred-fifty square feet of surface area is disturbed for this trench and it typically remains within the pipeline rights-of-way. Coating disturbed during cable installation is repaired. Any such work in habitat areas will follow the maintenance construction procedure outlined in the Phase One BA.

Cathodic protection system maintenance construction is typically conducted completely within the existing ROW. Though unexpected, the possibility exists that future construction could require work to occur outside the existing ROW, since a particular site could be attended with work space constraints (see procedure in the Phase One BA).

Depth of Cover

In 1998 Longhorn performed a depth of cover survey to determine the burial depth of the pipeline. In response to the findings of that depth of cover survey, Longhorn has identified a number of locations where the pipeline will be lowered or replaced. Examples of such locations are represented by LMCs 5 and 18; those locations were identified through the depth of cover survey and assigned priority either by Radian in the case of sensitive and hypersensitive areas (LMC 5) or by Longhorn in the case of other lowerings (LMC 18). In the coming years, the Longhorn Pipeline System Integrity Plan, Depth of Cover element, will determine, on a risk-assessed basis, the order and timing of future pipeline lowerings. The locations are prioritized by evaluating the potential for damage to the pipe.

As those locations are addressed, the activity will follow the maintenance construction procedures described in the Phase One BA. Maintenance construction is typically conducted completely within the existing ROW. Though unexpected, the possibility exists that future construction could require work to occur outside the existing ROW, since a particular site could be attended with work space constraints (see procedure in the Phase One BA).

Removal of Encroachments

Longhorn has identified a number of encroachments that will be removed from the pipeline ROW within one year of system startup, in accordance with the commitments of the LMP (See LMC 16). The Service has requested Longhorn's assistance to increase landowner awareness of species and habitat concerns in connection with encroachment removal. Longhorn thus hereby commits to seek to include in any agreement with an encroaching landowner the following acknowledgment:

> Landowner is hereby informed that threatened or endangered species and/or habitat may exist upon or in proximity to the Property [defined term to identify the Longhorn ROW], and Landowner may have responsibilities to consult with the U.S. Fish and Wildlife Service pursuant to the Endangered Species Act.

Longhorn acknowledges that the foregoing does not specifically prohibit by contract Landowner activity that could cause adverse effects to species and habitat. Since any agreement for encroachment removal would be voluntary, Longhorn cannot force landowners to agree that adverse effects will be avoided. Landowners would simply refuse to agree to such prohibitions, leaving Longhorn's power of eminent domain as the remedy. The power of eminent domain does not include within its scope the authority to require landowners to contractually agree to comply with applicable statutory requirements. In summary, Longhorn agrees to raise awareness as much as it legally may.

Section 7.0 of the Longhorn Pipeline Project Description provides additional detail about system operation and maintenance; see Phase Two Project Documentation Appendix at Tab 6.

3.4 Emergency Response

Risk Based Approach – Longhorn Mitigation Plan

The EA process included the identification of pipeline mitigation measures that Longhorn has committed to implement. Many of the pipeline mitigation measures were identified in response to potential risks identified in the EA. The pipeline mitigation measures are designed to reduce those risks by prioritizing the deployment of resources toward the following goals:

- Prevention: Reduce the risk of a release by focusing on the four primary categories of risk: outside force damage, corrosion, material defects, and improper operation.

- Detection: Rapid identification of a pipeline release through use of the best available leak detection technology system-wide, and sensor-based technology in the Edwards Aquifer recharge zone.

- Release Volume Minimization: Optimal use of block valves, coupled with the installation of additional check valves, will serve to reduce potential spill volumes, including in areas of potential effect to species.

- Control: Enhanced emergency response capability that employs thorough, detailed pre-planning, resource identification, and resource retention.

A description of the manner in which those pipeline mitigation measures reduce risk is presented in Longhorn's Risk Reduction Benefits Summary, Phase Two Project Documentation Appendix at Tab 9.

Prevention – Reduce the Risk of a Release

Numerous pipeline mitigation measures are focused on reducing the risk of a pipeline release; many pipeline mitigation measures reduce more than one risk category. For example, hydrostatic pressure testing of the pipeline addresses outside force damage, corrosion, and material defects by testing the pipeline to pressures that create a margin of safety above operating pressures. Flaws that would create a potential for release during operation are eliminated by raising and maintaining internal pipe pressure to at least 125% of its operating pressure over an eight hour period.

The pipeline mitigation measures that reduce the risk of a release include the following:

- Hydrostatic pressure testing (LMCs 1 and 2)
- Replacement of an 19-mile segment over the Edwards Aquifer recharge and contributing zones, with the additional protection of a concrete barrier over the pipe (LMC 3)
- Cathodic protection system enhancements (LMC 4)
- Lowering, replacing and/or reconditioning if necessary at least 38 locations (LMCs 5 and 18)
- Removal of stopple fittings (LMC 6)
- Investigation and repair if necessary of 7 potential pipeline flaws (LMCs 7 and 8)
- Replacement of the crossing of Rabbs Creek (LMC 8)
- Surge pressure in EA designated sensitive and hypersensitive areas will not exceed maximum operating pressure (LMC 9)

- In-line inspection within 3 months of system startup and additional in-line inspections according to the LMP, the Longhorn Pipeline System Integrity Plan and associated Operational Reliability Assessment (LMCs 10, 11, and 12)
- Increased frequency of cathodic protection system performance testing (LMCs 14 and 32)
- Documentation of adequate pipeline span support and secondary containment at tank facilities (LMCs 15 and 27)
- Removal of encroachments to the pipeline ROW (LMC 16)
- Clearing the ROW to excellent condition (LMC 17)
- Analysis and remediation if necessary of stress corrosion cracking and earth movement risks (such as water crossings and seismic activity) (LMC 19)
- Increased frequency of pipeline surveillance patrols (LMC 20)
- Increased frequency of pump station inspections and installation of remote cameras at all pump stations (LMC 21)
- Performance of a water crossing valve study, with DOT review and concurrence, of additional check valves (LMC 22)
- Development of an enhanced public education program, with performance monitoring (LMC 25)

The effect of the above mitigation measures is to significantly reduce risk far below pre-mitigation levels.

Detect – Best Available Leak Detection Technology

Longhorn has committed to employ the best available, proven leak detection technology in the pipeline industry. Pipeline mitigation measures that improve leak detection, thus reducing the risk of an undetected leak, include the following:

- Enhanced, computational-based leak detection system-wide, and sensor-based leak detection over the Edwards Aquifer recharge zone and the Slaughter Creek watershed in the contributing zone (LMC 13)
- Removal of encroachments to the pipeline ROW (LMC 16)
- Clearing the ROW to excellent condition (LMC 17; see Phase One BA and the Service's February 17, 2000 Biological Opinion)
- Increased frequency of pipeline surveillance patrols (LMC 20)
- Increased frequency of pump station inspections and installation of remote cameras at all pump stations (LMC 21)
- Development of an enhanced public education program, with performance monitoring (LMC 25)

Minimize – Reduce Potential Release Volumes

Pipeline mitigation measures also focus on reduction of potential leak volumes:

- Enhanced, computational-based leak detection system-wide, and sensor-based leak detection over the Edwards Aquifer recharge zone and the Slaughter Creek watershed in the contributing zone (LMC 13)

- Performance of a water crossing valve study, with DOT review and concurrence of additional valves (LMC 22)
- Install additional check valves, one over the Edwards Aquifer recharge zone and one over the Edwards Aquifer contributing zone (this Phase Two BA; see section entitled Edwards Aquifer Protections)

Control --Maximize Emergency Response Capability

Finally, Longhorn has committed to bolster its emergency response planning and preparedness capability to reduce response times and to be prepared, in advance, with a full response effort:

- Ensure maximum 2-hour full response to EA designated sensitive areas, maximum 1 to 2 hours in hypersensitive areas, and maximum 1-hour response in the Edwards Aquifer recharge zone and the Slaughter Creek watershed in the contributing zone (LMC 23)
- Establish a response center in South Austin (LMC 23)
- Enhanced facility response plan will:
  - Address firefighting in areas without Hazardous Materials response units (LMC 24)
  - Provide detailed planning for areas with high populations of potentially sensitive receptors (LMC 26)
  - Establish consistency with the City of Austin Barton Springs Oil Spill Response Plan and the Service's Barton Springs Salamander Recovery Plan (LMC 28)
  - Identify and provide detailed planning for multiple response locations within the Edwards Aquifer recharge and contributing zones selected on the basis of calculations of worst case times of transport to the recharge zone

In addition, Longhorn has included potential habitat areas on response plan maps and included protection of such habitat areas in response planning and preparedness training, in response to the Comment Letter (see Oil Pollution Act of 1990 Facility Response Plan).

Probability of Release and Risk Reduction

Longhorn has calculated the pre-mitigation probability of a pipeline release for the potential habitat areas along the pipeline. Those figures are presented in the APR report at Tab 10 of the Phase Two Project Documentation Appendix. The basis for the probabilities calculated is *pre-mitigation* data compiled by Radian for the Environmental Assessment. Thus, the probabilities do not take into account the numerous risk-reducing pipeline mitigation measures that Longhorn has committed to implement and is in the process of implementing; see above section Prevention - Reduce the Risk of a Release, and Table 2, Chronology of Longhorn Pipeline Actions. The result, then, is that the possibility of a release in the potential habitat areas will be further reduced from those shown in APR report.

System-Wide Software-Based Leak Detection

The Longhorn Pipeline will employ the best available, technologically proven pipeline leak detection system. The leak detection system is described in the following excerpt from Item 13 of the LMP submitted in connection with the EA:

"Objective:

The objective of this program is to identify the Longhorn Release Detection Systems that will be employed to minimize both the leak identification time and the shutdown time required to minimize the size and impact of a potential leak on the Longhorn Pipeline System.

Leak Detection Systems:

Leak detection for the unintended escape or potential loss of product from Longhorn Pipeline incorporates the use of a combination of visual, mechanical, and analytical processes, equipment, and models. Collectively, Longhorn's Leak Detection System capabilities, which provide for several areas of overlap, are designed to significantly reduce the likelihood of a protracted period of undetected pipeline system breaches and continued pipeline operations that would adversely contribute to human or environmental exposure to hydrocarbon products. Heightened awareness of the designated sensitive and hypersensitive areas along the Longhorn pipeline has resulted in the employment of enhanced leak detection technology and processes.

Longhorn's Leak Detection System is comprised of two primary components: External Patrols; and Technology Based systems. By design, these two areas of leak detection provide redundancy and assurance that a release will be detected within the shortest time possible using current best available technology.

External Patrols:

External Patrol of the Longhorn Pipeline System is primarily accomplished through the targeted activities of Longhorn Operations and directed third party surveillance contract personnel. Some of these activities include aerial patrol, inspection of water crossings, ground based right-of-way patrol, tank dike inspection, scheduled inspections of valve locations, surface facilities, buried road crossings, and DOT regulatory based activities.

External Patrol is also enhanced through the incorporation of data obtained through normal pipeline maintenance activities, such as those accomplished via cathodic protection inspections, One-Call line spotting, and physical pipeline examination during pipeline exposures.

Another important source of input under the category of External Patrol results from the involvement of the general public, emergency response organizations, contractors, and other third party sources. These groups are specifically targeted via Longhorn's Damage Prevention Program (see

Longhorn Pipeline System Integrity Plan) and other activities which are designed to instill awareness of the location of the pipeline corridor. Further, active public education programs are designed to result in an increase in public knowledge by which to primarily avoid, but to secondarily recognize, any activities that could reasonably lead to adverse effects to the pipeline system. With pipeline location awareness, product characteristic information, and emergency response phone numbers and points of contact, the general public, emergency responders, contractors, and other third party groups serve as further insurance that system leaks can be minimized from third party damage, may be recognized if one occurs, and in that case be communicated to Longhorn Operations personnel.

External Patrol leak detection is dependent upon the physical identification of some abnormality or change from the characteristics of the surrounding area of the pipeline corridor. Physical evidence can include a hydrocarbon odor, a sheen on a water surface, spraying product, bubbles along the ground, discoloration of soil, areas of vegetation "browning," and fires in near proximity to the pipeline assets. Similar to many other methods of leak detection, External Patrol leak detection can readily identify a moderate to major product release. Smaller leaks, be they from pinhole leaks or leaking pipeline components, often require more time to trigger the physical indicators such as defoliation or odor which indicate a potential product leak.

Technology Based:

Longhorn will employ a leak detection software system to monitor the operation of its pipeline system. This system represents the current best available, proven technology in the industry. The leak detection software is a transient model that is designed to analyze and compare the actual pipeline operations of pressures and flow rates against theoretical values during both steady state and changing conditions. Deviations between actual and theoretical values result in alarm indications and notification to the Operations Control Center for subsequent review, analysis, investigation, and if appropriate shutdown of the pipeline system.

Longhorn approached the selection of a computational based leak detection software system through the employment of a highly respected third party consultant who has demonstrated experience in the field of pipeline SCADA systems and leak detection, along with a current understanding of leak detection technologies and performance capabilities. Leak detection performance requirements, based upon demonstrated industry achievable levels and best available transient model technology, were developed by Longhorn's consultant and approved by Longhorn's management. Computational based Leak Detection "Requests For Proposals" were sent to several prospective vendors, and responses were returned to Longhorn's consultant for detailed review and evaluation. The review/analysis process included clarifying discussions with the vendors, technical presentations, and detailed reference checks with provided customer lists. This process yielded two vendors who were judged to be capable of meeting the leak detection

performance requirements established by Longhorn. Further discussions with the two "finalists" resulted in the selection of the computational based leak detection software system that was determined to have the higher degree of leak detection performance.

The software based leak detection system is fundamentally a volume (mass) balance system that employs a fully transient model. The flow balance calculated from flow measurements is corrected by the packing rate, which is calculated by the "real-time" model. The resulting volume balance allows calculation of potential leak indicators. A leak would be identified by comparing the node flow balances at measurement points. The model dynamically tracks changes in the pipeline's flow rate. Variation between modeled and measured flow shows up in the volume balance calculation. The rate of change of all boundary measurements affects the leak detection by affecting the model directly, as well as the dynamic thresholds. Leak alarm thresholds are provided for each volume balance section and averaging interval.

The SCADA system used for the Longhorn pipeline system operates on Neles (formerly Valmet Automation) Oasys software version 5.2. Longhorn operator Williams subscribes to the Neles maintenance program which provides software program updates. Williams maintains the most current revision of version 5.2. The Neles Oasys system provides an extremely reliable communication and control link with the pipeline system components. For example, in 1999 the SCADA system experienced 99.954% reliability (after deduction for Y2K testing). The 0.046% down time for that year is attributable to a single four-hour service outage. Thus, it is very unlikely that the SCADA system would be out of service for any appreciable amount of time.

A SCADA system outage could result in a loss of leak detection system sensitivity. An outage which does not affect the entire SCADA system can occur, for example, with the loss of data from a remote terminal unit (RTU) at a pump station for more than three minutes, in which case an alarm sounds in the Control Center to alert the controller. Under such circumstances, the system uses backup land line communications links to reestablish communications. However, the leak detection system is able to maintain its detection capability by modeling across the point of data loss. A loss of SCADA communications that affected the entire system, for example because of a computer malfunction, would immediately be known to the controller. If the SCADA system experiences any outage that results in a total loss of leak detection capability for all or any portion of the pipeline for a period in excess of 5 minutes, then the controller will take action to achieve system shutdown within 30 minutes. In the event that the SCADA system experiences an outage that does not result in a loss of leak detection capability, but instead results in a diminished capability of the system to detect a leak, then the controller will take action to achieve system shutdown within 30 minutes if the capability of the system to detect leaks is diminished

to a level that would prevent Longhorn from meeting its "Leak Detection Performance Commitment" set out below.

Further Enhancement:

In addition to the computational based leak detection system, Longhorn has committed to employ additional technology to provide for more stringent leak detection across the environmentally sensitive Edwards Aquifer Recharge Zone and the Slaughter Creek watershed in the Edwards Aquifer Contributing Zone (the "Enhanced Leak Detection System"). In order to achieve this capability, Longhorn plans to employ a hydrocarbon sensing leak detection cable system that has clearly demonstrated the leak detection capability to satisfy Longhorn's commitment contained within Mitigation Commitment 13.

This system is designed to detect a leak as small as 0.0030467 barrel per hour in twelve (12) to one hundred twenty (120) minutes from contact with the leak detection cable, depending upon the product sensed by the system. Several factors will make it probable that any released product will come into contact with the leak detection cable within a minimum amount of time, including the following: (a) the construction methods that Longhorn will employ over the recharge and contributing zones during replacement of this segment of pipe, including protection of all identified subsurface voids; and (b) backfill materials used within the trench (primarily fine materials to provide padding to the pipe and otherwise relatively porous media), coupled with the primarily limestone geology of the Edwards outcrop and the fact of the in-trench materials having been disturbed will cause any released product to accumulate within the trench where the leak detection cable will be located. Longhorn has committed to having this system in place prior to start-up of the pipeline.

The hydrocarbon sensing leak detection system is based upon the TraceTek hydrocarbon sensing cable manufactured by Raychem HTS. Longhorn's ultimate choice of the TraceTek cable was made after Longhorn, Williams and UTSI International Corporation performed exhaustive research of leak detection technology potentially feasible for this particular application. After detailed analysis of potentially feasible leak detection technologies, and consultation with the Office of Pipeline Safety, the TraceTek cable was identified as the current best available, proven technology in the industry. The table below identifies the sensing capabilities of the TraceTek system.

Leak Detection Response:

With notification typically originating through the utilization of its External Patrol and Technology Based components of its Leak Detection System Capabilities, Longhorn Pipeline will facilitate the orderly and controlled shutdown of its system within five (5) minutes of a probable leak indication.

Longhorn maintains 24-hour surveillance of its pump stations, motorized valve locations (MOV), terminals (pipe, pumps, valves, meters, and tanks), and meter stations through its SCADA system. (Truck loading operations at the El Paso Terminal are monitored locally.) Twenty-four-hour surveillance will also be maintained with respect to Longhorn's Enhanced Leak Detection System. Pipeline operational data from these locations is transmitted directly to the Tulsa Operations Control Center, where trained and qualified Operations Control personnel monitor and provide equipment control commands to the Longhorn system.

Operations Control personnel utilize the following methods for the determination or suspicion of a probable leak indication:

- Deviation outside normal operational thresholds from the computational based transient leak detection software system in a direction that is indicative of a leak;
- Receipt of an alarm by the sensor cable system over the Edwards Aquifer Recharge Zone;
- Unexpected deviation outside minimum or maximum alarm thresholds for system pressures and flow rates;
- Rate of Change alarms that compare pressure or flow value change versus time;
- Operations Control personnel independent analysis of flowing conditions;
- Third party call of suspected or confirmed product leak;
- Input from Field Operations Personnel;
- Automatic closure of MOV's or stoppage of pipeline pumps; and
- Terminal high level alarms.

Analysis of a suspected pipeline leak is accompanied by an identification of the location of the suspected leak.

Upon the detection, notification, and determination of a probable leak indication, Operations Control personnel are trained to immediately shut down the pump station(s) upstream to the leak location. The pump station downstream to the leak location is either kept running or is started to assist with the orderly movement of product away from the leak location. Following the shut down of the upstream pump(s), the Operations Control personnel will close the upstream MOV's from the leak location to prevent the introduction of new product to the segment. Through the use of the SCADA system, upstream pump stoppage and MOV closure are accomplished within five (5) minutes from the identification of a probable leak indication.

The Longhorn Pipeline was designed to be shut down immediately following a probable leak indication. Communication with field operations, product origination or destination points and terminals are not required to shut down the pipeline in an orderly or safe fashion. Operations Control personnel are trained to notify the appropriate supply, destination, field operations, and

emergency responder personnel as soon as practical following the shut down and isolation of the pipeline.

The above emergency shut down procedures will be documented and tested for Operations Control personnel training certification prior to start-up of the Longhorn Pipeline system.

The Longhorn pump stations utilize a Programmable Logic Controller (PLC) to handle the start-up, sequencing, data transmittal, and shut down of the equipment within the station. The Tulsa Operations Control Center sends command signals to and receives operational data from the PLC's at each pump station. The PLC's, coupled with the instrumentation contained at each pump station, serve to protect the pump equipment from mechanical disturbances such as vibration, abnormal motor winding or pump bearing temperatures, loss of product through seal leaks, and fire sources. Internally, the pump equipment is protected from conditions of high product flow, low product flow, low system pressure, high system pressure, and excessive or low motor amperage. The PLC is programmed to provide both early indication alarm and automatic pump shutdown in the event that designated parameters are operated outside their intended range.

Pressure, flow, and tank level readings from across the pipeline system are transmitted to the Tulsa Control Center via the SCADA system for computational transient modeling analysis and Operations Controller interpretation of the physical data, as is the data generated by the Enhanced Leak Detection System. The status of the sensor cable system over the Edwards Aquifer Recharge Zone also is transmitted to the Tulsa Control Center. Outside of the automatic shut down of pump units that are controlled by the local pump station PLC's, shut down of equipment and isolation of MOV's are originated by the Operations Controller.

Leak Detection Performance Commitment:

Longhorn is committed to implementing the best available leak detection systems with the following design specifications:

LOCATION	SYSTEM DESIGN SPECIFICATIONS
Tier I	1% of flow detected within one-half hour.
Tier II	1% or more of flow detected within one-half hour. 0.5% - 1% of flow detected within one hour.
Tier III	Same as Tier II, except Edwards Aquifer recharge zone and contributing zone (Slaughter Creek watershed).
Edwards Aquifer Recharge Zone and Contributing Zone (Slaughter Creek watershed)	Same as Tier II, and sensor-based detection of 0.0030467 barrel/hour from contact for the following products: • Gasoline – 12 minutes • Diesel Fuel – 60 to 120 minutes • Jet Fuel – 50 to 70 minutes

> The leak detection equipment will be installed prior to startup. The computational based system will be adjusted to become operational over approximately the first two weeks of pipeline operation and be further optimized within 6 months of startup. The sensor-based system will be fully operational, at full sensitivity, immediately upon startup. Leak detection capabilities will be demonstrated and periodically tested."

UTSI International is Longhorn's third party leak detection consulting firm. Correspondence describing leak detection system development and design is included in the Phase Two Project Documentation Appendix at Tab 11, as are qualifications of the UTSI personnel directly involved in system development and design. System shutdown is achievable without field communications due to the fact that the SCADA system gives remote control of all relevant system components to the pipeline control center in Tulsa.

The leak detection system software will not be inoperable during the fine-tuning period; rather, it will be adjusted to its operating status over approximately the first two weeks, and further optimized over as much as six months from startup. The sensor-based system over the Edwards Aquifer recharge zone and Slaughter Creek watershed in the contributing zone will be fully operational, at its full sensitivity, immediately upon system startup.

Emergency Response Preparation - Emergency Response Plan

The Williams System of Manuals contains an Emergency Response Plan volume, a copy of which is included in the Phase Two Project Documentation Appendix at Tab 12. The Emergency Response Plan provides direction to the employee first aware of an emergency situation, including emergencies that involve a release of a transported commodity. The priority for protection in the event of an emergency is appropriate: (1) human health and safety; (2) the environment; and (3) property. Among the first duties of the first aware/first responder role is to activate the applicable facility response plan (FRP; aka OPA '90 Plan). A copy of the most recent draft of the Longhorn FRP (March 24, 2000) is hereby provided as a separate Appendix; as development is completed, the final FRP will be provided to the Service.

Oil Pollution Act of 1990 Facility Response Plan

Longhorn developed and distributed an FRP in 1998 and submitted same to DOT for review and comment. The Settlement Stipulation that arose out of the NEPA lawsuit, however, contained DOT's agreement that it would not approve, or allow Longhorn to commence operations under, the FRP until the conclusion of the EA process. The FRP was scrutinized during the EA, and Longhorn committed to develop numerous enhancements to the FRP as listed in this Phase Two BA at Section 3.4. The Service also provided comments to enhance response capability over the EARZ/EACZ.

The FRP enhancements will serve to protect the environment as a whole, and listed species and habitat in particular, as well as human health and safety. The LMP contains a number of commitments to enhance the FRP, and those enhancements have been developed and implemented to the extent possible:

- Ensure maximum 2-hour full response to EA designated sensitive areas and maximum 1 to 2 hours in hypersensitive areas (LMC 23)
- Establish a response center in South Austin (LMC 23)
- Enhanced facility response plan will:
  - Address firefighting in areas without Hazardous Materials response units (LMC 24)
  - Provide detailed planning for areas with high populations of potentially sensitive receptors (LMC 26)
  - Establish consistency with the City of Austin Barton Springs Oil Spill Response Plan and the Service's Barton Springs Salamander Recovery Plan (LMC 28; these enhancements depend upon promulgation by the City of Austin and the Service of their respective plans, neither of which has occurred at this writing)

The EA took into account listed species and potential habitat when identifying areas to designate as sensitive and hypersensitive (see Section 3.1, above). Thus, the FRP benefits that are directed to sensitive and hypersensitive areas also are directed at species and habitat; see EA at Section 9.2.3 and Appendix 9C. The development of a new response center, to be located in south Austin, will limit the elapsed time between notification of response personnel and implementation of a full response at any release site. Longhorn will stage personnel and equipment to achieve a full response in sensitive areas in less than two hours, and in one to two hours in hypersensitive areas. A response time of 1 hour will prevail for the Edwards Aquifer recharge zone and Slaughter Creek watershed in the contributing zone. A maximum 1 to 2 hour response time will apply in the Barton Creek watershed in the contributing zone. More detailed, site-specific planning and preparation will enable more rapid and more effective deployment on-site. Sensitive and hypersensitive areas are interspersed along the pipeline route, with non-designated areas between; therefore, segments between sensitive and hypersensitive areas benefit from much the same treatment by virtue of proximity (See Longhorn FRP at Volumes II and III, Sections 4 and 5). Stated another way, a Tier I area located near a Tier II or Tier III area, or located between two areas of either Tier II or Tier III status, will by definition be within the reach of response crews within the same time periods stated above for sensitive (Tier II) and hypersensitive (Tier III) areas.

Emergency Response Activities

The following paragraphs describe generally the sequence and character of activities that occur at a pipeline release location. Each potential release would likely involve unique circumstances, and, among other factors (see APR Companies, Phase Two Project Documentation Appendix at Tab 10), the on-site response will vary with location, terrain, weather conditions, product released, and release volume. The area of disturbance caused by a response action varies depending upon the character of the response and by nature of the release. The following description identifies the majority of typical response activities.

The first responder(s) will immediately notify Longhorn Operations Control and the Area Manager. They will take appropriate action to protect life and ensure safety of personnel. They will additionally request Operations Control to notify the appropriate emergency responders. Operations Control will coordinate company response activities until company

personnel arrive on scene.

When a leak is detected, Operations Control will shut down the pipeline following procedures in the Operations Control Manual. Remote operated valves upstream of the release will be closed and downstream valves may be closed or left open to allow drainup, depending on conditions. The Longhorn First Responder assumes the role of Longhorn Incident Commander (IC) until relieved. The Longhorn IC will work in cooperation with the local emergency responders (reference Longhorn Emergency Response Plan from the System of Operating Manuals).

Responders will conduct a preliminary assessment of the situation including potential health and safety hazards. If someone is injured or if there is the potential for a fire or explosion, emergency services will be called out. Assistance from public agencies for site control and evacuations will be requested if necessary. Proper monitoring will be conducted to ensure public and personnel safety, and that the necessary spill response contractors have been mobilized to assist in containment and cleanup operations. Response contractors are currently identified in the FRP Volume I, Section 8 and within each county-level response zone plan (Volumes II and III). All or a portion of additional resources will be activated, as necessary. For a major release, all resources may be activated. Appropriate regulatory agencies will be notified.

Potentially affected sensitive areas will be identified. The designated Tier II and Tier III areas are identified on the strip maps in FRP Volumes II & III, Section 4. Additional information on the Wildlife Sensitive Areas is located in Section 5 of Volumes II & III. The topographic maps also locate sensitive features along and down gradient from the pipeline. Any response activities will involve measures to protect the sensitive areas. If there is the potential to affect the Wildlife Sensitive Areas, the biological contractor will be included as part of the response team.

A request for assistance to have potential ignition sources in the vicinity of the spill, including motors, electrical pumps, electrical power, etc. shut down will be made. Local fire departments and/or Boots & Coots, Eagle Environmental, or other release response contractors will be notified if the use of fire suppressants is required. Longhorn responders will shut down and control the source of the spill. This may include closing additional valves, collection of pooled product at the pipeline location, digging out the pipeline, collection of product from the pipeline and the pipeline ditch, and repair of the pipeline.

Longhorn responders will stabilize and contain the situation in coordination with appropriate agencies. This may include berming, the deployment of containment and/or sorbent booms, construction of dams, or trenching in a manner that limits the spread of the product. The tactic used is dependent upon many factors including the location, the volume, type of sensitive areas, weather, and similar factors. General response tactics are discussed in the FRP at Volume I, Section 3. Site-specific tactical plans for selected sensitive areas are located in Section 4 of Volumes II and III. Access points and possible response strategies are identified in the tactical plans. The pre-identified access points were chosen on the basis of calculations of worst case transport times, proximity to existing roads and other access, and suitability for use. Within the Edwards Aquifer recharge and contributing zones, multiple response locations with associated tactical plans have been identified along the Barton, Slaughter and Williamson Creek watersheds in the event a release were to

reach a stream or tributary and potentially be transported toward the recharge zone. (see LBG-Guyton, "Travel Times for Hypothetical Releases from Longhorn Pipeline within the Pipeline Replacement Corridor in Austin, Texas," 2000 in the Project Documentation Appendix). Additional access points may be utilized during an actual response. If indicated, wildlife protection measures will be initiated.

Product recovery and removal operations will be initiated. This may include recovery of free product from ground surface, water or trenches using vacuum trucks, skimmers or sorbents. Excavation of contaminated soil may be utilized. In situ methods such as biological treatment or controlled burns may be considered. Any technique used will attempt to minimize disturbance to the environment. Additional information on recovery techniques is located in Volume I, Section 3 of the FRP. All necessary approvals must be obtained from applicable resource trustees.

Documentation procedures will be initiated. Documentation of all response actions taken, including notifications, agency and media meetings, equipment and personnel mobilization and deployment, and area impacted will be made. Spill tracking and surveillance operations will be initiated. The extent of pollution may be determined via surveillance aircraft. In the event of subsurface impacts, cave monitoring or water well monitoring may be utilized. Photographers and/or videographers will be utilized.

The equipment and personnel required for a response are dependent on the specific release situations. The volume, location, and the unique site characteristics will affect the necessary resources. Some of the equipment such as transport vehicles, temporary storage or tank trucks may be located at a staging area rather than at an active work site. Site-specific resources are identified in the tactical plans within the FRP.

In general the major resources that may be utilized at the pipeline release response location may include:

- Vacuum Trucks (one or more at each recovery site depending on leak volume);
- Trackhoe or backhoe for pipeline dig out;
- Dirt moving equipment may include an additional backhoe or bulldozer and dump trucks for containment and recovery operations;
    - Spill response trailer;
    - Sorbent Material;
    - Tanker Trucks and/or temporary storage;
    - Welder's Truck (for pipeline repair);
    - Boom Truck (for pipeline repair);
    - Miscellaneous transport vehicles;
    - Roll offs or drums for contaminated debris; and
    - Fire suppressant material if necessary.

Species Habitat Areas

Longhorn has implemented additional levels of planning and preparedness in the FRP

since September 1999. Human health and safety must take precedence during the execution of an emergency response. If a release occurs within habitat, or at any location where the release could adversely affect species or habitat, Longhorn will employ additional measures to avoid any potential adverse effects to species or habitat. To do so, Longhorn has incorporated into the FRP maps depicting areas of potential habitat both adjacent to the pipeline and along pipeline sections from which a release could adversely affect species or habitat. Longhorn also has identified numerous pre-planned containment and recovery locations throughout the Edwards Aquifer recharge zone and the contributing zone. Further, Longhorn has included in its FRP training regimen for emergency response personnel the information necessary to identify such areas and prioritize response activities toward such areas. Habitat areas along the pipeline have been mapped, and the maps have been incorporated into the FRP along with descriptions of response actions that apply in those areas (See Longhorn FRP at Volumes II and III, Sections 4 and 5).

In addition, Longhorn will immediately engage a qualified biologist on-site to provide direction to response personnel if a release location is near an area of potential habitat. Personnel will be directed to avoid indirect effects such as traversing habitat areas to gain site access. They also will employ site and circumstance-specific measures to protect species and habitat threatened by a release and thereby avoid adverse effects; for example, were a release to ignite in Bastrop County, fire-fighting efforts would identify and give heightened protection to habitat areas near the fire (see Buescher State Park Fire Response Resources, in the Project Documentation Appendix).

Longhorn acknowledges the value of Service expertise in protecting species and habitat. As such, Longhorn solicits Service participation in emergency response planning and preparedness training with respect to species and habitat protection. Longhorn invites Service participation in response training at response drills and table-top exercises. Longhorn shall notify the Service of such training exercises, provide the Service an opportunity to review and comment upon preparation for the training, and invite Service participation during such training.

3.5 Edwards Aquifer Protections

The Edwards Aquifer in Travis and Hays Counties is a valued resource. In addition, the Barton Springs Salamander, which resides in several spring outlets of the Edwards Aquifer, is an endangered species that must be protected. Longhorn will implement a multitude of measures both to ensure that the quality and integrity of the aquifer is preserved, and to ensure the continued survival of the salamander. See document entitled Edwards Aquifer_ Protections, in the Project Documentation Appendix, which summarizes the various protections.

Longhorn will implement conservation measures to avoid the possibility of impacts to the aquifer that could result from a pipeline release over the recharge zone or upon the contributing zone, should ever one occur. However, the Service has requested an analysis of the potential effects if released product were to enter the aquifer.

Longhorn will implement a number of pipeline enhancements, including (a) replacement of the pipe over the recharge zone and the contributing zone with new thicker-walled pipe; (b) additionally protecting the new pipe with a reinforced concrete barrier; (c) installation of an

enhanced, sensor-based leak detection system through the recharge zone and the Slaughter Creek watershed in the contributing zone; (d) installation of additional check valves; and (e) daily inspections of the ROW (See Section 3.5.2). An extremely sensitive, sensor-based leak detection system will complement a computational-based leak detection system; jointly the systems will be capable of rapidly identifying potential small and large leaks. Daily patrols will identify potential threats to the pipeline, and enhanced emergency response capability will provide for rapid and effective release response.

Longhorn has commissioned thorough analyses of the Edwards Aquifer recharge zone and contributing zone by experienced hydrogeologists, geologists, and biologists (See resumes of Sherrod, Kreitler, Russo, Stein, Miller, Dorsey and Gasch, Phase Two Project Documentation Appendix at Tab 13). The subsurface along the pipeline traverse of the recharge zone has been studied by ground-penetrating radar, and subsequent investigations demonstrated the absence of significant voids along the pipeline (See LBG-Guyton letter to Vince Murchison dated 10 December, 1999, Phase Two Project Documentation Appendix at Tab 14). The related topography has been mapped, and surface drainage tendencies have been modeled. Local infrastructure has been surveyed and analyzed to determine the potential implications to infrastructure components in the unlikely event of a pipeline release; for example, roadways would interrupt the flow of a hypothetical release that resulted in surface flow. Storm water detention ponds in and around Austin receive detailed response planning.

Analysis of areas along the pipeline traverse of the recharge and contributing zones has identified locations where the capacity of the pipeline trench to retain fluid could be exceeded. Longhorn first will backfill the trench with fill that has been sized to result in high porosity, which will have the effect of increasing the capacity of the trench to retain fluid if any is released from the pipeline. At an estimated 18 locations at lower elevations, however, the capacity of the trench could be exceeded if worst case discharge volumes are used with the assumption of complete pipe drainage. At those locations, Longhorn will install a berm containment system that has been designed both to contain any product that may reach the surface and to prevent storm water accumulations that could compromise the capacity of the containment systems. Those containment systems are described in the analysis entitled “EARZ/EACZ Pipeline Replacement Trench and Berm Product Containment Conceptual Design,” "Response to Lead Agency Review of Conceptual Design for Trench and Berm Product Containment for the EARZ/EACZ Longhorn Pipeline Replacement," and "Response to USFWS’ draft letter of 8/26/00," all of which are included in the Project Documentation Appendix. Included with the conceptual design are diagrams of the containment systems. The containment systems will be constructed with hydrocarbon-sensing valves that allow the passage of storm water but automatically close, without human intervention, if hydrocarbons contact the valve.

Another preventive conservation measure Longhorn will employ is the installation of check valves over the Edwards Aquifer recharge zone and over the contributing zone. The check valves will be located in a manner that reduces potential volumes that could drain from the pipeline in the event of a breach.

Check valves are one-way valves that allow product within the pipeline to flow in the intended direction, i.e., downstream in the pipeline. However, check valves prevent flow in

the opposite direction, upstream, such that if for any reason product attempts to flow backward, the valve closes to preclude flow in the upstream direction. A hypothetical example illustrates the function of a check valve. If one assumes a pipeline breach on an incline such that the pipeline flow is uphill, the contents of the pipeline could drain out of the breach due to the forces of gravity. If one then assumes that a check valve was installed along that incline (downstream on the pipeline), then the check valve would stop the backward, downhill flow of the product from the pipeline, effectively reducing the volume of product that could drain from the breach (gravity is not the only force to be factored into the potential for draindown, as discussed below).

The check valves that Longhorn will install will be located to achieve just such effect. The valve over the recharge zone will be placed at approximately milepost 171.5, near the pipeline intersection with Whiteworth Loop in the Sendera Glen subdivision, which is downhill of a gradual rise in the land surface to the west. By being located near a low point of the pipeline traverse of the recharge zone, the check valve will prevent the potential for draindown of product from the check valve to a point approximating the western edge of the recharge zone. The valve over the contributing zone will be located at the existing Edwards Aquifer West Valve, approximately milepost 175.5, about 2.1 miles east of U.S. 290 and about 1.8 miles west of the boundary of the recharge zone. Again, this valve is located below a moderate incline to the west and will reduce the potential draindown volume of a release between the two check valves. See APR report, Phase Two Project Documentation Appendix at Tab 10.

Concerns have been raised by various parties, Longhorn opponents included, to the effect that a breach in a pipeline allows all product in the pipeline between adjacent block valves to drain out, but such is not the case. The California State Fire Marshall's office has analyzed pipeline release volumes to determine the extent to which various components of release volume contribute to total release volume (see Phase Two Project Documentation Appendix at Tab 15). The analysis determined that draindown contributes only marginal volumes to a release. Of the releases studied, in only 25% of the cases did the total release volume exceed 4.5% of the potential draindown of the pipeline, while in just 10% of the cases did the total release volume exceed 28% of the potential draindown. Among the reasons for low draindown volumes is that for product to flow out of the pipeline, it must first be displaced by air, similar to the manner in which water flows from a bottle that is turned upside down. See APR Companies, Phase Two Project Documentation Appendix at Tab 10. Longhorn has calculated full line draindown for hypothetical releases to the east of the recharge zone check valve described above; that volume is 3,875 barrels (162,750 gallons). However, if one applies the lessons of the California State Fire Marshall risk assessment that volume is more realistically calculated as 1,147 barrels (48,174 gallons) at 28% draindown and 841 barrels (35,322 gallons) at 4.5% draindown. Despite the findings of the California State Fire Marshall risk assessment, Longhorn has designed the bermed areas described above using the assumption that all product escapes from the pipeline segment affected by a release.

Using those more realistic assumptions, the potential threat to the Barton Springs Salamander from a pipeline release in such areas is lower than previously understood. Calculations of the effect of a release over the aquifer recharge zone performed by LBG-Guyton (see Phase Two Project Documentation Appendix at Tab 16) demonstrate that the potential for adverse effects to the salamander is greatly reduced. See Section 4.4 of this

BA and LBG-Guyton, Phase Two Project Documentation Appendix at Tab 16.

Nonetheless, Longhorn's conservation and mitigation measures will make it unlikely that adverse effects to the aquifer will occur.

3.6 Pipeline Maintenance Construction

This section identifies and describes incremental pipeline maintenance construction activities, in addition to those that were the subject of the Phase One BA, that will be implemented in two specific areas: (a) within Houston toad habitat in Bastrop County; and (b) across and adjacent to the Edwards Aquifer recharge zone within Austin. Additional maintenance construction will include planned, but unscheduled construction and future additional, but currently unforeseen construction. Maintenance construction that occurs outside the two presently identified areas will be subject to the maintenance construction procedures described in the Phase One BA, as will maintenance construction in Houston toad habitat and the Edwards Aquifer recharge zone; however, this BA contains descriptions of additional conservation measures that Longhorn will implement during the maintenance construction activities over the Edwards Aquifer recharge zone.

The maintenance construction procedures referred to herein, and presented in detail in the Phase One BA, are identified below:

1. Pipeline Maintenance -- Construction Planning
2. Project Environmental Inspectors
3. Site Preparation
4. Site Entry
5. Pipeline Lowering and/or Replacement – Open Terrain
6. Pipeline Lowering and/or Replacement – Creek Crossing

3.6.1 Buescher State Park

Maintenance construction activities planned within Buescher State Park (containing Houston toad habitat) result both from the EA process and from Longhorn commitments to reduce risks to species and habitat. The EA related project is the replacement of 671 feet of pipe at mile post 127.94 (Hunt Branch) within Buescher State Park in Bastrop County, Texas. Longhorn committed in the LMP (LMC 34) to replace the pipe since data on file at the time indicated that the segment contains several shorter sections of Grade B pipe. Longhorn has since identified file documentation that demonstrates that the existing pipe is adequate for the design pressure; however, Longhorn remains willing to replace the pipe to limit the potential for surge pressure-related damage and thus lower the risk of a release in this habitat area. Two additional tasks have been identified to reduce the risk of a release in Houston toad habitat: (a) lowering and replacement of the pipeline crossing of Dry Branch in Buescher State Park (pipeline mile post 128.33); and (b) lowering and replacement of the pipeline crossing of an unnamed creek approximately 1360 feet east of the 671-foot replacement (pipeline mile post 127.72). See additional engineering information at Tab 17 of the Phase Two Project Documentation Appendix.

The three projects significantly reduce the potential for damage to the pipe in and near the three creeks. Since land development does not occur within the state park, and taking into

account the pervasiveness and effect of the EA mitigation measures that focus on identifying and preventing corrosion, on eliminating material defects, and on preventing adverse consequences resulting from operator error, the greatest threat to the pipeline is outside force damage within the creek beds. For a complete discussion of the risk reduction realized by the creek crossing replacements, see APR Report (Phase Two Project Documentation Appendix at Tab 10). Further, the replacements will limit the potential volume of a release, should one occur, since the thicker and higher-grade new pipe will be least likely to suffer a breach, by serving as low-point catchments for product within the pipe that could escape if a release occurred at lower elevations.

The new creek crossing replacement pipe will have 0.375" wall thickness and be of American Petroleum Institute Grade X56 or better. The burial depth of the pipe will be determined on the basis of regulatory requirements (49 C.F.R. § 195.248) and site conditions such as type of stream bed material and basin and channel configuration; the pipe will be buried below a depth that would allow in-stream forces to pose a threat to pipeline integrity.

3.6.2 Edwards Aquifer Protections

During informal consultation on the Longhorn Pipeline Project, the Service voiced concerns about the pipeline crossing of the Edwards Aquifer recharge zone and the potential for adverse effects to the Barton Springs Salamander. Adverse effects to the salamander may be associated with water quality degradation within the aquifer (See Barton Springs salamander listing final rule at Tab 18 of the Phase Two Project Documentation Appendix). Typically, water quality degradation originates at the aquifer recharge and contributing zones and is largely associated with residential and commercial development and the creation of impervious cover. In addition, commercial and industrial operations and vehicular roadway traffic create the potential both for chronic water quality degradation as a result of ongoing activities and for acute water quality degradation in the event of a release of deleterious materials to the watershed.

System operation and ongoing, long-term maintenance of the pipeline are not likely to result in adverse effects to the salamander, for which critical habitat has not been designated. ROW maintenance, pipeline inspection, valve maintenance, and similar such activities are unlikely to result in adverse effects to the salamander inasmuch as the activities are implemented in a manner that does not affect aquifer water quality.

Longhorn responded to the Service's concerns about water quality by identifying measures that will not only reduce the potential for a pipeline release, but will protect water quality and promote public efforts to ensure the survival of the species in the unlikely event of a release that threatened the Barton Springs segment of the Edwards Aquifer. Longhorn committed to implement the following measures and included the measures in its Environmental Assessment mitigation commitments:

- Replacement of over 3 miles of pipe over (and east of) the recharge zone and 15 miles of pipe over the full extent of the contributing zone with new, thicker walled pipe (LMC 3).

- Installation of an enhanced, sensor-based leak detection system across the aquifer

recharge zone and the Slaughter Creek watershed in the contributing zone to complement the pipeline-system-wide computational-based leak detection system (LMC 13).

- Installation of check valves (one in the recharge zone and one in the contributing zone) to minimize the volume of a potential release should one occur (see Section 3.3, Edwards Aquifer Protection).

- Performance of daily pipeline surveillance patrols over the recharge zone (LMC 20).

- Establishment of a refugium and captive breeding program for the Barton Springs Salamander as a conservation measure to ensure the survival of the species in the event of any perturbation to the extant population (LMC 33).

Further in response to concerns voiced by the Service, and concerns voiced also by the Barton Springs/Edward Aquifer Conservation District, Longhorn will implement an additional measure to reduce the risk of a release that could adversely affect water quality. Longhorn commits to install a protective concrete barrier over the 5-foot-deep replacement pipe. The barrier will be engineered with reinforced concrete to provide a protective covering over the pipeline that will alert an errant excavator to the presence of the pipeline. The concrete will be colored red to ensure ready notice of the presence of a protected structure. The protection offered by the concrete barrier will provide further reduction of a threat to the pipeline, third party damage, in the developing areas of south Austin, southwestern Travis County, and northeastern Hays County (See additional information at Tab 19 of the Phase Two Project Documentation Appendix).

Analysis of the pipeline traverse of the recharge and contributing zones has identified areas where surface flow modeling indicates a tendency for surface flow toward known karst features or toward Slaughter Creek, Barton Creek or Williamson Creek (see LBG-Guyton, Phase Two Project Documentation Appendix at Tab 16 and associated figure). Those areas include (a) from the fire station west of Brodie Lane to Deer Lane, toward the Karst Preserve; (b) from the pipeline crossing of Deer Lane to a point just east of the Sendera Glen subdivision, toward the Blowing Sink tract; (c) just east of Sendera Glen, slightly toward Deer Park Cave; and (d) from 2,000 west of MoPac to FM 1826, toward Slaughter Creek. LBG-Guyton has recommended that measures be employed to divert surface flow from those features, with the result that in the event of a release that results in surface flow, the features and thus the Edwards Aquifer will not be subject to the potential for rapid infiltration to the aquifer; see LBG-Guyton, Phase Two Project Documentation Appendix at Tab 16.

Longhorn commits to employ such measures. Given the relatively low slope of surface topography across the recharge zone, slight modifications during final surface grading will accomplish the goal of protecting the sensitive features. Thus, planning for construction of the replacement pipe will include the requirement that, during final grading, a low swale or berm be created to protect those features. The precise location and design of these surface flow control features are not easily predictable in advance of construction; thus, Longhorn's geological, biological, and engineering consultants (LBG-Guyton, Horizon ESI, Paragon Engineering, Bury + Partners) will make field recommendations to the contractor as reclamation begins. These recommendations will be carried out by the Contractor at the

direction of the on-site Environmental Inspector. Since the Longhorn Pipeline primarily traverses the surface divide between the Williamson and Slaughter Creek drainage areas, little if any surface flow of storm water will be affected, and no adverse effect to aquifer recharge water quantity will occur.

Additional analysis has been performed with respect to the recharge and contributing zones. Surface flow modeling has identified surface flow tendencies along the pipeline, and the calculations have been made of time of travel, to the recharge zone or recharge features, of a hypothetical release under worst case stream flow conditions. See Drawing 199044-C2 and LBG-Guyton, "Travel Times for Hypothetical Releases from Longhorn Pipeline within the pipeline Replacement Corridor in Austin, Texas," 2000 in the Project Documentation Appendix. Longhorn has based its emergency response planning on the results of those analyses, resulting in the multiple pre-planned response locations identified in the Travis County and Hays/Blanco sections of the FRP. Multiple pre-planned response locations enable response personnel to identify the optimum response locations for a release along any segment of the recharge and contributing zones.

Longhorn also has identified locations across the recharge and contributing zones at which a release of product could fill the trench and reach the surface. At those locations, Longhorn will construct a bermed area that achieves two competing goals: (1) providing containment in the unlikely event of a release that reaches the surface; and (2) preventing the infiltration of storm water to the areas (which could otherwise compromise containment capacity). The areas will be constructed of berms and swales along and/or across the pipeline right-of-way. Storm water will be prevented from entering the bermed areas by the placement of diversion berms. The presently identified locations of potential surface presence of product, and the conceptual design of the bermed areas, is set forth in the "Longhorn Pipeline EARZ/EACZ

Pipeline Replacement Trench and Berm Product Containment Conceptual Design" in the Project Documentation Appendix (note that locations #1 and #20 are outside the applicable replacement segment).

Longhorn will execute replacement of the pipe section that crosses the recharge zone pursuant to a maintenance construction plan that does not include the segment across the contributing zone (See Tabs 20 and 44 of the Phase Two Project Documentation Appendix). Pipe replacement across the contributing zone shall be executed pursuant to typical project construction plans developed during the Phase One consultation (but including the sealing of identified karst features in the limestone trench; see additional details in the following paragraphs).

Longhorn also has committed to replace an additional one-half mile (approximately) of pipe east of the recharge zone. That area has been identified through surface flow modeling as susceptible to seeing surface flows toward the recharge zone and Williamson Creek. All new pipe will be buried to a depth of 5 feet to top of pipe and will be protected by a red concrete barrier. This segment of the project will be executed pursuant to project construction plans containing the same protections as those developed pursuant to Phase One of this consultation.

The maintenance project will employ numerous measures in excess of the maintenance construction procedures described in the Phase One BA, identified specifically and by qualified individuals and entities (See Phase Two Project Documentation Appendix at Tab 13 for resumes of Kreitler, Stein, Sherrod, Bury, and Miller) as protective of the Edwards Aquifer and thus the salamander. The procedures build upon a solid base of construction storm water best management practices (BMPs) that are implemented at every construction site; moreover, Longhorn will implement procedures at least as stringent as locally prescribed construction BMPs. Longhorn will design its construction project to employ the construction BMPs promulgated by the Texas Natural Resource Conservation Commission (TNRCC) for application during construction over the recharge zone.

During pipeline replacement, Longhorn will seal any identified karst features in the limestone trench or exposed in the ROW following guidelines established by TNRCC. Upon encountering any karst feature during construction, the Contractor and on-site Environmental Inspector will be required to immediately notify Longhorn's geological, biological, and engineering consultants (Sherrod, Miller, Kreitler, Stein, Bose, Bury - see resumes in Phase Two Project Documentation Appendix at Tab 13) who will promptly inspect the field situation and prescribe proper sealing methods to the contractor. In addition, immediate notice will be made to appropriate representatives of the City of Austin and the Barton Springs/Edwards Aquifer Conservation District who may also provide additional recommendations to Longhorn's specialists on proper sealing procedures. If exceptionally large or deep voids or caverns are encountered, structural engineering specialists will provide engineered recommendations for supporting the pipeline over the void closure (example void closure solutions are provided in the Construction Plan at Tabs 20 and 44 of the Phase Two Project Documentation Appendix). All void closure recommendations will minimize potential adverse effects to the function of the void (ie., recharge capability or faunal habitat) while providing the maximum seal from the pipeline and any potential releases. Not only does this address potential issues of impacts to species during construction, but also provides significant aquifer protection and product recovery benefits in the event of a release during operation. Pipeline releases should stay within the pipeline trench and at land surface within the ROW where they can be more easily contained and controlled.

First, the volume of a spill will be limited by the installation of check valves that reduce spill volume to a probable maximum of 2100 barrels in the recharge zone. Additionally, the APR report (Tab 10 of the Phase Two Project Documentation Appendix) concludes that only about 28% of the line fill capacity between block valves might be released in 90% of the release scenarios. Third, the topography across the recharge zone is relatively flat, and rapid runoff away from the ROW will not likely occur; see LBG-Guyton Addendum Phase Two Project Documentation Appendix at Tab 16. It is anticipated that with the flat terrain and limited spill volume, potential product spills will remain on the ROW of the pipeline where any caves and other karst features will have already been identified and been sealed or protected during pipeline replacement.

Longhorn has, however, committed to implement a number of bermed containment areas at locations where it is possible that product could reach the ground surface, and accumulate, in the event of a release (see Sec. 3.5). The bermed areas are designed so that any released product is captured within the trench and is captured if it rises to the

surface. The bermed areas also are designed to prevent storm water infiltration by run-on and to shed storm water through outlets; however, the systems will collect product in the event of a release by means of automatic, hydrocarbon sensing valves. These systems will be designed and built of low-porosity materials but with the integrity to withstand major storm events. The capacity of the bermed areas will be calculated to contain both a worst case release (assuming complete pipe segment drainage) and precipitation generated by a 100-year storm event. Periodic inspection of the locations will be performed in conjunction with regularly scheduled pipeline surveillance patrols.

Longhorn commits to perform a field test of both the trench sealing procedure and the berm construction methods in conjunction with the maintenance construction project over the recharge and contributing zones. If the field test identifies design or construction flaws, adjustments to design or construction techniques will be employed to achieve the desired effect. See "Proposal to Perform Field Tests to Verify the Design and Construction of the Pipeline Trench and Berms for the Longhorn Partners Pipeline over the Edwards Aquifer Recharge Zone in Austin, Texas," in the Project Documentation Appendix.

As a result of the foregoing measures, the following defenses protect the Edwards Aquifer:

1. New, thicker pipe;2. Five foot burial depth;
3. Concrete barrier;
4. Enhanced leak detection;
5. Sealing of all voids, fissures, vugs, and other potential recharge features in the limestone trench;
6. Trench backfill absorption enhancement;
7. Surface containment systems and berms; and
8. Enhanced response planning.

As described in Section 4.3 below, that risk will be further reduced by implementation of the Edwards Aquifer Protection Plan during construction.

3.7 Hydrostatic Pressure Testing And Proof Testing

Longhorn committed to perform hydrostatic pressure tests and proof tests of the pipeline, and those tests have proceeded during 2000. (See Phase One BA at Sec. 4.10 and LMP Items 1 and 2.) Hydrostatic and proof testing of the pipeline has been ongoing, beginning at the Longhorn GATX pump station in Galena Park (Houston) and proceeding westward to Crane Station, but skipping the segments through Houston toad habitat in Bastrop County and the Edwards Aquifer Recharge Zone in Travis County (refer to Phase One BA in the Phase Two Project Documentation Appendix at Tab 1).

The hydrostatic and proof testing has occurred in segments, which were subdivided into test sections of varying lengths. Due to sensitive aquatic species concerns, the Houston toad and the Barton Springs Salamander, two test sections were not tested during the overall Houston to Crane testing project. Those two sections are (a) Segment 4, Section 1, which encompasses habitat for the endangered Houston toad and (b) all of Segment 5, which encompasses eastern Travis County, the recharge zone of the Edwards Aquifer and part of the adjacent contributing zone, areas of concern to the endangered Barton Springs

Salamander. Those sections will be hydrostatic pressure tested, after completion of Phase Two consultation and after pipe replacement takes place, to complete the system integrity testing.

Procedures for testing will follow those described in the Phase One BA. However, due to the heightened sensitivity of these two locations, project environmental inspectors and spill response equipment will be onsite and in constant ready status for immediate response during the testing. Makeup water for the tests will originate from the Colorado River or from local sources, and other than the potential for small amounts of residual diesel no contaminants are foreseen in the test water. Since most of the tested line sections will be newly installed pipe and since the prior hydrostatic testing will have flushed the pipe that is not slated for replacement, significant contaminants are not expected to be present in the test water. New pipe is expected to contain minimal manufacturing residue.

3.8 Right-of-Way Maintenance

ROW maintenance was considered by the Service in Phase One of this consultation with the exception of one area, the Edwards Aquifer recharge zone; see Phase Two Project Documentation Appendix at Tabs 1 and 2. ROW maintenance in the recharge zone will be conducted in the same manner as described in the Phase One BA. In summary, the conservation measures described in the Phase One BA are designed to prevent disturbance of the earth, to preclude sedimentation, and to prevent the release or distribution of herbicides to the environment.

3.9 Corrosion Inhibitor

The LC-50 concentrations of Magnacide 575 in the water column for freshwater fish and aquatic invertebrates ranges from 19.4 ppm (ml/l)(*Daphnia*- 48 hr) to 119 ppm (mg/l)(trout - 96 hr). Reproductive capacity diminution in *Daphnia* was demonstrated to have an EC-50 of 0.154 ppm (ml/l). No-effect concentrations for this product on fish and aquatic invertebrates was not available. LC-50 concentrations for dermal exposure to terrestrial mammals (rabbit) is 2000 ppm (mg/kg).

Surface disturbance for the application of the corrosion inhibitor would be restricted to the seven valve setting sites previously noted. Access to those sites would be from public roads.

The mixture ratio for the proposed inhibitor in the pipeline is approximately 3500 to 4000 ppm. These concentrations exceed the LC-50 for aquatic organisms, and are also above the lethal levels for terrestrial organisms. A release of this product in a surface tributary stream could be toxic until such time as dilution in the water body reduces the toxicity below limits.

For listed species, the risk is believed to be very minimal. Terrestrial plants such as the Texas prairie dawn, Navasota ladies-tresses, and Tobusch fishhook cactus have very minimal exposure risk as spilled product on the ground would either be confined very quickly to topographically low areas or absorbed into the soil in a short distance from the pipeline. Surveys conducted for these plant species along the Longhorn ROW (Report of investigations - in progress) by Horizon in response to the requirements of the LMP did not reveal the presence of any individuals of these species within or near the ROW.

The Houston toad would also be unlikely to be exposed to a spill if one occurs in Houston toad habitat areas. During the late summer period when the activity is proposed to occur, Houston toads are generally in estivation in deep sand burrows in uplands. Exposure to spilled product would be extremely low probability. Additionally, Houston toad surveys were conducted along portions of the line passing through the designated critical habitat for the Houston toad. No toads where found to occur within or adjacent to the ROW, or downstream (report in preparation).

The only exposure avenue for the Barton Springs salamander would be entry of a large volume of the corrosion inhibitor directly into the Edwards Aquifer through a point recharge feature; however, the risk of a release of the corrosion inhibitor is demonstrably nominal as discussed in the following paragraphs.

That the risk of a release of the inhibitor is low is based upon the fact that the inhibitor treatment water will be moved through the pipeline at pressures significantly lower than the pressure reached during the recently completed hydrostatic tests. The inhibitor will be propelled by nitrogen injected at a maximum pressure of 285 pounds per square inch gauge ("psig"). At the point of the inhibitor water batches, the pressure will range from approximately 65 psig to 140 psig. In comparison, the hydrostatic tests induced pressures ranging from approximately 1,100 psig to over 1,500 psig. Further, though some segments were not tested

(22 miles across Buscher State Park in Bastrop County and 40 miles across the Edwards Aquifer recharge and contributing zones in Travis and Hays Counties), the hydrostatic test water was moved through those segments, and none was lost.

The following table compares the minimum hydrostatic test pressures to the maximum treatment pressure.

Segment/Section[1]	Hydrostatic Test Minimum(psig)[2]	Corrosion Inhibitor Treatment Maximum(psig)[3]	Ratio Hydrostatic Test to Inhibitor
2 (1802+63 - 4024+50)	1265.0	285	4.4
3 (4024+50 - 5964+47)	1113.0	285	3.9
4-1 (5964+47 - 7110+81)	650[4]	285	2.3
4-2 (7112+16 - 8004+00)	1113.0	285	3.9

Segment/Section[1]	Hydrostatic Test Minimum(psig)[2]	Corrosion Inhibitor Treatment Maximum(psig)[3]	Ratio Hydrostatic Test to Inhibitor
5 (8004+00 - 10163+00)	500[5]	285	1.8
6 (10163+00 - 12039+37)	1235.0	285	4.3
7 (12360+00 - 14597+72)	1265.0	285	4.4
8 (14606+00 - 16992+40)	1113.0	285	3.9

[1] Segments shown are those with threatened or endangered species or habitat in proximity to the pipeline.

[2] The pressures shown are test target pressures for segments actually tested; all target pressures were met during the test.

[3] Nitrogen will be injected at 285 psig and therefore is used as the maximum; the pressures at the inhibitor batches will be lower, on the order of 65 to 140 psig.

[4] This section was not hydrostatic tested, but experience pressures as high as 650 psig (nitrogen) while adjacent sections were tested.

[5] This segment was not hydrostatic tested, but experienced pressures as high as 500 psig (nitrogen) while adjacent segments were tested.

The above data demonstrate that treatment pressures will be significantly lower than were the hydrostatic test pressures. Since the hydrostatic test pressures were of such higher magnitude, and since the pipeline has been repaired at the few locations of hydrostatic test failures, the risk of a release is extremely low. In addition, regular, ongoing pipeline surveillance is monitoring activity near the pipeline to protect from third party damage that could threaten pipeline integrity.

Furthermore, Longhorn will take measures to prevent a release of the inhibitor to the environment. Piping and materials management protocols that will be implemented serve to ensure that the inhibitor is controlled at all times. Nonetheless, spill equipment and supplies necessary to contain and immediately remove a release will be maintained along the pipeline segments as the treatment procedure progresses westward. Finally, a biologist will be maintained on stand-by during treatment across Bastrop, Travis and Hays Counties, in the event of a release that could affect the Houston toad or the Barton Springs salamander, to immediately advise response crews in release response and mitigation. Therefore, no adverse affects to the Barton Springs salamander would be expected.

Exposure possibilities for the golden-cheeked warbler or black-capped vireo would be nearly zero. The opportunity for direct dermal exposure would be extremely unlikely. Ingestion by the birds would also be unlikely as these bird species do not frequently consume free water. Moisture requirements are usually meet by consumption of insects. Studies for the presence of the warbler and vireo in the springs of 1999 and 2000 along the ROW did not reveal the presence of either bird species within or in close proximity to the ROW (report in progress).

All ground activity associated with this process would be at previously disturbed valve setting locations, none of which are within or near listed species habitat.

The recently completed hydrostatic testing has proven the Longhorn Pipeline to be sound. The corrosion inhibitor solution would be pumped through the pipeline at significantly lower pressures than the hydrotest. Little handling of material is required for the procedure. The risk of a significant spill or release of the inhibitor material in the environment is extremely low. Even if released, exposure or toxicity of the solution would not be significant for any of the listed species.

4.0 AVOIDANCE AND CONSERVATION MEASURES

4.1 Avoidance

Longhorn will conduct pipeline operation, maintenance, construction, testing, and other subject activities in a manner that avoids potential effects to species and habitat. Controls and other measures designed to achieve that goal are described in the foregoing descriptions of the various activities. A number of those controls and measures are summarized as follows:

- Full implementation of the Longhorn Mitigation Plan;
- Identifying and marking habitat areas for avoidance;
- Planning project implementation to avoid the potential for any effects;
- Using FERC qualified environmental inspectors with authority to alter project implementation procedures in areas of potential concern to species, including application of incremental BMPs as a result of site-specific conditions;
- Adjusting project timing to avoid breeding populations; for example, maintenance or construction projects in Houston toad habitat will avoid the months of January through June and projects in golden-cheeked warbler and black-capped vireo habitat areas will be avoided from March 1 through August 1 and March 15 through September 1, respectively;
- Implementing storm water pollution control BMPs even when not required by permit;
- Maintaining qualified biologists in hydrostatic test project areas for immediate response in the event of a test water release in a habitat area;
- Avoiding work in areas of noise-sensitive species (i.e., golden-cheeked warbler and black-capped vireo) during the breeding/nesting season. If work must occur in habitat areas during noise-sensitive seasons, the Service will immediately be notified for additional avoidance procedures.

Longhorn's Monitoring Commitment

Longhorn has committed to survey the existing ROW to determine the presence/absence of listed species. The following summarizes the Longhorn Monitoring Commitment for each potentially affected species.

- Longhorn has completed surveys for the Texas prairie dawn within the potentially suitable habitat areas to confirm its presence or absence. The surveys were conducted within the ROW in areas identified as potential habitat in early April of 2000 to determine if the Texas prairie dawn was present, and if so, its distribution and abundance. No prairie dawn were found, nor was any highly suitable habitat

identified.

- Longhorn will conduct a fall survey (15 October to 15 November, 2000) for the Navasota ladies'- tresses within the ROW if suitable climatic conditions occur to determine the presence or absence of this species, and if present, its distribution and abundance.

- For the Tobusch fishhook cactus, Longhorn has conducted a blooming period survey (late February 2000) within the ROW throughout Kimble County to determine the species' distribution and abundance. No cacti were observed.

- A spring survey for the Houston toad in Buescher Park was conducted along and downstream of the pipeline to determine the presence or absence of toads and their overall distribution and abundance. No toads were detected in the park.

- One to two additional Spring breeding season surveys (as acceptable to the Service) will be conduced for the golden-cheeked warbler along and adjacent to the ROW within the potential habitat areas to determine habitat utilization and overall distribution and abundance. A survey for 2000 was conducted with no golden-cheeked warblers being found in or near the ROW.

- One to two additional spring breeding season surveys (as acceptable to the Service) will be conduced for the black-capped vireo along and adjacent to the ROW within the potential habitat areas to determine habitat utilization and overall distribution and abundance. A survey for 2000 was conducted with no black-capped vireos being found in or near the ROW.

4.2 Status of the Species/Environmental Baseline

The following is a review of the status of each species being considered in this biological opinion that may be adversely affected by the proposed action. The Service has reviewed the list of threatened and endangered species and identified potential impacts to the following species.

Texas prairie dawn (*Hymenoxys texana*) - The Texas prairie dawn is a small, delicate annual to 6 inches tall with single or branching stems. It has small yellow flowers blooming in late March to early April. It occurs in sparsely vegetated areas of fine-sandy compacted soil. Specifically, the species occurs in the northern part of the Gulf Coastal Prairie in Harris and Fort Bend counties, where it is found in poorly drained depressions or saline swales around the periphery of low, natural mounds (mima mounds) in open grasslands. These mostly barren areas are sparsely vegetated, and the soil is often covered with a blue-green alga (*Nostoc* sp.). It can also occur on disturbed soils such as rice fields, vacant lots, pastures, and possibly pipeline ROW if the soil structure remains relatively intact.

Federally-listed Threatened or Endangered Species which occur in counties traversed by Longhorn Pipeline

Species - Federal Classification	Austin	Bastrop	Blanco	Crane	Crockett	Culberson	Ector	El Paso	Fayette	Gillespie	Harris	Hays	Hudspeth	Kimble	Lee	Llano
American alligator - TSA																
Attwater's prairie-chicken - E	O															
Bald eagle - T(PDL)																
Barton Springs salamander - E																
Bee Creek Cave harvestman - E																
Black-capped vireo - E			X		O					X		O		X		X
Bone Cave harvestman - E																
Clear Creek gambusia - E																
Comal Springs dryopid beetle - E												O				
Comal Springs riffle beetle - E												O				
Comanche Springs pupfish - E																
Devil's River Minnow - T																
Fountain darter - E												O				
Golden-cheeked warbler - E			X							X		X		O		O
Gypsum wild-buckwheat - T						O										
Houston toad - E	X	X													O	
Interior least tern - E																
Kretschmarr Cave mold beetle - E																
Mexican spotted owl - T						O		O					O			
Navasota Ladies-tresses - E									X							
Northern aplomado falcon - E								M					M			
Pecos gambusia - E																
Pecos pupfish - PE																
Purple (Pecos) sunflower - T																
San Marcos gambusia - E												O				
San Marcos salamander - T												O				
Sneed pincushion cactus - E								O								
Southwestern willow flycatcher - E																
Texas blind salamander - E												O				
Texas prairie dawn-flower - E											X					
Texas snowbells - E														O		
Texas wild-rice - E												O				
Tobusch fishhook cactus - E														X		
Tooth Cave ground beetle - E																
Tooth Cave pseudoscorpion - E																
Tooth Cave spider - E																
Whooping crane - E										M						

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TABLE 4

Federally-listed Threatened or Endangered Species which occur in counties traversed by Longhorn Pipeline

Species - Federal Classification	Mason	Menard	Reagan	Reeves	Schleicher	Travis	Upton	Waller	Ward	Downstream
American alligator - TSA										X
Attwater's prairie-chicken - E										
Bald eagle - T(PDL)										X
Barton Springs salamander - E						X				
Bee Creek Cave harvestman - E						O				
Black-capped vireo - E	X	O	O		O	O	O			
Bone Cave harvestman - E						O				
Clear Creek gambusia - E		O								
Comal Springs dryopid beetle - E										
Comal Springs riffle beetle - E										
Comanche Springs pupfish - E				O						
Devil's River Minnow - T										O
Fountain darter - E										
Golden-cheeked warbler - E	X	O				O				
Gypsum wild-buckwheat - T										
Houston toad - E								O		X
Interior least tern - E								X		X
Kretschmarr Cave mold beetle - E						O				
Mexican spotted owl - T										
Navasota Ladies-tresses - E										
Northern aplomado falcon - E				M						
Pecos gambusia - E				O						
Pecos pupfish - PE				O						
Puzzle (Pecos) sunflower - T				O						
San Marcos gambusia - E										
San Marcos salamander - T										
Sneed pincushion cactus - E										
Southwestern willow flycatcher - E										X
Texas blind salamander - E										
Texas prairie dawn-flower - E								X		
Texas snowbells - E										
Texas wild-rice - E										
Tobusch fishhook cactus - E										
Tooth Cave ground beetle - E						O				
Tooth Cave pseudoscorpion - E						O				
Tooth Cave spider - E						O				
Whooping crane - E						M				

FEDERAL CLASSIFICATION
E - Listed Endangered
T - Listed Threatened
TSA - Listed Threatened Due to Similarity of Appearance
PE - Proposed to be Listed as Endangered
PDL - Proposed to be De-listed

X - Known or Suspected to Occur Within Area of Potential Effect
O - Not Likely to Occur Within Area of Potential Effect
M - Migrant Not Likely to be Adversely Affected

Source of Species: US Fish and Wildlife Service

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There are fewer than 35 known sites recorded for the species, and several have been lost in recent years to urbanization in the Houston area. Most populations remaining are small, and are on private land. Very few sites currently have any form of protection. The primary threat to the species is habitat destruction as a result of urbanization, roadway construction, and conversion of habitat for agricultural purposes.

An assessment of potentially suitable habitat for the Texas prairie dawn was conducted by Horizon in early June 1999 along the Longhorn pipeline ROW in western Harris and eastern Waller counties from the Satsuma Station on the west edge of Houston to near Monaville in Waller County. Three areas along the ROW, one in Waller County and two in Harris County, exhibited native range conditions with suitable soils that could be considered potentially suitable habitat areas for the prairie dawn. All other areas along the pipeline within the area investigated had been converted to row crop (corn), monoculture hay or grazing pasture, or disturbed for land development. A survey for the prairie dawn has been conducted within the potentially suitable habitat areas during early April 2000 with negative results.

Navasota ladies'-tresses (*Spiranthes parksii*) - The Navasota ladies' tresses was listed as endangered on May 6, 1982, without critical habitat. This member of the orchid family occurs primarily in moist, sandy soils in small openings in post oak savanna vegetation. The species is known to occur in Brazos, Burleson, Fayette, Freestone, Grimes, Jasper, Leon, Madison, Robertson, and Washington counties (USFWS 1984b).

Currently, approximately 149 sites have been recorded, representing perhaps 75-80 distinct population areas, predominantly concentrated around two centers of distribution, one in southern Brazos County and one in central Grimes County. Some of these recorded sites have been damaged or destroyed since they were reported. Together these population centers contain the majority of known sites and individuals (Wilson l993). However, the majority of sites contain fewer than 25 recorded plants. It is known that for this species not all individuals in a population are visible above ground in a given year, and most of these sites have been visited only once, so demographic data on populations is very limited. Nevertheless there is great concern among botanists that most of these sites may not represent viable populations.

Navasota ladies'-tresses occur in a variety of moist sandy soils near drainages, in the Post Oak Savannah vegetation associated with the Navasota, Brazos, and Trinity River watersheds. Navasota ladies'-tresses are typically found on erosional remnants between rills in slightly to moderately eroded areas along minor intermittent tributaries, from the upper drainage head, extending along the edges of temporary streams to the flood plain of permanent streams. Navasota ladies-tresses grow on sandy loam soils and are often associated with post oak, blackjack oak, yaupon, slender bigelowia (*Bigelowia nuttallii*), and *Spiranthes cernua*. Typical habitat consists of natural openings in upland Post Oak Savanna vegetation (Poole and Riskind l987, USFWS l984b, Wilson l993). Plants are believed to be situated where subsurface flow or seepage of water occurs seasonally, a common feature in other species of the genus (Arft and Ranker 1995, Kathy Parker, pers. comm.). While Navasota ladies'-tresses is found in small naturally created openings in the post oak woodlands, it cannot be regarded as a disturbance species, as it usually occurs in

well developed woodland and is not a colonizer of extensively disturbed areas. There are few records in flood plain forests, open savannahs and shrublands that have experienced little or no grazing pressure, and in hillside seepages.

Navasota ladies'-tresses is extremely slow-growing and long-lived. Rosette leaves support the formation of a storage tuber between November and March that sequesters resources in preparation for sending up a leafless bloom stalk at some future time. It is believed that often plants require more than one year of photosynthate storage to successfully send up a bloom stalk. If local conditions have not been favorable for forming sufficient below ground reserves, the plant may not bloom (Wilson l993).

Navasota ladies'-tresses apparently does not transplant well. In a mining project in Grimes county by Texas Municipal Power Association (TMPA), plants in the impact area were removed and transplanted into an adjacent habitat area. Plant survival has been low in most sites (TMPA l996). Similarly, in an experiment in Lick Creek Park near College Station, Dr. Hugh Wilson planted some seedlings which survived into their second season, but died prior to the third growing season (Wilson l993).

Because of the low numbers of individuals reported from populations, the slow growing nature of the plants, its unusual habitat requirements of openings in mature vegetation, and its sensitivity to disturbance and transplanting attempts, the species is not regarded as being very resilient, and recovery following any damage to a population is expected to be slow.

The primary threat to Navasota ladies'-tresses is destruction or modification of habitat due to urbanization, clearing for agricultural production, or mining (47 FR 19539, USFWS l995, l984b). Destruction of understory by feral pigs is also a problem in some areas. More than 40 known sites have been lost in the last ten years to mining or urbanization. Post oak savannah in many of these counties continues to be converted to bermuda grass pasture. Subsequently, habitat loss continues, particularly in the areas of Brazos and Grimes counties where most sites are located. The City of College Station in Brazos County is growing rapidly, particularly in the southern and southeastern fringes where most known populations are located. Mining in Grimes County disturbs more than 7,000 acres every 5 years (Wilson l993).

In Fayette County, the species is known from one small population approximately 6 miles south of the pipeline and 2 miles north of the town of Fayette. Based on analysis of soil distribution, vegetative cover, physiographic setting, and field assessment by Horizon in November of 1999, two small areas of potential habitat for Navasota ladies'-tresses are present along the pipeline corridor. Surveys for the species are scheduled to be conducted along the pipeline in October 2000 if suitable climactic conditions occur.

Tobusch Fishhook Cactus (*Ancistrocactus tobuschii*) - Tobusch fishhook cactus is a rounded, biscuit-shaped cacti usually 2 to 3 inches tall and up to 3.5 inches in diameter. There are 3 to 5 central spines with the upper 2 to 3 erect and straight and the lower central spines hooked at the tip and spreading. The plants are very inconspicuous, and produce cream to yellow flowers from February through early April. These cacti have been demonstrated to be obligate outcrossers pollinated by native bees with a foraging distance of about 1/4 mile, and seeds are dispersed by native ants.

Currently about 50 sites are recorded for the species, following a recent range-wide representative survey. Most of the populations are extremely small (5-20 plants), with individuals widely scattered. Known sites are separated by large distances. Most existing populations are on private land, and there are very few protected sites. Demographic data collected in monitoring studies over the last five years or so show that only one of the known populations is even marginally viable. The species is extremely slow growing and does not appear to reproduce until 10-17 years of age. It takes four successful flowers/fruits to produce one seedling (Jackie Poole, Texas Parks and Wildlife, pers. comm.). It is estimated that very few viable populations (10-15) remain over the 8 county range of the species. The survival and recovery of the species will require restoration and careful management, to provide sufficient numbers of populations and individuals in effective proximity to each other for successful pollination (and gene flow) to ensure the continuity of the species.

Studies examining the probable reasons for population declines are underway. Threats to the species are believed to include inappropriate timing of range management practices (such as fire and clearing practices that disturb the soil), extensive predation by beetle grubs, loss of habitat to real estate development, and some collection by cactus enthusiasts.

An assessment of potentially suitable habitat and pedestrian survey for the cacti was conducted by Horizon in April 1999 along portions of the Longhorn pipeline ROW in Kimble County, and no specimens were observed within the ROW. However, one Tobusch fishhook cactus was observed about 50 feet north of the cleared ROW. An additional survey of the entirety of the ROW through Kimble County was conducted by Horizon in late February 2000 with negative findings for the cactus. However, as a conclusion of the Phase One consultation, in the absence of complete surveys at that time, all of the ROW within Kimble County was considered as potentially suitable habitat and fully compensated.

Golden-cheeked Warbler (*Dendroica chrysoparia*) -The golden-cheeked warbler is a small, migratory songbird, 4.5 to 5 inches long, with a wingspan of about 8 inches. The male has a black back, throat, and cap, and yellow cheeks with a black stripe through the eye. Females are similar, but less colorful. The lower breast and belly of both sexes are white with black streaks on the flanks. Typical nesting habitat is found in tall, dense, mature stands of Ashe juniper (cedar) mixed with trees such as Texas (Spanish) oak, Lacey oak, shin (scalybark) oak, live oak, post oak, Texas ash, cedar elm, hackberry, bigtooth maple, sycamore, Arizona walnut, escarpment cherry, and pecan. This type of woodland generally grows in relatively moist areas such as steep-sided canyons and slopes. A mix of juniper and deciduous trees on the slopes, along drainage bottoms, and in creeks and draws provides ideal vegetation for birds. Warblers are also occasionally found in drier, upland juniper-oak (i.e., live oak, post oak, blackjack oak) woodlands over flat topography.

An assessment of potentially suitable habitat and surveys for the golden-cheeked warbler was conducted by Horizon in April and May 1999 along the Longhorn pipeline ROW from Austin, Texas, to the Mason/Kimble County line. Although no potentially suitable habitat areas were observed within the Longhorn ROW, several areas were located adjacent to the previously cleared permanent ROW. All areas were surveyed by Horizon a minimum of 5 times during April and May on days with favorable weather conditions for bird activity, per U.S. Fish and Wildlife Service guidelines (USFWS, 1994a). Surveys were conducted on 8, 9, 12, 27, 28 April, and 3, 11, 19 May. An equivalent of 4 person-hours per 100 acres were spent at each site, based on habitat size. No golden-cheeked warblers were found to be utilizing any of the potentially suitable habitat areas on or immediately adjacent to the ROW. However, three years of survey are necessary to confirm presence/absence under Service guidelines (USFWS 1994a). Additional surveys for the warbler are under way for the Spring of 2000.

Black-capped Vireo (*Vireo atricapillus*) -The black-capped vireo is a 4.5 inch long, insect-eating songbird. Mature males are olive green above and white below with faint greenish-yellow flanks. The crown and upper half of the head is black with a partial white eye-ring. The iris is brownish-red and the bill black. The plumage of the female is duller than the male. Females have a dark slate gray head. In Texas, vireo habitat is found on rocky limestone soils of the Edwards Plateau, Cross Timbers and Prairies, eastern Trans-Pecos, and, to a limited extent, on igneous soils in the Chisos Mountains. Black-capped vireos require shrub vegetation reaching to ground level for nesting cover. They typically nest in shrublands.

An assessment of potentially suitable habitat and surveys for the black-capped vireo was conducted by Horizon in April and May 1999 along the Longhorn pipeline ROW from Austin, Texas to Crane County. Potentially suitable habitat areas were observed within the Longhorn ROW as well as several areas located immediately adjacent to the previously cleared permanent ROW. All areas were surveyed by Horizon a minimum of 5 times during April and May on days with favorable weather conditions for bird activity, per Service guidelines (USFWS, 1994a). Surveys were conducted on April 8, 9, 12, 27, 28, and May 3, 11, and 19. An equivalent of 4 person-hours per 100 acres were spent at each site, based on size. No black-capped vireos were found to be utilizing any of the potentially suitable habitat areas on or immediately adjacent to the ROW. However, three years of survey are necessary to confirm presence/absence under Service guidelines (USFWS 1994a). Additional surveys for the vireos are under way for the Spring 2000.

Bald Eagle (*Haliaeetus leucocephalus*) -The bald eagle is a migrant and winter resident in Texas. The bald eagle was recently down-listed from endangered to threatened due to successful conservation efforts and is now proposed for de-listing. Migrating and wintering bald eagles typically arrive in Texas in November and depart around February. They are found primarily in association with reservoirs, rivers or other large bodies of water where they feed on fish, carrion, and waterfowl. Nesting bald eagles in Texas are found in the eastern portion of the state and along the coastal plain as far south as Calhoun and Refugio counties. No bald eagle nests have been identified near the pipeline ROW, however, bald eagles may occur along major waterways (Brazos and Colorado rivers, or major tributaries with impoundments) downstream of the pipeline corridor. The *Federal Register*, (Volume 64 No. 128, Tuesday, July 6, 1999; Page 36454) contains a proposed rule to remove the bald eagle from the List of Threatened and Endangered Wildlife in the

Lower 48 States of the United States. Formal delisting is now anticipated to occur in July 2000.

Interior Least Tern (*Sterna antillarum athalassos*) - Premier nesting sites for the interior least tern are salt flats, broad sandbars, and barren shores along wide, shallow rivers. Important breeding habitat characteristics include: (1) presence of bare or nearly bare ground and alluvial islands or sandbars for nesting; (2) availability of food (primarily small fish); and (3) favorable water levels during the nesting season (so nests remain above water). They usually nest on sites devoid of vegetation, but have been found in areas with an average of 11 to 30% vegetative cover, composed of grasses, shrubs, and trees and ranging from 1 to 3 feet in height. Vegetation, if present, is usually located well away from the colony, with the exception of bugseed, eastern cottonwood, and sandbar willow. As natural nesting sites have become sparse, birds have used sand and gravel pits, ash disposal areas of power plants, reservoir shorelines, gravel levee roads, and other manmade sites. The typical nesting period for the least tern in Texas is mid-April to mid-August.

While the interior least tern has not been documented along the pipeline corridor, potential habitat for the tern is present downstream of the pipeline along several major waterways including the Brazos, Colorado, Llano, and James Rivers, and Squaw, Beaver, and Sandy Creeks. The seasonal occurrence (Spring and Summer) and potential nesting of least terns is possible in these areas.

Barton Springs Salamander (*Eurycea sosorum*)- The Barton Spring Salamander was listed as endangered in 1997, without critical habitat. The Barton Springs Salamander belongs to a group of related salamanders that are endemic to the Edwards Plateau region of central Texas. All members of this group are obligately aquatic because the adults retain the larval, gill-breathing morphology throughout their lives. The Barton Springs Salamander, formally described in 1993, was first collected from Barton Springs in 1946 and has been found only at the four hydrologically connected outlets of Barton Springs in Zilker Park within the City of Austin (Brune, 1981; Chippindale et. al., 1993). This salamander is a small species, adults reaching 2.5 inches (about 68 mm) in total length with reduced eyes and elongate, spindly limbs indicative of a semi-subterranean lifestyle. Barton Springs Salamanders are found in the flowing, thermally constant water issuing from the spring outlets in association with aquatic macrophytes, leaves and organic debris, and gravel and rock substrates having little silt and sediment deposition. Water from the contributing and recharge zones of the Barton Springs segment of the Edwards Aquifer influences the conditions at Barton Springs. The main threat to the species has been identified as degradation of water quality from future growth and development on the Barton Springs segment of the Edwards Aquifer (*Federal Register* 62:23385). An expanded discussion of the environmental baseline for the salamander is provided in the Project Documentation Appendix at Tab 22.

Houston Toad (*Bufo houstonensis*) - The Houston toad was listed as endangered in l970 (*Federal Register*, October 13, 1970) and Critical Habitat was designated in Bastrop and Burleson counties in l978 (*Federal Register*, January 31, l978). Houston toads are generally brown and speckled, although individual toad coloration can vary considerably. Some may appear light brown, others almost black and they may also have a slightly reddish, yellowish, or greyish hue. Two dark bands extend down from each eye to the

mouth. Their legs are also banded with darker pigment. A variable white stripe streaks along the sides of the toad's body. Their undersides are usually pale with small, dark spots. Males have a dark throat which appears bluish when distended. Adult Houston toads are 2 to 3.5 inches long and like all toads, are covered with raised skin patches that contain chemicals that make the toad distasteful and sometimes poisonous to predators.

The toad was eliminated from three counties (Harris, Fort Bend, Liberty) prior to the 1970s due to habitat loss resulting from urban expansion. Although Houston toad populations have been found in nine other counties (Austin, Bastrop, Burleson, Colorado, Lavaca, Lee, Leon, Milam, Robertson), the Service is concerned about the long-term viability of these populations. The small population in Lavaca County has not been seen since its discovery in 1991; the population at the critical habitat site (Woodrow Lake) in Burleson County has not been seen since 1983; and the population in Leon County lies within an expanding residential area. The largest known population of Houston toads occurs within the pine/oak woodland region of Bastrop County. This area also contains federally designated critical habitat.

All known Houston toad populations occur along bands of geologic formations that support deep sands. Six populations occur on a band running through Bastrop County northeast to Freestone County. Three other populations occur on another band through Lavaca, Austin, and Colorado counties (USFWS, l994b). Houston toad habitat consists of rolling uplands characterized by pine and/or oak woodlands (loblolly pine, post oak, blackjack or sandjack oak) underlain by pockets of deep, sandy soils. Because their skin is semi-permeable to water, Houston toads become dormant to escape harsh weather conditions, such as winter cold (hibernation) and drought (estivation). They seek protection during this time by burrowing into sand or hiding under rocks, leaf litter, logs or in abandoned animal burrows (TPWD, l993). Although Houston toads are typically associated with woodland habitat, they also breed in and migrate across sparsely wooded and cleared areas near woodlands. They may also breed in and traverse areas that do not support deep sandy soils, including clay and gravel substrates, provided these areas are near woodlands underlain by pockets of deep sandy soils.

Houston toads breed from January to June, with a peak in February and March. During the breeding season, toads appear to move randomly from one breeding site to another, achieving genetic transfer between populations that may appear isolated, thus creating a metapopulation, an aggregation of smaller populations linked genetically and demographically and functioning almost as a single population. Presently, the most reliable breeding sites are stock ponds and similar impoundments, though in wet years breeding may occur wherever sufficient standing water is present. For successful breeding, water must persist for at least 30-60 days to allow egg hatching, tadpole maturation, and emergence of toadlets. Mortality in young is high, due to predation and drying of breeding sites, with significantly less than one percent of eggs laid believed to survive to adulthood (USFWS, 1984a, 1994b, l995).

The Houston toad is vulnerable to extinction primarily due to habitat loss, degradation, and fragmentation. Over the last 50 years, the historic range of Houston toads has contracted and several populations have been lost. Threats include expanding urbanization and conversion of woodlands to agricultural production areas, such as coastal bermuda pastures, use of fertilizers and pesticides that impact the toad directly or its food supply,

and loss of suitable breeding habitat because of alterations in watershed drainages and wetland alterations or destruction (such as degraded water quality, draining/filling of wetlands, stocking with predatory fish, etc.).

Since Phase One of the Longhorn Pipeline project involved the continuation of maintenance activities rather than new clearing or development, and minimization of these continuing maintenance activities included long-term habitat protection for the Houston toad, the Service concluded that Phase One of the project would provide a net conservation benefit for this species. According to the Houston Toad Recovery Plan (USFWS 1984a), Houston toad breeding sights have been recorded in Buescher State Park south of Longhorn Pipeline. Houston toads have also been heard chorusing on the adjacent property owned by the University of Texas to the north of Buescher State Park and Longhorn Pipeline (USFWS, unpublished data). Dr. James R. Dixon of Texas A&M University conducted a survey along the Longhorn Pipeline ROW and adjacent Phillips EZ Pipeline ROW in 1991 with negative results, although areas of potential habitat were noted (Horizon 1991).

Horizon Environmental Services, Inc. conducted a reevaluation of suitable habitat along the Longhorn Pipeline ROW within Bastrop County. The field reconnaissance was conducted on 2 June 1999 from the Colorado River, southeast of Bastrop, to FM 2104. Portions of the area along the pipeline had recently been cleared and planted in improved grasses. Based on field observations and discussions with the Service, two areas of suitable habitat were identified along and adjacent to the pipeline ROW. One area includes Buescher State Park from approximately 0.5 mile east of the eastern boundary of the park westward to near Highway 71. The second area begins about 500 feet to the west of FM 2104 and extends westward approximately 0.75 mile. The drainages in both of these areas flow south toward the Colorado River. A breeding season survey of the habitat areas in Buescher State Park has been conducted by Horizon during February and March of 2000 with negative results.

Comanche Springs Pupfish (*Cyprinodon elegans*) - The Comanche Springs pupfish seldom exceeds 2 inches in total length. It is gray-green above and pale yellow to white below, with clear to light orange fins. The sides are silvery white with blue-black blotches forming a “stripe” along the side (often faint on the male). Males have black speckling on the side and a black edge on the caudal (tail) fin.

Historically, this pupfish occurred in 2 separate spring systems of the Pecos River drainage. One was Comanche Springs, with headwaters (now almost always dry) within the city limits of Fort Stockton, Texas, and the other was a group of springs near Balmorhea. The pupfish population at Comanche Springs were extirpated (lost) when the springs first went dry in 1955. At present, the species occurs primarily in aquatic habitat fed by springflow from Phantom Lake, Griffin, and San Solomon Springs near Balmorhea, Texas. The Longhorn Pipeline is not within the sub-watersheds of these springs where the pupfish occur and groundwater contamination from product releases that would affect the springs is extremely unlikely (Dr. Charles Kreitler, personal communication). Therefore, this species is not likely to be adversely affected, but is addressed herein for information purposes only.

Pecos Gambusia (*Gambusia nobilis*) - The Pecos Gambusia is a small (2-inches long), live-bearing fish with a dark lateral stripe and a metallic gray-blue color. Females have a

black area on the abdomen that surrounds the anal fin and anus. The anal fin of males is modified into a gonopodium, a tube-like structure used in fertilization of the female.

Historically, the Pecos Gambusia was restricted to the Pecos River basin in southeastern New Mexico and western Texas. The species occurred from as far south as Fort Stockton, Texas to as far north as Fort Sumner, New Mexico. The populations of Pecos Gambusia that once existed at Leon Spring and Comanche Springs were lost when these springs went dry during the mid-1950s. Presently in Texas, populations of the Pecos Gambusia occur near Balmorhea in aquatic habitat supported by springflow from Phantom Lake, Griffin, San Solomon, and East Sandia Springs. A substantial population also occurs in Leon Creek and in Diamond-Y Spring outflow north of Fort Stockton. The species also occurs in a limited number of locations in New Mexico. The Longhorn Pipeline is not within the sub-watersheds that support the Pecos Gambusia and groundwater contamination that would affect any of the spring habitats is extremely unlikely (Dr. Charles Kreitler, personal communication). Therefore, this species is not likely to be adversely affected, but is addressed herein for information purposes only.

Devils River Minnow (Dionda diaboli) - The Devils River minnow is a small fish, with adults reaching sizes of 1.0 to 2.1 inches standard length. The fish has a wedge-shaped caudal spot and pronounced lateral stripe with double dashes extending through the eye to the snout but not reaching the lower lip. The species has a narrow head with prominent dark markings on scale pockets above the lateral line that produce a crosshatched appearance when viewed from the top.

General habitat associations for Devils River minnow have been described as channels of fast-flowing, spring-fed waters over gravel substrates. Although the species is closely associated with the stream, rather than in the spring outflow itself.

The known historic range of the species includes the Devils River from Beaver Lake downstream to near its confluence with the Rio Grande and four other tributaries of the Rio Grande River not associated with the Devils River. The current distribution of Devils River minnow is at 2 sites on the Devils River, 2 sites on San Felipe Creek, and 1 site on Sycamore Creek (US Fish and Wildlife Service, 1998).

The Longhorn Pipeline ROW crosses the northern most extent of the Devils River watershed, in excess of 100 river miles upstream from known populations of the minnow. At this distance, it is unlikely that released product would reach the population areas of the minnow in quantities to be toxic (James Miertschin, personal communication). This species is also unlikely to be adversely affected, but is included herein for informational purposes.

Southwest Willow Flycatcher (Empidonax trailii extimus) - The southwest willow flycatcher occurs in riparian woodlands along streams and rivers in Hudspeth, Culberson, and El Paso counties. Specific localities of this species in the vicinity of the pipeline are not known. It is possible this species could occur along the Pecos and Devil's rivers downstream of the pipeline. This species would not likely be directly affected by any activitiy associated with the pipeline. However, this species utilizes riparian woodlands that could be affected by a major release of product in a waterway. The methods for assessment of such a potential, but unlikely, event are addressed in section 3.4.

4.3 Effects of the Actions

Pipeline Operation

Normal operation of the pipeline is not expected to result in any adverse effects to listed species. There is a risk of an accidental release from the pipeline—a risk Longhorn has significantly minimized through various pipeline mitigation measures. Many of these pipeline mitigation measures were developed directly as a result of consultation with the Service, in order to significantly minimize the risk of a spill near listed species, such as the pipe replacement in Buescher State Park and the replacement of 19 miles of pipe over the Edwards Aquifer recharge and contributing zones. The occurrence of a pipeline release is so unlikely as to be improbable; see APR report, Project Mitigation Appendix at Tab 10. Recognized pipeline experts have concluded that the implementation of the LMP will enable the Longhorn Pipeline to operate at the highest reasonable level of safety attainable by current technology; see APR report at Tab 10 of the Phase Two Project Documentation Appendix.

Kiefner & Associates, Inc. (Kiefner) performed an audit of the Longhorn pipeline segment between Houston and Crane (Tab 23 in the Phase Two Project Documentation Appendix). Keifner concluded that the pipeline was safe to operate, even prior to the EA, so long as certain recommendations were followed. Longhorn has committed in the LMP to implement all of Kiefner's recommendations. Kiefner further reported on the safety of the pipeline system as it will stand after implementation of all EA pipeline mitigation measures. Among Kiefner's conclusions:

- Hydrostatic testing is the most important and positive way of proving that a pipeline is fit for service; the 2000 hydrostatic and proof testing will remove any doubts about the remote possibility that defects may have arisen since the 1995 hydrostatic test

- After the pipeline is placed into service, better technology than hydrostatic testing will be used to assure that no defect develops or grows in service to the point where a service failure results

- "Smart-Pig" technology will be utilized by Longhorn to locate and characterize anomalies that may represent . . . time-dependent developing defects

- Longhorn has taken the unprecedented step of committing to limit surge pressures to no more than the maximum allowable operating pressure (MAOP) in sensitive and hypersensitive areas . . . providing an extra margin of safety in the critical areas

- Longhorn's pipeline surveillance programs will "go a long way" to preventing excavation or construction activities from encroaching on the pipeline and possibly damaging it

- The new pipe in the Edwards Aquifer recharge zone "reduces the already low risk of failure from corrosion and excavation damage," providing an extra margin of safety

- "The proposed operation of the pipeline does not create in my opinion, an

unreasonable risk"

See Kiefner & Associates, Inc., January 13, 2000, Phase Two Project Documentation Appendix at Tab 23.

Further, APR Companies, a company that specializes in pipeline accident investigation, has concluded that the Longhorn Pipeline will benefit from a significant reduction in release probability; see Phase Two Project Documentation Appendix at Tab 10.

APR (reference Tab 10 in the Phase Two Project Documentation Appendix) has determined that the average probability of a release (1 in 1000 years per mile) is significantly improved for the pipeline in general through implementation of the LMP with a resulting 2 to 5 times reduction in spill probability. For the Edwards Aquifer recharge zone, the likelihood of a release is reduced 5 to 10 times with implementation of extensive LMCs for that area. A resulting probability for a release then becomes 1 in 5,000 to 10,000 years per mile.

APR further estimates the potential worst-case spill scenario for the Edwards Aquifer recharge zone. An earlier estimate approximated 5000 barrels of product released in a major incident. Placement of a single check valve at or near mile post 171 within the recharge zone limits the maximum line fill volume that could spill to 2088 barrels. However, APR's analysis also takes into consideration other factors that influence line drain down such as intervening topographic lows that will hold pipeline contents. Based on detailed analysis of the topography along the line through the recharge zone, and average per unit line drain downs from independent statistics, the probable worst-case spill volume would be only about 1147 barrels in 90% of the potential spill scenarios and 841 barrels in 75% of potential spill scenarios. Longhorn nonetheless has designed the replacement pipeline and emergency response capability on the basis of unqualified worst case release volumes.

LBG-Guyton (reference Tab 16 in the Phase Two Project Documentation Appendix) has developed a risk analysis for the Barton Springs Salamander based on the probable worst-case spill volume combined with the measures to be implemented to prevent or minimize released product entry to the aquifer, such as sealing voids in the pipeline trench and grading surface drainage within the ROW to direct any surface flow away from identified point recharge features. Bermed areas at lower elevations will serve to capture product that reaches the surface in those low areas. Their analysis concludes that product concentrations that might reach the aquifer, and ultimately Barton Springs, would be on the order of 0.2 to 0.002 ppb. Concentrations in the water column would be even less (in the absence of MTBE; see Kreitler at Tab 16 and LMC 35). These levels are at nearly an order of magnitude lower than measured levels of petroleum hydrocarbons found in the aquifer and at Sunken Gardens Spring in the past (see Tab 22 in the Phase Two Project Documentation Appendix).

Biotoxicological information assembled from existing literature and agency file sources for salamanders (and other aquatic vertebrates), and their prey base (aquatic invertebrates), indicate that concentrations of toxic product constituents (BTEX) in the water column in the ppb range are generally below the "no effect" levels for most organisms (Horizon, 2000). From the above analysis, levels of benzene reaching the springs would be in the 0.010 ppb

(ug/l) range, while toluene would be in the 0.014 ppb range. Horizon reports that EPA data indicate acute toxicity to freshwater aquatic life, for benzene, occurs at about 5,300 ug/l (ppb), while for toluene, the acute toxicity level is about 17,500 ug/l (ppb). The EPA information notes that more sensitive species would have lower acute toxicity levels. However, from the available information, concentrations reaching the springs under the above scenarios would conservatively be several orders of magnitude lower than toxic concentrations.

The LBG-Guyton analysis assumes that all or most of the probable worst-case spill volume would reach the aquifer. From prior spill experience with the Longhorn (under previous ownership) and Shell pipelines over the aquifer (1986 and 1987 incidents), 91 to 97 percent of the spilled product (west Texas crude with a similar viscosity to some refined products) was recovered at the surface. Those recovery volumes were in the absence of the void sealing and surface contouring Longhorn will implement to further enhance product recovery. Furthermore, modeling analyses by Rose (1986) and Ross (2000) indicate that soil retention capacity of spilled petroleum product over the Edwards Aquifer recharge zone would be in the range of 350 to 1600 barrels if spread over a 1 to 2 acre area with average soil depth of 0.33 to 1.5 feet. This absorption capacity, combined with high evaporation rates for refined products, and the potential for high levels of product recovery would significantly, if not totally, reduce or eliminate the quantity of product that might reach the aquifer, and ultimately Barton Springs.

The 1986 and 1987 incidents resulted in spills of 2245 barrels and 1139 barrels, respectively (in the absence of a block valve). The 1986 spill resulted in hydrocarbon fumes in caves in the vicinity, but no documented adverse effects to the salamander or the aquifer. Under the above-described scenario of a probable worst-case spill for the Longhorn Pipeline (with extremely low probability of occurrence), it is unlikely that adverse effects to the salamander would result as a result of the enhanced Longhorn mitigation measures.

In addition to those facets of system operation that limit potential consequences by minimizing release volumes and ensuring a rapid and effective response to a release, Longhorn's emergency response capability will be increased significantly through the LMP. Longhorn will ensure a maximum response time (a) of 1 hour in the recharge zone and Slaughter Creek watershed in the contributing zone; (b) in the Barton Creek watershed in the contributing zone and in other EA designated sensitive and hypersensitive areas of 1 hour to 2 hours; Longhorn will provide for the establishment of a response center in Central Texas, to be located in South Austin, to make certain that manpower and equipment is always at the ready. Prior experience has demonstrated an average response time of 58 minutes (see Tab 24 in the Phase Two Project Documentation Appendix). Once on-scene, the response crews will have

the advantage of thorough and detailed information relating to any area along the pipeline. Longhorn has commissioned the preparation of detailed studies of numerous facets of the pipeline ROW, and surrounding areas, to prepare its response crews in advance, if ever necessary. The information developed and advantages gained as a result of the studies includes the following:

- Species habitat: Response personnel will have the information necessary to avoid

species habitat areas during response and prioritize protective activities in the event of a release in or near a habitat area

- Topography: Advance knowledge of area topography allows advance planning for both release drainage potential and control and capture locations

- Rivers and streams: Detailed planning has identified waterways at risk and advantageous protective and control locations

- Water wells: Both public and private wells are mapped so that responders may prioritize drinking water supplies for protection

- Known karst features: Particularly within the Edwards Aquifer recharge zone, advance knowledge of karst features provides information that allows responders to prioritize protection of the aquifer and thus the Barton Springs Salamander

- Surface drainage potential: Flow modeling provides knowledge of the potential for released product to flow overland, enabling responders to identify likely scenarios relating both to habitat areas and to human health and safety issues; responders will also have the ability to identify preemptive control and capture locations; surface containment systems are designed to capture any release that reaches the ground surface

Longhorn has synthesized this information into stand-alone maps (See Project Documentation Appendix) and in its FRP; further, responders will be trained to use such information during training and during table-top and live drills.

Where a potential release might affect listed species or habitat, the precise level of impact cannot be predetermined due to the large number of variables at any given location. As a result, any such attempt at prediction is likely to result in an inaccurate estimate. Accordingly, Longhorn proposes to adopt a contingent methodology for calculating any such effects. This methodology should be useful in the event there is a release from the Longhorn pipeline but neither the Clean Water Act nor the Oil Pollution Act applies to the incident. In such a case, and if Longhorn is liable for the damage, Longhorn will use the Habitat Equivalency Analysis methodology to determine the amount of compensation for which Longhorn is responsible.

Longhorn proposes using a methodology that is capable of assessing natural resource damages, preferably the Habitat Equivalency Analysis (HEA) methodology developed by the National Oceanic and Atmospheric Administration (NOAA). HEA is briefly described below. A more detailed description of the HEA methodology is provided in Phase Two Project Documentation Appendix at Tab 25).

Pursuant to the HEA methodology:

- The duration and extent of injury are documented and estimated from the time of injury until the resource recovers to baseline.

- The services provided by a compensatory project are documented and estimated over the full life of the project.

- The size of a compensatory project is calculated such that the total increase in services provided by the compensatory project equals the total interim loss of services due to the injury.

- The cost of the compensatory project is calculated.

Other methods exist for assessing natural resource damages under NOAA's regulations governing Natural Resources Damages Assessments for oil spills pursuant to the Oil Pollution Act of 1990 (OPA). 33 U.S.C. § § 2701 *et seq.* These methodologies may prove more cost-effective than the HEA method and should be considered as well.

In the event of an accidental release from the pipeline in or near habitat for listed species, an adverse effect could occur. The level of potential take is impossible to predict in advance.

Long-term Maintenance

In general, most long-term maintenance is unlikely to result in any adverse effects to listed species beyond those addressed in the Phase One consultation. The majority of long-term maintenance involves ROW maintenance, above-ground facility upkeep, and periodic pipeline testing. These activities were addressed in the Phase One consultation and compensated accordingly. Certain maintenance activities may, however, require construction or land disturbance beyond the existing ROW. Such events are not presently determinable. In the event any such maintenance should necessitate access or construction within listed species habitat, the previously utilized Phase One BA maintenance construction procedures (see Phase One BA in the Phase Two Project Documentation Appendix at Tab 1) will be followed under the direction of FERC qualified environmental inspectors. To the extent feasible, all construction activity will be restricted to the existing ROW within habitat areas, which was fully compensated during Phase One of this consultation. If construction must exceed the ROW in an area of potential habitat,

the Service will be notified in advance and additional compensation, as required, will be calculated and provided pursuant to the conditions set forth in the Phase One BA for the given species, to the extent a specific location has not previously been compensated for off-ROW impacts.

An additional area of potential Houston toad habitat has been identified in Austin County since the Phase One consultation was completed. This habitat area is within the geologic formation known to support two small Houston toad populations in Austin County approximately 8 miles south of the pipeline corridor and other small populations in Colorado and Lavaca counties further to the south. This area is characterized as patchy woodlands approximately 3000 acres in extent surrounded and interspersed by improved grazing pastures, and with marginally suitable soils (loamy fine sands less than 24 inches deep) (SCS, 1984). The known populations of toads occur in the Catilla-Tremona soil association which is comprised predominantly of sandy soils (SCS,1984). The potential habitat area

occurs in the Tabor-Tremona-Chazos association which is comprised of loamy and sandy soils. The two associations are separated by several miles of clayey and clayey loam soils which are not favorable for Houston toads (SCS, 1984). Surveys of this area for the Houston toad are not known to have been conducted in the past. A breeding season survey is planned for spring of 2001. The pipeline ROW through this area traverses approximately 12,000 linear feet (2.3 miles). The existing 50 ft wide ROW, therefore, occupies 13.8 acres. This area could be adversely affected by maintenance of the ROW and is being addressed through the Phase One consultation.

Emergency Response

Potential impacts from an emergency response action could be highly variable depending on location, season, site characteristics, spill characteristics, and type of equipment needed to respond to a particular situation. Training of emergency response personnel will be conducted to make them aware of species related issues, designated potential habitat areas, and avoidance procedures. Avoidance of impacts will be achieved to the greatest extent possible under any given emergency situation. However, control and containment of a product release or fire will constitute a priority, and some level of impacts to designated potential habitats could occur. Impacts could occur from clearing or grading to gain access for emergency response equipment, building temporary containment structures outside of the established ROW, or to remove contaminated soil and vegetation. If fire containment is necessary, fire breaks may need to be dozed in advance of a fire. These activities could result in direct or indirect impacts to potential habitat areas. Such impacts would be assessed and mitigated in the same manner as described previously under the Pipeline Operation section above.

Construction

Buescher State Park (Houston Toad): Construction of the replacement and lowering projects within Buescher State Park will be contained within the existing 50 ft ROW, and/or within the previously cleared ROWs of the other two adjacent pipelines. No clearing beyond the limits of the existing ROWs will be conducted. Compensation based on the extent of existing Longhorn ROW through Houston toad habitat was provided in the Phase One consultation. Therefore, no additional impacts or compensation are required for this construction. A breeding season survey for toads in the vicinity of the pipeline has been completed, and no toad breeding activity was identified. However, special procedures will be implemented for avoidance prior to and during construction to ensure no adverse effects occur to the toad. Prior to any land disturbance, the construction zone will carefully be inspected by qualified biologists to ascertain the possible presence of Houston toads. The construction zone will then be completely encircled with silt fence (set into the ground) to preclude Houston toads from entering the work space. The construction zone will be inspected periodically by the biologists to ensure Houston toads have not entered the area. Therefore, this construction is unlikely to result in adverse effects to the Houston toad or designated critical habitat beyond those addressed and compensated for in the Phase One consultation.

Edwards Aquifer Recharge Zone (Barton Springs Salamander): As described in Section 3.5, a 3-mile segment across the aquifer recharge zone will be replaced with

heavier wall pipe for enhanced safety and integrity. Approximately one-half mile will be replaced immediately east of the recharge zone. The new pipe will also be lowered for greater depth of cover to minimize the potential for third-party strikes. Further, a concrete barrier will be installed over the pipeline to protect the pipeline from third party intrusion; the barrier will be constructed with colored reinforced concrete to increase its deterrent effect. A number of other safety and integrity enhancement measures will also be installed, including a sensor-based leak detection system and additional check valves. All these enhancements will significantly reduce the potential for releases and potential release volumes in the unlikely event of a pipeline release. Longhorn hereby provides to the Service mill certificates for the pipe that will be installed, along with Construction Specification CS4, the specifications that identify methods and procedures for pipeline construction; see the accompanying Phase Two Project Documentation Appendix at Tabs 26 and 27.

The construction to accomplish these enhancements will involve deepening the existing trench. Construction will occupy an average work space of 60 feet wide along the 3-mile route. This construction space has been investigated for karst features and other sensitive environmental resources. A detailed Edwards Aquifer Protection Plan has been developed for the project that includes the implementation of all required best management practices (BMPs) using as guidelines the City of Austin Land Development Code specifications and the TNRCC Edwards Aquifer Rules for construction over the recharge zone (Phase Two Project Documentation Appendix at Tab 28). Detailed construction plans will be developed to identify both the design and location of water quality control structures, as well as non-structural BMPs; those plans, which are currently under development, will be made available to the Service upon preparation of reasonably complete draft documents.

The environmental protection plan also provides for FERC qualified environmental inspectors to be onsite during the construction process to continuously review and evaluate the efficiency of the recommended BMPs and to make changes as needed for maximum environmental protection. The environmental inspectors will also react to any encounter of subsurface voids by immediately notifying project geological and biological experts for evaluation of the situation and to make recommendations for remedial actions. Remedial actions will, at a minimum, comply with TNRCC guidelines for closure of subsurface voids. All encountered limestone voids, regardless of size, will be appropriately sealed within the construction trench. This will prevent potential siltation into the aquifer via such voids during construction, as well as provide additional protection from aquifer contamination in the unlikely event of a product release during operation of the pipeline. In the event a large void is encountered, geotechnical engineers will also be involved in evaluating and recommending remedial actions. The City of Austin, TNRCC, Barton Springs/Edwards Aquifer Conservation District, and the Service will also be notified and informed of recommended remedial actions. The trench has been designed with high porosity containment capacity and bermed areas at locations where product could reach the surface.

With the implementation of the Edwards Aquifer Environmental Protection Plan, the construction across the Edwards Aquifer recharge zone is not expected to result in any significant adverse impacts to the aquifer or the Barton Springs Salamander.

Edwards Aquifer Contributing Zone (Barton Springs Salamander): As described in

Section 3.5, approximately 15 miles of pipe in the contributing zone will be lowered and replaced, and a check valve will be installed immediately downstream of the existing block valve over the contributing zone (MP 175.5), even though the replacement is not necessary (See "Edwards Aquifer Contributing Zone Protections" in The Project Documentation Appendix). The replacements will be installed using heavier wall pipe than exists at this time and will be lowered at least 5 feet below the ground surface. Construction over the contributing zone will be conducted pursuant to the methods and procedures outlined in the Phase One BA. The heavier, deeper pipe will reduce the risk of a release across the contributing zone. The trench has been designed with high porosity containment capacity and bermed areas at locations where product could reach the surface. The check valve will reduce potential release volumes by immediately stopping flow upstream, in the event of a release east of the block valve; as a result, the potential for drainage from higher-elevation segments to the west of the check valve is eliminated during the time required for the block valve to close. Moreover, at the Cedar Valley pump station, which is located in the contributing zone upgradient of the pipeline crossing of Barton Creek, Longhorn has committed to install secondary containment (LMC 27) and a remote monitoring camera (LMC 21) before project startup. The secondary containment will provide protection to Barton Creek, and remote cameras allow monitoring by the pipeline controllers.

Furthermore, the host of pipeline mitigation measures directed to Tier II and III areas will apply over much of the contributing zone, including hydrostatic pressure and proof testing, enhanced leak detection, frequent patrols, cathodic protection system testing, in-line inspection shortly after startup, surge pressure protection, and the establishment of a response center in South Austin. See Section 3.4, Emergency Response.

4.4 Planned, But Unscheduled Construction

As described in Section 3.0, several additional improvements to the pipeline are planned to take place, but have not been specifically designed or scheduled at this time. While many of these improvements are located at existing above-ground facilities (valves, pump stations, etc), the exact location and construction details are not yet known. It is believed that the majority of these additional improvements will not occur in potential habitat areas, but if so will not adversely affect listed species habitat, or can be designed to avoid habitat areas. In the event any such improvements should necessitate access or construction within listed species habitat, the previously utilized Phase One BA maintenance construction procedures (see Phase Two Project Documentation Appendix at Tab 1) will be followed under the direction of FERC qualified environmental inspectors. To the extent feasible, all construction activity will be restricted to the existing ROW within habitat areas, which has been fully compensated. If construction must exceed the ROW in an area of potential habitat, the Service will be notified in advance, and additional compensation, as required, will be calculated and provided according to the procedures set forth in the Phase One BA for the given species, to the extent a specific location has not previously been compensated for off-ROW impacts.

4.5 Future Additional, But Currently Unforseen Construction

As described in Section 3.0, at various, but unpredictable, times and places in the future, certain construction activities may be required for maintenance, repair, or testing of the

pipeline or attendant facilities. The majority of these future construction activities can be designed to avoid any adverse effect to listed species to the extent the activities occur within potential habitat areas. In the event any such construction should necessitate access or disturbance within listed species habitat, the previously utilized Phase One BA maintenance construction procedures (see Phase Two Project Documentation Appendix at Tab 1) will be followed under the direction of FERC qualified environmental inspectors. To the extent feasible, all construction activity will be restricted to the existing ROW within habitat areas, which has been fully compensated. If construction must exceed the ROW in an area of potential habitat, the Service will be notified in advance, and additional compensation, as required, will be calculated and provided pursuant to the conditions set forth in the Phase One BA for the given species, to the extent a specific location has not previously been compensated for off-ROW impacts.

4.6 Bays and Estuaries

The Longhorn Pipeline is in proximity to the Galveston/Trinity Bay system where it passes through Houston. All surface drainage in the Houston area crossed by the Longhorn Pipeline drains to the Galveston/Trinity Bay system ultimately through Buffalo Bayou and the Houston Ship Channel. Bay systems along the Texas coast, including the Galveston/Trinity Bay system, are documented to support a number of listed threatened or endangered sea turtles and marine mammals. Possible concern could exist in the event of a catastrophic release event that product could reach the bay system in sufficient quantities to be toxic or detrimental to those listed species.

Several factors are to be considered in this situation that result in an extremely low probability for significant quantities of product to be released in a tributary or waterway that would have direct inflow to Galveston and Trinity Bays. First, the Longhorn Pipeline is buried very deep at the various waterway crossings in north Houston, such as Greens Bayou (24 feet), Hunting Bayou (25.2 feet), ditch north of Hunting Bayou (33.1 feet), ditch south of Hunting Bayou (28 feet), and others (See depths of cover in Project Documentation Appendix). This significant depth greatly reduces the potential for third party strike. Second, most of the area through east and north Houston is ranked as Tier 2 or 3 zones, thus being subject to the enhanced LMP provisions for Sensitive Areas, and Hypersentitive areas. Additionally, all the tributaries drain to Buffalo Bayou and the Houston Ship Channel. Due to the large number of chemical, refining, and industrial facilities situated along the Houston Ship Channel, there exists in place a comprehensive spill response system and equipment to respond quickly to spills of any nature that occur in the channel. It is unlikely that a significant spill from the Longhorn Pipeline would occur in a sensitive drainage area, or would escape the Houston Ship Channel containment into the bays.

4.7 Summary of Conservation Measures

The following provides a summary of the avoidance and conservation measures that Longhorn commits to provide. These measures are assured by the mandates of this consultation and the overall NEPA process simultaneously ongoing with this consultation. The implementation of these conservation measures for listed species assure that the project will be unlikely to result in jeopardy or adverse modification of critical habitat for any listed species and is not likely to adversely effect species or habitat.

Many of the mitigation measures of the Longhorn Mitigation Plan which were designed prior to the Phase One or Phase Two consultation processes were intended to provide protections for listed species, either directly or intrinsically. While all LMP features provide significant safety and integrity enhancements for the pipeline as a whole that ultimately benefit species protection, those described below provide specific enhancements which will avoid potential impacts to listed species. Most of these features were incorporated into the LMP prior to finalization of either of the consultation processes.

- LMCs 3, 5, 34 - Pipe replacement and lowering over the Edwards Aquifer recharge and contributing zones, with trench and surface containment areas (Barton Springs Salamander), Buescher State Park (Houston toad), Pedernales Falls State Park (golden-cheeked warbler), and other locations in species habitat areas;

- LMC 22 - Analysis of, and if necessary, installation of additional valves to limit potential release volumes (all species);

- LMC 13 - Addition of an enhanced pipeline leak detection system with additional sensor-based leak detection over the recharge zone and slaughter creek watershed in the contributing zone (all species);

- LMC 20 - Increased pipeline surveillance in EA designated sensitive and hypersensitive areas and daily pipeline surveillance across the recharge zone (at least once per week on-ground) (all species);

- LMC 23 - Establishment of a fully equipped Emergency Response Center in South Austin (Barton Springs Salamander and Houston toad);

- LMC 28 - Revised Facility Response Plan to incorporate features of the City of Austin Barton Springs Oil Spill Contingency Plan and the U.S. Fish and Wildlife Service's Barton Springs Salamander Recovery Plan as well as detailed response planning based upon analysys of stream flow potential in the Edwards Aquifer recharge and contributing zones. (Barton Springs Salamander);

- LMC 33 - Establish a refugium for the Barton Springs Salamander and performance of other conservation measures for listed species as may be determined appropriate through consultation with the U.S. Fish and Wildlife Service (all species);

- LMC 27 - Provide secondary containment around the Cedar Valley pump station which lies within the Barton Springs/Edwards Aquifer contributing zone.

- LMC 35 - Longhorn has committed that it will not transport products containing MTBE or similar aliphatic ether fuel additives in greater than trace amounts;

- Though not a specific mitigation commitment, Longhorn has identified all potential areas of concern for listed species along the pipeline corridor from Houston to El Paso for purposes of assessment and avoidance.

- An additional intrinsic benefit of increased patrol frequencies (LMC 20) is the result that increased inspection and surveillance of the Longhorn Pipeline will enable inspection personnel to coincidentally observe the adjacent pipelines that parallel the Longhorn pipeline. This will provide the opportunity for identification of pipeline emergency situations and threats to the integrity of those pipelines with greater frequency than currently is the case.

In fulfillment of LMC 33, Longhorn has committed to a significant number of additional mitigation features specific to listed species developed during the Phase One and Phase Two consultation processes. These commitments become binding as a result of the conclusion of the consultation processes and issuance of the Service's Biological Opinion, and as incorporated into the LMP as it evolves during the EA process. These measures have been developed during the two phases of consultation through discussions between Longhorn, EPA, DOT, and the Service. These commitments are listed below by consultation phase.

Phase One

- Provision of conservation funding for potentially affected species in the approximate amount of $992,448 (all species).

- Monitoring studies of listed species within or adjacent to the ROW (all species).

- Minimization of maintenance construction work space in potential species habitat areas (all species).

- Seasonal timing of maintenance activities to avoid critical breeding, nesting, or blooming periods for listed species (all species).

- Use of special mowing/clearing processes and equipment in potential species habitat areas to minimize ground disturbance (all species).

- Provision of FERC qualified environmental inspectors during maintenance activities within potential species habitat areas (all species).

- Use of native grasses for restoration of disturbed areas during maintenance activities (all species).

- Minimization of the use of herbicides for maintenance purposes (all species).

Phase Two

- Detailed topographic and surface flow modeling to enhance spill response planning efforts (all species).

- Special investigative, preparation, and construction practices and techniques for pipe replacement over the Edwards Aquifer Recharge Zone (Barton Springs Salamander) including:

  – Intensive geological and biological field studies of the pipeline corridor to identify sensitive features and areas, including ground penetrating radar, geotechnical coring, karst identification, geological and biological investigations of identified features, and detailed geologic assessment for recharge potential.

  – Use of enhanced best management practices for erosion and sedimentation control during and after construction of new pipe.

  – Sealing of subsurface voids encountered during trench excavation.

  – Provision of a colored, reinforced concrete barrier over the new pipe for enhanced protection from third party damage.

  – Grading of the surface over the new pipe installation to direct surface drainage (potential surface release) away from identified sensitive areas/features.

- Lowering and replacement of 15 miles of pipe across the Edwards Aquifer Contributing Zone.

- Training for first responders and other spill response personnel for highest efficiency and care in species areas (all species).

Cumulative Effects

Cumulative effects of future State, local or private actions that are reasonably certain to occur in the action area are considered in this BA. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to Section 7 of the Act. Because of the linear nature of the pipeline and the long history of clearing and operations (about 50 years), no cumulative effects from the activities proposed are anticipated. The majority of the counties involved in the project are predominantly rural (see draft Environmental Assessment of the Proposed Longhorn Pipeline System at Section 4.1.1.2), and imminent future actions identified are not likely to result in jeopardy to the species and are not likely to adversely affect any listed species or habitat.

The various mitigation measures required for the Longhorn Pipeline as a result of the environmental review being conducted by the Lead Agencies or as a consequence of this

consultation can be expected to have net beneficial effects on the environment, including listed species and their habitats. First, the Longhorn Pipeline itself will be improved, providing a higher level of environmental protection than previously was the case for the pipeline. Second, the Barton Springs Salamander refugium and captive breeding program will help mitigate for risks posed not only by the Longhorn pipeline, but by the many other existing sources of potential harm to the salamander, outlined above in the discussion of the environmental baseline for the salamander.

In addition, some Longhorn-related mitigation measures will have the indirect or cumulative effect of reducing environmental and species-related risks associated with the two other petroleum pipelines in the area, especially over the Edwards Aquifer. For example, the Longhorn Mitigation Plan requires increased surveillance along the pipeline route. While most pipelines have weekly surveillance, Longhorn has committed to a patrol frequency of once every 2.5 days for sensitive and hypersensitive areas. In the three-mile crossing of the Barton Springs recharge zone, Longhorn will have daily patrols. This increased frequency of patrol will facilitate early detection of leaks and third party activity in the area of all three pipelines crossing the recharge zone.

Similarly, Longhorn's commitment to aggressive public education and awareness programs will help reduce risks for all three pipelines crossing the Barton Springs recharge zone. Public awareness should deter individuals from acts that might risk catastrophic spills or other accidents potentially affecting the environment and listed species.

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